lab 1

May 10, 2024

[1]:
```
!pip3 install beautifulsoup4
!pip3 install requests
```

```
Requirement already satisfied: beautifulsoup4 in
/home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (4.11.1)
Requirement already satisfied: soupsieve>1.2 in
/home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from
beautifulsoup4) (2.3.2.post1)
Requirement already satisfied: requests in
/home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (2.29.0)
Requirement already satisfied: charset-normalizer<4,>=2 in
/home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from requests)
(3.1.0)
Requirement already satisfied: idna<4,>=2.5 in
/home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from requests)
(3.4)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in
/home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from requests)
(1.26.15)
Requirement already satisfied: certifi>=2017.4.17 in
/home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from requests)
(2023.5.7)
```

[2]:
```
import sys

import requests
from bs4 import BeautifulSoup
import re
import unicodedata
import pandas as pd
```

[3]:
```
def date_time(table_cells):
    """
    This function returns the data and time from the HTML  table cell
    Input: the  element of a table data cell extracts extra row
    """
    return [data_time.strip() for data_time in list(table_cells.strings)][0:2]
```

```
def booster_version(table_cells):
    """
    This function returns the booster version from the HTML  table cell
    Input: the  element of a table data cell extracts extra row
    """
    out=''.join([booster_version for i,booster_version in enumerate(␣
 ↪table_cells.strings) if i%2==0][0:-1])
    return out

def landing_status(table_cells):
    """
    This function returns the landing status from the HTML table cell
    Input: the  element of a table data cell extracts extra row
    """
    out=[i for i in table_cells.strings][0]
    return out


def get_mass(table_cells):
    mass=unicodedata.normalize("NFKD", table_cells.text).strip()
    if mass:
        mass.find("kg")
        new_mass=mass[0:mass.find("kg")+2]
    else:
        new_mass=0
    return new_mass


def extract_column_from_header(row):
    """
    This function returns the landing status from the HTML table cell
    Input: the  element of a table data cell extracts extra row
    """
    if (row.br):
        row.br.extract()
    if row.a:
        row.a.extract()
    if row.sup:
        row.sup.extract()

    colunm_name = ' '.join(row.contents)

    # Filter the digit and empty names
    if not(colunm_name.strip().isdigit()):
        colunm_name = colunm_name.strip()
        return colunm_name
```

[4]:
```
static_url = "https://en.wikipedia.org/w/index.php?
 ↪title=List_of_Falcon_9_and_Falcon_Heavy_launches&oldid=1027686922"
```

[5]:
```
##TASK 1: Request the Falcon9 Launch Wiki page from its URL
# use requests.get() method with the provided static_url
# assign the response to a object
response = requests.get(static_url).text
```

[6]:
```
# Use BeautifulSoup() to create a BeautifulSoup object from a response text␣
 ↪content
soup = BeautifulSoup(response, 'html.parser')
```

[7]:
```
# using soup.title attribute
print(soup.title)
```

```
<title>List of Falcon 9 and Falcon Heavy launches - Wikipedia</title>
```

[8]:
```
###TASK 2: Extract all column/variable names from the HTML table header
# Use the find_all function in the BeautifulSoup object, with element type␣
 ↪`table`
# Assign the result to a list called `html_tables`
html_tables = soup.find_all("table")
print(html_tables)
```

```
[<table class="col-begin" role="presentation">
<tbody><tr>
<td class="col-break">
<h3><span class="mw-headline" id="Rocket_configurations">Rocket
configurations</span></h3>
<div class="chart noresize" style="margin-top:1em;max-width:420px;">
<div style="position:relative;min-height:320px;min-width:420px;max-
width:420px;">
<div style="float:right;position:relative;min-height:240px;min-width:320px;max-
width:320px;border-left:1px black solid;border-bottom:1px black solid;">
<div style="position:absolute;left:3px;top:224px;height:15px;min-width:18px;max-
width:18px;background-color:LightSteelBlue;-webkit-print-color-
adjust:exact;border:1px solid LightSteelBlue;border-
bottom:none;overflow:hidden;" title="[[Falcon 9 v1.0]]: 2"></div>
<div style="position:absolute;left:55px;top:224px;height:15px;min-
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bottom:none;overflow:hidden;" title="[[Falcon 9 v1.0]]: 2"></div>
<div style="position:absolute;left:81px;top:232px;height:7px;min-width:18px;max-
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adjust:exact;border:1px solid LightSteelBlue;border-
bottom:none;overflow:hidden;" title="[[Falcon 9 v1.0]]: 1"></div>
<div style="position:absolute;left:81px;top:216px;height:15px;min-
```

```
width:18px;max-width:18px;background-color:SteelBlue;-webkit-print-color-
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title="[[Falcon 9 v1.1]]: 6"></div>
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title="[[Falcon 9 v1.1]]: 1"></div>
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width:18px;max-width:18px;background-color:MediumBlue;-webkit-print-color-
adjust:exact;border:1px solid MediumBlue;border-bottom:none;overflow:hidden;"
title="[[Falcon 9 Full Thrust]]: 1"></div>
<div style="position:absolute;left:159px;top:176px;height:55px;min-
width:18px;max-width:18px;background-color:MediumBlue;-webkit-print-color-
adjust:exact;border:1px solid MediumBlue;border-bottom:none;overflow:hidden;"
title="[[Falcon 9 Full Thrust]]: 7"></div>
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adjust:exact;border:1px solid MediumBlue;border-bottom:none;overflow:hidden;"
title="[[Falcon 9 Full Thrust]]: 13"></div>
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width:18px;max-width:18px;background-color:MediumBlue;-webkit-print-color-
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title="[[Falcon 9 Full Thrust]]: 3"></div>
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bottom:none;overflow:hidden;" title="Falcon 9 FT (reused): 5"></div>
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adjust:exact;border:1px solid Teal;border-bottom:none;overflow:hidden;"
title="[[Falcon 9 Block 5]]: 6"></div>
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adjust:exact;border:1px solid Teal;border-bottom:none;overflow:hidden;"
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```
width:18px;max-width:18px;background-color:Teal;-webkit-print-color-
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title="[[Falcon 9 Block 5]]: 5"></div>
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adjust:exact;border:1px solid Teal;border-bottom:none;overflow:hidden;"
title="[[Falcon 9 Block 5]]: 1"></div>
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adjust:exact;border:1px solid LightSeaGreen;border-bottom:none;overflow:hidden;"
title="Falcon 9 B5 (reused): 4"></div>
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adjust:exact;border:1px solid LightSeaGreen;border-bottom:none;overflow:hidden;"
title="Falcon 9 B5 (reused): 8"></div>
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title="Falcon 9 B5 (reused): 21"></div>
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adjust:exact;border:1px solid LightSeaGreen;border-bottom:none;overflow:hidden;"
title="Falcon 9 B5 (reused): 17"></div>
<div style="position:absolute;left:211px;top:72px;height:7px;min-width:18px;max-
width:18px;background-color:Gold;-webkit-print-color-adjust:exact;border:1px
solid Gold;border-bottom:none;overflow:hidden;" title="[[Falcon Heavy]]:
1"></div>
<div style="position:absolute;left:237px;top:136px;height:15px;min-
width:18px;max-width:18px;background-color:Gold;-webkit-print-color-
adjust:exact;border:1px solid Gold;border-bottom:none;overflow:hidden;"
title="[[Falcon Heavy]]: 2"></div>
</div>
<div style="position:absolute;height:240px;min-width:100px;max-width:100px;">
<div style="position:absolute;height=20px;text-align:right;vertical-
align:middle;width:90px;top:190px;padding:0 2px">5</div>
<div style="position:absolute;height=1px;min-
width:5px;top:200px;left:96px;border:1px solid black;"></div>
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align:middle;width:90px;top:150px;padding:0 2px">10</div>
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width:5px;top:160px;left:96px;border:1px solid black;"></div>
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align:middle;width:90px;top:110px;padding:0 2px">15</div>
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width:5px;top:120px;left:96px;border:1px solid black;"></div>
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align:middle;width:90px;top:70px;padding:0 2px">20</div>
<div style="position:absolute;height=1px;min-
```

```
width:5px;top:80px;left:96px;border:1px solid black;"></div>
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align:middle;width:90px;top:30px;padding:0 2px">25</div>
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href="#2010_to_2013">'10</a></div>
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solid black;"></div>
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href="#2010_to_2013">'12</a></div>
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width:24px;text-align:center;vertical-align:top;"><a href="#2014">'14</a></div>
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```

```
width:24px;text-align:center;vertical-align:top;"><a href="#2018">'18</a></div>
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href="/wiki/Falcon_9_v1.0" title="Falcon 9 v1.0">Falcon 9 v1.0</a></li>
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href="/wiki/Falcon_9_v1.1" title="Falcon 9 v1.1">Falcon 9 v1.1</a></li>
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href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">Falcon 9 Full
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href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">Falcon 9 Block 5</a></li>
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Gold;margin-right:1em;-webkit-print-color-adjust:exact;"> </span> <a
href="/wiki/Falcon_Heavy" title="Falcon Heavy">Falcon Heavy</a></li></ul>
</div>
</div>
<p><br/>
</p>
</td>
<td class="col-break">
<h3><span class="mw-headline" id="Launch_sites">Launch sites</span></h3>
```

<div style="position:relative;min-height:320px;min-width:420px;max-
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title="[[Cape Canaveral Space Force Station|CCSFS]], [[Cape Canaveral Space
Launch Complex 40|SLC-40]]: 2">
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title="[[Cape Canaveral Space Force Station|CCSFS]], [[Cape Canaveral Space
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Launch Complex 40|SLC-40]]: 14"></div>
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Launch Complex 40|SLC-40]]: 11"></div>
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title="[[Kennedy Space Center|KSC]], [[Kennedy Space Center Launch Complex
39A|LC-39A]]: 12"></div>
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width:18px;max-width:18px;background-color:Chocolate;-webkit-print-color-
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title="[[Kennedy Space Center|KSC]], [[Kennedy Space Center Launch Complex
39A|LC-39A]]: 3"></div>
<div style="position:absolute;left:237px;top:152px;height:23px;min-
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39A|LC-39A]]: 3"></div>
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title="[[Kennedy Space Center|KSC]], [[Kennedy Space Center Launch Complex
39A|LC-39A]]: 11"></div>
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title="[[Vandenberg Air Force Base|VAFB]], [[Vandenberg Space Launch Complex
4|SLC-4E]]: 1"></div>
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4|SLC-4E]]: 1"></div>
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href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral Space
Force Station">CCSFS</a>, <a href="/wiki/Cape_Canaveral_Space_Launch_Complex_40"
title="Cape Canaveral Space Launch Complex 40">SLC-40</a></li>
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title="Loss during flight: 1"></div>
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title="Partial failure: 1"></div>
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title="Success (commercial and government): 2"></div>
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title="Success (commercial and government): 3"></div>
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adjust:exact;border:1px solid ForestGreen;border-bottom:none;overflow:hidden;"
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adjust:exact;border:1px solid ForestGreen;border-bottom:none;overflow:hidden;"
title="Success (commercial and government): 6"></div>
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title="Success (commercial and government): 8"></div>
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<span style="padding:0 1em;background-color:DarkRed;border:1px solid
DarkRed;margin-right:1em;-webkit-print-color-adjust:exact;"> Loss during
flight
<span style="padding:0 1em;background-color:Goldenrod;border:1px solid
Goldenrod;margin-right:1em;-webkit-print-color-adjust:exact;"> Partial
failure
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(commercial and government)
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DarkGreen;margin-right:1em;-webkit-print-color-adjust:exact;"> Success
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<h3>Booster landings</h3>

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title="Drone-ship failure: 2"></div>
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title="Drone-ship failure: 2"></div>
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title="Drone-ship failure: 1"></div>
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pad failure</li>
<li><span style="padding:0 1em;background-color:DarkRed;border:1px solid
DarkRed;margin-right:1em;-webkit-print-color-adjust:exact;"> </span> Drone-ship
failure</li>
<li><span style="padding:0 1em;background-color:Black;border:1px solid
Black;margin-right:1em;-webkit-print-color-adjust:exact;"> </span> Ocean test
failure<sup class="reference" id="cite_ref-8"><a
href="#cite_note-8">[i]</a></sup></li>
<li><span style="padding:0 1em;background-color:DimGrey;border:1px solid
DimGrey;margin-right:1em;-webkit-print-color-adjust:exact;"> </span> Parachute
test failure<sup class="reference" id="cite_ref-9"><a
href="#cite_note-9">[ii]</a></sup></li>
<li><span style="padding:0 1em;background-color:ForestGreen;border:1px solid
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pad success</li>
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ship success</li>
<li><span style="padding:0 1em;background-color:Darkgrey;border:1px solid
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success<sup class="reference" id="cite_ref-10"><a
href="#cite_note-10">[iii]</a></sup></li>
<li><span style="padding:0 1em;background-color:Gainsboro;border:1px solid
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<ol class="references">
<li id="cite_note-8">^ Controlled descent; ocean touchdown control failed; no recovery

<li id="cite_note-9">^ Passive reentry failed before parachute deployment

<li id="cite_note-10">^ Controlled descent; soft vertical ocean touchdown; no recovery

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time (UTC)
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<th scope="col">Version,
Booster ^{[b]}
</th>
<th scope="col">Launch site
</th>
<th scope="col">Payload^{[c]}
</th>
<th scope="col">Payload mass
</th>
<th scope="col">Orbit
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<th scope="col">Booster
landing
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<td>4 June 2010,<br/>18:45
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<td><a href="/wiki/Falcon_9_v1.0" title="Falcon 9 v1.0">F9 v1.0</a><sup
class="reference" id="cite_ref-MuskMay2012_13-0"><a href="#cite_note-
MuskMay2012-13">[7]</a></sup><br/>B0003.1<sup class="reference" id="cite_ref-
block_numbers_14-0"><a href="#cite_note-block_numbers-14">[8]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
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<td><a href="/wiki/Dragon_Spacecraft_Qualification_Unit" title="Dragon
Spacecraft Qualification Unit">Dragon Spacecraft Qualification Unit</a>
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text-align: center;">Success
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<td class="table-failure" style="background: #FFC7C7; vertical-align: middle;
text-align: center;">Failure<sup class="reference" id="cite_ref-
ns20110930_15-0"><a href="#cite_note-ns20110930-15">[9]</a></sup><sup
class="reference" id="cite_ref-16"><a
href="#cite_note-16">[10]</a></sup><br/><small>(parachute)</small>
</td></tr>
<tr>
<td colspan="9">First flight of Falcon 9 v1.0.<sup class="reference"
id="cite_ref-sfn20100604_17-0"><a href="#cite_note-
sfn20100604-17">[11]</a></sup> Used a boilerplate version of Dragon capsule
which was not designed to separate from the second stage.<small>(<a
href="#First_flight_of_Falcon_9">more details below</a>)</small> Attempted to
recover the first stage by parachuting it into the ocean, but it burned up on
reentry, before the parachutes even deployed.<sup class="reference"
id="cite_ref-parachute_18-0"><a href="#cite_note-parachute-18">[12]</a></sup>
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<td>8 December 2010,<br/>15:43<sup class="reference" id="cite_ref-
spaceflightnow_Clark_Launch_Report_19-0"><a href="#cite_note-
spaceflightnow_Clark_Launch_Report-19">[13]</a></sup>
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class="reference" id="cite_ref-MuskMay2012_13-1"><a href="#cite_note-
MuskMay2012-13">[7]</a></sup><br/>B0004.1<sup class="reference" id="cite_ref-
block_numbers_14-1"><a href="#cite_note-block_numbers-14">[8]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/SpaceX_Dragon" title="SpaceX Dragon">Dragon</a> <a class="mw-
redirect" href="/wiki/COTS_Demo_Flight_1" title="COTS Demo Flight 1">demo flight
C1</a><br/>(Dragon C101)
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<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a> (<a
href="/wiki/International_Space_Station" title="International Space
Station">ISS</a>)
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href="/wiki/Commercial_Orbital_Transportation_Services" title="Commercial
Orbital Transportation Services">COTS</a>)</li>
<li><a href="/wiki/National_Reconnaissance_Office" title="National
Reconnaissance Office">NRO</a></li></ul>
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<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
ns20110930_15-1"><a href="#cite_note-ns20110930-15">[9]</a></sup>
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<td class="table-failure" style="background: #FFC7C7; vertical-align: middle;
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ns20110930_15-2"><a href="#cite_note-ns20110930-15">[9]</a></sup><sup
class="reference" id="cite_ref-20"><a
href="#cite_note-20">[14]</a></sup><br/><small>(parachute)</small>
</td></tr>
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<td colspan="9">Maiden flight of <a class="mw-redirect"
href="/wiki/Dragon_capsule" title="Dragon capsule">Dragon capsule</a>,
consisting of over 3 hours of testing thruster maneuvering and reentry.<sup
class="reference" id="cite_ref-spaceflightnow_Clark_unleashing_Dragon_21-0"><a
href="#cite_note-spaceflightnow_Clark_unleashing_Dragon-21">[15]</a></sup>
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Attempted to recover the first stage by parachuting it into the ocean, but it
disintegrated upon reentry, before the parachutes were deployed.<sup
class="reference" id="cite_ref-parachute_18-1"><a href="#cite_note-
parachute-18">[12]</a></sup> <small>(<a href="#COTS_demo_missions">more details
below</a>)</small> It also included two <a href="/wiki/CubeSat"
title="CubeSat">CubeSats</a>,<sup class="reference" id="cite_ref-
NRO_Taps_Boeing_for_Next_Batch_of_CubeSats_22-0"><a href="#cite_note-
NRO_Taps_Boeing_for_Next_Batch_of_CubeSats-22">[16]</a></sup> and a wheel of <a
href="/wiki/Brou%C3%A8re" title="Brouère">Brouère</a> cheese.
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">3
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BBC_new_era_23-0"><a href="#cite_note-BBC_new_era-23">[17]</a></sup>
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<td><a href="/wiki/Falcon_9_v1.0" title="Falcon 9 v1.0">F9 v1.0</a><sup
class="reference" id="cite_ref-MuskMay2012_13-2"><a href="#cite_note-
MuskMay2012-13">[7]</a></sup><br/>B0005.1<sup class="reference" id="cite_ref-
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<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/SpaceX_Dragon" title="SpaceX Dragon">Dragon</a> <a class="mw-
redirect" href="/wiki/Dragon_C2%2B" title="Dragon C2+">demo flight C2+</a><sup
class="reference" id="cite_ref-C2_24-0"><a
href="#cite_note-C2-24">[18]</a></sup><br/>(Dragon C102)
</td>
<td>525 kg (1,157 lb)<sup class="reference" id="cite_ref-25"><a
href="#cite_note-25">[19]</a></sup>
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a> (<a
href="/wiki/International_Space_Station" title="International Space
Station">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Orbital_Transportation_Services" title="Commercial
Orbital Transportation Services">COTS</a>)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-26"><a
href="#cite_note-26">[20]</a></sup>
</td>
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white-space: nowrap; text-align: center;">No attempt
```

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</td></tr>
<tr>
<td colspan="9">Dragon spacecraft demonstrated a series of tests before it was
allowed to approach the <a href="/wiki/International_Space_Station"
title="International Space Station">International Space Station</a>. Two days
later, it became the first commercial spacecraft to board the ISS.<sup
class="reference" id="cite_ref-BBC_new_era_23-1"><a href="#cite_note-
BBC_new_era-23">[17]</a></sup> <small>(<a href="#COTS_demo_missions">more
details below</a>)</small>
</td></tr>
<tr>
<th rowspan="3" scope="row" style="text-align:center;">4
</th>
<td rowspan="2">8 October 2012,<br/>00:35<sup class="reference" id="cite_ref-
SFN_LLog_27-0"><a href="#cite_note-SFN_LLog-27">[21]</a></sup>
</td>
<td rowspan="2"><a href="/wiki/Falcon_9_v1.0" title="Falcon 9 v1.0">F9
v1.0</a><sup class="reference" id="cite_ref-MuskMay2012_13-3"><a
href="#cite_note-MuskMay2012-13">[7]</a></sup><br/>B0006.1<sup class="reference"
id="cite_ref-block_numbers_14-3"><a href="#cite_note-
block_numbers-14">[8]</a></sup>
</td>
<td rowspan="2"><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape
Canaveral Space Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/SpaceX_CRS-1" title="SpaceX CRS-1">SpaceX CRS-1</a><sup
class="reference" id="cite_ref-sxManifest20120925_28-0"><a href="#cite_note-
sxManifest20120925-28">[22]</a></sup><br/>(Dragon C103)
</td>
<td>4,700 kg (10,400 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a> (<a
href="/wiki/International_Space_Station" title="International Space
Station">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td rowspan="2" style="background:#ececec; text-align:center;"><span
class="nowrap">No attempt</span>
</td></tr>
<tr>
```

<td>Orbcomm-OG2^{[23]}
</td>
<td>172 kg (379 lb)^{[24]}
</td>
<td>LEO
</td>
<td>Orbcomm
</td>
<td class="table-partial" style="background: #FE9; vertical-align: middle; text-align: center;">Partial failure^{[25]}
</td></tr>
<tr>
<td colspan="9">CRS-1 was successful, but the secondary payload was inserted into an abnormally low orbit and subsequently lost. This was due to one of the nine Merlin engines shutting down during the launch, and NASA declining a second reignition, as per ISS visiting vehicle safety rules, the primary payload owner is contractually allowed to decline a second reignition. NASA stated that this was because SpaceX could not guarantee a high enough likelihood of the second stage completing the second burn successfully which was required to avoid any risk of secondary payload's collision with the ISS.^{[26]}^{[27]}^{[28]}
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">5
</th>
<td>1 March 2013,
15:10
</td>
<td>F9 v1.0^{[7]}
B0007.1^{[8]}
</td>
<td>CCAFS,
SLC-40
</td>
<td>SpaceX CRS-2<sup

```
class="reference" id="cite_ref-sxManifest20120925_28-1"><a href="#cite_note-
sxManifest20120925-28">[22]</a></sup><br/>(Dragon C104)
</td>
<td>4,877 kg (10,752 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a> (<a
class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
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text-align: center;">Success
</td>
<td class="table-noAttempt" style="background: #EEE; vertical-align: middle;
white-space: nowrap; text-align: center;">No attempt
</td></tr>
<tr>
<td colspan="9">Last launch of the original Falcon 9 v1.0 <a
href="/wiki/Launch_vehicle" title="Launch vehicle">launch vehicle</a>, first use
of the unpressurized trunk section of Dragon.<sup class="reference"
id="cite_ref-sxf9_20110321_35-0"><a href="#cite_note-
sxf9_20110321-35">[29]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">6
</th>
<td>29 September 2013,<br/>16:00<sup class="reference" id="cite_ref-
pa20130930_36-0"><a href="#cite_note-pa20130930-36">[30]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_v1.1" title="Falcon 9 v1.1">F9 v1.1</a><sup
class="reference" id="cite_ref-MuskMay2012_13-5"><a href="#cite_note-
MuskMay2012-13">[7]</a></sup><br/>B1003<sup class="reference" id="cite_ref-
block_numbers_14-5"><a href="#cite_note-block_numbers-14">[8]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Vandenberg_Air_Force_Base"
title="Vandenberg Air Force Base">VAFB</a>,<br/><a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E</a>
</td>
<td><a href="/wiki/CASSIOPE" title="CASSIOPE">CASSIOPE</a><sup class="reference"
id="cite_ref-sxManifest20120925_28-2"><a href="#cite_note-
sxManifest20120925-28">[22]</a></sup><sup class="reference" id="cite_ref-
CASSIOPE_MDA_37-0"><a href="#cite_note-CASSIOPE_MDA-37">[31]</a></sup>
</td>
<td>500 kg (1,100 lb)
</td>
```

<td>Polar orbit <a
href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO
</td>
<td>MDA
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
pa20130930_36-1">[30]</sup>
</td>
<td class="table-no2" style="background: #FFE3E3; color: black; vertical-align:
middle; text-align: center;">Uncontrolled
<small>(ocean)</small><sup
class="reference" id="cite_ref-ocean_landing_38-0"><a href="#cite_note-
ocean_landing-38">[d]</sup>
</td></tr>
<tr>
<td colspan="9">First commercial mission with a private customer, first launch
from Vandenberg, and demonstration flight of Falcon 9 v1.1 with an improved
13-tonne to LEO capacity.<sup class="reference" id="cite_ref-
sxf9_20110321_35-1">[29]</sup> After
separation from the second stage carrying Canadian commercial and scientific
satellites, the first stage booster performed a controlled reentry,<sup
class="reference" id="cite_ref-39">[32]</sup> and an
<a href="/wiki/Falcon_9_first-stage_landing_tests" title="Falcon 9 first-stage
landing tests">ocean touchdown test for the first time. This provided good
test data, even though the booster started rolling as it neared the ocean,
leading to the shutdown of the central engine as the roll depleted it of fuel,
resulting in a hard impact with the ocean.<sup class="reference" id="cite_ref-
pa20130930_36-2">[30]</sup> This was the
first known attempt of a rocket engine being lit to perform a supersonic retro
propulsion, and allowed SpaceX to enter a public-private partnership with <a
href="/wiki/NASA" title="NASA">NASA and its Mars entry, descent, and landing
technologies research projects.<sup class="reference" id="cite_ref-40"><a
href="#cite_note-40">[33]</sup> <small>(<a
href="#Maiden_flight_of_v1.1">more details below)</small>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">7
</th>
<td>3 December 2013,
22:41<sup class="reference" id="cite_ref-
sfn_wwls20130624_41-0">[34]</sup>
</td>
<td>F9 v1.1
B1004
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCAFS,
<a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40
</td>

<td>SES-8<sup class="reference"
id="cite_ref-sxManifest20120925_28-3"><a href="#cite_note-
sxManifest20120925-28">[22]</sup><sup class="reference" id="cite_ref-spx-
pr_42-0">[35]</sup><sup class="reference"
id="cite_ref-aw20110323_43-0">[36]</sup>
</td>
<td>3,170 kg (6,990 lb)
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO
</td>
<td>SES
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
SNMissionStatus7_44-0">[37]</sup>
</td>
<td class="table-noAttempt" style="background: #EEE; vertical-align: middle;
white-space: nowrap; text-align: center;">No attempt
<sup class="reference"
id="cite_ref-sf10120131203_45-0"><a href="#cite_note-
sf10120131203-45">[38]</sup>
</td></tr>
<tr>
<td colspan="9">First <a href="/wiki/Geostationary_transfer_orbit"
title="Geostationary transfer orbit">Geostationary transfer orbit (GTO)
launch for Falcon 9,<sup class="reference" id="cite_ref-spx-pr_42-1"><a
href="#cite_note-spx-pr-42">[35]</sup> and first successful reignition of
the second stage.<sup class="reference" id="cite_ref-46"><a
href="#cite_note-46">[39]</sup> SES-8 was inserted into a <a
href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">Super-Synchronous Transfer Orbit of 79,341 km (49,300 mi) in apogee
with an <a href="/wiki/Orbital_inclination" title="Orbital
inclination">inclination of 20.55° to the <a href="/wiki/Equator"
title="Equator">equator.
</td></tr></tbody></table>, <table class="wikitable plainrowheaders collapsible"
style="width: 100%;">
<tbody><tr>
<th scope="col">Flight No.
</th>
<th scope="col">Date and
time (<a href="/wiki/Coordinated_Universal_Time"
title="Coordinated Universal Time">UTC)
</th>
<th scope="col"><a href="/wiki/List_of_Falcon_9_first-stage_boosters"
title="List of Falcon 9 first-stage boosters">Version,
Booster<sup
class="reference" id="cite_ref-booster_11-1"><a href="#cite_note-
booster-11">[b]</sup>
</th>
<th scope="col">Launch site

```
</th>
<th scope="col">Payload<sup class="reference" id="cite_ref-Dragon_12-1"><a
href="#cite_note-Dragon-12">[c]</a></sup>
</th>
<th scope="col">Payload mass
</th>
<th scope="col">Orbit
</th>
<th scope="col">Customer
</th>
<th scope="col">Launch<br/>outcome
</th>
<th scope="col"><a href="/wiki/Falcon_9_first-stage_landing_tests" title="Falcon
9 first-stage landing tests">Booster<br/>landing</a>
</th></tr>
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<th rowspan="2" scope="row" style="text-align:center;">8
</th>
<td>6 January 2014,<br/>22:06<sup class="reference" id="cite_ref-
NASA_Spaceflight_48-0"><a href="#cite_note-NASA_Spaceflight-48">[41]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_v1.1" title="Falcon 9 v1.1">F9 v1.1</a>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Thaicom_6" title="Thaicom 6">Thaicom 6</a><sup
class="reference" id="cite_ref-sxManifest20120925_28-4"><a href="#cite_note-
sxManifest20120925-28">[22]</a></sup>
</td>
<td>3,325 kg (7,330 lb)
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a href="/wiki/Thaicom" title="Thaicom">Thaicom</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
sn20140106_49-0"><a href="#cite_note-sn20140106-49">[42]</a></sup>
</td>
<td class="table-noAttempt" style="background: #EEE; vertical-align: middle;
white-space: nowrap; text-align: center;">No attempt<br/><sup class="reference"
id="cite_ref-50"><a href="#cite_note-50">[43]</a></sup>
</td></tr>
<tr>
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<td colspan="9">The Thai communication satellite was the second <a
href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO launch for Falcon 9. The <a href="/wiki/United_States_Air_Force"
title="United States Air Force">USAF evaluated launch data from this flight
as part of a separate certification program for SpaceX to qualify to fly
military payloads, but found that the launch had "unacceptable fuel reserves at
engine cutoff of the stage 2 second burnoff".<sup class="reference"
id="cite_ref-bloomberg20140722_51-0"><a href="#cite_note-
bloomberg20140722-51">[44]</sup> Thaicom-6 was inserted into a <a
href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">Super-Synchronous Transfer Orbit of 90,039 km (55,948 mi) in <a
href="/wiki/Apsis" title="Apsis">apogee with an <a
href="/wiki/Orbital_inclination" title="Orbital inclination">inclination of
22.46° to the equator.
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">9
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<td>18 April 2014,
19:25<sup class="reference" id="cite_ref-
SFN_LLog_27-1">[21]</sup>
</td>
<td>F9 v1.1
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">Cape Canaveral,
<a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40
</td>
<td>SpaceX CRS-3<sup
class="reference" id="cite_ref-sxManifest20120925_28-5"><a href="#cite_note-
sxManifest20120925-28">[22]</sup>
(Dragon C105)
</td>
<td>2,296 kg (5,062 lb)<sup class="reference" id="cite_ref-52"><a
href="#cite_note-52">[45]</sup>
</td>
<td>LEO (<a
class="mw-redirect" href="/wiki/ISS" title="ISS">ISS)
</td>
<td>NASA (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="partial table-partial" style="background: #BFE; vertical-align:
middle; text-align: center;">Controlled
<small>(ocean)</small> <sup
class="reference" id="cite_ref-ocean_landing_38-1"><a href="#cite_note-

ocean_landing-38">[d]</sup><sup class="reference" id="cite_ref-auto_53-0"><a
href="#cite_note-auto-53">[46]</sup>
</td></tr>
<tr>
<td colspan="9">Following second-stage separation, SpaceX conducted a second <a
href="/wiki/Falcon_9_first-stage_landing_tests" title="Falcon 9 first-stage
landing tests">controlled-descent test of the discarded booster vehicle and
achieved the first successful controlled ocean touchdown of a liquid-rocket-
engine orbital booster.<sup class="reference" id="cite_ref-mit20140422_54-0"><a
href="#cite_note-mit20140422-54">[47]</sup><sup class="reference"
id="cite_ref-aw20140428_55-0">[48]</sup>
Following the soft touchdown, the first stage tipped over as expected and was
destroyed. This was the first Falcon 9 booster to fly with extensible landing
legs and the first Dragon mission with the <a href="/wiki/Falcon_9_v1.1"
title="Falcon 9 v1.1">Falcon 9 v1.1 launch vehicle. This flight also
launched the <a href="/wiki/Educational_Launch_of_Nanosatellites"
title="Educational Launch of Nanosatellites">ELaNa 5 mission for <a
href="/wiki/NASA" title="NASA">NASA as a secondary payload.<sup
class="reference" id="cite_ref-auto2_56-0"><a href="#cite_note-
auto2-56">[49]</sup><sup class="reference" id="cite_ref-57"><a
href="#cite_note-57">[50]</sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">10
</th>
<td>14 July 2014,
15:15
</td>
<td>F9 v1.1
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">Cape Canaveral,
<a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40
</td>
<td>Orbcomm-
OG2-1
(6 satellites)<sup class="reference" id="cite_ref-
sxManifest20120925_28-6"><a href="#cite_note-
sxManifest20120925-28">[22]</sup>
</td>
<td>1,316 kg (2,901 lb)
</td>
<td>LEO
</td>
<td>Orbcomm
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
og2-01_20140714_58-0">[51]</sup>

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</td>
<td class="partial table-partial" style="background: #BFE; vertical-align:
middle; text-align: center;">Controlled<br/><small>(ocean)</small><sup
class="reference" id="cite_ref-ocean_landing_38-2"><a href="#cite_note-
ocean_landing-38">[d]</a></sup><sup class="reference" id="cite_ref-auto_53-1"><a
href="#cite_note-auto-53">[46]</a></sup>
</td></tr>
<tr>
<td colspan="9">Payload included six satellites weighing 172 kg (379 lb) each
and two 142 kg (313 lb) mass simulators.<sup class="reference" id="cite_ref-
gunter-og2_30-1"><a href="#cite_note-gunter-og2-30">[24]</a></sup><sup
class="reference" id="cite_ref-gunter-og2-sim_59-0"><a href="#cite_note-gunter-
og2-sim-59">[52]</a></sup> Equipped for the second time with <a class="mw-
redirect" href="/wiki/Launch_vehicle_landing_gear" title="Launch vehicle landing
gear">landing legs</a>, the first-stage booster successfully conducted a <a
class="mw-redirect" href="/wiki/SpaceX_Falcon_9_booster_post-
mission,_controlled-descent,_test_program" title="SpaceX Falcon 9 booster post-
mission, controlled-descent, test program">controlled-descent</a> test
consisting of a burn for deceleration from <a class="mw-redirect"
href="/wiki/Hypersonic" title="Hypersonic">hypersonic</a> velocity in the upper
atmosphere, a <a href="/wiki/Atmospheric_entry" title="Atmospheric
entry">reentry</a> burn, and a final landing burn before soft-landing on the
ocean surface.<sup class="reference" id="cite_ref-SpaceX22072014_60-0"><a
href="#cite_note-SpaceX22072014-60">[53]</a></sup>
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<tr>
<th rowspan="2" scope="row" style="text-align:center;">11
</th>
<td>5 August 2014,<br/>08:00
</td>
<td><a href="/wiki/Falcon_9_v1.1" title="Falcon 9 v1.1">F9 v1.1</a>
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40</a>
</td>
<td><a href="/wiki/AsiaSat_8" title="AsiaSat 8">AsiaSat 8</a><sup
class="reference" id="cite_ref-sxManifest20120925_28-7"><a href="#cite_note-
sxManifest20120925-28">[22]</a></sup><sup class="reference" id="cite_ref-
AsiaSat_SpaceX_61-0"><a href="#cite_note-AsiaSat_SpaceX-61">[54]</a></sup><sup
class="reference" id="cite_ref-62"><a href="#cite_note-62">[55]</a></sup>
</td>
<td>4,535 kg (9,998 lb)
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
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<td><a href="/wiki/AsiaSat" title="AsiaSat">AsiaSat</a>
</td>
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text-align: center;">Success<sup class="reference" id="cite_ref-
as8_20140805_63-0"><a href="#cite_note-as8_20140805-63">[56]</a></sup>
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white-space: nowrap; text-align: center;">No attempt<br/><sup class="reference"
id="cite_ref-amspace-20140803_64-0"><a href="#cite_note-
amspace-20140803-64">[57]</a></sup>
</td></tr>
<tr>
<td colspan="9">First time SpaceX managed a launch site turnaround between two
flights of under a month (22 days). GTO launch of the large communication
satellite from Hong Kong did not allow for propulsive return-over-water and
controlled splashdown of the first stage.<sup class="reference" id="cite_ref-
amspace-20140803_64-1"><a href="#cite_note-amspace-20140803-64">[57]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">12
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<td>7 September 2014,<br/>05:00
</td>
<td><a href="/wiki/Falcon_9_v1.1" title="Falcon 9 v1.1">F9
v1.1</a><br/>B1011<sup class="reference" id="cite_ref-block_numbers_14-6"><a
href="#cite_note-block_numbers-14">[8]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40</a>
</td>
<td><a href="/wiki/AsiaSat_6" title="AsiaSat 6">AsiaSat 6</a><sup
class="reference" id="cite_ref-sxManifest20120925_28-8"><a href="#cite_note-
sxManifest20120925-28">[22]</a></sup><sup class="reference" id="cite_ref-
AsiaSat_SpaceX_61-1"><a href="#cite_note-AsiaSat_SpaceX-61">[54]</a></sup><sup
class="reference" id="cite_ref-65"><a href="#cite_note-65">[58]</a></sup>
</td>
<td>4,428 kg (9,762 lb)
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a href="/wiki/AsiaSat" title="AsiaSat">AsiaSat</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
sdc20140907_66-0"><a href="#cite_note-sdc20140907-66">[59]</a></sup>
```

```
</td>
<td class="table-noAttempt" style="background: #EEE; vertical-align: middle;
white-space: nowrap; text-align: center;">No attempt
</td></tr>
<tr>
<td colspan="9">Launch was delayed for two weeks for additional verifications
after a malfunction observed in the development of the <a class="mw-redirect"
href="/wiki/F9R_Dev1" title="F9R Dev1">F9R Dev1</a> prototype.<sup
class="reference" id="cite_ref-67"><a href="#cite_note-67">[60]</a></sup> GTO
launch of the heavy payload did not allow for controlled splashdown.<sup
class="reference" id="cite_ref-68"><a href="#cite_note-68">[61]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">13
</th>
<td>21 September 2014,<br/>05:52<sup class="reference" id="cite_ref-
SFN_LLog_27-2"><a href="#cite_note-SFN_LLog-27">[21]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_v1.1" title="Falcon 9 v1.1">F9
v1.1</a><br/>B1010<sup class="reference" id="cite_ref-block_numbers_14-7"><a
href="#cite_note-block_numbers-14">[8]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40</a>
</td>
<td><a href="/wiki/SpaceX_CRS-4" title="SpaceX CRS-4">SpaceX CRS-4</a><sup
class="reference" id="cite_ref-sxManifest20120925_28-9"><a href="#cite_note-
sxManifest20120925-28">[22]</a></sup><br/>(Dragon <a href="/wiki/Dragon_C106"
title="Dragon C106">C106</a>.1)
</td>
<td>2,216 kg (4,885 lb)<sup class="reference" id="cite_ref-69"><a
href="#cite_note-69">[62]</a></sup>
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a> (<a
class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
nasacrs420140921_70-0"><a href="#cite_note-nasacrs420140921-70">[63]</a></sup>
</td>
<td class="table-no2" style="background: #FFE3E3; color: black; vertical-align:
middle; text-align: center;">Uncontrolled<br/><small>(ocean)</small><sup
```

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class="reference" id="cite_ref-ocean_landing_38-3"><a href="#cite_note-
ocean_landing-38">[d]</a></sup><sup class="reference" id="cite_ref-
fail-13_71-0"><a href="#cite_note-fail-13-71">[64]</a></sup>
</td></tr>
<tr>
<td colspan="9">Fourth attempt of a soft ocean touchdown,<sup class="reference"
id="cite_ref-aw20141016_72-0"><a href="#cite_note-aw20141016-72">[65]</a></sup>
but the booster ran out of liquid oxygen.<sup class="reference" id="cite_ref-
fail-13_71-1"><a href="#cite_note-fail-13-71">[64]</a></sup> Detailed <a
class="mw-redirect" href="/wiki/Thermal_imaging" title="Thermal imaging">thermal
imaging</a> infrared sensor data was collected however by NASA, as part of a
joint arrangement with SpaceX as part of research on <a class="mw-redirect"
href="/wiki/Supersonic_retropropulsion" title="Supersonic
retropropulsion">retropropulsive deceleration technologies</a> for developing
new approaches to Martian <a href="/wiki/Atmospheric_entry" title="Atmospheric
entry">atmospheric entry</a>.<sup class="reference" id="cite_ref-
aw20141016_72-1"><a href="#cite_note-aw20141016-72">[65]</a></sup>
</td></tr></tbody></table>, <table class="wikitable plainrowheaders collapsible"
style="width: 100%;">
<tbody><tr>
<th scope="col">Flight No.
</th>
<th scope="col">Date and<br/>time (<a href="/wiki/Coordinated_Universal_Time"
title="Coordinated Universal Time">UTC</a>)
</th>
<th scope="col"><a href="/wiki/List_of_Falcon_9_first-stage_boosters"
title="List of Falcon 9 first-stage boosters">Version,<br/>Booster</a><sup
class="reference" id="cite_ref-booster_11-2"><a href="#cite_note-
booster-11">[b]</a></sup>
</th>
<th scope="col">Launch site
</th>
<th scope="col">Payload<sup class="reference" id="cite_ref-Dragon_12-2"><a
href="#cite_note-Dragon-12">[c]</a></sup>
</th>
<th scope="col">Payload mass
</th>
<th scope="col">Orbit
</th>
<th scope="col">Customer
</th>
<th scope="col">Launch<br/>outcome
</th>
<th scope="col"><a href="/wiki/Falcon_9_first-stage_landing_tests" title="Falcon
9 first-stage landing tests">Booster<br/>landing</a>
</th></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">14
```

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</th>
<td>10 January 2015,<br/>09:47<sup class="reference" id="cite_ref-
nasa20150107_74-0"><a href="#cite_note-nasa20150107-74">[67]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_v1.1" title="Falcon 9 v1.1">F9
v1.1</a><br/>B1012<sup class="reference" id="cite_ref-block_numbers_14-8"><a
href="#cite_note-block_numbers-14">[8]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40</a>
</td>
<td><a href="/wiki/SpaceX_CRS-5" title="SpaceX CRS-5">SpaceX CRS-5</a><sup
class="reference" id="cite_ref-sxManifest20130731_75-0"><a href="#cite_note-
sxManifest20130731-75">[68]</a></sup><br/>(Dragon C107)
</td>
<td>2,395 kg (5,280 lb)<sup class="reference" id="cite_ref-76"><a
href="#cite_note-76">[69]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
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text-align: center;">Success<sup class="reference" id="cite_ref-
nasacrs520150110_77-0"><a href="#cite_note-nasacrs520150110-77">[70]</a></sup>
</td>
<td class="table-failure" style="background: #FFC7C7; vertical-align: middle;
text-align: center;">Failure <small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Following second-stage separation, SpaceX attempted to <a
href="/wiki/Falcon_9_first-stage_landing_tests" title="Falcon 9 first-stage
landing tests">return</a> the first stage for the first time to a 90 m × 50 m
(300 ft × 160 ft) <a class="mw-redirect" href="/wiki/Floating_landing_platform"
title="Floating landing platform">floating platform</a> - called the <a
href="/wiki/Autonomous_spaceport_drone_ship" title="Autonomous spaceport drone
ship">autonomous spaceport drone ship</a>. The test achieved many objectives and
returned a large amount of data, but the <a href="/wiki/Grid_fin" title="Grid
fin">grid-fin</a> control surfaces used for the first time for more precise
reentry positioning ran out of hydraulic fluid for its control system a minute
before landing, resulting in a landing crash.<sup class="reference"
id="cite_ref-sfn20150110_78-0"><a href="#cite_note-
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sfn20150110-78">[71]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">15
</th>
<td>11 February 2015,<br/>23:03<sup class="reference" id="cite_ref-79"><a
href="#cite_note-79">[72]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_v1.1" title="Falcon 9 v1.1">F9
v1.1</a><br/>B1013<sup class="reference" id="cite_ref-block_numbers_14-9"><a
href="#cite_note-block_numbers-14">[8]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40</a>
</td>
<td><a class="mw-redirect" href="/wiki/DSCOVR" title="DSCOVR">DSCOVR</a><sup
class="reference" id="cite_ref-sxManifest20130731_75-1"><a href="#cite_note-
sxManifest20130731-75">[68]</a></sup><sup class="reference" id="cite_ref-80"><a
href="#cite_note-80">[73]</a></sup>
</td>
<td>570 kg (1,260 lb)
</td>
<td><a href="/wiki/High_Earth_orbit" title="High Earth orbit">HEO</a><br/>(<a
href="/wiki/Lagrange_point" title="Lagrange point">Sun-Earth L<sub>1</sub></a>
insertion)
</td>
<td><link href="mw-data:TemplateStyles:r1126788409" rel="mw-deduplicated-inline-
style"/><div class="plainlist">
<ul><li><a href="/wiki/United_States_Air_Force" title="United States Air
Force">USAF</a></li>
<li><a href="/wiki/NASA" title="NASA">NASA</a></li>
<li><a class="mw-redirect" href="/wiki/NOAA" title="NOAA">NOAA</a></li></ul>
</div>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="partial table-partial" style="background: #BFE; vertical-align:
middle; text-align: center;">Controlled<br/><small>(ocean)</small><sup
class="reference" id="cite_ref-ocean_landing_38-4"><a href="#cite_note-
ocean_landing-38">[d]</a></sup>
</td></tr>
<tr>
<td colspan="9">First launch under USAF's <a
href="/wiki/List_of_U.S._government_and_military_acronyms#O" title="List of U.S.
government and military acronyms">OSP</a> 3 launch contract.<sup
```

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class="reference" id="cite_ref-spx20121205_81-0"><a href="#cite_note-
spx20121205-81">[74]</a></sup> First SpaceX launch to put a satellite beyond a
geostationary transfer orbit, first SpaceX launch into interplanetary space, and
first SpaceX launch of an American research satellite. The first stage made a
test flight descent to an over-ocean landing within 10 m (33 ft) of its intended
target.<sup class="reference" id="cite_ref-MuskTweet-20150211_82-0"><a
href="#cite_note-MuskTweet-20150211-82">[75]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">16
</th>
<td>2 March 2015,<br/>03:50<sup class="reference" id="cite_ref-SFN_LLog_27-3"><a
href="#cite_note-SFN_LLog-27">[21]</a></sup><sup class="reference" id="cite_ref-
patrickafmil02142015_83-0"><a href="#cite_note-
patrickafmil02142015-83">[76]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_v1.1" title="Falcon 9 v1.1">F9
v1.1</a><br/>B1014<sup class="reference" id="cite_ref-block_numbers_14-10"><a
href="#cite_note-block_numbers-14">[8]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40</a>
</td>
<td><link href="mw-data:TemplateStyles:r1126788409" rel="mw-deduplicated-inline-
style"/><div class="plainlist">
<ul><li><a href="/wiki/ABS-3A" title="ABS-3A">ABS-3A</a></li>
<li><a href="/wiki/Eutelsat_115_West_B" title="Eutelsat 115 West B">Eutelsat 115
West B</a><sup class="reference" id="cite_ref-sxManifest20130731_75-2"><a
href="#cite_note-sxManifest20130731-75">[68]</a></sup></li></ul>
</div>
</td>
<td>4,159 kg (9,169 lb)
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><link href="mw-data:TemplateStyles:r1126788409" rel="mw-deduplicated-inline-
style"/><div class="plainlist">
<ul><li><a class="mw-redirect" href="/wiki/Asia_Broadcast_Satellite" title="Asia
Broadcast Satellite">ABS</a></li>
<li><a href="/wiki/Eutelsat" title="Eutelsat">Eutelsat</a></li></ul>
</div>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
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<td class="table-noAttempt" style="background: #EEE; vertical-align: middle;
white-space: nowrap; text-align: center;">No attempt<sup class="reference"
id="cite_ref-84"><a href="#cite_note-84">[77]</a></sup>
</td></tr>
<tr>
<td colspan="9">The launch was Boeing's first conjoined launch of a <a
href="/wiki/Boeing_702" title="Boeing 702">lighter-weight dual-commsat stack</a>
that was specifically designed to take advantage of the <a
href="/wiki/Space_launch_market_competition" title="Space launch market
competition">lower-cost</a> SpaceX Falcon 9 launch vehicle.<sup
class="reference" id="cite_ref-aw20140310_85-0"><a href="#cite_note-
aw20140310-85">[78]</a></sup><sup class="reference" id="cite_ref-
boeing20141112_86-0"><a href="#cite_note-boeing20141112-86">[79]</a></sup> Per
satellite, launch costs were less than US$30 million.<sup class="reference"
id="cite_ref-sfn20150302_87-0"><a href="#cite_note-
sfn20150302-87">[80]</a></sup> The ABS satellite reached its final destination
ahead of schedule and started operations on 10 September 2015.<sup
class="reference" id="cite_ref-boeing_88-0"><a href="#cite_note-
boeing-88">[81]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">17
</th>
<td>14 April 2015,<br/>20:10<sup class="reference" id="cite_ref-
SFN_LLog_27-4"><a href="#cite_note-SFN_LLog-27">[21]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_v1.1" title="Falcon 9 v1.1">F9
v1.1</a><br/>B1015<sup class="reference" id="cite_ref-block_numbers_14-11"><a
href="#cite_note-block_numbers-14">[8]</a></sup>
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title="Cape Canaveral Air Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40</a>
</td>
<td><a href="/wiki/SpaceX_CRS-6" title="SpaceX CRS-6">SpaceX CRS-6</a><sup
class="reference" id="cite_ref-sxManifest20130731_75-3"><a href="#cite_note-
sxManifest20130731-75">[68]</a></sup><br/>(Dragon <a href="/wiki/Dragon_C108"
title="Dragon C108">C108.1</a>)
</td>
<td>1,898 kg (4,184 lb)<sup class="reference" id="cite_ref-89"><a
href="#cite_note-89">[82]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
```

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Services">CRS</a>)
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text-align: center;">Success
</td>
<td class="table-failure" style="background: #FFC7C7; vertical-align: middle;
text-align: center;">Failure<sup class="reference" id="cite_ref-90"><a
href="#cite_note-90">[83]</a></sup><br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">After second-stage separation, a controlled-descent test was
attempted with the first stage. After the booster contacted the ship, it tipped
over due to excess lateral velocity caused by a stuck throttle valve that
delayed downthrottle at the correct time.<sup class="reference"
id="cite_ref-91"><a href="#cite_note-91">[84]</a></sup><sup class="reference"
id="cite_ref-92"><a href="#cite_note-92">[85]</a></sup>
</td></tr>
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patrickafb20150414_93-0"><a href="#cite_note-
patrickafb20150414-93">[86]</a></sup>
</td>
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v1.1</a><br/>B1016<sup class="reference" id="cite_ref-block_numbers_14-12"><a
href="#cite_note-block_numbers-14">[8]</a></sup>
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Space Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40</a>
</td>
<td><a href="/wiki/T%C3%BCrkmen%C3%84lem_52%C2%B0E_/_MonacoSAT"
title="TürkmenÄlem 52°E / MonacoSAT">TürkmenÄlem 52°E / MonacoSAT</a><sup
class="reference" id="cite_ref-sxManifest20130731_75-4"><a href="#cite_note-
sxManifest20130731-75">[68]</a></sup><sup class="reference" id="cite_ref-
turkmen-monaco_94-0"><a href="#cite_note-turkmen-monaco-94">[87]</a></sup>
</td>
<td>4,707 kg (10,377 lb)
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a href="/wiki/Turkmenistan_National_Space_Agency" title="Turkmenistan
National Space Agency">Turkmenistan National<br/>Space Agency</a><sup
class="reference" id="cite_ref-95"><a href="#cite_note-95">[88]</a></sup>
</td>
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<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-noAttempt" style="background: #EEE; vertical-align: middle;
white-space: nowrap; text-align: center;">No attempt<sup class="reference"
id="cite_ref-96"><a href="#cite_note-96">[89]</a></sup>
</td></tr>
<tr>
<td colspan="9">Original intended launch was delayed over a month after an issue
with the helium pressurisation system was identified on similar parts in the
assembly plant.<sup class="reference" id="cite_ref-zgn20150323_97-0"><a
href="#cite_note-zgn20150323-97">[90]</a></sup> Subsequent launch successfully
positioned this first Turkmen satellite at 52.0° east.
</td></tr>
<tr>
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</th>
<td>28 June 2015,<br/>14:21<sup class="reference" id="cite_ref-SFN_LLog_27-5"><a
href="#cite_note-SFN_LLog-27">[21]</a></sup><sup class="reference" id="cite_ref-
nasama20150520_98-0"><a href="#cite_note-nasama20150520-98">[91]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_v1.1" title="Falcon 9 v1.1">F9
v1.1</a><br/>B1018<sup class="reference" id="cite_ref-block_numbers_14-13"><a
href="#cite_note-block_numbers-14">[8]</a></sup>
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Space Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40</a>
</td>
<td><a href="/wiki/SpaceX_CRS-7" title="SpaceX CRS-7">SpaceX CRS-7</a><sup
class="reference" id="cite_ref-sxManifest20130731_75-5"><a href="#cite_note-
sxManifest20130731-75">[68]</a></sup><br/>(Dragon C109)
</td>
<td>1,952 kg (4,303 lb)<sup class="reference" id="cite_ref-99"><a
href="#cite_note-99">[92]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
<td class="table-failure" style="background: #FFC7C7; vertical-align: middle;
text-align: center;">Failure<sup class="reference" id="cite_ref-
nyt-20150628_100-0"><a href="#cite_note-
nyt-20150628-100">[93]</a></sup><br/><small>(in flight)</small>
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</td>
<td style="background:#ececec; text-align:center;">Precluded<sup
class="reference" id="cite_ref-101"><a
href="#cite_note-101">[94]</a></sup><br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Launch performance was nominal until an overpressure incident in
the second-stage <a class="mw-redirect" href="/wiki/LOX" title="LOX">LOX</a>
tank, leading to vehicle breakup at T+150 seconds. Dragon capsule survived the
explosion but was lost upon splashdown as its software did not contain
provisions for parachute deployment on launch vehicle failure.<sup
class="reference" id="cite_ref-nsf-20150727_102-0"><a href="#cite_note-
nsf-20150727-102">[95]</a></sup><small>(<a href="#Loss_of_CRS-7_mission">more
details below</a>)</small> The drone ship <i>Of Course I Still Love You</i> was
towed out to sea to prepare for a landing test so this mission was its first
operational assignment.<sup class="reference" id="cite_ref-nsf20150618_103-0"><a
href="#cite_note-nsf20150618-103">[96]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">20
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<td>22 December 2015,<br/>01:29<sup class="reference" id="cite_ref-orbcomm-
og2_104-0"><a href="#cite_note-orbcomm-og2-104">[97]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9
FT</a><br/>B1019.1<sup class="reference" id="cite_ref-flight20-booster_105-0"><a
href="#cite_note-flight20-booster-105">[98]</a></sup>
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<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40</a>
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<td><a class="mw-redirect" href="/wiki/Orbcomm-OG2" title="Orbcomm-OG2">Orbcomm-
OG2</a>-2<br/>(11 satellites)<sup class="reference" id="cite_ref-
sxManifest20120925_28-10"><a href="#cite_note-
sxManifest20120925-28">[22]</a></sup><sup class="reference" id="cite_ref-
orbcomm-og2_104-1"><a href="#cite_note-orbcomm-og2-104">[97]</a></sup>
</td>
<td>2,034 kg (4,484 lb)
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a>
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<td><a href="/wiki/Orbcomm" title="Orbcomm">Orbcomm</a>
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flight20-landing_106-0"><a href="#cite_note-
flight20-landing-106">[99]</sup>
<small>(ground
pad)</small>
</td></tr>
<tr>
<td colspan="9">Payload included eleven satellites weighing 172 kg (379 lb)
each,<sup class="reference" id="cite_ref-gunter-og2_30-2"><a href="#cite_note-
gunter-og2-30">[24]</sup> and a 142 kg (313 lb) mass simulator.<sup
class="reference" id="cite_ref-gunter-og2-sim_59-1"><a href="#cite_note-gunter-
og2-sim-59">[52]</sup> First launch of the upgraded v1.1 version, with a 30%
power increase.<sup class="reference" id="cite_ref-sn20151016_107-0"><a
href="#cite_note-sn20151016-107">[100]</sup> Orbcomm had originally agreed
to be the third flight of the enhanced-thrust rocket,<sup class="reference"
id="cite_ref-sn20150508_108-0"><a href="#cite_note-
sn20150508-108">[101]</sup> but the change to the maiden flight position was
announced in October 2015.<sup class="reference" id="cite_ref-
sn20151016_107-1">[100]</sup> SpaceX
received a permit from the <a class="mw-redirect" href="/wiki/FAA"
title="FAA">FAA to land the booster <a href="/wiki/Landing_Zones_1_and_2"
title="Landing Zones 1 and 2">on solid ground at <a
href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral Space
Force Station">Cape Canaveral<sup class="reference" id="cite_ref-109"><a
href="#cite_note-109">[102]</sup> and succeeded for the first time.<sup
class="reference" id="cite_ref-flight20-landing_106-1"><a href="#cite_note-
flight20-landing-106">[99]</sup> This booster, serial number <a class="mw-
redirect" href="/wiki/B1019" title="B1019">B1019, is now on permanent
display outside SpaceX's headquarters in <a href="/wiki/Hawthorne,_California"
title="Hawthorne, California">Hawthorne, California, at the intersection of
Crenshaw Boulevard and Jack Northrop Avenue.<sup class="reference" id="cite_ref-
flight20-booster_105-1">[98]</sup>
<small>(more details
below)</small>
</td></tr></tbody></table>, <table class="wikitable plainrowheaders collapsible"
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</th>
<th scope="col">Date and
time (<a href="/wiki/Coordinated_Universal_Time"
title="Coordinated Universal Time">UTC)
</th>
<th scope="col"><a href="/wiki/List_of_Falcon_9_first-stage_boosters"
title="List of Falcon 9 first-stage boosters">Version,
Booster<sup
class="reference" id="cite_ref-booster_11-3"><a href="#cite_note-
booster-11">[b]</sup>

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</th>
<th scope="col">Launch site
</th>
<th scope="col">Payload<sup class="reference" id="cite_ref-Dragon_12-3"><a
href="#cite_note-Dragon-12">[c]</a></sup>
</th>
<th scope="col">Payload mass
</th>
<th scope="col">Orbit
</th>
<th scope="col">Customer
</th>
<th scope="col">Launch<br/>outcome
</th>
<th scope="col"><a href="/wiki/Falcon_9_first-stage_landing_tests" title="Falcon
9 first-stage landing tests">Booster<br/>landing</a>
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<td>17 January 2016,<br/>18:42<sup class="reference" id="cite_ref-
SFN_LLog_27-6"><a href="#cite_note-SFN_LLog-27">[21]</a></sup>
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<td><a href="/wiki/Falcon_9_v1.1" title="Falcon 9 v1.1">F9
v1.1</a><br/>B1017<sup class="reference" id="cite_ref-block_numbers_14-14"><a
href="#cite_note-block_numbers-14">[8]</a></sup>
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<td><a class="mw-redirect" href="/wiki/Vandenberg_Air_Force_Base"
title="Vandenberg Air Force Base">VAFB</a>,<br/><a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E</a>
</td>
<td><a href="/wiki/Jason-3" title="Jason-3">Jason-3</a><sup class="reference"
id="cite_ref-sxManifest20130731_75-6"><a href="#cite_note-
sxManifest20130731-75">[68]</a></sup><sup class="reference" id="cite_ref-111"><a
href="#cite_note-111">[104]</a></sup>
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<td>553 kg (1,219 lb)
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Program">LSP</a>)</li>
<li><a class="mw-redirect" href="/wiki/NOAA" title="NOAA">NOAA</a></li>
<li><a href="/wiki/CNES" title="CNES">CNES</a></li></ul>
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<td colspan="9">First launch of NASA and NOAA joint science mission under the <a
class="mw-redirect" href="/wiki/Launch_Services_Program" title="Launch Services
Program">NLS II</a> launch contract (not related to NASA CRS or USAF OSP3
contracts) and last launch of the Falcon 9 v1.1 launch vehicle. The <a
href="/wiki/Jason-3" title="Jason-3">Jason-3</a> satellite was successfully
deployed to target orbit.<sup class="reference" id="cite_ref-
gw20160117_112-0"><a href="#cite_note-gw20160117-112">[105]</a></sup>  SpaceX
attempted for the first time to recover the first-stage booster on its new
Pacific autonomous drone ship, but after a soft landing on the ship, the lockout
on one of the landing legs failed to latch and the booster fell over and
exploded.<sup class="reference" id="cite_ref-113"><a
href="#cite_note-113">[106]</a></sup><sup class="reference" id="cite_ref-
wp20160118_114-0"><a href="#cite_note-wp20160118-114">[107]</a></sup>
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href="#cite_note-SFN_LLog-27">[21]</a></sup>
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href="#cite_note-skyrocket_1.2-115">[108]</a></sup>
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<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40</a>
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<td><a href="/wiki/SES-9" title="SES-9">SES-9</a><sup class="reference"
id="cite_ref-sxManifest20130731_75-7"><a href="#cite_note-
sxManifest20130731-75">[68]</a></sup><sup class="reference" id="cite_ref-
spacenews20140410_116-0"><a href="#cite_note-
spacenews20140410-116">[109]</a></sup><sup class="reference" id="cite_ref-
nsf20160208_117-0"><a href="#cite_note-nsf20160208-117">[110]</a></sup>
</td>
<td>5,271 kg (11,621 lb)
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
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orbit">GTO</a>
</td>
<td><a class="mw-redirect" href="/wiki/SES_S.A." title="SES S.A.">SES</a>
</td>
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<td class="table-failure" style="background: #FFC7C7; vertical-align: middle;
text-align: center;">Failure<br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">Second launch of the enhanced <a
href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">Falcon 9 Full
Thrust</a> launch vehicle.<sup class="reference" id="cite_ref-
sn20151016_107-2"><a href="#cite_note-sn20151016-107">[100]</a></sup> SpaceX
attempted for the first time to recover a booster from a GTO launch to a <a
href="/wiki/Autonomous_spaceport_drone_ship" title="Autonomous spaceport drone
ship">drone ship</a>.<sup class="reference" id="cite_ref-bi20160223_118-0"><a
href="#cite_note-bi20160223-118">[111]</a></sup> Successful landing was not
expected due to low fuel reserves<sup class="reference" id="cite_ref-
sxPressKit20160223_119-0"><a href="#cite_note-
sxPressKit20160223-119">[112]</a></sup> and the booster "landed hard".<sup
class="reference" id="cite_ref-musk-tweet-20160305_120-0"><a href="#cite_note-
musk-tweet-20160305-120">[113]</a></sup> But the controlled-descent, atmospheric
re-entry and navigation to the drone ship were successful and returned
significant test data on bringing back high-energy Falcon 9 boosters.<sup
class="reference" id="cite_ref-sn20160304_121-0"><a href="#cite_note-
sn20160304-121">[114]</a></sup>
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href="#cite_note-SFN_LLog-27">[21]</a></sup>
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FT</a><br/><a href="/wiki/List_of_Falcon_9_first-stage_boosters" title="List of
Falcon 9 first-stage boosters">B1021.1</a><sup class="reference" id="cite_ref-
nsf-20170330_122-0"><a href="#cite_note-nsf-20170330-122">[115]</a></sup>
</td>
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Space Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40</a>
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<td><a href="/wiki/SpaceX_CRS-8" title="SpaceX CRS-8">SpaceX CRS-8</a><sup
class="reference" id="cite_ref-sxManifest20130731_75-8"><a href="#cite_note-
sxManifest20130731-75">[68]</a></sup><sup class="reference" id="cite_ref-
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nsf20160208_117-1"><a href="#cite_note-
nsf20160208-117">[110]</a></sup><br/>(Dragon C110.1)
</td>
<td>3,136 kg (6,914 lb)<sup class="reference" id="cite_ref-123"><a
href="#cite_note-123">[116]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
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<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
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text-align: center;">Success<sup class="reference" id="cite_ref-
crs-8-webcast_124-0"><a href="#cite_note-crs-8-webcast-124">[117]</a></sup>
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<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-125"><a
href="#cite_note-125">[118]</a></sup><br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">Dragon carried over 1,500 kg (3,300 lb) of supplies and
delivered the inflatable <a href="/wiki/Bigelow_Expandable_Activity_Module"
title="Bigelow Expandable Activity Module">Bigelow Expandable Activity
Module</a> (BEAM) to the ISS for two years of in-orbit tests.<sup
class="reference" id="cite_ref-126"><a href="#cite_note-126">[119]</a></sup> The
rocket's first stage landed smoothly on SpaceX's <a
href="/wiki/Autonomous_spaceport_drone_ship" title="Autonomous spaceport drone
ship">autonomous spaceport drone ship</a> at 9 minutes after liftoff, making
this the first successful landing of a rocket booster on a ship at sea from an
orbital launch.<sup class="reference" id="cite_ref-flight23_127-0"><a
href="#cite_note-flight23-127">[120]</a></sup> The first stage <a class="mw-
redirect" href="/wiki/B1021" title="B1021">B1021</a> later became the first
orbital booster to be reused when it launched <a href="/wiki/SES-10"
title="SES-10">SES-10</a> on 30 March 2017.<sup class="reference" id="cite_ref-
nsf-20170330_122-1"><a href="#cite_note-nsf-20170330-122">[115]</a></sup> A
month later, the Dragon spacecraft returned a downmass containing astronaut's
Scott Kelly biological samples from his year-long mission on ISS.<sup
class="reference" id="cite_ref-128"><a
href="#cite_note-128">[121]</a></sup><small>(<a href="#Full-
thrust_version_and_first_booster_landings">more details below</a>)</small>
</td></tr>
<tr>
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<td>6 May 2016,<br/>05:21<sup class="reference" id="cite_ref-SFN_LLog_27-9"><a
href="#cite_note-SFN_LLog-27">[21]</a></sup>
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<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9
FT</a><br/>B1022.1<sup class="reference" id="cite_ref-nsf20170325_129-0"><a
href="#cite_note-nsf20170325-129">[122]</a></sup>
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Space Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40</a>
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<td><a href="/wiki/SKY_Perfect_JSAT" title="SKY Perfect JSAT">JCSAT-14</a><sup
class="reference" id="cite_ref-130"><a href="#cite_note-130">[123]</a></sup>
</td>
<td>4,696 kg (10,353 lb)<sup class="reference" id="cite_ref-131"><a
href="#cite_note-131">[124]</a></sup>
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a href="/wiki/SKY_Perfect_JSAT" title="SKY Perfect JSAT">SKY Perfect JSAT
Group</a>
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<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">First time SpaceX launched a Japanese satellite, and first time
a booster landed successfully after launching a payload into a GTO.<sup
class="reference" id="cite_ref-132"><a href="#cite_note-132">[125]</a></sup> As
this flight profile has a smaller margin for the booster recovery, the first
stage re-entered Earth's atmosphere faster than for previous landings, with five
times the heating power.<sup class="reference" id="cite_ref-133"><a
href="#cite_note-133">[126]</a></sup><sup class="reference" id="cite_ref-134"><a
href="#cite_note-134">[127]</a></sup>
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href="#cite_note-135">[128]</a></sup>
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FT</a><br/><a href="/wiki/List_of_Falcon_9_first-stage_boosters" title="List of
Falcon 9 first-stage boosters">B1023.1</a><sup class="reference" id="cite_ref-
nsf-20170425_136-0"><a href="#cite_note-nsf-20170425-136">[129]</a></sup>
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Space Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40</a>
</td>
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class="reference" id="cite_ref-sn20140430_137-0"><a href="#cite_note-
sn20140430-137">[130]</a></sup><sup class="reference" id="cite_ref-138"><a
href="#cite_note-138">[131]</a></sup>
</td>
<td>3,100 kg (6,800 lb)<sup class="reference" id="cite_ref-139"><a
href="#cite_note-139">[132]</a></sup>
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a href="/wiki/Thaicom" title="Thaicom">Thaicom</a>
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text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-140"><a
href="#cite_note-140">[133]</a></sup><br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">Second successful return from a GTO launch,<sup
class="reference" id="cite_ref-141"><a href="#cite_note-141">[134]</a></sup>
after launching Thaicom 8 towards <a href="/wiki/78th_meridian_east" title="78th
meridian east">78.5° east</a>.<sup class="reference" id="cite_ref-142"><a
href="#cite_note-142">[135]</a></sup> Later became the first booster to be
reflown after being recovered from a GTO launch. THAICOM 8 was delivered to a <a
href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">Super-Synchronous Transfer Orbit</a> of 91,000 km (57,000 mi).<sup
class="reference" id="cite_ref-143"><a href="#cite_note-143">[136]</a></sup>
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SFN_LLog_27-10"><a href="#cite_note-SFN_LLog-27">[21]</a></sup>
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FT</a><br/>B1024.1<sup class="reference" id="cite_ref-skyrocket_1.2_115-1"><a
href="#cite_note-skyrocket_1.2-115">[108]</a></sup>
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<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
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Space Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
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<ul><li><a href="/wiki/ABS_(satellite_operator)" title="ABS (satellite
operator)">ABS-2A</a></li>
<li><a href="/wiki/Eutelsat" title="Eutelsat">Eutelsat 117 West B</a><sup
class="reference" id="cite_ref-sxManifest20130731_75-9"><a href="#cite_note-
sxManifest20130731-75">[68]</a></sup></li></ul>
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</td>
<td>3,600 kg (7,900 lb)
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<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
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Broadcast Satellite">ABS</a></li>
<li><a href="/wiki/Eutelsat" title="Eutelsat">Eutelsat</a></li></ul>
</div>
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<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-failure" style="background: #FFC7C7; vertical-align: middle;
text-align: center;">Failure<sup class="reference" id="cite_ref-fail-13_71-2"><a
href="#cite_note-fail-13-71">[64]</a></sup><br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">One year after pioneering this technique on Flight 16, Falcon
again launched two <a href="/wiki/Boeing_702" title="Boeing 702">Boeing
702SP</a> <a href="/wiki/XIPS-25" title="XIPS-25">gridded ion thruster</a>
satellites at 1,800 kg (4,000 lb) each,<sup class="reference"
id="cite_ref-144"><a href="#cite_note-144">[137]</a></sup><sup class="reference"
id="cite_ref-145"><a href="#cite_note-145">[138]</a></sup> in a dual-stack
configuration, with the two customers sharing the rocket and mission costs.<sup
class="reference" id="cite_ref-boeing_88-1"><a href="#cite_note-
boeing-88">[81]</a></sup> First-stage landing attempt on drone ship failed due
to low thrust on one of the three landing engines;<sup class="reference"
id="cite_ref-146"><a href="#cite_note-146">[139]</a></sup> a sub-optimal path
led to the stage running out of propellant just above the deck of the landing
ship.<sup class="reference" id="cite_ref-147"><a
href="#cite_note-147">[140]</a></sup>
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<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9
FT</a><br/>B1025.1<sup class="reference" id="cite_ref-nsf-20170425_136-1"><a
href="#cite_note-nsf-20170425-136">[129]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40</a>
</td>
<td><a href="/wiki/SpaceX_CRS-9" title="SpaceX CRS-9">SpaceX CRS-9</a><sup
class="reference" id="cite_ref-sxManifest20130731_75-10"><a href="#cite_note-
sxManifest20130731-75">[68]</a></sup><sup class="reference" id="cite_ref-
spn-20160224_148-0"><a href="#cite_note-
spn-20160224-148">[141]</a></sup><br/>(Dragon C111.1)
</td>
<td>2,257 kg (4,976 lb)<sup class="reference" id="cite_ref-149"><a
href="#cite_note-149">[142]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small>(ground pad)</small>
</td></tr>
<tr>
<td colspan="9">Cargo to ISS included an <a
href="/wiki/International_Docking_Adapter" title="International Docking
Adapter">International Docking Adapter</a> (IDA-2) and total payload with
reusable Dragon Capsule was 6,457 kg (14,235 lb). Second successful <a
href="/wiki/Falcon_9_first-stage_landing_tests" title="Falcon 9 first-stage
landing tests">first-stage landing</a> on a ground pad.<sup class="reference"
id="cite_ref-150"><a href="#cite_note-150">[143]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">28
```

```
</th>
<td>14 August 2016,<br/>05:26
</td>
<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9
FT</a><br/>B1026.1<sup class="reference" id="cite_ref-skyrocket_1.2_115-2"><a
href="#cite_note-skyrocket_1.2-115">[108]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">LC-40</a>
</td>
<td><a href="/wiki/JCSAT-16" title="JCSAT-16">JCSAT-16</a>
</td>
<td>4,600 kg (10,100 lb)
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a class="mw-redirect" href="/wiki/SKY_Perfect_JSAT_Group" title="SKY
Perfect JSAT Group">SKY Perfect JSAT Group</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">First attempt to land from a ballistic trajectory using a
single-engine landing burn, as all previous landings from a ballistic trajectory
had fired three engines on the final burn. The latter provides more braking
force but subjects the vehicle to greater structural stresses, while the single-
engine landing burn takes more time and fuel while allowing more time during
final descent for corrections.<sup class="reference" id="cite_ref-151"><a
href="#cite_note-151">[144]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">N/A <sup
class="reference" id="cite_ref-152"><a href="#cite_note-152">[e]</a></sup>
</th>
<td>3 September 2016,<br/>07:00<br/>(planned)<sup class="reference"
id="cite_ref-153"><a href="#cite_note-153">[145]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9 FT</a>
<br/>B1028.1<sup class="reference" id="cite_ref-skyrocket_1.2_115-3"><a
href="#cite_note-skyrocket_1.2-115">[108]</a></sup>
</td>
```

<td>Cape Canaveral,
LC-40
</td>
<td>Amos-6^{[146]}
</td>
<td>5,500 kg (12,100 lb)
</td>
<td>GTO
</td>
<td>Spacecom
</td>
<td class="table-failure" style="background: #FFC7C7; vertical-align: middle; text-align: center;">Precluded
<small>(failure pre-flight)</small>
</td>
<td style="background:#ececec; text-align:center;">Precluded
<small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">The rocket and the Amos-6 payload were lost in a launch pad explosion on 1 September 2016 during propellant filling procedures prior to a static fire test.^{[147]} The pad was clear of personnel, and there were no injuries.^{[148]} SpaceX released an official statement in January 2017 indicating that the cause of the failure was a buckled liner in several of the Composite overwrapped pressure vessel (COPV) (used to store helium which pressurize the stage's propellant tanks), causing perforations that allowed liquid and/or solid oxygen to accumulate underneath the lining, which was ignited by friction.^{[149]} Following the explosion, SpaceX has switched to performing static fire tests only without attached payloads.<small>(more details below)</small>
</td></tr></tbody></table>, <table class="wikitable plainrowheaders collapsible" style="width: 100%;">
<tbody><tr>
<th scope="col">Flight No.
</th>
<th scope="col">Date and
time (UTC)
</th>
<th scope="col"><a href="/wiki/List_of_Falcon_9_first-stage_boosters"

```
title="List of Falcon 9 first-stage boosters">Version,<br/>Booster</a><sup
class="reference" id="cite_ref-booster_11-4"><a href="#cite_note-
booster-11">[b]</a></sup>
</th>
<th scope="col">Launch site
</th>
<th scope="col">Payload<sup class="reference" id="cite_ref-Dragon_12-4"><a
href="#cite_note-Dragon-12">[c]</a></sup>
</th>
<th scope="col">Payload mass
</th>
<th scope="col">Orbit
</th>
<th scope="col">Customer
</th>
<th scope="col">Launch<br/>outcome
</th>
<th scope="col"><a href="/wiki/Falcon_9_first-stage_landing_tests" title="Falcon
9 first-stage landing tests">Booster<br/>landing</a>
</th></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">29
</th>
<td>14 January 2017,<br/>17:54
</td>
<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9
FT</a><br/><a href="/wiki/List_of_Falcon_9_first-stage_boosters" title="List of
Falcon 9 first-stage boosters">B1029.1</a><sup class="reference" id="cite_ref-
NSF-2017-01-17_159-0"><a href="#cite_note-NSF-2017-01-17-159">[151]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Vandenberg_Air_Force_Base"
title="Vandenberg Air Force Base">VAFB</a>,<br/><a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E</a>
</td>
<td><a class="mw-redirect" href="/wiki/Iridium_NEXT" title="Iridium
NEXT">Iridium NEXT</a>-1<br/>(10 satellites)<sup class="reference" id="cite_ref-
sdc20100616_160-0"><a href="#cite_note-sdc20100616-160">[152]</a></sup><sup
class="reference" id="cite_ref-161"><a href="#cite_note-161">[153]</a></sup>
</td>
<td>9,600 kg (21,200 lb)
</td>
<td><a href="/wiki/Polar_orbit" title="Polar orbit">Polar</a> <a
href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/Iridium_Communications" title="Iridium
Communications">Iridium Communications</a>
</td>
```

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<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-162"><a
href="#cite_note-162">[154]</a></sup><br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">Return-to-flight mission after the loss of <a class="mw-
redirect" href="/wiki/Amos-6" title="Amos-6">Amos-6</a> in September 2016. This
was the first launch of a series of Iridium NEXT satellites intended to replace
the <a href="/wiki/Iridium_satellite_constellation" title="Iridium satellite
constellation">original Iridium constellation</a> launched in the late 1990s.
Each Falcon 9 mission carried 10 satellites, with a goal of 66 plus 9 spare<sup
class="reference" id="cite_ref-IridiumridesharePR_163-0"><a href="#cite_note-
IridiumridesharePR-163">[155]</a></sup> satellites constellation by
mid-2018.<sup class="reference" id="cite_ref-sfn_164-0"><a href="#cite_note-
sfn-164">[156]</a></sup><sup class="reference" id="cite_ref-165"><a
href="#cite_note-165">[157]</a></sup> Following the delayed launch of the first
two Iridium units with a <a href="/wiki/Dnepr_(rocket)" title="Dnepr
(rocket)">Dnepr rocket</a> from April 2016, Iridium Communications decided to
launch the first batch of 10 satellites with SpaceX instead.<sup
class="reference" id="cite_ref-spn-20160225_166-0"><a href="#cite_note-
spn-20160225-166">[158]</a></sup> Payload comprised ten satellites weighing
860 kg (1,900 lb) each plus a 1,000 kg (2,200 lb) dispenser.<sup
class="reference" id="cite_ref-spn_167-0"><a href="#cite_note-
spn-167">[159]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">30
</th>
<td>19 February 2017,<br/>14:39
</td>
<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9
FT</a><br/>B1031.1<sup class="reference" id="cite_ref-block_numbers_14-15"><a
href="#cite_note-block_numbers-14">[8]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/SpaceX_CRS-10" title="SpaceX CRS-10">SpaceX CRS-10</a><sup
class="reference" id="cite_ref-spn-20160224_148-1"><a href="#cite_note-
spn-20160224-148">[141]</a></sup><br/>(Dragon C112.1)
</td>
<td>2,490 kg (5,490 lb)<sup class="reference" id="cite_ref-168"><a
href="#cite_note-168">[160]</a></sup>
</td>
```

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<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a> (<a
class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small>(ground pad)</small>
</td></tr>
<tr>
<td colspan="9">First Falcon 9 flight from the historic <a
href="/wiki/Kennedy_Space_Center_Launch_Complex_39A" title="Kennedy Space Center
Launch Complex 39A">LC-39A</a> launchpad at <a href="/wiki/Kennedy_Space_Center"
title="Kennedy Space Center">Kennedy Space Center</a>, and first uncrewed launch
from LC-39A since <a href="/wiki/Skylab" title="Skylab">Skylab-1</a>.<sup
class="reference" id="cite_ref-:10_169-0"><a
href="#cite_note-:10-169">[161]</a></sup> The flight carried supplies and
materials to support ISS Expeditions <a href="/wiki/Expedition_50"
title="Expedition 50">50</a> and <a href="/wiki/Expedition_51" title="Expedition
51">51</a>, and third return of first stage booster to landing pad at <a
href="/wiki/Cape_Canaveral" title="Cape Canaveral">Cape Canaveral</a> <a
href="/wiki/Landing_Zones_1_and_2" title="Landing Zones 1 and 2">Landing Zone
1</a>.<sup class="reference" id="cite_ref-170"><a
href="#cite_note-170">[162]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">31
</th>
<td>16 March 2017,<br/>06:00
</td>
<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9
FT</a><br/>B1030.1<sup class="reference" id="cite_ref-171"><a
href="#cite_note-171">[163]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a class="mw-redirect" href="/wiki/EchoStar_23" title="EchoStar 23">EchoStar
23</a>
</td>
<td>5,600 kg (12,300 lb)<sup class="reference" id="cite_ref-172"><a
href="#cite_note-172">[164]</a></sup>
</td>
```

<td>GTO
</td>
<td>EchoStar
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle; text-align: center;">Success
</td>
<td class="table-noAttempt" style="background: #EEE; vertical-align: middle; white-space: nowrap; text-align: center;">No attempt
^{[165]}
</td></tr>
<tr>
<td colspan="9">First uncrewed non-station launch from LC-39A since Apollo 6.^{[161]} Launched a communications satellite for broadcast services over Brazil.^{[166]} Due to the payload size launch into a GTO, the booster was expended into the Atlantic Ocean and did not feature landing legs and grid fins.^{[167]}
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">32
</th>
<td>30 March 2017,
22:27
</td>
<td>F9 FT
<abbr title="Flight proven booster"> </abbr>
B1021.2^{[115]}
</td>
<td>KSC,
LC-39A
</td>
<td>SES-10^{[109]}^{[168]}
</td>
<td>5,300 kg (11,700 lb)^{[169]}
</td>

<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO
</td>
<td>SES
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
thevergeflight32_178-0"><a href="#cite_note-
thevergeflight32-178">[170]</sup>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
<small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">First payload to fly on a reused first stage, B1021, previously
launched with CRS-8, and
first to land intact a second time.<sup class="reference" id="cite_ref-179"><a
href="#cite_note-179">[171]</sup><sup class="reference" id="cite_ref-
thevergeflight32_178-1"><a href="#cite_note-
thevergeflight32-178">[170]</sup> Additionally, this flight was the first
reused rocket to fly from LC-39A since <a href="/wiki/STS-135"
title="STS-135">STS-135 and for the first time the <a
href="/wiki/Payload_fairing" title="Payload fairing">payload fairing, used
to protect the payload during launch, remained intact after a successful <a
href="/wiki/Splashdown" title="Splashdown">splashdown achieved with
thrusters and a steerable parachute.<sup class="reference" id="cite_ref-180"><a
href="#cite_note-180">[172]</sup><sup class="reference" id="cite_ref-181"><a
href="#cite_note-181">[173]</sup><small>(<a
href="#Inaugural_reuse_of_the_first_stage">more details below)</small>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">33
</th>
<td>1 May 2017,
11:15
</td>
<td>F9
FT
B1032.1<sup class="reference" id="cite_ref-nsf-20170425_136-2"><a
href="#cite_note-nsf-20170425-136">[129]</sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC,
<a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A
</td>
<td><a href="/wiki/List_of_NRO_launches" title="List of NRO
launches">NROL-76<sup class="reference" id="cite_ref-nrol-76_182-0"><a
href="#cite_note-nrol-76-182">[174]</sup>
</td>
<td class="table-na" data-sort-value="" style="background: #ececec; color:

#2C2C2C; vertical-align: middle; text-align: center;">Classified
</td>
<td>LEO<sup
class="reference" id="cite_ref-183">[175]</sup>
</td>
<td><a href="/wiki/National_Reconnaissance_Office" title="National
Reconnaissance Office">NRO
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
<small>(ground pad)</small>
</td></tr>
<tr>
<td colspan="9">First launch under SpaceX's 2015 certification for national
security space missions, which allowed SpaceX to contract launch services for
classified payloads,<sup class="reference" id="cite_ref-184"><a
href="#cite_note-184">[176]</sup> and thus breaking the monopoly <a
href="/wiki/United_Launch_Alliance" title="United Launch Alliance">United Launch
Alliance (ULA) held on classified launches since 2006.<sup class="reference"
id="cite_ref-185">[177]</sup> For the first time,
SpaceX offered continuous livestream of first stage booster from liftoff to
landing, but omitted second-stage speed and altitude telemetry.<sup
class="reference" id="cite_ref-186">[178]</sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">34
</th>
<td>15 May 2017,
23:21
</td>
<td>F9
FT
B1034.1<sup class="reference" id="cite_ref-187"><a
href="#cite_note-187">[179]</sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC,
<a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A
</td>
<td>Inmarsat-5 F4<sup
class="reference" id="cite_ref-spacenews20140702_188-0"><a href="#cite_note-
spacenews20140702-188">[180]</sup>
</td>
<td>6,070 kg (13,380 lb)<sup class="reference" id="cite_ref-gunter-
inmarsat5_189-0">[181]</sup>
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO

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</td>
<td><a href="/wiki/Inmarsat" title="Inmarsat">Inmarsat</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-noAttempt" style="background: #EEE; vertical-align: middle;
white-space: nowrap; text-align: center;">No attempt<br/><sup class="reference"
id="cite_ref-expendable_173-1"><a href="#cite_note-
expendable-173">[165]</a></sup>
</td></tr>
<tr>
<td colspan="9">The launch was originally scheduled for the Falcon Heavy, but <a
href="/wiki/Falcon_9_Full_Thrust#Modifications_from_Falcon_9_v1.1" title="Falcon
9 Full Thrust">performance improvements</a> allowed the mission to be carried
out by an expendable Falcon 9 instead.<sup class="reference" id="cite_ref-
sn_190-0"><a href="#cite_note-sn-190">[182]</a></sup>  Inmarsat-5 F4 is
Inmarsat's "largest and most complicated communications satellite ever
built".<sup class="reference" id="cite_ref-191"><a
href="#cite_note-191">[183]</a></sup> Inmarsat 5 F4 was delivered into an arcing
<a href="/wiki/Supersynchronous_orbit" title="Supersynchronous
orbit">"supersynchronous" transfer orbit</a> of 381 km × 68,839 km (237 mi
× 42,775 mi) in altitude, tilted 24.5° to the <a href="/wiki/Equator"
title="Equator">equator</a>.<sup class="reference" id="cite_ref-192"><a
href="#cite_note-192">[184]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">35
</th>
<td>3 June 2017,<br/>21:07
</td>
<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9
FT</a><br/>B1035.1<sup class="reference" id="cite_ref-nsf-20170528_193-0"><a
href="#cite_note-nsf-20170528-193">[185]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/SpaceX_CRS-11" title="SpaceX CRS-11">SpaceX CRS-11</a><sup
class="reference" id="cite_ref-spn-20160224_148-2"><a href="#cite_note-
spn-20160224-148">[141]</a></sup><br/>(Dragon C106.2 )
</td>
<td>2,708 kg (5,970 lb)<sup class="reference" id="cite_ref-194"><a
href="#cite_note-194">[186]</a></sup>
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a> (<a
class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
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</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small>(ground pad)</small>
</td></tr>
<tr>
<td colspan="9">This mission delivered <a
href="/wiki/Neutron_Star_Interior_Composition_Explorer" title="Neutron Star
Interior Composition Explorer">Neutron Star Interior Composition Explorer</a>
(NICER),<sup class="reference" id="cite_ref-nasa-nicer-manifest_195-0"><a
href="#cite_note-nasa-nicer-manifest-195">[187]</a></sup> Multiple User System
for Earth Sensing Facility (MUSES),<sup class="reference" id="cite_ref-196"><a
href="#cite_note-196">[188]</a></sup> <a href="/wiki/Roll_Out_Solar_Array"
title="Roll Out Solar Array">Roll Out Solar Array</a> (ROSA),<sup
class="reference" id="cite_ref-197"><a href="#cite_note-197">[189]</a></sup> an
<a class="new"
href="/w/index.php?title=Advanced_Plant_Habitat&amp;action=edit&amp;redlink=1"
title="Advanced Plant Habitat (page does not exist)">Advanced Plant Habitat</a>
to the ISS,<sup class="reference" id="cite_ref-workshop-matsew20160517_198-0"><a
href="#cite_note-workshop-matsew20160517-198">[190]</a></sup><sup
class="reference" id="cite_ref-199"><a href="#cite_note-199">[191]</a></sup> and
<a href="/wiki/Birds-1" title="Birds-1">Birds-1</a> payloads. This mission
launched for the first time a refurbished Dragon capsule,<sup class="reference"
id="cite_ref-dragon-reuse_200-0"><a href="#cite_note-dragon-
reuse-200">[192]</a></sup> serial number <a href="/wiki/Dragon_C106"
title="Dragon C106">C106</a>, which had flown in September 2014 on the <a
href="/wiki/SpaceX_CRS-4" title="SpaceX CRS-4">SpaceX CRS-4</a> mission,<sup
class="reference" id="cite_ref-nsf-20170528_193-1"><a href="#cite_note-
nsf-20170528-193">[185]</a></sup> and was the first time since 2011 a reused
spacecraft arrived at the ISS.<sup class="reference" id="cite_ref-201"><a
href="#cite_note-201">[193]</a></sup> Five <a class="mw-redirect"
href="/wiki/Cubesat" title="Cubesat">cubesats</a> were included in the payload,
the first satellites from the countries of <a href="/wiki/Bangladesh"
title="Bangladesh">Bangladesh</a> (<i><a href="/wiki/BRAC_Onnesha" title="BRAC
Onnesha">BRAC Onnesha</a></i>), <a href="/wiki/Ghana" title="Ghana">Ghana</a>
(<i><a href="/wiki/GhanaSat-1" title="GhanaSat-1">GhanaSat-1</a></i>), and <a
href="/wiki/Mongolia" title="Mongolia">Mongolia</a> (<i><a
href="/wiki/Mazaalai_(satellite)" title="Mazaalai
(satellite)">Mazaalai</a></i>).<sup class="reference" id="cite_ref-
Amsat_202-0"><a href="#cite_note-Amsat-202">[194]</a></sup>
</td></tr>
<tr>
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<th rowspan="2" scope="row" style="text-align:center;">36
</th>
<td>23 June 2017,<br/>19:10
</td>
<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9 FT</a>
 <br/><a href="/wiki/List_of_Falcon_9_first-stage_boosters" title="List of
Falcon 9 first-stage boosters">B1029.2</a><sup class="reference" id="cite_ref-
sfn-20170505_203-0"><a href="#cite_note-sfn-20170505-203">[195]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/BulgariaSat-1" title="BulgariaSat-1">BulgariaSat-1</a><sup
class="reference" id="cite_ref-ssloral20140908_204-0"><a href="#cite_note-
ssloral20140908-204">[196]</a></sup>
</td>
<td>3,669 kg (8,089 lb)<sup class="reference" id="cite_ref-205"><a
href="#cite_note-205">[197]</a></sup>
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a href="/wiki/Bulsatcom" title="Bulsatcom">Bulsatcom</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">Second time a booster was reused, as <a
href="/wiki/List_of_Falcon_9_first-stage_boosters" title="List of Falcon 9
first-stage boosters">B1029</a> had flown the Iridium mission in January
2017.<sup class="reference" id="cite_ref-sfn-20170505_203-1"><a
href="#cite_note-sfn-20170505-203">[195]</a></sup> This was the first commercial
Bulgarian-owned communications satellite.<sup class="reference" id="cite_ref-
sfn-20170505_203-2"><a href="#cite_note-sfn-20170505-203">[195]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">37
</th>
<td>25 June 2017,<br/>20:25
</td>
<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9
FT</a><br/>B1036.1<sup class="reference" id="cite_ref-nsf-20170624_206-0"><a
href="#cite_note-nsf-20170624-206">[198]</a></sup>
```

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</td>
<td><a class="mw-redirect" href="/wiki/Vandenberg_Air_Force_Base"
title="Vandenberg Air Force Base">VAFB</a>,<br/><a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E</a>
</td>
<td><a class="mw-redirect" href="/wiki/Iridium_NEXT" title="Iridium
NEXT">Iridium NEXT</a>-2<br/>(10 satellites)
</td>
<td>9,600 kg (21,200 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/Iridium_Communications" title="Iridium
Communications">Iridium Communications</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">Second Iridium constellation launch of 10 satellites, and first
flight using <a href="/wiki/Titanium" title="Titanium">titanium</a> (instead of
<a href="/wiki/Aluminium" title="Aluminium">aluminium</a>) grid fins to improve
control authority and better cope with heat during re-entry.<sup
class="reference" id="cite_ref-207"><a href="#cite_note-207">[199]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">38
</th>
<td>5 July 2017,<br/>23:38
</td>
<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9
FT</a><br/>B1037.1<sup class="reference" id="cite_ref-nsf-20170629_208-0"><a
href="#cite_note-nsf-20170629-208">[200]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/Intelsat_35e" title="Intelsat 35e">Intelsat 35e</a><sup
class="reference" id="cite_ref-sfn-20160830_209-0"><a href="#cite_note-
sfn-20160830-209">[201]</a></sup>
</td>
<td>6,761 kg (14,905 lb)<sup class="reference" id="cite_ref-210"><a
href="#cite_note-210">[202]</a></sup>
```

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</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a href="/wiki/Intelsat" title="Intelsat">Intelsat</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-noAttempt" style="background: #EEE; vertical-align: middle;
white-space: nowrap; text-align: center;">No attempt<br/><sup class="reference"
id="cite_ref-expendable_173-2"><a href="#cite_note-
expendable-173">[165]</a></sup>
</td></tr>
<tr>
<td colspan="9">Originally expected to be flown on a <a
href="/wiki/Falcon_Heavy" title="Falcon Heavy">Falcon Heavy</a>,<sup
class="reference" id="cite_ref-211"><a href="#cite_note-211">[203]</a></sup>
improvements to the Merlin engines meant that the heavy satellite could be flown
to GTO in an expendable configuration of Falcon 9.<sup class="reference"
id="cite_ref-gunter-falcon-ex_212-0"><a href="#cite_note-gunter-falcon-
ex-212">[204]</a></sup> The rocket achieved a <a
href="/wiki/Supersynchronous_orbit" title="Supersynchronous
orbit">supersynchronous orbit</a> peaking at 43,000 km (27,000 mi), exceeding
the minimum requirements of 28,000 km (17,000 mi).<sup class="reference"
id="cite_ref-213"><a href="#cite_note-213">[205]</a></sup> Intelsat 35e is the
largest Intelsat's currently active satellite.<sup class="reference"
id="cite_ref-214"><a href="#cite_note-214">[206]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">39
</th>
<td>14 August 2017,<br/>16:31
</td>
<td><a class="mw-redirect" href="/wiki/Falcon_9_Block_4" title="Falcon 9 Block
4">F9 B4</a><br/>B1039.1<sup class="reference" id="cite_ref-
nsf-20170814_215-0"><a href="#cite_note-nsf-20170814-215">[207]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/SpaceX_CRS-12" title="SpaceX CRS-12">SpaceX CRS-12</a><sup
class="reference" id="cite_ref-spn-20160224_148-3"><a href="#cite_note-
spn-20160224-148">[141]</a></sup><br/>(Dragon C113.1)
</td>
<td>3,310 kg (7,300 lb)
</td>
```

<td>LEO (<a
class="mw-redirect" href="/wiki/ISS" title="ISS">ISS)
</td>
<td>NASA (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
<small>(ground pad)</small>
</td></tr>
<tr>
<td colspan="9">Dragon carried 2,349 kg (5,179 lb) of pressurized and 961 kg
(2,119 lb) unpressurized mass, including the <a
href="/wiki/Cosmic_Ray_Energetics_and_Mass_Experiment" title="Cosmic Ray
Energetics and Mass Experiment">Cosmic Ray Energetics and Mass Experiment
(CREAM) detector.<sup class="reference" id="cite_ref-workshop-
matsew20160517_198-1"><a href="#cite_note-workshop-
matsew20160517-198">[190]</sup> First flight of the upgrade known informally
as "Block 4", which increases thrust from the main engines and includes other
small upgrades,<sup class="reference" id="cite_ref-nsf-20170814_215-1"><a
href="#cite_note-nsf-20170814-215">[207]</sup> and last flight of a newly
built Dragon capsule, as further missions are planned to use refurbished
spacecraft.<sup class="reference" id="cite_ref-nsf-20170726_216-0"><a
href="#cite_note-nsf-20170726-216">[208]</sup> Also launched the <a
href="/wiki/Educational_Launch_of_Nanosatellites" title="Educational Launch of
Nanosatellites">Educational Launch of Nanosatellites ELaNa 22 mission.<sup
class="reference" id="cite_ref-auto2_56-1"><a href="#cite_note-
auto2-56">[49]</sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">40
</th>
<td>24 August 2017,
18:51
</td>
<td>F9
FT
B1038.1<sup class="reference" id="cite_ref-nsf-20170819_217-0"><a
href="#cite_note-nsf-20170819-217">[209]</sup>
</td>
<td><a class="mw-redirect" href="/wiki/Vandenberg_Air_Force_Base"
title="Vandenberg Air Force Base">VAFB,
<a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E
</td>
<td>Formosat-5<sup
class="reference" id="cite_ref-eoportal-formosat5_218-0"><a href="#cite_note-

```
eoportal-formosat5-218">[210]</a></sup><sup class="reference" id="cite_ref-
Formosat5_homepage_219-0"><a href="#cite_note-
Formosat5_homepage-219">[211]</a></sup>
</td>
<td>475 kg (1,047 lb)<sup class="reference" id="cite_ref-gunter-
formosat5_220-0"><a href="#cite_note-gunter-formosat5-220">[212]</a></sup>
</td>
<td><a href="/wiki/Sun-synchronous_orbit" title="Sun-synchronous orbit">SSO</a>
</td>
<td><a class="mw-redirect" href="/wiki/National_Space_Organization"
title="National Space Organization">NSPO</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">First <a href="/wiki/Earth_observation_satellite" title="Earth
observation satellite">Earth observation satellite</a> developed and constructed
by <a href="/wiki/Taiwan" title="Taiwan">Taiwan</a>. The payload was much under
the rocket's specifications, as the <a href="/wiki/Spaceflight_Industries"
title="Spaceflight Industries">Spaceflight Industries</a> <a
href="/wiki/SHERPA_(space_tug)" title="SHERPA (space tug)">SHERPA</a> <a
href="/wiki/Space_tug" title="Space tug">space tug</a> had been removed from the
cargo manifest of this mission,<sup class="reference" id="cite_ref-221"><a
href="#cite_note-221">[213]</a></sup> leading to analyst speculations that with
discounts due to delays, SpaceX lost money on the launch.<sup class="reference"
id="cite_ref-222"><a href="#cite_note-222">[214]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">41
</th>
<td>7 September 2017,<br/>14:00<sup class="reference" id="cite_ref-223"><a
href="#cite_note-223">[215]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Falcon_9_Block_4" title="Falcon 9 Block
4">F9 B4</a><br/>B1040.1<sup class="reference" id="cite_ref-
skyrocket_1.2_115-4"><a href="#cite_note-skyrocket_1.2-115">[108]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/Boeing_X-37" title="Boeing X-37">Boeing X-37B</a> <a
class="mw-redirect" href="/wiki/USA-277" title="USA-277">OTV-5</a>
</td>
```

<td>4,990 kg (11,000 lb)<sup class="reference" id="cite_ref-224"><a
href="#cite_note-224">[216]</sup>
<small>+ OTV payload</small>
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO
</td>
<td><a href="/wiki/United_States_Air_Force" title="United States Air
Force">USAF
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
<small>(ground pad)</small>
</td></tr>
<tr>
<td colspan="9">Due to the classified nature of the mission, the second-stage
speed and altitude telemetry were omitted from the launch webcast. Notably, the
primary contractor, Boeing, had
launched the X-37B with ULA, a Boeing partnership and a SpaceX competitor.<sup
class="reference" id="cite_ref-cnbc_2017_06_06_225-0"><a href="#cite_note-
cnbc_2017_06_06-225">[217]</sup> Second flight of the <a
href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">Falcon 9 Block
4 upgrade.<sup class="reference" id="cite_ref-nsf-20170607_226-0"><a
href="#cite_note-nsf-20170607-226">[218]</sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">42
</th>
<td>9 October 2017,
12:37
</td>
<td><a class="mw-redirect" href="/wiki/Falcon_9_Block_4" title="Falcon 9 Block
4">F9 B4
B1041.1<sup class="reference" id="cite_ref-
nsf-20170925_227-0">[219]</sup>
</td>
<td><a class="mw-redirect" href="/wiki/Vandenberg_Air_Force_Base"
title="Vandenberg Air Force Base">VAFB,
<a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E
</td>
<td><a class="mw-redirect" href="/wiki/Iridium_NEXT" title="Iridium
NEXT">Iridium NEXT-3
(10 satellites)<sup class="reference" id="cite_ref-
sdc20100616_160-1">[152]</sup>
</td>
<td>9,600 kg (21,200 lb)
</td>
<td>Polar <a
href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO

```
</td>
<td><a href="/wiki/Iridium_Communications" title="Iridium
Communications">Iridium Communications</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">Third flight of the <a class="mw-redirect"
href="/wiki/Falcon_9_Block_4" title="Falcon 9 Block 4">Falcon 9 Block 4</a>
upgrade, and the third launch of 10 Iridium NEXT satellites.<sup
class="reference" id="cite_ref-nsf-20170925_227-1"><a href="#cite_note-
nsf-20170925-227">[219]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">43
</th>
<td>11 October 2017,<br/>22:53:00
</td>
<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9 FT</a>
  <br/>B1031.2<sup class="reference" id="cite_ref-ses11-reuse_228-0"><a
href="#cite_note-ses11-reuse-228">[220]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/List_of_SES_satellites" title="List of SES
satellites">SES-11</a> / <a href="/wiki/EchoStar" title="EchoStar">EchoStar
105</a>
</td>
<td>5,200 kg (11,500 lb)
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><link href="mw-data:TemplateStyles:r1126788409" rel="mw-deduplicated-inline-
style"/><div class="plainlist">
<ul><li><a class="mw-redirect" href="/wiki/SES_S.A." title="SES S.A.">SES
S.A.</a></li>
<li><a href="/wiki/EchoStar" title="EchoStar">EchoStar</a></li></ul>
</div>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
```

```
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">Third reuse and recovery of a previously flown first-stage
booster, and the second time the contractor SES used a reflown booster.<sup
class="reference" id="cite_ref-ses11-reuse_228-1"><a href="#cite_note-
ses11-reuse-228">[220]</a></sup> The large satellite is shared, in "<a
href="/wiki/CondoSat" title="CondoSat">CondoSat</a>" arrangement between SES and
<a href="/wiki/EchoStar" title="EchoStar">EchoStar</a>.<sup class="reference"
id="cite_ref-229"><a href="#cite_note-229">[221]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">44
</th>
<td>30 October 2017,<br/>19:34
</td>
<td><a class="mw-redirect" href="/wiki/Falcon_9_Block_4" title="Falcon 9 Block
4">F9 B4</a><br/>B1042.1<sup class="reference" id="cite_ref-
nsf-20170925_227-2"><a href="#cite_note-nsf-20170925-227">[219]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/Koreasat_5A" title="Koreasat 5A">Koreasat 5A</a><sup
class="reference" id="cite_ref-spacenews20140512_230-0"><a href="#cite_note-
spacenews20140512-230">[222]</a></sup>
</td>
<td>3,500 kg (7,700 lb)
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a href="/wiki/KT_Corporation" title="KT Corporation">KT Corporation</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">First SpaceX launch of a South Korean satellite, placed in GEO
at 113.0° east.<sup class="reference" id="cite_ref-koreasat5a_231-0"><a
href="#cite_note-koreasat5a-231">[223]</a></sup> It was the third launch and
land for SpaceX in three weeks, and the 15th successful landing in a row.<sup
```

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class="reference" id="cite_ref-232"><a href="#cite_note-232">[224]</a></sup> A
small fire was observed under the booster after it landed, leading to
speculations about damages to the engines which would preclude it from flying it
again.<sup class="reference" id="cite_ref-233"><a
href="#cite_note-233">[225]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">45
</th>
<td>15 December 2017,<br/>15:36<sup class="reference" id="cite_ref-234"><a
href="#cite_note-234">[226]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9 FT</a>
  <br/>B1035.2<sup class="reference" id="cite_ref-nsf-20171111_235-0"><a
href="#cite_note-nsf-20171111-235">[227]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">Cape Canaveral</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/SpaceX_CRS-13" title="SpaceX CRS-13">SpaceX CRS-13</a><sup
class="reference" id="cite_ref-spn-20160224_148-4"><a href="#cite_note-
spn-20160224-148">[141]</a></sup><br/>(Dragon C108.2 )
</td>
<td>2,205 kg (4,861 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a> (<a
class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small>(ground pad)</small>
</td></tr>
<tr>
<td colspan="9">First launch to take place at the refurbished pad at Cape
Canaveral after the 2016 <a class="mw-redirect" href="/wiki/Amos-6"
title="Amos-6">Amos-6</a> explosion, and the 20th successful booster landing.
Being the second reuse of a Dragon capsule (previously flown on <a
href="/wiki/SpaceX_CRS-6" title="SpaceX CRS-6">SpaceX CRS-6</a>) and fourth
reuse of a booster (previously flown on <a href="/wiki/SpaceX_CRS-11"
title="SpaceX CRS-11">SpaceX CRS-11</a>) it was the first time both major
```

```
components were reused on the same flight.<sup class="reference"
id="cite_ref-236"><a href="#cite_note-236">[228]</a></sup><sup class="reference"
id="cite_ref-nsf-20171111_235-1"><a href="#cite_note-
nsf-20171111-235">[227]</a></sup>
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<tr>
<th rowspan="2" scope="row" style="text-align:center;">46
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<td>23 December 2017,<br/>01:27<sup class="reference" id="cite_ref-
sfn_iridium4_237-0"><a href="#cite_note-sfn_iridium4-237">[229]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9 FT</a>
 <br/>B1036.2<sup class="reference" id="cite_ref-nsf-20171111_235-2"><a
href="#cite_note-nsf-20171111-235">[227]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Vandenberg_Air_Force_Base"
title="Vandenberg Air Force Base">VAFB</a>,<br/><a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E</a>
</td>
<td><a class="mw-redirect" href="/wiki/Iridium_NEXT" title="Iridium
NEXT">Iridium NEXT</a>-4<br/>(10 satellites)<sup class="reference" id="cite_ref-
sdc20100616_160-2"><a href="#cite_note-sdc20100616-160">[152]</a></sup>
</td>
<td>9,600 kg (21,200 lb)
</td>
<td><a href="/wiki/Polar_orbit" title="Polar orbit">Polar</a> <a
href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/Iridium_Communications" title="Iridium
Communications">Iridium Communications</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
Iridium_NEXT-4_SN_238-0"><a href="#cite_note-
Iridium_NEXT-4_SN-238">[230]</a></sup>
</td>
<td class="partial table-partial" style="background: #BFE; vertical-align:
middle; text-align: center;">Controlled<br/><small>(ocean)</small><sup
class="reference" id="cite_ref-ocean_landing_38-5"><a href="#cite_note-
ocean_landing-38">[d]</a></sup><sup class="reference" id="cite_ref-
Iridium_NEXT-4_SN_238-1"><a href="#cite_note-
Iridium_NEXT-4_SN-238">[230]</a></sup>
</td></tr>
<tr>
<td colspan="9">In order to avoid delays and convinced of no increased risks,
Iridium Communications accepted the use of a recovered booster for its 10
satellites, and became the first customer to fly the same first-stage booster
```

twice (from the second Iridium NEXT mission).<sup class="reference"
id="cite_ref-239">[231]</sup><sup class="reference"
id="cite_ref-nsf_iridium_240-0"><a href="#cite_note-
nsf_iridium-240">[232]</sup> SpaceX chose not to attempt recovery of the
booster, but did perform a soft ocean touchdown.<sup class="reference"
id="cite_ref-241">[233]</sup> The launch occurred
during sunset, which caused a <a class="mw-redirect"
href="/wiki/Twilight_phenomena" title="Twilight phenomena">twilight effect
where sunlight reflected from the rocket plumes at high altitude, causing "jaw-
dropping views" across <a href="/wiki/Southern_California" title="Southern
California">Southern California and surrounding regions.<sup
class="reference" id="cite_ref-242">[234]</sup>
</td></tr></tbody></table>, <table class="wikitable plainrowheaders collapsible"
style="width: 100%;">
<tbody><tr>
<th scope="col">Flight No.
</th>
<th scope="col">Date and
time (<a href="/wiki/Coordinated_Universal_Time"
title="Coordinated Universal Time">UTC)
</th>
<th scope="col"><a href="/wiki/List_of_Falcon_9_first-stage_boosters"
title="List of Falcon 9 first-stage boosters">Version,
Booster<sup
class="reference" id="cite_ref-booster_11-5"><a href="#cite_note-
booster-11">[b]</sup>
</th>
<th scope="col">Launch site
</th>
<th scope="col">Payload<sup class="reference" id="cite_ref-Dragon_12-5"><a
href="#cite_note-Dragon-12">[c]</sup>
</th>
<th scope="col">Payload mass
</th>
<th scope="col">Orbit
</th>
<th scope="col">Customer
</th>
<th scope="col">Launch
outcome
</th>
<th scope="col"><a href="/wiki/Falcon_9_first-stage_landing_tests" title="Falcon
9 first-stage landing tests">Booster
landing
</th></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">47
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<td>8 January 2018,
01:00<sup class="reference" id="cite_ref-245"><a
href="#cite_note-245">[237]</sup>
</td>
<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9

```
B4</a><br/>B1043.1<sup class="reference" id="cite_ref-zuma_246-0"><a
href="#cite_note-zuma-246">[238]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a><br/>
</td>
<td><a href="/wiki/Zuma_(satellite)" title="Zuma (satellite)">Zuma</a><sup
class="reference" id="cite_ref-zuma_246-1"><a href="#cite_note-
zuma-246">[238]</a></sup><sup class="reference" id="cite_ref-247"><a
href="#cite_note-247">[239]</a></sup><sup class="reference" id="cite_ref-248"><a
href="#cite_note-248">[240]</a></sup>
</td>
<td class="table-na" data-sort-value="" style="background: #ececec; color:
#2C2C2C; vertical-align: middle; text-align: center;">Classified
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/Northrop_Grumman" title="Northrop Grumman">Northrop
Grumman</a> <sup class="reference" id="cite_ref-249"><a
href="#cite_note-249">[f]</a></sup><sup class="reference" id="cite_ref-
zuma_246-2"><a href="#cite_note-zuma-246">[238]</a></sup>
</td>
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text-align: center;">Success<sup class="reference" id="cite_ref-250"><a
href="#cite_note-250">[241]</a></sup>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small>(ground pad)</small>
</td></tr>
<tr>
<td colspan="9">The mission had been postponed by nearly two months. Following a
nominal launch, the recovery of the first-stage booster marked the 17th
successful recovery in a row.<sup class="reference" id="cite_ref-zuma-
presskit2_251-0"><a href="#cite_note-zuma-presskit2-251">[242]</a></sup> Rumors
appeared that the payload was lost, as the satellite might have failed to
separate from the second stage<sup class="reference" id="cite_ref-
ZumaVerge2_252-0"><a href="#cite_note-ZumaVerge2-252">[243]</a></sup> due to a
fault in the Northrop Grumman-manufactured payload adapter, to which SpaceX
announced that their rocket performed nominally.<sup class="reference"
id="cite_ref-ZumaVerge2_252-1"><a href="#cite_note-
ZumaVerge2-252">[243]</a></sup> The classified nature of the mission means that
there is little confirmed information.<small>(<a
href="#Zuma_launch_controversy">more details below</a>)</small>
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<tr>
<th rowspan="2" scope="row" style="text-align:center;">48
```

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</th>
<td>31 January 2018,<br/>21:25<sup class="reference" id="cite_ref-253"><a
href="#cite_note-253">[244]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9 FT</a>
 <br/>B1032.2<sup class="reference" id="cite_ref-sfn-20180111_254-0"><a
href="#cite_note-sfn-20180111-254">[245]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/SES-16" title="SES-16">GovSat-1</a> (SES-16)<sup
class="reference" id="cite_ref-ses20150225_255-0"><a href="#cite_note-
ses20150225-255">[246]</a></sup>
</td>
<td>4,230 kg (9,330 lb)<sup class="reference" id="cite_ref-256"><a
href="#cite_note-256">[247]</a></sup>
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a class="mw-redirect" href="/wiki/SES_S.A." title="SES S.A.">SES</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
Govsat_SN_257-0"><a href="#cite_note-Govsat_SN-257">[248]</a></sup>
</td>
<td class="partial table-partial" style="background: #BFE; vertical-align:
middle; text-align: center;">Controlled<br/><small>(ocean)</small><sup
class="reference" id="cite_ref-ocean_landing_38-6"><a href="#cite_note-
ocean_landing-38">[d]</a></sup><sup class="reference" id="cite_ref-
Govsat_SN_257-1"><a href="#cite_note-Govsat_SN-257">[248]</a></sup>
</td></tr>
<tr>
<td colspan="9">Reused booster from the classified <a
href="/wiki/List_of_NRO_launches" title="List of NRO launches">NROL-76</a>
mission in May 2017.<sup class="reference" id="cite_ref-sfn-20180111_254-1"><a
href="#cite_note-sfn-20180111-254">[245]</a></sup> Following a successful
experimental soft ocean landing that used three engines, the booster
unexpectedly remained intact. Recovery was talked about and a <a
href="/wiki/Craigslist" title="Craigslist">Craigslist</a> ad believed to be made
by Elon Musk jokingly said the booster was for sale at US$9.9 million if the
buyer brought their own <a href="/wiki/Tugboat" title="Tugboat">tugboat</a>.<sup
class="reference" id="cite_ref-258"><a href="#cite_note-258">[249]</a></sup>
Despite this, recovery was not attempted, and the booster was subsequently
destroyed.<sup class="reference" id="cite_ref-259"><a
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href="#cite_note-259">[250]</a></sup> GovSat-1 satellite was put into a high-
energy <a href="/wiki/Supersynchronous_orbit" title="Supersynchronous
orbit">Supersynchronous Transfer Orbit</a> of 250 km × 51,500 km (160 mi
× 32,000 mi).<sup class="reference" id="cite_ref-260"><a
href="#cite_note-260">[251]</a></sup><sup class="reference" id="cite_ref-261"><a
href="#cite_note-261">[252]</a></sup>
</td></tr>
<tr>
<th rowspan="4" scope="row" style="text-align:center;"><a
href="/wiki/Falcon_Heavy_test_flight" title="Falcon Heavy test flight">FH 1</a>
</th>
<td rowspan="3">6 February 2018,<br/>20:45<sup class="reference"
id="cite_ref-262"><a href="#cite_note-262">[253]</a></sup>
</td>
<td><a href="/wiki/Falcon_Heavy" title="Falcon Heavy">Falcon
Heavy</a><br/>B1033.1 <small>(core)</small><sup class="reference" id="cite_ref-
nsf-20170425_136-3"><a href="#cite_note-nsf-20170425-136">[129]</a></sup>
</td>
<td rowspan="3"><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td rowspan="3"><a href="/wiki/Elon_Musk%27s_Tesla_Roadster" title="Elon Musk's
Tesla Roadster">Elon Musk's Tesla Roadster</a><sup class="reference"
id="cite_ref-263"><a href="#cite_note-263">[254]</a></sup><sup class="reference"
id="cite_ref-264"><a href="#cite_note-264">[255]</a></sup>
</td>
<td rowspan="3">~1,250 kg (2,760 lb)<sup class="reference" id="cite_ref-
teslaorbit_265-0"><a href="#cite_note-teslaorbit-265">[256]</a></sup>
</td>
<td rowspan="3"><a href="/wiki/Heliocentric_orbit" title="Heliocentric
orbit">Heliocentric</a><br/>0.99-1.67 AU<sup class="reference" id="cite_ref-
teslaorbit_265-1"><a href="#cite_note-teslaorbit-265">[256]</a></sup><br/>(close
to <a class="mw-redirect" href="/wiki/Mars_transfer_orbit" title="Mars transfer
orbit">Mars transfer orbit</a>)
</td>
<td rowspan="3"><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" rowspan="3" style="background: #9EFF9E; vertical-
align: middle; text-align: center;">Success<sup class="reference" id="cite_ref-
NYT_Heavy_266-0"><a href="#cite_note-NYT_Heavy-266">[257]</a></sup>
</td>
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text-align: center;">Failure<sup class="reference" id="cite_ref-
NYT_Heavy_266-1"><a href="#cite_note-
NYT_Heavy-266">[257]</a></sup><br/><small>(drone ship)</small>
</td></tr>
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<td>B1023.2^{[8]} <small>(side)</small>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle; text-align: center;">Success
<small>(ground pad)</small>
</td></tr>
<tr>
<td>B1025.2^{[8]} <small>(side)</small>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle; text-align: center;">Success
<small>(ground pad)</small>
</td></tr>
<tr>
<td colspan="9">Maiden flight of Falcon Heavy, using two recovered Falcon 9 cores as side boosters (from the Thaicom 8^{[258]} and SpaceX CRS-9^{[129]} missions), as well as a modified Block 3 booster reinforced to endure the additional load from the two side boosters. The static fire test, held on 24 January 2018, was the first time 27 engines were tested together.^{[259]} The launch was a success, and the side boosters landed simultaneously at adjacent ground pads.^{[257]} Drone ship landing of the central core failed due to TEA-TEB chemical igniter running out, preventing two of its engines from restarting; the landing failure caused damage to the nearby drone ship.^{[260]}^{[261]} Final burn to heliocentric Earth-Mars orbit was performed after the second stage and payload cruised for 6 hours through the Van Allen radiation belts.^{[262]} Later, Elon Musk tweeted that the third burn was successful,^{[263]} and JPL Horizons On-Line Ephemeris System showed the second stage and payload in an

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orbit with an <a class="mw-redirect" href="/wiki/Perihelion_and_aphelion"
title="Perihelion and aphelion">aphelion</a> of 1.67 <a
href="/wiki/Astronomical_unit" title="Astronomical unit">AU</a>.<sup
class="reference" id="cite_ref-horizons_273-0"><a href="#cite_note-
horizons-273">[264]</a></sup> The live webcast proved immensely popular, as it
became the second most watched livestream so far on <a href="/wiki/YouTube"
title="YouTube">YouTube</a>, reaching over 2.3 million concurrent views.<sup
class="reference" id="cite_ref-274"><a href="#cite_note-274">[265]</a></sup>
Over 100,000 visitors are believed to have come to the <a
href="/wiki/Space_Coast" title="Space Coast">Space Coast</a> to watch the launch
in person.<sup class="reference" id="cite_ref-floridatoday.com_275-0"><a
href="#cite_note-floridatoday.com-275">[266]</a></sup><small>(<a
href="#Falcon_Heavy_test_flight">more details below</a>)</small>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">49
</th>
<td>22 February 2018,<br/>14:17<sup class="reference" id="cite_ref-276"><a
href="#cite_note-276">[267]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">F9 FT</a>
 <br/>B1038.2<sup class="reference" id="cite_ref-gunter-f9_277-0"><a
href="#cite_note-gunter-f9-277">[268]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Vandenberg_Air_Force_Base"
title="Vandenberg Air Force Base">VAFB</a>,<br/><a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E</a>
</td>
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style"/><div class="plainlist">
<ul><li><a href="/wiki/Paz_(satellite)" title="Paz (satellite)">Paz</a><sup
class="reference" id="cite_ref-paz_278-0"><a href="#cite_note-
paz-278">[269]</a></sup></li>
<li><a href="/wiki/Starlink" title="Starlink">Tintin A and Tintin B</a><sup
class="reference" id="cite_ref-gunter-microsat2_279-0"><a href="#cite_note-
gunter-microsat2-279">[270]</a></sup></li></ul>
</div>
</td>
<td>2,150 kg (4,740 lb)
</td>
<td><a href="/wiki/Sun-synchronous_orbit" title="Sun-synchronous orbit">SSO</a>
</td>
<td><link href="mw-data:TemplateStyles:r1126788409" rel="mw-deduplicated-inline-
style"/><div class="plainlist">
<ul><li><a href="/wiki/Hisdesat" title="Hisdesat">Hisdesat</a></li>
<li><a href="/wiki/ExactEarth" title="ExactEarth">exactEarth</a></li>
<li><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a></li></ul>
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text-align: center;">Success<sup class="reference" id="cite_ref-Paz_SN_280-0"><a
href="#cite_note-Paz_SN-280">[271]</a></sup>
</td>
<td class="table-noAttempt" style="background: #EEE; vertical-align: middle;
white-space: nowrap; text-align: center;">No attempt<br/><sup class="reference"
id="cite_ref-Paz_SN_280-1"><a href="#cite_note-Paz_SN-280">[271]</a></sup>
</td></tr>
<tr>
<td colspan="9">Last flight of a <a class="mw-redirect"
href="/wiki/Falcon_9_Block_3" title="Falcon 9 Block 3">Block 3</a> first stage.
Reused the booster from the <a href="/wiki/Formosat-5"
title="Formosat-5">Formosat-5</a> mission.<sup class="reference" id="cite_ref-
gunter-f9_277-1"><a href="#cite_note-gunter-f9-277">[268]</a></sup> Paz (peace)
is Spain's first spy satellite<sup class="reference" id="cite_ref-281"><a
href="#cite_note-281">[272]</a></sup> that will be operated in a constellation
with the German SAR fleet <a href="/wiki/TerraSAR-X" title="TerraSAR-X">TSX</a>
and <a href="/wiki/TanDEM-X" title="TanDEM-X">TDX</a>.<sup class="reference"
id="cite_ref-paz_278-1"><a href="#cite_note-paz-278">[269]</a></sup> In
addition, the rocket carried two SpaceX test satellites for their forthcoming <a
class="mw-redirect" href="/wiki/Starlink_(satellite_constellation)"
title="Starlink (satellite constellation)">communications network in low Earth
orbit</a>.<sup class="reference" id="cite_ref-nsf-20180211_282-0"><a
href="#cite_note-nsf-20180211-282">[273]</a></sup><sup class="reference"
id="cite_ref-gunter-microsat2_279-1"><a href="#cite_note-gunter-
microsat2-279">[270]</a></sup> This core flew without landing legs and was
expended at sea.<sup class="reference" id="cite_ref-nsf-20180211_282-1"><a
href="#cite_note-nsf-20180211-282">[273]</a></sup> It also featured an upgraded
payload fairing 2.0 with a first recovery attempt using the <i><a class="mw-
redirect" href="/wiki/Mr._Steven" title="Mr. Steven">Mr. Steven</a></i> crew
boat equipped with a net. The fairing narrowly missed the boat, but achieved a
soft water landing.<sup class="reference" id="cite_ref-283"><a
href="#cite_note-283">[274]</a></sup><sup class="reference" id="cite_ref-284"><a
href="#cite_note-284">[275]</a></sup><sup class="reference" id="cite_ref-
Paz_SN_280-2"><a href="#cite_note-Paz_SN-280">[271]</a></sup>
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<th rowspan="2" scope="row" style="text-align:center;">50
</th>
<td>6 March 2018,<br/>05:33<sup class="reference" id="cite_ref-:1_285-0"><a
href="#cite_note-:1-285">[276]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Falcon_9_Block_4" title="Falcon 9 Block
4">F9 B4</a><br/>B1044.1<sup class="reference" id="cite_ref-
skyrocket_1.2_115-5"><a href="#cite_note-skyrocket_1.2-115">[108]</a></sup>
</td>
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<td>CCAFS,
SLC-40
</td>
<td><link href="mw-data:TemplateStyles:r1126788409" rel="mw-deduplicated-inline-style"/>
Hispasat 30W-6^{[277]}
PODSat^{[278]}

</td>
<td>6,092 kg (13,431 lb)^{[279]}
</td>
<td>GTO
</td>
<td><link href="mw-data:TemplateStyles:r1126788409" rel="mw-deduplicated-inline-style"/>
Hispasat^{[277]}
NovaWurks

</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle; text-align: center;">Success^{[280]}
</td>
<td style="background:#ececec; text-align:center;">No attempt
^{[281]}
</td></tr>
<tr>
<td colspan="9">The Spanish commsat was the largest satellite flown by SpaceX as of March 2018^{[update]}, "nearly the size of a bus".^{[282]} A drone ship landing was planned, but scrapped due to unfavorable weather conditions.^{[281]} SpaceX left the landing legs and titanium grid fins in place to prevent further delays, after previous concerns with the fairing pressurization and conflicts with the launch of <a

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class="mw-redirect" href="/wiki/GOES-S" title="GOES-S">GOES-S</a>.<sup
class="reference" id="cite_ref-292"><a href="#cite_note-292">[283]</a></sup> The
Hispasat 30W-6 satellite was propelled into a supersynchronous transfer
orbit.<sup class="reference" id="cite_ref-293"><a
href="#cite_note-293">[284]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">51
</th>
<td>30 March 2018,<br/>14:14<sup class="reference" id="cite_ref-294"><a
href="#cite_note-294">[285]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Falcon_9_Block_4" title="Falcon 9 Block
4">F9 B4</a>  <br/>B1041.2<sup class="reference" id="cite_ref-
gunter-f9_277-2"><a href="#cite_note-gunter-f9-277">[268]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Vandenberg_Air_Force_Base"
title="Vandenberg Air Force Base">VAFB</a>,<br/><a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E</a>
</td>
<td><a class="mw-redirect" href="/wiki/Iridium_NEXT" title="Iridium
NEXT">Iridium NEXT</a>-5<br/>(10 satellites)<sup class="reference" id="cite_ref-
sdc20100616_160-3"><a href="#cite_note-sdc20100616-160">[152]</a></sup>
</td>
<td>9,600 kg (21,200 lb)
</td>
<td><a href="/wiki/Polar_orbit" title="Polar orbit">Polar</a> <a
href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/Iridium_Communications" title="Iridium
Communications">Iridium Communications</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
Iridium_NEXT_5_NSF_295-0"><a href="#cite_note-
Iridium_NEXT_5_NSF-295">[286]</a></sup>
</td>
<td style="background:#ececec; text-align:center;">No attempt<br/><sup
class="reference" id="cite_ref-296"><a href="#cite_note-296">[287]</a></sup>
</td></tr>
<tr>
<td colspan="9">Fifth Iridium NEXT mission launch of 10 satellites used the
refurbished booster from third Iridium flight. As with recent reflown boosters,
SpaceX used the controlled descent of the first stage to test more booster
recovery options.<sup class="reference" id="cite_ref-297"><a
href="#cite_note-297">[288]</a></sup> SpaceX planned a second recovery attempt
of one half of the fairing using the specially modified boat <a class="mw-
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redirect" href="/wiki/Mr._Steven" title="Mr. Steven">Mr. Steven</a>,<sup
class="reference" id="cite_ref-298"><a href="#cite_note-298">[289]</a></sup> but
the parafoil twisted, which led to the fairing half missing the boat.<sup
class="reference" id="cite_ref-299"><a href="#cite_note-299">[290]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">52
</th>
<td>2 April 2018,<br/>20:30<sup class="reference" id="cite_ref-300"><a
href="#cite_note-300">[291]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Falcon_9_Block_4" title="Falcon 9 Block
4">F9 B4</a>  <br/>B1039.2<sup class="reference" id="cite_ref-
nsf-20180328_301-0"><a href="#cite_note-nsf-20180328-301">[292]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/SpaceX_CRS-14" title="SpaceX CRS-14">SpaceX CRS-14</a><sup
class="reference" id="cite_ref-spn-20160224_148-5"><a href="#cite_note-
spn-20160224-148">[141]</a></sup><br/>(Dragon C110.2  )
</td>
<td>2,647 kg (5,836 lb)<sup class="reference" id="cite_ref-
nsf-20180328_301-1"><a href="#cite_note-nsf-20180328-301">[292]</a></sup>
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a> (<a
class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-302"><a
href="#cite_note-302">[293]</a></sup>
</td>
<td class="table-noAttempt" style="background: #EEE; vertical-align: middle;
white-space: nowrap; text-align: center;">No attempt<br/><sup class="reference"
id="cite_ref-CRS-14_NSF_303-0"><a href="#cite_note-
CRS-14_NSF-303">[294]</a></sup>
</td></tr>
<tr>
<td colspan="9">The launch used a refurbished booster (from <a
href="/wiki/SpaceX_CRS-12" title="SpaceX CRS-12">CRS-12</a>) and a refurbished
capsule (C110 from <a href="/wiki/SpaceX_CRS-8" title="SpaceX
CRS-8">CRS-8</a>).<sup class="reference" id="cite_ref-nsf-20180328_301-2"><a
```

href="#cite_note-nsf-20180328-301">[292]</sup> External payloads include a materials research platform Materials International Space Station Experiment (MISSE-FF)^{[295]} phase 3 of the Robotic Refueling Mission (RRM)^{[296]} TSIS,^{[297]} ASIM heliophysics sensor,^{[190]} several crystallization experiments,^{[298]} and the RemoveDEBRIS system aimed at space debris removal.^{[299]} The booster was expended, and SpaceX collected more data on reentry profiles.^{[300]} It also carried the first Costa Rican satellite, Project Irazú,^{[301]} and the first Kenyan satellite, 1KUNS-PF.^{[302]}
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">53
</th>
<td>18 April 2018,
22:51^{[303]}
</td>
<td>F9 B4
B1045.1^{[268]}
</td>
<td>CCAFS,
SLC-40
</td>
<td>Transiting Exoplanet Survey Satellite (TESS)^{[304]}
</td>

<td>362 kg (798 lb)<sup class="reference" id="cite_ref-tess-flight_314-0"><a
href="#cite_note-tess-flight-314">[305]</sup>
</td>
<td>HEO for <a
class="mw-redirect" href="/wiki/P/2_orbit" title="P/2 orbit">P/2 orbit
</td>
<td>NASA (<a class="mw-redirect"
href="/wiki/Launch_Services_Program" title="Launch Services Program">LSP)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
TESS_NSF_315-0">[306]</sup>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
TESS_NSF_315-1"><a href="#cite_note-
TESS_NSF-315">[306]</sup>
<small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">First NASA high-priority science mission launched by SpaceX.
Part of the <a class="mw-redirect" href="/wiki/Explorers_program"
title="Explorers program">Explorers program, TESS is <a
href="/wiki/Space_telescope" title="Space telescope">space telescope
intended for wide-field search of <a href="/wiki/Exoplanet"
title="Exoplanet">exoplanets transiting nearby stars. It was the first time
SpaceX launched a scientific satellite which wasn't designed to focus on <a
href="/wiki/Earth_observation_satellite" title="Earth observation
satellite">Earth observations. The second stage placed the spacecraft into a
high elliptical Earth orbit, after which
the satellite performed its own maneuvers, including a lunar flyby, such that
over the course of two months it reached a stable 2:1 resonant orbit with the
Moon.<sup class="reference" id="cite_ref-316"><a
href="#cite_note-316">[307]</sup> In January 2018, SpaceX received NASA's <a
class="mw-redirect" href="/wiki/Launch_Services_Program" title="Launch Services
Program">Launch Services Program Category 2 certification of its Falcon 9
"Full Thrust", certification which is required for launching "medium-risk"
missions like TESS.<sup class="reference" id="cite_ref-317"><a
href="#cite_note-317">[308]</sup> Last launch of a new Block 4 booster,<sup
class="reference" id="cite_ref-318">[309]</sup> and
the 24th successful recovery of the first stage. An experimental water landing
of the launch fairing was performed in order to attempt fairing recovery,
primarily as a test of parachute systems.<sup class="reference" id="cite_ref-
tess-flight_314-1">[305]</sup><sup
class="reference" id="cite_ref-TESS_NSF_315-2"><a href="#cite_note-
TESS_NSF-315">[306]</sup>
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<th rowspan="2" scope="row" style="text-align:center;">54

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</th>
<td>11 May 2018,<br/>20:14<sup class="reference" id="cite_ref-319"><a
href="#cite_note-319">[310]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a><sup
class="reference" id="cite_ref-320"><a
href="#cite_note-320">[311]</a></sup><br/><a href="/wiki/Falcon_9_B1046"
title="Falcon 9 B1046">B1046.1</a><sup class="reference" id="cite_ref-
gunter-f9_277-4"><a href="#cite_note-gunter-f9-277">[268]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/Bangabandhu-1" title="Bangabandhu-1">Bangabandhu-1</a><sup
class="reference" id="cite_ref-dhakatribune_321-0"><a href="#cite_note-
dhakatribune-321">[312]</a></sup><sup class="reference" id="cite_ref-gunter-
bd1_322-0"><a href="#cite_note-gunter-bd1-322">[313]</a></sup>
</td>
<td>3,600 kg (7,900 lb)<sup class="reference" id="cite_ref-323"><a
href="#cite_note-323">[314]</a></sup>
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a href="/wiki/Thales_Alenia_Space" title="Thales Alenia Space">Thales-
Alenia</a> / <a href="/wiki/Bangladesh_Telecommunication_Regulatory_Commission"
title="Bangladesh Telecommunication Regulatory Commission">BTRC</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
Bangabandhu-1_AT_324-0"><a href="#cite_note-
Bangabandhu-1_AT-324">[315]</a></sup>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
Bangabandhu-1_AT_324-1"><a href="#cite_note-
Bangabandhu-1_AT-324">[315]</a></sup><br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">First <a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block
5">Block 5</a> launch vehicle booster to fly. Initially planned for an <a
href="/wiki/Ariane_5" title="Ariane 5">Ariane 5</a> launch in December 2017,<sup
class="reference" id="cite_ref-325"><a href="#cite_note-325">[316]</a></sup> it
became the first Bangladeshi commercial satellite,<sup class="reference"
id="cite_ref-326"><a href="#cite_note-326">[317]</a></sup> <a
href="/wiki/BRAC_Onnesha" title="BRAC Onnesha">BRAC Onnesha</a> is a cubesat
built by <a href="/wiki/Thales_Alenia_Space" title="Thales Alenia Space">Thales
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Alenia Space</a>.<sup class="reference" id="cite_ref-327"><a
href="#cite_note-327">[318]</a></sup><sup class="reference" id="cite_ref-328"><a
href="#cite_note-328">[319]</a></sup> It is intended to serve telecom services
from 119.0° east with a lifetime of 15 years.<sup class="reference"
id="cite_ref-329"><a href="#cite_note-329">[320]</a></sup> It was the 25th
successfully recovered first stage booster.<sup class="reference" id="cite_ref-
Bangabandhu-1_AT_324-2"><a href="#cite_note-
Bangabandhu-1_AT-324">[315]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">55
</th>
<td>22 May 2018,<br/>19:47<sup class="reference" id="cite_ref-330"><a
href="#cite_note-330">[321]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Falcon_9_Block_4" title="Falcon 9 Block
4">F9 B4</a>  <br/>B1043.2<sup class="reference" id="cite_ref-331"><a
href="#cite_note-331">[322]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Vandenberg_Air_Force_Base"
title="Vandenberg Air Force Base">VAFB</a>,<br/><a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E</a>
</td>
<td><link href="mw-data:TemplateStyles:r1126788409" rel="mw-deduplicated-inline-
style"/><div class="plainlist">
<ul><li><a class="mw-redirect" href="/wiki/Iridium_NEXT" title="Iridium
NEXT">Iridium NEXT</a>-6<br/>(5 satellites)<sup class="reference" id="cite_ref-
sdc20100616_160-4"><a href="#cite_note-sdc20100616-160">[152]</a></sup><sup
class="reference" id="cite_ref-IridiumridesharePR_163-1"><a href="#cite_note-
IridiumridesharePR-163">[155]</a></sup></li>
<li><span class="nowrap"><a class="mw-redirect" href="/wiki/GRACE-FO"
title="GRACE-FO">GRACE-FO</a> × 2</span><sup class="reference" id="cite_ref-
iridium-rideshare_332-0"><a href="#cite_note-iridium-
rideshare-332">[323]</a></sup><sup class="reference" id="cite_ref-grace-fo-
launch_333-0"><a href="#cite_note-grace-fo-launch-333">[324]</a></sup></li></ul>
</div>
</td>
<td>6,460 kg (14,240 lb)<sup class="reference" id="cite_ref-336"><a
href="#cite_note-336">[g]</a></sup>
</td>
<td><a href="/wiki/Polar_orbit" title="Polar orbit">Polar</a> <a
href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><link href="mw-data:TemplateStyles:r1126788409" rel="mw-deduplicated-inline-
style"/><div class="plainlist">
<ul><li><a href="/wiki/Iridium_Communications" title="Iridium
Communications">Iridium Communications</a></li>
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GFZ • NASA

</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle; text-align: center;">Success^{[327]}
</td>
<td class="table-noAttempt" style="background: #EEE; vertical-align: middle; white-space: nowrap; text-align: center;">No attempt
^{[165]}
</td></tr>
<tr>
<td colspan="9">Sixth Iridium NEXT mission launching 5 satellites used the refurbished booster from Zuma. GFZ arranged a rideshare of GRACE-FO on a Falcon 9 with Iridium following the cancellation of their Dnepr launch contract in 2015.^{[323]} Iridium CEO Matt Desch disclosed in September 2017 that GRACE-FO would be launched on this mission.^{[328]} The booster reuse turnaround was a record 4.5 months between flights.^{[329]}
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">56
</th>
<td>4 June 2018,
04:45^{[330]}
</td>
<td>F9 B4
B1040.2^{[268]}
</td>
<td>CCAFS,
SLC-40
</td>
<td>SES-12^{[331]}
</td>
<td>5,384 kg (11,870 lb)^{[332]}
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer

orbit">GTO
</td>
<td>SES
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-343"><a
href="#cite_note-343">[333]</sup>
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white-space: nowrap; text-align: center;">No attempt
<sup class="reference"
id="cite_ref-expendable_173-4"><a href="#cite_note-
expendable-173">[165]</sup>
</td></tr>
<tr>
<td colspan="9">The communications satellite serving the Middle East and the
Asia-Pacific region at the same place as <a href="/wiki/SES-8"
title="SES-8">SES-8, and was the largest satellite built for SES.<sup
class="reference" id="cite_ref-SES12_341-1"><a href="#cite_note-
SES12-341">[331]</sup> The Block 4 first stage was expended,<sup
class="reference" id="cite_ref-nsf-20180531_342-1"><a href="#cite_note-
nsf-20180531-342">[332]</sup> while the second stage was a Block 5 version,
delivering more power towards a higher <a href="/wiki/Supersynchronous_orbit"
title="Supersynchronous orbit">supersynchronous transfer orbit with
58,000 km (36,000 mi) apogee.<sup class="reference" id="cite_ref-344"><a
href="#cite_note-344">[334]</sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">57
</th>
<td>29 June 2018,
09:42<sup class="reference" id="cite_ref-345"><a
href="#cite_note-345">[335]</sup>
</td>
<td><a class="mw-redirect" href="/wiki/Falcon_9_Block_4" title="Falcon 9 Block
4">F9 B4
B1045.2<sup class="reference" id="cite_ref-346"><a
href="#cite_note-346">[336]</sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCAFS,
<a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40
</td>
<td>SpaceX
CRS-15
(Dragon C111.2)
</td>
<td>2,697 kg (5,946 lb)<sup class="reference" id="cite_ref-347"><a
href="#cite_note-347">[337]</sup>
</td>
<td>LEO (<a

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class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-348"><a
href="#cite_note-348">[338]</a></sup>
</td>
<td class="table-noAttempt" style="background: #EEE; vertical-align: middle;
white-space: nowrap; text-align: center;">No attempt<br/><sup class="reference"
id="cite_ref-expendable_173-5"><a href="#cite_note-
expendable-173">[165]</a></sup>
</td></tr>
<tr>
<td colspan="9">Payload included <a
href="/wiki/Materials_International_Space_Station_Experiment" title="Materials
International Space Station Experiment">MISSE-FF 2</a>, <a
href="/wiki/ECOSTRESS" title="ECOSTRESS">ECOSTRESS</a>, a <a
href="/wiki/Mobile_Servicing_System" title="Mobile Servicing System">Latching
End Effector</a>, and <a href="/wiki/Birds-2" title="Birds-2">Birds-2</a>
payloads. The refurbished booster featured a record 2.5 months period turnaround
from its original launch of TESS, a record held until February 2020 with the
Starlink L4 mission. The fastest previous was 4.5 months. This was the last
flight of a Block 4 booster, which was expended into the <a
href="/wiki/Atlantic_Ocean" title="Atlantic Ocean">Atlantic Ocean</a> without
landing legs and grid fins.<sup class="reference" id="cite_ref-
block4retirement_349-0"><a href="#cite_note-
block4retirement-349">[339]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">58
</th>
<td>22 July 2018,<br/>05:50<sup class="reference" id="cite_ref-350"><a
href="#cite_note-350">[340]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a><br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters" title="List of Falcon 9
first-stage boosters">B1047.1</a>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Telstar_19V" title="Telstar 19V">Telstar 19V</a><sup
class="reference" id="cite_ref-sfn-20160226_351-0"><a href="#cite_note-
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sfn-20160226-351">[341]</a></sup>
</td>
<td>7,075 kg (15,598 lb)<sup class="reference" id="cite_ref-352"><a
href="#cite_note-352">[342]</a></sup>
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a><sup class="reference" id="cite_ref-sfn-20180722_353-0"><a
href="#cite_note-sfn-20180722-353">[343]</a></sup>
</td>
<td><a href="/wiki/Telesat" title="Telesat">Telesat</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
Telstar_19V_SFI_354-0"><a href="#cite_note-Telstar_19V_SFI-354">[344]</a></sup>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
Telstar_19V_SFI_354-1"><a href="#cite_note-
Telstar_19V_SFI-354">[344]</a></sup><br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9"><a href="/wiki/SSL_(company)" title="SSL
(company)">SSL</a>-manufactured communications satellite intended to be placed
at 63.0° west over the Americas,<sup class="reference" id="cite_ref-355"><a
href="#cite_note-355">[345]</a></sup> replacing Telstar 14R.<sup
class="reference" id="cite_ref-sfn-20180722_353-1"><a href="#cite_note-
sfn-20180722-353">[343]</a></sup> At 7,075 kg (15,598 lb), it became the
heaviest commercial communications satellite so far launched.<sup
class="reference" id="cite_ref-356"><a href="#cite_note-356">[346]</a></sup><sup
class="reference" id="cite_ref-357"><a href="#cite_note-357">[347]</a></sup>
This necessitated that the satellite be launched into a lower-energy orbit than
a usual GTO, with its initial apogee at roughly 17,900 km (11,100 mi).<sup
class="reference" id="cite_ref-sfn-20180722_353-2"><a href="#cite_note-
sfn-20180722-353">[343]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">59
</th>
<td>25 July 2018,<br/>11:39<sup class="reference" id="cite_ref-358"><a
href="#cite_note-358">[348]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a><sup
class="reference" id="cite_ref-iridiumboosters_359-0"><a href="#cite_note-
iridiumboosters-359">[349]</a></sup><br/><a class="mw-redirect"
href="/wiki/Falcon_9_booster_B1048" title="Falcon 9 booster
B1048">B1048</a>.1<sup class="reference" id="cite_ref-360"><a
href="#cite_note-360">[350]</a></sup>
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<td><a class="mw-redirect" href="/wiki/Vandenberg_Air_Force_Base"
title="Vandenberg Air Force Base">VAFB</a>,<br/><a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E</a>
</td>
<td><a class="mw-redirect" href="/wiki/Iridium_NEXT" title="Iridium
NEXT">Iridium NEXT</a>-7<br/>(10 satellites)<sup class="reference" id="cite_ref-
sdc20100616_160-5"><a href="#cite_note-sdc20100616-160">[152]</a></sup>
</td>
<td>9,600 kg (21,200 lb)
</td>
<td><a href="/wiki/Polar_orbit" title="Polar orbit">Polar</a> <a
href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/Iridium_Communications" title="Iridium
Communications">Iridium Communications</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
Iridium_NEXT-7_SN_361-0"><a href="#cite_note-
Iridium_NEXT-7_SN-361">[351]</a></sup>
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<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
Iridium_NEXT-7_space_362-0"><a href="#cite_note-
Iridium_NEXT-7_space-362">[352]</a></sup><br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">Seventh Iridium NEXT launch, with 10 communication
satellites.<sup class="reference" id="cite_ref-Iridium_NEXT-7_SN_361-1"><a
href="#cite_note-Iridium_NEXT-7_SN-361">[351]</a></sup> The booster landed
safely on the drone ship in the worst weather conditions for any landing yet
attempted.<sup class="reference" id="cite_ref-Iridium_NEXT-7_space_362-1"><a
href="#cite_note-Iridium_NEXT-7_space-362">[352]</a></sup><sup class="reference"
id="cite_ref-Iridium_NEXT-7_SN_361-2"><a href="#cite_note-
Iridium_NEXT-7_SN-361">[351]</a></sup> <i>Mr. Steven</i> boat with an upgraded
4x size net was used to attempt fairing recovery but failed due to harsh
weather.<sup class="reference" id="cite_ref-Iridium_NEXT-7_space_362-2"><a
href="#cite_note-Iridium_NEXT-7_space-362">[352]</a></sup><sup class="reference"
id="cite_ref-Iridium_NEXT-7_SN_361-3"><a href="#cite_note-
Iridium_NEXT-7_SN-361">[351]</a></sup>
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<td>7 August 2018,<br/>05:18<sup class="reference" id="cite_ref-363"><a
href="#cite_note-363">[353]</a></sup>
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<td>F9 B5

<a class="mw-redirect" href="/wiki/Falcon_9_booster_B1046" title="Falcon 9
booster B1046">B1046.2<sup class="reference" id="cite_ref-
Ralph-20180727_364-0">[354]</sup>
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS,
<a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40
</td>
<td><a class="mw-redirect" href="/wiki/Merah_Putih_(satellite)" title="Merah
Putih (satellite)">Merah Putih (formerly Telkom 4)<sup class="reference"
id="cite_ref-365">[355]</sup><sup class="reference"
id="cite_ref-366">[356]</sup>
</td>
<td>5,800 kg (12,800 lb)<sup class="reference" id="cite_ref-367"><a
href="#cite_note-367">[357]</sup>
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO
</td>
<td>Telkom
Indonesia
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
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TelcomI_S.com_368-0">[358]</sup>
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text-align: center;">Success<sup class="reference" id="cite_ref-
TelcomI_S.com_368-1"><a href="#cite_note-
TelcomI_S.com-368">[358]</sup>
<small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">Indonesian comsat intended to replace the aging <a class="mw-
redirect" href="/wiki/Telkom_1" title="Telkom 1">Telkom 1 at
108.0° east.<sup class="reference" id="cite_ref-369"><a
href="#cite_note-369">[359]</sup> First reflight of a Block 5-version
booster.<sup class="reference" id="cite_ref-370"><a
href="#cite_note-370">[360]</sup>
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04:45<sup class="reference" id="cite_ref-
sfn-20180910_371-0">[361]</sup>
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<td>F9 B5
<a

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B1049">B1049.1</a><sup class="reference" id="cite_ref-gunter-f9_277-6"><a
href="#cite_note-gunter-f9-277">[268]</a></sup>
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<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Telstar_18V" title="Telstar 18V">Telstar 18V</a> / <a
class="mw-redirect" href="/wiki/Apstar" title="Apstar">Apstar</a>-5C<sup
class="reference" id="cite_ref-sfn-20160226_351-1"><a href="#cite_note-
sfn-20160226-351">[341]</a></sup>
</td>
<td>7,060 kg (15,560 lb)<sup class="reference" id="cite_ref-
sfn-20180910_371-1"><a href="#cite_note-sfn-20180910-371">[361]</a></sup>
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a><sup class="reference" id="cite_ref-sfn-20180910_371-2"><a
href="#cite_note-sfn-20180910-371">[361]</a></sup>
</td>
<td><a href="/wiki/Telesat" title="Telesat">Telesat</a>
</td>
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text-align: center;">Success<sup class="reference" id="cite_ref-
sfn-20180910_371-3"><a href="#cite_note-sfn-20180910-371">[361]</a></sup>
</td>
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text-align: center;">Success<sup class="reference" id="cite_ref-
sfn-20180910_371-4"><a href="#cite_note-
sfn-20180910-371">[361]</a></sup><br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9"><a href="/wiki/CondoSat" title="CondoSat">Condosat</a> for
138.0° east over Asia and Pacific.<sup class="reference" id="cite_ref-372"><a
href="#cite_note-372">[362]</a></sup> Delivered to a GTO orbit with apogee close
to 18,000 km (11,000 mi).<sup class="reference" id="cite_ref-
sfn-20180910_371-5"><a href="#cite_note-sfn-20180910-371">[361]</a></sup>
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<th rowspan="2" scope="row" style="text-align:center;">62
</th>
<td>8 October 2018,<br/>02:22<sup class="reference" id="cite_ref-
nsf-20181008_373-0"><a href="#cite_note-nsf-20181008-373">[363]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
class="mw-redirect" href="/wiki/Falcon_9_booster_B1048" title="Falcon 9 booster
B1048">B1048.2</a><sup class="reference" id="cite_ref-374"><a
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href="#cite_note-374">[364]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Vandenberg_Air_Force_Base"
title="Vandenberg Air Force Base">VAFB</a>,<br/><a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E</a>
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<td><a class="mw-redirect" href="/wiki/SAOCOM_1A" title="SAOCOM 1A">SAOCOM
1A</a><sup class="reference" id="cite_ref-SAOCOM20090416_375-0"><a
href="#cite_note-SAOCOM20090416-375">[365]</a></sup><sup class="reference"
id="cite_ref-saocom_revision_376-0"><a href="#cite_note-
saocom_revision-376">[366]</a></sup>
</td>
<td>3,000 kg (6,600 lb)<sup class="reference" id="cite_ref-
nsf-20181008_373-1"><a href="#cite_note-nsf-20181008-373">[363]</a></sup>
</td>
<td><a href="/wiki/Sun-synchronous_orbit" title="Sun-synchronous orbit">SSO</a>
</td>
<td><a class="mw-redirect"
href="/wiki/Comisi%C3%B3n_Nacional_de_Actividades_Espaciales" title="Comisión
Nacional de Actividades Espaciales">CONAE</a>
</td>
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nsf-20181008_373-2"><a href="#cite_note-nsf-20181008-373">[363]</a></sup>
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text-align: center;">Success<sup class="reference" id="cite_ref-
nsf-20181008_373-3"><a href="#cite_note-
nsf-20181008-373">[363]</a></sup><br/><small>(ground pad)</small>
</td></tr>
<tr>
<td colspan="9">Argentinian Earth-observation satellite was originally intended
to be launched in 2012.<sup class="reference" id="cite_ref-
SAOCOM20090416_375-1"><a href="#cite_note-SAOCOM20090416-375">[365]</a></sup>
First landing on the <a href="/wiki/SpaceX_landing_zone" title="SpaceX landing
zone">West Coast ground pad</a>.<sup class="reference" id="cite_ref-
nsf-20181008_373-4"><a href="#cite_note-nsf-20181008-373">[363]</a></sup>
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<th rowspan="2" scope="row" style="text-align:center;">63
</th>
<td>15 November 2018,<br/>20:46<sup class="reference" id="cite_ref-377"><a
href="#cite_note-377">[367]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
class="mw-redirect" href="/wiki/Falcon_9_booster_B1047" title="Falcon 9 booster
B1047">B1047.2</a><sup class="reference" id="cite_ref-gunter-f9_277-7"><a
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href="#cite_note-gunter-f9-277">[268]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/Es%27hail_2" title="Es'hail 2">Es'hail 2</a><sup
class="reference" id="cite_ref-eshail2_378-0"><a href="#cite_note-
eshail2-378">[368]</a></sup>
</td>
<td>5,300 kg (11,700 lb)<sup class="reference" id="cite_ref-379"><a
href="#cite_note-379">[369]</a></sup>
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a href="/wiki/Es%27hailSat" title="Es'hailSat">Es'hailSat</a>
</td>
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spacenews20181115_380-0"><a href="#cite_note-
spacenews20181115-380">[370]</a></sup>
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<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
spacenews20181115_380-1"><a href="#cite_note-
spacenews20181115-380">[370]</a></sup><br/><small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">Qatari comsat positioned at 26.0° east.<sup class="reference"
id="cite_ref-eshail2_378-1"><a href="#cite_note-eshail2-378">[368]</a></sup>
This launch used redesigned <a
href="/wiki/Composite_overwrapped_pressure_vessel" title="Composite overwrapped
pressure vessel">COPVs</a>. This was to meet NASA safety requirements for
commercial crew missions, in response to the September 2016 pad explosion.<sup
class="reference" id="cite_ref-381"><a href="#cite_note-381">[371]</a></sup>
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</th>
<td>3 December 2018,<br/>18:34:05
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<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a>  <a
class="mw-redirect" href="/wiki/Falcon_9_booster_B1046" title="Falcon 9 booster
B1046">B1046.3</a><sup class="reference" id="cite_ref-gunter-f9_277-8"><a
href="#cite_note-gunter-f9-277">[268]</a></sup><br/><a
href="/wiki/SHERPA_(space_tug)" title="SHERPA (space tug)">SHERPA</a>
</td>
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<td><a class="mw-redirect" href="/wiki/Vandenberg_Air_Force_Base"
title="Vandenberg Air Force Base">VAFB,
<a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E
</td>
<td>SSO-A
(SmallSat Express)
</td>
<td>~4,000 kg (8,800 lb)<sup class="reference" id="cite_ref-382"><a
href="#cite_note-382">[372]</sup>
</td>
<td>SSO
</td>
<td><a href="/wiki/Spaceflight_Industries" title="Spaceflight
Industries">Spaceflight Industries
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spacenews20181203_383-0"><a href="#cite_note-
spacenews20181203-383">[373]</sup>
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spacenews20181203_383-1"><a href="#cite_note-
spacenews20181203-383">[373]</sup>
<small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">Rideshare mission<sup class="reference" id="cite_ref-
spaceflight-rideshare_384-0"><a href="#cite_note-spaceflight-
rideshare-384">[374]</sup> where two <a href="/wiki/SHERPA_(space_tug)"
title="SHERPA (space tug)">SHERPA <a href="/wiki/Satellite_dispenser"
title="Satellite dispenser">dispensers deployed 64 small satellites,<sup
class="reference" id="cite_ref-:2_385-0"><a
href="#cite_note-:2-385">[375]</sup><sup class="reference"
id="cite_ref-:3_386-0">[376]</sup> including <a
href="/wiki/EuCROPIS" title="EuCROPIS">Eu:CROPIS<sup class="reference"
id="cite_ref-eucropis_387-0">[377]</sup>
for the German <a href="/wiki/German_Aerospace_Center" title="German Aerospace
Center">DLR, HIBER-2 for the Dutch Hiber Global,<sup class="reference"
id="cite_ref-:4_388-0">[378]</sup> ITASAT-1 for
the Brazilian <a href="/wiki/Instituto_Tecnol%C3%B3gico_de_Aeron%C3%A1utica"
title="Instituto Tecnológico de Aeronáutica">Instituto Tecnológico de
Aeronáutica,<sup class="reference" id="cite_ref-:5_389-0"><a
href="#cite_note-:5-389">[379]</sup> two high-resolution <a
href="/wiki/SkySat" title="SkySat">SkySat imaging satellites for <a
href="/wiki/Planet_Labs" title="Planet Labs">Planet Labs,<sup
class="reference" id="cite_ref-nsf-20180129_390-0"><a href="#cite_note-
nsf-20180129-390">[380]</sup> and two high school CubeSats part of NASA's <a

```
href="/wiki/Educational_Launch_of_Nanosatellites" title="Educational Launch of
Nanosatellites">ELaNa 24</a>.<sup class="reference" id="cite_ref-Upcoming-
ELaNa_391-0"><a href="#cite_note-Upcoming-ELaNa-391">[381]</a></sup> This was
the first time a booster was used for a third flight.
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<td>5 December 2018,<br/>18:16
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class="mw-redirect" href="/wiki/Falcon_9_booster_B1050" title="Falcon 9 booster
B1050">B1050</a><sup class="reference" id="cite_ref-gunter-f9_277-9"><a
href="#cite_note-gunter-f9-277">[268]</a></sup>
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<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/SpaceX_CRS-16" title="SpaceX CRS-16">SpaceX
CRS-16</a><br/>(Dragon C112.2 )
</td>
<td>2,500 kg (5,500 lb)<sup class="reference" id="cite_ref-392"><a
href="#cite_note-392">[382]</a></sup>
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a> (<a
class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
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Grush-20181205_393-0"><a href="#cite_note-
Grush-20181205-393">[383]</a></sup><br/><small>(ground pad)</small>
</td></tr>
<tr>
<td colspan="9">First CRS mission with the Falcon 9 Block 5. This carried the <a
class="mw-redirect" href="/wiki/Global_Ecosystem_Dynamics_Investigation_lidar"
title="Global Ecosystem Dynamics Investigation lidar">Global Ecosystem Dynamics
Investigation lidar</a> (GEDI) as an external payload.<sup class="reference"
id="cite_ref-394"><a href="#cite_note-394">[384]</a></sup> The mission was
delayed by one day due to moldy rodent food for one of the experiments on the
```

Space Station. A previously flown Dragon spacecraft was used for the mission. The booster, in use for the first time, experienced a grid fin hydraulic pump stall on reentry, which caused it to spin out of control and touchdown at sea, heavily damaging the interstage section; this was the first failed landing targeted for a ground pad.^{[383]}^{[385]}
</td></tr>
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</th>
<td>23 December 2018,
13:51^{[386]}
</td>
<td>F9 B5
B1054^{[387]}
</td>
<td>CCAFS,
SLC-40
</td>
<td>GPS III-01 (Vespucci)
</td>
<td>4,400 kg (9,700 lb)^{[388]}
</td>
<td>MEO
</td>
<td>USAF
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle; text-align: center;">Success^{[386]}
</td>
<td class="table-noAttempt" style="background: #EEE; vertical-align: middle; white-space: nowrap; text-align: center;">No attempt
^{[386]}
</td></tr>
<tr>

<td colspan="9">Initially planned for a Delta IV launch,^{[389]} this was SpaceX's first launch of an EELV-class payload.^{[390]} There was no attempt to recover the first-stage booster for reuse^{[391]}^{[387]} due to the customer's requirements, including a high inclination orbit of 55.0°.^{[392]} Nicknamed Vespucci, the USAF marked the satellite operational on 1 January 2020 under the label SVN 74.^{[393]}
</td></tr></tbody></table>, <table class="wikitable plainrowheaders collapsible" style="width: 100%;">
<tbody><tr>
<th scope="col">Flight No.
</th>
<th scope="col">Date and
time (UTC)
</th>
<th scope="col">Version,
Booster^{[b]}
</th>
<th scope="col">Launch
site
</th>
<th scope="col">Payload^{[c]}
</th>
<th scope="col">Payload mass
</th>
<th scope="col">Orbit
</th>
<th scope="col">Customer
</th>
<th scope="col">Launch
outcome
</th>
<th scope="col">Booster
landing
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</th>
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15:31<sup class="reference" id="cite_ref-406"><a

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href="#cite_note-406">[396]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
class="mw-redirect" href="/wiki/Falcon_9_booster_B1049" title="Falcon 9 booster
B1049">B1049.2</a><sup class="reference" id="cite_ref-407"><a
href="#cite_note-407">[397]</a></sup>
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<td><a class="mw-redirect" href="/wiki/Vandenberg_Air_Force_Base"
title="Vandenberg Air Force Base">VAFB</a>,<br/><a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E</a>
</td>
<td nowrap=""><a class="mw-redirect" href="/wiki/Iridium_NEXT" title="Iridium
NEXT">Iridium NEXT</a>-8<br/>(10 satellites)<sup class="reference" id="cite_ref-
sdc20100616_160-6"><a href="#cite_note-sdc20100616-160">[152]</a></sup>
</td>
<td>9,600 kg (21,200 lb)
</td>
<td><span class="nowrap"><a href="/wiki/Polar_orbit" title="Polar
orbit">Polar</a> <a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low
Earth Orbit">LEO</a></span>
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<td><a href="/wiki/Iridium_Communications" title="Iridium
Communications">Iridium Communications</a>
</td>
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<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
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<tr>
<td colspan="9">Final launch of the Iridium NEXT contract, launching 10
satellites.
</td></tr>
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<th rowspan="2" scope="row" style="text-align:center;">68
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<td>22 February 2019,<br/>01:45<sup class="reference" id="cite_ref-408"><a
href="#cite_note-408">[398]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
class="mw-redirect" href="/wiki/Falcon_9_booster_B1048" title="Falcon 9 booster
B1048">B1048.3</a><sup class="reference" id="cite_ref-409"><a
href="#cite_note-409">[399]</a></sup>
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<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
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title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
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<ul><li><a href="/wiki/Nusantara_Satu" title="Nusantara Satu">Nusantara Satu</a>
(PSN-6)<sup class="reference" id="cite_ref-jls-201801012_410-0"><a
href="#cite_note-jls-201801012-410">[400]</a></sup></li>
<li><i><a href="/wiki/Beresheet" title="Beresheet">Beresheet</a></i> Moon
lander<sup class="reference" id="cite_ref-sn-20181218_411-0"><a
href="#cite_note-sn-20181218-411">[401]</a></sup></li>
<li>S5<sup class="reference" id="cite_ref-sn150219_412-0"><a href="#cite_note-
sn150219-412">[402]</a></sup></li></ul>
</div>
</td>
<td>4,850 kg (10,690 lb)<sup class="reference" id="cite_ref-sn200219_413-0"><a
href="#cite_note-sn200219-413">[403]</a></sup>
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><link href="mw-data:TemplateStyles:r1126788409" rel="mw-deduplicated-inline-
style"/><div class="plainlist">
<ul><li><a href="/wiki/PT_Pasifik_Satelit_Nusantara" title="PT Pasifik Satelit
Nusantara">PSN</a></li>
<li><a href="/wiki/SpaceIL" title="SpaceIL">SpaceIL</a> / <a
href="/wiki/Israel_Aerospace_Industries" title="Israel Aerospace
Industries">IAI</a></li>
<li><a href="/wiki/Air_Force_Research_Laboratory" title="Air Force Research
Laboratory">Air Force Research</a></li></ul>
</div>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Nusantara Satu is a private Indonesian comsat planned to be
located at 146.0° east,<sup class="reference" id="cite_ref-
jls-201801012_410-1"><a href="#cite_note-jls-201801012-410">[400]</a></sup> with
a launch mass of 4,100 kg (9,000 lb),<sup class="reference" id="cite_ref-
sn200219_413-1"><a href="#cite_note-sn200219-413">[403]</a></sup> and featuring
<a class="mw-redirect" href="/wiki/Electrically_powered_spacecraft_propulsion"
title="Electrically powered spacecraft propulsion">electric propulsion</a> for
```

orbit-raising and station-keeping.^{[404]}^{[405]} S5, a 60-kg smallsat by the Air Force Research Laboratory (AFRL), was piggybacked on Nusantara Satu, and was deployed near its GEO position to perform a classified space situational awareness mission. This launch opportunity was brokered by Spaceflight Industries as "GTO-1".^{[402]}
The Beresheet Moon lander (initially called Sparrow) was one of the candidates for the Google Lunar X-Prize, whose developers SpaceIL had secured a launch contract with Spaceflight Industries in October 2015.^{[406]} Its launch mass was 585 kg (1,290 lb) including fuel.^{[407]} After separating into a supersynchronous transfer orbit^{[408]} with an apogee of 69,400 km (43,100 mi),^{[409]}^{[407]} Beresheet raised its orbit by its own power over two months and flew to the Moon.^{[408]}^{[410]} After successfully getting into lunar orbit, Beresheet attempted to land on the Moon on 11 April 2019 but failed.^{[411]}

</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">69
</th>
<td>2 March 2019,
07:49^{[412]}
</td>
<td>F9 B5
B1051.1^{[268]}^{[413]}
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space

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Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/Crew_Dragon_Demo-1" title="Crew Dragon Demo-1">Crew Dragon
Demo-1</a><sup class="reference" id="cite_ref-nsf20150305_424-0"><a
href="#cite_note-nsf20150305-424">[414]</a></sup><br/>(Dragon C201)
</td>
<td>12,055 kg (26,577 lb)<sup class="reference" id="cite_ref-Clark_425-0"><a
href="#cite_note-Clark-425">[415]</a></sup><sup class="reference" id="cite_ref-
DM1-payload-mass_426-0"><a href="#cite_note-DM1-payload-mass-426">[h]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><span class="nowrap"> <a href="/wiki/NASA" title="NASA">NASA</a> (<a
class="mw-redirect" href="/wiki/Commercial_Crew_Development" title="Commercial
Crew Development">CCD</a>) </span>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
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</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">First flight of the SpaceX <a href="/wiki/SpaceX_Dragon_2"
title="SpaceX Dragon 2">Crew Dragon</a>. This was the first demonstration flight
for the <a class="mw-redirect" href="/wiki/Commercial_Crew_Development"
title="Commercial Crew Development">NASA Commercial Crew Program</a> which
awarded SpaceX a contract in September 2014 with flights hoped as early as
2015.<sup class="reference" id="cite_ref-427"><a
href="#cite_note-427">[416]</a></sup> The Dragon performed an autonomous docking
to the ISS 27 hours after launch with the hatch being opened roughly 2 hours
later.<sup class="reference" id="cite_ref-428"><a
href="#cite_note-428">[417]</a></sup> The vehicle spent nearly a week docked to
the ISS to test critical functions. It undocked roughly a week later on 8 March
2019 and splashed down six hours later at 13:45.<sup class="reference"
id="cite_ref-429"><a href="#cite_note-429">[418]</a></sup> The Dragon used on
this flight was scheduled to fly on the inflight abort test in mid-2019 but was
destroyed during testing.<sup class="reference" id="cite_ref-:11_430-0"><a
href="#cite_note-:11-430">[419]</a></sup> The booster B1051.1 replaced <a
class="mw-redirect" href="/wiki/Falcon_9_booster_B1050" title="Falcon 9 booster
B1050">B1050</a><sup class="reference" id="cite_ref-nsf-20190306_431-0"><a
href="#cite_note-nsf-20190306-431">[420]</a></sup> and flew again on 12 June
2019.
</td></tr>
<tr>
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<th rowspan="4" scope="row" style="text-align:center;">FH 2
</th>
<td rowspan="3">11 April 2019,<br/>22:35<sup class="reference" id="cite_ref-
nsf-20190411_432-0"><a href="#cite_note-nsf-20190411-432">[421]</a></sup>
</td>
<td><a href="/wiki/Falcon_Heavy" title="Falcon Heavy">Falcon Heavy</a><br/><span
class="nowrap">B1055 core</span><sup class="reference" id="cite_ref-
nsf-20190411_432-1"><a href="#cite_note-nsf-20190411-432">[421]</a></sup>
</td>
<td rowspan="3"><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td rowspan="3"><a href="/wiki/Arabsat-6A" title="Arabsat-6A">Arabsat-6A</a><sup
class="reference" id="cite_ref-sfn-20150429_433-0"><a href="#cite_note-
sfn-20150429-433">[422]</a></sup>
</td>
<td rowspan="3">6,465 kg (14,253 lb)<sup class="reference" id="cite_ref-434"><a
href="#cite_note-434">[423]</a></sup>
</td>
<td rowspan="3"><a href="/wiki/Geostationary_transfer_orbit"
title="Geostationary transfer orbit">GTO</a>
</td>
<td rowspan="3"><a href="/wiki/Arab_Satellite_Communications_Organization"
title="Arab Satellite Communications Organization">Arabsat</a>
</td>
<td class="table-success" rowspan="3" style="background: #9EFF9E; vertical-
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</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
Falcon_tip_over_436-0"><a href="#cite_note-
Falcon_tip_over-436">[i]</a></sup><br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td>B1052.1<br/>(side)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(ground
pad)</span></small>
</td></tr>
<tr>
<td>B1053.1<br/>(side)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(ground
pad)</span></small>
```

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</td></tr>
<tr>
<td colspan="9">Second flight of <a href="/wiki/Falcon_Heavy" title="Falcon
Heavy">Falcon Heavy</a>, the first commercial flight, and the first one using <a
href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">Block 5</a> boosters.
SpaceX successfully landed the side boosters at <a
href="/wiki/Landing_Zones_1_and_2" title="Landing Zones 1 and 2">Landing Zone
1</a> and <a href="/wiki/Landing_Zones_1_and_2" title="Landing Zones 1 and 2">LZ
2</a> and reused the side boosters later for the <a
href="/wiki/Space_Test_Program" title="Space Test Program">STP-2</a> mission.
The central core landed on <a href="/wiki/Autonomous_spaceport_drone_ship"
title="Autonomous spaceport drone ship">drone ship</a> <i>Of Course I Still Love
You</i>, located 967 km (601 mi) downrange, the furthest sea landing so far
attempted.<sup class="reference" id="cite_ref-fanblog20190413_437-0"><a
href="#cite_note-fanblog20190413-437">[425]</a></sup> Despite the successful
landing, due to rough seas the central core was unable to be secured to the deck
for recovery and later tipped overboard in transit.<sup class="reference"
id="cite_ref-lost_at_sea_438-0"><a href="#cite_note-
lost_at_sea-438">[426]</a></sup><sup class="reference" id="cite_ref-439"><a
href="#cite_note-439">[427]</a></sup> SpaceX recovered the fairing from this
launch and later reused it in the November 2019 <a href="/wiki/Starlink"
title="Starlink">Starlink</a> launch.<sup class="reference" id="cite_ref-440"><a
href="#cite_note-440">[428]</a></sup><sup class="reference"
id="cite_ref-:14_441-0"><a href="#cite_note-:14-441">[429]</a></sup> <a
href="/wiki/Arabsat-6A" title="Arabsat-6A">Arabsat-6A</a>, a 6,465 kg
(14,253 lb) Saudi satellite, is the most advanced commercial communications
satellite so far built by <a href="/wiki/Lockheed_Martin" title="Lockheed
Martin">Lockheed Martin</a>.<sup class="reference" id="cite_ref-442"><a
href="#cite_note-442">[430]</a></sup> The Falcon Heavy delivered the Arabsat-6A
into a <a href="/wiki/Supersynchronous_orbit" title="Supersynchronous
orbit">supersynchronous transfer orbit</a> with 90,000 km (56,000 mi) apogee
with an inclination of 23.0° to the <a href="/wiki/Equator"
title="Equator">equator</a>.<sup class="reference" id="cite_ref-443"><a
href="#cite_note-443">[431]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">70
</th>
<td>4 May 2019,<br/>06:48
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a><br/><a
class="mw-redirect" href="/wiki/Falcon_9_booster_B1056" title="Falcon 9 booster
B1056">B1056.1</a><sup class="reference" id="cite_ref-nsf-20190306_431-1"><a
href="#cite_note-nsf-20190306-431">[420]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
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Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/SpaceX_CRS-17" title="SpaceX CRS-17">SpaceX CRS-17</a><sup
class="reference" id="cite_ref-spn-20160224_148-6"><a href="#cite_note-
spn-20160224-148">[141]</a></sup><br/>(Dragon C113.2 )
</td>
<td>2,495 kg (5,501 lb)<sup class="reference" id="cite_ref-:8_444-0"><a
href="#cite_note-:8-444">[432]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">A <a href="/wiki/Commercial_Resupply_Services" title="Commercial
Resupply Services">Commercial Resupply Service mission</a> to the <a
href="/wiki/International_Space_Station" title="International Space
Station">International Space Station</a> carrying nearly 2.5 tons of cargo
including the <a href="/wiki/Orbiting_Carbon_Observatory_3" title="Orbiting
Carbon Observatory 3">Orbiting Carbon Observatory-3</a> as an external
payload.<sup class="reference" id="cite_ref-:8_444-1"><a
href="#cite_note-:8-444">[432]</a></sup> Originally planned to land at Landing
Zone 1, the landing was moved to the drone ship after a Dragon 2 had an anomaly
during testing at LZ-1.<sup class="reference" id="cite_ref-445"><a
href="#cite_note-445">[433]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">71
</th>
<td>24 May 2019,<br/>02:30
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
class="mw-redirect" href="/wiki/Falcon_9_booster_B1049" title="Falcon 9 booster
B1049">B1049.3</a><sup class="reference" id="cite_ref-446"><a
href="#cite_note-446">[434]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
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href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> v0.9 <br/>(60
satellites)
</td>
<td>13,620 kg (30,030 lb)<sup class="reference" id="cite_ref-SLNov19_5-1"><a
href="#cite_note-SLNov19-5">[5]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Following the launch of the two Tintin test satellites, this was
the first full-scale test launch of the Starlink constellation, launching
"production design" satellites.<sup class="reference" id="cite_ref-
sn20190426_447-0"><a href="#cite_note-sn20190426-447">[435]</a></sup><sup
class="reference" id="cite_ref-448"><a href="#cite_note-448">[436]</a></sup><sup
class="reference" id="cite_ref-449"><a href="#cite_note-449">[437]</a></sup>
Each Starlink satellite has a mass of 227 kg (500 lb),<sup class="reference"
id="cite_ref-450"><a href="#cite_note-450">[438]</a></sup> and the combined
launch mass was 13,620 kg (30,030 lb) the heaviest payload launched by SpaceX at
that time.<sup class="reference" id="cite_ref-451"><a
href="#cite_note-451">[439]</a></sup> The fairings were recovered<sup
class="reference" id="cite_ref-452"><a href="#cite_note-452">[440]</a></sup> and
reused for Starlink L5 in March 2020.<sup class="reference" id="cite_ref-453"><a
href="#cite_note-453">[441]</a></sup> These are the first commercial satellites
to use <a href="/wiki/Krypton" title="Krypton">krypton</a> as fuel for their <a
href="/wiki/Ion_thruster" title="Ion thruster">ion thrusters</a>, which is
cheaper than the usual <a href="/wiki/Xenon" title="Xenon">xenon</a> fuel.<sup
class="reference" id="cite_ref-454"><a href="#cite_note-454">[442]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">72
</th>
<td>12 June 2019,<br/>14:17
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a>
 <br/>B1051.2<sup class="reference" id="cite_ref-nsf-20190306_431-2"><a
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href="#cite_note-nsf-20190306-431">[420]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Vandenberg_Air_Force_Base"
title="Vandenberg Air Force Base">VAFB</a>,<br/><a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E</a>
</td>
<td><a href="/wiki/RADARSAT_Constellation" title="RADARSAT
Constellation">RADARSAT Constellation</a><br/>(3 satellites)
</td>
<td>4,200 kg (9,300 lb)<sup class="reference" id="cite_ref-:9_455-0"><a
href="#cite_note-:9-455">[443]</a></sup>
</td>
<td><a href="/wiki/Sun-synchronous_orbit" title="Sun-synchronous orbit">SSO</a>
</td>
<td><a href="/wiki/Canadian_Space_Agency" title="Canadian Space Agency">Canadian
Space Agency</a> (CSA)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(ground
pad)</span></small>
</td></tr>
<tr>
<td colspan="9">A trio of satellites built for Canada's RADARSAT program were
launched that plan to replace the aging <a href="/wiki/Radarsat-1"
title="Radarsat-1">Radarsat-1</a> and <a href="/wiki/Radarsat-2"
title="Radarsat-2">Radarsat-2</a>. The new satellites contain Automated
Identification System (AIS) for locating ships and provide the world's most
advanced, comprehensive method of maintaining Arctic sovereignty, conducting
coastal surveillance, and ensuring maritime security.<sup class="reference"
id="cite_ref-456"><a href="#cite_note-456">[444]</a></sup><sup class="reference"
id="cite_ref-:9_455-1"><a href="#cite_note-:9-455">[443]</a></sup> The mission
was originally scheduled to lift off in February but due to the landing failure
of booster <a class="mw-redirect" href="/wiki/Falcon_9_booster_B1050"
title="Falcon 9 booster B1050">B1050</a>, this flight was switched to B1051
(used on <a href="/wiki/Crew_Dragon_Demo-1" title="Crew Dragon Demo-1">Crew
Dragon Demo-1</a>) and delayed to allow refurbishment and transport to the West
coast.<sup class="reference" id="cite_ref-nsf-20190306_431-3"><a
href="#cite_note-nsf-20190306-431">[420]</a></sup> The booster landed safely
through fog.<sup class="reference" id="cite_ref-457"><a
href="#cite_note-457">[445]</a></sup> A payload cost of roughly US$1 billion
made this SpaceX's second most expensive payload launched<sup class="reference"
id="cite_ref-458"><a href="#cite_note-458">[446]</a></sup><sup class="reference"
id="cite_ref-459"><a href="#cite_note-459">[447]</a></sup> and most valuable
commercial payload so far put into orbit.<sup class="reference"
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id="cite_ref-460"><a href="#cite_note-460">[448]</a></sup>
</td></tr>
<tr>
<th rowspan="4" scope="row" style="text-align:center;">FH 3
</th>
<td rowspan="3">25 June 2019,<br/>06:30<sup class="reference"
id="cite_ref-461"><a href="#cite_note-461">[449]</a></sup>
</td>
<td><a href="/wiki/Falcon_Heavy" title="Falcon Heavy">Falcon Heavy</a><br/><span
class="nowrap">B1057 core</span><sup class="reference" id="cite_ref-
nsf-20190306_431-4"><a href="#cite_note-nsf-20190306-431">[420]</a></sup>
</td>
<td rowspan="3"><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td rowspan="3"><a href="/wiki/Space_Test_Program" title="Space Test
Program">Space Test Program</a> Flight 2 (STP-2)
</td>
<td rowspan="3">3,700 kg (8,200 lb)
</td>
<td rowspan="3"><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low
Earth Orbit">LEO</a> / <a class="mw-redirect" href="/wiki/Medium_Earth_Orbit"
title="Medium Earth Orbit">MEO</a>
</td>
<td rowspan="3"><a href="/wiki/United_States_Air_Force" title="United States Air
Force">USAF</a>
</td>
<td class="table-success" rowspan="3" style="background: #9EFF9E; vertical-
align: middle; text-align: center;">Success
</td>
<td class="table-failure" style="background: #FFC7C7; vertical-align: middle;
text-align: center;">Failure<br/><small>(drone ship)</small>
</td></tr>
<tr>
<td>B1052.2<br/>(side)
</td>
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text-align: center;">Success<br/><small>(ground pad)</small>
</td></tr>
<tr>
<td>B1053.2<br/>(side)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small>(ground pad)</small>
</td></tr>
<tr>
<td colspan="9"><a href="/wiki/United_States_Air_Force" title="United States Air
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Force">USAF Space Test Program Flight 2 (STP-2)^{[74]} carried 24 small satellites,^{[450]} including: FormoSat-7 A/B/C/D/E/F integrated using EELV Secondary Payload Adapter,^{[451]} DSX, Prox-1^{[452]} GPIM,^{[453]} DSAC,^{[454]} ISAT, SET,^{[455]} COSMIC-2, Oculus-ASR, OBT, NPSat,^{[456]} and several CubeSats including E-TBEx,^{[457]} LightSail 2,^{[458]} TEPCE, PSAT, and three ELaNa 15 CubeSats. Total payload mass was 3,700 kg (8,200 lb).^{[459]} The mission lasted six hours during which the second stage ignited four times and went into different orbits to deploy satellites including a "propulsive passivation maneuver".^{[456]}^{[460]}
<p>Third flight of Falcon Heavy. The side boosters from the Arabsat-6A mission just 2.5 months before were reused on this flight and successfully returned to LZ-1 and LZ-2.^{[420]} The center core, in use for the first time, underwent the most energetic reentry attempted by SpaceX, and attempted a landing over 1,200 km (750 mi) downrange, 30% further than any previous landing.^{[461]} This core suffered a thrust vector control failure in the center engine caused by a breach in the engine bay due to the

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extreme heat. The core thus failed its landing attempt on the drone ship <i>Of
Course I Still Love You</i> due to lack of control when the outer engines shut
down.<sup class="reference" id="cite_ref-474"><a
href="#cite_note-474">[462]</a></sup> For the first time one fairing half was
successfully landed on the catch-net of the support ship GO <i><a class="mw-
redirect" href="/wiki/Ms._Tree_(ship)" title="Ms. Tree (ship)">Ms. Tree</a></i>
(formerly <i>Mr. Steven</i>).<sup class="reference" id="cite_ref-475"><a
href="#cite_note-475">[463]</a></sup>
</p>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">73
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<td>25 July 2019,<br/>22:01<sup class="reference" id="cite_ref-auto5_476-0"><a
href="#cite_note-auto5-476">[464]</a></sup>
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class="mw-redirect" href="/wiki/Falcon_9_booster_B1056" title="Falcon 9 booster
B1056">B1056.2</a><sup class="reference" id="cite_ref-B1056use_477-0"><a
href="#cite_note-B1056use-477">[465]</a></sup>
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<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a><br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/SpaceX_CRS-18" title="SpaceX CRS-18">SpaceX CRS-18</a><sup
class="reference" id="cite_ref-spn-20160224_148-7"><a href="#cite_note-
spn-20160224-148">[141]</a></sup><br/>(<a href="/wiki/Dragon_C108" title="Dragon
C108">Dragon C108</a>.3 )
</td>
<td>2,268 kg (5,000 lb)<sup class="reference" id="cite_ref-auto5_476-1"><a
href="#cite_note-auto5-476">[464]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
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</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
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pad)</span></small>
</td></tr>
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<tr>
<td colspan="9">This launch carried nearly 9,000 individual unique payloads
including over one ton of science experiments, the most so far launched on a <a
href="/wiki/SpaceX_Dragon" title="SpaceX Dragon">SpaceX Dragon</a>. The third <a
href="/wiki/International_Docking_Adapter" title="International Docking
Adapter">International Docking Adapter</a> (IDA-3), a replacement for the first
IDA lost during the <a href="/wiki/SpaceX_CRS-7" title="SpaceX CRS-7">CRS-7</a>
launch anomaly, was one of the external payloads on this mission.<sup
class="reference" id="cite_ref-478"><a href="#cite_note-478">[466]</a></sup>
Along with food and science, the Dragon also carried the <a
href="/wiki/Educational_Launch_of_Nanosatellites" title="Educational Launch of
Nanosatellites">ELaNa 27</a> RFTSat CubeSat<sup class="reference"
id="cite_ref-479"><a href="#cite_note-479">[467]</a></sup> and MakerSat-1 which
will be used to demonstrate microgravity additive manufacturing. The satellite
is expected to be launched by a <a href="/wiki/Cygnus_(spacecraft)"
title="Cygnus (spacecraft)">Cygnus</a> dispenser later in July 2019.
<p>The booster used on this flight was the same used on <a
href="/wiki/SpaceX_CRS-17" title="SpaceX CRS-17">CRS-17</a> earlier in the year;
originally, it was planned to reuse it again for the <a
href="/wiki/SpaceX_CRS-19" title="SpaceX CRS-19">CRS-19</a> mission later this
year,<sup class="reference" id="cite_ref-480"><a
href="#cite_note-480">[468]</a></sup> but the plan was scrapped. For the first
time, the twice flown <a href="/wiki/SpaceX_Dragon" title="SpaceX
Dragon">Dragon</a> spacecraft also made a third flight.<sup class="reference"
id="cite_ref-:12_481-0"><a href="#cite_note-:12-481">[469]</a></sup> Also used
for the first time was a gray-band painted where the <a href="/wiki/RP-1"
title="RP-1">RP-1 kerosene</a> tank is located, to help with thermal
conductivity and thus saving fuel during long coasts.<sup class="reference"
id="cite_ref-482"><a href="#cite_note-482">[470]</a></sup>
</p>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">74
</th>
<td>6 August 2019,<br/>23:23<sup class="reference" id="cite_ref-483"><a
href="#cite_note-483">[471]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
class="mw-redirect" href="/wiki/Falcon_9_booster_B1047" title="Falcon 9 booster
B1047">B1047.3</a><sup class="reference" id="cite_ref-484"><a
href="#cite_note-484">[472]</a></sup>
</td>
<td nowrap=""><a class="mw-redirect"
href="/wiki/Cape_Canaveral_Air_Force_Station" title="Cape Canaveral Air Force
Station">CCAFS</a>,<br/><a href="/wiki/Cape_Canaveral_Space_Launch_Complex_40"
title="Cape Canaveral Space Launch Complex 40">SLC-40</a>
</td>
<td><a class="mw-redirect" href="/wiki/Amos-17" title="Amos-17">AMOS-17</a><sup
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class="reference" id="cite_ref-485"><a href="#cite_note-485">[473]</a></sup>
</td>
<td>6,500 kg (14,300 lb)<sup class="reference"
id="cite_ref-1047expended_486-0"><a
href="#cite_note-1047expended-486">[474]</a></sup>
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a href="/wiki/Spacecom" title="Spacecom">Spacecom</a>
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white-space: nowrap; text-align: center;">No attempt<sup class="reference"
id="cite_ref-1047expended_486-1"><a
href="#cite_note-1047expended-486">[474]</a></sup>
</td></tr>
<tr>
<td colspan="9">AMOS-17 is the most advanced high-throughput satellite to
provide satellite communication services to Africa.<sup class="reference"
id="cite_ref-487"><a href="#cite_note-487">[475]</a></sup> Following the loss of
<a class="mw-redirect" href="/wiki/AMOS-6" title="AMOS-6">AMOS-6</a> in
September 2016, Spacecom was granted a free launch in compensation for the lost
satellite.<sup class="reference" id="cite_ref-488"><a
href="#cite_note-488">[476]</a></sup> Due to the free launch, Spacecom was able
to expend the booster with no extra cost that comes with expending a booster,
and thus could reach final orbit quicker. This booster became the second Block 5
booster to be expended.<sup class="reference"
id="cite_ref-1047expended_486-2"><a
href="#cite_note-1047expended-486">[474]</a></sup><sup class="reference"
id="cite_ref-489"><a href="#cite_note-489">[477]</a></sup> For the second time,
<i>Ms. Tree</i> managed to catch a fairing half directly into its net.<sup
class="reference" id="cite_ref-490"><a href="#cite_note-490">[478]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">75
</th>
<td>11 November 2019,<br/>14:56<sup class="reference" id="cite_ref-491"><a
href="#cite_note-491">[479]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
class="mw-redirect" href="/wiki/B1048" title="B1048">B1048.4</a>
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
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Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 1 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)<sup class="reference" id="cite_ref-SLNov19_5-2"><a
href="#cite_note-SLNov19-5">[5]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a>
</td>
<td><a href="/wiki/Spacecom" title="Spacecom">SpaceX</a>
</td>
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</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Second large batch of Starlink satellites and the first
operational mission of the constellation, it launched in a roughly 290 km
(180 mi) orbit at an inclination of 53.0°. At 15,600 kg (34,400 lb), it is the
heaviest payload so far launched by SpaceX, breaking the record set by the
Starlink v0.9 flight earlier that year.<sup class="reference" id="cite_ref-
SLNov19_5-3"><a href="#cite_note-SLNov19-5">[5]</a></sup> This flight marked the
first time that a Falcon 9 booster made a fourth flight and landing.<sup
class="reference" id="cite_ref-:13_492-0"><a
href="#cite_note-:13-492">[480]</a></sup> This was also the first time that a
Falcon 9 re-used fairings (from ArabSat-6A in April 2019).<sup class="reference"
id="cite_ref-:14_441-1"><a href="#cite_note-:14-441">[429]</a></sup> It was
planned to recover the fairings with both <i>Ms. Tree</i> and <i>Ms. Chief</i>
but the plan was abandoned due to rough seas.<sup class="reference"
id="cite_ref-SLNov19_5-4"><a href="#cite_note-SLNov19-5">[5]</a></sup>
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<th rowspan="2" scope="row" style="text-align:center;">76
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<td>5 December 2019,<br/>17:29<sup class="reference" id="cite_ref-493"><a
href="#cite_note-493">[481]</a></sup>
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<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9
B5</a><br/>B1059.1<sup class="reference" id="cite_ref-:02_494-0"><a
href="#cite_note-:02-494">[482]</a></sup>
</td>
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title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
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href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/SpaceX_CRS-19" title="SpaceX CRS-19">SpaceX CRS-19</a><sup
class="reference" id="cite_ref-spn-201602242_495-0"><a href="#cite_note-
spn-201602242-495">[483]</a></sup><br/>(Dragon C106.3 )
</td>
<td>2,617 kg (5,769 lb)
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Second re-supply flight to use a Cargo Dragon for the third
time.<sup class="reference" id="cite_ref-496"><a
href="#cite_note-496">[484]</a></sup> This flight carried Robotic Tool Stowage
(RiTS), a docking station that allows equipment that looks for leaks on the
Space Station be stored on the outside. Also on board were upgrades for the <a
href="/wiki/Cold_Atom_Laboratory" title="Cold Atom Laboratory">Cold Atom
Laboratory (CAL)</a>. Onboard experiments include the testing of the spread of
fire in space, mating barley in microgravity and experiments to test muscle and
bone growth in microgravity.<sup class="reference" id="cite_ref-:152_497-0"><a
href="#cite_note-:152-497">[485]</a></sup> Secondary payloads include the
Hyperspectral Imager Suite (HISUI), an experiment to image high resolution
across all colours of the light spectrum, allowing for imaging of soil, rocks,
vegetation, snow, ice and man-made objects. Additionally, there were three
CubeSats from NASA's <a href="/wiki/Educational_Launch_of_Nanosatellites"
title="Educational Launch of Nanosatellites">ELaNa 28</a> mission,<sup
class="reference" id="cite_ref-Upcoming-ELaNa_391-1"><a href="#cite_note-
Upcoming-ELaNa-391">[381]</a></sup> including the AztechSat-1 satellite built by
students in Mexico.<sup class="reference" id="cite_ref-:152_497-1"><a
href="#cite_note-:152-497">[485]</a></sup>
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<td>17 December 2019,<br/>00:10<sup class="reference" id="cite_ref-
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sjcs_498-0"><a href="#cite_note-sjcs-498">[486]</a></sup>
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class="mw-redirect" href="/wiki/B1056" title="B1056">B1056.3</a><sup
class="reference" id="cite_ref-:02_494-1"><a
href="#cite_note-:02-494">[482]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/JSAT_(satellite_constellation)" title="JSAT (satellite
constellation)">JCSat-18</a> / <a href="/wiki/Kacific_Broadband_Satellites"
title="Kacific Broadband Satellites">Kacific 1</a><sup class="reference"
id="cite_ref-sn-20170905_499-0"><a href="#cite_note-
sn-20170905-499">[487]</a></sup>
</td>
<td>6,956 kg (15,335 lb)<sup class="reference" id="cite_ref-sjcs_498-1"><a
href="#cite_note-sjcs-498">[486]</a></sup>
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a class="mw-redirect" href="/wiki/SKY_Perfect_JSAT_Group" title="SKY
Perfect JSAT Group">Sky Perfect JSAT</a><br/><a
href="/wiki/Kacific_Broadband_Satellites" title="Kacific Broadband
Satellites">Kacific 1</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
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</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Singaporean-Japanese <a href="/wiki/CondoSat"
title="CondoSat">CondoSat</a> that will cover the Asia-Pacific region.<sup
class="reference" id="cite_ref-500"><a href="#cite_note-500">[488]</a></sup> Due
to the heavy weight of the payload, it was injected into a lower energy sub-
synchronous orbit of 20,000 km (12,000 mi); the satellite itself will transfer
to full GTO. This was the third Falcon 9 launch for JSAT and the previous two
were in 2016. SpaceX successfully landed B1056.3 but both fairing halves missed
the recovery boats <i>Ms. Tree</i> and <i>Ms. Chief.</i><sup class="reference"
id="cite_ref-501"><a href="#cite_note-501">[489]</a></sup>
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<tbody><tr>
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</th>
<th scope="col">Date and<br/>time (<a href="/wiki/Coordinated_Universal_Time"
title="Coordinated Universal Time">UTC</a>)
</th>
<th scope="col"><a href="/wiki/List_of_Falcon_9_first-stage_boosters"
title="List of Falcon 9 first-stage boosters">Version,<br/>Booster</a><sup
class="reference" id="cite_ref-booster_11-7"><a href="#cite_note-
booster-11">[b]</a></sup>
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<th scope="col">Launch<br/>site
</th>
<th scope="col">Payload<sup class="reference" id="cite_ref-Dragon_12-7"><a
href="#cite_note-Dragon-12">[c]</a></sup>
</th>
<th scope="col">Payload mass
</th>
<th scope="col">Orbit
</th>
<th scope="col">Customer
</th>
<th scope="col">Launch<br/>outcome
</th>
<th scope="col"><a href="/wiki/Falcon_9_first-stage_landing_tests" title="Falcon
9 first-stage landing tests">Booster<br/>landing</a>
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<tr>
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</th>
<td>7 January 2020,<br/>02:19:21<sup class="reference" id="cite_ref-504"><a
href="#cite_note-504">[492]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a>
<br/><a href="/wiki/List_of_Falcon_9_first-stage_boosters#B1049" title="List of
Falcon 9 first-stage boosters">B1049.4</a>
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<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 2 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)<sup class="reference" id="cite_ref-SLNov19_5-5"><a
href="#cite_note-SLNov19-5">[5]</a></sup>
</td>
```

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<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Third large batch and second operational flight of Starlink
constellation. One of the 60 satellites included a test coating to make the
satellite less reflective, and thus less likely to interfere with ground-based
astronomical observations.<sup class="reference" id="cite_ref-505"><a
href="#cite_note-505">[493]</a></sup>
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href="#cite_note-506">[494]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a>
<br/><a class="mw-redirect" href="/wiki/B1046" title="B1046">B1046.4</a>
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Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/SpaceX_Dragon_2#In-flight_abort_test" title="SpaceX Dragon
2">Crew Dragon in-flight abort test</a><sup class="reference" id="cite_ref-
sn20150702_507-0"><a href="#cite_note-
sn20150702-507">[495]</a></sup><br/>(Dragon C205.1)
</td>
<td>12,050 kg (26,570 lb)
</td>
<td><a class="mw-redirect" href="/wiki/Sub-orbital" title="Sub-orbital">Sub-
orbital</a><sup class="reference" id="cite_ref-508"><a
href="#cite_note-508">[496]</a></sup>
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a class="mw-redirect"
href="/wiki/ISS_Crew_Transportation_Services" title="ISS Crew Transportation
Services">CTS</a>)<sup class="reference" id="cite_ref-CCD6_509-0"><a
href="#cite_note-CCD6-509">[497]</a></sup>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
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text-align: center;">Success
</td>
<td class="table-noAttempt" style="background: #EEE; vertical-align: middle;
white-space: nowrap; text-align: center;">No attempt
</td></tr>
<tr>
<td colspan="9">An atmospheric test of the <a href="/wiki/SpaceX_Dragon_2"
title="SpaceX Dragon 2">Dragon 2 abort system after <a class="mw-redirect"
href="/wiki/Max_Q" title="Max Q">Max Q. The capsule fired its <a
href="/wiki/SuperDraco" title="SuperDraco">SuperDraco engines, reached an
apogee of 40 km (25 mi), deployed parachutes after reentry, and <a
href="/wiki/Splashdown" title="Splashdown">splashed down in the ocean 31 km
(19 mi) downrange from the launch site. The test was previously slated to be
accomplished with the <a href="/wiki/Crew_Dragon_Demo-1" title="Crew Dragon
Demo-1">Crew Dragon Demo-1 capsule;<sup class="reference" id="cite_ref-
nsf-20170811_510-0">[498]</sup> but
that test article exploded during a ground test of SuperDraco engines on 20
April 2019.<sup class="reference" id="cite_ref-:11_430-1"><a
href="#cite_note-:11-430">[419]</sup> The abort test used the capsule
originally intended for the first crewed flight.<sup class="reference"
id="cite_ref-sfn_crewdragon_may19_511-0"><a href="#cite_note-
sfn_crewdragon_may19-511">[499]</sup> As expected, the booster was destroyed
by aerodynamic forces after the capsule aborted.<sup class="reference"
id="cite_ref-512">[500]</sup> First flight of a
Falcon 9 with only one functional stage - the second stage had a <a class="mw-
redirect" href="/wiki/Mass_simulator" title="Mass simulator">mass simulator
in place of its engine.
</td></tr>
<tr>
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</th>
<td>29 January 2020,
14:07<sup class="reference" id="cite_ref-513"><a
href="#cite_note-513">[501]</sup>
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<td>F9 B5
<a
class="mw-redirect" href="/wiki/Falcon_9_booster_B1051" title="Falcon 9 booster
B1051">B1051.3
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title="Cape Canaveral Air Force Station">CCAFS,
<a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40
</td>
<td>Starlink 3 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)<sup class="reference" id="cite_ref-SLNov19_5-6"><a
href="#cite_note-SLNov19-5">[5]</sup>

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<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Third operational and fourth large batch of Starlink satellites,
deployed in a circular 290 km (180 mi) orbit. One of the fairing halves was
caught, while the other was fished out of the ocean.<sup class="reference"
id="cite_ref-catch3_514-0"><a href="#cite_note-catch3-514">[502]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">81
</th>
<td>17 February 2020,<br/>15:05<sup class="reference" id="cite_ref-515"><a
href="#cite_note-515">[503]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
class="mw-redirect" href="/wiki/Falcon_9_booster_B1056" title="Falcon 9 booster
B1056">B1056.4</a>
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 4 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)<sup class="reference" id="cite_ref-SLNov19_5-7"><a
href="#cite_note-SLNov19-5">[5]</a></sup>
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-failure" style="background: #FFC7C7; vertical-align: middle;
text-align: center;">Failure<br/><small>(drone ship)</small>
```

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</td></tr>
<tr>
<td colspan="9">Fourth operational and fifth large batch of Starlink satellites.
Used a new flight profile which deployed into a 212 km × 386 km (132 mi
× 240 mi) elliptical orbit instead of launching into a circular orbit and firing
the second stage engine twice. The first stage booster failed to land on the
drone ship<sup class="reference" id="cite_ref-516"><a
href="#cite_note-516">[504]</a></sup> due to incorrect wind data.<sup
class="reference" id="cite_ref-517"><a href="#cite_note-517">[505]</a></sup>
This was the first time a flight proven booster failed to land.
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">82
</th>
<td>7 March 2020,<br/>04:50<sup class="reference" id="cite_ref-518"><a
href="#cite_note-518">[506]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1059" title="List of Falcon 9
first-stage boosters">B1059.2</a>
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/SpaceX_CRS-20" title="SpaceX CRS-20">SpaceX
CRS-20</a><br/>(Dragon C112.3 )
</td>
<td>1,977 kg (4,359 lb)<sup class="reference" id="cite_ref-519"><a
href="#cite_note-519">[507]</a></sup>
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a> (<a
class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(ground
pad)</span></small>
</td></tr>
<tr>
<td colspan="9">Last launch of phase 1 of the CRS contract. Carries
```

Bartolomeo, an <a class="mw-redirect" href="/wiki/ESA"
title="ESA">ESA platform for hosting external payloads onto ISS.<sup
class="reference" id="cite_ref-520">[508]</sup>
Originally scheduled to launch on 2 March 2020, the launch date was pushed back
due to a second stage engine failure. SpaceX decided to swap out the second
stage instead of replacing the faulty part.<sup class="reference"
id="cite_ref-521">[509]</sup> It was SpaceX's 50th
successful landing of a first stage booster, the third flight of the Dragon C112
and the last launch of the cargo <a class="mw-redirect"
href="/wiki/Dragon_(spacecraft)" title="Dragon (spacecraft)">Dragon
spacecraft.
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">83
</th>
<td>18 March 2020,
12:16<sup class="reference" id="cite_ref-522"><a
href="#cite_note-522">[510]</sup>
</td>
<td>F9 B5

<a class="mw-redirect" href="/wiki/Falcon_9_booster_B1048" title="Falcon 9
booster B1048">B1048.5
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC,
<a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A
</td>
<td>Starlink 5 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)<sup class="reference" id="cite_ref-SLNov19_5-8"><a
href="#cite_note-SLNov19-5">[5]</sup>
</td>
<td>LEO
</td>
<td>SpaceX
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-failure" style="background: #FFC7C7; vertical-align: middle;
text-align: center;">Failure
<small>(drone
ship)</small>
</td></tr>
<tr>
<td colspan="9">Fifth operational launch of Starlink satellites. It was the
first time a first stage booster flew for a fifth time and the second time the
fairings were reused (Starlink flight in May 2019).<sup class="reference"
id="cite_ref-523">[511]</sup> Towards the end of

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the first stage burn, the booster suffered premature shut down of an engine, the
first of a <a class="mw-redirect" href="/wiki/Merlin_1D" title="Merlin
1D">Merlin 1D</a> variant and first since the CRS-1 mission in October 2012.
However, the payload still reached the targeted orbit.<sup class="reference"
id="cite_ref-524"><a href="#cite_note-524">[512]</a></sup> This was the second
Starlink launch booster landing failure in a row, later revealed to be caused by
residual cleaning fluid trapped inside a sensor.<sup class="reference"
id="cite_ref-525"><a href="#cite_note-525">[513]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">84
</th>
<td>22 April 2020,<br/>19:30<sup class="reference" id="cite_ref-526"><a
href="#cite_note-526">[514]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1051" title="List of Falcon 9
first-stage boosters">B1051.4</a>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 6 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)<sup class="reference" id="cite_ref-SLNov19_5-9"><a
href="#cite_note-SLNov19-5">[5]</a></sup>
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Sixth operational launch of Starlink satellites. The 84th flight
of the Falcon 9 rocket, it surpassed <a href="/wiki/Atlas_V" title="Atlas
V">Atlas V</a> to become the most-flown operational US rocket.<sup
class="reference" id="cite_ref-leader_527-0"><a href="#cite_note-
leader-527">[515]</a></sup> Used fairings launched on AMOS-17 (August 2019).<sup
class="reference" id="cite_ref-528"><a href="#cite_note-528">[516]</a></sup>
</td></tr>
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<tr>
<th rowspan="2" scope="row" style="text-align:center;">85
</th>
<td>30 May 2020,<br/>19:22<sup class="reference" id="cite_ref-529"><a
href="#cite_note-529">[517]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a><br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1058" title="List of Falcon 9
first-stage boosters">B1058.1</a><sup class="reference" id="cite_ref-
nsf_2Aug19_530-0"><a href="#cite_note-nsf_2Aug19-530">[518]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/Crew_Dragon_Demo-2" title="Crew Dragon Demo-2">Crew Dragon
Demo-2</a><sup class="reference" id="cite_ref-nsf20150305_424-1"><a
href="#cite_note-nsf20150305-424">[414]</a></sup><br/>(<a class="mw-redirect"
href="/wiki/SpaceX_Crew_Dragon_Endeavour" title="SpaceX Crew Dragon
Endeavour">Crew Dragon C206.1 <i>Endeavour</i></a>)
</td>
<td>12,530 kg (27,620 lb)<sup class="reference" id="cite_ref-531"><a
href="#cite_note-531">[519]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a class="mw-redirect"
href="/wiki/Commercial_Crew_Development" title="Commercial Crew
Development">CCDev</a>)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">First crewed orbital spaceflight from American soil since Space
Shuttle <a href="/wiki/STS-135" title="STS-135">STS-135</a> in July 2011,
carrying <a href="/wiki/NASA" title="NASA">NASA</a> astronauts <a
href="/wiki/Bob_Behnken" title="Bob Behnken">Bob Behnken</a> and <a
href="/wiki/Doug_Hurley" title="Doug Hurley">Doug Hurley</a> to the <a
href="/wiki/International_Space_Station" title="International Space
Station">International Space Station</a>.<sup class="reference" id="cite_ref-
nsf20150305_424-2"><a href="#cite_note-nsf20150305-424">[414]</a></sup> The
SpaceX live stream was peaked at 4.1 million viewers, while NASA estimated
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roughly 10 million people watched on various online platforms, and approximately
150,000 people gathered on Florida's <a class="mw-redirect"
href="/wiki/Space_coast" title="Space coast">space coast</a> despite the risks
of the <a href="/wiki/COVID-19_pandemic" title="COVID-19 pandemic">COVID-19
pandemic</a>.<sup class="reference" id="cite_ref-532"><a
href="#cite_note-532">[520]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">86
</th>
<td>4 June 2020,<br/>01:25<sup class="reference" id="cite_ref-:16_533-0"><a
href="#cite_note-:16-533">[521]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1049" title="List of Falcon 9
first-stage boosters">B1049.5</a>
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 7 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)<sup class="reference" id="cite_ref-SLNov19_5-10"><a
href="#cite_note-SLNov19-5">[5]</a></sup>
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Seventh operational launch of Starlink satellites, occurred on
the 10th anniversary of the first Falcon 9 flight. Included "VisorSat" satellite
test that uses a sunshade to limit reflectivity.<sup class="reference"
id="cite_ref-NAS280420_534-0"><a href="#cite_note-NAS280420-534">[522]</a></sup>
First booster to successfully land five times, and first to land on <a
href="/wiki/Autonomous_spaceport_drone_ship" title="Autonomous spaceport drone
ship">Just Read The Instructions</a> since it was moved to the <a
href="/wiki/East_Coast_of_the_United_States" title="East Coast of the United
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States">East Coast.
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">87
</th>
<td>13 June 2020,
09:21<sup class="reference" id="cite_ref-:17_535-0"><a
href="#cite_note-:17-535">[523]</sup>
</td>
<td>F9 B5
<a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1059" title="List of Falcon 9
first-stage boosters">B1059.3
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS,
<a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40
</td>
<td>Starlink 8 v1.0 (58
satellites),<sup class="reference" id="cite_ref-nsf20200612_536-0"><a
href="#cite_note-nsf20200612-536">[524]</sup><sup class="reference"
id="cite_ref-537">[525]</sup>
<a
href="/wiki/SkySat" title="SkySat">SkySats-16, -17, -18
</td>
<td>15,410 kg (33,970 lb)<sup class="reference" id="cite_ref-:17_535-1"><a
href="#cite_note-:17-535">[523]</sup>
</td>
<td>LEO
</td>
<td>SpaceX
<a
href="/wiki/Planet_Labs" title="Planet Labs">Planet Labs
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
<small>(drone
ship)</small>
</td></tr>
<tr>
<td colspan="9">Eighth operational launch of Starlink satellites, included the
first rideshare
in SpaceX's <a class="mw-redirect"
href="/wiki/SpaceX_SmallSat_Rideshare_Program" title="SpaceX SmallSat Rideshare
Program">SmallSat Program, of three <a href="/wiki/SkySat"
title="SkySat">SkySat satellites.<sup class="reference"
id="cite_ref-:15_538-0">[526]</sup><sup
class="reference" id="cite_ref-539">[527]</sup> One
payload fairing half launched on <a href="/wiki/JSAT_(satellite_constellation)"

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title="JSAT (satellite constellation)">JCSat-18</a> / <a
href="/wiki/Kacific_Broadband_Satellites" title="Kacific Broadband
Satellites">Kacific 1</a> mission in December 2019. The other payload fairing
half flew on Starlink 2 v1.0 in January 2020.<sup class="reference"
id="cite_ref-540"><a href="#cite_note-540">[528]</a></sup> For the first time,
SpaceX did not perform a static fire before launch.
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">88
</th>
<td>30 June 2020,<br/>20:10:46<sup class="reference" id="cite_ref-541"><a
href="#cite_note-541">[529]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a><br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1060" title="List of Falcon 9
first-stage boosters">B1060.1</a>
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/GPS_Block_III" title="GPS Block III">GPS III</a>-<a
href="/wiki/List_of_GPS_satellites" title="List of GPS satellites">03</a> (<i><a
href="/wiki/Matthew_Henson" title="Matthew Henson">Matthew Henson</a></i>)
</td>
<td>4,311 kg (9,504 lb)<sup class="reference" id="cite_ref-
clark-20200630_542-0"><a href="#cite_note-clark-20200630-542">[530]</a></sup>
</td>
<td><a href="/wiki/Medium_Earth_orbit" title="Medium Earth orbit">MEO</a>
</td>
<td><a href="/wiki/United_States_Space_Force" title="United States Space
Force">U.S. Space Force</a><sup class="reference" id="cite_ref-
clark-20200630_542-1"><a href="#cite_note-clark-20200630-542">[530]</a></sup>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Payload manufacturing contract awarded January 2012,<sup
class="reference" id="cite_ref-gps_34_manufacturing_543-0"><a href="#cite_note-
gps_34_manufacturing-543">[531]</a></sup> fully assembled in August 2017,<sup
class="reference" id="cite_ref-gpsworld_20171127_544-0"><a href="#cite_note-
gpsworld_20171127-544">[532]</a></sup><sup class="reference" id="cite_ref-
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gleckel-2017-11_545-0"><a href="#cite_note-gleckel-2017-11-545">[533]</a></sup>
and completed thermal vacuum testing in June 2018.<sup class="reference"
id="cite_ref-gps_status_20180926_546-0"><a href="#cite_note-
gps_status_20180926-546">[534]</a></sup> Launch contract was awarded initially
for US$96.5 million,<sup class="reference" id="cite_ref-547"><a
href="#cite_note-547">[535]</a></sup> but later, this was discounted in exchange
for allowing to launch configuration enabling booster recovery.<sup
class="reference" id="cite_ref-548"><a href="#cite_note-548">[536]</a></sup> The
vehicle nicknamed <i>Columbus</i> was transported to Florida in February
2020,<sup class="reference" id="cite_ref-549"><a
href="#cite_note-549">[537]</a></sup> but launch was delayed by the customer
from April 2020 due to the <a href="/wiki/COVID-19"
title="COVID-19">COVID-19</a> pandemic.<sup class="reference" id="cite_ref-
sn20200407_550-0"><a href="#cite_note-sn20200407-550">[538]</a></sup> The launch
was dedicated to the memory of the recently deceased, late commander of the <a
href="/wiki/21st_Space_Wing" title="21st Space Wing">21st Space Wing</a>,
Colonel Thomas G. Falzarano,<sup class="reference" id="cite_ref-
sn20200630_551-0"><a href="#cite_note-sn20200630-551">[539]</a></sup><sup
class="reference" id="cite_ref-s&amp;amp;s20200513_552-0"><a
href="#cite_note-s&amp;amp;s20200513-552">[540]</a></sup> and after launch, in
October 2020, the nickname was changed to that of the Arctic explorer <a
href="/wiki/Matthew_Henson" title="Matthew Henson">Matthew Henson</a>.<sup
class="reference" id="cite_ref-GPS_553-0"><a href="#cite_note-
GPS-553">[541]</a></sup><sup class="reference" id="cite_ref-
sn-20160427_400-1"><a href="#cite_note-sn-20160427-400">[390]</a></sup> The
second stage featured a gray band to allow more heat to be absorbed during the
longer coasting period,<sup class="reference" id="cite_ref-554"><a
href="#cite_note-554">[542]</a></sup> while both fairings were recovered out of
the water without attempting a catch in the net.
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">89
</th>
<td>20 July 2020,<br/>21:30<sup class="reference" id="cite_ref-
SFN20200720_555-0"><a href="#cite_note-SFN20200720-555">[543]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a>
<br/><a href="/wiki/List_of_Falcon_9_first-stage_boosters#B1058" title="List of
Falcon 9 first-stage boosters">B1058.2</a><sup class="reference" id="cite_ref-
Gunter_556-0"><a href="#cite_note-Gunter-556">[544]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/ANASIS-II" title="ANASIS-II">ANASIS-II</a>
</td>
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<td>5,000-6,000 kg (11,000-13,000 lb)
</td>
<td>GTO
</td>
<td>Republic of Korea Army
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle; text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle; text-align: center;">Success
<small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">At 5-6 tonnes, the satellite formerly known as K-Milsat-1 is South Korea's first dedicated military satellite. Contracted by South Korea's Defense Acquisition Program Administration in 2014.^{[545]} 57th successful recovery of a Falcon 9 first stage. For the first time both fairing halves were also successfully caught by fairing catching ships.^{[546]} This launch featured a booster reflight within 51 days, a new record turnaround time for a Falcon booster.^{[547]} It was the same booster that launched the Crew Dragon Demo-2 spacecraft on 30 May 2020.^{[543]} The satellite was delivered to a super-synchronous transfer orbit of 211 km × 45,454 km (131 mi × 28,244 mi), while both fairing halves were caught in the catch nets of the supports ships.^{[548]}
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">90
</th>
<td>7 August 2020,
05:12^{[549]}
</td>
<td>F9 B5
B1051.5
</td>

<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC,
<a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A
</td>
<td>Starlink 9 v1.0 (57
Satellites),<sup class="reference" id="cite_ref-nsf20200612_536-1"><a
href="#cite_note-nsf20200612-536">[524]</sup>
<a
href="/wiki/Spaceflight_Industries#BlackSky" title="Spaceflight
Industries">SXRS-1 (BlackSky Global 7 and 8)
</td>
<td>14,932 kg (32,919 lb)
</td>
<td>LEO
</td>
<td>SpaceX
<a
href="/wiki/Spaceflight_Industries" title="Spaceflight Industries">Spaceflight
Industries (BlackSky)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
<small>(drone
ship)</small>
</td></tr>
<tr>
<td colspan="9">Ninth operational launch of Starlink satellites. This mission
carried 57 Starlink satellites and two <a
href="/wiki/Spaceflight_Industries#BlackSky" title="Spaceflight
Industries">BlackSky satellites as rideshare.<sup class="reference"
id="cite_ref-562">[550]</sup> This first rideshare
contracted with Spaceflight Industries was dubbed internally as "SXRS-1".<sup
class="reference" id="cite_ref-spaceflight-20200617_563-0"><a href="#cite_note-
spaceflight-20200617-563">[551]</sup> After previously testing on a single
Starlink, the launch will have all 57 satellites include a "VisorSat" to reduce
their brightness.<sup class="reference" id="cite_ref-564"><a
href="#cite_note-564">[552]</sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">91
</th>
<td>18 August 2020
14:31<sup class="reference" id="cite_ref-565"><a
href="#cite_note-565">[553]</sup>
</td>
<td>F9 B5
<a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1049" title="List of Falcon 9
first-stage boosters">B1049.6<sup class="reference" id="cite_ref-
Gunter_556-1">[544]</sup>

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</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 10 v1.0 (58
satellites)<br/><a href="/wiki/SkySat" title="SkySat">SkySat</a>-19, -20, -21
</td>
<td>~15,440 kg (34,040 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a><br/><a
href="/wiki/Planet_Labs" title="Planet Labs">Planet Labs</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
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</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Tenth operational launch of Starlink satellites. Starlink flight
including three <a href="/wiki/SkySat" title="SkySat">SkySat</a> rideshare
satellites.<sup class="reference" id="cite_ref-:15_538-1"><a
href="#cite_note-:15-538">[526]</a></sup> First time a booster made a 6th
flight.<sup class="reference" id="cite_ref-566"><a
href="#cite_note-566">[554]</a></sup> The fairings previously flew on Starlink 3
v1.0. One fairing half was caught by <i>Go Ms. Tree</i>, the other was scooped
out of the ocean.<sup class="reference" id="cite_ref-:15_538-2"><a
href="#cite_note-:15-538">[526]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">92
</th>
<td>30 August 2020<br/>23:18<sup class="reference" id="cite_ref-567"><a
href="#cite_note-567">[555]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1059" title="List of Falcon 9
first-stage boosters">B1059.4</a>
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
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</td>
<td><a class="mw-redirect" href="/wiki/SAOCOM_1B" title="SAOCOM 1B">SAOCOM
1B</a><sup class="reference" id="cite_ref-skyrocket-saocom1b_568-0"><a
href="#cite_note-skyrocket-saocom1b-568">[556]</a></sup><br/><a class="new"
href="/w/index.php?title=GNOMES_1&amp;action=edit&amp;redlink=1" title="GNOMES 1
(page does not exist)">GNOMES 1</a><sup class="reference" id="cite_ref-
skyrocket-saocom1b_568-1"><a href="#cite_note-skyrocket-
saocom1b-568">[556]</a></sup><br/><a href="/wiki/Tyvak"
title="Tyvak">Tyvak-0172</a><sup class="reference" id="cite_ref-
SAOCOM_1B_Mission_569-0"><a href="#cite_note-
SAOCOM_1B_Mission-569">[557]</a></sup>
</td>
<td>3,130 kg (6,900 lb)<sup class="reference" id="cite_ref-570"><a
href="#cite_note-570">[558]</a></sup>
</td>
<td><a href="/wiki/Sun-synchronous_orbit" title="Sun-synchronous orbit">SSO</a>
</td>
<td><a class="mw-redirect" href="/wiki/CONAE" title="CONAE">CONAE</a><br/><a
class="new" href="/w/index.php?title=PlanetIQ&amp;action=edit&amp;redlink=1"
title="PlanetIQ (page does not exist)">PlanetIQ</a><br/><a href="/wiki/Tyvak"
title="Tyvak">Tyvak</a>
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<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
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<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(ground
pad)</span></small>
</td></tr>
<tr>
<td colspan="9">The 100th launch in SpaceX's history, first time a commercial
launch on a fourth launch of a booster, it deployed Earth-observing satellites
built by Argentina's space agency CONAE and two rideshares. SpaceX was
contracted in 2009 for an initial launch as early as 2013.<sup class="reference"
id="cite_ref-571"><a href="#cite_note-571">[559]</a></sup> Originally planned
for launch from Vandenberg but launched from Cape Canaveral, which made it the
first flight from there using the southern corridor to a polar orbit since
1969.<sup class="reference" id="cite_ref-572"><a
href="#cite_note-572">[560]</a></sup><sup class="reference" id="cite_ref-573"><a
href="#cite_note-573">[561]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">93
</th>
<td>3 September 2020<br/>12:46:14<sup class="reference" id="cite_ref-
sfn-20200903_574-0"><a href="#cite_note-sfn-20200903-574">[562]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
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href="/wiki/List_of_Falcon_9_first-stage_boosters#B1060" title="List of Falcon 9
first-stage boosters">B1060.2</a><sup class="reference" id="cite_ref-
nsf290820_575-0"><a href="#cite_note-nsf290820-575">[563]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 11 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)<sup class="reference" id="cite_ref-SLNov19_5-11"><a
href="#cite_note-SLNov19-5">[5]</a></sup>
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Eleventh operational launch of Starlink satellites, bringing the
total to 713 launched Starlink satellites.<sup class="reference" id="cite_ref-
sfn-20200903_574-1"><a href="#cite_note-sfn-20200903-574">[562]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">94
</th>
<td>6 October 2020<br/>11:29:34<sup class="reference" id="cite_ref-576"><a
href="#cite_note-576">[564]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters" title="List of Falcon 9
first-stage boosters">B1058.3</a><sup class="reference" id="cite_ref-577"><a
href="#cite_note-577">[565]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 12 v1.0 (60
satellites)
</td>
```

<td>15,600 kg (34,400 lb)<sup class="reference" id="cite_ref-SLNov19_5-12"><a
href="#cite_note-SLNov19-5">[5]</sup>
</td>
<td>LEO
</td>
<td>SpaceX
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
<small>(drone
ship)</small>
</td></tr>
<tr>
<td colspan="9">Twelfth operational launch of Starlink satellites, which for the
first time used a fairing half on its third launch.<sup class="reference"
id="cite_ref-578">[566]</sup> Also, the B1058 holds
the title for the shortest time a booster reached 3 flights which is 129 days
beating B1046 by 77 days.
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">95
</th>
<td>18 October 2020
12:25:57<sup class="reference" id="cite_ref-579"><a
href="#cite_note-579">[567]</sup>
</td>
<td>F9 B5
<a
href="/wiki/List_of_Falcon_9_first-stage_boosters" title="List of Falcon 9
first-stage boosters">B1051.6<sup class="reference" id="cite_ref-580"><a
href="#cite_note-580">[568]</sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC,
<a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A
</td>
<td>Starlink 13 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)<sup class="reference" id="cite_ref-SLNov19_5-13"><a
href="#cite_note-SLNov19-5">[5]</sup>
</td>
<td>LEO
</td>
<td>SpaceX
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success

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</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Thirteenth operational launch of Starlink satellites. Second
time a booster was flown six times and first time both fairing halves were flown
a third time. Both fairing halves landed on their respective ships but one
fairing broke the net on Ms Tree.<sup class="reference" id="cite_ref-581"><a
href="#cite_note-581">[569]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">96
</th>
<td>24 October 2020<br/>15:31:34<sup class="reference" id="cite_ref-582"><a
href="#cite_note-582">[570]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters" title="List of Falcon 9
first-stage boosters">B1060.3</a>
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 14 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Fourteenth operational launch of Starlink satellites and the
100th successful launch of a Falcon vehicle.<sup class="reference"
id="cite_ref-583"><a href="#cite_note-583">[571]</a></sup>
</td></tr>
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<tr>
<th rowspan="2" scope="row" style="text-align:center;">97
</th>
<td>5 November 2020<br/>23:24:23<sup class="reference" id="cite_ref-584"><a
href="#cite_note-584">[572]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a><br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1062" title="List of Falcon 9
first-stage boosters">B1062.1</a>
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/GPS_Block_III" title="GPS Block III">GPS III</a>-<a
href="/wiki/List_of_GPS_satellites#Planned_launches" title="List of GPS
satellites">04</a> (<i><a href="/wiki/Sacagawea"
title="Sacagawea">Sacagawea</a></i>)<sup class="reference" id="cite_ref-
GPS_553-1"><a href="#cite_note-GPS-553">[541]</a></sup><sup class="reference"
id="cite_ref-cr-048-15_585-0"><a href="#cite_note-cr-048-15-585">[573]</a></sup>
</td>
<td>4,311 kg (9,504 lb)
</td>
<td><a href="/wiki/Medium_Earth_orbit" title="Medium Earth orbit">MEO</a>
</td>
<td><a href="/wiki/United_States_Space_Force" title="United States Space
Force">USSF</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Manufacturing contract awarded in January 2012,<sup
class="reference" id="cite_ref-gps_34_manufacturing_543-1"><a href="#cite_note-
gps_34_manufacturing-543">[531]</a></sup> underwent thermal vacuum testing in
December 2018,<sup class="reference" id="cite_ref-
gps_advisory_board_2018_20181205_586-0"><a href="#cite_note-
gps_advisory_board_2018_20181205-586">[574]</a></sup> while the launch contract
was awarded in March 2018.<sup class="reference" id="cite_ref-587"><a
href="#cite_note-587">[575]</a></sup> A launch attempt on 3 October 2020 was
aborted two seconds before liftoff due to early start in two engines.<sup
class="reference" id="cite_ref-588"><a href="#cite_note-588">[576]</a></sup><sup
class="reference" id="cite_ref-589"><a href="#cite_note-589">[577]</a></sup>
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Following the abort, two engines from B1062 were sent for further testing.<sup
class="reference" id="cite_ref-590"><a href="#cite_note-590">[578]</a></sup> The
abort also caused delays to the Crew-1 launch to allow time for data review.<sup
class="reference" id="cite_ref-591"><a href="#cite_note-591">[579]</a></sup><sup
class="reference" id="cite_ref-592"><a href="#cite_note-592">[580]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">98
</th>
<td>16 November 2020<br/>00:27<sup class="reference" id="cite_ref-593"><a
href="#cite_note-593">[581]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a><br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1061" title="List of Falcon 9
first-stage boosters">B1061.1</a><sup class="reference" id="cite_ref-594"><a
href="#cite_note-594">[582]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/SpaceX_Crew-1" title="SpaceX Crew-1">Crew-1</a><br/>(<a
href="/wiki/Crew_Dragon_Resilience" title="Crew Dragon Resilience">Crew Dragon
C207.1 <i>Resilience</i></a>)
</td>
<td>~12,500 kg (27,600 lb)
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Crew_Program" title="Commercial Crew
Program">CCP</a>)<sup class="reference" id="cite_ref-CCD6_509-1"><a
href="#cite_note-CCD6-509">[497]</a></sup>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">First crew rotation of the commercial crew program, following
the return in August of the crewed test flight mission <a
href="/wiki/Crew_Dragon_Demo-2" title="Crew Dragon Demo-2">Crew Demo 2</a>.
Originally designated "USCV-1" by NASA. Carried astronauts <a
href="/wiki/Victor_J._Glover" title="Victor J. Glover">Victor Glover</a>, <a
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href="/wiki/Michael_S._Hopkins" title="Michael S. Hopkins">Mike Hopkins</a>, <a
href="/wiki/Shannon_Walker" title="Shannon Walker">Shannon Walker</a> and <a
href="/wiki/Soichi_Noguchi" title="Soichi Noguchi">Soichi Noguchi</a>, for a
6-month stay aboard the ISS, during which the <a href="/wiki/Boeing_Starliner"
title="Boeing Starliner">Boeing Starliner</a> <a class="mw-redirect"
href="/wiki/Orbital_Flight_Test_2" title="Orbital Flight Test 2">OFT-2</a>
flight is expected to dock also.<sup class="reference" id="cite_ref-595"><a
href="#cite_note-595">[583]</a></sup> The first flight of the crew program was
initially expected to launch in 2017,<sup class="reference" id="cite_ref-596"><a
href="#cite_note-596">[584]</a></sup><sup class="reference" id="cite_ref-
scientificamerican-2_597-0"><a href="#cite_note-
scientificamerican-2-597">[585]</a></sup> and finished final certifications in
November 2020.<sup class="reference" id="cite_ref-598"><a
href="#cite_note-598">[586]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">99
</th>
<td>21 November 2020<br/>17:17:08<sup class="reference" id="cite_ref-599"><a
href="#cite_note-599">[587]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a><br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1063" title="List of Falcon 9
first-stage boosters">B1063.1</a>
</td>
<td><a class="mw-redirect" href="/wiki/Vandenberg_Air_Force_Base"
title="Vandenberg Air Force Base">VAFB</a>,<br/><a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E</a>
</td>
<td><a class="mw-redirect" href="/wiki/Copernicus_Sentinel-6" title="Copernicus
Sentinel-6">Sentinel-6 Michael Freilich (Jason-CS A)</a>
</td>
<td>1,192 kg (2,628 lb)
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a>
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> / <a class="mw-redirect"
href="/wiki/NOAA" title="NOAA">NOAA</a> / <a class="mw-redirect"
href="/wiki/ESA" title="ESA">ESA</a> / <a href="/wiki/EUMETSAT"
title="EUMETSAT">EUMETSAT</a>
</td>
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text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(ground
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pad)</span></small>
</td></tr>
<tr>
<td colspan="9">Named after the former director of NASA's Earth science program,
it is a radar altimeter satellite part of the <a
href="/wiki/Ocean_surface_topography#Satellite_missions" title="Ocean surface
topography">Ocean Surface Topography</a> constellation located at 1,336 km
(830 mi) and 66° <a href="/wiki/Orbital_inclination" title="Orbital
inclination">inclination</a>, and a follow-up to <a class="mw-redirect"
href="/wiki/Jason_3" title="Jason 3">Jason 3</a> as a partnership between the
United States (<a href="/wiki/National_Oceanic_and_Atmospheric_Administration"
title="National Oceanic and Atmospheric Administration">NOAA</a> and <a
href="/wiki/NASA" title="NASA">NASA</a>), <a href="/wiki/Europe"
title="Europe">Europe</a> (<a class="mw-redirect" href="/wiki/European_Organisat
ion_for_the_Exploitation_of_Meteorological_Satellites" title="European
Organisation for the Exploitation of Meteorological Satellites">EUMETSAT</a>, <a
href="/wiki/European_Space_Agency" title="European Space Agency">ESA</a>, <a
href="/wiki/CNES" title="CNES">CNES</a>).<sup class="reference"
id="cite_ref-600"><a href="#cite_note-600">[588]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">100
</th>
<td>25 November 2020<br/>02:13<sup class="reference" id="cite_ref-
SFN20201122_601-0"><a href="#cite_note-SFN20201122-601">[589]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5 </a><br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1049" title="List of Falcon 9
first-stage boosters">B1049.7</a><sup class="reference" id="cite_ref-602"><a
href="#cite_note-602">[590]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Cape_Canaveral_Air_Force_Station"
title="Cape Canaveral Air Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 15 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
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<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">First time a booster was launched for a seventh time and first
time SpaceX completed four launches in a single month.
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">101
</th>
<td>6 December 2020<br/>16:17:08<sup class="reference" id="cite_ref-603"><a
href="#cite_note-603">[591]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5 </a><br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters" title="List of Falcon 9
first-stage boosters">B1058.4</a><sup class="reference" id="cite_ref-
nextspaceflight-20201013_604-0"><a href="#cite_note-
nextspaceflight-20201013-604">[592]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/SpaceX_CRS-21" title="SpaceX CRS-21">SpaceX
CRS-21</a><br/>(Dragon C208.1)
</td>
<td>2,972 kg (6,552 lb)
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
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</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">First launch of <a
href="/wiki/Commercial_Resupply_Services#Commercial_Resupply_Services_phase_2"
title="Commercial Resupply Services">phase 2 of the CRS contract</a> of six
launches awarded in January 2016.<sup class="reference" id="cite_ref-605"><a
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href="#cite_note-605">[593]</a></sup> It was the first launch of the upgraded
version Cargo Dragon 2 spacecraft, with increased payload capacity and
autonomous docking to the ISS. Payloads included Will <a class="mw-redirect"
href="/wiki/Bishop_Airlock_Module" title="Bishop Airlock Module">Nanoracks
Bishop Airlock</a><sup class="reference" id="cite_ref-Bishop2020_606-0"><a
href="#cite_note-Bishop2020-606">[594]</a></sup> and CFIG-1 (Cool Flames
Investigation with Gases).<sup class="reference" id="cite_ref-grc-
schedule_607-0"><a href="#cite_note-grc-schedule-607">[595]</a></sup> It's also
the 100th successful Falcon 9 launch.
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">102
</th>
<td>13 December 2020<br/>17:30:00<sup class="reference" id="cite_ref-608"><a
href="#cite_note-608">[596]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5 </a><br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters" title="List of Falcon 9
first-stage boosters">B1051.7</a>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCSFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a><sup class="reference" id="cite_ref-609"><a
href="#cite_note-609">[597]</a></sup>
</td>
<td><a href="/wiki/Sirius_XM" title="Sirius XM">SXM-7</a>
</td>
<td>7,000 kg (15,000 lb)
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a href="/wiki/Sirius_XM" title="Sirius XM">Sirius XM</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Launched the largest, high-power broadcasting satellite for
SiriusXM's <a href="/wiki/Digital_audio_radio_service" title="Digital audio
radio service">digital audio radio service</a> (DARS). SXM-7 was built by <a
href="/wiki/Maxar_Technologies" title="Maxar Technologies">Maxar
Technologies</a>; intended to operate in the <a href="/wiki/S_band" title="S
```

band">S-band spectrum, it will replace the SXM-3 satellite. The satellite will deliver the highest power density of any commercial satellite on-orbit,^{[598]} generate more than 20 kW of power, and have a large unfoldable antenna reflector, which enables broadcast to radios without the need for large dish-type antennas on the ground. Due to the heavy weight, the payload was injected into a sub-synchronous orbit of 224 km × 19,411 km (139 mi × 12,061 mi) and the satellite itself will transfer to full GTO.^{[599]} It was the first time a commercial primary payload flew on a booster which had been flown more than 4 times before.^{[600]} First dedicated customer launch where the fairings were previously used.^{[601]}
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">103
</th>
<td>19 December 2020
14:00:00^{[602]}
</td>
<td>F9 B5
B1059.5
</td>
<td>KSC,
LC-39A
</td>
<td>NROL-108
</td>
<td class="table-na" data-sort-value="" style="background: #ececec; color: #2C2C2C; vertical-align: middle; text-align: center;">Classified
</td>
<td>LEO
</td>
<td>NRO
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<td class="table-success" style="background: #9EFF9E; vertical-align: middle; text-align: center;">Success
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<td class="table-success" style="background: #9EFF9E; vertical-align: middle; text-align: center;">Success
<small>(ground pad)</small>
</td></tr>
<tr>

<td colspan="9">The planned launch was not known by the public until FCC filings appeared in late September followed by confirmation from the NRO on 5 October 2020, likely a relatively light payload that allows the return of the booster to the launch site.^{[603]}
</td></tr>
</tbody></table>, <table class="wikitable plainrowheaders collapsible" style="width: 100%;">
<tbody><tr>
<th scope="col">Flight No.

</th>
<th scope="col">Date and
time (UTC)
</th>
<th scope="col">Version,
Booster^{[b]}
</th>
<th scope="col">Launch
site
</th>
<th scope="col">Payload^{[c]}
</th>
<th scope="col">Payload mass
</th>
<th scope="col">Orbit
</th>
<th scope="col">Customer
</th>
<th scope="col">Launch
outcome
</th>
<th scope="col">Booster
landing
</th></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">104
</th>
<td>8 January 2021
02:15^{[604]}
</td>
<td>F9 B5
B1060.4
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral

```
Space Force Station">CCSFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/T%C3%BCrksat_5A" title="Türksat 5A">Türksat 5A</a><sup
class="reference" id="cite_ref-turk5a_617-0"><a href="#cite_note-
turk5a-617">[605]</a></sup>
</td>
<td>3,500 kg (7,700 lb)
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a href="/wiki/T%C3%BCrksat_(company)" title="Türksat (company)">Türksat</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">A 3,500 kg (7,700 lb) satellite intended to be stationed at
31.0° east.<sup class="reference" id="cite_ref-turk5a_617-1"><a
href="#cite_note-turk5a-617">[605]</a></sup> This is the most powerful satellite
in Türksat's fleet<sup class="reference" id="cite_ref-618"><a
href="#cite_note-618">[606]</a></sup> and will provide <a class="mw-redirect"
href="/wiki/Ku-band" title="Ku-band">Ku-band</a> television broadcast services
over <a href="/wiki/Turkey" title="Turkey">Turkey</a>, the <a
href="/wiki/Middle_East" title="Middle East">Middle East</a>, <a
href="/wiki/Europe" title="Europe">Europe</a> and <a href="/wiki/Africa"
title="Africa">Africa</a>. The satellite was injected in to a <a
href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">Super-synchronous transfer orbit</a> of 280 km × 55,000 km (170 mi
× 34,180 mi) with 17.6° <a href="/wiki/Orbital_inclination" title="Orbital
inclination">inclination</a>.<sup class="reference" id="cite_ref-619"><a
href="#cite_note-619">[607]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">105
</th>
<td>20 January 2021<br/>13:02<sup class="reference" id="cite_ref-620"><a
href="#cite_note-620">[608]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1051" title="List of Falcon 9
first-stage boosters">B1051.8</a><sup class="reference" id="cite_ref-621"><a
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href="#cite_note-621">[609]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 16 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">The first booster to successfully launch and land eight times.
Achieved a record turnaround time between two launches of the same booster of
only 38 days and brought the total of launched Starlink satellites to over
1000.<sup class="reference" id="cite_ref-622"><a
href="#cite_note-622">[610]</a></sup> SpaceX stated that the landing would occur
during higher winds than usual; this test to expand the landing envelope was
successfully passed by the booster.<sup class="reference" id="cite_ref-623"><a
href="#cite_note-623">[611]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">106
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<td>24 January 2021<br/>15:00<sup class="reference" id="cite_ref-624"><a
href="#cite_note-624">[612]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1058" title="List of Falcon 9
first-stage boosters">B1058.5</a><sup class="reference" id="cite_ref-625"><a
href="#cite_note-625">[613]</a></sup>
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<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCSFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
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<td><a class="new"
href="/w/index.php?title=Transporter-1&action=edit&redlink=1"
title="Transporter-1 (page does not exist)">Transporter-1 (<a href="/wik
i/List_of_spaceflight_launches_in_January%E2%80%93June_2021#SpXTransporter1"
title="List of spaceflight launches in January–June 2021">143 smallsat
rideshare)
</td>
<td>~5,000 kg (11,000 lb)
</td>
<td>SSO
</td>
<td>Various
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
<small>(drone
ship)</small>
</td></tr>
<tr>
<td colspan="9">First dedicated smallsat rideshare launch, targeting a 525 km
(326 mi) <a class="mw-redirect" href="/wiki/Orbital_altitude" title="Orbital
altitude">altitude orbit.<sup class="reference" id="cite_ref-RsA_626-0"><a
href="#cite_note-RsA-626">[614]</sup> The launch deployed a record 143
satellites, consisting of 120 <a href="/wiki/CubeSat"
title="CubeSat">CubeSats, 11 <a class="mw-redirect"
href="/wiki/Microsatellite_(spaceflight)" title="Microsatellite
(spaceflight)">microsatellites, 10 <a href="/wiki/Starlink"
title="Starlink">Starlinks, and 2 transfer stages. In addition, 2 hosted
payloads and 1 non-separating dummy satellite<sup class="reference"
id="cite_ref-627">[615]</sup> were<sup
class="noprint Inline-Template" style="white-space:nowrap;">[<a
href="/wiki/Wikipedia:Verifiability" title="Wikipedia:Verifiability"><span
title="The material near this tag failed verification of its source citation(s).
(May 2021)">failed verification]</sup> launched.<sup
class="reference" id="cite_ref-628">[616]</sup>
These include <a class="mw-redirect" href="/wiki/SpaceBEE"
title="SpaceBEE">SpaceBEE (x 36), <a href="/wiki/Spire_Global" title="Spire
Global">Lemur-2 (x 8), ICEYE (x 3),
UVSQ-SAT,<sup class="reference" id="cite_ref-629"><a
href="#cite_note-629">[617]</sup> <a
href="/wiki/Educational_Launch_of_Nanosatellites" title="Educational Launch of
Nanosatellites">ELaNa 35 (<a href="/wiki/Pathfinder_Technology_Demonstrator"
title="Pathfinder Technology Demonstrator">PTD-1),<sup class="reference"
id="cite_ref-Upcoming-ELaNa_391-2"><a href="#cite_note-Upcoming-
ELaNa-391">[381]</sup> and multiple Kepler nanosats.<sup class="reference"
id="cite_ref-630">[618]</sup><sup class="reference"

```
id="cite_ref-631"><a href="#cite_note-631">[619]</a></sup> D-Orbit flew their
ION SCV LAURENTIUS, 10 <a href="/wiki/Starlink" title="Starlink">Starlink</a>
satellites were placed in a polar orbit<sup class="reference"
id="cite_ref-632"><a href="#cite_note-632">[620]</a></sup> and 2 of 15 payloads
remained attached to <a href="/wiki/SHERPA_(space_tug)" title="SHERPA (space
tug)">SHERPA-FX1</a>. <a href="/wiki/Exolaunch" title="Exolaunch">Exolaunch</a>
deployed several small satellites and cubesats via their own deployment
mechanisms. First flight of a Falcon 9 with a <a href="/wiki/SHERPA_(space_tug)"
title="SHERPA (space tug)">SHERPA-FX</a> transfer stage called  SHERPA-FX1.<sup
class="reference" id="cite_ref-633"><a href="#cite_note-633">[621]</a></sup><sup
class="reference" id="cite_ref-634"><a href="#cite_note-634">[622]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">107
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<td>4 February 2021 <br/>06:19<sup class="reference" id="cite_ref-635"><a
href="#cite_note-635">[623]</a></sup>
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<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5 </a><br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1060" title="List of Falcon 9
first-stage boosters">B1060.5</a><sup class="reference" id="cite_ref-636"><a
href="#cite_note-636">[624]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCSFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 18 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">This marked the fastest turnaround to date, at 27 days, and the
first time a Falcon 9 flies twice within a month.<sup class="reference"
id="cite_ref-637"><a href="#cite_note-637">[625]</a></sup>
```

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</td></tr>
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<th rowspan="2" scope="row" style="text-align:center;">108
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href="#cite_note-638">[626]</a></sup>
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href="/wiki/List_of_Falcon_9_first-stage_boosters#B1059" title="List of Falcon 9
first-stage boosters">B1059.6</a>
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Space Force Station">CCSFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 19 v1.0 (60
satellites)<sup class="reference" id="cite_ref-nextSL19_639-0"><a
href="#cite_note-nextSL19-639">[627]</a></sup>
</td>
<td>15,600 kg (34,400 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
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text-align: center;">Success
</td>
<td class="table-failure" style="background: #FFC7C7; vertical-align: middle;
text-align: center;">Failure<br/> <small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">A hole in a heat-shielding engine cover, which likely developed
through fatigue, allowed recirculating hot exhaust gases to damage one of the <a
href="/wiki/SpaceX_Merlin" title="SpaceX Merlin">Merlin 1D</a> first-stage
engines, causing it to shut down early during ascent. <a href="/wiki/Fail-safe"
title="Fail-safe">Engine-out capability</a> of the Falcon 9 allowed the mission
to continue and successfully deploy the 60 Starlink satellites to orbit.<sup
class="reference" id="cite_ref-640"><a href="#cite_note-640">[628]</a></sup> The
issue caused the booster to fail its landing attempt and miss the droneship
<i><a href="/wiki/Autonomous_spaceport_drone_ship#Of_Course_I_Still_Love_You"
title="Autonomous spaceport drone ship">Of Course I Still Love You</a></i>
(OCISLY) after its entry burn, breaking the longest streak of 24 landing
successes.<sup class="reference" id="cite_ref-641"><a
href="#cite_note-641">[629]</a></sup> During this mission, <i><a class="mw-
redirect" href="/wiki/Ms._Tree_(ship)" title="Ms. Tree (ship)">GO Ms.
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Tree</a></i> and <i><a class="mw-redirect" href="/wiki/Ms._Chief" title="Ms.
Chief">GO Ms. Chief</a></i> were used for the last time to recover the
fairings.<sup class="reference" id="cite_ref-642"><a
href="#cite_note-642">[630]</a></sup><sup class="reference" id="cite_ref-643"><a
href="#cite_note-643">[631]</a></sup> After this mission, both ships were
retired because SpaceX no longer plans to catch the fairings.<sup
class="reference" id="cite_ref-644"><a href="#cite_note-644">[632]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">109
</th>
<td>4 March 2021<br/>08:24<sup class="reference" id="cite_ref-645"><a
href="#cite_note-645">[633]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5 </a><br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1049" title="List of Falcon 9
first-stage boosters">B1049.8</a><sup class="reference" id="cite_ref-
nextSL17_646-0"><a href="#cite_note-nextSL17-646">[634]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 17 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Launch had previously been postponed multiple times, causing the
payload Starlink L17 to launch after the L18 and L19 missions. Featured for the
first time, a fairing which was flying on its fourth flight.<sup
class="reference" id="cite_ref-647"><a href="#cite_note-647">[635]</a></sup> The
second-stage deorbit burn failed, causing an uncontrolled reentry on 26 March
2021 over the west coast of the United States.<sup class="reference"
id="cite_ref-648"><a href="#cite_note-648">[636]</a></sup>
</td></tr>
```

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<tr>
<th rowspan="2" scope="row" style="text-align:center;">110
</th>
<td>11 March 2021<br/>08:13:29<sup class="reference" id="cite_ref-649"><a
href="#cite_note-649">[637]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5 </a><br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1058" title="List of Falcon 9
first-stage boosters">B1058.6</a><sup class="reference" id="cite_ref-
NextL20_650-0"><a href="#cite_note-NextL20-650">[638]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCSFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 20 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Twentieth operational launch of Starlink satellites, bringing
the total to 1,265 (including prototypes) launched Starlink satellites.<sup
class="reference" id="cite_ref-651"><a href="#cite_note-651">[639]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">111
</th>
<td>14 March 2021<br/>10:01<sup class="reference" id="cite_ref-652"><a
href="#cite_note-652">[640]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5 </a><br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1051" title="List of Falcon 9
first-stage boosters">B1051.9</a>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
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Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 21 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">First time a first-stage booster flew and landed for the ninth
time. This flight also marked the fastest turnaround time for a fairing half, at
49 days. Both fairing halves previously flew on the Transporter-1 mission.<sup
class="reference" id="cite_ref-653"><a href="#cite_note-653">[641]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">112
</th>
<td>24 March 2021<br/>08:28<sup class="reference" id="cite_ref-654"><a
href="#cite_note-654">[642]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters" title="List of Falcon 9
first-stage boosters">B1060.6</a><sup class="reference" id="cite_ref-655"><a
href="#cite_note-655">[643]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCSFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 22 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
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<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Fairing "wet recovery" achieved by contracted recovery vessel
<i>Shelia Bordelon</i> for the first time. Both fairing halves were retrieved
from the water.<sup class="reference" id="cite_ref-656"><a
href="#cite_note-656">[644]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">113
</th>
<td>7 April 2021<br/>16:34
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5 </a><br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1058" title="List of Falcon 9
first-stage boosters">B1058.7</a>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCSFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 23 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">23rd operational launch of Starlink satellites, bringing the
total to 1,385 launched <a href="/wiki/Starlink" title="Starlink">Starlink
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satellites (including prototype). This launch featured the second fastest booster turnaround time at 27 days and 8 hours (after Starlink 18 with B1060.5, which was 4 hours faster).^{[645]}
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">114
</th>
<td>23 April 2021
9:49^{[646]}
</td>
<td>F9 B5
B1061.2^{[647]}
</td>
<td>KSC,
LC-39A
</td>
<td>Crew-2
(Crew Dragon C206.2 Endeavour)
</td>
<td>~13,000 kg (29,000 lb)^{[648]}
</td>
<td>LEO (ISS)
</td>
<td>NASA (CTS)^{[497]}
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle; text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle; text-align: center;">Success
<small>(drone ship)</small>
</td></tr>
<tr>
<td colspan="9">Second operational flight of Crew Dragon for Commercial Crew Program. Transported NASA astronauts Shane Kimbrough and Megan McArthur, JAXA Astronaut <a

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href="/wiki/Akihiko_Hoshide" title="Akihiko Hoshide">Akihiko Hoshide</a> and <a
href="/wiki/European_Space_Agency" title="European Space Agency">ESA</a>
astronaut <a href="/wiki/Thomas_Pesquet" title="Thomas Pesquet">Thomas
Pesquet</a> to the ISS.<sup class="reference" id="cite_ref-661"><a
href="#cite_note-661">[649]</a></sup> The four astronauts will spend 6 months
aboard the ISS. Beginning with the Crew-2 mission, NASA has modified the
contract to allow NASA astronauts to use flight-proven Dragon capsules and
booster.<sup class="reference" id="cite_ref-662"><a
href="#cite_note-662">[650]</a></sup> Thus SpaceX reflew the Dragon used on
Demo-2 and used Booster B1061-2 which had been used to launch <a
href="/wiki/SpaceX_Crew-1" title="SpaceX Crew-1">Crew-1</a> in November 2020.
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">115
</th>
<td>29 April 2021<br/>03:44<sup class="reference" id="cite_ref-663"><a
href="#cite_note-663">[651]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1060" title="List of Falcon 9
first-stage boosters">B1060.7</a><sup class="reference" id="cite_ref-664"><a
href="#cite_note-664">[652]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCSFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 24 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">24th operational launch of Starlink satellites, bringing the
total to 1,434 Starlink satellites still in orbit. This launch also paid tribute
to <a href="/wiki/Apollo_11" title="Apollo 11">Apollo 11</a> crew <a
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href="/wiki/Michael_Collins_(astronaut)" title="Michael Collins
(astronaut)">Michael Collins</a>, who passed away hours before the launch.<sup
class="reference" id="cite_ref-665"><a href="#cite_note-665">[653]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">116
</th>
<td>4 May 2021<br/>19:01<sup class="reference" id="cite_ref-666"><a
href="#cite_note-666">[654]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1049" title="List of Falcon 9
first-stage boosters">B1049.9</a><sup class="reference" id="cite_ref-667"><a
href="#cite_note-667">[655]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 25 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">25th operational launch of Starlink satellites, bringing the
total to 1,494 Starlink satellites still in orbit, second time a booster flew
for the ninth time.
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">117
</th>
<td>9 May 2021<br/>06:42<sup class="reference" id="cite_ref-668"><a
href="#cite_note-668">[656]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1051" title="List of Falcon 9
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first-stage boosters">B1051.10</a><sup class="reference" id="cite_ref-669"><a
href="#cite_note-669">[657]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCSFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 27 v1.0 (60
satellites)
</td>
<td>15,600 kg (34,400 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Booster flew and landed for a record 10th time, with reused
fairings, bringing the total number of operational Starlink satellites in the
first shell to approximately 1516 out of a planned 1584.<sup class="reference"
id="cite_ref-NSF8521_670-0"><a href="#cite_note-NSF8521-670">[658]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">118
</th>
<td>15 May 2021<br/>22:56<sup class="reference" id="cite_ref-671"><a
href="#cite_note-671">[659]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1058" title="List of Falcon 9
first-stage boosters">B1058.8</a><sup class="reference" id="cite_ref-672"><a
href="#cite_note-672">[660]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a><sup class="reference"
id="cite_ref-673"><a href="#cite_note-673">[661]</a></sup>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 26 v1.0 (52
Satellites)<br/> <a href="/wiki/Capella_Space" title="Capella
```

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Space">Capella</a>-6 &amp;amp;<a href="/wiki/Tyvak" title="Tyvak">Tyvak</a>-0130<sup
class="reference" id="cite_ref-674"><a href="#cite_note-674">[662]</a></sup>
</td>
<td>~14,000 kg (31,000 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a><br/> <a
href="/wiki/Capella_Space" title="Capella Space">Capella Space</a> and <a
href="/wiki/Tyvak" title="Tyvak">Tyvak</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Rideshare launch with a targeted orbit at 569x582, significantly
higher than typical Starlink launches, to allow for needs of the rideshare
payloads.<sup class="reference" id="cite_ref-SL28_675-0"><a href="#cite_note-
SL28-675">[663]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">119
</th>
<td>26 May 2021<br/>18:59<sup class="reference" id="cite_ref-676"><a
href="#cite_note-676">[664]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1063" title="List of Falcon 9
first-stage boosters">B1063.2</a><sup class="reference" id="cite_ref-
NSFSl28_677-0"><a href="#cite_note-NSFSl28-677">[665]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCSFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a><sup class="reference" id="cite_ref-
NSFSl28_677-1"><a href="#cite_note-NSFSl28-677">[665]</a></sup>
</td>
<td><a href="/wiki/Starlink" title="Starlink">Starlink</a> 28 v1.0 (60
Satellites)<sup class="reference" id="cite_ref-NSFSl28_677-2"><a
href="#cite_note-NSFSl28-677">[665]</a></sup>
</td>
<td>15,600 kg (34,400 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
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</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Will likely complete the first shell of the Starlink network
located at 550 km altitude and containing 1584 satellites.<sup class="reference"
id="cite_ref-SL28_675-1"><a href="#cite_note-SL28-675">[663]</a></sup> It was
40th launch a fairing was reused, with one half being used for the 5th time
(first fairing to do so) and the other for a 3rd time.<sup class="reference"
id="cite_ref-sn20210526_678-0"><a href="#cite_note-
sn20210526-678">[666]</a></sup> This launch marks SpaceX's 100th successful
launch in a row without in-flight failure since December 2015.
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">120
</th>
<td>3 June 2021<br/>17:29<sup class="reference" id="cite_ref-679"><a
href="#cite_note-679">[667]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <br/><a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1067" title="List of Falcon 9
first-stage boosters">B1067.1</a><sup class="reference" id="cite_ref-680"><a
href="#cite_note-680">[668]</a></sup>
</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/SpaceX_CRS-22" title="SpaceX CRS-22">SpaceX
CRS-22</a><br/>(<a href="/wiki/Cargo_Dragon_C209" title="Cargo Dragon
C209">Dragon C209.1</a>)
</td>
<td>3,328 kg (7,337 lb)
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
```

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<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<br/><small><span class="nowrap">(drone
ship)</span></small>
</td></tr>
<tr>
<td colspan="9">Second of a minimum of six new cargo missions under the <a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS-2 contract</a>, which NASA awarded SpaceX in 2015. Mission was
flown with an uncrewed Dragon 2 capsule,<sup class="reference" id="cite_ref-
nasa-20160114_681-0"><a href="#cite_note-nasa-20160114-681">[669]</a></sup>
which carried solar panels, catalytic reactor for the station's life support
system, an emergency air supply system, Kurs remote control unit, and a Potable
Water Dispense (PWD) filter. Also carried were the RamSat cubesat as payload for
<a class="mw-redirect" href="/wiki/ELaNa" title="ELaNa">ELaNa 36</a>,<sup
class="reference" id="cite_ref-682"><a href="#cite_note-682">[670]</a></sup> the
SOAR cubesat for the <a href="/wiki/University_of_Manchester" title="University
of Manchester">University of Manchester</a><sup class="reference"
id="cite_ref-683"><a href="#cite_note-683">[671]</a></sup> and the first
Mauritian satellite MIR-SAT1<sup class="reference" id="cite_ref-684"><a
href="#cite_note-684">[672]</a></sup> to be launched from the station later.
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">121
</th>
<td>6 June 2021<br/>04:26<sup class="reference" id="cite_ref-685"><a
href="#cite_note-685">[673]</a></sup>
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<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a>
<br/><a href="/wiki/List_of_Falcon_9_first-stage_boosters#B1061" title="List of
Falcon 9 first-stage boosters">B1061.3</a>
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<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCSFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Sirius_XM#Satellites" title="Sirius XM">SXM-8</a><sup
class="reference" id="cite_ref-spacex_manifest_686-0"><a href="#cite_note-
spacex_manifest-686">[674]</a></sup>
</td>
<td>7,000 kg (15,000 lb)
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
```

<td>Sirius XM
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
<small>(drone
ship)</small>
</td></tr>
<tr>
<td colspan="9">A large, high-power broadcasting satellite for SiriusXM's
digital audio radio service (DARS) contracted together with SXM-7 to replace the
aging XM-4 satellite and allow broadcast to radios without the need for large
dish-type antennas on the ground.<sup class="reference" id="cite_ref-
auto3_612-1">[600]</sup><sup
class="reference" id="cite_ref-687">[675]</sup>
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Time">UTC)
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title="List of Falcon 9 first-stage boosters">Version,
Booster<sup
class="reference" id="cite_ref-booster_11-9"><a href="#cite_note-
booster-11">[b]</sup>
</th>
<th scope="col">Launch site
</th>
<th scope="col">Payload<sup class="reference" id="cite_ref-Dragon_12-9"><a
href="#cite_note-Dragon-12">[c]</sup>
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<th scope="col">Customer
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16:09-16:24<sup class="reference" id="cite_ref-
sfn_ls_688-1">[676]</sup>
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<td>F9 B5

<a href="/wiki/List_of_Falcon_9_first-stage_boosters#B1062" title="List of
Falcon 9 first-stage boosters">B1062.2<sup class="reference" id="cite_ref-
GPS_boosterreuse_693-0"><a href="#cite_note-
GPS_boosterreuse-693">[681]</sup>
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Space Force Station">CCSFS,
<a

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href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
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<td><a href="/wiki/GPS_Block_III" title="GPS Block III">GPS III</a>-<a
href="/wiki/List_of_GPS_satellites" title="List of GPS satellites">05</a>
(<i>Neil Armstrong</i>)<sup class="reference" id="cite_ref-GPS_553-2"><a
href="#cite_note-GPS-553">[541]</a></sup><sup class="reference" id="cite_ref-
sfn-20181217_398-1"><a href="#cite_note-sfn-20181217-398">[388]</a></sup>
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<td><a href="/wiki/Medium_Earth_orbit" title="Medium Earth orbit">MEO</a>
</td>
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Force">USSF</a><sup class="reference" id="cite_ref-clark-20200630_542-2"><a
href="#cite_note-clark-20200630-542">[530]</a></sup>
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<tr>
<td colspan="5">Manufacturing contract awarded February 2013.<sup
class="reference" id="cite_ref-GPS_III_5678_694-0"><a href="#cite_note-
GPS_III_5678-694">[682]</a></sup> In March 2018, the Air Force announced it had
awarded the launch contract for three GPS satellites to SpaceX.<sup
class="reference" id="cite_ref-airforce_20170629_695-0"><a href="#cite_note-
airforce_20170629-695">[683]</a></sup>
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nextSFupcoming_690-1"><a href="#cite_note-nextSFupcoming-690">[678]</a></sup>
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<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a>
<br/><a href="/wiki/List_of_Falcon_9_first-stage_boosters#B1060" title="List of
Falcon 9 first-stage boosters">B1060.8</a>
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<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCSFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><i>Transporter-2</i> SmallSat Rideshare
</td>
<td><a href="/wiki/Sun-synchronous_orbit" title="Sun-synchronous orbit">SSO</a>
</td>
<td>Various
</td></tr>
<tr>
<td colspan="5">Expected to launch are Polar Vigilence (4 sats), Exolaunch YAM-3
(~30 Sats), - Mars Demo-1, <a href="/wiki/Satellogic"
title="Satellogic">Satellogic</a>,<sup class="reference" id="cite_ref-696"><a
href="#cite_note-696">[684]</a></sup> Capella-5<sup class="reference"
id="cite_ref-697"><a href="#cite_note-697">[685]</a></sup> HawkEye Cluster 3
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(multiple sats), <a href="/wiki/Spaceflight_Industries" title="Spaceflight
Industries">Spaceflight Industries</a> (multiple sats on <a
href="/wiki/SHERPA_(space_tug)" title="SHERPA (space tug)">Sherpa-FX2 Sherpa-
LTE1</a> and one on a separate port).<sup class="reference" id="cite_ref-698"><a
href="#cite_note-698">[686]</a></sup>
</td></tr>
<tr>
<td rowspan="2">July 2021<sup class="reference" id="cite_ref-
nextSFupcoming_690-2"><a href="#cite_note-nextSFupcoming-690">[678]</a></sup>
</td>
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<br/><a href="/wiki/List_of_Falcon_9_first-stage_boosters#B1049" title="List of
Falcon 9 first-stage boosters">B1049.10</a><sup class="reference"
id="cite_ref-699"><a href="#cite_note-699">[687]</a></sup>
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<td><a href="/wiki/Vandenberg_Space_Force_Base" title="Vandenberg Space Force
Base">VSFB</a>,<br/><a href="/wiki/Vandenberg_Space_Launch_Complex_4"
title="Vandenberg Space Launch Complex 4">SLC-4E</a>
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<td><a href="/wiki/Starlink" title="Starlink">Starlink</a>
</td>
<td><span class="nowrap"><a href="/wiki/Polar_orbit" title="Polar
orbit">Polar</a> <a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low
Earth Orbit">LEO</a></span>
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<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
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<td colspan="5">Polar Starlink launches to start from July 2021.<sup
class="reference" id="cite_ref-SL28_675-2"><a href="#cite_note-
SL28-675">[663]</a></sup>
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href="#cite_note-sfn28521-700">[688]</a></sup>
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<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a>
</td>
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href="/wiki/Kennedy_Space_Center_Launch_Complex_39A" title="Kennedy Space Center
Launch Complex 39A">LC-39A</a> or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a> or <a href="/wiki/Vandenberg_Space_Force_Base"
title="Vandenberg Space Force Base">VSFB</a>, <a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E</a>
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<td><a href="/wiki/Starlink" title="Starlink">Starlink</a>
```

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orbit">Polar</a> <a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low
Earth Orbit">LEO</a> or <a class="mw-redirect" href="/wiki/Low_Earth_Orbit"
title="Low Earth Orbit">LEO</a></span>
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<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
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<td rowspan="2">18 August 2021<sup class="reference" id="cite_ref-
sfn_ls_688-2"><a href="#cite_note-sfn_ls-688">[676]</a></sup>
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</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
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<td><a href="/wiki/SpaceX_CRS-23" title="SpaceX CRS-23">SpaceX CRS-23</a>
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
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<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td></tr>
<tr>
<td colspan="5">Third of six new cargo missions NASA awarded in 2015 to SpaceX
under the <a href="/wiki/Commercial_Resupply_Services" title="Commercial
Resupply Services">CRS-2 contract</a> to be flown after the initial 20 missions
of phase 1 were completed in 2020.<sup class="reference" id="cite_ref-
nasa-20160114_681-1"><a href="#cite_note-nasa-20160114-681">[669]</a></sup>
Includes FBCE, SoFIE.
</td></tr>
<tr>
<td rowspan="2">August 2021<sup class="reference" id="cite_ref-RsA_626-1"><a
href="#cite_note-RsA-626">[614]</a></sup>
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href="/wiki/Kennedy_Space_Center_Launch_Complex_39A" title="Kennedy Space Center
Launch Complex 39A">LC-39A</a> or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
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Launch Complex 40">SLC-40</a>
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<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
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<td colspan="5">
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<tr>
<td rowspan="2">15 September 2021<sup class="reference" id="cite_ref-701"><a
href="#cite_note-701">[689]</a></sup>
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<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a>  <sup
class="reference" id="cite_ref-Isaacman_Youtube_702-0"><a href="#cite_note-
Isaacman_Youtube-702">[690]</a></sup>
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<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
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<td><a href="/wiki/Inspiration4" title="Inspiration4">Inspiration4</a>
</td>
<td>LEO
</td>
<td><a href="/wiki/Jared_Isaacman" title="Jared Isaacman">Jared Isaacman</a>
</td></tr>
<tr>
<td colspan="5">SpaceX signed in February 2021, its first all-civilian flight
for a crewed spacecraft with <a href="/wiki/Jared_Isaacman" title="Jared
Isaacman">Jared Isaacman</a> (Leadership), founder and CEO of Shift4 Payments,
who will command and pilot the mission, and who donated the three other seats in
the Crew Dragon vehicle's launch to LEO. The first of these three seats
(Generosity) was won by <a href="/wiki/Christopher_Sembroski" title="Christopher
Sembroski">Christopher Sembroski</a> in a lottery, who donated to <a
href="/wiki/St._Jude_Children%27s_Research_Hospital" title="St. Jude Children's
Research Hospital">St. Jude Children's Research Hospital</a>, the second seat
(Hope) was awarded to <a href="/wiki/Hayley_Arceneaux" title="Hayley
Arceneaux">Hayley Arceneaux</a>, an ambassador associated with that hospital,
and the third seat (Prosperity) was awarded to <a href="/wiki/Sian_Proctor"
title="Sian Proctor">Sian Proctor</a>, the winner of a contest between
entrepreneurs who use Shift4Shop. The seats was awarded on 30 March 2021.<sup
class="reference" id="cite_ref-703"><a href="#cite_note-703">[691]</a></sup><sup
class="reference" id="cite_ref-BW20210201_704-0"><a href="#cite_note-
BW20210201-704">[692]</a></sup> The mission will go to an orbit with an apogee
of about 540 km and last about three days. The docking adapter of Crew Dragon
```

Resilience will be replaced by an extra dome window.^{[690]}^{[693]}
</td></tr>
<tr>
<td rowspan="2">September 2021^{[694]}
</td>
<td>F9 B5
</td>
<td>VSFB,
SLC-4E
</td>
<td>SARah-1^{[694]}
Additional payload to be announced.^{[694]}
</td>
<td>SSO
</td>
<td>German Intelligence Service
</td></tr>
<tr>
<td colspan="5">Phased-array-antenna satellite intended to upgrade the German SAR-Lupe surveillance satellites.^{[695]} In January 2019, the satellites were expected to be launched between November 2020 and September 2021.^{[696]}
</td></tr>
<tr>
<td rowspan="2">September 2021^{[697]}
</td>
<td>F9 B5
</td>
<td>VSFB,
SLC-4E
</td>
<td>SARah 2 & 3<sup class="reference" id="cite_ref-gunter-sarah2_709-1"><a href="#cite_note-

gunter-sarah2-709">[697]</sup>
</td>
<td>SSO
</td>
<td><a href="/wiki/Federal_Intelligence_Service" title="Federal Intelligence
Service">German Intelligence Service
</td></tr>
<tr>
<td colspan="5">In January 2019, the satellites were expected to be launched
between November 2020 and September 2021.<sup class="reference" id="cite_ref-
Deutscher_Bundestag_708-1"><a href="#cite_note-
Deutscher_Bundestag-708">[696]</sup>
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<tr>
<td rowspan="2">September 2021<sup class="reference" id="cite_ref-
Ridesharefl_710-0">[698]</sup>
</td>
<td>F9 B5
</td>
<td>CC,
<a
href="/wiki/Kennedy_Space_Center_Launch_Complex_39A" title="Kennedy Space Center
Launch Complex 39A">LC-39A or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40
</td>
<td>Starlink
</td>
<td>LEO
</td>
<td>SpaceX
</td></tr>
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<td rowspan="2">Q3 2021<sup class="reference" id="cite_ref-711"><a
href="#cite_note-711">[699]</sup>
</td>
<td>F9 B5
</td>
<td>CC,
<span
class="nowrap"><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40
</td>
<td>O3b mPOWER 1, 2 and 3
</td>

<td>MEO
</td>
<td>SES
</td></tr>
<tr>
<td colspan="5">In September 2019, SES signed a contract to launch the first part of their seven MEO satellites for its proven O3b low-latency, high-performance connectivity services.^{[700]}^{[701]}
</td></tr>
<tr>
<td rowspan="2">23 October 2021^{[676]}
</td>
<td>F9 B5
B1067.2^{[702]}
</td>
<td>KSC,
LC-39A
</td>
<td>Crew-3
</td>
<td>LEO (ISS)
</td>
<td>NASA (CTS)^{[497]}
</td></tr>
<tr>
<td colspan="5">SpaceX's third operational Crew Dragon flight is scheduled to carry NASA astronauts Thomas Marshburn, Kayla Barron and Raja Chari as well as German ESA astronaut Matthias Maurer.^{[703]} It will also carry up to 100 kg (220 lb) of cargo to the ISS as well as feature a lifeboat function to evacuate astronauts from ISS in case of an emergency.^{[497]}
</td></tr>

<tr>
<td rowspan="2">October 2021<sup class="reference" id="cite_ref-
sfn-20210523_716-0">[704]</sup>
</td>
<td>Falcon Heavy
<a
href="/wiki/List_of_Falcon_9_first-stage_boosters#B1064" title="List of Falcon 9
first-stage boosters">B1064.1, <a href="/wiki/List_of_Falcon_9_first-
stage_boosters#B1065" title="List of Falcon 9 first-stage boosters">B1065.1,
<a href="/wiki/List_of_Falcon_9_first-stage_boosters#B1066" title="List of
Falcon 9 first-stage boosters">B1066
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Center">KSC,
<a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A
</td>
<td><a href="/wiki/United_States_Space_Force" title="United States Space
Force">USSF-44<sup class="reference" id="cite_ref-USDD190219_717-0"><a
href="#cite_note-USDD190219-717">[705]</sup>
Tetra-1<sup
class="reference" id="cite_ref-718">[706]</sup>
</td>
<td><a class="mw-redirect" href="/wiki/Geostationary_Earth_orbit"
title="Geostationary Earth orbit">GEO
</td>
<td><a href="/wiki/United_States_Space_Force" title="United States Space
Force">USSF
</td></tr>
<tr>
<td colspan="5">Classified payload totaling 3,750 kg (8,270 lb). Will use three
new boosters, and first Heavy launch to deliberately expend the center core
which may lack grid fins and landing gear needed for a landing, while the two
side-boosters will be targeting a simultaneous landing on droneships, JRTI and
<a href="/wiki/Autonomous_spaceport_drone_ship#A_Shortfall_Of_Gravitas"
title="Autonomous spaceport drone ship">A Shortfall Of Gravitas (ASOG).<sup
class="reference" id="cite_ref-719">[707]</sup><sup
class="reference" id="cite_ref-720">[708]</sup><sup
class="reference" id="cite_ref-721">[709]</sup>
First SpaceX mission directly to geostationary orbit. Secondary payload
Tetra-1.
</td></tr>
<tr>
<td rowspan="2">October 2021<sup class="reference" id="cite_ref-722"><a
href="#cite_note-722">[710]</sup>
</td>
<td>F9 B5
</td>
<td>CC,
<a
href="/wiki/Kennedy_Space_Center_Launch_Complex_39A" title="Kennedy Space Center
Launch Complex 39A">LC-39A or <a

```
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/List_of_NRO_launches" title="List of NRO
launches">NROL-85</a> (Intruder 13A and 13B)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/National_Reconnaissance_Office" title="National
Reconnaissance Office">NRO</a>
</td></tr>
<tr>
<td colspan="5">Classified mission awarded to SpaceX in February 2019.<sup
class="reference" id="cite_ref-723"><a href="#cite_note-723">[711]</a></sup>
</td></tr>
<tr>
<td rowspan="2">17 November 2021<sup class="reference" id="cite_ref-
sfn_ls_688-4"><a href="#cite_note-sfn_ls-688">[676]</a></sup>
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<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
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<td><a class="mw-redirect" href="/wiki/Imaging_X-ray_Polarimetry_Explorer"
title="Imaging X-ray Polarimetry Explorer">Imaging X-ray Polarimetry
Explorer</a> (IXPE)<sup class="reference" id="cite_ref-NASA_ixpe_724-0"><a
href="#cite_note-NASA_ixpe-724">[712]</a></sup>
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<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (LSP)
</td></tr>
<tr>
<td colspan="5">SMEX 14 mission with three identical NASA telescopes on a single
spacecraft, designed to measure X-Rays. The launch contract was awarded to
SpaceX for US$50.3 million.<sup class="reference" id="cite_ref-
NASA_ixpe_724-1"><a href="#cite_note-NASA_ixpe-724">[712]</a></sup>
</td></tr>
<tr>
<td rowspan="2">24 November 2021<sup class="reference" id="cite_ref-725"><a
href="#cite_note-725">[713]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a>
</td>
<td><a href="/wiki/Vandenberg_Space_Force_Base" title="Vandenberg Space Force
Base">VSFB</a>,<br/><a href="/wiki/Vandenberg_Space_Launch_Complex_4"
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title="Vandenberg Space Launch Complex 4">SLC-4E</a>
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<td><a href="/wiki/Double_Asteroid_Redirection_Test" title="Double Asteroid
Redirection Test">Double Asteroid Redirection Test (DART)</a><sup
class="reference" id="cite_ref-NASA_DART_726-0"><a href="#cite_note-
NASA_DART-726">[714]</a></sup><sup class="reference" id="cite_ref-727"><a
href="#cite_note-727">[715]</a></sup>
</td>
<td><a href="/wiki/Heliocentric_orbit" title="Heliocentric
orbit">Heliocentric</a>
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (LSP)
</td></tr>
<tr>
<td colspan="5">The 500 kg DART spacecraft will be used to measure the kinetic
effects of crashing an impactor into the surface of the moon of <a
href="/wiki/65803_Didymos" title="65803 Didymos">65803 Didymos</a> asteroid. It
will be the first mission to demonstrate asteroid redirect capability.<sup
class="reference" id="cite_ref-NASA_DART_726-1"><a href="#cite_note-
NASA_DART-726">[714]</a></sup>
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Ridesharefl_710-1"><a href="#cite_note-Ridesharefl-710">[698]</a></sup>
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Launch Complex 40">SLC-40</a>
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sfn_ls_688-5"><a href="#cite_note-sfn_ls-688">[676]</a></sup>
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Services">CRS)
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<td colspan="5">Fourth of six new cargo missions NASA awarded in 2015 to SpaceX
under the <a href="/wiki/Commercial_Resupply_Services" title="Commercial
Resupply Services">CRS-2 contract to be flown after the initial 20 missions
of phase 1 were completed in 2020.<sup class="reference" id="cite_ref-
nasa-20160114_681-2">[669]</sup>
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Base">VSFB,
<a href="/wiki/Vandenberg_Space_Launch_Complex_4"
title="Vandenberg Space Launch Complex 4">SLC-4E
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id="cite_ref-728">[716]</sup>
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<td>Various
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href="#cite_note-sfn_ls-688">[676]</sup>
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</td>
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Launch Complex 39A">LC-39A</a> or <a
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orbit">GTO</a>
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(9,900 lb) satellite is intended to be placed at 42.0° east.<sup
class="reference" id="cite_ref-729"><a href="#cite_note-729">[717]</a></sup>
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title="Vandenberg Space Launch Complex 4">SLC-4E</a>
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title="DigitalGlobe">WorldView Legion Mission 1</a><sup class="reference"
id="cite_ref-worldviewlegion_731-1"><a href="#cite_note-
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Technologies">Maxar Technologies</a> satellites built by subsidiary <a
href="/wiki/SSL_(company)" title="SSL (company)">SSL</a> for subsidiary <a
href="/wiki/DigitalGlobe" title="DigitalGlobe">DigitalGlobe</a>.<sup
class="reference" id="cite_ref-worldviewlegion_731-2"><a href="#cite_note-
worldviewlegion-731">[719]</a></sup>
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spaceflightnow_2020-02-18_732-0"><a href="#cite_note-
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<a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A
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title="Space Adventures Dragon Mission">Space Adventures Dragon Mission
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<td>LEO
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<td>Space
Adventures
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<td colspan="5">SpaceX signed in February 2020, its first commercial flight for
a crewed spacecraft with the Virginia-based company that had flown seven space
tourists between 2001 and 2009. The flight will be around 3 days, up to 5 days,
on an elliptical orbit with the apogee three times that of the ISS, and up to
four space tourists with a price per seat of around US$50 million.<sup
class="reference" id="cite_ref-spaceflightnow_2020-02-18_732-1"><a
href="#cite_note-spaceflightnow_2020-02-18-732">[720]</sup><sup
class="reference" id="cite_ref-733">[721]</sup>
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Time">UTC)
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title="List of Falcon 9 first-stage boosters">Version,
Booster<sup
class="reference" id="cite_ref-booster_11-10"><a href="#cite_note-
booster-11">[b]</sup>
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<th scope="col">Payload<sup class="reference" id="cite_ref-Dragon_12-10"><a
href="#cite_note-Dragon-12">[c]</sup>
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<th scope="col">Orbit
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href="#cite_note-734">[722]</a></sup>
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Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
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title="Axiom Space Dragon mission 1">AX-1</a><br/>(<a
href="/wiki/Crew_Dragon_Resilience" title="Crew Dragon Resilience">Crew Dragon
C207.3 <i>Resilience</i></a> )
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<td colspan="5">Announced in March 2020, the flight will be the first fully
private flight to the ISS.<sup class="reference" id="cite_ref-735"><a
href="#cite_note-735">[723]</a></sup> Crew Dragon will be commanded by Axiom
professional astronaut <a href="/wiki/Michael_L%C3%B3pez-Alegr%C3%ADa"
title="Michael López-Alegría">Michael López-Alegría</a>.
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Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
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href="/wiki/ISS_Crew_Transportation_Services" title="ISS Crew Transportation
Services">CTS</a>)<sup class="reference" id="cite_ref-CCD6_509-5"><a
href="#cite_note-CCD6-509">[497]</a></sup>
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<td colspan="5">NASA has awarded six missions with <a class="mw-redirect"
href="/wiki/Crew_Dragon" title="Crew Dragon">Crew Dragon</a> to carry up to four
astronauts and 100 kg (220 lb) of cargo to the ISS as well as feature a lifeboat
```

function to evacuate astronauts from ISS in case of an emergency.^{[497]} First two astronauts are NASA's Kjell Lindgren and Bob Hines.^{[724]}
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<td rowspan="2">March 2022^{[725]}
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<td>CC,
LC-39A or SLC-40
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<td>O3b mPOWER -4, -5, -6
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<td>MEO
</td>
<td>SES
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<td colspan="5">Second part of SES' MEO satellites for its proven O3b low-latency, high-performance connectivity services.^{[700]}^{[701]}
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<td rowspan="2">March 2022^{[726]}
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<td>VSFB,
SLC-4E
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<td>Transporter-4, SmallSat Rideshare
</td>
<td>SSO
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<td>Various

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href="#cite_note-739">[727]</a></sup>
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Machines</a> <i><a class="mw-redirect" href="/wiki/Nova-C"
title="Nova-C">Nova-C</a></i> lunar lander
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<td><a href="/wiki/Trans-lunar_injection" title="Trans-lunar injection">TLI</a>
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<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Lunar_Payload_Services" title="Commercial Lunar Payload
Services">CLPS</a>)
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<td colspan="5">First mission of NASA's <a
href="/wiki/Commercial_Lunar_Payload_Services" title="Commercial Lunar Payload
Services">Commercial Lunar Payload Services</a> program, and would be the first
private American company to land a spacecraft on the Moon. The lander is
expected to carry five payloads of up to 100 kg (220 lb) total (LRA, NDL, LN-1,
SCALPSS, and ROLSES) and transmit data from the lunar surface in a mission
lasting 2 weeks.<sup class="reference" id="cite_ref-740"><a
href="#cite_note-740">[728]</a></sup><sup class="reference" id="cite_ref-741"><a
href="#cite_note-741">[729]</a></sup><sup class="reference" id="cite_ref-
arst-20190601_742-0"><a href="#cite_note-arst-20190601-742">[730]</a></sup>
DOGE-1 will be a secondary rideshare payload massing 40 kg.<sup
class="reference" id="cite_ref-743"><a href="#cite_note-743">[731]</a></sup><sup
class="reference" id="cite_ref-744"><a href="#cite_note-744">[732]</a></sup>
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<td rowspan="2">Q1 2022<sup class="reference" id="cite_ref-
via-20210504_730-1"><a href="#cite_note-via-20210504-730">[718]</a></sup><sup
class="reference" id="cite_ref-745"><a href="#cite_note-745">[733]</a></sup>
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class="reference" id="cite_ref-worldviewlegion_731-3"><a href="#cite_note-
worldviewlegion-731">[719]</a></sup>
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<a href="/wiki/Vandenberg_Space_Launch_Complex_4"
title="Vandenberg Space Launch Complex 4">SLC-4E
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title="DigitalGlobe">WorldView Legion Mission 2<sup class="reference"
id="cite_ref-worldviewlegion_731-4"><a href="#cite_note-
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Technologies">Maxar Technologies built satellites.
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class="reference" id="cite_ref-nasa-20160114_681-3"><a href="#cite_note-
nasa-20160114-681">[669]</sup>
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Services">CRS)
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<td colspan="5">Fifth of six new cargo missions NASA awarded in 2015 to SpaceX
under the <a href="/wiki/Commercial_Resupply_Services" title="Commercial
Resupply Services">CRS-2 contract to be flown after the initial 20 missions
of phase 1 were completed in 2020.<sup class="reference" id="cite_ref-
nasa-20160114_681-4">[669]</sup>
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sfn-20210523_716-1">[704]</sup><sup

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class="reference" id="cite_ref-sfn_ls_688-7"><a href="#cite_note-
sfn_ls-688">[676]</a></sup>
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Force">USSF-52</a>
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orbit">GTO</a>
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<td><a href="/wiki/United_States_Space_Force" title="United States Space
Force">USSF</a>
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<td colspan="5">Classified payload contract awarded in June 2018 for US$130
million.<sup class="reference" id="cite_ref-747"><a
href="#cite_note-747">[735]</a></sup> Draft solicitation said the launch was
6,350 kg (14,000 lb) to GTO.<sup class="reference" id="cite_ref-748"><a
href="#cite_note-748">[736]</a></sup>
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href="#cite_note-750">[738]</a></sup><sup class="reference" id="cite_ref-
SN20181025_751-0"><a href="#cite_note-SN20181025-751">[739]</a></sup>
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<td colspan="5">This mission will inject the satellite in close proximity to <a
href="/wiki/Geostationary_orbit" title="Geostationary orbit">geostationary
orbit</a>, thus allowing it to be operational faster. Satellites of the ViaSat-3
```

class use <a class="mw-redirect" href="/wiki/Electric_propulsion"
title="Electric propulsion">electric propulsion, which requires less fuel
for stationkeeping operations over their lifetime, but would need several months
to raise its orbit from GTO to GEO.<sup class="reference" id="cite_ref-
SN20181025_751-1">[739]</sup>
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smallsat_738-1">[726]</sup>
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<a href="/wiki/Vandenberg_Space_Launch_Complex_4"
title="Vandenberg Space Launch Complex 4">SLC-4E
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<td>Transporter-5, SmallSat Rideshare
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<tr>
<td colspan="5">Dedicated SmallSat Rideshare mission to sun-synchronous orbit.
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href="#cite_note-752">[740]</sup><sup class="reference" id="cite_ref-753"><a
href="#cite_note-753">[741]</sup>
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Space Force Station">CCSFS,
<a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40
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title="Korea Pathfinder Lunar Orbiter">Korea Pathfinder Lunar Orbiter
(KPLO)<sup class="reference" id="cite_ref-kplo_754-0"><a href="#cite_note-
kplo-754">[742]</sup>
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<td><a href="/wiki/Korea_Aerospace_Research_Institute" title="Korea Aerospace
Research Institute">KARI
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<td colspan="5">South Korea's first lunar mission.<sup class="reference"
id="cite_ref-kplo_754-1">[742]</sup>
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<a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A
</td>
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(spacecraft)">Psyche and possibly <a href="/wiki/Janus_(spacecraft)"
title="Janus (spacecraft)">Janus<sup class="reference"
id="cite_ref-755">[743]</sup>
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<td><a href="/wiki/Heliocentric_orbit" title="Heliocentric
orbit">Heliocentric
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<td>NASA (<a
href="/wiki/Discovery_Program" title="Discovery Program">Discovery)
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<td colspan="5"><a href="/wiki/Discovery_Program" title="Discovery
Program">Discovery Program mission designed to explore asteroid <a
href="/wiki/16_Psyche" title="16 Psyche">16 Psyche that has a limited 6-week
launch window. The asteroid is hoped to show what the early solar system looked
like and how planets formed.<sup class="reference" id="cite_ref-756"><a
href="#cite_note-756">[744]</sup> Janus, planned dual <a class="mw-redirect"
href="/wiki/Space_probe" title="Space probe">space probe to visit two binary
asteroids, (35107) 1991
VH and <a href="/wiki/(175706)_1996_FG3"
title="(175706) 1996 FG3">(175706) 1996 FG<span style="position: relative; top:
0.3em;">3 is also expected
to be launched as a secondary payload together with the Psyche space probe.
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SMSR_746-2">[734]</sup>
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<td><a href="/wiki/SpaceX_CRS-26" title="SpaceX CRS-26">SpaceX CRS-26</a><sup
class="reference" id="cite_ref-nasa-20160114_681-5"><a href="#cite_note-
nasa-20160114-681">[669]</a></sup>
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Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
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<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
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<td colspan="5">Last of six new cargo missions NASA awarded in 2015 to SpaceX
under the <a href="/wiki/Commercial_Resupply_Services" title="Commercial
Resupply Services">CRS-2 contract</a> to be flown after the initial 20 missions
of phase 1 were completed in 2020.<sup class="reference" id="cite_ref-
nasa-20160114_681-6"><a href="#cite_note-nasa-20160114-681">[669]</a></sup>
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<tr>
<td rowspan="2">Q3 2022
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<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a>
</td>
<td><a href="/wiki/Cape_Canaveral" title="Cape Canaveral">CC</a>,<br/><a
href="/wiki/Kennedy_Space_Center_Launch_Complex_39A" title="Kennedy Space Center
Launch Complex 39A">LC-39A</a> or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td>Galaxy 31 and Galaxy 32 (2 satellites)
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a href="/wiki/Intelsat" title="Intelsat">Intelsat</a>
</td></tr>
<tr>
<td colspan="5"><a href="/wiki/Maxar_Technologies" title="Maxar
Technologies">Maxar Technologies</a> or <a href="/wiki/Northrop_Grumman"
title="Northrop Grumman">Northrop Grumman</a> built satellites<sup
class="reference" id="cite_ref-cnbc.com_757-0"><a href="#cite_note-
cnbc.com-757">[745]</a></sup>
</td></tr>
<tr>
<td rowspan="2">Q3 2022<sup class="reference" id="cite_ref-
arstechnica.com_758-0"><a href="#cite_note-arstechnica.com-758">[746]</a></sup>
</td>
<td>Likely <a href="/wiki/Falcon_Heavy" title="Falcon Heavy">Falcon Heavy</a>
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</td>
<td>TBD
</td>
<td>USSF-67
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<td>TBD
</td>
<td><a href="/wiki/United_States_Space_Force" title="United States Space
Force">USSF</a>
</td></tr>
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<td colspan="5">First launch of Phase 2 US Air Force contract. US$316 million
cost for the fiscal year of 2022 for the first flight,<sup class="reference"
id="cite_ref-arstechnica.com_758-1"><a href="#cite_note-
arstechnica.com-758">[746]</a></sup> mostly includes the cost of an extended
payload fairing, upgrades to the company's West Coast launch pad at <a
href="/wiki/Vandenberg_Space_Force_Base" title="Vandenberg Space Force
Base">Vandenberg Space Force Base</a> in <a href="/wiki/California"
title="California">California</a>, and a vertical integration facility required
for NRO missions, while the launching price does not increase.<sup
class="reference" id="cite_ref-759"><a href="#cite_note-759">[747]</a></sup>
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<tr>
<td rowspan="2">1 October 2022
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href="/wiki/Kennedy_Space_Center_Launch_Complex_39A" title="Kennedy Space Center
Launch Complex 39A">LC-39A</a> or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
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<td><a href="/wiki/MethaneSAT" title="MethaneSAT">MethaneSAT</a>
</td>
<td>SSO
</td>
<td>Environmental Defense Fund<br/>New Zealand Space Agency
</td></tr>
<tr>
<td colspan="5">MethaneSAT is a 350 kg (770 lb) among satellite aimed at
locating, quantifying, and tracking <a href="/wiki/Methane_emissions"
title="Methane emissions">methane emissions</a> from oil and gas operations
worldwide. The project received $100 million grant for the mission's completion
and launching from the Bezos Earth Fund, established by <a
href="/wiki/Jeff_Bezos" title="Jeff Bezos">Jeff Bezos</a>.<sup class="reference"
id="cite_ref-760"><a href="#cite_note-760">[748]</a></sup>
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<td rowspan="2">25 October 2022<sup class="reference" id="cite_ref-NASA-
SMSR_746-3"><a href="#cite_note-NASA-SMSR-746">[734]</a></sup>
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</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
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<td>Crew-5
</td>
<td><a class="mw-redirect" href="/wiki/Low_Earth_Orbit" title="Low Earth
Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a class="mw-redirect"
href="/wiki/ISS_Crew_Transportation_Services" title="ISS Crew Transportation
Services">CTS</a>)<sup class="reference" id="cite_ref-CCD6_509-7"><a
href="#cite_note-CCD6-509">[497]</a></sup>
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<td colspan="5">Fifth <a class="mw-redirect"
href="/wiki/Commercial_Crew_Development" title="Commercial Crew
Development">USCV</a> launches out of NASA award of six <a class="mw-redirect"
href="/wiki/Crew_Dragon" title="Crew Dragon">Crew Dragon</a> mission, to carry
up to four astronauts and 100 kg (220 lb) of cargo to the ISS as well as feature
a lifeboat function to evacuate astronauts from ISS in case of an emergency.<sup
class="reference" id="cite_ref-CCD6_509-8"><a href="#cite_note-
CCD6-509">[497]</a></sup>
</td></tr>
<tr>
<td rowspan="2">October 2022<sup class="reference" id="cite_ref-spacex-
smallsat_738-2"><a href="#cite_note-spacex-smallsat-738">[726]</a></sup>
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</td>
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Base">VSFB</a>,<br/><a href="/wiki/Vandenberg_Space_Launch_Complex_4"
title="Vandenberg Space Launch Complex 4">SLC-4E</a>
</td>
<td><i>Transporter-6</i>, SmallSat Rideshare
</td>
<td><a href="/wiki/Sun-synchronous_orbit" title="Sun-synchronous orbit">SSO</a>
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<td>Various
</td></tr>
<tr>
<td colspan="5">Dedicated SmallSat Rideshare mission to sun-synchronous orbit.
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SMSR_746-4"><a href="#cite_note-NASA-SMSR-746">[734]</a></sup>
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<td><a href="/wiki/Vandenberg_Space_Force_Base" title="Vandenberg Space Force
Base">VSFB</a>,<br/><a href="/wiki/Vandenberg_Space_Launch_Complex_4"
title="Vandenberg Space Launch Complex 4">SLC-4E</a><sup class="reference"
id="cite_ref-swot-contract_761-0"><a href="#cite_note-swot-
contract-761">[749]</a></sup>
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title="Surface Water Ocean Topography">Surface Water Ocean Topography</a> (SWOT)
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Orbit">LEO</a>
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a>
</td></tr>
<tr>
<td colspan="5">American-European satellite intended to measure the surface
altitude of water bodies with centimeter-level precision.<sup class="reference"
id="cite_ref-762"><a href="#cite_note-762">[750]</a></sup>
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<td>TBD
</td>
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Systems">Masten Mission One (MM1)</a><br/><a
href="/wiki/Masten_Space_Systems#XL-1" title="Masten Space Systems">XL-1</a>
lunar lander
</td>
<td><a href="/wiki/Trans-lunar_injection" title="Trans-lunar injection">TLI</a>
</td>
<td><a href="/wiki/Masten_Space_Systems" title="Masten Space Systems">Masten
Space Systems</a><br/><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Lunar_Payload_Services" title="Commercial Lunar Payload
Services">CLPS</a>)
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<tr>
<td colspan="5">In April 2020, NASA announced Masten as one of the CLPS contract
winners to send a lander to the lunar South pole in 2022 with several
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payloads.<sup class="reference" id="cite_ref-763"><a
href="#cite_note-763">[751]</a></sup> In August 2020, Masten announced they
signed a launch contract with SpaceX.<sup class="reference" id="cite_ref-764"><a
href="#cite_note-764">[752]</a></sup><sup class="reference" id="cite_ref-765"><a
href="#cite_note-765">[753]</a></sup>
</td></tr>
<tr>
<td rowspan="2">Late 2022<sup class="reference" id="cite_ref-
HenrySpaceNorway_766-0"><a href="#cite_note-
HenrySpaceNorway-766">[754]</a></sup>
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<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a>
</td>
<td><a href="/wiki/Vandenberg_Space_Force_Base" title="Vandenberg Space Force
Base">VSFB</a>,<br/><a href="/wiki/Vandenberg_Space_Launch_Complex_4"
title="Vandenberg Space Launch Complex 4">SLC-4E</a>
</td>
<td>ASBM 1 and ASBM 2
</td>
<td><a href="/wiki/Highly_elliptical_orbit" title="Highly elliptical
orbit">HEO</a>
</td>
<td><a href="/wiki/Norwegian_Space_Agency" title="Norwegian Space Agency">Space
Norway</a>
</td></tr>
<tr>
<td colspan="5"><a href="/wiki/Norwegian_Space_Agency" title="Norwegian Space
Agency">Space Norway</a> will launch 2 satellites of the <a class="mw-redirect"
href="/wiki/Arctic_Satellite_Broadband_Mission" title="Arctic Satellite
Broadband Mission">Arctic Satellite Broadband Mission</a> (ASBM) system into
highly elliptical orbits (apogee 43,509 km (27,035 mi), perigee 8,089 km
(5,026 mi), 63.4°)<sup class="reference" id="cite_ref-767"><a
href="#cite_note-767">[755]</a></sup>) to provide communication coverage to high
latitudes not served by geosynchronous satellites.<sup class="reference"
id="cite_ref-HenrySpaceNorway_766-1"><a href="#cite_note-
HenrySpaceNorway-766">[754]</a></sup>
</td></tr>
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</td>
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href="/wiki/Kennedy_Space_Center_Launch_Complex_39A" title="Kennedy Space Center
Launch Complex 39A">LC-39A</a> or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
```

<td>Galaxy 33 and Galaxy 34 (2 satellites)
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO
</td>
<td>Intelsat
</td></tr>
<tr>
<td colspan="5"><a href="/wiki/Maxar_Technologies" title="Maxar
Technologies">Maxar Technologies or <a href="/wiki/Northrop_Grumman"
title="Northrop Grumman">Northrop Grumman built satellites.<sup
class="reference" id="cite_ref-cnbc.com_757-1"><a href="#cite_note-
cnbc.com-757">[745]</sup>
</td></tr>
<tr>
<td rowspan="2">Q4 2022<sup class="reference" id="cite_ref-768"><a
href="#cite_note-768">[756]</sup>
</td>
<td>F9 B5
</td>
<td>TBD
</td>
<td>Intuitive
Machines <a class="mw-redirect" href="/wiki/Nova-C"
title="Nova-C">Nova-C 2 lunar lander
</td>
<td>TLI
</td>
<td>NASA (<a
href="/wiki/Commercial_Lunar_Payload_Services" title="Commercial Lunar Payload
Services">CLPS)
<a href="/wiki/Ispace_(Japanese_company)" title="Ispace
(Japanese company)">ispace
</td></tr>
<tr>
<td colspan="5">Intuitive Machines is sending its second lander aboard a SpaceX
Falcon 9, with a projected launch time frame happening sometime around late
2022. Intuitive Machines has already booked a first lander mission via SpaceX,
which is also hosting payloads for other private companies seeking to make lunar
landfall under NASA's Commercial Lunar Payload Services program.
</td></tr>
<tr>
<td rowspan="2">2022<sup class="reference" id="cite_ref-769"><a
href="#cite_note-769">[757]</sup>
</td>
<td>F9 B5
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CC,
<a class="mw-redirect" href="/wiki/SLC-40"

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title="SLC-40">SLC-40</a>
</td>
<td><a href="/wiki/Hakuto" title="Hakuto">Hakuto</a>-R Mission 1 Moon lander
and<br/><a href="/wiki/Emirates_Lunar_Mission" title="Emirates Lunar
Mission">Emirates Lunar Mission</a> (<a href="/wiki/Emirates_Lunar_Mission"
title="Emirates Lunar Mission">Rashid</a>) rover (secondary payload)
</td>
<td><a href="/wiki/Trans-lunar_injection" title="Trans-lunar injection">TLI</a>
</td>
<td><a href="/wiki/Ispace_(Japanese_company)" title="Ispace (Japanese
company)">ispace</a> and <br/><a href="/wiki/Mohammed_bin_Rashid_Space_Centre"
title="Mohammed bin Rashid Space Centre">MBRSC</a>
</td></tr>
<tr>
<td colspan="5"><a href="/wiki/Ispace_(Japanese_company)" title="Ispace
(Japanese company)">ispace</a>'s Hakuto-R (for Reboot) is derived from the <a
href="/wiki/Hakuto" title="Hakuto">Hakuto</a> project that was one of the
defunct <a href="/wiki/Google_Lunar_X_Prize" title="Google Lunar X Prize">Google
Lunar X Prize</a> contestants. The rebooted project aims to launch a lander-
rover mission carrying a <a href="/wiki/Hakuto" title="Hakuto">Hakuto</a>-R
lander and <a href="/wiki/Emirates_Lunar_Mission" title="Emirates Lunar
Mission">Emirates Lunar Mission</a>(<a href="/wiki/Emirates_Lunar_Mission"
title="Emirates Lunar Mission">Rashid</a>) rover (in collaboration with <a
href="/wiki/Mohammed_bin_Rashid_Space_Centre" title="Mohammed bin Rashid Space
Centre">MBRSC</a>) in 2022 with a separate Japanese rover mission in 2023, both
as secondary payloads on other unspecified Falcon 9 missions.<sup
class="reference" id="cite_ref-spacenews-20180926_770-0"><a href="#cite_note-
spacenews-20180926-770">[758]</a></sup><sup class="reference" id="cite_ref-
ispace20190822_771-0"><a href="#cite_note-ispace20190822-771">[759]</a></sup>
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<td rowspan="2">2022<sup class="reference" id="cite_ref-772"><a
href="#cite_note-772">[760]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a> <sup
class="reference" id="cite_ref-GPS_boosterreuse_693-1"><a href="#cite_note-
GPS_boosterreuse-693">[681]</a></sup>
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<td><a href="/wiki/Cape_Canaveral" title="Cape Canaveral">CC</a>,<br/><a
href="/wiki/Kennedy_Space_Center_Launch_Complex_39A" title="Kennedy Space Center
Launch Complex 39A">LC-39A</a> or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
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<td><a href="/wiki/GPS_Block_III" title="GPS Block III">GPS III</a>-<a
href="/wiki/List_of_GPS_satellites" title="List of GPS satellites">06</a>
(<i>Amelia Earhart</i>)<sup class="reference" id="cite_ref-GPS_553-3"><a
href="#cite_note-GPS-553">[541]</a></sup><sup class="reference" id="cite_ref-
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sfn-20181217_398-2">[388]</sup>
</td>
<td>MEO
</td>
<td><a href="/wiki/United_States_Space_Force" title="United States Space
Force">USSF<sup class="reference" id="cite_ref-clark-20200630_542-3"><a
href="#cite_note-clark-20200630-542">[530]</sup>
</td></tr>
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<td colspan="5">Space vehicle manufacturing contract awarded February 2013.<sup
class="reference" id="cite_ref-GPS_III_5678_694-1"><a href="#cite_note-
GPS_III_5678-694">[682]</sup> In September 2018, the space vehicle was
integrating harnesses.<sup class="reference" id="cite_ref-
gps_status_20180926_546-1"><a href="#cite_note-
gps_status_20180926-546">[534]</sup> In March 2018, the Air Force announced
it had awarded the launch contract for three GPS satellites to SpaceX.
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href="#cite_note-773">[761]</sup>
</td>
<td>F9 B5 or <a
href="/wiki/Falcon_Heavy" title="Falcon Heavy">Falcon Heavy
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Center">KSC,
<a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A
</td>
<td>Inmarsat-6B
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO
</td>
<td>Inmarsat
</td></tr>
<tr>
<td colspan="5">Inmarsat maintained its launch option after a scheduled 2016
Falcon Heavy launch (a <a href="/wiki/European_Aviation_Network" title="European
Aviation Network">European Aviation Network satellite) was switched for an
Ariane 5 launch in 2017.<sup
class="reference" id="cite_ref-spacenews-20180601_774-0"><a href="#cite_note-
spacenews-20180601-774">[762]</sup> This option may be used for launching
Inmarsat-6B,<sup class="reference" id="cite_ref-gxflex_775-0"><a
href="#cite_note-gxflex-775">[763]</sup> and, as of April 2020<sup
class="plainlinks noexcerpt noprint asof-tag update" style="display:none;"><a
class="external text" href="https://en.wikipedia.org/w/index.php?title=List_of_F
alcon_9_and_Falcon_Heavy_launches&action=edit">[update]</sup>, SpaceX's
launch manifest listed Inmarsat for a Falcon 9 launch.<sup class="reference"

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id="cite_ref-launchmanifest20200406_776-0"><a href="#cite_note-
launchmanifest20200406-776">[764]</a></sup>
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<tr>
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href="/wiki/Kennedy_Space_Center_Launch_Complex_39A" title="Kennedy Space Center
Launch Complex 39A">LC-39A</a> or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td>SES-18 and SES-19<sup class="reference" id="cite_ref-777"><a
href="#cite_note-777">[765]</a></sup>
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a class="mw-redirect" href="/wiki/SES_S.A." title="SES S.A.">SES</a>
</td></tr>
<tr>
<td colspan="5">SpaceX will launch two C-band satellites for SES, with the
option to launch a third satellite on a second flight.<sup class="reference"
id="cite_ref-778"><a href="#cite_note-778">[766]</a></sup><sup class="reference"
id="cite_ref-779"><a href="#cite_note-779">[767]</a></sup>
</td></tr>
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<td rowspan="2">2022<sup class="reference" id="cite_ref-sn-20200820_737-1"><a
href="#cite_note-sn-20200820-737">[725]</a></sup>
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title="Kennedy Space Center Launch Complex 39A">LC-39A</a> or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a></span>
</td>
<td><a href="/wiki/O3b_mPOWER" title="O3b mPOWER">O3b mPOWER</a> 7, 8 and 9
</td>
<td><a href="/wiki/Medium_Earth_orbit" title="Medium Earth orbit">MEO</a>
</td>
<td><a class="mw-redirect" href="/wiki/SES_S.A." title="SES S.A.">SES</a>
</td></tr>
<tr>
<td colspan="5">In August 2020, SES expanded the O3m contract with two
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additional launches, raising the number of satellites from 7 to 11 satellites at
nearly 2 tons each.<sup class="reference" id="cite_ref-780"><a
href="#cite_note-780">[768]</a></sup><sup class="reference" id="cite_ref-
businesswire.com_781-0"><a href="#cite_note-
businesswire.com-781">[769]</a></sup>
</td></tr>
<tr>
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broadcastpro20200122_782-0"><a href="#cite_note-
broadcastpro20200122-782">[770]</a></sup>
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href="/wiki/Kennedy_Space_Center_Launch_Complex_39A" title="Kennedy Space Center
Launch Complex 39A">LC-39A</a> or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td>Nilesat-301<sup class="reference" id="cite_ref-
broadcastpro20200122_782-1"><a href="#cite_note-
broadcastpro20200122-782">[770]</a></sup>
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a href="/wiki/Nilesat" title="Nilesat">Nilesat</a>
</td></tr>
<tr>
<td colspan="5">Built by <a href="/wiki/Thales_Alenia_Space" title="Thales
Alenia Space">Thales Alenia Space</a>, the Egyptian satellite will be stationed
at 7.0° west.<sup class="reference" id="cite_ref-broadcastpro20200122_782-2"><a
href="#cite_note-broadcastpro20200122-782">[770]</a></sup>
</td></tr>
<tr>
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Launch Complex 39A">LC-39A</a> or <a
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Emissions: Monitoring of Pollution">TEMPO</a>
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orbit">GTO</a>
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href="/wiki/NASA" title="NASA">NASA</a>
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Technologies">Maxar Technologies</a> built satellite that will service North and
Central America.<sup class="reference" id="cite_ref-783"><a
href="#cite_note-783">[771]</a></sup>
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href="#cite_note-784">[772]</a></sup>
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Base">VSFB</a>,<br/><a href="/wiki/Vandenberg_Space_Launch_Complex_4"
title="Vandenberg Space Launch Complex 4">SLC-4E</a>
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orbit">SSO</a><sup class="reference" id="cite_ref-gunter-NRO_785-0"><a
href="#cite_note-gunter-NRO-785">[773]</a></sup>
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Reconnaissance Office">NRO</a>
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<td colspan="5">Classified payload. It was expected to be completed by December
2021.<sup class="reference" id="cite_ref-USDD190219_717-1"><a href="#cite_note-
USDD190219-717">[705]</a></sup>
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href="/wiki/Kennedy_Space_Center_Launch_Complex_39A" title="Kennedy Space Center
Launch Complex 39A">LC-39A</a> or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
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Launch Complex 40">SLC-40</a>
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<td>Aurora 4A (secondary payload)<sup class="reference" id="cite_ref-787"><a
href="#cite_note-787">[775]</a></sup>
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orbit">GTO</a>
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<td colspan="5">This small (300 kg (660 lb)) geostationary satellite intends to
provide 7.5 Gbit/s of bandwidth to Alaska, in partnership with <a class="new"
href="/w/index.php?title=Pacific_Dataport&amp;action=edit&amp;redlink=1"
title="Pacific Dataport (page does not exist)">Pacific Dataport</a>. Originally
was aiming for launch in quarter four 2020.<sup class="reference"
id="cite_ref-788"><a href="#cite_note-788">[776]</a></sup>
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title="List of Falcon 9 first-stage boosters">Version,<br/>Booster</a><sup
class="reference" id="cite_ref-booster_11-11"><a href="#cite_note-
booster-11">[b]</a></sup>
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<th scope="col">Launch site
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<th scope="col">Payload<sup class="reference" id="cite_ref-Dragon_12-11"><a
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Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
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Services">CRS)
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title="Commercial Resupply Services">CRS-2 missions for Dragon 2 covering up
to CRS-29 were announced in December 2020.<sup class="reference" id="cite_ref-
gunter-v2c_789-0">[777]</sup>
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SMSR_746-6">[734]</sup>
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Center">KSC,
<a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A
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<td>Crew-6
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Orbit">LEO (ISS)
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<td>NASA (<a class="mw-redirect"
href="/wiki/ISS_Crew_Transportation_Services" title="ISS Crew Transportation
Services">CTS)<sup class="reference" id="cite_ref-CCD6_509-9"><a
href="#cite_note-CCD6-509">[497]</sup>
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href="/wiki/Commercial_Crew_Development" title="Commercial Crew
Development">USCV launches out of NASA award of six <a class="mw-redirect"
href="/wiki/Crew_Dragon" title="Crew Dragon">Crew Dragon mission, to carry
up to four astronauts and 100 kg (220 lb) of cargo to the ISS as well as feature
a lifeboat function to evacuate astronauts from ISS in case of an emergency.<sup
class="reference" id="cite_ref-CCD6_509-10"><a href="#cite_note-
CCD6-509">[497]</sup>
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ispace20190822_771-1"><a href="#cite_note-

ispace20190822-771">[759]</sup><sup class="reference" id="cite_ref-790"><a
href="#cite_note-790">[778]</sup>
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<a
href="/wiki/Kennedy_Space_Center_Launch_Complex_39A" title="Kennedy Space Center
Launch Complex 39A">LC-39A or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40
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<td>Hakuto-R Moon lander (secondary
payload)<sup class="reference" id="cite_ref-spacenews-20180926_770-1"><a
href="#cite_note-spacenews-20180926-770">[758]</sup><sup class="reference"
id="cite_ref-791">[779]</sup>
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<td><a href="/wiki/Ispace_(Japanese_company)" title="Ispace (Japanese
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(Japanese company)">Ispace's Hakuto-R (for Reboot) is derived from the <a
href="/wiki/Hakuto" title="Hakuto">Hakuto project that was one of the
defunct Google
Lunar X Prize contestants. The rebooted project aims to launch a lander-
rover mission carrying a Hakuto-R
lander and <a href="/wiki/Emirates_Lunar_Mission" title="Emirates Lunar
Mission">Rashid rover (in collaboration with <a
href="/wiki/Mohammed_bin_Rashid_Space_Centre" title="Mohammed bin Rashid Space
Centre">MBRSC) in 2021 with a separate Japanese rover mission in 2023, both
as secondary payloads on other unspecified Falcon 9 missions.<sup
class="reference" id="cite_ref-spacenews-20180926_770-2"><a href="#cite_note-
spacenews-20180926-770">[758]</sup><sup class="reference" id="cite_ref-
ispace20190822_771-2">[759]</sup>
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smallsat_738-3">[726]</sup>
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<a href="/wiki/Vandenberg_Space_Launch_Complex_4"
title="Vandenberg Space Launch Complex 4">SLC-4E
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<td>Transporter-7, SmallSat Rideshare

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The On-Orbit Servicing, Assembly and Manufacturing Mission 2 (OSAM-2), formerly
known as <a href="/wiki/Archinaut" title="Archinaut">Archinaut</a> One, may
launch on this rideshare mission in early 2023.<sup class="reference"
id="cite_ref-792"><a href="#cite_note-792">[780]</a></sup><sup class="reference"
id="cite_ref-793"><a href="#cite_note-793">[781]</a></sup>
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SMSR_746-7"><a href="#cite_note-NASA-SMSR-746">[734]</a></sup>
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Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
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Orbit">LEO</a> (<a class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
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href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
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title="Commercial Resupply Services">CRS-2</a> missions for Dragon 2 covering up
to CRS-29 were announced in December 2020.<sup class="reference" id="cite_ref-
gunter-v2c_789-1"><a href="#cite_note-gunter-v2c-789">[777]</a></sup>
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smallsat_738-4"><a href="#cite_note-spacex-smallsat-738">[726]</a></sup>
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href="#cite_note-795">[783]</sup>
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Center">KSC,
<a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A
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<td><a href="/wiki/Firefly_Aerospace#Blue_Ghost_lunar_lander" title="Firefly
Aerospace">Blue Ghost lunar lander
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<td>TLI
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<td>Firefly
Aerospace
NASA (<a href="/wiki/Commercial_Lunar_Payload_Services"
title="Commercial Lunar Payload Services">CLPS)
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<td colspan="5"><a href="/wiki/Firefly_Aerospace" title="Firefly
Aerospace">Firefly Aerospace chose <a href="/wiki/SpaceX"
title="SpaceX">SpaceX's Falcon 9 rocket to deliver the Blue Ghost lunar
lander to the lunar surface. Blue Ghost will carry 10 payloads for NASA's <a
href="/wiki/Commercial_Lunar_Payload_Services" title="Commercial Lunar Payload
Services">Commercial Lunar Payload Services task order 19D mission along
with other separately contracted payloads.<sup class="reference"
id="cite_ref-796">[784]</sup>
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title="Kennedy Space Center Launch Complex 39A">LC-39A

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Space Force Station">CCSFS</a>,<br/><a
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Launch Complex 40">SLC-40</a>
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Aerosol, Cloud, ocean Ecosystem">PACE</a>
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href="/wiki/Launch_Services_Program" title="Launch Services Program">LSP</a>)
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<td colspan="5"><i>Plankton, Aerosol, Cloud, ocean Ecosystem</i> is a 1.7 tonne,
US$800 million craft that will orbit at 676 km (420 mi) altitude. It will
include the <i>Ocean Color Imager</i> intended to study phytoplankton in the
ocean, and two polarimeters for studying properties of clouds, aerosols and the
ocean. The launch price was US$80.4 million.<sup class="reference"
id="cite_ref-797"><a href="#cite_note-797">[785]</a></sup>
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1">Griffin Mission 1</a>
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title="Astrobotic">Astrobotic</a><br/>NASA (<a href="/wiki/Artemis_program"
title="Artemis program">Artemis</a>)
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href="/wiki/Griffin_(spacecraft)" title="Griffin (spacecraft)">Griffin lunar
lander</a> will deliver NASA's <i><a href="/wiki/VIPER_(rover)" title="VIPER
(rover)">VIPER</a></i> spacecraft to the <a href="/wiki/Lunar_south_pole"
title="Lunar south pole">lunar south pole</a>.<sup class="reference"
id="cite_ref-799"><a href="#cite_note-799">[787]</a></sup>
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Base">VSFB</a>,<br/><a href="/wiki/Vandenberg_Space_Launch_Complex_4"
title="Vandenberg Space Launch Complex 4">SLC-4E</a>
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href="#cite_note-800">[788]</a></sup>
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title="Kennedy Space Center Launch Complex 39A">LC-39A or <a
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Launch Complex 40">SLC-40
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orbit">GTO
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<td><a href="/wiki/PT_Pasifik_Satelit_Nusantara" title="PT Pasifik Satelit
Nusantara">PT Pasifik Satelit Nusantara
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instead of a Chinese rocket or Ariane
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title="Kennedy Space Center Launch Complex 39A">LC-39A or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40<sup class="reference" id="cite_ref-
ussf36location_802-0">[790]</sup>
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Force">USSF
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2021.<sup class="reference" id="cite_ref-defense.gov_803-0"><a href="#cite_note-
defense.gov-803">[791]</sup>
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title="Kennedy Space Center Launch Complex 39A">LC-39A</a> or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a></span><sup class="reference" id="cite_ref-
ussf36location_802-1"><a href="#cite_note-ussf36location-802">[790]</a></sup>
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Launch Complex 39A">LC-39A</a> or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
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<td>Intelsat satellite
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<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
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<td><a href="/wiki/Intelsat" title="Intelsat">Intelsat</a>
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<td colspan="5">Intelsat contracted both SpaceX and Arianespace to launch its
fifth <a href="/wiki/Maxar_Technologies" title="Maxar Technologies">Maxar
Technologies</a> built satellite, and award whichever doesn't launch it with a
separate contract at a later date.<sup class="reference" id="cite_ref-
cnbc.com_757-2"><a href="#cite_note-cnbc.com-757">[745]</a></sup>
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class="reference" id="cite_ref-ussf36config_801-2"><a href="#cite_note-
ussf36config-801">[789]</a></sup>
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<td><a href="/wiki/Cape_Canaveral" title="Cape Canaveral">CC</a>,<br/><span
class="nowrap"><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a> or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a></span>
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<td>Ax-2
</td>
<td>TBD
</td>
<td>Axiom Space
</td></tr>
<tr>
<td colspan="5">Contract for 3 additional missions was signed in June 2021.<sup
class="reference" id="cite_ref-axiom_804-0"><a href="#cite_note-
axiom-804">[792]</a></sup> <a href="/wiki/Peggy_Whitson" title="Peggy
Whitson">Peggy Whitson</a> and <a href="/wiki/John_Shoffner" title="John
Shoffner">John Shoffner</a> were signed on as commander and pilot.<sup
class="reference" id="cite_ref-805"><a href="#cite_note-805">[793]</a></sup><sup
class="reference" id="cite_ref-806"><a href="#cite_note-806">[794]</a></sup> The
third seat is expected to be awarded to a <a href="/wiki/Discovery_Channel"
title="Discovery Channel">Discovery</a> reality TV show winner of <a class="new"
href="/w/index.php?title=Who_Wants_To_Be_An_Astronaut%3F&amp;action=edit&amp;red
link=1" title="Who Wants To Be An Astronaut? (page does not exist)">Who Wants To
Be An Astronaut?</a>.<sup class="reference" id="cite_ref-807"><a
href="#cite_note-807">[795]</a></sup>
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<td rowspan="2">2023
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<td><a href="/wiki/Falcon_9_Block_5" title="Falcon 9 Block 5">F9 B5</a><sup
class="reference" id="cite_ref-ussf36config_801-3"><a href="#cite_note-
ussf36config-801">[789]</a></sup>
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title="Kennedy Space Center Launch Complex 39A">LC-39A</a> or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a></span>
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<td>Ax-3
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class="reference" id="cite_ref-axiom_804-1"><a href="#cite_note-
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ussf36config-801">[789]</sup>
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<span
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title="Kennedy Space Center Launch Complex 39A">LC-39A or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40
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href="/wiki/Coordinated_Universal_Time" title="Coordinated Universal
Time">UTC)
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title="List of Falcon 9 first-stage boosters">Version,
Booster<sup
class="reference" id="cite_ref-booster_11-12"><a href="#cite_note-
booster-11">[b]</sup>
</th>
<th scope="col">Launch site
</th>

<th scope="col">Payload<sup class="reference" id="cite_ref-Dragon_12-12"><a
href="#cite_note-Dragon-12">[c]</sup>
</th>
<th scope="col">Orbit
</th>
<th scope="col">Customer
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<td rowspan="2">2024-2027<sup class="reference" id="cite_ref-
arstechnica.com_758-2">[746]</sup>
</td>
<td>TBD
</td>
<td>TBD
</td>
<td>about 12 more launches
</td>
<td>TBD
</td>
<td><a href="/wiki/United_States_Space_Force" title="United States Space
Force">USSF
</td></tr>
<tr>
<td colspan="5">Launches part of Phase 2 US Air Force contract awarding SpaceX
40% of the about 34 launches expected to occur between 2022 and 2027.<sup
class="reference" id="cite_ref-arstechnica.com_758-3"><a href="#cite_note-
arstechnica.com-758">[746]</sup>
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<td><a href="/wiki/Vandenberg_Space_Force_Base" title="Vandenberg Space Force
Base">VSFB,
<a href="/wiki/Vandenberg_Space_Launch_Complex_4"
title="Vandenberg Space Launch Complex 4">SLC-4E
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<td>SPHEREx
</td>
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orbit">SSO<sup class="reference" id="cite_ref-808"><a
href="#cite_note-808">[796]</sup>
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<td>NASA
</td></tr>
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<td colspan="5">In February 2021, NASA announced a $99m contract for its
Astrophysics Division.<sup class="reference" id="cite_ref-809"><a

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href="#cite_note-809">[797]</a></sup>
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href="#cite_note-810">[798]</a></sup>
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</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
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Element">Power and Propulsion Element</a> (PPE)<br/><a
href="/wiki/Lunar_Gateway#Planned_modules" title="Lunar Gateway">Habitation and
Logistics Outpost</a> (HALO)<sup class="reference" id="cite_ref-811"><a
href="#cite_note-811">[799]</a></sup>
</td>
<td><a href="/wiki/Trans-lunar_injection" title="Trans-lunar injection">TLI</a>
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a href="/wiki/Artemis_program"
title="Artemis program">Artemis</a>)
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<td colspan="5">First elements for the <a href="/wiki/Lunar_Gateway"
title="Lunar Gateway">Gateway</a> station as part of the <a
href="/wiki/Artemis_program" title="Artemis program">Artemis program</a>,
awarded in February 2021. The launch will cost NASA $331.8 million.<sup
class="reference" id="cite_ref-ppe_812-0"><a href="#cite_note-
ppe-812">[800]</a></sup>
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href="#cite_note-sn-20200820-737">[725]</a></sup>
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</td>
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class="nowrap"><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a> or <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a></span>
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<td><a href="/wiki/O3b_mPOWER" title="O3b mPOWER">O3b mPOWER</a> 10 and 11
</td>
<td><a href="/wiki/Medium_Earth_orbit" title="Medium Earth orbit">MEO</a>
</td>
<td><a class="mw-redirect" href="/wiki/SES_S.A." title="SES S.A.">SES</a>
```

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<td colspan="5">In August 2020, SES expanded the O3m contract with a fourth
launch.<sup class="reference" id="cite_ref-businesswire.com_781-1"><a
href="#cite_note-businesswire.com-781">[769]</a></sup>
</td></tr>
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href="#cite_note-813">[801]</a></sup><sup class="reference" id="cite_ref-814"><a
href="#cite_note-814">[802]</a></sup>
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</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
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<td><a class="mw-redirect" href="/wiki/Dragon_XL" title="Dragon XL">Dragon
XL</a>
</td>
<td><a href="/wiki/Trans-lunar_injection" title="Trans-lunar injection">TLI</a>
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Gateway_Logistics_Services" title="Gateway Logistics
Services">Gateway Logistics Services</a>)
</td></tr>
<tr>
<td colspan="5">In March 2020, NASA announced its first contract for the <a
href="/wiki/Gateway_Logistics_Services" title="Gateway Logistics
Services">Gateway Logistics Services</a> that guarantees at least two launches
on a modified Crew Dragon spacecraft that will carry over 5 tonnes of cargo to
the Lunar orbit on 6-12 months long missions.<sup class="reference"
id="cite_ref-815"><a href="#cite_note-815">[803]</a></sup>
</td></tr>
<tr>
<td rowspan="2">1 February 2025<sup class="reference" id="cite_ref-816"><a
href="#cite_note-816">[804]</a></sup>
</td>
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</td>
<td><a href="/wiki/Kennedy_Space_Center" title="Kennedy Space
Center">KSC</a>,<br/><a href="/wiki/Kennedy_Space_Center_Launch_Complex_39A"
title="Kennedy Space Center Launch Complex 39A">LC-39A</a>
</td>
<td><a href="/wiki/Interstellar_Mapping_and_Acceleration_Probe"
title="Interstellar Mapping and Acceleration Probe">Interstellar Mapping and
Acceleration Probe</a> (IMAP)
</td>
```

<td>Sun-Earth L₁
</td>
<td>NASA
</td></tr>
<tr>
<td colspan="5">In September 2020, NASA selected SpaceX to launch IMAP mission, which will help researchers better understand the boundary of the heliosphere, a magnetic barrier surrounding our solar system. The total launch cost is approximately US$109.4 million. The secondary payloads are NASA's Lunar Trailblazer mission, two NASA heliophysics missions of opportunity, and the National Oceanic and Atmospheric Administration's Space Weather Follow On-Lagrange 1 (SWFO-L1) mission.^{[805]}
</td></tr>
<tr>
<td rowspan="2">2026^{[806]}
</td>
<td>Falcon Heavy
</td>
<td>KSC,
LC-39A
</td>
<td>Dragon XL
</td>
<td>TLI
</td>
<td>NASA (Gateway Logistics Services)
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<td colspan="5">Second Dragon XL logistics module.^{[806]}
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<li class="nv-talk"><abbr style=";;background:none transparent;border:none;box-shadow:none;padding:0;" title="Discuss this template">t</abbr>
<li class="nv-edit"><abbr style=";;background:none transparent;border:none;box-shadow:none;padding:0;" title="Edit this template">e</abbr> SpaceX missions and payloads </th></tr><tr><th class="navbox-group" scope="row" style="width:1%">Launch vehicles</th><td class="navbox-list-with-group navbox-list navbox-odd" style="width:100%;padding:0">
Falcon 1
Falcon 9
v1.0
v1.1
Full Thrust
Block 5
Falcon Heavy
Starship
</td></tr><tr><th class="navbox-group" scope="row" style="width:1%">Falcon 1 missions</th><td class="navbox-list-with-group navbox-list navbox-even" style="width:100%;padding:0">
Demo 1† (FalconSAT-2)
Demo 2†
Flight 3†
Trailblazer
PRESat

NanoSail-D
Explorers
Ratsat
RazakSAT
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with-group navbox-list navbox-odd" style="width:100%;padding:0"><div
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style="border-spacing:0"><tbody><tr><th class="navbox-group" scope="row"
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<a href="/wiki/Dragon_Spacecraft_Qualification_Unit" title="Dragon
Spacecraft Qualification Unit">Dragon test flight
<a href="/wiki/SpaceX_COTS_Demo_Flight_1" title="SpaceX COTS Demo Flight
1">COTS-1
<a href="/wiki/SpaceX_COTS_Demo_Flight_2" title="SpaceX COTS Demo Flight
2">COTS-2
Crew
Dragon
<a href="/wiki/Crew_Dragon_Pad_Abort_Test" title="Crew Dragon Pad Abort
Test">Pad Abort Test
<a href="/wiki/Crew_Dragon_Demo-1" title="Crew Dragon
Demo-1">Demo-1
<a href="/wiki/Crew_Dragon_In-Flight_Abort_Test" title="Crew Dragon In-
Flight Abort Test">In-Flight Abort Test
<a href="/wiki/Crew_Dragon_Demo-2" title="Crew Dragon
Demo-2">Demo-2
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CRS-1
CRS-2
CRS-3
CRS-4
CRS-5
CRS-6
CRS-7†
CRS-8
CRS-9
CRS-10
CRS-11
CRS-12
CRS-13
CRS-14
CRS-15
CRS-16
CRS-17

CRS-18
CRS-19
CRS-20
CRS-21
CRS-22
CRS-23
CRS-24
CRS-25
CRS-26
CRS-27
CRS-28
CRS-29
<u>Cygnus
NG-20</u>
CRS-30
Cygnus
NG-21
<a class="mw-redirect" href="/wiki/SpaceX_CRS-31#Cargo_Dragon_flights"
title="SpaceX CRS-31">CRS-31-35
<a class="mw-redirect" href="/wiki/Cygnus_NG-22#Missions" title="Cygnus
NG-22">Cygnus NG-22-25
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<a href="/wiki/Crew_Dragon_Demo-2" title="Crew Dragon
Demo-2">Demo-2
Crew-1
Crew-2
Inspiration4
Crew-3
Axiom-1
Crew-4
Crew-5
Crew-6
Axiom-2
Crew-7
Axiom-3
<u>Crew-8</u>
Crew-9
Polaris
Dawn
<a class="mw-redirect" href="/wiki/SpaceX_Crew-10#Crew_Dragon_Missions"
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satellites</th><td class="navbox-list-with-group
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0.25em">
SES-8

Thaicom 6
Orbcomm OG2 × 6
AsiaSat 8
AsiaSat 6
ABS-3A / Eutelsat 115 West B
TürkmenÄlem 52°E
Orbcomm OG2 × 11
SES-9
JCSAT-14
Thaicom 8
ABS-2A / Eutelsat 117 West B
JCSAT-16
AMOS-6†
Iridium NEXT 1-10
EchoStar 23
SES-10
Inmarsat-5 F4
BulgariaSat-1
Iridium NEXT 11-20
Intelsat 35e
Iridium NEXT 21-30
SES-11
Koreasat 5A
Iridium NEXT 31-40
Hispasat 30W-6
Iridium NEXT 41-50
Bangabandhu-1
Iridium NEXT 51-55
SES-12
Telstar 19V
Iridium NEXT 56-65
Telkom 4 (Merah Putih)
Telstar 18V
Es'hail 2

Iridium NEXT 66-75
Nusantara Satu /
Beresheet
Amos 17
JCSAT-18
<a class="mw-redirect" href="/wiki/Sirius_XM_Holdings#Satellites"
title="Sirius XM Holdings">SXM 7
Türksat 5A
SXM 8
Türksat 5B
<a class="mw-redirect" href="/wiki/Nilesat-301"
title="Nilesat-301">Nilesat-301
<a href="/wiki/List_of_SES_satellites#SES_fleet" title="List of SES
satellites">SES-22
Galaxy 33,<a
href="/wiki/List_of_Intelsat_satellites#Galaxy_(Intelsat_Americas,_since_1992)"
title="List of Intelsat satellites">34
Hotbird
13F
Hotbird
13G
<a
href="/wiki/List_of_Intelsat_satellites#Galaxy_(Intelsat_Americas,_since_1992)"
title="List of Intelsat satellites">Galaxy 31,32
Eutelsat 10B
OneWeb
#15
O3b mPOWER 1,2
OneWeb #16
Amazonas
Nexus
OneWeb #17
SES 18,19
Intelsat 40e
O3b mPOWER 3,4
Iridium NEXT 76-80 and OneWeb #19
<a href="/wiki/Arab_Satellite_Communications_Organization#Arabsat-7"
title="Arab Satellite Communications Organization">ArabSat 7B
<a href="/wiki/PT_Pasifik_Satelit_Nusantara#SATRIA" title="PT Pasifik
Satelit Nusantara">SATRIA
<a
href="/wiki/List_of_Intelsat_satellites#Galaxy_(Intelsat_Americas,_since_1992)"
title="List of Intelsat satellites">Galaxy 37
O3b mPOWER 5,6
Ovzon-3
Merah Putih
2
Eutelsat 36D

Galileo FOC FM25,27
WorldView Legion 1,2
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satellites</th><td class="navbox-list-with-group navbox-list navbox-odd" style="width:100%;padding:0">
CASSIOPE
DSCOVR
Jason-3
Formosat-5
TESS
GRACE-FO
SAOCOM 1A
RADARSAT Constellation
SAOCOM 1B
DART
IXPE
Hakuto-R
S6MF
KPLO
SWOT
Euclid
PACE
IM-1
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satellites</th><td class="navbox-list-with-group navbox-list navbox-even" style="width:100%;padding:0">
NROL-76
X-37B OTV-5
Zuma
SES-16 / GovSat-1
Paz
GPS III-01

ANASIS-II
GPS III-03
NROL-108
GPS III-04
GPS III-05
<a href="/wiki/COSMO-SkyMed#COSMO-SkyMed_second_generation_(CSG)"
title="COSMO-SkyMed">COSMO-SkyMed CSG-2
NROL-87
NROL-85 (<a class="mw-redirect" href="/wiki/Intruder_(satellite)"
title="Intruder (satellite)">Intruder 13A/B)
SARah 1
<a href="/wiki/EROS_(satellite)#EROS_NG" title="EROS
(satellite)">EROS-C3
GPS III-06
<a href="/wiki/Space_Development_Agency#Launches" title="Space Development
Agency">Transport and Tracking Layer (Tranche 0, Flight 1)
Transport and Tracking Layer (Tranche 0, Flight 2)
425 Project SAR Satellite
SARah 2/3
USSF-124
425 Project SAR satellite flight 2
<a href="/wiki/Weather_System_Follow-on_Microwave" title="Weather System
Follow-on Microwave">Weather System Follow-on Microwave 1
NROL-146
NROL-69
Spainsat NG
I
SDA Tranche 1 Tracking layer T1TL-B
SDA Tranche 1 Tracking layer T1TL-C
SDA Tranche 1 Tracking layer T1TL-D
425 Project SAR satellite flight 3
SDA Tranche 1 Tracking layer T1TL-E
SDA Tranche 1 Transport layer T1TR-C
USSF-36
USSF-31
Skynet
6A
Spainsat NG
II
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and Starshield launches">List of Starlink and Starshield
launches </td></tr><tr><th class="navbox-group" scope="row"
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2018
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title="SSO-A">SSO-A
<table class="nowraplinks navbox-subgroup" style="border-
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style="width:1%">Transporter</th><td class="navbox-list-with-group navbox-list
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2021
<a href="/wiki/List_of_spaceflight_launches_in_January%E2%80%93June_2021
#SpXTransporter1" title="List of spaceflight launches in January-June
2021">1
<a href="/wiki/List_of_spaceflight_launches_in_January%E2%80%93June_2021#SpX
Transporter2" title="List of spaceflight launches in January-June
2021">2
2022
<a href="/wiki/List_of_spaceflight_launches_in_January%E2%80%93June_2022
#SpXTransporter3" title="List of spaceflight launches in January-June
2022">3
<a href="/wiki/List_of_spaceflight_launches_in_January%E2%80%93June_2022#SpX
Transporter4" title="List of spaceflight launches in January-June
2022">4
<a href="/wiki/List_of_spaceflight_launches_in_January%E2%80%93June_2022#SpX
Transporter5" title="List of spaceflight launches in January-June
2022">5
2023
<a href="/wiki/List_of_spaceflight_launches_in_January%E2%80%93June_2023
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2023">6
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Transporter7" title="List of spaceflight launches in January-June
2023">7
<a href="/wiki/List_of_spaceflight_launches_in_January%E2%80%93June_2023#SpX
Transporter8" title="List of spaceflight launches in January-June
2023">8
<a href="/wiki/List_of_spaceflight_launches_in_July%E2%80%93December_2023#Sp
XTransporter9" title="List of spaceflight launches in July-December
2023">9
2024
<a href="/wiki/List_of_spaceflight_launches_in_January%E2%80%93June_2024
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2024">10
<a href="/wiki/List_of_spaceflight_launches_in_July%E2%80%93December_2024#Sp
XTransporter11" title="List of spaceflight launches in July-December
2024">11
<a href="/wiki/List_of_spaceflight_launches_in_July%E2%80%93December_2024#Sp
XTransporter12" title="List of spaceflight launches in July-December
2024">12
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2024
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</td></tr></tbody></table> </td></tr><tr><th class="navbox-group" scope="row" style="width:1%">Falcon Heavy missions</th><td class="navbox-list-with-group navbox-list navbox-odd" style="width:100%;padding:0">
Test flight
Tesla Roadster
Arabsat-6A
USAF STP-2
DSX
FormoSat-7
LightSail 2
GPIM
DSAC
ISAT
USSF-44
USSF-67
ViaSat-3 Americas
Jupiter-3
Psyche
USSF-52 (X-37B OTV-7)
GOES-U
Europa Clipper
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IFT-1
IFT-2
IFT-3
<a class="mw-redirect" href="/wiki/IFT-4"
title="IFT-4">IFT-4
<a class="mw-redirect" href="/wiki/Polaris_Program" title="Polaris
Program">Polaris Program third flight
<a href="/wiki/DearMoon_project" title="DearMoon
project">dearMoon
two Starship HLS
flights
<a href="/wiki/Superbird-9"
title="Superbird-9">Superbird-9
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<u>Ongoing spaceflights</u> are underlined
Future missions and vehicles under development in italics
Failed missions† are marked with <a href="/wiki/Dagger_(mark)" title="Dagger
(mark)">dagger †
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Spacecraft Qualification Unit">Dragon test flight
<a href="/wiki/SpaceX_COTS_Demo_Flight_1" title="SpaceX COTS Demo Flight
1">COTS-1
<a href="/wiki/SpaceX_COTS_Demo_Flight_2" title="SpaceX COTS Demo Flight
2">COTS-2
Crew
Dragon
<a href="/wiki/Crew_Dragon_Pad_Abort_Test" title="Crew Dragon Pad Abort
Test">Pad Abort Test
<a href="/wiki/Crew_Dragon_Demo-1" title="Crew Dragon
Demo-1">Demo-1
<a href="/wiki/Crew_Dragon_In-Flight_Abort_Test" title="Crew Dragon In-
Flight Abort Test">In-Flight Abort Test
<a href="/wiki/Crew_Dragon_Demo-2" title="Crew Dragon
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CRS-1
CRS-2

CRS-3
CRS-4
CRS-5
CRS-6
CRS-7†
CRS-8
CRS-9
CRS-10
CRS-11
CRS-12
CRS-13
CRS-14
CRS-15
CRS-16
CRS-17
CRS-18
CRS-19
CRS-20
CRS-21
CRS-22
CRS-23
CRS-24
CRS-25
CRS-26
CRS-27
CRS-28
CRS-29
<u>Cygnus
NG-20</u>
CRS-30
Cygnus
NG-21
<a class="mw-redirect" href="/wiki/SpaceX_CRS-31#Cargo_Dragon_flights"
title="SpaceX CRS-31">CRS-31-35
<a class="mw-redirect" href="/wiki/Cygnus_NG-22#Missions" title="Cygnus
NG-22">Cygnus NG-22-25
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<a href="/wiki/Crew_Dragon_Demo-2" title="Crew Dragon
Demo-2">Demo-2
Crew-1
Crew-2
Inspiration4
Crew-3
Axiom-1
Crew-4
Crew-5

Crew-6
Axiom-2
Crew-7
Axiom-3
<u>Crew-8</u>
Crew-9
Polaris
Dawn
<a class="mw-redirect" href="/wiki/SpaceX_Crew-10#Crew_Dragon_Missions"
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satellites</th><td class="navbox-list-with-group
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SES-8
Thaicom 6
Orbcomm OG2 ×
6
AsiaSat 8
AsiaSat 6
ABS-3A / <a
href="/wiki/Eutelsat_115_West_B" title="Eutelsat 115 West B">Eutelsat 115 West
B
<a href="/wiki/T%C3%BCrkmen%C3%84lem_52%C2%B0E_/_MonacoSAT"
title="TürkmenÄlem 52°E / MonacoSAT">TürkmenÄlem 52°E
Orbcomm OG2 ×
11
SES-9
<a class="mw-redirect" href="/wiki/JCSAT-14"
title="JCSAT-14">JCSAT-14
Thaicom 8
ABS-2A / <a class="mw-redirect"
href="/wiki/Eutelsat_117_West_B" title="Eutelsat 117 West B">Eutelsat 117 West
B
JCSAT-16
<a href="/wiki/AMOS-6_(satellite)" title="AMOS-6
(satellite)">AMOS-6†
<a class="mw-redirect" href="/wiki/Iridium_NEXT" title="Iridium
NEXT">Iridium NEXT 1-10
EchoStar
23
SES-10
<a class="mw-redirect" href="/wiki/Inmarsat-5_F4" title="Inmarsat-5
F4">Inmarsat-5 F4
BulgariaSat-1
Iridium NEXT 11-20
Intelsat 35e
Iridium NEXT 21-30

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<li><a href="/wiki/SES-11" title="SES-11">SES-11</a></li>
<li><a href="/wiki/Koreasat_5A" title="Koreasat 5A">Koreasat 5A</a></li>
<li>Iridium NEXT 31-40</li>
<li><a href="/wiki/Hispasat_30W-6" title="Hispasat 30W-6">Hispasat
30W-6</a></li>
<li>Iridium NEXT 41-50</li>
<li><a href="/wiki/Bangabandhu-1" title="Bangabandhu-1">Bangabandhu-1</a></li>
<li>Iridium NEXT 51-55</li>
<li><a href="/wiki/SES-12" title="SES-12">SES-12</a></li>
<li><a href="/wiki/Telstar_19V" title="Telstar 19V">Telstar 19V</a></li>
<li>Iridium NEXT 56-65</li>
<li><a class="mw-redirect" href="/wiki/Telkom_4" title="Telkom 4">Telkom 4</a>
(Merah Putih)</li>
<li><a href="/wiki/Telstar_18V" title="Telstar 18V">Telstar 18V</a></li>
<li><a href="/wiki/Es%27hail_2" title="Es'hail 2">Es'hail 2</a></li>
<li>Iridium NEXT 66-75</li>
<li><a href="/wiki/Nusantara_Satu" title="Nusantara Satu">Nusantara Satu</a> /
<a href="/wiki/Beresheet" title="Beresheet">Beresheet</a></li>
<li><a class="mw-redirect" href="/wiki/Amos_17" title="Amos 17">Amos 17</a></li>
<li><a class="mw-redirect" href="/wiki/JCSAT" title="JCSAT">JCSAT</a>-18</li>
<li><a class="mw-redirect" href="/wiki/Sirius_XM_Holdings#Satellites"
title="Sirius XM Holdings">SXM</a> 7</li>
<li><a href="/wiki/T%C3%BCrksat_5A" title="Türksat 5A">Türksat 5A</a></li>
<li>SXM 8</li>
<li><a href="/wiki/T%C3%BCrksat_5B" title="Türksat 5B">Türksat 5B</a></li>
<li><a class="mw-redirect" href="/wiki/Nilesat-301"
title="Nilesat-301">Nilesat-301</a></li>
<li><a href="/wiki/List_of_SES_satellites#SES_fleet" title="List of SES
satellites">SES-22</a></li>
<li>Galaxy <a href="/wiki/Galaxy_33" title="Galaxy 33">33</a>,<a
href="/wiki/List_of_Intelsat_satellites#Galaxy_(Intelsat_Americas,_since_1992)"
title="List of Intelsat satellites">34</a></li>
<li><a class="mw-redirect" href="/wiki/Hotbird_13F" title="Hotbird 13F">Hotbird
13F</a></li>
<li><a class="mw-redirect" href="/wiki/Hotbird_13G" title="Hotbird 13G">Hotbird
13G</a></li>
<li><a
href="/wiki/List_of_Intelsat_satellites#Galaxy_(Intelsat_Americas,_since_1992)"
title="List of Intelsat satellites">Galaxy 31,32</a></li>
<li><a href="/wiki/Eutelsat" title="Eutelsat">Eutelsat</a> 10B</li>
<li><a class="mw-redirect" href="/wiki/OneWeb" title="OneWeb">OneWeb</a>
#15</li>
<li><a href="/wiki/O3b_mPOWER" title="O3b mPOWER">O3b mPOWER</a> 1,2</li>
<li>OneWeb #16</li>
<li><a href="/wiki/Hispasat#Launched_satellites" title="Hispasat">Amazonas
Nexus</a></li>
<li>OneWeb #17</li>
<li>SES 18,19</li>
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Intelsat 40e
O3b mPOWER 3,4
Iridium NEXT 76-80 and OneWeb #19
<a href="/wiki/Arab_Satellite_Communications_Organization#Arabsat-7"
title="Arab Satellite Communications Organization">ArabSat 7B
<a href="/wiki/PT_Pasifik_Satelit_Nusantara#SATRIA" title="PT Pasifik
Satelit Nusantara">SATRIA
<a
href="/wiki/List_of_Intelsat_satellites#Galaxy_(Intelsat_Americas,_since_1992)"
title="List of Intelsat satellites">Galaxy 37
O3b mPOWER 5,6
Ovzon-3
Merah Putih
2
Eutelsat 36D
<a href="/wiki/List_of_Galileo_satellites" title="List of Galileo
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WorldView Legion
1,2
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Observatory">DSCOVR
Jason-3
Formosat-5
<a href="/wiki/Transiting_Exoplanet_Survey_Satellite" title="Transiting
Exoplanet Survey Satellite">TESS
GRACE-
FO
SAOCOM 1A
<a href="/wiki/RADARSAT_Constellation" title="RADARSAT
Constellation">RADARSAT Constellation
SAOCOM 1B
<a href="/wiki/Double_Asteroid_Redirection_Test" title="Double Asteroid
Redirection Test">DART
<a class="mw-redirect" href="/wiki/Imaging_X-ray_Polarimetry_Explorer"
title="Imaging X-ray Polarimetry Explorer">IXPE
Hakuto-R
<a href="/wiki/Sentinel-6_Michael_Freilich" title="Sentinel-6 Michael
Freilich">S6MF
<a class="mw-redirect" href="/wiki/Korea_Pathfinder_Lunar_Orbiter"
title="Korea Pathfinder Lunar Orbiter">KPLO
<a href="/wiki/Surface_Water_and_Ocean_Topography" title="Surface Water and
Ocean Topography">SWOT
<a href="/wiki/Euclid_(spacecraft)" title="Euclid

(spacecraft)">Euclid
<a href="/wiki/Plankton,_Aerosol,_Cloud,_ocean_Ecosystem" title="Plankton,
Aerosol, Cloud, ocean Ecosystem">PACE
IM-1
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X-37B OTV-5
Zuma
SES-16 / GovSat-1
Paz
GPS
III-01
ANASIS-II
GPS III-03
NROL-108
GPS III-04
GPS III-05
<a href="/wiki/COSMO-SkyMed#COSMO-SkyMed_second_generation_(CSG)"
title="COSMO-SkyMed">COSMO-SkyMed CSG-2
NROL-87
NROL-85 (<a class="mw-redirect" href="/wiki/Intruder_(satellite)"
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SARah 1
<a href="/wiki/EROS_(satellite)#EROS_NG" title="EROS
(satellite)">EROS-C3
GPS III-06
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Agency">Transport and Tracking Layer (Tranche 0, Flight 1)
Transport and Tracking Layer (Tranche 0, Flight 2)
425 Project SAR Satellite
SARah 2/3
USSF-124
425 Project SAR satellite flight 2
<a href="/wiki/Weather_System_Follow-on_Microwave" title="Weather System
Follow-on Microwave">Weather System Follow-on Microwave 1
NROL-146
NROL-69
Spainsat NG
I
SDA Tranche 1 Tracking layer T1TL-B
SDA Tranche 1 Tracking layer T1TL-C
SDA Tranche 1 Tracking layer T1TL-D
425 Project SAR satellite flight 3
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SDA Tranche 1 Transport layer T1TR-C

USSF-36
USSF-31
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2022
<a href="/wiki/List_of_spaceflight_launches_in_January%E2%80%93June_2022
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<a href="/wiki/List_of_spaceflight_launches_in_January%E2%80%93June_2023#SpX
Transporter7" title="List of spaceflight launches in January-June
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<a href="/wiki/List_of_spaceflight_launches_in_January%E2%80%93June_2023#SpX
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9
2024
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11
12
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2024
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2
2022
3
4
5
2023
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2023">6
<a href="/wiki/List_of_spaceflight_launches_in_January%E2%80%93June_2023#SpX
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<a href="/wiki/List_of_spaceflight_launches_in_January%E2%80%93June_2023#SpX
Transporter8" title="List of spaceflight launches in January-June
2023">8
<a href="/wiki/List_of_spaceflight_launches_in_July%E2%80%93December_2023#Sp
XTransporter9" title="List of spaceflight launches in July-December
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2024
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2024
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2024">1
<a href="/wiki/List_of_spaceflight_launches_in_July%E2%80%93December_2024#Sp
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style=";;background:none transparent;border:none;box-shadow:none;padding:0;"
title="View this template">v</abbr>
<li class="nv-talk"><a
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style=";;background:none transparent;border:none;box-shadow:none;padding:0;"
title="Discuss this template">t</abbr>
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title="Special:EditPage/Template:SpaceX"><abbr style=";;background:none
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Falcon 9
Block
5
Falcon Heavy
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development</th><td class="navbox-list-with-group navbox-list navbox-even"
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Starship
Super
Heavy booster
<a href="/wiki/SpaceX_Starship_(spacecraft)" title="SpaceX Starship
(spacecraft)">upper stage
lunar lander
<a class="mw-redirect" href="/wiki/List_of_SpaceX_Starship_flight_tests"
title="List of SpaceX Starship flight tests">flight tests
<a href="/wiki/SpaceX_Starship_integrated_flight_test_1" title="SpaceX
Starship integrated flight test 1">first/<a
href="/wiki/SpaceX_Starship_integrated_flight_test_2" title="SpaceX Starship
integrated flight test 2">second/<a
href="/wiki/SpaceX_Starship_integrated_flight_test_3" title="SpaceX Starship
integrated flight test 3">third orbital test
flights
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Falcon 1
Falcon 9
v1.0
v1.1
"Full
Thrust" v1.2
<a href="/wiki/Falcon_9_Full_Thrust#Block_4" title="Falcon 9 Full
Thrust">Block 4
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Falcon

1e*
Falcon
5*
Falcon
9 Air*
<a href="/wiki/SpaceX_launch_vehicles#BFR_and_ITS" title="SpaceX launch
vehicles">BFR and ITS*
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//upload.wikimedia.org/wikipedia/commons/thumb/3/36/SpaceX-Logo-Xonly.svg/200px-
SpaceX-Logo-Xonly.svg.png 2x" width="100"/> </td></tr><tr><th
class="navbox-group" scope="row" style="width:1%">Spacecraft</th><td
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list-with-group navbox-list navbox-odd" style="width:100%;padding:0"><div
style="padding:0 0.25em">
Dragon 1
Cargo
Dragon 2
Cargo
<a class="mw-redirect" href="/wiki/SpaceX_Dragon_XL" title="SpaceX Dragon
XL">Dragon XL*
<a href="/wiki/SpaceX_Starship" title="SpaceX
Starship">Starship*
</td></tr><tr><th class="navbox-group" scope="row"
style="width:1%">Crewed</th><td class="navbox-list-with-group navbox-list
navbox-even" style="width:100%;padding:0">
Dragon 2
Crew
C206
Endeavour
C207
Resilience
C210
Endurance
C212
Freedom
<a href="/wiki/SpaceX_Starship" title="SpaceX
Starship">Starship*
</td></tr></tbody></table> </td></tr><tr><th class="navbox-

group" scope="row" style="width:1%">Test vehicles</th><td class="navbox-list-
with-group navbox-list navbox-odd hlist" style="width:100%;padding:0"><div
style="padding:0 0.25em"> <table class="nowraplinks navbox-subgroup"
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Starship prototypes
<a href="/wiki/SpaceX_Super_Heavy#Development" title="SpaceX Super
Heavy">first stage booster
<a href="/wiki/SpaceX_Starship_(spacecraft)#Development" title="SpaceX
Starship (spacecraft)">upper stage
</td></tr><tr><th class="navbox-group" scope="row"
style="width:1%">Retired</th><td class="navbox-list-with-group navbox-list
navbox-even" style="width:100%;padding:0">
<a class="mw-redirect" href="/wiki/SpaceX_Grasshopper" title="SpaceX
Grasshopper">Grasshopper
F9R
Dev1†
<a href="/wiki/Dragon_2_DragonFly" title="Dragon 2
DragonFly">DragonFly
<a class="mw-redirect" href="/wiki/Starhopper"
title="Starhopper">Starhopper
</td></tr><tr><th class="navbox-group" scope="row"
style="width:1%">Unflown</th><td class="navbox-list-with-group navbox-list
navbox-odd" style="width:100%;padding:0">
F9R
Dev2*
</td></tr></tbody></table> </td></tr><tr><th class="navbox-
group" scope="row" style="width:1%"><a href="/wiki/SpaceX_rocket_engines"
title="SpaceX rocket engines">Rocket engines</th><td class="navbox-list-
with-group navbox-list navbox-even hlist" style="width:100%;padding:0"><div
style="padding:0 0.25em">
Merlin
1A
1B*
1C
1D
Vacuum
Kestrel
Draco
SuperDraco
Raptor
1
2
3
Vacuum
</td></tr><tr><th class="navbox-group" scope="row" style="width:1%"><a
href="/wiki/Template:SpaceX_missions_and_payloads" title="Template:SpaceX

missions and payloads">Lists of missions</th><td class="navbox-list-with-
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style="padding:0 0.25em">
Falcon
1
Falcon 9 and Falcon Heavy
<a
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title="List of Falcon 9 and Falcon Heavy launches
(2010-2019)">2010-2019
<a class="mw-redirect"
href="/wiki/List_of_Falcon_9_and_Falcon_Heavy_launches_(2020%E2%80%932021)"
title="List of Falcon 9 and Falcon Heavy launches
(2020-2021)">2020-2021
<a href="/wiki/Swarm_Technologies#Satellite_constellation" title="Swarm
Technologies">SpaceBEE
Starlink
<a href="/wiki/List_of_Starlink_and_Starshield_launches" title="List of
Starlink and Starshield launches">launches
<a href="/wiki/Starlink_in_the_Russo-Ukrainian_War" title="Starlink in the
Russo-Ukrainian War">in the Russo-Ukrainian War
<a class="mw-redirect" href="/wiki/List_of_SpaceX_Starship_launches"
title="List of SpaceX Starship launches">Starship
</td></tr><tr><th class="navbox-group" scope="row" style="width:1%"><a
class="mw-redirect" href="/wiki/SpaceX_launch_facilities" title="SpaceX launch
facilities">Launch facilities</th><td class="navbox-list-with-group navbox-
list navbox-odd hlist" style="width:100%;padding:0"><div style="padding:0
0.25em"> <table class="nowraplinks navbox-subgroup" style="border-
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style="width:1%">Orbital</th><td class="navbox-list-with-group navbox-list
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<a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCSFS <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40
KSC <a
href="/wiki/Kennedy_Space_Center_Launch_Complex_39A" title="Kennedy Space Center
Launch Complex 39A">LC-39A
<a href="/wiki/Vandenberg_Space_Force_Base" title="Vandenberg Space Force
Base">VSFB <a href="/wiki/Vandenberg_Space_Launch_Complex_4#SLC-4E"
title="Vandenberg Space Launch Complex 4">SLC-4E
VSFB <a href="/wiki/Vandenberg_Space_Launch_Complex_6" title="Vandenberg
Space Launch Complex 6">SLC-6*
<a href="/wiki/Ronald_Reagan_Ballistic_Missile_Defense_Test_Site"
title="Ronald Reagan Ballistic Missile Defense Test Site">Omelek
Island†
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style="width:1%">Atmospheric</th><td class="navbox-list-with-group navbox-list

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<a class="mw-redirect" href="/wiki/SpaceX_launch_facilities#SpaceX_rocke
t_development_and_test_facility,_McGregor,_Texas" title="SpaceX launch
facilities">McGregor
<a class="mw-redirect" href="/wiki/SpaceX_launch_facilities#SpaceX_high-
altitude_test_facility,_New_Mexico" title="SpaceX launch facilities">New
Mexico†
<a class="mw-redirect" href="/wiki/SpaceX_South_Texas_launch_site"
title="SpaceX South Texas launch site">Starbase
<a href="/wiki/Boca_Chica_Village,_Texas" title="Boca Chica Village,
Texas">Boca Chica
</td></tr></tbody></table> </td></tr><tr><th class="navbox-
group" scope="row" style="width:1%">Landing sites</th><td class="navbox-list-
with-group navbox-list navbox-even hlist" style="width:100%;padding:0"><div
style="padding:0 0.25em">
<a href="/wiki/Autonomous_spaceport_drone_ship" title="Autonomous
spaceport drone ship">Autonomous spaceport drone ships
Landing Zones
LZ-1
and LZ-2
<a class="mw-redirect"
href="/wiki/Vandenberg_Air_Force_Base_Space_Launch_Complex_4#LZ-4"
title="Vandenberg Air Force Base Space Launch Complex
4">LZ-4
</td></tr><tr><th class="navbox-group" scope="row" style="width:1%">Other
facilities</th><td class="navbox-list-with-group navbox-list navbox-odd hlist"
style="width:100%;padding:0">
<a href="/wiki/SpaceX#Headquarters,_mission_control,_manufacturing,_and_
refurbishment_facilities" title="SpaceX">Headquarters and factory
<a href="/wiki/Hawthorne,_California" title="Hawthorne,
California">Hawthorne, California
<a class="mw-redirect" href="/wiki/SpaceX_launch_facilities#SpaceX_Rocket_De
velopment_and_Test_Facility,_McGregor,_Texas" title="SpaceX launch
facilities">Rocket development and test facility
McGregor,
Texas
<a class="mw-redirect" href="/wiki/SpaceX_satellite_development_facility"
title="SpaceX satellite development facility">Satellite development facility
Redmond,
Washington
Regional offices
Chantilly, Houston, Seattle, Washington DC
STARGATE
</td></tr><tr><th class="navbox-group" scope="row"
style="width:1%">Support</th><td class="navbox-list-with-group navbox-list
navbox-even hlist" style="width:100%;padding:0">
Megan
(recovery ship)

Shannon
(recovery ship)
<a href="/wiki/SpaceX_fairing_recovery_program" title="SpaceX fairing
recovery program">SpaceX fairing recovery program
</td></tr><tr><th class="navbox-group" scope="row"
style="width:1%">Contracts</th><td class="navbox-list-with-group navbox-list
navbox-odd hlist" style="width:100%;padding:0">
<a href="/wiki/Commercial_Orbital_Transportation_Services"
title="Commercial Orbital Transportation Services">Commercial Orbital
Transportation Services
<a href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">Commercial Resupply Services
<a href="/wiki/Commercial_Crew_Program" title="Commercial Crew
Program">Commercial Crew Program
<a href="/wiki/Commercial_Lunar_Payload_Services" title="Commercial Lunar
Payload Services">Commercial Lunar Payload Services
<a href="/wiki/Gateway_Logistics_Services" title="Gateway Logistics
Services">Gateway Logistics Services
Human Landing
System
Polaris
Rocket Cargo
<a href="/wiki/SpaceX_Starshield" title="SpaceX
Starshield">Starshield
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style="width:1%">R&D programs</th><td class="navbox-list-with-group navbox-
list navbox-even hlist" style="width:100%;padding:0"><div style="padding:0
0.25em">
<a href="/wiki/SpaceX_reusable_launch_system_development_program"
title="SpaceX reusable launch system development program">Reusability
<a href="/wiki/Falcon_9_first-stage_landing_tests" title="Falcon 9 first-
stage landing tests">Falcon 9 landing tests
Red Dragon
(canceled)
<a class="mw-redirect" href="/wiki/SpaceX_Mars_program" title="SpaceX Mars
program">Mars transport
</td></tr><tr><th class="navbox-group" scope="row" style="width:1%">Key
people</th><td class="navbox-list-with-group navbox-list navbox-odd hlist"
style="width:100%;padding:0">
Elon Musk (CEO,
CTO)
Gwynne Shotwell
(President and COO)
Tom Mueller (former VP
of Propulsion Development)
</td></tr><tr><th class="navbox-group" scope="row"
style="width:1%">Related</th><td class="navbox-list-with-group navbox-list
navbox-even hlist" style="width:100%;padding:0">

Blue Origin v. United States & SpaceX
Commercial astronaut
Billionaire space race
Countdown: Inspiration4 Mission to Space (2021 docuseries)
Return to Space (2022)
</td></tr><tr><td class="navbox-abovebelow" colspan="3"> * denotes unflown vehicles or engines, and future missions or sites. † denotes failed missions, destroyed vehicles, and abandoned sites.
  Category </td></tr></tbody></table>, <table class="nowraplinks navbox-subgroup" style="border-spacing:0"><tbody><tr><th class="navbox-group" scope="row" style="width:1%">Current</th><td class="navbox-list-with-group navbox-list navbox-odd" style="width:100%;padding:0">
Falcon 9
Block 5
Falcon Heavy
</td></tr><tr><th class="navbox-group" scope="row" style="width:1%">In development</th><td class="navbox-list-with-group navbox-list navbox-even" style="width:100%;padding:0">
Starship
Super Heavy booster
upper stage
lunar lander
flight tests
first/second/<a

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href="/wiki/SpaceX_Starship_integrated_flight_test_3" title="SpaceX Starship
integrated flight test 3">third</a> orbital test
flights</li></ul></li></ul></li></ul>
</div></td></tr><tr><th class="navbox-group" scope="row"
style="width:1%">Retired</th><td class="navbox-list-with-group navbox-list
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<ul><li><a href="/wiki/Falcon_1" title="Falcon 1">Falcon 1</a></li>
<li>Falcon 9
<ul><li><a href="/wiki/Falcon_9_v1.0" title="Falcon 9 v1.0">v1.0</a></li>
<li><a href="/wiki/Falcon_9_v1.1" title="Falcon 9 v1.1">v1.1</a></li>
<li><a href="/wiki/Falcon_9_Full_Thrust" title="Falcon 9 Full Thrust">"Full
Thrust" v1.2</a></li>
<li><a href="/wiki/Falcon_9_Full_Thrust#Block_4" title="Falcon 9 Full
Thrust">Block 4</a></li></ul></li></ul>
</div></td></tr><tr><th class="navbox-group" scope="row"
style="width:1%">Cancelled</th><td class="navbox-list-with-group navbox-list
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1e</a>*</li>
<li><a class="mw-redirect" href="/wiki/Falcon_5" title="Falcon 5">Falcon
5</a>*</li>
<li><a class="mw-redirect" href="/wiki/Falcon_9_Air" title="Falcon 9 Air">Falcon
9 Air</a>*</li>
<li><a href="/wiki/SpaceX_launch_vehicles#BFR_and_ITS" title="SpaceX launch
vehicles">BFR and ITS</a>*</li></ul>
</div></td></tr></tbody></table>, <table class="nowraplinks navbox-subgroup"
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style="width:1%">Cargo</th><td class="navbox-list-with-group navbox-list navbox-
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<ul><li><a href="/wiki/SpaceX_Dragon_1" title="SpaceX Dragon 1">Dragon 1
Cargo</a></li>
<li><a href="/wiki/SpaceX_Dragon_2" title="SpaceX Dragon 2">Dragon 2
Cargo</a></li>
<li><a class="mw-redirect" href="/wiki/SpaceX_Dragon_XL" title="SpaceX Dragon
XL">Dragon XL</a>*</li>
<li><a href="/wiki/SpaceX_Starship" title="SpaceX
Starship">Starship</a>*</li></ul>
</div></td></tr><tr><th class="navbox-group" scope="row"
style="width:1%">Crewed</th><td class="navbox-list-with-group navbox-list
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<ul><li><a href="/wiki/SpaceX_Dragon_2" title="SpaceX Dragon 2">Dragon 2
Crew</a>
<ul><li><a href="/wiki/Crew_Dragon_Endeavour" title="Crew Dragon Endeavour">C206
<i>Endeavour</i></a></li>
<li><a href="/wiki/Crew_Dragon_Resilience" title="Crew Dragon Resilience">C207
<i>Resilience</i></a></li>
<li><a href="/wiki/Crew_Dragon_Endurance" title="Crew Dragon Endurance">C210
<i>Endurance</i></a></li>
```

C212
Freedom
<a href="/wiki/SpaceX_Starship" title="SpaceX
Starship">Starship*
</td></tr></tbody></table>, <table class="nowraplinks navbox-subgroup"
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Starship prototypes
<a href="/wiki/SpaceX_Super_Heavy#Development" title="SpaceX Super
Heavy">first stage booster
<a href="/wiki/SpaceX_Starship_(spacecraft)#Development" title="SpaceX
Starship (spacecraft)">upper stage
</td></tr><tr><th class="navbox-group" scope="row"
style="width:1%">Retired</th><td class="navbox-list-with-group navbox-list
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Grasshopper">Grasshopper
F9R
Dev1†
<a href="/wiki/Dragon_2_DragonFly" title="Dragon 2
DragonFly">DragonFly
<a class="mw-redirect" href="/wiki/Starhopper"
title="Starhopper">Starhopper
</td></tr><tr><th class="navbox-group" scope="row"
style="width:1%">Unflown</th><td class="navbox-list-with-group navbox-list
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F9R
Dev2*
</td></tr></tbody></table>, <table class="nowraplinks navbox-subgroup"
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Space Force Station">CCSFS <a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40
KSC <a
href="/wiki/Kennedy_Space_Center_Launch_Complex_39A" title="Kennedy Space Center
Launch Complex 39A">LC-39A
<a href="/wiki/Vandenberg_Space_Force_Base" title="Vandenberg Space Force
Base">VSFB <a href="/wiki/Vandenberg_Space_Launch_Complex_4#SLC-4E"
title="Vandenberg Space Launch Complex 4">SLC-4E
VSFB <a href="/wiki/Vandenberg_Space_Launch_Complex_6" title="Vandenberg
Space Launch Complex 6">SLC-6*
<a href="/wiki/Ronald_Reagan_Ballistic_Missile_Defense_Test_Site"
title="Ronald Reagan Ballistic Missile Defense Test Site">Omelek
Island†

</td></tr><tr><th class="navbox-group" scope="row"
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<a class="mw-redirect" href="/wiki/SpaceX_launch_facilities#SpaceX_rocke
t_development_and_test_facility,_McGregor,_Texas" title="SpaceX launch
facilities">McGregor
<a class="mw-redirect" href="/wiki/SpaceX_launch_facilities#SpaceX_high-
altitude_test_facility,_New_Mexico" title="SpaceX launch facilities">New
Mexico†
<a class="mw-redirect" href="/wiki/SpaceX_South_Texas_launch_site"
title="SpaceX South Texas launch site">Starbase
<a href="/wiki/Boca_Chica_Village,_Texas" title="Boca Chica Village,
Texas">Boca Chica
</td></tr></tbody></table>, <table class="nowraplinks hlist mw-collapsible
autocollapse navbox-inner" style="border-
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data:TemplateStyles:r1063604349" rel="mw-deduplicated-inline-style"/><div
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transparent;border:none;box-shadow:none;padding:0;" title="View this
template">v</abbr>
<li class="nv-talk"><a
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talk:Spaceflight lists and timelines"><abbr style=";;background:none
transparent;border:none;box-shadow:none;padding:0;" title="Discuss this
template">t</abbr>
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style=";;background:none transparent;border:none;box-shadow:none;padding:0;"
title="Edit this template">e</abbr> <div
id="Spaceflight_lists_and_timelines" style="font-size:114%;margin:0 4em"><a
href="/wiki/Spaceflight" title="Spaceflight">Spaceflight lists and
timelines </th></tr><tr><td class="navbox-abovebelow" colspan="2">
<a href="/wiki/Timeline_of_spaceflight" title="Timeline of
spaceflight">Timeline of spaceflight
</td></tr><tr><th class="navbox-group" scope="row"
style="width:1%">General</th><td class="navbox-list-with-group navbox-list
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Space
exploration
<a href="/wiki/Outline_of_space_exploration" title="Outline of space
exploration">outline
<a href="/wiki/Timeline_of_space_exploration" title="Timeline of space
exploration">timeline
<a class="mw-redirect" href="/wiki/Lists_of_spacecraft" title="Lists of
spacecraft">Spacecraft

Spaceflight records
Space Race
Rocket and missile technology
</td></tr><tr><th class="navbox-group" scope="row" style="width:1%">Human spaceflight</th><td class="navbox-list-with-group navbox-list navbox-odd" style="width:100%;padding:0"> <table class="nowraplinks navbox-subgroup" style="border-spacing:0"><tbody><tr><th class="navbox-group" scope="row" style="width:1%">General</th><td class="navbox-list-with-group navbox-list navbox-even" style="width:100%;padding:0">
Crewed spacecraft
timeline
by program
Spaceflights
1961-1970
1971-1980
1981-1990
1991-2000
2001-2010
2011-2020
2021-present
Soviet
Russian
Vostok and Voskhod
Soyuz
Mercury
Gemini
Apollo

Skylab
<a href="/wiki/China_Manned_Space_Program" title="China Manned Space
Program">Shenzhou
<a href="/wiki/Indian_Human_Spaceflight_Programme" title="Indian Human
Spaceflight Programme">Gaganyaan
Spacelab
<a href="/wiki/List_of_Artemis_missions" title="List of Artemis
missions">Artemis
Civilian spaceflight
<a href="/wiki/List_of_fully_civilian_crewed_orbital_spaceflights"
title="List of fully civilian crewed orbital spaceflights">Orbital
<a href="/wiki/List_of_fully_civilian_crewed_suborbital_spaceflights"
title="List of fully civilian crewed suborbital
spaceflights">Suborbital
</td></tr><tr><th class="navbox-group" scope="row" style="width:1%"><a
href="/wiki/Salyut_programme" title="Salyut programme">Salyut</th><td
class="navbox-list-with-group navbox-list navbox-odd"
style="width:100%;padding:0">
<a href="/wiki/List_of_Salyut_expeditions" title="List of Salyut
expeditions">Expeditions
Spaceflights
<a href="/wiki/List_of_human_spaceflights_to_Salyut_space_stations"
title="List of human spaceflights to Salyut space stations">crewed
<a href="/wiki/List_of_uncrewed_spaceflights_to_Salyut_space_stations"
title="List of uncrewed spaceflights to Salyut space
stations">uncrewed
<a href="/wiki/List_of_Salyut_spacewalks" title="List of Salyut
spacewalks">Spacewalks
<a href="/wiki/List_of_Salyut_visitors" title="List of Salyut
visitors">Visitors
</td></tr><tr><th class="navbox-group" scope="row" style="width:1%"><a
href="/wiki/Mir" title="Mir">Mir</th><td class="navbox-list-with-group
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0.25em">
<a href="/wiki/List_of_Mir_expeditions" title="List of Mir
expeditions">Expeditions
<a href="/wiki/List_of_ESA_space_expeditions" title="List of ESA space
expeditions">ESA
Spaceflights
<a href="/wiki/List_of_human_spaceflights_to_Mir" title="List of human
spaceflights to Mir">crewed
<a href="/wiki/List_of_uncrewed_spaceflights_to_Mir" title="List of uncrewed
spaceflights to Mir">uncrewed
<a href="/wiki/List_of_Mir_spacewalks" title="List of Mir
spacewalks">Spacewalks
<a href="/wiki/List_of_Mir_visitors" title="List of Mir
visitors">Visitors
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```
href="/wiki/International_Space_Station" title="International Space
Station">ISS</a></th><td class="navbox-list-with-group navbox-list navbox-odd"
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<ul><li><a href="/wiki/List_of_ESA_space_expeditions" title="List of ESA space
expeditions">ESA</a></li>
<li><a
href="/wiki/List_of_visiting_expeditions_to_the_International_Space_Station"
title="List of visiting expeditions to the International Space
Station">Visiting</a></li></ul></li>
<li>Spaceflights
<ul><li><a
href="/wiki/List_of_human_spaceflights_to_the_International_Space_Station"
title="List of human spaceflights to the International Space
Station">crewed</a></li>
<li><a href="/wiki/Uncrewed_spaceflights_to_the_International_Space_Station"
title="Uncrewed spaceflights to the International Space
Station">uncrewed</a></li></ul></li>
<li><a href="/wiki/List_of_International_Space_Station_spacewalks" title="List
of International Space Station spacewalks">Spacewalks</a></li>
<li><a href="/wiki/List_of_visitors_to_the_International_Space_Station"
title="List of visitors to the International Space Station">Visitors</a></li>
<li><a
href="/wiki/List_of_spacecraft_deployed_from_the_International_Space_Station"
title="List of spacecraft deployed from the International Space
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of Tiangong Space Station expeditions">Expeditions</a></li>
<li><a href="/wiki/List_of_human_spaceflights_to_the_Tiangong_space_station"
title="List of human spaceflights to the Tiangong space station">Crewed
Spaceflights</a></li>
<li><a href="/wiki/List_of_Tiangong_space_station_spacewalks" title="List of
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crews">Crews</a></li>
<li><a href="/wiki/List_of_Space_Shuttle_missions" title="List of Space Shuttle
missions">Missions</a></li>
<li><a href="/wiki/List_of_Space_Shuttle_rollbacks" title="List of Space Shuttle
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<ul><li><a href="/wiki/List_of_astronauts_by_name" title="List of astronauts by
name">by name</a></li>
<li><a href="/wiki/List_of_astronauts_by_year_of_selection" title="List of
astronauts by year of selection">by year of selection</a></li>
<li><a href="/wiki/List_of_Apollo_astronauts" title="List of Apollo
astronauts">Apollo</a></li>
<li><a href="/wiki/List_of_Gemini_astronauts" title="List of Gemini
astronauts">Gemini</a></li>
<li><a href="/wiki/Mercury_Seven#Group_members" title="Mercury
Seven">Mercury</a></li>
<li><a href="/wiki/List_of_Chinese_astronauts" title="List of Chinese
astronauts">Chinese</a></li>
<li><a href="/wiki/List_of_Asian_astronauts" title="List of Asian
astronauts">Asian</a></li>
<li><a href="/wiki/List_of_European_astronauts" title="List of European
astronauts">European</a></li>
<li><a href="/wiki/List_of_cosmonauts" title="List of
cosmonauts">Cosmonauts</a></li>
<li><a href="/wiki/List_of_women_astronauts" title="List of women
astronauts">women</a></li>
<li><a href="/wiki/List_of_Muslim_astronauts" title="List of Muslim
astronauts">Muslim</a></li>
<li><a href="/wiki/List_of_Arab_astronauts" title="List of Arab
astronauts">Arab</a></li>
<li><a href="/wiki/List_of_African-American_astronauts" title="List of African-
American astronauts">African American</a></li>
<li><a href="/wiki/List_of_Ibero-American_spacefarers" title="List of Ibero-
American spacefarers">Ibero-America</a></li></ul></li>
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scientists">Space scientists</a></li>
<li>Space travelers
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title="List of space travelers by name">by name</a></li>
<li><a href="/wiki/List_of_space_travellers_by_first_flight" title="List of
space travellers by first flight">by first flight</a></li>
<li><a href="/wiki/List_of_space_travelers_by_nationality" title="List of space
travelers by nationality">by nationality</a></li>
<li><a href="/wiki/List_of_billionaire_spacetravellers" title="List of
billionaire spacetravellers">billionaires</a></li>
<li><a href="/wiki/Timeline_of_space_travel_by_nationality" title="Timeline of
space travel by nationality">timeline by nationality</a></li></ul></li>
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title="List of spaceflight-related accidents and incidents">Spaceflight-related
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human fatalities
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title="List of spacewalks and moonwalks 1965-1999">1965-1999
<a href="/wiki/List_of_spacewalks_2000%E2%80%932014" title="List of
spacewalks 2000-2014">2000-2014
<a href="/wiki/List_of_spacewalks_since_2015" title="List of spacewalks
since 2015">2015-present
<a href="/wiki/List_of_cumulative_spacewalk_records" title="List of
cumulative spacewalk records">Cumulative spacewalk records
<a href="/wiki/List_of_longest_spacewalks" title="List of longest
spacewalks">Longest spacewalks
<a href="/wiki/List_of_spacewalkers" title="List of
spacewalkers">Spacewalkers
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Solar System exploration">Timeline
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voyages">Interplanetary voyages
<a href="/wiki/List_of_landings_on_extraterrestrial_bodies" title="List of
landings on extraterrestrial bodies">Landings on other planets
<a href="/wiki/List_of_rovers_on_extraterrestrial_bodies" title="List of
rovers on extraterrestrial bodies">rovers
<a href="/wiki/List_of_artificial_objects_on_extraterrestrial_surfaces"
title="List of artificial objects on extraterrestrial surfaces">artificial
objects
<a href="/wiki/List_of_objects_at_Lagrange_points" title="List of objects at
Lagrange points">Objects at Lagrange points
<a href="/wiki/List_of_Solar_System_probes" title="List of Solar System
probes">Probes
<a href="/wiki/List_of_active_Solar_System_probes" title="List of active
Solar System probes">active
<a href="/wiki/List_of_extraterrestrial_orbiters" title="List of
extraterrestrial orbiters">orbiters
<a href="/wiki/List_of_artificial_objects_leaving_the_Solar_System"
title="List of artificial objects leaving the Solar System">leaving the Solar
System
lunar
probes
<a href="/wiki/List_of_missions_to_the_Moon" title="List of missions to the

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Moon">Missions to the Moon</a></li>
<li><a href="/wiki/Timeline_of_artificial_satellites_and_space_probes"
title="Timeline of artificial satellites and space probes">Timeline of
satellites</a></li>
<li><a href="/wiki/Sample-return_mission" title="Sample-return mission">Sample-
return mission</a>
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mission">Mars</a></li></ul></li></ul>
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orbiting<br/>satellites</a></th><td class="navbox-list-with-group navbox-list
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communications satellite firsts">Communications satellite firsts</a></li>
<li><a href="/wiki/CubeSat" title="CubeSat">CubeSats</a></li>
<li><a href="/wiki/PocketQube" title="PocketQube">PocketQube</a></li>
<li><a href="/wiki/List_of_Earth_observation_satellites" title="List of Earth
observation satellites">Earth observation satellites</a>
<ul><li><a href="/wiki/Timeline_of_first_Earth_observation_satellites"
title="Timeline of first Earth observation satellites">Timeline of first Earth
observation satellites</a></li></ul></li>
<li><a href="/wiki/List_of_satellites_in_geosynchronous_orbit" title="List of
satellites in geosynchronous orbit">Geosynchronous orbit</a></li>
<li><a href="/wiki/List_of_GOES_satellites" title="List of GOES
satellites">GOES</a></li>
<li><a href="/wiki/List_of_GPS_satellites" title="List of GPS
satellites">GPS</a></li>
<li><a href="/wiki/List_of_Kosmos_satellites" title="List of Kosmos
satellites">Kosmos</a></li>
<li>Magnetospheric</li>
<li><a href="/wiki/List_of_NRO_launches" title="List of NRO
launches">NRO</a></li>
<li><a href="/wiki/List_of_TDRS_satellites" title="List of TDRS
satellites">TDRS</a></li>
<li><a href="/wiki/List_of_USA_satellites" title="List of USA
satellites">USA</a></li></ul>
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launch systems">Orbital launch systems</a>
<ul><li><a href="/wiki/Comparison_of_orbital_launch_systems" title="Comparison
of orbital launch systems">Comparison</a></li></ul></li>
<li><a href="/wiki/List_of_sounding_rockets" title="List of sounding
rockets">Sounding rocket list</a></li>
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spacecraft">crewed</a></li>
<li><a href="/wiki/List_of_heaviest_spacecraft" title="List of heaviest
spacecraft">heaviest</a></li></ul></li>
<li><a href="/wiki/List_of_rocket_stages" title="List of rocket stages">Upper
stages</a></li>
<li><a href="/wiki/Sounding_rocket" title="Sounding rocket">Sounding
rocket</a></li>
<li><a href="/wiki/Small-lift_launch_vehicle" title="Small-lift launch
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<li><a href="/wiki/Medium-lift_launch_vehicle" title="Medium-lift launch
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<li><a href="/wiki/Heavy-lift_launch_vehicle" title="Heavy-lift launch
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<li><a href="/wiki/Super_heavy-lift_launch_vehicle" title="Super heavy-lift
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<li><a href="/wiki/List_of_Antares_launches" title="List of Antares
launches">Antares</a></li>
<li><a href="/wiki/List_of_Atlas_launches" title="List of Atlas
launches">Atlas</a></li>
<li><a href="/wiki/List_of_Atlas_LV3B_launches" title="List of Atlas LV3B
launches">Atlas LV3B</a></li>
<li><a href="/wiki/List_of_Atlas_LV3C_launches" title="List of Atlas LV3C
launches">Atlas LV3C</a></li>
<li><a href="/wiki/List_of_Black_Brant_launches" title="List of Black Brant
launches">Black Brant</a></li>
<li><a href="/wiki/List_of_Electron_launches" title="List of Electron
launches">Electron</a></li>
<li><a href="/wiki/List_of_Delta_DM-19_launches" title="List of Delta DM-19
launches">Delta DM-19</a></li>
<li><a href="/wiki/List_of_Delta_1_launches" title="List of Delta 1
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<li><a href="/wiki/List_of_Delta_II_launches" title="List of Delta II
launches">Delta II</a></li>
<li><a href="/wiki/List_of_Delta_III_launches" title="List of Delta III
launches">Delta III</a></li>
<li><a href="/wiki/List_of_Delta_IV_Heavy_launches" title="List of Delta IV
Heavy launches">Delta IV Heavy</a></li>
<li><a href="/wiki/List_of_Delta_IV_Medium_launches" title="List of Delta IV
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Falcon 9 and Heavy
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(2010-2019)">2010-2019
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launches">GSLV
<a href="/wiki/List_of_H-II_series_and_H3_launches" title="List of H-II
series and H3 launches">H-II and H3
<a href="/wiki/List_of_Kosmos_launches" title="List of Kosmos
launches">Kosmos
<a href="/wiki/List_of_Long_March_launches" title="List of Long March
launches">Long March
<a href="/wiki/Minotaur_(rocket_family)" title="Minotaur (rocket
family)">Minotaur
<a href="/wiki/List_of_Proton_launches" title="List of Proton
launches">Proton
<a href="/wiki/List_of_PSLV_launches" title="List of PSLV
launches">PSLV
R-7
(including Semyorka, Molniya, Vostok, Voskhod and Soyuz)
<a href="/wiki/List_of_Scout_launches" title="List of Scout
launches">Scout
<a href="/wiki/List_of_Space_Launch_System_launches" title="List of Space
Launch System launches">SLS
<a href="/wiki/SpaceX_Starship_flight_tests" title="SpaceX Starship flight
tests">Starship
<a href="/wiki/List_of_Thor_and_Delta_launches" title="List of Thor and
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<a href="/wiki/List_of_Thor-Agena_launches" title="List of Thor-Agena
launches">Thor-Agena
<a href="/wiki/List_of_Thor-Able_launches" title="List of Thor-Able
launches">Thor DM-18 Able
<a href="/wiki/List_of_Thor_DM-18_Agena-A_launches" title="List of Thor
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launches">Thor DM-18
<a href="/wiki/List_of_Thor_DM-21_Agena-B_launches" title="List of Thor
DM-21 Agena-B launches">Thor DM-21 Agena-B
<a href="/wiki/List_of_Titan_launches" title="List of Titan
launches">Titan
<a href="/wiki/List_of_Tsyklon_launches" title="List of Tsyklon

launches">Tsyklon
<a href="/wiki/List_of_V-2_test_launches" title="List of V-2 test
launches">V-2 tests
<a href="/wiki/List_of_Vega_launches" title="List of Vega
launches">Vega
<a href="/wiki/List_of_Vulcan_launches" title="List of Vulcan
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and facilities</th><td class="navbox-
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<a href="/wiki/Comparison_of_communication_satellite_operators"
title="Comparison of communication satellite
operators">comparison
<a href="/wiki/List_of_private_spaceflight_companies" title="List of private
spaceflight companies">Private spaceflight companies
<a href="/wiki/List_of_rocket_launch_sites" title="List of rocket launch
sites">Rocket launch sites
<a href="/wiki/List_of_government_space_agencies" title="List of government
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<a href="/wiki/List_of_spacecraft_manufacturers" title="List of spacecraft
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country
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satellites by country">First satellites by country
NASA
missions
<a href="/wiki/List_of_Constellation_missions" title="List of
Constellation missions">Constellation missions
<a href="/wiki/Timeline_of_first_images_of_Earth_from_space" title="Timeline
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Timeline of longest spaceflights
Timeline of private spaceflight
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Crewed spacecraft
timeline
by program
Spaceflights
1961-1970
1971-1980
1981-1990
1991-2000
2001-2010
2011-2020
2021-present
Soviet
Russian
Vostok and Voskhod
Soyuz
Mercury
Gemini
Apollo
Skylab
Shenzhou
Gaganyaan
Spacelab

<a href="/wiki/List_of_Artemis_missions" title="List of Artemis
missions">Artemis
Civilian spaceflight
<a href="/wiki/List_of_fully_civilian_crewed_orbital_spaceflights"
title="List of fully civilian crewed orbital spaceflights">Orbital
<a href="/wiki/List_of_fully_civilian_crewed_suborbital_spaceflights"
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spaceflights">Suborbital
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expeditions">Expeditions
Spaceflights
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title="List of human spaceflights to Salyut space stations">crewed
<a href="/wiki/List_of_uncrewed_spaceflights_to_Salyut_space_stations"
title="List of uncrewed spaceflights to Salyut space
stations">uncrewed
<a href="/wiki/List_of_Salyut_spacewalks" title="List of Salyut
spacewalks">Spacewalks
<a href="/wiki/List_of_Salyut_visitors" title="List of Salyut
visitors">Visitors
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expeditions">ESA
Spaceflights
<a href="/wiki/List_of_human_spaceflights_to_Mir" title="List of human
spaceflights to Mir">crewed
<a href="/wiki/List_of_uncrewed_spaceflights_to_Mir" title="List of uncrewed
spaceflights to Mir">uncrewed
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title="List of International Space Station expeditions">Expeditions
<a href="/wiki/List_of_ESA_space_expeditions" title="List of ESA space

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expeditions">ESA</a></li>
<li><a
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Station">Visiting</a></li></ul></li>
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<ul><li><a
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title="List of human spaceflights to the International Space
Station">crewed</a></li>
<li><a href="/wiki/Uncrewed_spaceflights_to_the_International_Space_Station"
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<li><a href="/wiki/List_of_International_Space_Station_spacewalks" title="List
of International Space Station spacewalks">Spacewalks</a></li>
<li><a href="/wiki/List_of_visitors_to_the_International_Space_Station"
title="List of visitors to the International Space Station">Visitors</a></li>
<li><a
href="/wiki/List_of_spacecraft_deployed_from_the_International_Space_Station"
title="List of spacecraft deployed from the International Space
Station">Deployed</a></li></ul>
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<li><a href="/wiki/List_of_human_spaceflights_to_the_Tiangong_space_station"
title="List of human spaceflights to the Tiangong space station">Crewed
Spaceflights</a></li>
<li><a href="/wiki/List_of_Tiangong_space_station_spacewalks" title="List of
Tiangong space station spacewalks">Spacewalks</a></li></ul>
</div></td></tr><tr><th class="navbox-group" scope="row" style="width:1%"><a
href="/wiki/Space_Shuttle" title="Space Shuttle">Shuttle</a></th><td
class="navbox-list-with-group navbox-list navbox-odd"
style="width:100%;padding:0"><div style="padding:0 0.25em">
<ul><li><a href="/wiki/List_of_Space_Shuttle_crews" title="List of Space Shuttle
crews">Crews</a></li>
<li><a href="/wiki/List_of_Space_Shuttle_missions" title="List of Space Shuttle
missions">Missions</a></li>
<li><a href="/wiki/List_of_Space_Shuttle_rollbacks" title="List of Space Shuttle
rollbacks">Rollbacks</a></li></ul>
</div></td></tr><tr><th class="navbox-group" scope="row"
style="width:1%">People</th><td class="navbox-list-with-group navbox-list
navbox-even" style="width:100%;padding:0"><div style="padding:0 0.25em">
<ul><li><a href="/wiki/Lists_of_astronauts" title="Lists of
astronauts">Astronauts</a>
<ul><li><a href="/wiki/List_of_astronauts_by_name" title="List of astronauts by
```

name">by name
<a href="/wiki/List_of_astronauts_by_year_of_selection" title="List of
astronauts by year of selection">by year of selection
<a href="/wiki/List_of_Apollo_astronauts" title="List of Apollo
astronauts">Apollo
<a href="/wiki/List_of_Gemini_astronauts" title="List of Gemini
astronauts">Gemini
<a href="/wiki/Mercury_Seven#Group_members" title="Mercury
Seven">Mercury
<a href="/wiki/List_of_Chinese_astronauts" title="List of Chinese
astronauts">Chinese
<a href="/wiki/List_of_Asian_astronauts" title="List of Asian
astronauts">Asian
<a href="/wiki/List_of_European_astronauts" title="List of European
astronauts">European
<a href="/wiki/List_of_cosmonauts" title="List of
cosmonauts">Cosmonauts
<a href="/wiki/List_of_women_astronauts" title="List of women
astronauts">women
<a href="/wiki/List_of_Muslim_astronauts" title="List of Muslim
astronauts">Muslim
<a href="/wiki/List_of_Arab_astronauts" title="List of Arab
astronauts">Arab
<a href="/wiki/List_of_African-American_astronauts" title="List of African-
American astronauts">African American
<a href="/wiki/List_of_Ibero-American_spacefarers" title="List of Ibero-
American spacefarers">Ibero-America
<a href="/wiki/Lists_of_space_scientists" title="Lists of space
scientists">Space scientists
Space travelers
<a class="mw-redirect" href="/wiki/List_of_space_travelers_by_name"
title="List of space travelers by name">by name
<a href="/wiki/List_of_space_travellers_by_first_flight" title="List of
space travellers by first flight">by first flight
<a href="/wiki/List_of_space_travelers_by_nationality" title="List of space
travelers by nationality">by nationality
<a href="/wiki/List_of_billionaire_spacetravellers" title="List of
billionaire spacetravellers">billionaires
<a href="/wiki/Timeline_of_space_travel_by_nationality" title="Timeline of
space travel by nationality">timeline by nationality
<a href="/wiki/List_of_spaceflight-related_accidents_and_incidents"
title="List of spaceflight-related accidents and incidents">Spaceflight-related
human fatalities
</td></tr><tr><th class="navbox-group" scope="row" style="width:1%"><a
href="/wiki/Extravehicular_activity" title="Extravehicular
activity">EVA</th><td class="navbox-list-with-group navbox-list navbox-odd"
style="width:100%;padding:0">
<a href="/wiki/List_of_spacewalks_and_moonwalks_1965%E2%80%931999"

```
title="List of spacewalks and moonwalks 1965-1999">1965-1999</a></li>
<li><a href="/wiki/List_of_spacewalks_2000%E2%80%932014" title="List of
spacewalks 2000-2014">2000-2014</a></li>
<li><a href="/wiki/List_of_spacewalks_since_2015" title="List of spacewalks
since 2015">2015-present</a></li>
<li><a href="/wiki/List_of_cumulative_spacewalk_records" title="List of
cumulative spacewalk records">Cumulative spacewalk records</a></li>
<li><a href="/wiki/List_of_longest_spacewalks" title="List of longest
spacewalks">Longest spacewalks</a></li>
<li><a href="/wiki/List_of_spacewalkers" title="List of
spacewalkers">Spacewalkers</a></li></ul>
</div></td></tr></tbody></table>]
```

[9]:
```
# Let's print the third table and check its content
first_launch_table = html_tables[2]
print(first_launch_table)
```

```
<table class="wikitable plainrowheaders collapsible" style="width: 100%;">
<tbody><tr>
<th scope="col">Flight No.
</th>
<th scope="col">Date and<br/>time (<a href="/wiki/Coordinated_Universal_Time"
title="Coordinated Universal Time">UTC</a>)
</th>
<th scope="col"><a href="/wiki/List_of_Falcon_9_first-stage_boosters"
title="List of Falcon 9 first-stage boosters">Version,<br/>Booster</a> <sup
class="reference" id="cite_ref-booster_11-0"><a href="#cite_note-
booster-11">[b]</a></sup>
</th>
<th scope="col">Launch site
</th>
<th scope="col">Payload<sup class="reference" id="cite_ref-Dragon_12-0"><a
href="#cite_note-Dragon-12">[c]</a></sup>
</th>
<th scope="col">Payload mass
</th>
<th scope="col">Orbit
</th>
<th scope="col">Customer
</th>
<th scope="col">Launch<br/>outcome
</th>
<th scope="col"><a href="/wiki/Falcon_9_first-stage_landing_tests" title="Falcon
9 first-stage landing tests">Booster<br/>landing</a>
</th></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">1
</th>
```

```
<td>4 June 2010,<br/>18:45
</td>
<td><a href="/wiki/Falcon_9_v1.0" title="Falcon 9 v1.0">F9 v1.0</a><sup
class="reference" id="cite_ref-MuskMay2012_13-0"><a href="#cite_note-
MuskMay2012-13">[7]</a></sup><br/>B0003.1<sup class="reference" id="cite_ref-
block_numbers_14-0"><a href="#cite_note-block_numbers-14">[8]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/Dragon_Spacecraft_Qualification_Unit" title="Dragon
Spacecraft Qualification Unit">Dragon Spacecraft Qualification Unit</a>
</td>
<td>
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/SpaceX" title="SpaceX">SpaceX</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-failure" style="background: #FFC7C7; vertical-align: middle;
text-align: center;">Failure<sup class="reference" id="cite_ref-
ns20110930_15-0"><a href="#cite_note-ns20110930-15">[9]</a></sup><sup
class="reference" id="cite_ref-16"><a
href="#cite_note-16">[10]</a></sup><br/><small>(parachute)</small>
</td></tr>
<tr>
<td colspan="9">First flight of Falcon 9 v1.0.<sup class="reference"
id="cite_ref-sfn20100604_17-0"><a href="#cite_note-
sfn20100604-17">[11]</a></sup> Used a boilerplate version of Dragon capsule
which was not designed to separate from the second stage.<small>(<a
href="#First_flight_of_Falcon_9">more details below</a>)</small> Attempted to
recover the first stage by parachuting it into the ocean, but it burned up on
reentry, before the parachutes even deployed.<sup class="reference"
id="cite_ref-parachute_18-0"><a href="#cite_note-parachute-18">[12]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">2
</th>
<td>8 December 2010,<br/>15:43<sup class="reference" id="cite_ref-
spaceflightnow_Clark_Launch_Report_19-0"><a href="#cite_note-
spaceflightnow_Clark_Launch_Report-19">[13]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_v1.0" title="Falcon 9 v1.0">F9 v1.0</a><sup
```

```
class="reference" id="cite_ref-MuskMay2012_13-1"><a href="#cite_note-
MuskMay2012-13">[7]</a></sup><br/>B0004.1<sup class="reference" id="cite_ref-
block_numbers_14-1"><a href="#cite_note-block_numbers-14">[8]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/SpaceX_Dragon" title="SpaceX Dragon">Dragon</a> <a class="mw-
redirect" href="/wiki/COTS_Demo_Flight_1" title="COTS Demo Flight 1">demo flight
C1</a><br/>(Dragon C101)
</td>
<td>
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a> (<a
href="/wiki/International_Space_Station" title="International Space
Station">ISS</a>)
</td>
<td><style data-mw-deduplicate="TemplateStyles:r1126788409">.mw-parser-output
.plainlist ol,.mw-parser-output .plainlist ul{line-height:inherit;list-
style:none;margin:0;padding:0}.mw-parser-output .plainlist ol li,.mw-parser-
output .plainlist ul li{margin-bottom:0}</style><div class="plainlist">
<ul><li><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Orbital_Transportation_Services" title="Commercial
Orbital Transportation Services">COTS</a>)</li>
<li><a href="/wiki/National_Reconnaissance_Office" title="National
Reconnaissance Office">NRO</a></li></ul>
</div>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
ns20110930_15-1"><a href="#cite_note-ns20110930-15">[9]</a></sup>
</td>
<td class="table-failure" style="background: #FFC7C7; vertical-align: middle;
text-align: center;">Failure<sup class="reference" id="cite_ref-
ns20110930_15-2"><a href="#cite_note-ns20110930-15">[9]</a></sup><sup
class="reference" id="cite_ref-20"><a
href="#cite_note-20">[14]</a></sup><br/><small>(parachute)</small>
</td></tr>
<tr>
<td colspan="9">Maiden flight of <a class="mw-redirect"
href="/wiki/Dragon_capsule" title="Dragon capsule">Dragon capsule</a>,
consisting of over 3 hours of testing thruster maneuvering and reentry.<sup
class="reference" id="cite_ref-spaceflightnow_Clark_unleashing_Dragon_21-0"><a
href="#cite_note-spaceflightnow_Clark_unleashing_Dragon-21">[15]</a></sup>
Attempted to recover the first stage by parachuting it into the ocean, but it
disintegrated upon reentry, before the parachutes were deployed.<sup
```

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class="reference" id="cite_ref-parachute_18-1"><a href="#cite_note-
parachute-18">[12]</a></sup> <small>(<a href="#COTS_demo_missions">more details
below</a>)</small> It also included two <a href="/wiki/CubeSat"
title="CubeSat">CubeSats</a>,<sup class="reference" id="cite_ref-
NRO_Taps_Boeing_for_Next_Batch_of_CubeSats_22-0"><a href="#cite_note-
NRO_Taps_Boeing_for_Next_Batch_of_CubeSats-22">[16]</a></sup> and a wheel of <a
href="/wiki/Brou%C3%A8re" title="Brouère">Brouère</a> cheese.
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">3
</th>
<td>22 May 2012,<br/>07:44<sup class="reference" id="cite_ref-
BBC_new_era_23-0"><a href="#cite_note-BBC_new_era-23">[17]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_v1.0" title="Falcon 9 v1.0">F9 v1.0</a><sup
class="reference" id="cite_ref-MuskMay2012_13-2"><a href="#cite_note-
MuskMay2012-13">[7]</a></sup><br/>B0005.1<sup class="reference" id="cite_ref-
block_numbers_14-2"><a href="#cite_note-block_numbers-14">[8]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/SpaceX_Dragon" title="SpaceX Dragon">Dragon</a> <a class="mw-
redirect" href="/wiki/Dragon_C2%2B" title="Dragon C2+">demo flight C2+</a><sup
class="reference" id="cite_ref-C2_24-0"><a
href="#cite_note-C2-24">[18]</a></sup><br/>(Dragon C102)
</td>
<td>525 kg (1,157 lb)<sup class="reference" id="cite_ref-25"><a
href="#cite_note-25">[19]</a></sup>
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a> (<a
href="/wiki/International_Space_Station" title="International Space
Station">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Orbital_Transportation_Services" title="Commercial
Orbital Transportation Services">COTS</a>)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-26"><a
href="#cite_note-26">[20]</a></sup>
</td>
<td class="table-noAttempt" style="background: #EEE; vertical-align: middle;
white-space: nowrap; text-align: center;">No attempt
</td></tr>
<tr>
```

<td colspan="9">Dragon spacecraft demonstrated a series of tests before it was allowed to approach the International Space Station. Two days later, it became the first commercial spacecraft to board the ISS.^{[17]} <small>(more details below)</small>
</td></tr>
<tr>
<th rowspan="3" scope="row" style="text-align:center;">4
</th>
<td rowspan="2">8 October 2012,
00:35^{[21]}
</td>
<td rowspan="2">F9 v1.0^{[7]}
B0006.1^{[8]}
</td>
<td rowspan="2">CCAFS,
SLC-40
</td>
<td>SpaceX CRS-1^{[22]}
(Dragon C103)
</td>
<td>4,700 kg (10,400 lb)
</td>
<td>LEO (ISS)
</td>
<td>NASA (CRS)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle; text-align: center;">Success
</td>
<td rowspan="2" style="background:#ececec; text-align:center;">No attempt
</td></tr>
<tr>
<td>Orbcomm-OG2<sup class="reference" id="cite_ref-Orbcomm_29-0"><a href="#cite_note-

```
Orbcomm-29">[23]</a></sup>
</td>
<td>172 kg (379 lb)<sup class="reference" id="cite_ref-gunter-og2_30-0"><a
href="#cite_note-gunter-og2-30">[24]</a></sup>
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
</td>
<td><a href="/wiki/Orbcomm" title="Orbcomm">Orbcomm</a>
</td>
<td class="table-partial" style="background: #FE9; vertical-align: middle; text-
align: center;">Partial failure<sup class="reference" id="cite_ref-
nyt-20121030_31-0"><a href="#cite_note-nyt-20121030-31">[25]</a></sup>
</td></tr>
<tr>
<td colspan="9">CRS-1 was successful, but the <a href="/wiki/Secondary_payload"
title="Secondary payload">secondary payload</a> was inserted into an abnormally
low orbit and subsequently lost. This was due to one of the nine <a
href="/wiki/SpaceX_Merlin" title="SpaceX Merlin">Merlin engines</a> shutting
down during the launch, and NASA declining a second reignition, as per <a
href="/wiki/International_Space_Station" title="International Space
Station">ISS</a> visiting vehicle safety rules, the primary payload owner is
contractually allowed to decline a second reignition. NASA stated that this was
because SpaceX could not guarantee a high enough likelihood of the second stage
completing the second burn successfully which was required to avoid any risk of
secondary payload's collision with the ISS.<sup class="reference" id="cite_ref-
OrbcommTotalLoss_32-0"><a href="#cite_note-
OrbcommTotalLoss-32">[26]</a></sup><sup class="reference" id="cite_ref-
sn20121011_33-0"><a href="#cite_note-sn20121011-33">[27]</a></sup><sup
class="reference" id="cite_ref-34"><a href="#cite_note-34">[28]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">5
</th>
<td>1 March 2013,<br/>15:10
</td>
<td><a href="/wiki/Falcon_9_v1.0" title="Falcon 9 v1.0">F9 v1.0</a><sup
class="reference" id="cite_ref-MuskMay2012_13-4"><a href="#cite_note-
MuskMay2012-13">[7]</a></sup><br/>B0007.1<sup class="reference" id="cite_ref-
block_numbers_14-4"><a href="#cite_note-block_numbers-14">[8]</a></sup>
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/SpaceX_CRS-2" title="SpaceX CRS-2">SpaceX CRS-2</a><sup
class="reference" id="cite_ref-sxManifest20120925_28-1"><a href="#cite_note-
sxManifest20120925-28">[22]</a></sup><br/>(Dragon C104)
```

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</td>
<td>4,877 kg (10,752 lb)
</td>
<td><a href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a> (<a
class="mw-redirect" href="/wiki/ISS" title="ISS">ISS</a>)
</td>
<td><a href="/wiki/NASA" title="NASA">NASA</a> (<a
href="/wiki/Commercial_Resupply_Services" title="Commercial Resupply
Services">CRS</a>)
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success
</td>
<td class="table-noAttempt" style="background: #EEE; vertical-align: middle;
white-space: nowrap; text-align: center;">No attempt
</td></tr>
<tr>
<td colspan="9">Last launch of the original Falcon 9 v1.0 <a
href="/wiki/Launch_vehicle" title="Launch vehicle">launch vehicle</a>, first use
of the unpressurized trunk section of Dragon.<sup class="reference"
id="cite_ref-sxf9_20110321_35-0"><a href="#cite_note-
sxf9_20110321-35">[29]</a></sup>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">6
</th>
<td>29 September 2013,<br/>16:00<sup class="reference" id="cite_ref-
pa20130930_36-0"><a href="#cite_note-pa20130930-36">[30]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_v1.1" title="Falcon 9 v1.1">F9 v1.1</a><sup
class="reference" id="cite_ref-MuskMay2012_13-5"><a href="#cite_note-
MuskMay2012-13">[7]</a></sup><br/>B1003<sup class="reference" id="cite_ref-
block_numbers_14-5"><a href="#cite_note-block_numbers-14">[8]</a></sup>
</td>
<td><a class="mw-redirect" href="/wiki/Vandenberg_Air_Force_Base"
title="Vandenberg Air Force Base">VAFB</a>,<br/><a
href="/wiki/Vandenberg_Space_Launch_Complex_4" title="Vandenberg Space Launch
Complex 4">SLC-4E</a>
</td>
<td><a href="/wiki/CASSIOPE" title="CASSIOPE">CASSIOPE</a><sup class="reference"
id="cite_ref-sxManifest20120925_28-2"><a href="#cite_note-
sxManifest20120925-28">[22]</a></sup><sup class="reference" id="cite_ref-
CASSIOPE_MDA_37-0"><a href="#cite_note-CASSIOPE_MDA-37">[31]</a></sup>
</td>
<td>500 kg (1,100 lb)
</td>
<td><a href="/wiki/Polar_orbit" title="Polar orbit">Polar orbit</a> <a
href="/wiki/Low_Earth_orbit" title="Low Earth orbit">LEO</a>
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</td>
<td><a href="/wiki/Maxar_Technologies" title="Maxar Technologies">MDA</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
pa20130930_36-1"><a href="#cite_note-pa20130930-36">[30]</a></sup>
</td>
<td class="table-no2" style="background: #FFE3E3; color: black; vertical-align:
middle; text-align: center;">Uncontrolled<br/><small>(ocean)</small><sup
class="reference" id="cite_ref-ocean_landing_38-0"><a href="#cite_note-
ocean_landing-38">[d]</a></sup>
</td></tr>
<tr>
<td colspan="9">First commercial mission with a private customer, first launch
from Vandenberg, and demonstration flight of Falcon 9 v1.1 with an improved
13-tonne to LEO capacity.<sup class="reference" id="cite_ref-
sxf9_20110321_35-1"><a href="#cite_note-sxf9_20110321-35">[29]</a></sup> After
separation from the second stage carrying Canadian commercial and scientific
satellites, the first stage booster performed a controlled reentry,<sup
class="reference" id="cite_ref-39"><a href="#cite_note-39">[32]</a></sup> and an
<a href="/wiki/Falcon_9_first-stage_landing_tests" title="Falcon 9 first-stage
landing tests">ocean touchdown test</a> for the first time. This provided good
test data, even though the booster started rolling as it neared the ocean,
leading to the shutdown of the central engine as the roll depleted it of fuel,
resulting in a hard impact with the ocean.<sup class="reference" id="cite_ref-
pa20130930_36-2"><a href="#cite_note-pa20130930-36">[30]</a></sup> This was the
first known attempt of a rocket engine being lit to perform a supersonic retro
propulsion, and allowed SpaceX to enter a public-private partnership with <a
href="/wiki/NASA" title="NASA">NASA</a> and its Mars entry, descent, and landing
technologies research projects.<sup class="reference" id="cite_ref-40"><a
href="#cite_note-40">[33]</a></sup> <small>(<a
href="#Maiden_flight_of_v1.1">more details below</a>)</small>
</td></tr>
<tr>
<th rowspan="2" scope="row" style="text-align:center;">7
</th>
<td>3 December 2013,<br/>22:41<sup class="reference" id="cite_ref-
sfn_wwls20130624_41-0"><a href="#cite_note-sfn_wwls20130624-41">[34]</a></sup>
</td>
<td><a href="/wiki/Falcon_9_v1.1" title="Falcon 9 v1.1">F9 v1.1</a><br/>B1004
</td>
<td><a href="/wiki/Cape_Canaveral_Space_Force_Station" title="Cape Canaveral
Space Force Station">CCAFS</a>,<br/><a
href="/wiki/Cape_Canaveral_Space_Launch_Complex_40" title="Cape Canaveral Space
Launch Complex 40">SLC-40</a>
</td>
<td><a href="/wiki/SES-8" title="SES-8">SES-8</a><sup class="reference"
id="cite_ref-sxManifest20120925_28-3"><a href="#cite_note-
```

```
sxManifest20120925-28">[22]</a></sup><sup class="reference" id="cite_ref-spx-
pr_42-0"><a href="#cite_note-spx-pr-42">[35]</a></sup><sup class="reference"
id="cite_ref-aw20110323_43-0"><a href="#cite_note-aw20110323-43">[36]</a></sup>
</td>
<td>3,170 kg (6,990 lb)
</td>
<td><a href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">GTO</a>
</td>
<td><a class="mw-redirect" href="/wiki/SES_S.A." title="SES S.A.">SES</a>
</td>
<td class="table-success" style="background: #9EFF9E; vertical-align: middle;
text-align: center;">Success<sup class="reference" id="cite_ref-
SNMissionStatus7_44-0"><a href="#cite_note-SNMissionStatus7-44">[37]</a></sup>
</td>
<td class="table-noAttempt" style="background: #EEE; vertical-align: middle;
white-space: nowrap; text-align: center;">No attempt<br/><sup class="reference"
id="cite_ref-sf10120131203_45-0"><a href="#cite_note-
sf10120131203-45">[38]</a></sup>
</td></tr>
<tr>
<td colspan="9">First <a href="/wiki/Geostationary_transfer_orbit"
title="Geostationary transfer orbit">Geostationary transfer orbit</a> (GTO)
launch for Falcon 9,<sup class="reference" id="cite_ref-spx-pr_42-1"><a
href="#cite_note-spx-pr-42">[35]</a></sup> and first successful reignition of
the second stage.<sup class="reference" id="cite_ref-46"><a
href="#cite_note-46">[39]</a></sup> SES-8 was inserted into a <a
href="/wiki/Geostationary_transfer_orbit" title="Geostationary transfer
orbit">Super-Synchronous Transfer Orbit</a> of 79,341 km (49,300 mi) in apogee
with an <a href="/wiki/Orbital_inclination" title="Orbital
inclination">inclination</a> of 20.55° to the <a href="/wiki/Equator"
title="Equator">equator</a>.
</td></tr></tbody></table>
```

[10]:
```
column_names = []
# Apply find_all() function with `th` element on first_launch_table
# Iterate each th element and apply the provided extract_column_from_header()␣
 ↪to get a column name
# Append the Non-empty column name (`if name is not None and len(name) > 0`)␣
 ↪into a list called column_names

for row in first_launch_table.find_all('th'):
    name = extract_column_from_header(row)
    if (name != None and len(name) > 0):
        column_names.append(name)
```

[11]:
```
print(column_names)
```

```
['Flight No.', 'Date and time ( )', 'Launch site', 'Payload', 'Payload mass',
'Orbit', 'Customer', 'Launch outcome']
```

[12]:
```
###TASK 3: Create a data frame by parsing the launch HTML tables
launch_dict= dict.fromkeys(column_names)

# Remove an irrelvant column
del launch_dict['Date and time ( )']

# Let's initial the launch_dict with each value to be an empty list
launch_dict['Flight No.'] = []
launch_dict['Launch site'] = []
launch_dict['Payload'] = []
launch_dict['Payload mass'] = []
launch_dict['Orbit'] = []
launch_dict['Customer'] = []
launch_dict['Launch outcome'] = []
# Added some new columns
launch_dict['Version Booster']=[]
launch_dict['Booster landing']=[]
launch_dict['Date']=[]
launch_dict['Time']=[]
```

[13]:
```
extracted_row = 0
#Extract each table
for table_number,table in enumerate(soup.find_all('table',"wikitable␣
 ↪plainrowheaders collapsible")):
   # get table row
    for rows in table.find_all("tr"):
        #check to see if first table heading is as number corresponding to␣
 ↪launch a number
        if rows.th:
            if rows.th.string:
                flight_number=rows.th.string.strip()
                flag=flight_number.isdigit()
        else:
            flag=False
        #get table element
        row=rows.find_all('td')
        #if it is number save cells in a dictonary
        if flag:
            extracted_row += 1
            # Flight Number value
            # TODO: Append the flight_number into launch_dict with key `Flight␣
 ↪No.`
            launch_dict['Flight No.'].append(flight_number) #TODO-1
            #print(flight_number)
```

```
            datatimelist=date_time(row[0])

            # Date value
            # TODO: Append the date into launch_dict with key `Date`
            date = datatimelist[0].strip(',')
            launch_dict['Date'].append(date) #TODO-2
            #print(date)
            # Time value
            # TODO: Append the time into launch_dict with key `Time`
            time = datatimelist[1]
            launch_dict['Time'].append(time) #TODO-3
            #print(time)

            # Booster version
            # TODO: Append the bv into launch_dict with key `Version Booster`
            bv=booster_version(row[1])
            if not(bv):
                bv=row[1].a.string
            launch_dict['Version Booster'].append(bv) #TODO-4
            #print(bv)

            # Launch Site
            # TODO: Append the bv into launch_dict with key `Launch site`
            launch_site = row[2].a.string
            launch_dict['Launch site'].append(launch_site) #TODO-5
            #print(launch_site)

            # Payload
            # TODO: Append the payload into launch_dict with key `Payload`
            payload = row[3].a.string
            launch_dict['Payload'].append(payload) #TODO-6
            #print(payload)
            # Payload Mass
            # TODO: Append the payload_mass into launch_dict with key `Payload␣
↪mass`
            payload_mass = get_mass(row[4])
            launch_dict['Payload mass'].append(payload_mass) #TODO-7
            #print(payload)

            # Orbit
            # TODO: Append the orbit into launch_dict with key `Orbit`
            orbit = row[5].a.string
            launch_dict['Orbit'].append(orbit) #TODO-8
            #print(orbit)

            # Customer
            # TODO: Append the customer into launch_dict with key `Customer`
```

```
            customer = row[6].text.strip()
            launch_dict['Customer'].append(customer) #TODO-9
            #print(customer)

            # Launch outcome
            # TODO: Append the launch_outcome into launch_dict with key `Launch␣
↪outcome`
            launch_outcome = list(row[7].strings)[0]
            launch_dict['Launch outcome'].append(launch_outcome) #TODO-10
            #print(launch_outcome)

            # Booster landing
            # TODO: Append the launch_outcome into launch_dict with key␣
↪`Booster landing`
            booster_landing = landing_status(row[8])
            launch_dict['Booster landing'].append(booster_landing) #TODO-11
            #print(booster_landing)
```

[14]:
```
df= pd.DataFrame({ key:pd.Series(value) for key, value in launch_dict.items() })
```

[15]:
```
df
```

[15]:

	Flight No.	Launch site	Payload	Payload mass	\
0	1	CCAFS	Dragon Spacecraft Qualification Unit	0	
1	2	CCAFS	Dragon	0	
2	3	CCAFS	Dragon	525 kg	
3	4	CCAFS	SpaceX CRS-1	4,700 kg	
4	5	CCAFS	SpaceX CRS-2	4,877 kg	
..	…	…	…	…	
116	117	CCSFS	Starlink	15,600 kg	
117	118	KSC	Starlink	~14,000 kg	
118	119	CCSFS	Starlink	15,600 kg	
119	120	KSC	SpaceX CRS-22	3,328 kg	
120	121	CCSFS	SXM-8	7,000 kg	

	Orbit	Customer	Launch outcome	Version Booster	\
0	LEO	SpaceX	Success\n	F9 v1.0B0003.1	
1	LEO	NASA (COTS)\nNRO	Success	F9 v1.0B0004.1	
2	LEO	NASA (COTS)	Success	F9 v1.0B0005.1	
3	LEO	NASA (CRS)	Success\n	F9 v1.0B0006.1	
4	LEO	NASA (CRS)	Success\n	F9 v1.0B0007.1	
..	…	…	…	…	
116	LEO	SpaceX	Success\n	F9 B5B1051.10	
117	LEO	SpaceX Capella Space and Tyvak	Success\n	F9 B5B1058.8	
118	LEO	SpaceX	Success\n	F9 B5B1063.2	
119	LEO	NASA (CRS)	Success\n	F9 B5B1067.1	

```
120   GTO                      Sirius XM      Success\n           F9 B5

    Booster landing              Date   Time
0           Failure      4 June 2010  18:45
1           Failure  8 December 2010  15:43
2      No attempt\n      22 May 2012  07:44
3        No attempt   8 October 2012  00:35
4      No attempt\n     1 March 2013  15:10
..              …              …    …
116         Success       9 May 2021  06:42
117         Success      15 May 2021  22:56
118         Success      26 May 2021  18:59
119         Success       3 June 2021  17:29
120         Success       6 June 2021  04:26

[121 rows x 11 columns]
```

[16]:
```
df.to_csv('spacex_web_scraped.csv', index=False)
```

[ ]:
```

```