Instructions:

1. **If required, install the most current version of STK:** Download STK, then install and license it on your computer (Free version). You can take this test using the web-based STK Cloud which does not require an install or license.
   - **Note:** If you want to use STK Cloud to take this Certification test and do not have access to the STK Cloud Trial, please email certification@agi.com to help gain access.
2. **Complete Training:** Complete the Level 1 - Beginner Training.
   a. Online at our Level 1 - STK Beginner Training.
   b. Locally in the STK Help under "STK > Training > Level 1 – Beginner Training".
3. **Complete the Certification Exercise:** Complete all scenario steps and tasks for each section.
   ** This test must be completed independently and must be **your own work**.*
4. **Submit your Certification Test:** Upload the scenario to the Certification Grader at https://register.agi.com/training/certification/grade-test/stk/.

Level 1 Certification Exercise:

On October 28, 2011, a 6.9-magnitude earthquake hit the central coast of Peru, destroying several homes and injuring dozens. Due to the number of recurring damaging earthquakes in the area, future aircraft and satellite systems are being considered to provide timely damage assessment to nearby cities. Use STK to model these systems and evaluate various aspects of their missions. Historical earthquake data is provided and will be the basis for this exercise.

Section 1: Create a New Scenario

Scenario steps:

1. Create a new scenario starting at the time of the Earthquake, and ending five hours later.
   Name: "STK_Cert_FirstNameLastName_STKVersion" e.g. STK_Cert_JohnSmith_V12
   Start: 28 Oct 2011 18:54:00 UTCG
   Stop: 28 Oct 2011 23:54:00 UTCG
2. Save your scenario.
   - If you are using STK Desktop: save your scenario to your computer's File Directory (e.g. Documents > STK 12). A folder with the same name as your scenario is created for you in the location specified in the Create a Scenario Window.
   - If you are using STK Cloud: save your scenario to STK Cloud's File Directory (e.g. Documents > STK 12) following the steps below. Please note, the steps to zip the folder and download it to your local machine when finished are at the end of this exercise.
     - Click Save () when the scenario loads.
     - Ensure File System is selected for the Location.
     - Navigate to Documents > STK 12.
     - Create a folder with the same name as your scenario.
     - Open the new folder.

- Ensure Scenario files (*.sc) is selected as the Save as type.
- Click Save.

➢ **Note:** *Save all Task files to the folder you just created. If you are using STK Cloud, any necessary notes about saving Task files will be listed within the Task after the words "STK Cloud:".*

➢ **Note:** *Save Often!*

3. Disable the Terrain Server on the Scenario – Properties, Basic – Terrain page.
4. The coordinates of the nearest runway to the epicenter are provided in the table below. They outline the runway. Create an Area Target object called "Runway" based on these Lat / Lon values for the perimeter points:

Latitude	Longitude
-12.1501 deg	-76.9957 deg
-12.1711 deg	-77.0026 deg
-12.1713 deg	-77.0022 deg
-12.1503 deg	-76.9953 deg

4. To account for the local surroundings, add a 2 deg elevation angle constraint to Runway.
5. The city hit hardest by the 2011 earthquake was Ica, Peru.
   - Insert Ica as a Place object (- 14.0639 deg, -75.7303 deg).
6. Another hard-hit city was Paracas, Peru.
   - Insert Paracas as a Place object (-13.849 deg, -76.255 deg).
7. Re-orient the 3D Graphics Window to view the Quake Region. Ensure you can see Ica, Paracas, and the Runway.

Tasks:

T1. Create a stored view of the Quake Region from the last scenario step performed called "Quake Region."
T2. Add the lighting intervals for Ica to the Timeline View.
T3. Create a custom report that shows the latitude and longitude of Ica and save it as a Quick Report called "Ica_LatLon".

Section 2: Model the Aircraft System

Scenario steps:

8. Create a new Aircraft object called "CertAircraft", and ensure the Propagator is set to Great Arc.
9. Use 3D Object Editor Toolbar or enter the Lat / Lon values for the following waypoints:
   1. Runway (use the centroid only and use a constant altitude of 10,000 ft)
   2. Paracas
   3. Ica
   4. Runway (use the centroid only)
10. Set each waypoint's turn radius to 1 km.
11. Change the route color to white and make the route line width one level thicker.
12. Zoom to CertAircraft.
13. Change CertAircraft's 3D model to the "uav.mdl" model.
14. Use the coordinated turn attitude type to model the banking of CertAircraft.

15. Create a Sensor object called “AC_Camera” which has a Rectangular 100x100 deg field of view and attach it to CertAircraft. Note, this is the actual field of view; Rectangular Sensors are defined in STK by vertical and horizontal half-angles.

Tasks:

T4. Create a custom report for CertAircraft called “FlightSummary” that includes the following groups, data providers and elements. Then save it as a .csv file. Click OK to close the Information pop-up window:

Time (Set the units to EpSec)
LLA State-Fixed-Lat
LLA State-Fixed-Lon
LLA State-Fixed-Alt
Heading-Fixed-Azimuth
Heading-Fixed-Elevation
Heading-Fixed-Velocity

- STK Cloud:
  - Click Save as .csv in the report toolbar.
  - Select File System in the Location drop-down menu.
  - Navigate to your scenario folder.
  - Save the .csv file to your scenario folder.

T5. Create an Access report to determine if CertAircraft has line-of- sight access to Runway for its entire route and save it as a Quick Report called “Aircraft_to_Runway”.

T6. Using X Real-time Animation Mode ( ) create a ten to fifteen second STK video of CertAircraft flying over Ica called “AircraftView.wmv.”

- **Note:** *Recording the movie with the Movie Timeline Tool will automatically change the animation time period. After recording the video, set the animation start and stop times to the entire scenario period (Scenario – Properties > Basic – Time).*

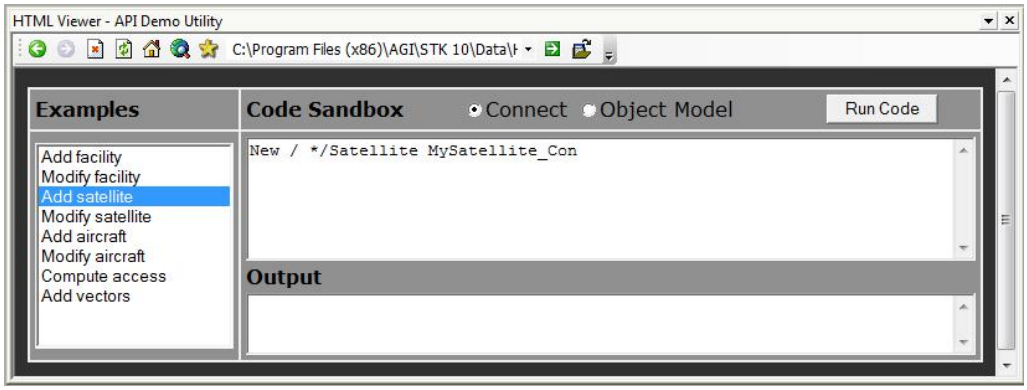
T7. Increase CertAircraft’s altitude so it maintains line-of-sight to Runway for the entire flight.

Section 3: Model the Satellite System

Scenario steps:

16. Use STK Connect to create a Satellite object named “CertSatellite”, and add the connect command to the Scenario Description – Long Description field.

- Hint: Refer to [Task 6.2: Use the examples to familiarize yourself with Connect] on start.agi.com
- Also available as an installed Example HTML utility:
  <STK install folder>\Data\HtmlUtilities\STK Automation\API Demo



17. Use STK Connect to change the Inclination of CertSatellite to 15 deg, and add the connect command to the Scenario Description – Long Description field.
    - Hint: Search for "SetState Classical" in the STK Help
18. Change CertSatellite's 3D model to the "cubesat_3u.glb" model.
19. Create a Sensor object called "Sat_Camera" which has a Simple Conic 60 deg field of view and attach it to CertSatellite. Note, this is the actual field of view; Simple Conic Sensors are defined in STK by Cone Half Angles.
20. Zoom to CertSatellite and set the animation time to when the Sat_Camera first accesses Ica.

Tasks:

T8. Using Snap Frame, create a .bmp of CertSatellite from the last scenario step performed called "SatView.bmp."
    - STK Cloud:
        - When in the Save as Window, select File System in the Location drop-down menu.
        - Navigate to your scenario folder.
        - Save the .bmp file to your scenario folder.

T9. Create an Access report that shows the azimuth, elevation and range (AER) from Sat_Camera to Ica and save it as a Quick Report called "SatCamera_to_Ica".

T10. Add Access Intervals to the Timeline View to determine which vehicle's camera can see Ica first and the longest.

Section 4: Submit your Certification Test

Scenario steps:

21. Save your scenario.
    - STK Cloud: Save your scenario to the folder you created on STK Cloud.
22. Make sure all task output files (snaps, reports, video) are saved in your scenario folder.
23. Zip up your Scenario folder.
    - STK Cloud:
        - Once you are ready to save your STK scenario to your local machine, click on the Gear () icon in the bottom left of your STK Cloud browser window.
        - Select Frame Explorer.
        - Navigate to the scenario folder you want to copy to your local machine.
        - Right-click on the scenario folder, select Send to, and select Compressed zipped folder. Note, if you do not compress the folder before downloading it, the folder structure will not be maintained during the download. Each file will be downloaded individually and not within the folder.
24. If you are using STK Desktop, skip to the next step. If you are using STK Cloud, download your zipped scenario folder to your local machine before proceeding to the next step.
    - Ctrl + drag the zipped folder to the Download Now folder in Frame Explorer. Note, dragging the file without pressing the Ctrl key moves the file and deletes it from the cloud instance.
    - Your browser may ask you to confirm you want to allow the download from stkcloud.agi.com.
    - Hover over the download icon located in the bottom right-hand side to view the status of the download as "Preparing to Download" or "Downloading."
    - Once the download is complete, it will be saved on your local machine. It defaults to the “Downloads” folder.
25. Upload your zipped folder to the Certification Grader at https://register.agi.com/training/certification/grade-test/stk/. Your test will be immediately graded, and your score will be presented. This can take a few moments to compute, so please be patient. We suggest using Google Chrome or Microsoft Edge.