Python Module 2 Lesson 1

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Recap:

- 1. Module 1 recap
- 2. Congratulations on passing Module 1

Learning Outcomes:

- 1. Recap functions being used to
- 2. Introduction to lists and for loc
 - Loop through strings
 - Loop through lists
- 3. List Indexing
- 4. Introduction to Range(), Range (start, stop), Range(start, stop, step)
 - -Concept of step Counter
 - Concept of len
- 5. List Slicing
- 6. Slicing values in a range Converting range to list
- 7. Concept of sum in lists and range
- 8. Creating multiplication table with for loops

Explanation Points:

- Explain the rationale on why we use For Loops
- Basic introduction to sequences
- Understanding of Start, Stop, Step
- Recognize that there are multiple ways of solving one question

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Breakdown of Lesson Plan:

Lesson 1.1 (Repetition in Programming)	10 min
Lesson 1.2 (Basic For Loops with Strings) Remember to explain task 7	15 min
Lesson 1.3 (Range functions and Counters)	20 min
Lesson 1.4 (List Indexing)	10 min
Lesson 1.5 (List Slicing)	15 min
Lesson 1.6 (List Typecasting)	10 min
Lesson 1.7 (Finding sum of a list)	20 min
Lesson 1.8 (Multiplication Table)	10 min
Lesson 1 Quiz	20 min

^{*}Note: There is a high chance of student not being able to complete on time.

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Lesson 1.1

While coding, it is unavoidable for us to repeat certain commands or actions multiple times in succession. So far, we have learnt how to deal with it by using functions to repeat the similar actions as such. In the example below, we are looking at getting the output in a sequence starting from 6 and ending at 10.

Output

1	def add(x,y):
2	print(x+y)
3	return(x+y)
4	
5	A = 5
6	B = add(A,1)
7	C = add(B,1)
8	D = add(C,1)
9	E = add (D,1)
10	F = add(E,1)

1	6
2	7
3	8
4	9
5	10

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Using functions is indeed useful, especially in making long calculations shorter. Let us revise on this concept!

Task 1: Using functions, output the numbers starting from 15 to 5 as shown in the output. Complete lines 2,3,5 and 6

1	def funct(x,y):
	, . , ,
2	print
3	return
4	
5	Start=
6	Count=
7	
8	Z=funct(Start,Count)
9	Y=funct(Z,Count)
10	X=funct(Y,Count)
11	W=funct(X,Count)
12	V=funct(W,Count)
13	U=funct(V,Count)

1	15
2	13
3	11
4	9
5	7
6	5

Type the following and fill in the output after pressing F5

^{*}The numbers represent the lines.

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Lesson 1.1

Task 2: Using functions, output the numbers starting from 100 to 600 as shown in the output.

Output

1	def funct(x,y):
2	
3	
4	
5	Start=
6	Count=
7	
8	Z=funct(Start,Count)
9	Y=funct(Z,Count)
10	X=funct(Y,Count)
11	W=funct(X,Count)
12	V=funct(W,Count)
13	U=funct(V,Count)

1	100
2	200
3	300
4	400
5	500
6	600

Task 3: Using functions, output the numbers starting from 5 in multiples of 5 as shown in the output.

1	def funct(x,y):
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	

1	5	
2	10	
3	15	

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Lesson 1.2

Although functions can help us shorten the amount of time, the examples in Lesson 1.1 clearly show how difficult and tiring it is to do so. Hence, we can use loops to help us shorten the time.

There are 2 types of loops in Python – While loop and For Loop

For Loop is used for iterating over a sequence (that is either a list or a string)

Python For Loop syntax:

For iterating variable in a sequence:

statement block
print(statement)

The iterating variable gets assigned with the successive values from the input sequence

The sequence may refer to python objects such as list or string

Example of showing For Loop through string

Output

1	for letter in "python":
2	print(letter)

1	p
2	у
3	t
4	h
5	0
6	n

List is an ordered sequence of items. It is changeable and allows for duplicate members

All the items in a list do not need to be of the same type.

Declaring a list: Items are separated by commas, enclosed within brackets [].

Example of showing For Loop through list

1	list1=[1,2,3,4,5,6]
2	for i in list1:
3	print(i)

1	1
2	2
3	3
4	4
5	5
6	6

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Lesson 1.2

For Task 1 to 8, we will be looping through strings $% \left(1\right) =\left(1\right) \left(1\right) \left$

Task 1:

1	for name in "tan":
2	print(name)

Output

1	
2	
3	

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Task 2:

1	for sound in "boo":
2	print(sound)

Output

1	
2	
3	

Task 3:

1	for pitch in "high":
2	print(pitch)

Output

1	
2	
3	
4	

Task 4:

1	for height in "short":
2	print(height)

Output

1	
2	
3	
4	
5	

Task 5:

1	height='abcd'
2	for x in height:
3	print(x)

1	
2	
3	
4	

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Lesson 1.2

Task 6:

1	weight = 'Hi there'
2	for fat in weight:
3	print(fat)

Output

1	
2	
3	
4	
5	
6	
7	
8	

Task 7:

1	fruit = 'cake'
2	for type in fruit:
3	print(fruit)

Output

1	
2	
3	
4	

Task 8:

1	colour = '1234567'
2	for red in colour:
3	print(red)

1	
2	
3	
4	
5	
6	
7	

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Name: Lesson 1.2

For Task 9 to 12, we will be looping through list

Task 9:

1	list1 = [1,2,3,4,5,6,7]
2	for numbers in list1:
3	print(numbers)

Output

Date:

1	
2	
3	
4	
5	
6	
7	

Task 10:

1	list2 = ["one","two","three","four","five"]
2	for numberwords in list2:
3	print(numberwords)

1	
2	
3	
4	
5	

Task 11: Create a list named list 3. Using for loops, print the output as shown Output

	1	
	2	
ſ	3	

1	100
2	200
3	300
4	400
5	500

Task 12: Create a list named list 4. Using for loops, print the output as shown Output

1	
2	
3	

1	L
2	0
3	G
4	1
5	С

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Lesson 1.3

The range() function returns a sequence of numbers, starting from index 0 by default, and increments by 1 (by default), and ends at a specified number.

The range(n) is of exclusive nature that is why it doesn't include the last number in the output. i.e., The given endpoint is never part of the generated result.

3 types of range function range (end) range (start, end) range (start, end, step)

Python range() function syntax:

range(start: stop: step)

Start: Optional. An integer number specifying at which position to start. Default is 0

Stop: Required. An integer number specifying at which position to end.

Step: Optional. An integer number specifying the incrementation. Default is 1

Rules for range() function:

range() function only works with integers i.e., whole numbers.

All argument must be integers.

All three arguments can be positive or negative.

The step value must not be zero. If a step is zero python raises a ValueError exception.

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Lesson 1.3

Recap for loops in list:

1 | list1 = [1,2,3,4,5] 2 | for numbers in list1: 3 | print(numbers)

Output

1	1
2	2
3	3
4	4
5	5

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Let's look at the range function:

Output

1	for numbers in range(5):
2	print(numbers)

1	0
2	1
3	2
4	3
5	4

Output

1	for numbers in range(3,6):
2	print(numbers)

1	3
2	4
3	5

1	for numbers in range(3,8,2):
2	print(numbers)

1	3
2	5
3	7

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Lesson 1.3

Let's look at the concept of a counter. Counter allows you to count the number of items in a list of range. Note the indentation of print and what you are printing in line 5

Output

1	list1 = [1,2,3,4,5]
2	count=0
3	for numbers in list1:
4	count=count+1
5	print(count)

1	5

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We can also use the concept of len to count the number of items in a list

Output

1	list1 = [1,2,3,4,5]
2	print(len(list1))

1	5		

Now, our list is a range. Let's count the how many numbers are in the range

Output

1	count=0
2	for numbers in range(7):
3	count=count+1
4	print(count)

1	7		

We counted 7 numbers above. What are the 7 numbers?

(Recall the code to print the numbers in a range?)

1	for numbers in range(7):
2	print(numbers)

1	0
2	1
3	2
4	3
5	4
6	5
7	6

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Lesson 1.3

Type the following and fill in the output after pressing F5

Task 1: Using for loops, print each number in list3 where list3=[61,17,21,13,16]

Output

1	
2	
3	

1	61
2	17
3	21
4	13
5	16

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Task 2: Using for loops, find the output of list1, where list1 = [1,2,3,4].

Output

1	
2	
3	
4	
5	

1	
2	
3	
4	

Task 3a: Using for loops, find the number of items in list2 where list2=[6,7,2,3,6,0,1,20,15]

1	
2	
3	
4	
5	
6	

1			

Task 3b: Using the function of len, find the number of items in list2 above

^{*}The numbers represent the lines.

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Lesson 1.3

For Task 4 to Task 6, use for loops and range(start, stop, step)

Task 4:

Create a sequence of numbers starting from 0, ending at 3 with increment of 1

Output

1	
2	
3	

1	0
2	1
3	2
4	3

Task 5:

Create a sequence of numbers starting from 3, ending 9, with increment of 2

Output

1	
2	
3	

1	3
2	5
3	7
4	9

Task 6:

Create a sequence of numbers starting from 4, ending 12, with increment of 4

1	
2	
3	

1	4
2	8
3	12

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Lesson 1.3

In Task 7, we will explore a method to print a range of values, with only 1 argument in our range() function.

Task 7a:

Create a sequence of numbers starting from 1, ending at 5 with increment of 1

Output

1	a=1
2	for numbers in range(5):
3	print(a + numbers)

1	1
2	2
3	3
4	4
5	5

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Task 7b: Recap of loop through range -

Output

1	for numbers in range(5):
2	print(numbers)

1	0
2	1
3	2
4	3
5	4

Taala 7a	7h. Evalaia	The difference	and wells warm	Key take-aways.
iask /a.	/D: Explain	the difference	and write vour	Kev take-aways.

do you think it	is useful to have	only 1 argume	nt in the range fu	nction?

HINT:

Notice that the number of outputs is the same as the argument in the range() function.

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Lesson 1.3

For Task 8 and 9, use for loops and range(n)

Task 8:

Create a sequence of numbers starting

vith decreasing by 1

1	
2	
3	

1	10
2	9
3	8
4	7
5	6
6	5

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Task 9:

Create a sequence of numbers starting from 10, ending at 0 with decreasing by 2

1	
2	
3	

1	10
2	8
3	6
4	4
5	2
6	0

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7 (11011 1110 0 0 1 1 2 2 2 2 2 3 3 1 1 2

Lesson 1.4

List Indexing: 1. Index starts from 0 in Python.

- 2. First element has an index 0, second element has index 1, so on.
- 3. Negative Index starts from -1
- 4. To access an element by its index we need to use square brackets

Output

1	mylist1= ['Jacob', 'Tom', 'Daniel']
2	print(mylist1[0])

	1	Jacob
--	---	-------

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Output

1	mylist2= [1,8,10,4]			
2	print(mylist2[2])			

1	10

Output

1	mylist3=
	[1,8,10,"happy",3,"sad","fat",4]
	print(mylist3[-1])

1 4

Type the following and fill in the output after pressing F5

Task 1:

1	length=[55,87,91,67,83,23]
2	print(length[5])

J	u	t	р	u	t

Task 2:

1	height=["short",187,191,183]
2	print(height[0])

1		
	1	

^{*}The numbers represent the lines.

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Lesson 1.4

Task 3:

Output

1	width=[15,17,91,16,"wide"]	1	
2	print(width[-1])		

Task 4:

1	name=['Jane', 'Kate', 'Claire',
	'Jasmine', 'Jennifer', 'Jenn']
2	print(name[1])

Output

|--|

Task 5:

1	name=['Liam', 'Noah', 'Tyler',
	'33', '2', 'Jake']
2	print(name[-3])

Output

1	
	_

Task 6:

1	weight=[20,"fat",80,10,89,71,35]
2	print(weight[-6])

Output

1

Task 7:

1	index=['James', 'John', 'Daniel',
	'Jacob', 'Johan', 'Kenny']
2	print(index[-4])

1	
1	

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Lesson 1.5

Recap our string slicing in Module 1? Slicing a list is the same.

Slice Notation Syntax:

- 1. The full slice syntax is start : stop : step.
- 2. Start refers to the index of the element which is used as a start of our slice.
- 3. Stop refers to the index of the element we should stop just before to finish our slice.
- 4. Step allows you to take each nth-element within a start: stop range.

Output

1	mylist= [1,2,3,4,5,6,7,8]
2	print(mylist[2:7])

1	[3,4,5,6,7]

Output

1	mylist= [1,2,3,4,5,6,7,8]
2	print(mylist[2:-1])

1	[3 4 5 6 7]
1	[3,7,3,6,7]

Type the following and fill in the output after pressing F5

Task 1:

Output

1	height=[10,50,90,100,70,80,30]
2	print(height[0:4])

1		

Task 2:

Output

1	weight=[20,101,80,10,89,71,35]
2	print(weight[1:5])



Task 3:

1	mylist=[55,87,91,67,83,23]
2	print(mylist[-5:-1])

1	

^{*}The numbers represent the lines.

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Lesson 1.5

Task 4:

1	num=[155,287,931,637,83,23]
2	print (num[2:-1])

Output

1

Date:

Task 5:

1	size=[15,28,31,63,3,2]
2	print (size[0:-3])

Output

|--|

Task 6:

4		·
	1	score=[99,50, 78,92,26,100]
	2	

1	[78,92,26]

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Less	son 1.6			
To s	lice values in a range, convert the			
-	non typecasting range to list syntax: ist(range())			
		Output		
2	a = list(range (1,5)) print(a[2])	1	3	
		Output		
2	a = list(range (1,10)) print(a[2:5])	1	[3,4,5]	
	e the following and fill in the output a numbers represent the lines.	fter pressing	g F5	
Task	(1.	Output		
1 2	a = list(range (1,20)) print(a[0:5])	1		
Task	(2 :	Output		
2	a = list(range (1,10)) print(a[-5:-1])	1		
Task	α3 :	Output		
1 2	a = [1,2,3,4,5,6,7,8,9,10] print(a[-5:-1])	1		
Task	k 2, 3: Explain the difference and writ	te your Key t	take-aways.	

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Lesson 1.6

Task 4:

1	a = list(range (1,10))
2	print(a[2:-4])

Output

1

Task 5:

1	a = list(range (1,10))
2	print

Output

1	[5,6]

Task 6:

Output

1	a = list(range (1,12))
2	print

	1	[6,7,8]	
--	---	---------	--

Task 7: Using for loops, print each number in list1 where list1=list(range(4,20,5))

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Name: Lesson 1.7

We have learnt the concept of a cour list of range. What if we would like t

Task 1a: Using for loops, find the result 40, 50]

ou to count the number of items in a umbers in the list or in the range?

s in the list a where a = [10, 20, 30,

1	num=[10,20,30,40,50]
2	sum=0
3	for numbers in num:
4	sum=sum+numbers
5	print(sum)

1	

Date:

Task 1b.: Take note of the indentation of print. What happens?

Output

1	num=[10,20,30,40,50]	
2	sum=0	
3	for numbers in num:	
4	sum=sum+numbers	
5	print(sum)	

1	
2	
3	
4	
5	

Task 2:

Using for loops, find the result of the multiplication of numbers in the list b where b = [2, 4, 6, 8, 12]. The answer will be $(2 \times 4 \times 6 \times 8 \times 12 = 4608)$

1	
2	
3	
4	
5	

1	4608

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Lesson 1.7

Task 3:

Using for loops and range, find the result of the multiplication of the numbers in the range(1,5). The answer will be ($1 \times 2 \times 3 \times 4 = 24$)

1	
2	
3	
4	
5	

1	24
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Lesson 1.7

Task 5:

Alfred studies the cell division process of a special type of organism. For every 5 minutes, the organism will increase by 1.

a. Given a starting number of 5 organism, Alfred wants to know how many organisms will be present after each cycle, for a total of <u>10 cycles</u> (50 minutes). Fill in *column a*

Date:

1	organism=5	
2	for number in range(1,51,5):	
3	organism=organism+1	
4	print(organism)	

Cycle	Time	(Column a) Starting with 5 organisms	Starting with 15 organisms
1	5		
2	10		
3	15		
4	20		
5	25		
6	30		
7	35		
8	40		
9	45		
10	50		

Question b:

Fill in this cell.

b. Find the total number of organisms at the end of 10 cycles (50 mins) if the starting number of organisms is 15 (*hint: Steps same as above, change in print indentation)

1	
2	
3	
4	

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Lesson 1.7

Task 6:

John has a very rich father who gives him his pocket money daily increasing by \$2 each day. On day 1, he gets \$2. On day 2, he gets \$4. (No functions required)

a. Using for loops, print the amount he gets in each day from day 1 to day 5 in the format:

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"In day 1, he gets \$2"

"In day 2, he gets \$4"

"In day 3, he gets \$6"

"In day 4, he get \$8"

"In day 5, he gets \$10"

Complete lines 1 and 2

1	for i in range (
2	eachday=
3	print("In day", i, "he gets", "\$", eachday)

b. Using for loops, find the total amount he gets from Day 1 to Day 5. Print in the format "He gets total of \$____"

Complete lines 2 and 3

1	Total=0
2	for i in range (
3	eachday=
4	Total = Total + eachday
5	print("He gets total of", "\$", "Total)

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Lesson 1.8

To get our multiplication number, we can achieve it via 2 ways. (Using example of 5 times table)

Method 1 – multiplying the multiple

i *5

Method 2 – adding the multiple to the last

ans= ans + 5

Method 1: Using for loops and range (start, stop, step), create a multiplication table

Task 1a: Create a 3 times table with the output

Output

1	for i in range (1,5,1):	
2	result = i * 3	
3	print(i, "x", "3" , "=", result)	

1	1 x 3=3
2	2 x 3=6
3	3 x 3=9
4	4 x 3=12

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Method 1: Using for loops and range (), create a multiplication table

Task 1b: Create a 5 times table with the output

1	
2	
3	
4	

1	1 x 5=5
2	2 x 5=10
3	3 x 5=15
4	4 x 5=20
5	5 x 5=25

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Lesson 1.8

Method 2: Using for loops and range (start, stop, step), create a multiplication table

Task 2a: Create a 3 times table with the output

Output

1	Ans = 0
2	for i in range (1,5,1):
3	Ans = Ans + 3
4	print(i, "x", "3" , "=", Ans)

1	1 x 3 = 3
2	2 x 3 = 6
3	3 x 3 = 9
4	4 x 3 = 12

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Method 2: Using for loops and range (), create a multiplication table

Task 2b: Create a 5 times table with the output

1	
2	
3	
4	

1	1 x 5=5
2	2 x 5=10
3	3 x 5=15
4	4 x 5=20
5	5 x 5=25

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End of Lesson 1 Quiz

Question 1:

Using For Loops and range(), print the output as shown

Output

1	
2	
3	
4	
5	

1	10
2	9
3	8
4	7
5	6

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Question 2:

Using For Loops and range(start, stop step), create a sequence of numbers as shown.

Output

1	
2	
3	
4	
5	

1	1
2	3
3	5
4	7
5	9
6	11
7	13

Question 3:

a. Using for loops, find the number of items in list1 where list1=range(10)

Output

1	list1 = range (4)
2	
3	
4	
5	
6	

1	
т _	

b. Using the function of len, find the number of items in list1 above

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End of Lesson 1 Quiz

Question 4:

Using For Loops, print the numbers in list4 where list3=[10,56,34,4,7]

Output

1	
2	
3	

1	10
2	56
3	34
4	4
5	7

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Question 5:

Use for loops to create a 10 times table with the output

Output

1	
2	
3	
4	
5	
6	

1	1 x 10 = 10
2	2 x 10 = 20
3	3 x 10 = 30
4	4 x 10 = 40
5	5 x 10 = 50
6	6 x 10 = 60
7	7 x 10 = 70

Question 6:

Using list slicing, print the 5^{th} number in the list called f where f = [1,2,3,4,5,6,7]

Output

1	
2	

|--|

Question 7:

Using list slicing, print the following score numbers from your maths test in the list called score where score = [99,50,78,92,26,100,22]

1	
2	

<i>1</i> [78, 92, 26, 100, 22]

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	λ
	7
	4
	1
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End of Lesson 1 Quiz

Question 8:

Using list slicing, find the output for the following.

Output

1	mylist=[55,87,91,67,83,23,100]
2	print(weight[-5:-1])

1		

Date:

Question 9:

Jane has a list of different flavours of sweets named listsweets.

listsweets=["orange", "strawberry", "grape", "lemon", "mint"]

- a. Write a code using for loops to find the number of flavours in the list named listsweets in the format "There are ____ flavours in total"
- b. Using len, find the number of flavours in the list named listsweets in the format "
 There are ____ flavours"

Question 10:

James sells a fixed number of 2 toys each day for extra pocket money. He starts off with selling each toy at \$5. The selling price of his toy increases by \$5 each day. (No functions required)

a. Using for loops, print the amount he collects on each day from day 1 to day 10 in the format:

"In day 1, he collects \$10"

"In day 2, he gets \$20"

"In day 3, he gets \$30"

"In day 4, he get \$40"

"In day 5, he gets \$50"

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"In day 10, he collects"

b. Using for loops, find the total amount he gets from Day 1 to Day 10. Print in the format "He collects total of \$ "