Python Modules: math, random and statistics

Standard difficulty · 20 questions · 40 marks · Time: 37 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. A module in Python is:

(a) a data type
(b) an error message
(c) a kind of loop
(d) a file of Python definitions that can be imported and used

2. What does this program print?

```
import math
print(math.ceil(159 / 8))
```

(a) 22 **(b)** 40 **(c)** 20 **(d)** 21

3. Which of these can this program NEVER print?

```
import random
print(random.randint(20, 24))
```

(a) 25 **(b)** 23 **(c)** 20 **(d)** 24

4. What does this program print?

```
import statistics
data = [13, 12, 24, 17, 26, 17, 30]
print(statistics.median(data))
```

(a) 16 **(b)** 17.0 **(c)** 18 **(d)** 17

5. What does this program print?

```
import math
print(math.ceil(67 / 7), math.floor(67 / 7), 67 // 7)
```

(a) 10.0 9.0 9 **(b)** 10 9 10 **(c)** 9 10 9 **(d)** 10 9 9

6. After the statement import math, which of these runs without an error?

(a) print(fabs(18.5)) **(b)** print(math.fabs[18.5])
(c) print(math.fabs(18.5)) **(d)** print(math(fabs(18.5)))

7. How many different values can this program print?

```
import random
print(random.randrange(8, 25, 2))
```

(a) 10 **(b)** 17 **(c)** 9 **(d)** 8

8. What is the largest value this program can print?

```
import random
x = int(random.random() * 17) + 11
print(x)
```

(a) 27 **(b)** 28 **(c)** 16 **(d)** 17

Section B — Short answer — 8 × 2 = 16 marks

9. What is the difference between import math and from math import sqrt?

10. What does this program print? Give (a) the first line (b) the second.

```
import math
print(math.floor(8.5 - 17))
print(math.pow(2, 3))
```

11. What does this program print? Give the three lines (a) to (c).

```
import statistics as st
data = [29, 5, 21, 20, 20]
print(st.mean(data))
print(st.median(data))
print(st.mode(data))
```

12. What are (a) the smallest (b) the largest values this program can print?

```
import random
x = random.randint(3, 12) * 5 + 8
print(x)
```

13. What does this program print? Give (a) the first line (b) the second.

```
import math
a, b = 80, 84
c = math.sqrt(a ** 2 + b ** 2)
print(c)
print(int(math.sqrt(121)))
```

14. What does this program print?

```
import math
print(math.pow(2, 2) + math.fabs(11 - 22))
```

15. 274 students go on a trip in buses of 56 seats. What does this program print? Give (a) the first line (b) the second.

```
from math import ceil
students = 274
seats = 56
buses = ceil(students / seats)
print(buses)
print(buses * seats - students)
```

16. What does this program print? Give (a) the first line (b) the second.

```
import math
r = 5
print(math.floor(math.pi * r * r))
print(math.ceil(2 * math.pi * r))
```

Section C — Word problems — 4 × 4 = 16 marks

17. Explain three ways of importing a module and using its functions, with examples.

18. The user types 30. What does this program print? Give the three lines (a) to (c).

```
import math
r = int(input())
area = math.pi * r ** 2
circ = 2 * math.pi * r
print(math.floor(area))
print(math.ceil(circ))
print(math.sqrt(r * r))
```

19. What does this program print? Give the three lines (a) to (c).

```
from statistics import mean, median, mode
scores = [27, 14, 30, 14, 6, 24, 15]
print(mean(scores))
print(median(scores))
print(mode(scores))
```

20. This program throws two dice, one with 7 faces and one with 5.

```
import random
a = random.randint(1, 7)
b = random.randint(1, 5)
print(a + b)
```

(a) What is the smallest total it can print? (b) The largest? (c) How many different totals can it print?

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Answer key

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Q	Answer	Working
1	**(d) a file of Python definitions that can be imported and used**	—
2	**(c) 20**	ceil() rounds up to a whole number (an int)
3	**(a) 25**	randint(20, 24) gives a whole number from 20 to 24, both included
4	**(d) 17**	sorted: 12, 13, 17, 17, 24, 26, 30
5	**(d) 10 9 9**	67 / 7 = 9.571428571428571
6	**(c) print(math.fabs(18.5))**	import math brings in the module; each function is used as math.fabs(…)
7	**(c) 9**	the values are 8, 10, 12, 14, 16, 18, 20, 22, 24
8	**(a) 27**	random() gives 0 ≤ r < 1, so int(r × 17) is 0 to 16
9	**import math brings in the module, so functions are used as math.sqrt(); from math import sqrt brings in only sqrt, used directly as sqrt().**	—
10	**(a) −9; (b) 8.0**	8.5 − 17 = −8.5; floor() goes down, to the more negative whole number; pow() always gives a float
11	**(a) 19; (b) 20; (c) 20**	sum 95 ÷ 5; sorted: 5, 20, 20, 21, 29; mean of whole numbers prints without .0 only when it is exact, and the median of an even count is a float
12	**(a) 23; (b) 68**	3 × 5 + 8 and 12 × 5 + 8
13	**(a) 116.0; (b) 11**	$80^2 + 84^2 = 13456$; int() drops the fraction of √121
14	**15.0**	4.0 + 11.0: both give floats
15	**(a) 5; (b) 6**	274 ÷ 56 ≈ 4.89, rounded up; then the empty seats
16	**(a) 78; (b) 32**	π × 5 × 5 ≈ 78.54; 2 × π × 5 ≈ 31.42
17	**import math → math.sqrt(9); from math import sqrt → sqrt(9); from math import * → sqrt(9) and pi; import math as m → m.sqrt(9).**	—
18	**(a) 2827; (b) 189; (c) 30.0**	area ≈ 2827.43, circumference ≈ 188.5; sqrt() gives a float
19	**(a) 18.571428571428573; (b) 15; (c) 14**	sum 130 ÷ 7; sorted: 6, 14, 14, 15, 24, 27, 30; 14 is the most common
20	**(a) 2; (b) 12; (c) 11**	totals run from 1 + 1 to 7 + 5, every whole number in between

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