



F1.9 Arithmetic operators

Programming basics · GCSE · OCR J277 2.2.1, AQA 8525 3.2.3, Edexcel
1CP2 6.5.1 · about 15 min

What this lesson is about

The seven operators, integer division and remainder, and the order they work in.

- The seven operators
- Integer division and remainder
- Division always gives a real number
- Order of operations
- Arithmetic with the robot

Questions

11 marks in all

1. What does this program print?

[1 mark]

```
print(20 / 5)
```

Answer:

```
4.0
```

Dividing always gives a float, even when the answer is whole.

2. What does this program print?

[1 mark]

```
print(10 // 4)  
print(10 % 4)
```

Answer:

```
2  
2
```

// is whole-number division (4 goes into 10 twice) and % is the remainder (2 left over).

3. What is the value of `2 + 3 * 4`?

[1 mark]

Answer: 14. Multiply before add, as in maths: $3 * 4$ is 12, plus 2 is 14.

4. What is the value of `(2 + 3) * 4`?

[1 mark]

Answer: 20. Brackets first: $2 + 3$ is 5, times 4 is 20.

5. Which of these is a float?

[1 mark]

- ☐ A 4.0
- ☐ B 4
- ☐ C -3
- ☐ D 100

Answer: A. A float has a decimal point. The others are integers, whole numbers.

6. `x % 2` is 0 when x is even. What is it when x is odd?

[1 mark]

- ☐ A 1
- ☐ B 0
- ☐ C 2
- ☐ D x

Answer: A. An odd number divided by 2 always leaves a remainder of 1.

7. What does this program print?

[1 mark]

```
print(round(10 / 3, 2))
```

Answer:

3.33

round with a second argument keeps that many decimal places.

8. What is the value of `17 // 5` ?

[1 mark]

Answer: 3. Integer division: five goes into seventeen three whole times.

9. What is the value of `17 % 5` ?

[1 mark]

Answer: 2. Modulus gives the remainder: 17 is 3 fives and 2 left over.

10. What does this program print?

[1 mark]

```
print(2 * 3 ** 2)
```

Answer:

18

Exponent before multiply: `3 ** 2` is 9, times 2 is 18.

11. What does this program print?

[1 mark]

```
seconds = 135
print(seconds // 60, seconds % 60)
```

Answer:

2 15

135 seconds is 2 whole minutes, with 15 seconds left over.

The task: robot maths

Using only the numbers 17 and 5 in your calculations, print four lines: `divide: 3.4`, `DIV: 3`, `MOD: 2` and `power: 25` (the power is 5 to the power 2). Work each one out with an operator; do not type the answers. The robot must not drive.

```
# the two lines every program starts with: the commands, then the robot
from bugbot import *
connect()

print("divide:", 17 / 5)
```

The hint students can ask for: Use the same pair of numbers with each of the four operators, and print a labelled line for each. Remember which one throws the remainder away and which one keeps it.

A solution

```
from bugbot import *
connect()
print("divide:", 17 / 5)
print("DIV:", 17 // 5)
print("MOD:", 17 % 5)
print("power:", 5 ** 2)
```

Any program that meets the task's checks is marked correct in the simulator; this is one way, not the only way.