eClassroom

GCSE Mathematics

Order of Operations

Questions

Pearson Edexcel GCSE & iGCSE Mathematics

Section A — Foundation

Worked Examples

[Fluency]

Calculate 5 + 2 × 3

BIDMAS: Multiplication before Addition.

5 + 2 × 3 = 5 + 6 = **11**

[Reasoning]

Sam says (8 – 2) × 3 = 8 – 2 × 3. Is Sam correct?

Left side: (8–2)×3 = 6×3 = 18

Right side: 8–2×3 = 8–6 = 2

18 ≠ 2, so **Sam is incorrect**. Brackets change the order of operations.

[Problem Solving]

Use the digits 2, 3 and 4 once each, with operations and brackets, to make the answer 20.

Try: 4 × (3 + 2) = 4 × 5 = **20** ✓

[Fluency]

1. Work out $3 + 4 \times 2$

(1 mark)

[Fluency]

2. Work out $(5 + 3) \times 4$

(1 mark)

[Fluency]

3.

Work out

$$20 - 3^2 + 1$$

(2 marks)

[Fluency]

4.

Work out

$$4^2 \div 2 + 3$$

(2 marks)

[Fluency]

5.

Work out

$3 \times (2 + 4)^2 \div 9$

(2 marks)

[Reasoning]

6. Place one pair of brackets in the expression below to make it equal to 34.

3 + 4 × 5 – 1

(2 marks)

[Reasoning]

7. Ahmed says: "3 + 12 ÷ 3 – 1 = 6"

Show whether Ahmed is correct or not. Show all steps of your working.

(2 marks)

[Reasoning]

8.

Work out

$(2 + 3)^2 - 4 \times 3$

(2 marks)

[Problem Solving]

9. Using the digit 3 four times and any operations (+, –, ×, ÷), show how to make the answer 10.

You may also use brackets.

(2 marks)

[Problem Solving]

10.

Work out the value of

$\sqrt{5^2 + 12^2}$

(2 marks)

Section B — Higher

Worked Examples

[Fluency]

Evaluate $(12 - 2^2) \div (1 + 3)$

Step 1 — Brackets first:

$(12-4) \div (4) = 8 \div 4 =$ **2**

[Reasoning]

Is $3 + (4 \times 5)^2$ the same as $(3 + 4 \times 5)^2$?

Left: $3 + (20)^2 = 3 + 400 = 403$

Right: $(3+20)^2 = 23^2 = 529$

$403 \neq 529 \rightarrow$ **No, the bracket position changes the result.**

[Problem Solving]

Evaluate $(a^2 + b) \div (a - b^2)$ when a = 5 and b = 2.

Numerator: $5^2 + 2 = 25 + 2 = 27$

Denominator: $5 - 2^2 = 5 - 4 = 1$

Result: $27 \div 1 =$ **27**

[Fluency]

1.

Work out

$$2 + 3 \times 4^2 - 1$$

(2 marks)

[Fluency]

2.

Work out

$$(15 - 3^2) \div (1 + 2)$$

(2 marks)

[Fluency]

3.

Work out

$$\sqrt{100} - 3^2 \times 0.5 + 1$$

(2 marks)

[Reasoning]

4.

Work out, showing each step clearly:

$$\frac{(3.7 + 1.3)^2}{6 - 1}$$

(2 marks)

[Reasoning]

5.

Use a calculator to evaluate the following, giving your answer correct to 3 significant figures:

$$\frac{4.2 + \sqrt{7.29}}{(3.1 - 1.4)^2}$$

(3 marks)

[Reasoning]

6. Place brackets in the expression below so that it equals 93.

$5 \times 3 + 4^2 - 2$

(2 marks)

[Problem Solving]

7. Sasha says: "$(2 + 3)^2 = 2^2 + 3^2 = 13$"

Show clearly that Sasha is wrong and find the correct answer.

(3 marks)

[Problem Solving]

8.

Given that a = 2.4 and b = 1.5, evaluate:

$$\frac{a^2 - b}{a + b^2}$$

Give your answer correct to 3 significant figures.

(3 marks)

[Problem Solving]

9. Using the digits 1, 2, 3 and 4 exactly once each, and any combination of +, –, ×, ÷ and brackets, find the **largest** possible result.

Show your working.

(3 marks)

[Problem Solving]

10. Show, with an example using numbers, that

$a \div (b \div c)$ is **not** always equal to $(a \div b) \div c$

Hence explain why division is not associative.

(3 marks)