



eClassroom

GCSE Mathematics

Order of Operations

Worked Solutions

Pearson Edexcel GCSE & iGCSE Mathematics



Section A — Foundation — Worked Solutions

[Fluency] Question 1

BIDMAS: multiplication first. $4 \times 2 = 8$

$$3 + 8 = 11$$

$$\therefore 11$$

[Fluency] Question 2

Brackets first: $5 + 3 = 8$

Then: $8 \times 4 = 32$

$$\therefore 32$$

[Fluency] Question 3

Indices first: $3^2 = 9$

Then left to right: $20 - 9 + 1 = 11 + 1$

$$\therefore 12$$

[Fluency] Question 4

Indices: $4^2 = 16$

Division: $16 \div 2 = 8$

Addition: $8 + 3$

$$\therefore 11$$

[Fluency] Question 5

Brackets: $2 + 4 = 6$

Indices: $6^2 = 36$

Working left to right: $3 \times 36 \div 9 = 108 \div 9$

$$\therefore 12$$

[Reasoning] Question 6

Without brackets: $3 + 4 \times 5 - 1 = 3 + 20 - 1 = 22 \neq 34$

Try $(3 + 4) \times 5 - 1 = 7 \times 5 - 1 = 35 - 1 = 34 \checkmark$

$$\therefore (3 + 4) \times 5 - 1 = 34$$



[Reasoning] Question 7

Apply BIDMAS: division before addition/subtraction.

$$3 + 12 \div 3 - 1 = 3 + 4 - 1 = 6$$

Ahmed is correct.

\therefore Ahmed is correct. ✓

[Reasoning] Question 8

Brackets: $2 + 3 = 5$

Indices: $5^2 = 25$

Multiplication: $4 \times 3 = 12$

Subtraction: $25 - 12$

\therefore 13

[Problem Solving] Question 9

Need total = 10 using four 3s and operations.

$$3 \times 3 + 3 \div 3 = 9 + 1 = 10 \checkmark$$

\therefore $3 \times 3 + 3 \div 3 = 10$

[Problem Solving] Question 10

Work inside the square root first:

$$5^2 = 25 \quad 12^2 = 144$$

$$25 + 144 = 169$$

$$\sqrt{169} = 13$$

\therefore 13



Section B — Higher — Worked Solutions

[Fluency] Question 1

Indices first: $4^2 = 16$

Multiplication: $3 \times 16 = 48$

Left to right: $2 + 48 - 1$

\therefore **49**

[Fluency] Question 2

Brackets: $(15 - 3^2) = (15 - 9) = 6$ and $(1 + 2) = 3$

Division: $6 \div 3$

\therefore **2**

[Fluency] Question 3

$\sqrt{100} = 10$ $3^2 = 9$

Multiplication: $9 \times 0.5 = 4.5$

Left to right: $10 - 4.5 + 1$

\therefore **6.5**

[Reasoning] Question 4

Numerator: $(3.7 + 1.3)^2 = (5.0)^2 = 25$

Denominator: $6 - 1 = 5$

Result: $25 \div 5$

\therefore **5**

[Reasoning] Question 5

Numerator: $4.2 + \sqrt{7.29} = 4.2 + 2.7 = 6.9$

Denominator: $(3.1 - 1.4)^2 = (1.7)^2 = 2.89$

Result: $6.9 \div 2.89 = 2.3875\dots$

\therefore **2.39 (3 s.f.)**



[Reasoning] Question 6

Without brackets: $5 \times 3 + 16 - 2 = 15 + 16 - 2 = 29 \neq 93$

Try $5 \times (3 + 4^2) - 2 = 5 \times (3 + 16) - 2 = 5 \times 19 - 2 = 95 - 2 = 93 \checkmark$

$$\therefore 5 \times (3 + 4^2) - 2 = 93$$

[Problem Solving] Question 7

Sasha's error: she expanded $(2+3)^2$ incorrectly.

Correct: $(2+3)^2 = 5^2 = 25$

Sasha computed $2^2+3^2=4+9=13$, which is wrong.

$(a+b)^2 \neq a^2+b^2$ (correct expansion: $a^2+2ab+b^2$)

\therefore **Correct answer is 25, not 13.**

[Problem Solving] Question 8

Numerator: $a^2 - b = 2.4^2 - 1.5 = 5.76 - 1.5 = 4.26$

Denominator: $a + b^2 = 2.4 + 1.5^2 = 2.4 + 2.25 = 4.65$

Result: $4.26 \div 4.65 = 0.9161\dots$

\therefore **0.916 (3 s.f.)**

[Problem Solving] Question 9

Try different arrangements with BIDMAS:

$$4 \times 3 \times (2+1) = 4 \times 3 \times 3 = 36$$

Check others: $(4+2) \times (3+1) = 24$, $4 \times 3 \times 2 + 1 = 25$, $4 \times 3 \times 2 \times 1 = 24$

Largest found: $4 \times 3 \times (2+1) = 36$

\therefore **Largest value = 36**

[Problem Solving] Question 10

Let $a=12$, $b=6$, $c=2$:

$$a \div (b \div c) = 12 \div (6 \div 2) = 12 \div 3 = 4$$

$$(a \div b) \div c = (12 \div 6) \div 2 = 2 \div 2 = 1$$

$4 \neq 1$, so the two expressions are not equal.

Division is not associative because changing the grouping changes the result.

$$\therefore a \div (b \div c) = 4 \neq 1 = (a \div b) \div c \checkmark$$