



eClassroom

GCSE Mathematics

Powers & Roots

Worked Solutions

Pearson Edexcel GCSE & iGCSE Mathematics



Section A — Foundation — Worked Solutions

[Fluency] Question 1

$$12 \times 12 = 144$$

$$\therefore \mathbf{12}$$

[Fluency] Question 2

Find the number whose cube is 216: $6^3 = 216$

$$\therefore \mathbf{6}$$

[Fluency] Question 3

$$7^2 = 49 \quad 8^2 = 64$$

Since $49 < 50 < 64$:

$$\therefore \mathbf{7 < \sqrt{50} < 8}$$

[Fluency] Question 4

$$\sqrt{3^2 + 4^2} = \sqrt{9 + 16} = \sqrt{25}$$

$$\therefore \mathbf{5}$$

[Fluency] Question 5

$\sqrt{2}$ is **irrational**.

This means it cannot be written as a fraction p/q where p and q are integers.

Its decimal expansion is non-terminating and non-repeating: 1.41421...

$$\therefore \mathbf{\sqrt{2} \text{ is irrational.}}$$

[Reasoning] Question 6

Find the largest perfect square factor of 72:

$$72 = 36 \times 2$$

$$\sqrt{72} = \sqrt{36 \times 2} = \sqrt{36} \times \sqrt{2} = 6\sqrt{2}$$

$$\therefore$$

**[Reasoning] Question 7**

$$\sqrt{48} = \sqrt{16 \times 3} = 4\sqrt{3}$$

$$4\sqrt{3} + \sqrt{3} = 5\sqrt{3}$$

∴

[Reasoning] Question 8

$$\text{Side} = \sqrt{45}$$

$$\sqrt{45} = \sqrt{9 \times 5} = 3\sqrt{5}$$

∴

[Problem Solving] Question 9

$$(a) \text{ Area} = 5\sqrt{2} \times 3\sqrt{2} = 15 \times 2 = 30 \text{ cm}^2$$

$$(b) \text{ Perimeter} = 2(5\sqrt{2} + 3\sqrt{2}) = 2 \times 8\sqrt{2} = 16\sqrt{2} \text{ cm}$$

∴ **(a) 30 cm²** **(b) 16√2 cm**

[Problem Solving] Question 10

$$h^2 = 5^2 + (\sqrt{11})^2 = 25 + 11 = 36$$

$$h = \sqrt{36} = 6 \text{ cm}$$

∴ **6 cm**



Section B — Higher — Worked Solutions

[Fluency] Question 1

$$\sqrt{200} = \sqrt{100 \times 2} = 10\sqrt{2}$$

∴

[Fluency] Question 2

$$(3\sqrt{5})^2 = 3^2 \times (\sqrt{5})^2 = 9 \times 5$$

∴ **45**

[Fluency] Question 3

Multiply numerator and denominator by $\sqrt{3}$:

$$\frac{6}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{6\sqrt{3}}{3}$$

∴

[Reasoning] Question 4

Difference of two squares: $(a+b)(a-b) = a^2 - b^2$

$$(2 + \sqrt{3})(2 - \sqrt{3}) = 2^2 - (\sqrt{3})^2 = 4 - 3$$

∴ **1**

[Reasoning] Question 5

$$(3 + \sqrt{5})^2 = 3^2 + 2 \times 3 \times \sqrt{5} + (\sqrt{5})^2$$

$$= 9 + 6\sqrt{5} + 5$$

∴

[Reasoning] Question 6

Multiply by conjugate $(3+\sqrt{5})/(3+\sqrt{5})$:

$$\frac{8}{3-\sqrt{5}} \times \frac{3+\sqrt{5}}{3+\sqrt{5}} = \frac{8(3+\sqrt{5})}{9-5} = \frac{8(3+\sqrt{5})}{4}$$

∴

**[Reasoning] Question 7**

$$\sqrt{75} = \sqrt{25 \times 3} = 5\sqrt{3}$$

$$\sqrt{12} = \sqrt{4 \times 3} = 2\sqrt{3}$$

$$5\sqrt{3} - 2\sqrt{3} = 3\sqrt{3} \quad \checkmark$$

\therefore

[Problem Solving] Question 8

(a) Difference of two squares:

$$(3 + \sqrt{2})(3 - \sqrt{2}) = 9 - (\sqrt{2})^2 = 9 - 2 = 7$$

7 is rational. \checkmark

(b) Perimeter = $2[(3+\sqrt{2})+(3-\sqrt{2})] = 2[6] = 12$ cm

\therefore **(a) Area = 7 cm² (rational \checkmark) (b) Perimeter = 12 cm**

[Problem Solving] Question 9

$$x = \pm\sqrt{75} = \pm\sqrt{25 \times 3} = \pm 5\sqrt{3}$$

\therefore

[Problem Solving] Question 10

(a) Let each leg = l . By Pythagoras: $l^2 + l^2 = 10^2$

$$2l^2 = 100 \Rightarrow l^2 = 50 \Rightarrow l = \sqrt{50} = 5\sqrt{2} \quad \checkmark$$

(b) Area = $\frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 5\sqrt{2} \times 5\sqrt{2}$

$$= \frac{1}{2} \times 25 \times 2 = 25 \text{ cm}^2$$

\therefore **(a) each leg = $5\sqrt{2}$ cm \checkmark (b) Area = 25 cm²**