
Answers

Question 1

A. Write each ratio in its simplest form:

i) $35 : 15$

$$35 \div 5 : 15 \div 5 \\ = 7 : 3$$

ii) $1/3 : 3/4$

$$\text{Multiply both terms by 12:} \\ (1/3 \times 12) : (3/4 \times 12) \\ = 4 : 9$$

B. €58.50 is divided between Ann and Barry in the ratio 8 : 5.

How much does each person receive?

$$\text{Total parts} = 8 + 5 = 13$$

$$\text{Ann's share} = (8/13) \times 58.50 = \text{€}36.00$$

$$\text{Barry's share} = (5/13) \times 58.50 = \text{€}22.50$$

C. Sam and Tina share a bag of sweets in the ratio 2 : 3.

If Sam receives 18 sweets, how many sweets will Tina receive?

$$2 \text{ parts} = 18 \text{ sweets}$$

$$1 \text{ part} = 9 \text{ sweets}$$

$$\text{Tina} = 3 \times 9 = 27 \text{ sweets}$$

Question 2

12 men can paint a school building in 10 days.

$$\text{Total work} = 12 \times 10 = 120 \text{ man-days}$$

a) How long would it take one man to paint the same school by himself?
 $= 120 \text{ days}$

b) How many men would it take to paint the same school in 15 days?
 $120 \div 15 = 8 \text{ men}$

Question 4

A. Find the angles x and y in the diagram, giving reasons for each answer.

In triangle ACB:

$$55^\circ + 80^\circ + y = 180^\circ$$

$$y = 45^\circ$$

Since $AC \parallel BE$, corresponding angles are equal:

$$x = 55^\circ$$

B. Find the value of x and the value of y .

Triangle angles:

$$72^\circ + 2x^\circ + 4y^\circ = 180^\circ$$

$$\rightarrow x + 2y = 54$$

Straight line angles:

$$4y + 5x = 180$$

Solving simultaneously:
 $x = 24^\circ$, $y = 15^\circ$

Question 5

A. Simplify:

$$\begin{aligned}4(2x + 1) + 3(5x - 2) \\&= 8x + 4 + 15x - 6 \\&= 23x - 2\end{aligned}$$

B. Simplify:

$$\begin{aligned}-2a(a - 3y) - a(a + 4y) \\&= -2a^2 + 6ay - a^2 - 4ay \\&= -3a^2 + 2ay\end{aligned}$$

C. Simplify:

$$\begin{aligned}(x + 4)(x - 3) \\&= x^2 + x - 12\end{aligned}$$

Question 6

If $t = 4$ and $p = -3$, find the value of:

$$\begin{aligned}2t - 3p^2 \\&= 2(4) - 3(9) \\&= 8 - 27 \\&= -19\end{aligned}$$

Question 7

A. Solve for x :

$$\begin{aligned}2x + 7 &= 4x - 5 \\2x &= 12 \\x &= 6\end{aligned}$$

B. Solve for y :

$$\begin{aligned}5(y - 2) + 12 &= 2(y - 5) \\5y + 2 &= 2y - 10 \\3y &= -12 \\y &= -4\end{aligned}$$

Question 8

Bart has x euro.

Lisa has $x + 12$ euro.

Maggie has $4x$ euro.

Equation:

$$x + (x + 12) = 4x$$

$$2x + 12 = 4x$$

$x = 6$
Bart has €6
(Lisa €18, Maggie €24)

Question 9

The length of a rectangle is 3 cm longer than its width.

Let width = x cm

a) Length = $x + 3$ cm

b) Perimeter

$$= 2(x + x + 3)$$

$$= 4x + 6 \text{ cm}$$

c) If the perimeter is 26 cm:

$$4x + 6 = 26$$

$$x = 5 \text{ cm}$$

Question 10

A. Solve:

$$5x - 7 > 3, \quad x \in \mathbb{N}$$

$$5x > 10$$

$$x > 2$$

$$x \geq 3$$

B. Solve:

$$7x + 1 \leq 3x - 15, \quad x \in \mathbb{R}$$

$$4x \leq -16$$

$$x \leq -4$$

Question 11

A. Solve:

$$x + y = 5$$

$$x - y = -7$$

$$2x = -2$$

$$x = -1$$

$$y = 6$$

B. Solve:

$$3x + 4y = 5$$

$$5x - 6y = 2$$

$$x = 1, y = \frac{1}{2}$$

Question 12

A. Use Pythagoras' Theorem to find side length a .

$$a^2 = 10^2 + 12^2$$

$$a = \sqrt{244}$$

$$a = 2\sqrt{61}$$

B. Find side length f .

$$f^2 = 5^2 - 2^2$$

$$f = \sqrt{21}$$

Question 13

$$\text{Area} = \text{base} \times \text{height} = 88 \text{ cm}^2$$

$$\text{Base} = 11 \text{ cm}$$

$$h = 88 \div 11$$

$$h = 8 \text{ cm}$$

Question 14

Find the circumference of a circle with diameter 18 cm.

$$C = \pi d$$

$$= 18\pi$$

$$\approx 56.5 \text{ cm (to 1 d.p.)}$$

Question 15

a) Work out the area of the front face of the shed.

$$\text{Rectangle area} = 8 \times 7 = 56 \text{ m}^2$$

$$\text{Triangle area} = \frac{1}{2} \times 8 \times 3 = 12 \text{ m}^2$$

$$\text{Total area} = 68 \text{ m}^2$$

b) Hence work out the capacity of the shed in litres

$$(1 \text{ m}^3 = 1,000 \text{ litres})$$

$$\text{Volume} = 68 \times 20 = 1,360 \text{ m}^3$$

$$= 1,360,000 \text{ litres}$$

Question 16

A cylinder with radius 15 cm and height 24 cm

$$\text{Volume} = \pi r^2 h$$

$$= \pi \times 15^2 \times 24$$

$$= 5400\pi \text{ cm}^3$$

Question 17

A sphere of radius 7 cm fits exactly into a cube.

A. Volume of the sphere

$$= \left(\frac{4}{3}\right)\pi r^3$$

$$= \left(\frac{4}{3}\right)\pi(7^3)$$

$$= \left(\frac{1372}{3}\right)\pi \text{ cm}^3$$

B. Volume of the box

$$\text{Side length} = 14 \text{ cm}$$

$$14^3 = 2744 \text{ cm}^3$$

C. Volume not occupied by the sphere

$$2744 - (1372/3)\pi$$

$$\approx 1307 \text{ cm}^3 \text{ (nearest cm}^3\text{)}$$

D . Percentage of the box not occupied

$$(1307 \div 2744) \times 100$$

$$\approx 47.6\%$$