

Answers

□

Question 1

A. Write each ratio in its simplest form:

i) $35 : 15$

$$35 \div 5 : 15 \div 5$$

$$= 7 : 3$$

ii) $1/3 : 3/4$

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?

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

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

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

□

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 :

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

$$y = -4$$

□

Q uestion 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)

□

Q uestion 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:

$$4x + 6 = 26$$

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

□

Q uestion 10

A. Solve:

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

$$5x > 10$$

$$x > 2$$

$$x \geq 3$$

□

B. Solve:

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

$$4x \leq -16$$

$$x \leq -4$$

□

Q uestion 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

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

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

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

□

Q uestions 16

A cylinder with radius 15 cm and height 24 cm

$$\begin{aligned}\text{Volume} &= \pi r^2 h \\ &= \pi \times 15^2 \times 24 \\ &= 5400\pi \text{ cm}^3\end{aligned}$$

□

Q uestions 17

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

A. Volume of the sphere

$$\begin{aligned}&= (4/3)\pi r^3 \\ &= (4/3)\pi(7^3) \\ &= (1372/3)\pi \text{ cm}^3\end{aligned}$$

□

B. Volume of the box

Side length = 14 cm

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

□

C. Volume not occupied by the sphere

$$\begin{aligned}&2744 - (1372/3)\pi \\ &\approx 1307 \text{ cm}^3 \text{ (nearest cm}^3\text{)}\end{aligned}$$

□

D . P ercentage of the box not occupied

$$\begin{aligned}&(1307 \div 2744) \times 100 \\ &\approx 47.6\%\end{aligned}$$