Unit 12 · Perimeter, Area and Volume

HARDER PRACTICE QUESTIONS · ANSWER KEY

Full marks 34

Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Work backwards

ANSWER A · 3

i. Area = length × breadth, so 12 × breadth = 72. Breadth = 72 ÷ 12 = **6 m**. Check: 12 × 6 = 72. ✓

ii. Perimeter = 2 × 12 + 2 × 6 = 24 + 12 = **36 m**.

MARKING SCHEME

- ✓ 12 × breadth = 72.
- ✓ Breadth 6 m.
- ✓ Perimeter 36 m.

2 Four times round

ANSWER A · 3

i. One time round: 160 ÷ 4 = **40 m**.

ii. A square has 4 equal sides: 40 ÷ 4 = **10 m**.

iii. 10 × 10 = **100 sq. m**.

MARKING SCHEME

- ✓ Perimeter 40 m.
- ✓ Side 10 m.
- ✓ Area 100 sq. m.

3 Think: cut off a corner

ANSWER HA · 4

i. Rectangle: 6 × 4 = **24 sq. cm**. The cut square: 2 × 2 = 4 sq. cm. The L: 24 − 4 = **20 sq. cm**.

ii. Going round: 6 + 2 + 2 + 2 + 4 + 4 = **20 cm**.

iii. **No.** The rectangle's perimeter was 2 × 6 + 2 × 4 = 20 cm too. The cut takes away 2 cm of the top edge and 2 cm of the side edge, but adds two new edges of 2 cm inside the corner. So the perimeter stays the same, while the area gets smaller.

MARKING SCHEME

- ✓ 24 sq. cm and 20 sq. cm.
- ✓ Perimeter of the L, 20 cm.
- ✓ The rectangle's perimeter was also 20 cm.
- ✓ The new inside edges replace the edges cut away.

4 A carpet and a border

ANSWER A · 4

i. Area = 6 × 5 = 30 sq. m. Cost = 30 × 400 = **Rs. 12,000**.

ii. Perimeter = 2 × 6 + 2 × 5 = 12 + 10 = 22 m. Leave out the door: 22 − 1 = **21 m**.

MARKING SCHEME

- ✓ Area 30 sq. m.
- ✓ Rs. 12,000.
- ✓ Perimeter 22 m.
- ✓ 21 m without the door.

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5 Spot the error

ANSWER U · 3

The **numbers** are the same, but the **measures** are different. The perimeter is a length, **16 cm**: the distance round the edge. The area is **16 sq. cm**: 16 squares covering the inside. A length and an area can't be equal, just as 16 kg can't be equal to 16 m. With sides of 5 cm, the numbers aren't even the same: 20 cm and 25 sq. cm.

MARKING SCHEME

- ✓ Perimeter 16 cm, a length round the edge.
- ✓ Area 16 sq. cm, the squares inside.
- ✓ Different measures, so not the same thing.

6 Packing soap

ANSWER A · 3

i. Along the length $20 \div 5 = \mathbf{4}$, along the breadth $12 \div 4 = \mathbf{3}$, up the height $10 \div 2 = \mathbf{5}$.
ii. One layer has $4 \times 3 = 12$ bars, and there are 5 layers: $12 \times 5 = \mathbf{60\ bars}$.
iii. Carton: $20 \times 12 \times 10 = 2{,}400$ cubic cm. One bar: $5 \times 4 \times 2 = 40$ cubic cm. $2{,}400 \div 40 = \mathbf{60}$. ✓

MARKING SCHEME

- ✓ 4, 3 and 5.
- ✓ 60 bars.
- ✓ $2{,}400 \div 40 = 60$.

7 A fish tank

ANSWER A · 4

i. $50 \times 30 \times 40 = 1{,}500 \times 40 = \mathbf{60{,}000\ cubic\ cm}$.
ii. $60{,}000 \div 1{,}000 = \mathbf{60\ liters}$.
iii. The water is a cuboid 50 cm by 30 cm by 30 cm: $50 \times 30 \times 30 = 45{,}000$ cubic cm, which is $45{,}000 \div 1{,}000 = \mathbf{45\ liters}$.

MARKING SCHEME

- ✓ 60,000 cubic cm.
- ✓ 60 liters.
- ✓ 45,000 cubic cm of water.
- ✓ 45 liters.

8 A bigger cube

ANSWER HA · 3

i. A cube is length × length × length. Try: $3 \times 3 \times 3 = 27$, $4 \times 4 \times 4 = 64$. So each edge is **4 cm**.
ii. The new cube is $5 \times 5 \times 5 = 125$ cubes. He needs $125 - 64 = \mathbf{61\ more}$.

MARKING SCHEME

- ✓ $4 \times 4 \times 4 = 64$.
- ✓ $5 \times 5 \times 5 = 125$.
- ✓ 61 more cubes.

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9 Is it possible?

ANSWER HA · 4

i. **Yes.** 4 cm by 3 cm: area $4 \times 3 = 12$ sq. cm, perimeter $2 \times 4 + 2 \times 3 = 14$ cm.
ii. **No.** A perimeter of 20 cm makes each side $20 \div 4 = 5$ cm, and then the area is $5 \times 5 = 25$ sq. cm.
iii. **Yes.** Its bottom layer must have $24 \div 2 = 12$ cubes, so for example 4 cm by 3 cm by 2 cm (or 6 by 2 by 2, or 12 by 1 by 2).
iv. **No.** $2 \times 2 \times 2 = 8$ is too small and $3 \times 3 \times 3 = 27$ is too big.

MARKING SCHEME

- ✓ i. Yes, 4 cm by 3 cm.
- ✓ ii. No, the area would be 25 sq. cm.
- ✓ iii. Yes, with an example.
- ✓ iv. No, 8 and 27 are the nearest.

10 Make your own

ANSWER HA · 3

i. **1 by 24**: 50 cm. **2 by 12**: 28 cm. **3 by 8**: 22 cm. **4 by 6**: 20 cm.
ii. **4 by 6**, with 20 cm. It is the one closest to a square. The longer and thinner a rectangle is, the bigger its perimeter for the same area.

MARKING SCHEME

- ✓ All four rectangles.
- ✓ Their perimeters.
- ✓ 4 by 6 is smallest, closest to a square.

See it at Science Playground

Exhibits and plants at the center, Bhaktapur, that go with this unit. Book a class visit at science-playground.com/booking.

- **Pac-Man Cube Mosaic** (exhibit): Each picture is a rectangle of square cube faces, with no gaps. Count the squares in a row and the rows, then multiply: length × breadth.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	0	3	17	14	**34**

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