Unit 10 · Perimeter, Area and Volume

HARDER PRACTICE QUESTIONS · ANSWER KEY

Full marks 30

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

1 Same fence, different gardens

ANSWER A · 4

i. Length + breadth = half of 24 = 12 m.

Length (m)	11	10	9	8	7	6
Breadth (m)	1	**2**	**3**	**4**	**5**	**6**
Area (m^2)	11	**20**	**27**	**32**	**35**	**36**

ii. The **6 m by 6 m square**, with **36 m^2**.

iii. **No**: with the same 24 m of fence the area goes from 11 m^2 to 36 m^2. The nearer the bed is to a square, the bigger its area.

MARKING SCHEME

- ✓ Length + breadth = 12 m.
- ✓ The breadths and areas in the table.
- ✓ The 6 m square, 36 m^2.
- ✓ No, the areas differ.

2 Spot the error

ANSWER U · 3

i. Side 3 cm: area $3 \times 3 = 9$ cm^2. Side 6 cm: area $6 \times 6 = 36$ cm^2, which is **not** $2 \times 9 = 18$ cm^2.

ii. The area becomes **4 times** as big: twice as many rows of twice as many squares.

iii. Edge 3 cm: 27 cm^3; edge 6 cm: 216 cm^3. The volume becomes **8 times** as big ($2 \times 2 \times 2$).

MARKING SCHEME

- ✓ 9 cm^2 and 36 cm^2.
- ✓ 4 times the area.
- ✓ 8 times the volume.

3 A leaf on squared paper

ANSWER U · 3

i. 18 + 10 = **about 28 cm^2**. The 7 squares less than half covered are left out.

ii. **No.** Counting every touched square counts all the bits less than half covered as whole squares, so 35 cm^2 is too big.

iii. Use **smaller squares** (for example 5 mm squares): the rough edge is then a smaller part of the count.

MARKING SCHEME

- ✓ About 28 cm^2.
- ✓ No, it counts the small bits as whole squares.
- ✓ Smaller squares.

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4 Tiling a floor

ANSWER A · 3

i. 4 m = 400 cm, and 400 ÷ 25 = **16** tiles along the length. 3 m = 300 cm, and 300 ÷ 25 = **12** along the breadth.
ii. 16 × 12 = **192 tiles**.
iii. 192 × 85 = **Rs 16320**.

MARKING SCHEME

✓ 16 and 12.
✓ 192 tiles.
✓ Rs 16320.

5 A fence with a gate

ANSWER A · 4

i. Breadth = 135 ÷ 15 = **9 m**.
ii. P = 2(15 + 9) = **48 m**.
iii. One round, without the gate: 48 − 2 = 46 m. Three rounds: 46 × 3 = **138 m**.
iv. 138 × 45 = **Rs 6210**.

MARKING SCHEME

✓ 9 m.
✓ 48 m.
✓ 138 m, the gate left out of each round.
✓ Rs 6210.

6 A path round a lawn

ANSWER HA · 3

The path adds 1 m on **each** side, so the lawn and path together are 10 + 2 = 12 m long and 6 + 2 = 8 m broad: 12 × 8 = 96 m^2.
Lawn: 10 × 6 = 60 m^2. Path: 96 − 60 = **36 m^2**.

MARKING SCHEME

✓ The outer rectangle 12 m by 8 m.
✓ 96 m^2 and 60 m^2.
✓ 36 m^2.

7 The water tank

ANSWER A · 3

i. V = 2 × 1.5 × 1 = **3 m^3**.
ii. 3 × 1000 = **3000 liters**.
iii. 3000 ÷ 250 = **12 days**.

MARKING SCHEME

✓ 3 m^3.
✓ 3000 liters.
✓ 12 days.

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8 Make your own

ANSWER A · 3

For example, **10 cm long, 9 cm broad and 4 cm high**: $10 \times 9 \times 4 = 360$ cm^3. Its base is $10 \times 9 = \mathbf{90}$ **cm^2**.

Any three different whole numbers that multiply to 360 are right (such as 12, 6 and 5, or 8, 9 and 5), with the base's area from its length and breadth.

MARKING SCHEME

- ✓ Three different whole numbers.
- ✓ Their product is 360.
- ✓ The base's area, in cm^2.

9 Think: how many boxes fit?

ANSWER HA · 4

i. $60 \times 40 \times 30 = \mathbf{72000\ cm^3}$.

ii. 6 along the length, 4 along the breadth and 3 layers: $6 \times 4 \times 3 = \mathbf{72\ boxes}$. ($72000 \div 1000 = 72$ too.)

iii. A 20 cm cube has a volume of 8000 cm^3, and $72000 \div 8000 = 9$. But only 3 fit along the length ($60 \div 20$), 2 along the breadth ($40 \div 20$), and **1 layer** in the 30 cm height, with 10 cm empty above it: $3 \times 2 \times 1 = \mathbf{6\ cubes}$. Dividing volumes works only when the boxes fill the carton with no space left over.

MARKING SCHEME

- ✓ 72000 cm^3.
- ✓ 72 boxes.
- ✓ Only 6 fit ($3 \times 2 \times 1$).
- ✓ The 10 cm left at the top can't take another layer.

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.
- **Woods of Nepal** (exhibit): Each wood block is a cube with 10 cm edges, so its volume is $10 \times 10 \times 10 = 1{,}000$ cm^3. Weigh two kinds: same volume, same weight?

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	0	6	17	7	**30**

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