Unit 10 · Triangle and Quadrilaterals

HARDER WORKSHEET · ANSWER KEY

Full marks 22

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

1 Find the areas

ANSWER A · 3

$\triangle APD$ stands on the base AD with P on $BC \parallel AD$: $\frac{1}{2} \times 60 = \mathbf{30\ cm^2}$.
$\triangle ABC$ is half the parallelogram, 30 cm^2, and AP is its median: $\triangle ABP = \mathbf{15\ cm^2}$.
In the same way DP is a median of $\triangle DBC$ (30 cm^2): $\triangle PCD = \mathbf{15\ cm^2}$. Check: $30 + 15 + 15 = 60$. ✓

MARKING SCHEME

- ✓ $\triangle APD = 30$ cm^2.
- ✓ $\triangle ABP = 15$ cm^2, by the median.
- ✓ $\triangle PCD = 15$ cm^2.

2 Show it

ANSWER HA · 3

1. Area of $\triangle ABD$ = area of $\triangle ADC = \frac{1}{2}$ area of $\triangle ABC$: AD is a median.
2. Area of $\triangle EBD = \frac{1}{2}$ area of $\triangle ABD$: BE is a median of $\triangle ABD$. Likewise area of $\triangle ECD = \frac{1}{2}$ area of $\triangle ADC$.
3. Area of $\triangle BEC = \triangle EBD + \triangle ECD = \frac{1}{2}(\triangle ABD + \triangle ADC) = \frac{1}{2}$ area of $\triangle ABC$.

MARKING SCHEME

- ✓ AD halves $\triangle ABC$.
- ✓ BE and CE halve $\triangle ABD$ and $\triangle ADC$.
- ✓ Adding: $\triangle BEC = \frac{1}{2}\ \triangle ABC$.

3 Spot the error

MARKING SCHEME U · 3

- ✓ The height is 5 cm, not the side 6 cm.
- ✓ Area of $ABCD = 50$ cm^2.
- ✓ $\triangle ABE$ is half: 25 cm^2.

4 Work backwards

ANSWER A · 3

Let the parallelogram be x cm^2; the triangle is $\frac{x}{2}$. Then $x - \frac{x}{2} = 24$, so $x = \mathbf{48\ cm^2}$ and the triangle **24 cm^2**.
$8 \times h = 48$, so the lines are **6 cm** apart.

MARKING SCHEME

- ✓ The triangle is half the parallelogram: $x - \frac{x}{2} = 24$.
- ✓ 48 cm^2 and 24 cm^2.
- ✓ The distance 6 cm.

5 In a real setting

ANSWER

Q is where the line through P parallel to AB meets the south edge. From A to B the boundary goes 30 m east for 64 m south; from P, 32 m south means 15 m east. So Q is $80 + 15 = \mathbf{95\ m}$ from the south-west corner.

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Ram's share before: the trapezium west of AB, $\frac{1}{2} \times (70 + 40) \times 64 = 3{,}520$ m^2, and $\triangle ABP$, which sticks out east of it. That triangle is the field's rectangle 40 m to 80 m east and 0 to 64 m north (2,560 m^2) without three right triangles, 960, 160 and 640 m^2: 800 m^2. Together 4,320 m^2. After, the trapezium with parallel sides 95 m and 40 m, 64 m apart: $\frac{1}{2} \times (95 + 40) \times 64 =$ **4,320 m^2**. ✓ A · 4

MARKING SCHEME

- ✓ Q on the line through P parallel to AB.
- ✓ Q 95 m from the corner.
- ✓ Ram's share before, 4,320 m^2.
- ✓ Ram's share after, 4,320 m^2, the same.

6 Is the claim true?

ANSWER HA · 2

Yes. With base b: $\frac{1}{2} \times b \times h_t = b \times h_p$, so $h_t = 2h_p$.

MARKING SCHEME

- ✓ $\frac{1}{2}\, b\, h_t = b\, h_p$.
- ✓ Right: $h_t = 2h_p$.

7 Make your own

ANSWER HA · 2

The triangle's base must be 1½ times the parallelogram's ($\frac{1}{2} \times 1.5 = 0.75$). For example a parallelogram on 4 cm (16 cm^2) and a triangle on 6 cm ($\frac{1}{2} \times 6 \times 4 = 12$ cm^2, three quarters of 16).

MARKING SCHEME

- ✓ Triangle's base 1.5 times the parallelogram's.
- ✓ A correct pair with both areas.

8 Think

ANSWER HA · 2

The area **stays the same**, equal to $\triangle ABC$'s: the base and the height don't change. The perimeter **grows without limit**, since DB and DC get longer and longer. Equal area says nothing about perimeter.

MARKING SCHEME

- ✓ The area doesn't change (same base, same parallels).
- ✓ The perimeter keeps growing.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	0	3	10	9	**22**

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