Unit 13 · Lines and Angles

HARDER PRACTICE QUESTIONS · ANSWER KEY

Full marks 26

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

1 Find every angle

ANSWER A · 3

i. Co-interior angles add up to 180°: $2x + 3x = 180°$, so $x = 36°$. The angles are **72° and 108°**.

ii. **Two sizes**, 72° and 108°: four angles of each. They add up to $4 \times 72° + 4 \times 108° = \mathbf{720}°$ (two full turns, one at each crossing).

MARKING SCHEME

- ✓ $2x + 3x = 180°$.
- ✓ 72° and 108°.
- ✓ Two sizes, adding up to 720°.

2 With algebra

ANSWER A · 3

i. For parallel lines, corresponding angles are equal: $3x - 10 = 2x + 25$, so $x = \mathbf{35}$ (each angle is 95°).

ii. **No.** The angles are 80° and 85°. They aren't equal, so the lines aren't parallel.

MARKING SCHEME

- ✓ $3x - 10 = 2x + 25$.
- ✓ $x = 35$.
- ✓ No: 80° and 85° aren't equal.

3 The bent line

ANSWER HA · 3

Draw XY through E, parallel to AB and CD, with X to the left of E.

$\angle AEX = \angle BAE = 40°$ (alternate angles, $AB \parallel XY$).

$\angle CEX = \angle DCE = 35°$ (alternate angles, $CD \parallel XY$).

$\angle AEC = 40° + 35° = \mathbf{75}°$.

MARKING SCHEME

- ✓ The line through E parallel to AB.
- ✓ 40° and 35°, with the reason.
- ✓ 75°.

4 Show it

ANSWER HA · 3

Draw $CE \parallel BA$, with E on the same side of BD as A.

$\angle ACE = \angle BAC$ (alternate angles, $BA \parallel CE$, transversal AC).

$\angle ECD = \angle ABC$ (corresponding angles, $BA \parallel CE$, transversal BD).

$\angle ACD = \angle ACE + \angle ECD = \angle BAC + \angle ABC$.

MARKING SCHEME

- ✓ $\angle ACE = \angle BAC$, alternate angles.
- ✓ $\angle ECD = \angle ABC$, corresponding angles.
- ✓ The two added to give $\angle ACD$.

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5 Two bisectors

ANSWER HA · 3

$\angle BGH + \angle DHG = 180°$ (co-interior angles).
In $\triangle GKH$, the angles at G and H are halves of these, so they add up to 90°.
$\angle GKH = 180° - 90° = \mathbf{90}°$. It **doesn't change**, however the transversal leans.

MARKING SCHEME

- ✓ The co-interior angles add up to 180°.
- ✓ The halves add up to 90°.
- ✓ 90°, always.

6 Spot the error

ANSWER U · 3

Two mistakes. Alternate angles are equal **only if the lines are parallel**: she can't use that before she knows the lines are parallel, and one angle alone can't tell her.
Co-interior angles aren't equal: for parallel lines they **add up to 180**°, so the co-interior angle would be 70°.
To show that lines are parallel, she must measure a second angle.

MARKING SCHEME

- ✓ Alternate angles are equal only for parallel lines.
- ✓ Co-interior angles add up to 180°, so 70° for parallel lines.
- ✓ One angle isn't enough to show the lines are parallel.

7 In a real setting

ANSWER A · 4

i. **45**°: the ray between the mirrors is a transversal of two parallel lines, and these are alternate angles.
ii. $180° - 45° - 45° = \mathbf{90}°$, each.
iii. The ray that comes in and the middle ray make an angle of 90° at the top mirror, and the middle ray and the ray that leaves make an equal angle at the bottom. These are alternate angles on the middle ray, so the two outer rays are **parallel**.
iv. **Yes.** The same steps work with 40°: alternate angles are equal for any angle.

MARKING SCHEME

- ✓ 45°, alternate angles.
- ✓ 90°.
- ✓ Equal alternate angles on the middle ray, so the rays are parallel.
- ✓ Yes.

8 Think

ANSWER HA · 2

The corresponding angle at a equals the one at c, and the corresponding angle at b equals the one at c.
So the corresponding angles at a and b are equal, and that makes $a \parallel b$.

MARKING SCHEME

- ✓ The angles at a and at b each equal the angle at c.
- ✓ So the corresponding angles at a and b are equal, and $a \parallel b$.

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9 Make your own

HA · 2

ANSWER

For example, $(5x + 10)°$ and $(2x + 30)°$. $7x + 40 = 180$ gives $x = 20$, and the angles are $110°$ and $70°$.

MARKING SCHEME

- ✓ Two expressions that add up to 180 when $x = 20$.
- ✓ The two angles, adding up to 180°.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	0	3	10	13	**26**

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