Answers - Angles, shapes and symmetry

Year: Year 4

Answer to Question 1

a. The angle is **acute** (smaller than a right angle).
b. The angle is **a right angle**.
c. The angle is **obtuse** (bigger than a right angle).
d. The angle is **acute** (smaller than a right angle).
e. The angle is **obtuse** (bigger than a right angle).
f. The angle is **acute** (smaller than a right angle).

Answer to Question 2

a. A is a little more than a right angle.
b. B is a small, sharp angle.
c. C is a right angle (it shows the small square).
d. The order, smallest first, is **B, C, A**. B is acute, C is a right angle and A is obtuse.

Answer to Question 3

Shape	Number of sides	Name
Triangle	**3**	triangle
Square or rectangle	4	quadrilateral
Pentagon	**5**	pentagon
6-sided shape	6	hexagon
8-sided shape	8	octagon

A stop sign is an octagon (8 sides). A pencil is usually a hexagon (6 sides) when you look at its end.

Answer to Question 4

a. All three sides are equal: **equilateral**.
b. Two sides are equal: **isosceles**.
c. No sides are equal: **scalene**.
d. Two sides are equal (8 cm and 8 cm): **isosceles**.
e. It has a right angle, so it is a **right-angled triangle**; with sides of 3 and 4 and a right angle the third side is 5 cm, so it is scalene as well.

Answer to Question 5

a. 4 equal sides and 4 right angles describe a **square**. It is the only quadrilateral with both properties.
b. Opposite sides equal in pairs and 4 right angles, but not all sides equal: this is a **rectangle**.
c. A quadrilateral with exactly one pair of parallel sides is a **trapezium**. A parallelogram has two pairs, so it does not fit.
d. 4 equal sides but no right angles: a **rhombus**, which looks like a square pushed over.

Answer to Question 6

a. A rectangle folds exactly in half across the middle and down the middle: **2** lines. The diagonals are not lines of symmetry, because the halves do not match when folded.
b. A square folds onto itself across, down and along both diagonals: **4** lines.
c. A kite only folds onto itself along the line through its top and bottom corners: **1** line.
d. A regular hexagon has a line through each pair of opposite corners (3) and through each pair of opposite sides (3): **6** lines.
e. A regular pentagon has a line from each corner to the middle of the opposite side: **5** lines. A regular polygon has as many lines of symmetry as sides.

Answer to Question 7

a. $3 \times 30° =$ **90°**, a right angle.
b. $1 \times 30° =$ **30°**, an acute angle.
c. $4 \times 30° =$ **120°**, an obtuse angle.
d. $6 \times 30° =$ **180°**, a straight line.

Answer to Question 8

a. A quarter turn clockwise from north is **east**.
b. A half turn from north is **south**.
c. Three quarter turns from north: east, south, west. She faces **west**.
d. A full turn is **360°**. She faces **north** again.

Answer to Question 9

a. **8 sides** (octagon).

b. **3 sides** (triangle). If all the sides are equal it is an **equilateral** triangle.
c. A square has **4** lines of symmetry, whichever way it is turned.
d. An equilateral triangle has **3** lines of symmetry.

Answer to Question 10

a. A hexagon has 6 sides. 3 × 6 = **18 sides**.
b. Each square has 4 corners. 6 × 4 = **24 corners**.
c. Each triangle has 3 sides. 8 × 3 = **24 sides**.
d. The hexagon: it has **6** lines of symmetry (a square has 4 and a triangle 3).

Answer to Question 11

a. An isosceles triangle has **2** equal sides.
b. A rectangle has **4** right angles.
c. A square has **4** lines of symmetry.
d. A kite has **1** line of symmetry.

Answer to Question 12

a. A, H, M and T each have a vertical line of symmetry: **A, H, M, T**.
b. **H** has 2 lines of symmetry: one vertical and one horizontal.
c. **S and F** have no lines of symmetry.
d. Each letter is symmetrical, but the word is not: the first letter M is not the mirror image of the last letter T. So the word **MAT** has no vertical line of symmetry. (The word MOM or TOT would be symmetrical.)

Answer to Question 13

a. A kite has **4** sides.
b. 2 × 30 + 2 × 50 = 60 + 100 = **160 cm**.
c. The kite has **1** line of symmetry.
d. 160 ÷ 10 = 16 and 16 × 20p = 320p = **£3.20**.

Answer to Question 14

a. Q (7, 7) and S (8, 8) each have 2 equal sides: **Q and S**.
b. P has 3 equal sides: **P**.
c. R has no equal sides: **R**.
d. Q: 5 + 7 + 7 = **19 cm**. P = 18, Q = 19, R = 19, S = 21. The longest perimeter is **S (21 cm)**.

Answer to Question 15

Shape	Number of sides	Number of right angles	Lines of symmetry
Square	4	4	4
Rectangle	4	4	2
Equilateral triangle	3	0	3
Regular hexagon	6	0	6
Kite	4	0	1

a. The table is completed above.
b. The regular hexagon has the most: **6** lines of symmetry.
c. The **equilateral triangle, the regular hexagon and the kite** have no right angles.
d. The **square (4 and 4), the equilateral triangle (3 and 3) and the regular hexagon (6 and 6)** have as many lines of symmetry as sides: all three are regular polygons.

Answer to Question 16

a. A regular octagon has 8 equal sides: 8 × 4 = **32 cm**.
b. 4 × 3 = **12 cm**.
c. The octagon has **8** lines of symmetry and the square has **4**.
d. The logo can only be symmetric along lines that are lines of symmetry of both shapes. A square placed with sides parallel to the sides of the octagon shares 4 of those lines, so the logo has **4** lines of symmetry.
e. 10 × 32 = **320 cm** (3 m 20 cm).

Answer to Question 17

a. 6 × 4 = **24 m**.
b. 8 × 3 = **24 m**.
c. Hexagons: 5 × 6 = 30 m. Pentagons: 4 × 5 = 20 m. Together **50 m**.
d. 24 + 24 + 50 = **98 m**.
e. 98 m rounds up to 100 m, which is 10 lots of 10 m: 10 × £2 = **£20**.

Answer to Question 18

a. A is 3 squares to the left of x = 4, so A′ is 3 squares to the right: **A′ (7, 1)**.
b. B is 1 square from the line: **B′ (5, 1)**. C (3, 4) is 1 square from the line: **C′ (5, 4)**. D is 3 squares from the line: **D′ (7, 3)**.
c. A and A′ are 3 + 3 = **6 squares** apart. B and B′ are 1 + 1 = **2 squares** apart.

d. Reflection is like a mirror image: every point is the same distance from the mirror line as its reflection. All the distances stay the same, so the sides and the angles stay the same and the shape has the **same size**; it is only turned the other way round.

Answer to Question 19

a. 360 ÷ 4 = **90°**, a right angle.
b. 360 ÷ 8 = **45°**, an acute angle.
c. 360 ÷ 6 = **60°**.
d. 3 × 45° = **135°**, an obtuse angle.
e. 2 slices from 8: 2 × 45° = 90°. 1 slice from 4: 90°. They are **equal**, both 90°.

Answer to Question 20

a. There are **4** small triangles.
b. The 4 small triangles, plus 4 larger triangles each made of 2 small triangles (one for each side of the square): 4 + 4 = **8 triangles**.
c. A square has **4** lines of symmetry. Yes, both diagonals are lines of symmetry (the other two go through the middle of opposite sides).
d. A decagon has **10** lines of symmetry and **10** angles.