Answers - Angles and polygons

Year: Year 5

Answer to Question 1

a. 30° is **acute** (less than 90°).
b. 90° is **a right angle** (exactly one quarter turn).
c. 135° is **obtuse** (between 90° and 180°).
d. 200° is **reflex** (between 180° and 360°).
e. 180° is **a straight angle** (exactly a half turn).
f. 350° is **reflex** (between 180° and 360°).

Answer to Question 2

a. A is **acute**, B is **obtuse**, C is **reflex**.
b. A is less than a right angle, about **40°**. B is a bit more than a right angle, about **120°**. C is more than a straight line, about **250°**.
c. **A (40°), B (120°), C (250°)**.

Answer to Question 3

a. $x = 180 - 130 =$ **50°**.
b. $x = 180 - 65 =$ **115°**.
c. $45 + 80 = 125$, so $x = 180 - 125 =$ **55°**.
d. $x = 180 - 90 =$ **90°**.
e. $115 + 25 = 140$, so $x = 180 - 140 =$ **40°**.

Answer to Question 4

a. $110 + 90 + 75 = 275$. $x = 360 - 275 =$ **85°**.
b. $x = 360 - 200 =$ **160°**.
c. $120 + 120 = 240$. $x = 360 - 240 =$ **120°**.
d. $45 + 135 + 90 = 270$. $x = 360 - 270 =$ **90°**.
e. $35 + 85 + 140 = 260$. $x = 360 - 260 =$ **100°**.

Answer to Question 5

a. Count the sides of each shape: the first has 5 sides, the second 6 and the third 8. The answer is **pentagon, hexagon, octagon**.
b. Any polygon with four straight sides is called a **quadrilateral** (squares,

rectangles and kites are all quadrilaterals).
c. Three straight sides and three vertices make a **triangle**.
d. The prefix “deca” means ten, as in decade. A 10-sided polygon is a **decagon**.
e. A seven-sided shape is a **heptagon**; the 50p and 20p coins are based on this shape.

Answer to Question 6

a. A regular polygon has all its sides equal, so perimeter = number of sides × side length. A hexagon has 6 sides: 6 × 6 = **36 cm**.
b. An octagon has 8 equal sides: 8 × 4 = **32 cm**.
c. A pentagon has 5 equal sides: 5 × 9 = **45 cm**.
d. An equilateral triangle has 3 equal sides: 3 × 12 = **36 cm**.
e. Work backwards: the 10 equal sides share the perimeter, so 80 ÷ 10 = **8 cm**. Check: 10 × 8 = 80.

Answer to Question 7

a. 360 ÷ 12 = **30°**.
b. At 3 o'clock the hands are 3 hours apart: 3 × 30 = **90°**, a right angle.
c. 6 hours apart: 6 × 30 = **180°**, a straight line.
d. 4 hours apart: 4 × 30 = **120°**, obtuse.
e. 15 minutes is a quarter of an hour: 360 ÷ 4 = **90°**.

Answer to Question 8

a. It has **8 sides**. All the sides are equal and all the angles are equal because it is regular.
b. 8 × 25 = **200 cm** (2 m).
c. 195 ÷ 3 = **65 cm**.
d. 12 × 200 cm = 2,400 cm = **24 m**.

Answer to Question 9

a. The angles at the centre make a full turn of 360°, shared equally between 8 slices: 360 ÷ 8 = **45°**.
b. Shared between 6 slices: 360 ÷ 6 = **60°**.
c. Shared between 12 slices: 360 ÷ 12 = **30°**, like the angle between two numbers on a clock face.
d. Each slice is 45°, so 3 slices make 3 × 45 = **135°**. The rest of the pizza is 360 − 135 = **225°** (5 slices × 45°).

Answer to Question 10

a. Add the turns: 90 + 90 = **180°**. That is a half turn, a straight angle, so the robot now faces the opposite way.
b. A quarter turn is 90°, so three quarters is 3 × 90 = **270°**.
c. 180° is a half turn, which points the opposite way. The opposite of north is **south**.
d. A full turn is 360°. The missing part is 360 − 270 = **90°**, one more quarter turn.

Answer to Question 11

a. The two angles sit on a straight line (the fence), and angles on a straight line add up to 180°. So x = 180 − 130 = **50°**.
b. The gate moves 20° towards the side of x, so x shrinks by 20°: 50 − 20 = **30°**. (The other angle grows to 150°; 150 + 30 = 180.)
c. A right angle is 90°, and 180 − 90 = 90, so the angle is **90°** on both sides.
d. Again the angles on the straight fence add up to 180°: y = 180 − 75 = **105°**.

Answer to Question 12

a. A 90° clockwise turn from north takes her to the next compass point, **east**.
b. 180° is a half turn, so she faces the opposite direction. The opposite of east is **west**.
c. Clockwise from north: 90° to east, 180° to south, 270° to west. The answer is **270°** (or 90° anticlockwise).
d. Anticlockwise from south: 90° brings her to east, 180° to north and 270° to **west**.

Answer to Question 13

a. A hexagon has **6 sides** and the perimeter is 6 × 3 = **18 cm**.
b. 360 ÷ 3 = **120°**.
c. Two hexagons have 12 sides in total. They share 1 side, so 12 − 2 = **10 sides** are on the outside.
d. 10 × 3 = **30 cm**.

Answer to Question 14

a. A decagon has **10 sides**.
b. 10 × 1.5 = **15 m**.
c. 15 ÷ 5 = **3 tins**.
d. Square: 4 × 2 = 8 m. Triangle: 3 × 3 = 9 m. Total: 15 + 8 + 9 = **32 m**.

Answer to Question 15

a. 5 sides. Perimeter = 5 × 8 = **40 m**.
b. 40 − 2 = **38 m**.
c. 38 × 12 = **£456**.
d. The hexagon has 6 sides and the same perimeter of 40 m. 40 ÷ 6 = 6 remainder 4, so each side is **6 2/3 m** (about 6.67 m).
e. The five angles at the centre are equal and add to 360°: 360 ÷ 5 = **72°**.

Answer to Question 16

a. a = 180 − 65 = **115°**.
b. The angles add to 180°: 30 + b + 2b = 180, so 3b = 150 and b = **50°**. (The three angles are 30°, 50° and 100°.)
c. 90 + 80 = 170 and 360 − 170 = 190. Two equal angles: 190 ÷ 2 = **95°** each.
d. 100 + d + 3d = 360, so 4d = 260 and d = **65°**. Then 3d = **195°**.
e. Acute: b = 50° and d = 65°. Obtuse: a = 115°, 2b = 100° and c = 95°. Reflex: 3d = 195°.

Answer to Question 17

a. Stop sign: 8 × 30 = **240 cm**. Warning sign: 3 × 90 = **270 cm**.
b. 25 × 240 = 6,000 cm = **60 m**.
c. 20 × 270 = 5,400 cm = **54 m**.
d. 60 + 54 = 114 m. 114 × £2 = **£228**.
e. Stop signs need 60 m and warning signs need 54 m. Stop signs need **6 m more**.

Answer to Question 18

a. 4 corners: 360 ÷ 4 = **90°**.
b. 5 corners: 360 ÷ 5 = **72°**.
c. 6 corners: 360 ÷ 6 = **60°**.
d. 360 ÷ 40 = **9 sides**, a regular nonagon.
e. The **square** (90°). The more sides a polygon has, the smaller the turn at each corner.

Answer to Question 19

a. **C** is scalene because all three sides are different lengths.
b. **A and D** have three equal sides.
c. **B** has exactly two equal sides.

d. A: 15 cm. B: 6 + 6 + 4 = 16 cm. C: 7 + 5 + 4 = 16 cm. D: 24 cm.
e. A regular hexagon with side 4 cm has perimeter 6 × 4 = 24 cm, so **triangle D** matches.

Answer to Question 20

a. 180 ÷ 45 = **4 steps**.
b. 360 ÷ 45 = **8 steps**.
c. 5 × 45 = **225°**, which is a **reflex** angle.
d. 7 × 45 = **315°**, also **reflex**.
e. 315 ÷ 45 = **7 steps**. It still has to turn 360 − 315 = **45°**.

Answer to Question 21

a. Inside angle = 180 − 60 = **120°**.
b. Outside turn: 360 ÷ 8 = 45°. Inside angle: 180 − 45 = **135°**.
c. Square: outside 90°, inside 180 − 90 = **90°**. Triangle: outside 120°, inside 180 − 120 = **60°**.
d. Three corners meet at the point: 3 × 120 = **360°**, a full turn, so they fit with no gaps.