Worksheet - Angles and polygons

Year: Year 5 · 21

Show your working.

Question 1

Question 1 – Types of angle *(Section A · Practice)*

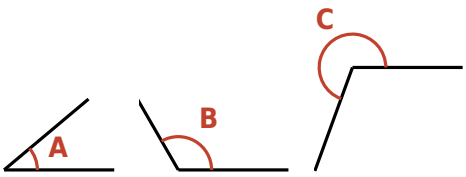
Say whether each angle is acute, right, obtuse, straight or reflex.

a. 30°
b. 90°
c. 135°
d. 200°
e. 180°
f. 350°

Question 2

Question 2 – Look and estimate *(Section A · Practice)*

Look at the three angles drawn below.

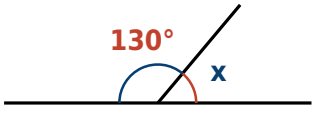


a. Name the type of angle for A, B and C.
b. Estimate each angle to the nearest 10°. (A quarter turn is 90°.)
c. Put A, B and C in order, smallest first.

Question 3

Question 3 – Angles on a straight line *(Section A · Practice)*

The angles in each part are on a straight line. Find the missing angle x.



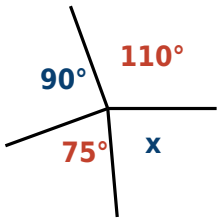
a. 130° and x
b. 65° and x
c. 45°, 80° and x

d. 90° and x
e. 115°, 25° and x

Question 4

Question 4 – Angles at a point *(Section A · Practice)*

The angles in each part meet at a point. Find the missing angle x.

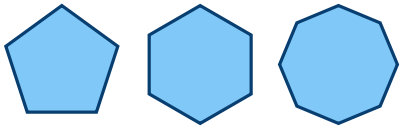


a. 110°, 90°, 75° and x
b. 200° and x
c. 120°, 120° and x
d. 45°, 135°, 90° and x
e. 35°, 85°, 140° and x

Question 5

Question 5 – Naming polygons *(Section A · Practice)*

Write the name of each polygon.



a. The three shapes above, from left to right
b. A polygon with 4 sides
c. A polygon with 3 sides
d. A polygon with 10 sides
e. A shape with 7 sides

Question 6

Question 6 – Perimeter of regular polygons *(Section A · Practice)*

Work out the perimeter of each regular polygon.

a. A regular hexagon with side 6 cm
b. A regular octagon with side 4 cm
c. A regular pentagon with side 9 cm
d. An equilateral triangle with side 12 cm
e. A regular decagon has a perimeter of 80 cm. How long is each side?

Question 7

Question 7 – The clock face *(Section B · Real-life practice)*

The hands of a clock turn through angles. A clock has 12 hours around the face and a whole turn is 360°.

a. How many degrees does the hour hand turn in 1 hour?
b. What is the angle between the hands at 3 o'clock? What type of angle is it?
c. What is the angle between the hands at 6 o'clock?
d. What is the angle between the hands at 4 o'clock?
e. How many degrees does the minute hand turn in 15 minutes?

Question 8

Question 8 – Road signs *(Section B · Real-life practice)*

Many road signs are polygons. The stop sign is a regular octagon and warning signs are equilateral triangles.

a. How many sides does a stop sign have? What do you know about its sides and angles?
b. A stop sign has sides of 25 cm. Find its perimeter.
c. A warning sign is an equilateral triangle with a perimeter of 195 cm. How long is each side?
d. A council wants to put a red border strip round 12 stop signs. How many metres of strip do they need?

Question 9

Question 9 – Slicing the pizza *(Section B · Real-life practice)*

A round pizza is cut into equal slices. The slices meet at the centre and the angles at the centre add up to 360°.

a. What is the angle of each slice if the pizza is cut into 8 equal slices?
b. What is the angle if it is cut into 6 equal slices?
c. What is the angle of each slice if it is cut into 12 equal slices?
d. Sam eats 3 slices of an 8-slice pizza. What angle is that in total? What is the angle of the pizza that is left?

Question 10

Question 10 – Robot turns *(Section B · Real-life practice)*

Otto programs a robot to turn. A clockwise quarter turn is 90°.

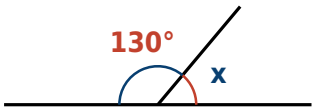
a. The robot turns 90° and then another 90°. How far has it turned? What angle is that?

b. It does a three-quarter turn. How many degrees is that?
c. The robot is facing north. It turns 180° clockwise. Which direction is it now facing?
d. The robot turns through 270° and then through a further angle to complete a full turn. What is the angle of the further turn?

Question 11

Question 11 – The garden fence *(Section B · Real-life practice)*

A straight fence runs along the bottom of a garden. A gate is hinged on the fence and opens to different angles.



a. The gate is open and makes an angle of 130° with the fence on one side. What is the angle x on the other side?
b. Gran opens the gate through another 20° so that the angle x gets smaller. What is the new angle x?
c. What is the angle between the gate and the fence when the gate is at a right angle?
d. The gate makes angles of 75° and y on a straight fence. Find y.

Question 12

Question 12 – Which way? *(Section B · Real-life practice)*

Sofia is holding a map and facing north. The four main compass points are north, east, south and west. A turn clockwise from north to east is 90°.

a. She turns 90° clockwise. Which way is she facing?
b. She turns another 180° clockwise. Which way does she face now?
c. Starting facing north, how many degrees clockwise to face west?
d. She faces south and turns 270° anticlockwise. Which way does she face?

Question 13

Question 13 – The honeycomb *(Section B · Real-life practice)*

A bee builds a honeycomb out of regular hexagon cells. Each cell has sides of 3 cm.

a. How many sides has a cell, and what is the perimeter of one cell?
b. Three cells are placed touching at one point, with no gaps between them. The three angles at the point add up to 360°. What is the angle of one corner of a cell?
c. Two cells share one side. How many sides can be seen on the outside of the pair?
d. What is the total outside perimeter of the two cells?

Question 14

Question 14 – Playground markings *(Section B · Real-life practice)*

The caretaker paints a regular decagon on the playground. The decagon has sides of 1.5 m.

a. How many sides has a decagon?
b. Find the perimeter of the decagon.
c. The paint is sold in tins that cover 5 m of line each. How many tins are needed?
d. He also paints a square with sides of 2 m and an equilateral triangle with sides of 3 m. What is the total perimeter of all three shapes?

Question 15

Question 15 – Fencing the garden *(Section C · Problem solving)*

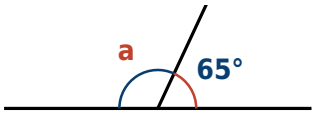
Mr Khan wants to put a fence round a garden in the shape of a regular pentagon with sides of 8 m. There is a gate that takes up 2 m of one side.

a. How many sides does the garden have? What is its perimeter?
b. How many metres of fencing does he need, not counting the gate?
c. Fencing costs £12 for each metre. How much does it cost?
d. He decides to use a regular hexagon instead with the same perimeter as the pentagon. How long is each side of the hexagon? Explain.
e. The angles at the centre of a regular pentagon are all equal. What is the size of each?

Question 16

Question 16 – Angle puzzles *(Section C · Problem solving)*

Otto draws diagrams with straight lines and points. Work out the missing angles. Show each step.



a. Find angle a on the straight line. (The other angle is 65°.)
b. On a straight line there are three angles: 30°, b and 2b. Find b.
c. Four angles at a point are 90°, 80°, c and c (the two angles c are equal). Find c.
d. The angles at a point are 100°, d and 3d. Find d and 3d.
e. Which of the answers a, b, 2b, c, d and 3d are acute, which are obtuse and which are reflex?

Question 17

Question 17 – Stop and go signs *(Section C · Problem solving)*

A company makes road signs. It makes regular octagons for stop signs and equilateral triangles for warning signs. The table shows an order.

Sign	Side length	Number ordered
Stop sign (octagon)	30 cm	25
Warning sign (triangle)	90 cm	20

a. Find the perimeter of one stop sign and one warning sign.
b. A thin silver strip goes round the edge of every sign. How many metres of strip are needed for all the stop signs?
c. How many metres are needed for all the warning signs?
d. Strip costs £2 per metre. How much does the strip for the whole order cost?
e. Which type of sign needs more strip in total, and by how many metres?

Question 18

Question 18 – Turning through a polygon *(Section C · Problem solving)*

A robot draws shapes on the floor. It moves forward and turns, then repeats. To draw a regular polygon it turns through the same angle at every corner, and the turns add up to 360°.

a. The robot draws a square. How many degrees does it turn at each corner?
b. It draws a regular pentagon. How many degrees does it turn at each corner?
c. It draws a regular hexagon. What is the turn at each corner?
d. It turns through 40° at every corner and draws a regular polygon. How many sides does the polygon have?
e. Which of the polygons in (a) to (d) needs the biggest turn at each corner, and why?

Question 19

Question 19 – Sorting triangles *(Section C · Problem solving)*

Jo has drawn four triangles. The side lengths are given in the table.

Triangle	Side 1	Side 2	Side 3
A	5 cm	5 cm	5 cm
B	6 cm	6 cm	4 cm
C	7 cm	5 cm	4 cm
D	8 cm	8 cm	8 cm

a. Which triangle is scalene? Explain.
b. Which two triangles are equilateral?
c. Which triangle is isosceles?
d. Find the perimeter of each triangle.
e. Which triangles have the same perimeter as a regular hexagon with side 4 cm?

Question 20

Question 20 – The rotating sprinkler *(Section C · Problem solving)*

A garden sprinkler turns round and waters a sector of the lawn. It starts pointing north and turns clockwise in steps.

a. It turns through 45° each time. How many steps does it take to turn through a half turn?
b. How many steps does it take to turn right round, back to the start?
c. After 5 steps, how many degrees has it turned? What type of angle is this?
d. After 7 steps, how many degrees has it turned? What type of angle is this?
e. The sprinkler is stopped after turning 315°. How many steps was that, and how many degrees does it still have to turn to complete the full circle?

Question 21

Question 21 – Challenge: the angle in the polygon *(Section D · Challenge)*

Otto wants to find the angle inside a regular polygon. At each corner of a regular polygon, the outside turn and the inside angle lie on a straight line, so they add up to 180°.

a. A regular hexagon has outside turns of 60° at each corner. Find the inside angle.
b. Find the inside angle of a regular octagon. (The outside turn is 360 ÷ 8.)
c. Find the inside angle of a square and of an equilateral triangle.
d. Three regular hexagons meet at a point with no gaps. Show that this works using your answer to (a).