Angles

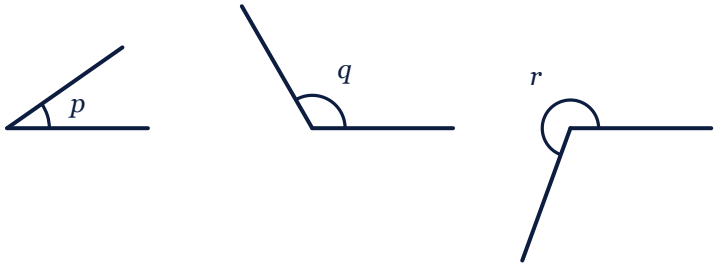
Worked solutions

KS3 Maths topic practice

This topic online

1 Here are three angles, p, q and r.

For each angle, write down whether it is acute, obtuse or reflex, and estimate its size in degrees.



(3 marks)

acute < 90°, obtuse 90° to 180°, reflex > 180°

p is smaller than a right angle

p acute, about 35°

q is between a right angle and a straight line

q obtuse, about 120°

r is more than a straight line: 180° + about 70°

r reflex, about 250°

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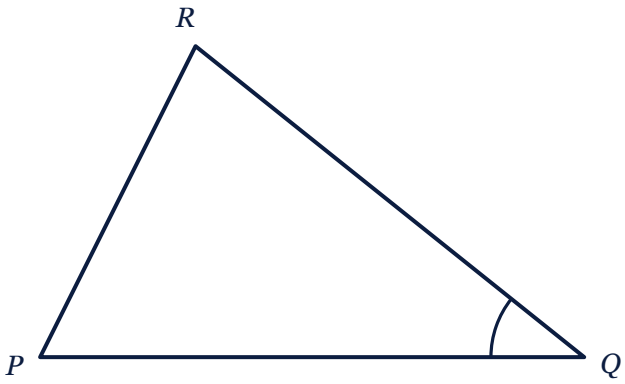
2 The diagram shows triangle PQR. One angle is marked.

a. Use three letters to name the marked angle.

b. Use two letters to name the longest side of the triangle.

c. Use three letters to name the angle at vertex R.

d. The side opposite angle P is called side p. Use two letters to name side p.



(4 marks)

a) the vertex letter goes in the middle

angle PQR

b) a side is named by its two end points

PQ

c) R in the middle

angle PRQ

d) the side that does not touch P

QR

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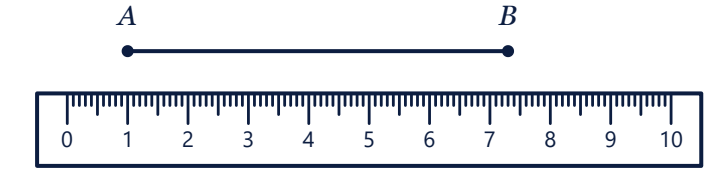
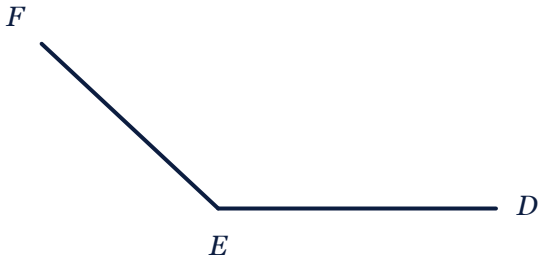
3 a. The diagram shows line AB above a ruler marked in centimetres and millimetres. Write down the length of AB to the nearest millimetre.

b. Use a protractor to measure angle DEF.





(2 marks)

a) A is at 1 cm, B is at 7.3 cm

$7.3 - 1 = 6.3$

6.3 cm = 63 mm

b) centre on E, 0° along ED

obtuse, so more than 90°

137°

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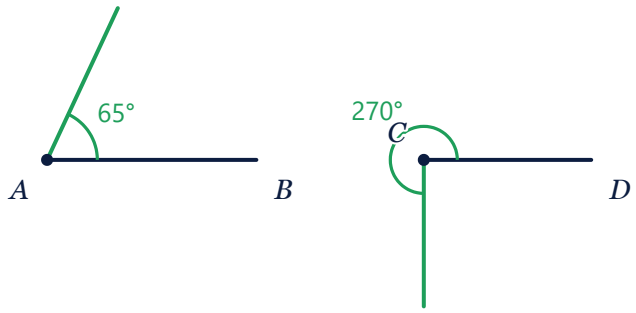
4 a. At A, draw an angle of 65° above the line AB.

b. At C, draw an angle of 270° measured anticlockwise from the line CD (a three-quarter turn).



(2 marks)

a) protractor centre on A, 0° along AB

mark 65°, then join to A

angle of 65° drawn at A

b) 270° = 3 × 90°

three right angles anticlockwise from CD

the new arm points straight down

reflex angle of 270° at C

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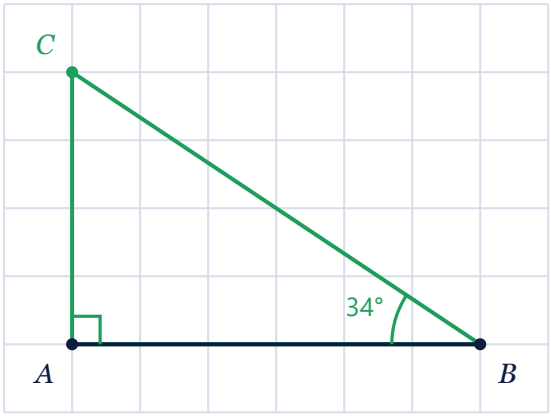
5 The grid is made of centimetre squares.

a. Draw triangle ABC where AB = 6 cm, angle BAC = 90° and AC = 4 cm. C is above A.

b. Measure angle ABC in your triangle.



(3 marks)

a) 90° at A, so go straight up from A

count 4 squares up: that is C

join C to B

triangle ABC drawn

b) protractor centre on B, 0° along BA

angle ABC = 34°

6 Three angles meet at a point. Two of the angles are 145° and 118°. The third angle is x°.

Work out the value of x. Give a reason for your answer.

(2 marks)

Angles around a point add up to 360°

145 + 118 = 263

x = 360 − 263 = 97

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7 Two straight lines cross. One angle is 38°.

Work out the sizes of the angles marked a, b and c. Give a reason for each answer.

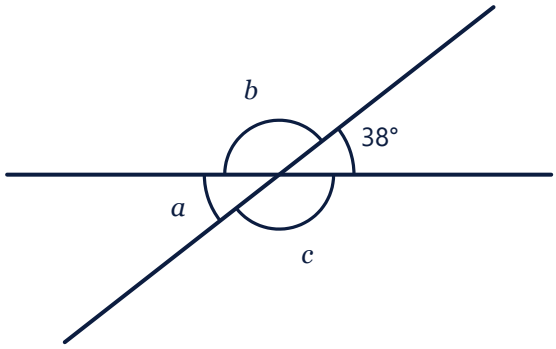

Diagram NOT accurately drawn

(3 marks)

vertically opposite angles are equal

$a = 38°$

angles on a straight line add up to 180°

$b = 180 - 38$

$b = 142$

$b = 142°$

c is vertically opposite b

$c = 142°$

8 Write down the mathematical name of each shape.

a. A quadrilateral with four equal sides and four right angles.

b. A quadrilateral with four equal sides and no right angles.

c. A quadrilateral with exactly one pair of parallel sides.

d. A quadrilateral with two pairs of equal sides next to each other, and one line of symmetry.

e. A triangle with exactly two equal sides and two equal angles.

(4 marks)

a) square

b) rhombus

c) trapezium

d) kite

e) isosceles triangle

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9 Work out the sizes of the angles marked x, y and z.

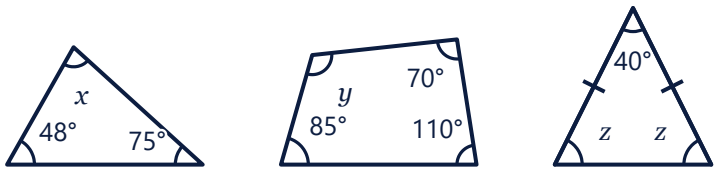

Diagram NOT accurately drawn

(4 marks)

angles in a triangle add up to 180°

$x = 180 - 48 - 75$

$x = 57$

$\boxed{x = 57^\circ}$

angles in a quadrilateral add up to 360°

$y = 360 - 85 - 110 - 70$

$y = 95$

$\boxed{y = 95^\circ}$

isosceles: the two base angles are equal

$180 - 40 = 140$

$z = 140 \div 2$

$z = 70$

$\boxed{z = 70^\circ}$

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10 ABC is a straight line. The point D lies above the line.

Triangle BCD is isosceles with $BD = CD$.

Angle $DBA = 134°$.

Work out the size of angle BDC. Give a reason for each stage of your working.

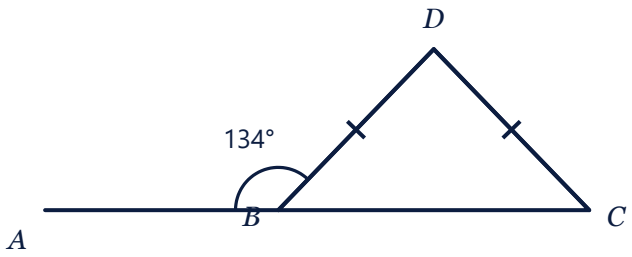

Diagram NOT accurately drawn

(4 marks)

Angle $DBC = 180 - 134 = 46°$ (angles on a straight line add up to $180°$)

Angle DCB = angle $DBC = 46°$ (base angles of an isosceles triangle are equal, since $BD = CD$)

Angle $BDC = 180 - 46 - 46 = 88°$ (angles in a triangle add up to $180°$)

$\boxed{88°}$

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11 In triangle ABC, the side BC is extended to D.

The angles inside the triangle are a, b and c. The angle outside the triangle at C is d.

a. Explain why $c + d = 180°$

b. Explain why $a + b + c = 180°$

c. Use parts (a) and (b) to show that $d = a + b$

d. When $a = 50°$ and $b = 65°$, work out d.

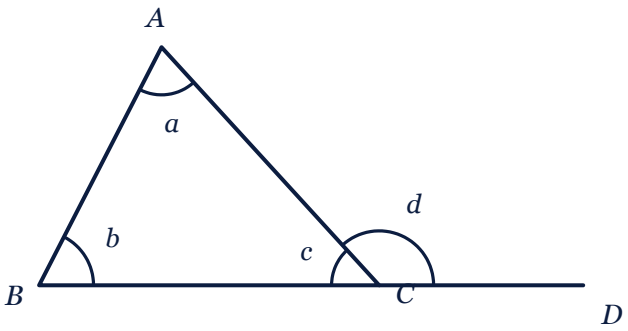

Diagram NOT accurately drawn

(4 marks)

a) angles on a straight line add up to 180°

$c + d = 180°$

b) angles in a triangle add up to 180°

$a + b + c = 180°$

c) both are equal to 180°

$a + b + c = c + d$

$a + b = d$

$d = a + b$

d)

$d = 50 + 65$

$d = 115$

$d = 115°$

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12 The diagram shows triangle ABC. The line PQ goes through C and is parallel to AB.

Alternate angles between parallel lines are equal.

a. Explain why angle p = angle x.

b. Explain why angle q = angle y.

c. Use the straight line PQ to prove that $x + y + z = 180°$

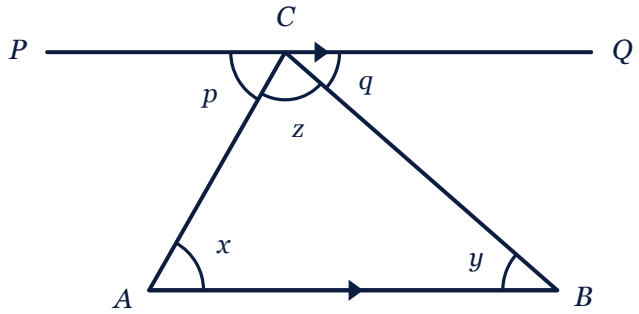

Diagram NOT accurately drawn

(3 marks)

a) AC crosses the parallel lines

$p = x$ (alternate angles)

b) BC crosses the parallel lines

$q = y$ (alternate angles)

c) angles on the straight line PQ

$p + z + q = 180°$

swap p for x and q for y

$x + z + y = 180°$

$x + y + z = 180°$

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