GCSE 7+ Session 6
Independent Practice
Angles and Circles

KING'S MATHS SCHOOL

Revise, refresh, recall *the core knowledge and skills:*

1 Copy and complete this table, filling in the empty cells.

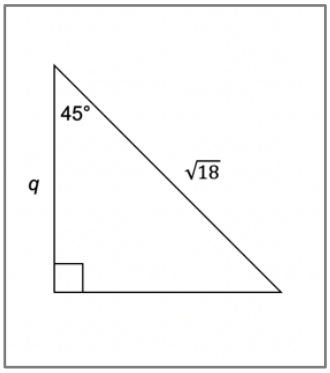
Name of **regular** polygon	Number of sides	Size of **each** exterior angle	Size of **each** interior angle
Pentagon	5		
Hexagon			
			135°
		36°	
Dodecagon	12		
24-gon	24		165°
30-gon	30		
			176°
			179°

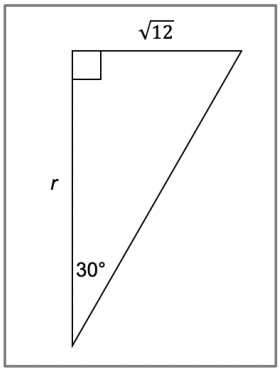
Agree or challenge:

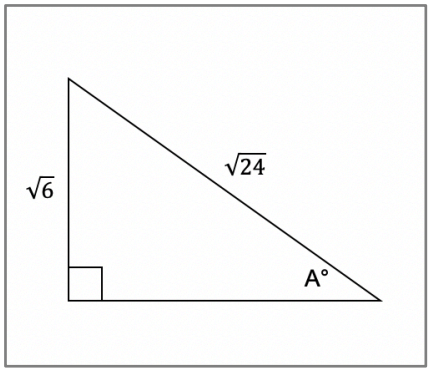
a) the size of each interior angle of a regular polygon is directly proportional to the number of sides of the polygon

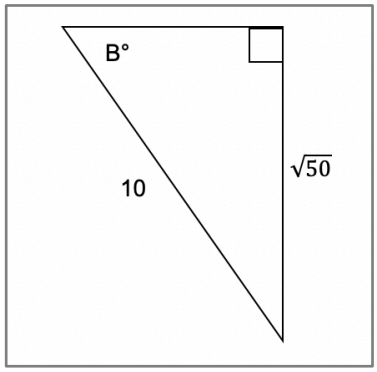
b) the size of each exterior angle of a regular polygon is inversely proportional to the number of sides of the polygon

2 Work out the unknown sides or angles in these right-angled triangles:



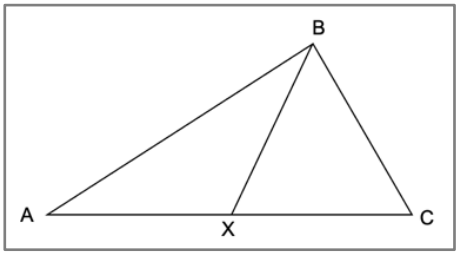






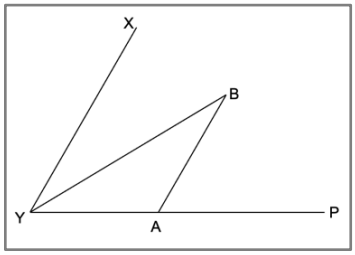
3 AX = BX = BC.

Prove that angle BCX is twice angle ABX.



4 XY is parallel to BA. YB bisects angle XYP.

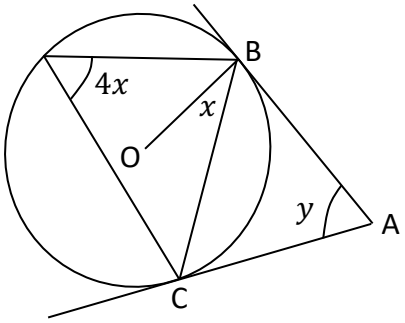
Prove that AY = AB.



5 Work out x and y.

O is the centre of the circle.

AB and AC are tangents.

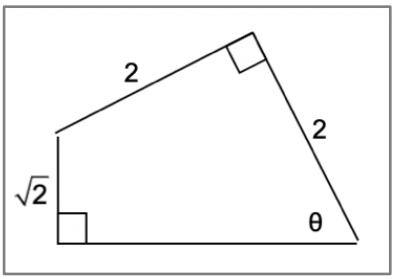


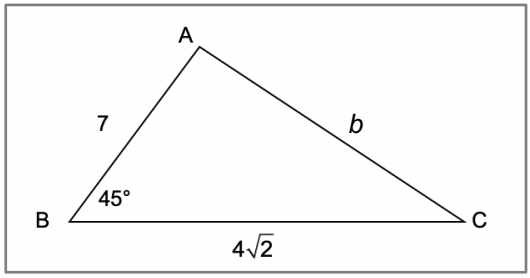
Practice makes permanent: *these questions will help you embed and make secure your factual knowledge, procedural fluency and conceptual understanding:*

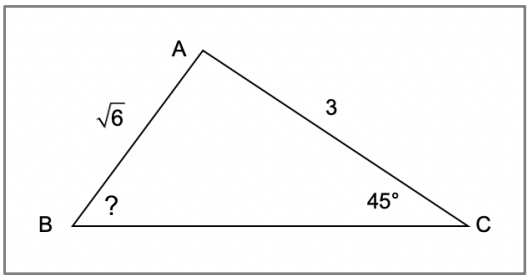
6 Which, if any, of these are right-angled triangles?

- Triangle ABC with AB = 8cm, BC = 5cm, AC = 10cm
- Triangle PQR with PQ = 5cm, QR = 5cm, PR = 10cm
- Triangle JKL with JK = $\sqrt{5}$cm, KL = $\sqrt{5}$cm, JL = $\sqrt{10}$cm

7 Work out the unknown sides or angles in these shapes:







8 In the triangle ABC, angle ABC = 60° and angle BCA = 45°.

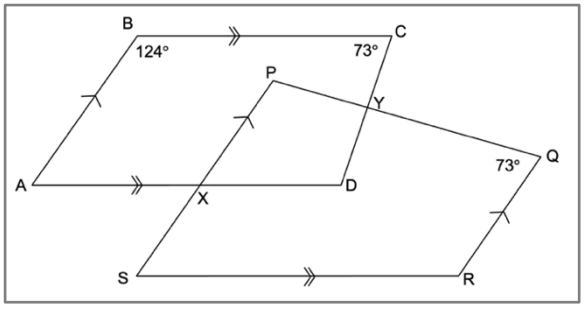
AC is 1 cm longer than AB. Work out the exact length of AB.

9 ABCD is a quadrilateral with sides AB = 16cm, BC = 25cm, CD = 33cm and DA = 60cm.

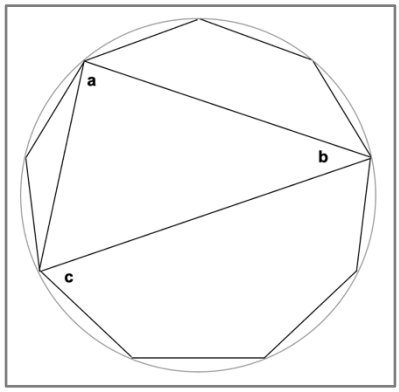
Diagonal BD has length 52cm. Prove that ABCD is a cyclic quadrilateral.

You can use your calculator 😀 

10 Work out angles PYD and SRQ.



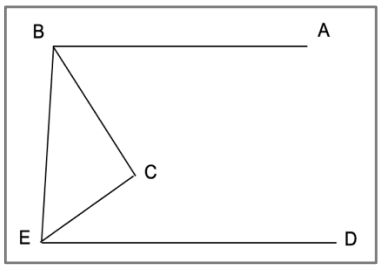
11 A regular polygon is inscribed in a circle.
Work out angles a, b and c.



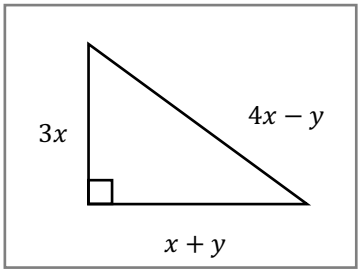
Productive struggle: *these harder questions require deeper thinking.*

12 AB is parallel to DE. BC bisects ∠ABE. EC bisects angle BED.

Work out angle BCE.

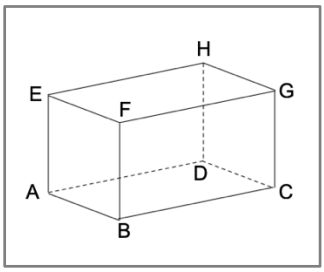


13 Work out the ratio $x : y$



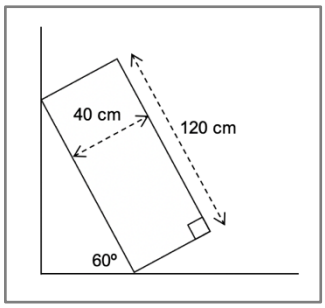
14 In this cuboid, AB = $\sqrt{3}$ cm, BC = 4 cm and AG = $\sqrt{20}$ cm.

Work out angle FAB.



15 The diagram shows a box with rectangular cross-section resting between a horizontal floor and a vertical wall.

What is the exact height of the highest point of the box above the ground?



16 a) Prove that two regular octagons and a square fit together at a point leaving no gap.

b) Two regular pentagons and a 3rd regular polygon fit together at a point leaving no gap. How many sides does the third polygon have?

c) Find an example of three different regular polygons that fit together at a point leaving no gap.

d) A regular p-gon, q-gon and r-gon fit together at a point leaving no gap. Work out and simplify a relationship between p, q and r.

e) Verify that the values of p, q and r in parts a)-c) satisfy your relationship.

f) Can you find

- some
- all

other positive integer values of p, q and r that satisfy your relationship?