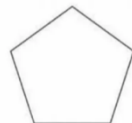
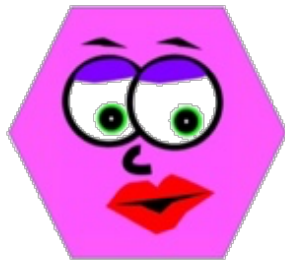


Polygons Questions By Topic:

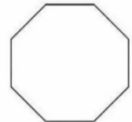


Pentagon



Hexagon

ME SOLVING
FOR WHAT
IS A POLYGON



Octagon



wagon

ME KNOWING
EVERY
COUNTRY'S FLAG



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Formulae Reminders

Let n = number of sides

Sum Of All Interior Angles



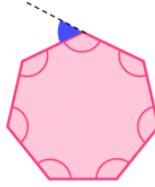
$$180(n - 2)$$

1 Interior Angle



$$\frac{180(n - 2)}{n}$$

1 Exterior Angle

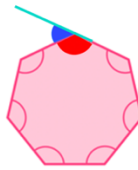


$$\frac{360}{n}$$

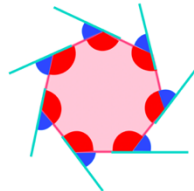
We can also use the formula

$$180 - \text{interior angle}$$

Why can we use the second formula? This is because the interior and exterior angles are **straight line angles**



$$\text{Interior} + \text{exterior} = 180^\circ$$



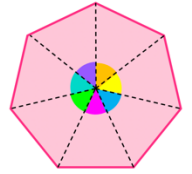
Number Of Sides

$$\frac{360}{\text{exterior angle}}$$

We can also use the formula

$$\frac{360}{180 - \text{interior angle}}$$

Angles At The Centre

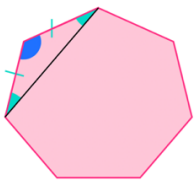


Each angle at the centre

$$\frac{360}{n}$$

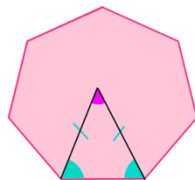
You may also need to use some angle rules:

Isosceles Triangle



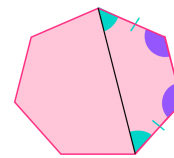
The base angles are equal
each $\triangle = \frac{180 - \text{top angle}}{2}$

Isosceles Triangle



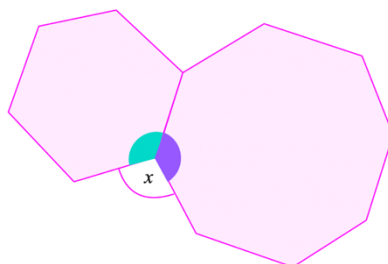
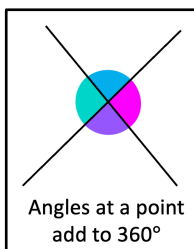
The base angles are equal
each $\triangle = \frac{180 - \text{top angle}}{2}$

Isosceles Trapezoid



each $\triangle = \frac{180 - \text{top angle}}{2}$
each $\triangle = \frac{180 - \text{bottom angle}}{2}$

You may also need to deal with multiple polygons



$$\frac{180(5 - 2)}{5} = 108^\circ$$

$$\frac{180(8 - 2)}{8} = 135^\circ$$

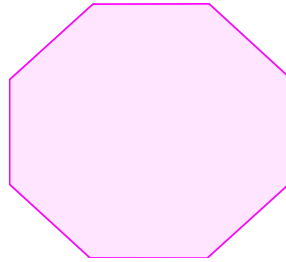
$$360 - 108 - 135 = 117^\circ$$

1 Bronze

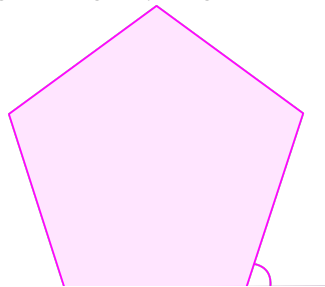


1.1 Working Out Angles

- 1) Work out the size of an exterior angle of a regular octagon.



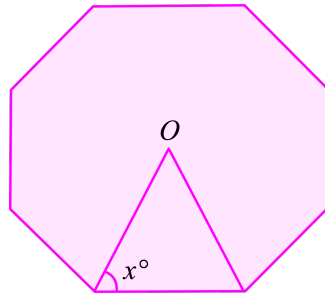
- 2) Work out the size of an exterior angle of a regular pentagon



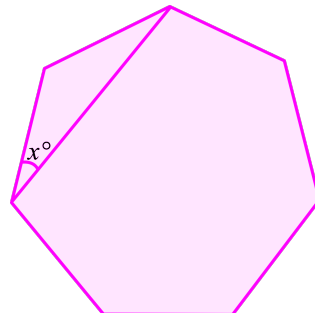
- 3) Find the sum of the interior angles of a polygon with 7 sides.
- 4) The diagram shows part of a regular 10-sided polygon. Work out the size of the angle marked x .



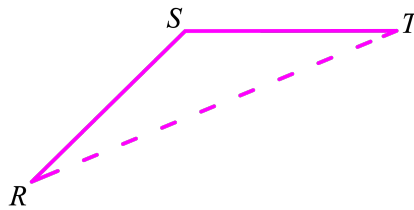
- 5) The diagram shows a regular octagon, with centre O . Work out the value of x° .



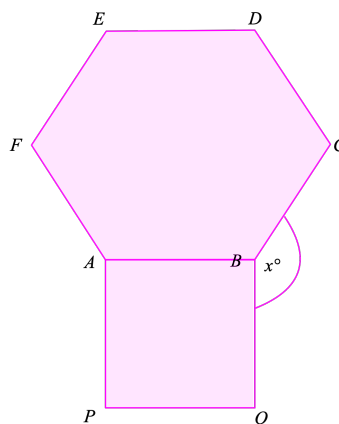
- 6) The diagram shows a regular polygon with 7 sides. Write out the value of x .



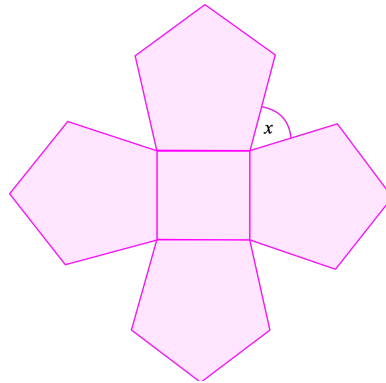
- 7) RS and ST are 2 sides of a regular 12-sided polygon. RT is a diagonal of a polygon. Work out the size of angle of STR .



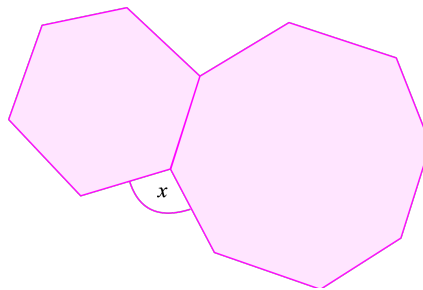
- 8) $ABCDEF$ is a regular hexagon and $ABQP$ is a square. Angle $CBQ = x^\circ$. Work out the value of x



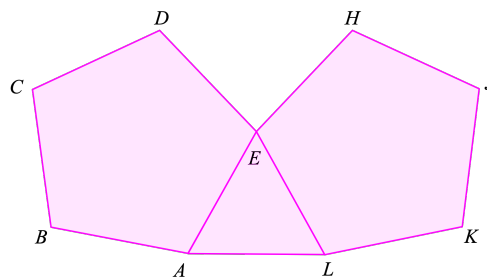
- 9) The diagram shows a square and 4 regular pentagons. Work out the size of the angle marked x .



- 10) The diagram shows a regular hexagon and a regular octagon. Calculate the size of the angle marked x . You must show all your working.



- 11) ABCDE and EHLK are regular pentagons. AEL is an equilateral triangle. Work out the size of angle DEH.



1.2 Working Out The Number Of Sides

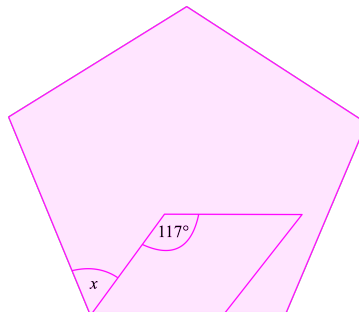
- 12) Each exterior angle of a regular polygon is 30° . Work out the number of sides of the polygon.
- 13) The size of each exterior angle of a regular polygon is 18°
- Work out how many sides the polygon has
 - Work out the sum of the interior angles of the polygon
- 14) The size of each interior angle of a regular polygon is 156° . Work out the number of sides of the polygon

2 Silver

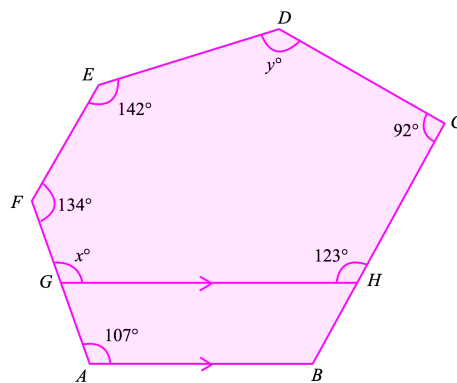


2.1 Working Out Angles

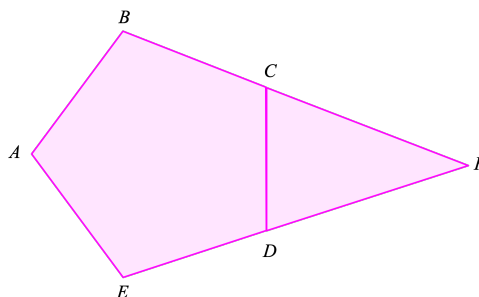
- 15) The diagram shows a regular pentagon and parallelogram. Work out the size of the angle marked x .



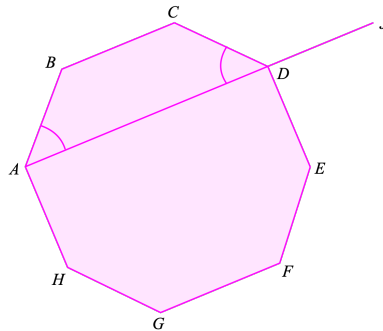
- 16) ABCDEF is a hexagon. G is a point on AF and H is a point on BC. GH is parallel to AB.
- Give a reason why $x = 107$
 - Work out the value of y



- 17) ABCDE is a regular pentagon. BCF and EDF are straight lines. Work out the size of angle CFD.

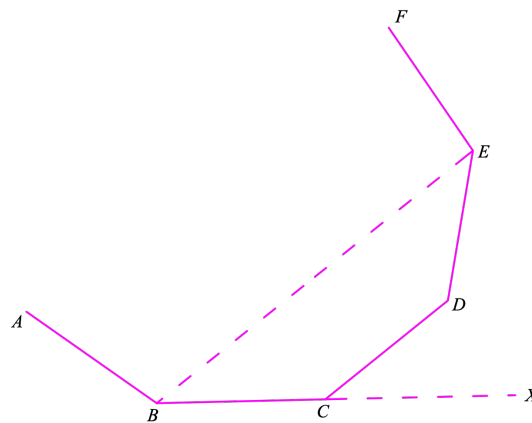


- 18) $ABCDEFGH$ is a regular octagon. ADJ is a straight line.



angle $BAD =$ angle CDA
 Show that angle $CDJ = 135^\circ$

- 19) $ABCDEF$ is part of a regular nonagon. BC is extended to X . B is joined to E . Calculate the size of



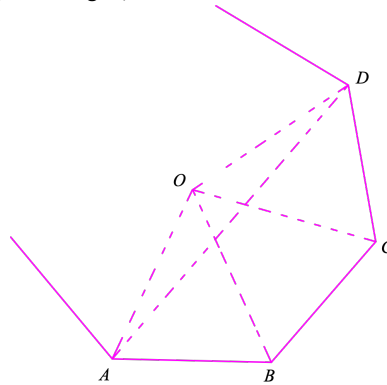
- i. Angle DCX
- ii. Angle BCD
- iii. Angle ABE

3 Gold

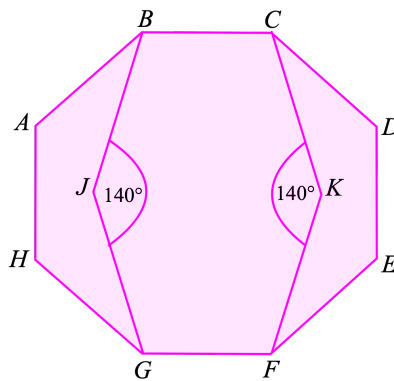


3.1 Working Out Angles

20) ABCD forms three sides of a regular octagon, centre O. Calculate the size of angle BOC, OBC and OAD

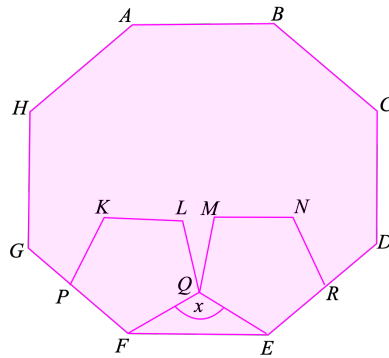


21) ABCDEFGH is a regular octagon

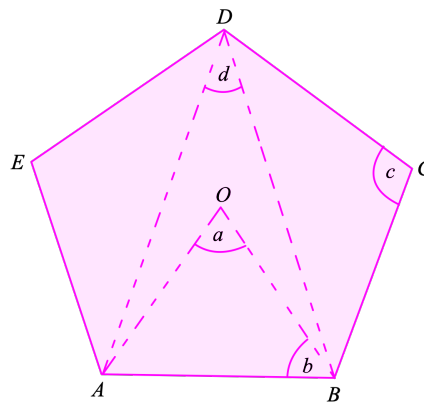


BCKFGJ is a hexagon
 JK is a line of symmetry of the hexagon
 Angle $BJK = \text{angle } CKJ = 140^\circ$
 Work out the size of angle KFE

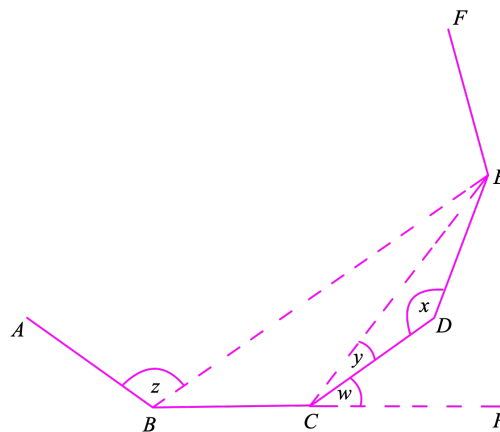
- 22) ABCDEFGH is a regular octagon. KLQFP and MNREQ are two identical regular pentagons. Work out the size of the angle marked x



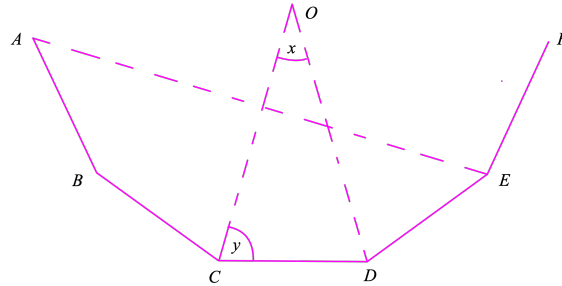
- 23) ABCDE is a regular polygon, centre O. Calculate the size of each of the angles marked a, b, c and d.



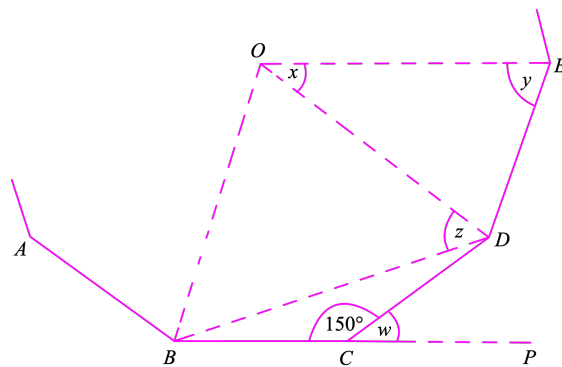
- 24) ABCDEF is part of a regular polygon with 10 sides. BCP is a straight line. Calculate the size of each of the angles marked $w, x, y,$ and z



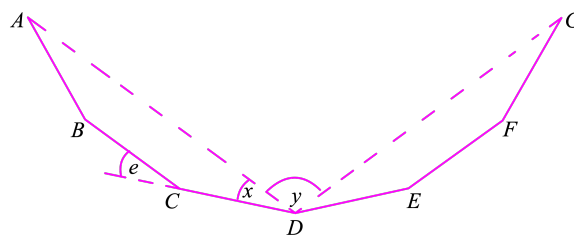
- 25) ABCDEF is part of a regular polygon, centre O. The size of angle COD and OCD are in the ratio 1:2. Calculate the size of angle
- COD
 - CDE
 - AED



- 26) A, B, C, D and E are corners of a regular polygon with centre O. BC is extended to P



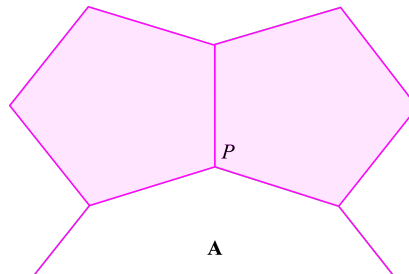
- Calculate the size the angle marked w
 - How many sides does the polygon have
 - Calculate the size of each of the angles marked x , y , and z
 - What type of triangle is OBD?
- 27) ABCDF is part of a regular 15-sided polygon. CD is extended to Z. Calculate



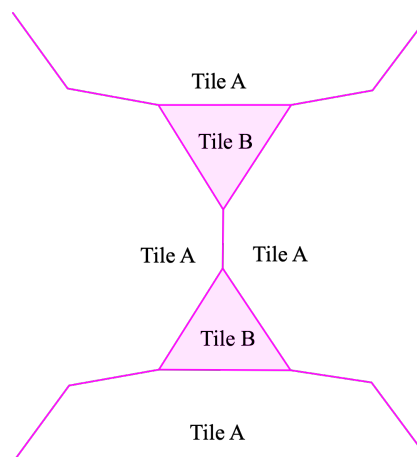
- the size of an exterior angle, e
- the size of an interior angle
- the size of angle x
- the size of angle y

3.2 Working Out The Number Of Sides

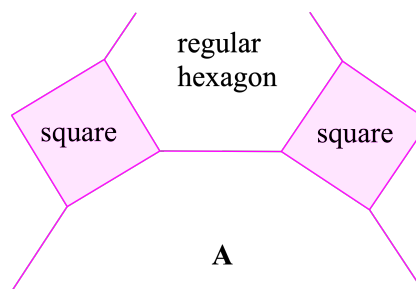
- 28) The diagram shows two congruent regular pentagons and part of a regular n -sided polygon **A**. Two sides of each of the regular pentagons and two sides of **A** meet at the point P . Calculate the value of n . show all your working clearly.



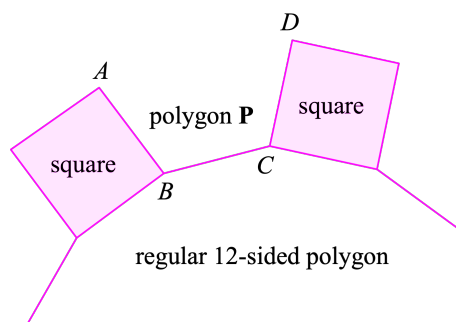
- 29) The diagram shows part of a pattern made from tiles. The pattern is made from two types of tiles, tile A and tile B. Both tile A and tile B are regular polygons. Work out the number of sides tile A has.



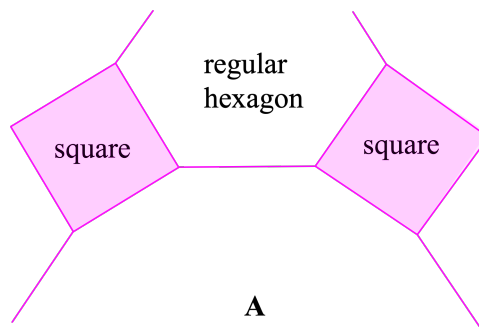
- 30) The diagram shows part of a tiling pattern. The tiling pattern is made from three shapes. Two of the shapes are squares and regular hexagons. The third shape is a regular n -sided polygon **A**. Work out the value of n .



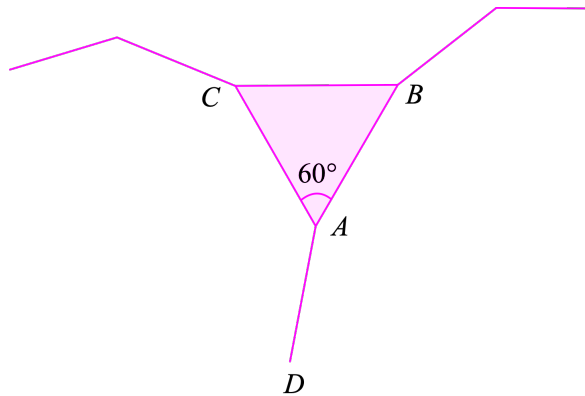
- 31) AB , BC and CD are three sides of a regular polygon P . Show that polygon P is a hexagon. Show your working



- 32) The diagram shows part of a tiling pattern. The tiling pattern is made from three shapes. Two of the shapes are regular hexagons. The third shape is a regular n -sided polygon **A**. Work out the value of n .



- 33) The sides of an equilateral triangle ABC and two regular polygons meet at the point A . AB and AD are adjacent sides of a regular 10-sided polygon. AC and AD are adjacent sides of a regular n -sided polygon. Work out the value of n .

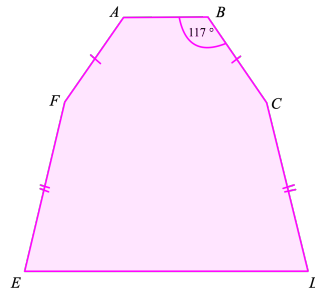


- 34) A regular pentagon, a square and one other regular shape meet at a point and perfectly fit together leaving no gap. How many sides does this third mystery shape have and what is the sum of the interior angles?

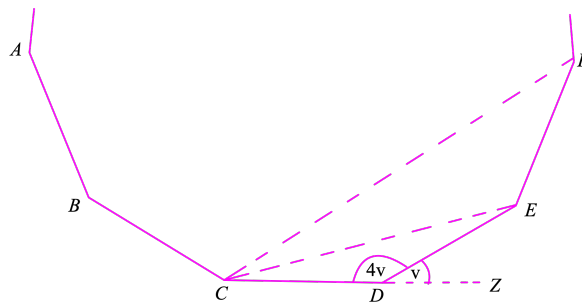
4 Diamond



- 35) The diagram shows a hexagon with 1 line of symmetry.
 $FA = BE = CD$
 Angle $ABC = 117^\circ$
 Angle $BDC = 2 \times$ angle CDE
 Work out the size of angle AFE .

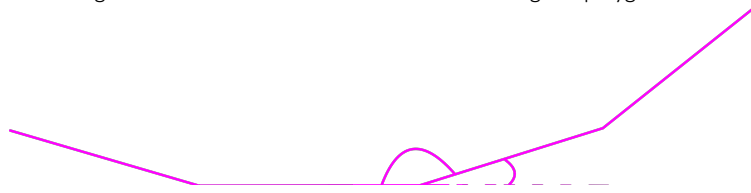


- 36) ABCDEF is part of a regular polygon. CD is extended to Z
- Calculate the size of the angle marked v
 - Write down the number of sides of the regular polygon
 - Calculate the size of the angle DCE
 - Calculate the size of the angle FEC
 - Calculate the size of the angle EFC



- 37) A Polygon has an interior angle exactly 6.5 times the size of an exterior angle. Determine if this shape could be a regular polygon.
- 38) An irregular polygon has 5 of its angles as $79^\circ, 42^\circ, 49^\circ, 52^\circ$ and 97° . Explain why this shape cannot be a hexagon.

- 39) The diagram shows an incomplete regular polygon. The size of each interior angle is 140 degrees greater than the size of each exterior angle. Work out the number of the sides the regular polygon has.



- 40) The diagram shows part of a regular polygon. The interior angle and the exterior angle at a vertex are marked. The size of the interior angle is 7 times the size of the exterior angle.



Work out the number of sides of the polygon.

- 41) The size of each interior angle of a regular polygon is 11 times the size of each exterior angle. Work out the number of sides the polygon has.