

Foundation all exam boards

23

69

A regular polygon has an exterior angle of  $20^\circ$

Work out the number of sides of the polygon.

**[2 marks]**

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Answer \_\_\_\_\_

23

A regular polygon has an exterior angle of  $20^\circ$ 

69

Work out the number of sides of the polygon.

**[2 marks]**

$$360 \div \text{sides} = \text{ext}$$

$$360 \div \square = 20^\circ$$

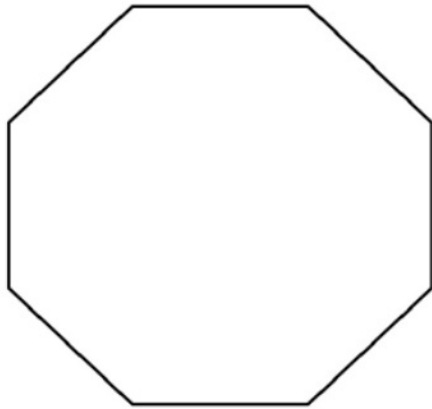
$$\frac{360}{20} = \frac{36}{2} = 18$$

Answer

18 sides ✓

16 (b) Amba is working out the size of an interior angle of a regular octagon.

69



Her method is Interior angle =  $360 \div 8$

Is her method correct?

Tick a box.

Yes

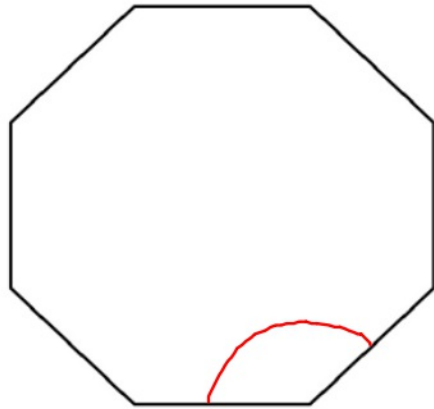
No

Give a reason for your answer.

**[1 mark]**

16 (b) Amba is working out the size of an interior angle of a regular octagon.

69



Her method is Interior angle =  $360 \div 8$

Is her method correct?

Tick a box.

Yes

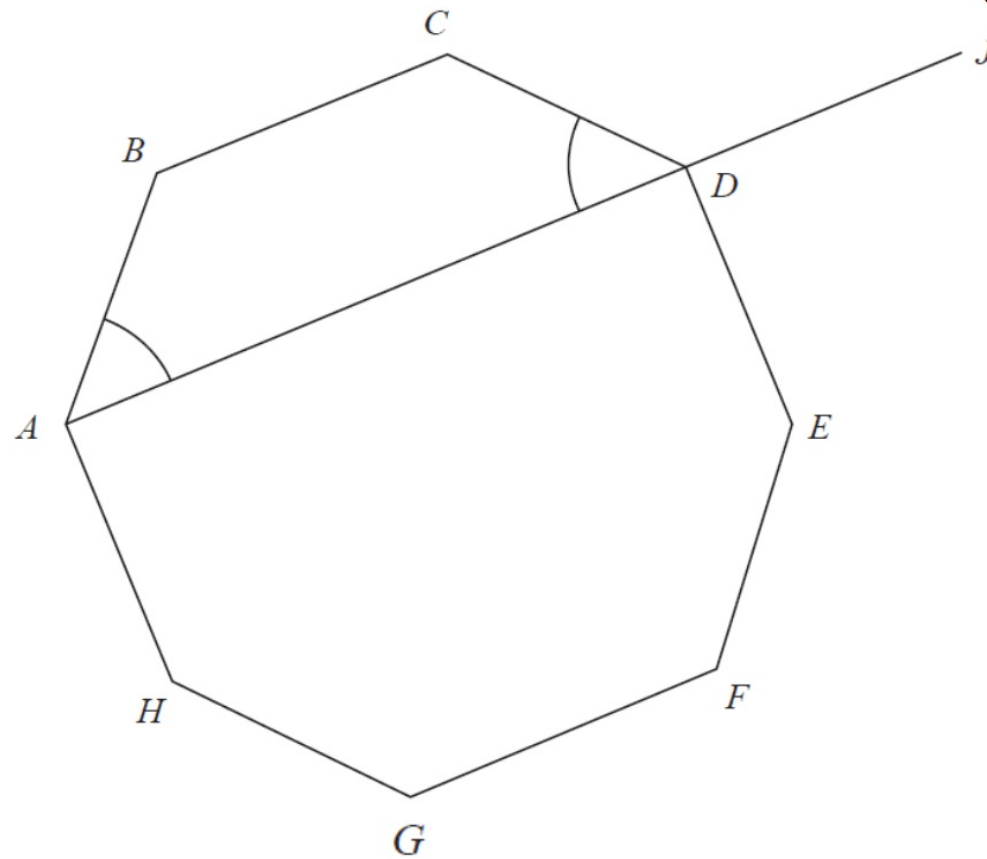
No

Give a reason for your answer.

[1 mark]

$360 \div \text{sides} = \text{ext angle}$

not the interior angle.



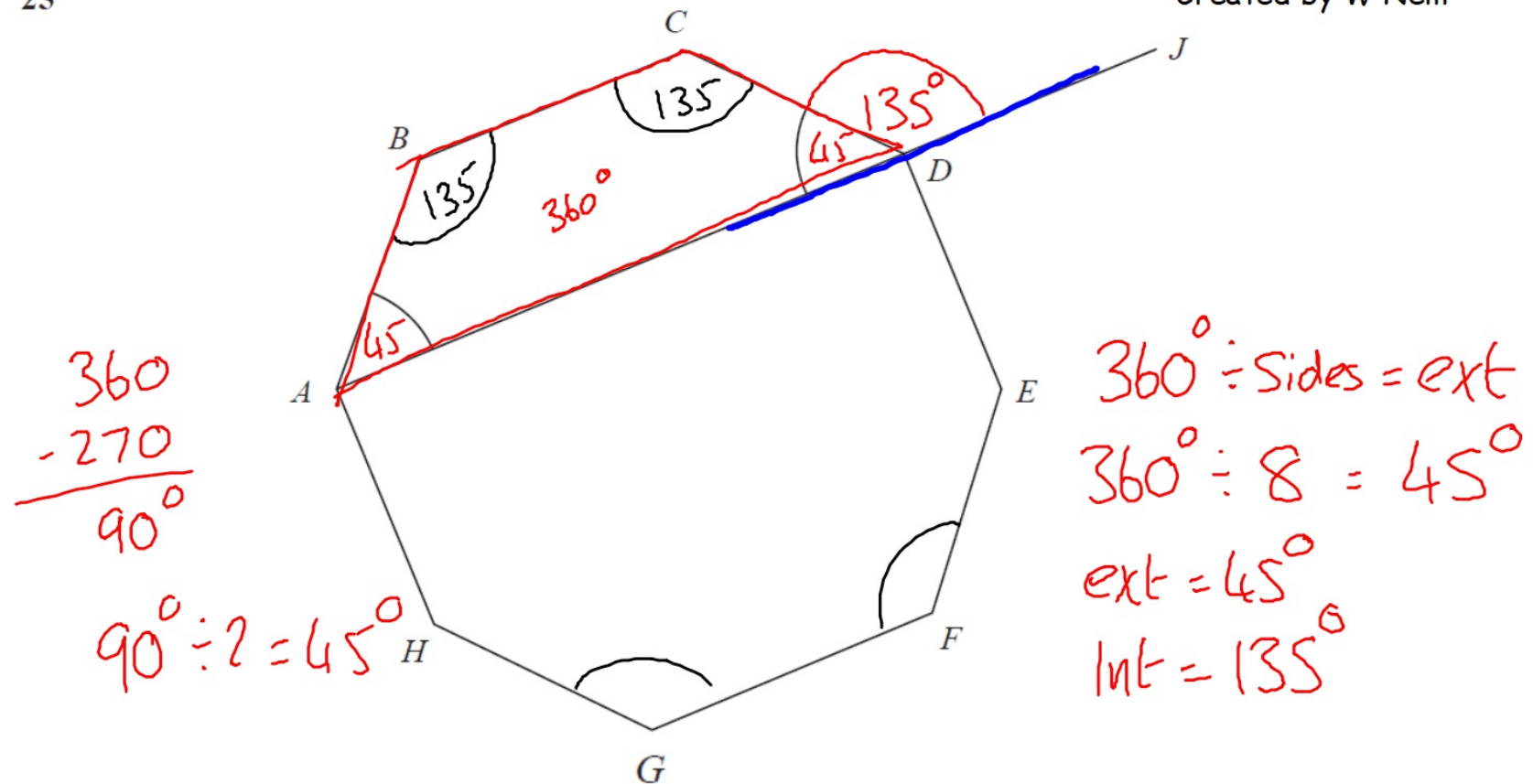
$ABCDEFGH$  is a regular octagon.

$ADJ$  is a straight line.

angle  $BAD =$  angle  $CDA$

Show that angle  $CDJ = 135^\circ$

(Total for Question 25 is 4 marks)



$ABCDEFGH$  is a regular octagon.

$ADJ$  is a straight line.

angle  $BAD$  = angle  $CDA$

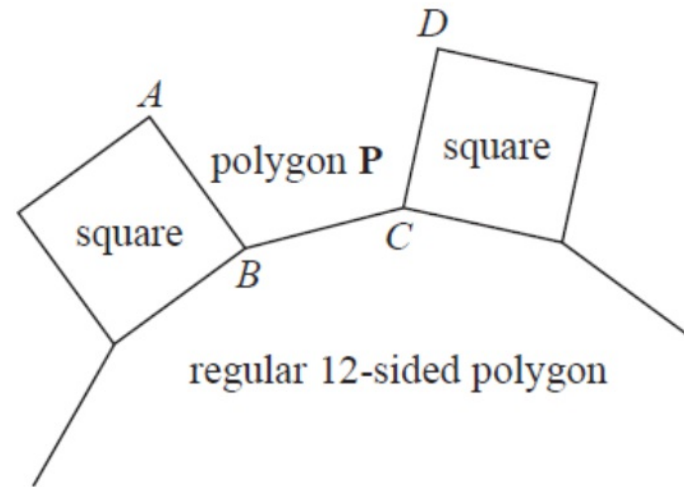
Show that angle  $CDJ = 135^\circ$

$135 + 45 = 180^\circ$   $CDJ$  must  
be  $135$  as  $SL$  add to  $180^\circ$  ✓

(Total for Question is 4 marks)

Video created by W Neill

19 In the diagram,  $AB$ ,  $BC$  and  $CD$  are three sides of a regular polygon  $P$ .

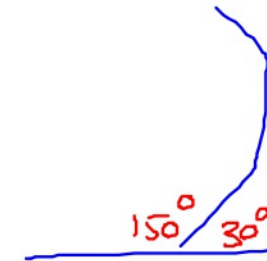
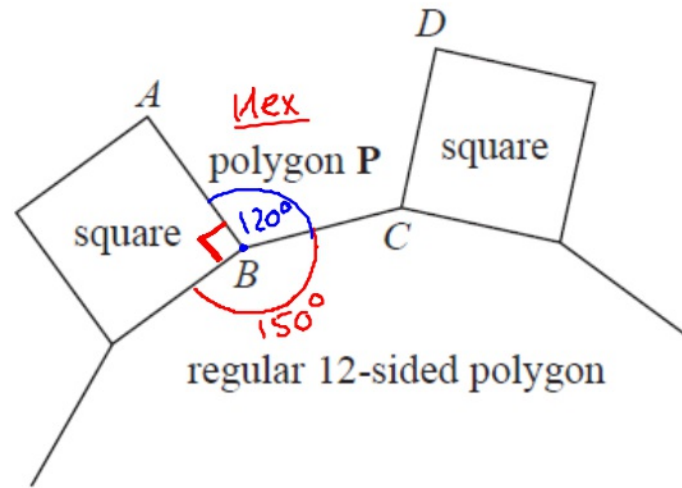


Show that polygon  $P$  is a hexagon.  
You must show your working.



Video created by W Neill

19 In the diagram,  $AB$ ,  $BC$  and  $CD$  are three sides of a regular polygon  $P$ .



Show that polygon  $P$  is a hexagon.  
You must show your working.

$$360 \div 6 = 60^\circ = \text{ext} \\ 120^\circ = \text{int}$$

$$360 \div \text{sides} = \text{ext}$$

$$360 \div 12 = 30^\circ = \text{ext} \\ 150^\circ = \text{int}$$

$$150 + 120 + 90 = 360^\circ \checkmark \text{ complete turn so yes} \\ \text{it is a hexagon.}$$

**28** The size of each interior angle of a regular polygon is 11 times the size of each exterior angle.

Work out how many sides the polygon has.

A16

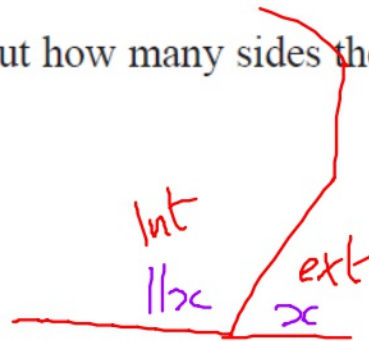
G9

.....  
(Total for Question 28 is 3 marks)

28 The size of each interior angle of a regular polygon is 11 times the size of each exterior angle.

Work out how many sides the polygon has.

A16  
G9



$$12x = 180^\circ$$

$$x = \frac{180}{12}$$

$$x = 15^\circ \text{ . exterior angle}$$

$$360 \div \text{sides} = \text{ext}$$

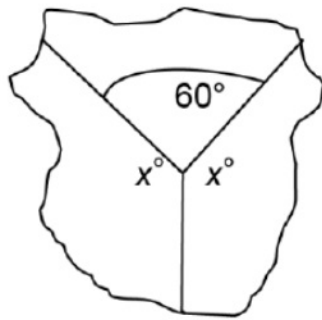
$$360 \div \boxed{24} = 15$$

$$15 \overline{) 360}$$

24 ✓

(Total for Question 28 is 3 marks)

18 Three **regular** polygons meet at a point.



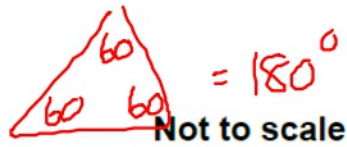
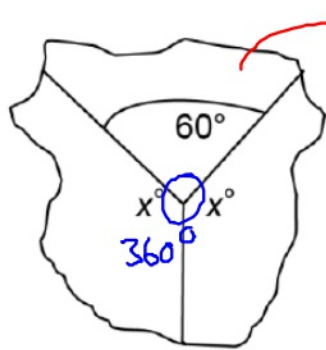
**Not to scale**

Find the number of sides of each of the three regular polygons in the diagram.

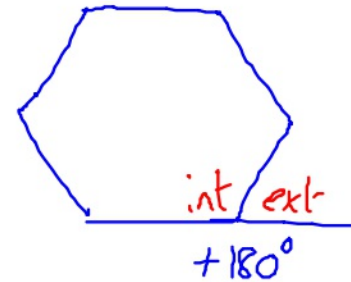
.....and.....and.....[6]

18 Three **regular** polygons meet at a point.

Created by W Neill



Triangle = 3



all angles equal

Find the number of sides of each of the three regular polygons in the diagram.

$$360^\circ - 60^\circ = \frac{300^\circ}{2}$$

$$x = 150^\circ$$

Regular Polygons ...  $360 \div \text{sides} = \text{ext}$

$$\text{int} = 150^\circ$$

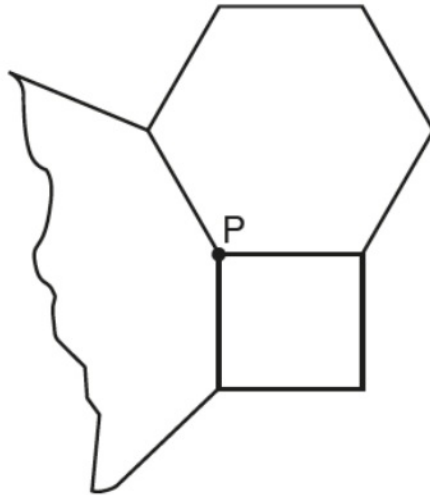
$$360 \div \text{sides} = 30^\circ$$

$$\text{Sides} = \frac{360}{30} = 12 \text{ sides}$$

3 .....and.....12 .....and.....12 .....[6]

18 The diagram shows a square, a regular hexagon and part of another regular polygon meeting at point P.

69



Not to scale

(a) Show that the size of one interior angle of a regular hexagon is  $120^\circ$ .

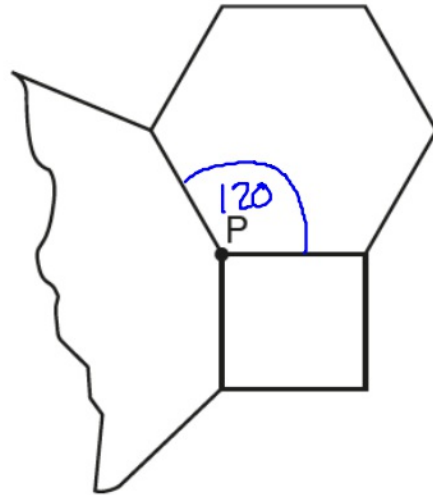
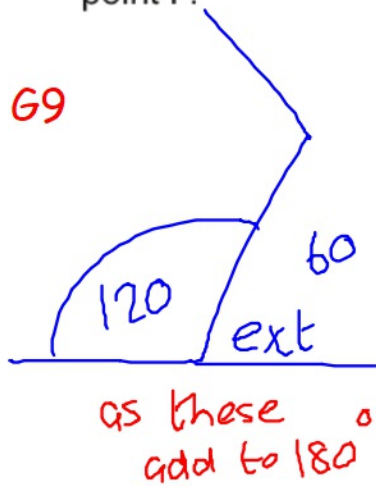
[2]

(b) Find the number of sides of the other regular polygon.

(b) ..... [4]

18 The diagram shows a square, a regular hexagon and part of another regular polygon meeting at point P.

G9



Not to scale

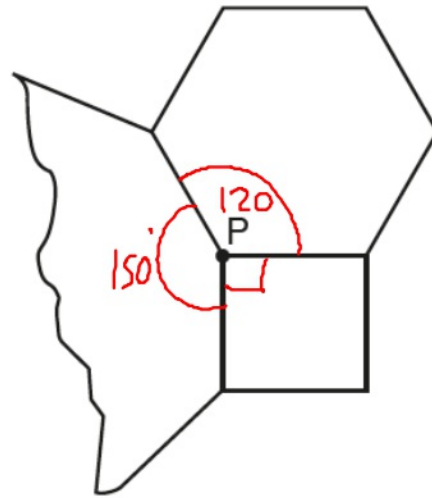
$$360 \div \text{sides} = \text{exterior}$$
$$360 \div 6 = 60^\circ$$

(a) Show that the size of one interior angle of a regular hexagon is  $120^\circ$ .

[2]

$$\text{ext} = 60^\circ$$
$$\text{Int} = 120^\circ \checkmark$$

18 The diagram shows a square, a regular hexagon and part of another regular polygon meeting at point P.



$$\begin{array}{r} \text{Int} = 150 \\ \text{ext} = 30 \\ \hline 180 \end{array}$$

Not to scale

$$360 - 90 - 120 =$$

(b) Find the number of sides of the other regular polygon.

[2]

$$360 \div \text{sides} = \text{ext}$$

$$360 \div \square = 30$$

12 sides.

(b) ..... [4]



Higher all exam boards

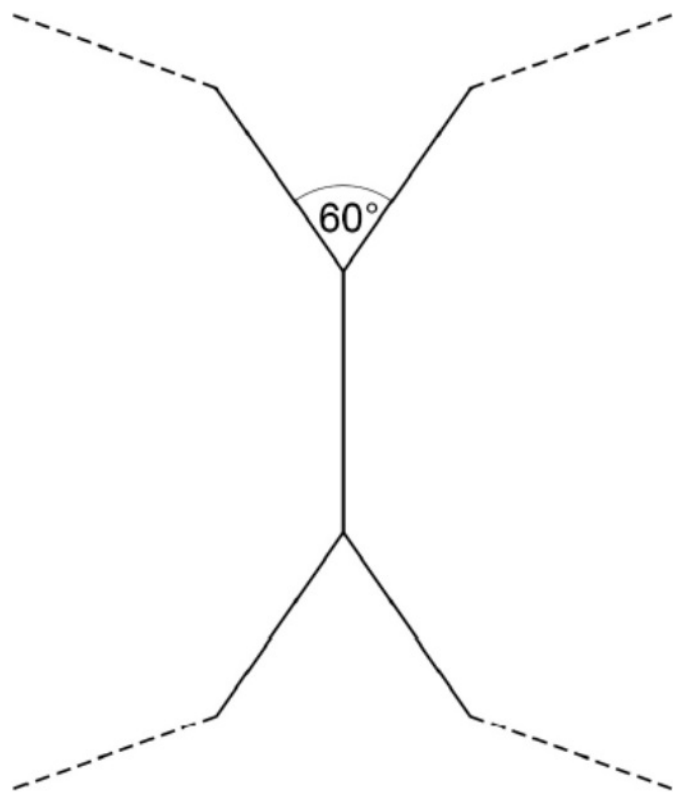
14

Two congruent regular polygons are joined together.

Video created by W Neill

G9

Not drawn accurately



Work out the number of sides on each polygon.

**[3 marks]**

Answer \_\_\_\_\_

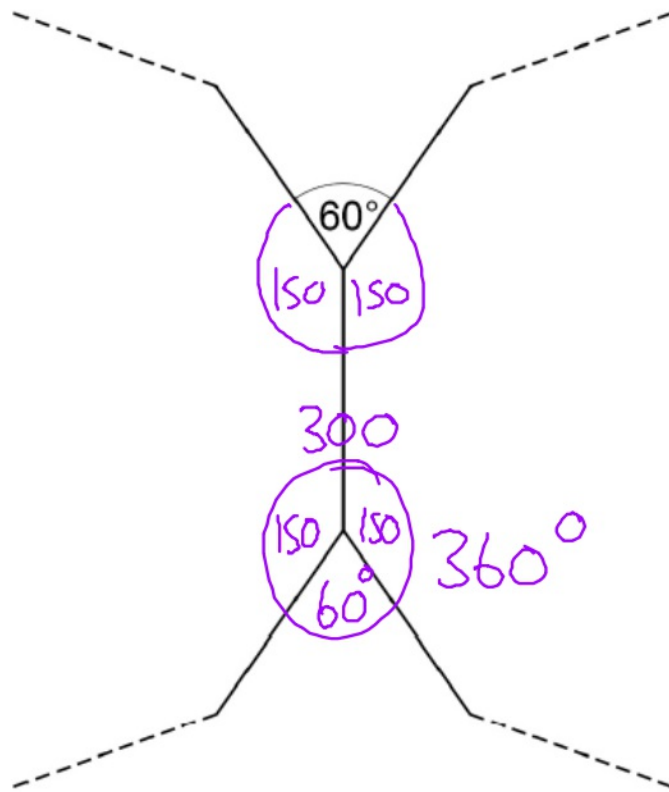
14

Two congruent regular polygons are joined together.

Video created by W Neill

G9

Not drawn accurately



$$\left. \begin{array}{l} \text{Int} = 150^\circ \\ \text{ext} = 30^\circ \end{array} \right\} + 180^\circ$$

Work out the number of sides on each polygon.

[3 marks]

$$360 \div \text{sides} = \text{ext}$$

$$360 \div \boxed{12} = 30^\circ$$

$$\frac{360}{30} = 12$$

Answer 12 sides ✓

4 What is the size of an exterior angle of a regular decagon?

Circle your answer.

69

[1 mark]

18°

36°

144°

162°

10 sides

4 What is the size of an exterior angle of a regular decagon?

Circle your answer.

69

[1 mark]

18°

36°

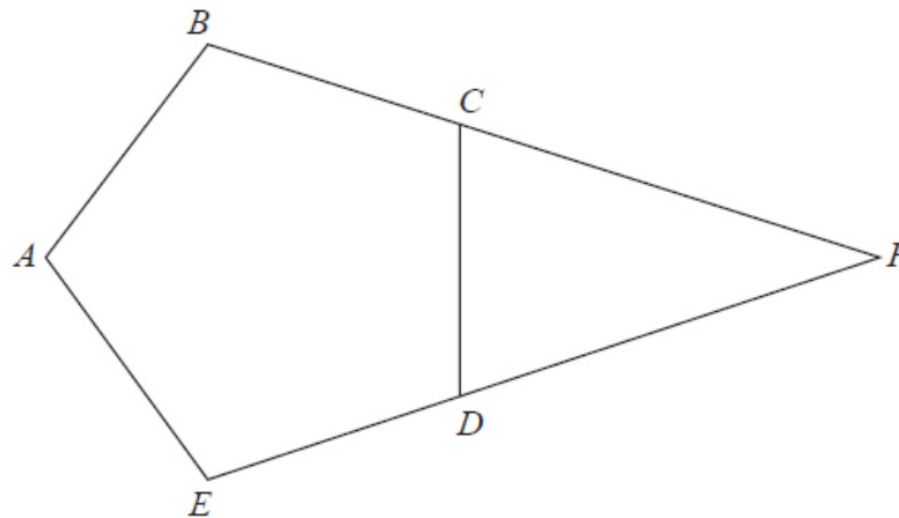
144°

162°

$$360 \div \text{sides} = \text{ext}$$
$$360 \div 10 = 36^\circ$$

6

Video created by W Neill



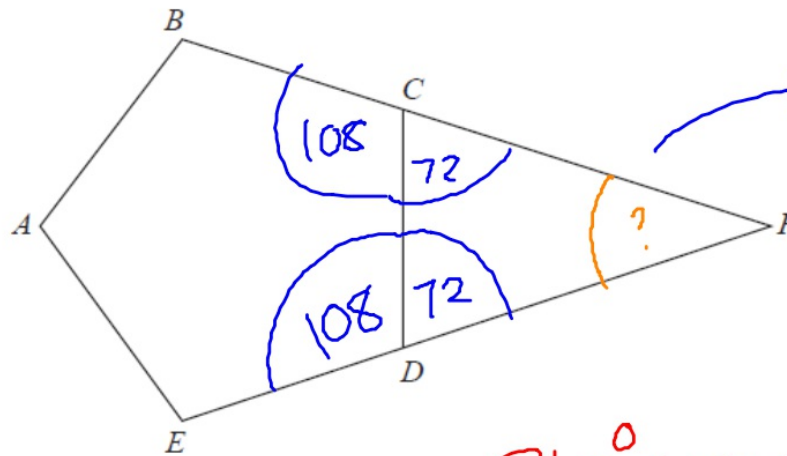
$ABCDE$  is a regular pentagon.  
 $BCF$  and  $EDF$  are straight lines.

Work out the size of angle  $CFD$ .  
You must show how you get your answer.

.....  
(Total for Question 6 is 3 marks)

6

Video created by W Neill



Triangle CFE is  
isosceles.

$$180^\circ - 72^\circ - 72^\circ = 36^\circ$$

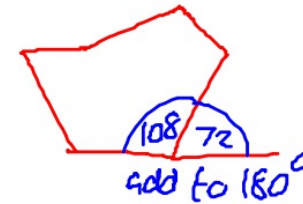
ABCDE is a regular pentagon.  
BCF and EDF are straight lines.

Work out the size of angle CFD.

You must show how you get your answer.

$$360^\circ \div \text{Sides} = \text{exterior}$$

$$360^\circ \div 5 = 72^\circ$$

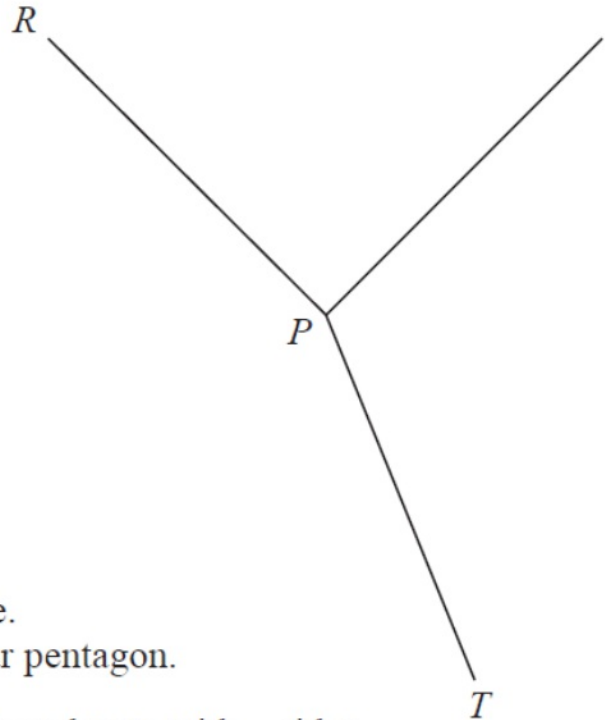


36°

(Total for Question 23 is 3 marks)

9

69



$PR$  and  $PS$  are two sides of a square.

$PS$  and  $PT$  are two sides of a regular pentagon.

$PR$  and  $PT$  are two sides of a regular polygon with  $n$  sides.

Work out the value of  $n$ .

You must show your working.

$n = \dots\dots\dots$

**(Total for Question 9 is 4 marks)**



9

69

$$\text{Int} = 162^\circ$$

$$\text{ext} = 18$$

$$360 \div n = 18^\circ$$

$$n = \frac{360}{18} = 20$$

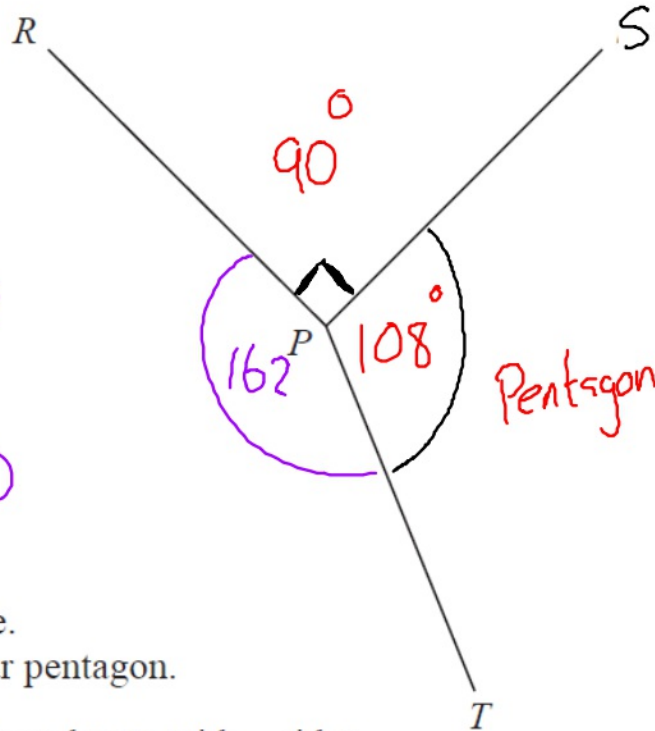
$PR$  and  $PS$  are two sides of a square.

$PS$  and  $PT$  are two sides of a regular pentagon.

$PR$  and  $PT$  are two sides of a regular polygon with  $n$  sides.

Work out the value of  $n$ .

You must show your working.



$$360 \div \text{sides} = \text{ext}$$

$$360 \div 5 = 72$$

$$\text{ext} = 72^\circ$$

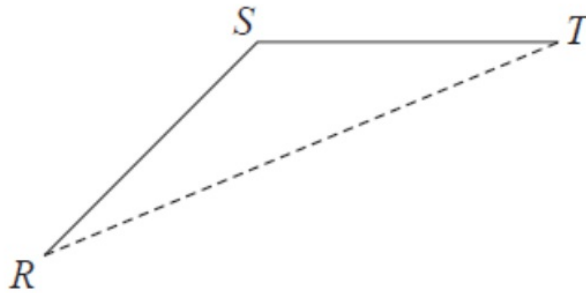
$$\text{Int} = 108^\circ$$



$$n = \underline{20}$$

**(Total for Question 9 is 4 marks)**

12



$RS$  and  $ST$  are 2 sides of a regular 12-sided polygon.  
 $RT$  is a diagonal of the polygon.

Work out the size of angle  $STR$ .  
You must show your working.

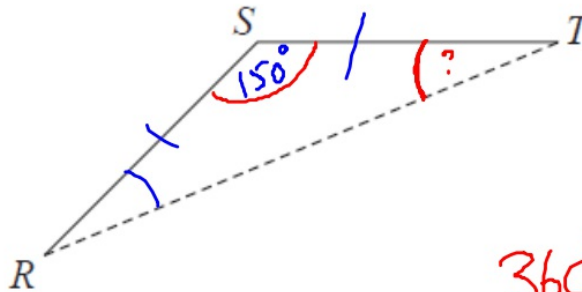
o

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**(Total for Question 12 is 3 marks)**

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12



$RS$  and  $ST$  are 2 sides of a regular 12-sided polygon.  
 $RT$  is a diagonal of the polygon.

Work out the size of angle  $STR$ .  
 You must show your working.

$$360^\circ \div \text{sides} = \text{ext}$$

$$360^\circ \div 12 = 30^\circ$$

$$\text{ext} = 30^\circ$$

$$\text{Int} = 150^\circ$$

$$180^\circ - 150^\circ = 30^\circ$$

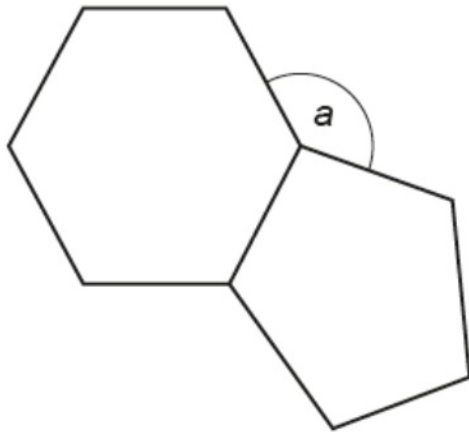
$$\frac{30^\circ}{2} = 15^\circ \checkmark$$

$$15^\circ \checkmark$$

(Total for Question 12 is 3 marks)

Video created by W Neill

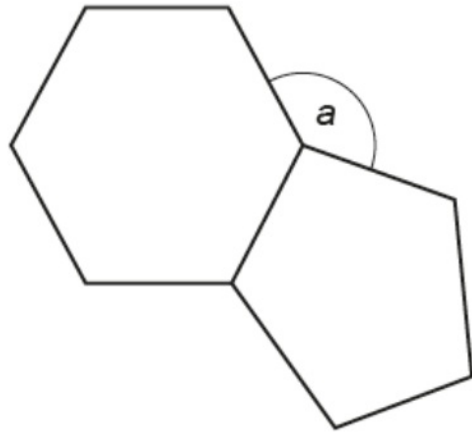
- 8 Imran joins two tiles together as shown below.  
One tile is a regular hexagon and the other tile is a regular pentagon.



Not to scale

- (a) Show that angle  $a$  is  $132^\circ$ .

Video created by W Neill



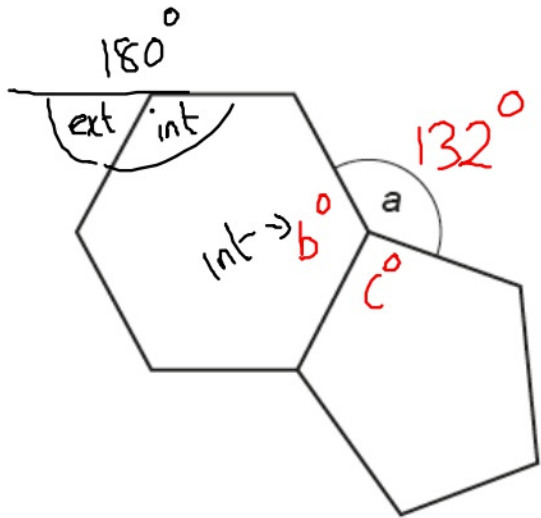
Not to scale

(b) Imran thinks that another tile in the shape of a regular polygon will fit **exactly** into angle  $a$ .

Is Imran correct?  
Show your reasoning.

..... [3]

8 Imran joins two tiles together as shown below.  
 G9 One tile is a regular hexagon and the other tile is a regular pentagon.



(a) Show that angle a is 132°.

$$\begin{array}{r} 72 \\ 5 \overline{) 360} \end{array}$$

Not to scale

$$a = 132$$

$$360 \div \text{Sides} = \text{Ext}$$

$$b^\circ = 360 \div 6 = 60^\circ = \text{ext}$$

$$120^\circ = \text{Int}$$

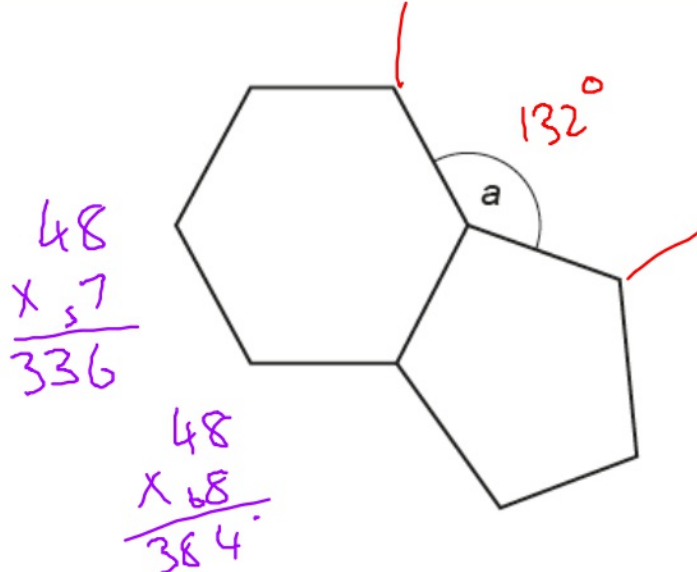
$$c^\circ = 360 \div 5 = 72^\circ = \text{Ext}$$

$$108^\circ = \text{Int}$$

$$120 + 108 = 228^\circ$$

$$\begin{array}{r} 228 \\ + 132 \\ \hline 360 \end{array}$$

proved as  
it should add  
to 360



Not to scale

$$\begin{array}{r} 48 \\ \times 7 \\ \hline 336 \end{array}$$

$$\begin{array}{r} 48 \\ \times 68 \\ \hline 384 \end{array}$$

$$\begin{aligned} \text{Interior} &= 132^\circ \\ \text{ext} &= 48^\circ \end{aligned}$$

(b) Imran thinks that another tile in the shape of a regular polygon will fit **exactly** into angle a.

Is Imran correct?  
Show your reasoning.

$$48 \times 7 =$$

$$\frac{360}{48} \times$$

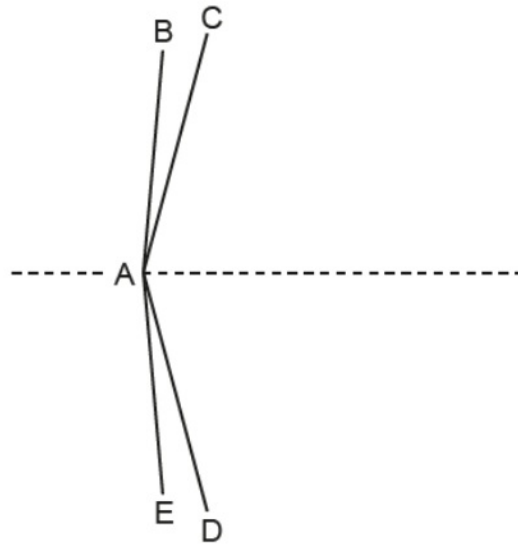
$$48 \times 10 \text{ sides} = 480$$

$$360^\circ \div \text{sides} = \text{ext}$$

$$360 \div \square = 48^\circ$$

No, a regular polygon will not fit.

- 7 Angle BAE is part of a regular 18-sided polygon.  
Angle CAD is part of a regular 10-sided polygon.  
69 The dashed line through A is a line of symmetry of both polygons.



Not to scale

Work out angle BAC.

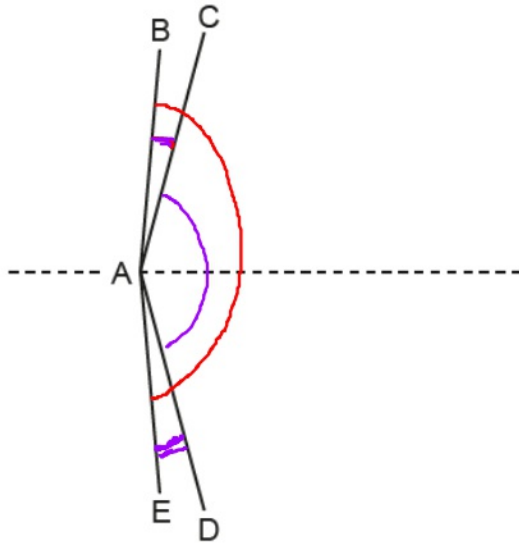
.....° [5]



- 7 Angle BAE is part of a regular 18-sided polygon.  
 Angle CAD is part of a regular 10-sided polygon.  
 G9 The dashed line through A is a line of symmetry of both polygons.

$$\text{ext} + \text{int} = 180^\circ$$

$$360 \div \text{Sides} = \text{ext}$$



Not to scale

$$\text{Angle BAE} \dots 360 \div 18 = \text{ext} = 20^\circ$$

$$\text{int} = 160^\circ$$

$$\text{Angle CAD} \dots 360 \div 10 = \text{ext} = 36^\circ$$

$$\text{int} = 144^\circ$$

$$160^\circ - 144^\circ = 16^\circ$$

$$16 \div 2$$

$$8^\circ \checkmark$$

Work out angle BAC.

.....° [5]

- 11 A regular polygon has  $n$  sides.  
The polygon's interior angle is 5 times the size of its exterior angle.

Find  $n$ .

A16

G9

$n = \dots\dots\dots [5]$

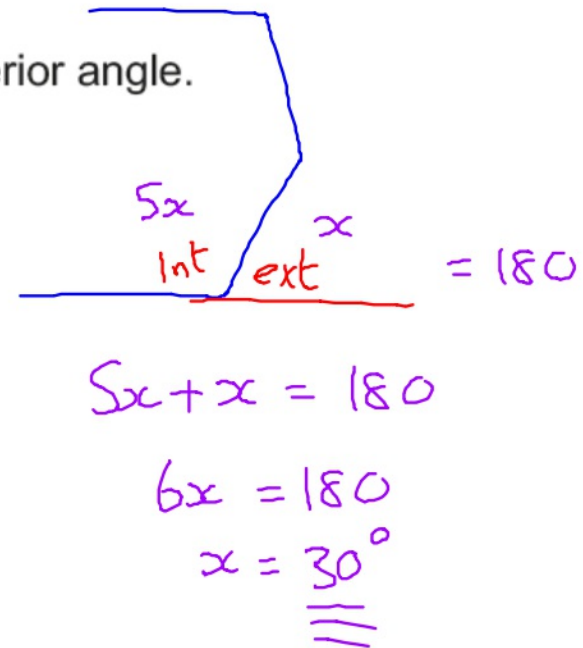
- 11 A regular polygon has  $n$  sides.  
The polygon's interior angle is 5 times the size of its exterior angle.

Find  $n$ .

A16  
G9

$$360 \div \text{sides} = \text{ext}$$

$$360^\circ \div \boxed{12} = 30^\circ$$



$n =$  ..... **12 sides** [5]