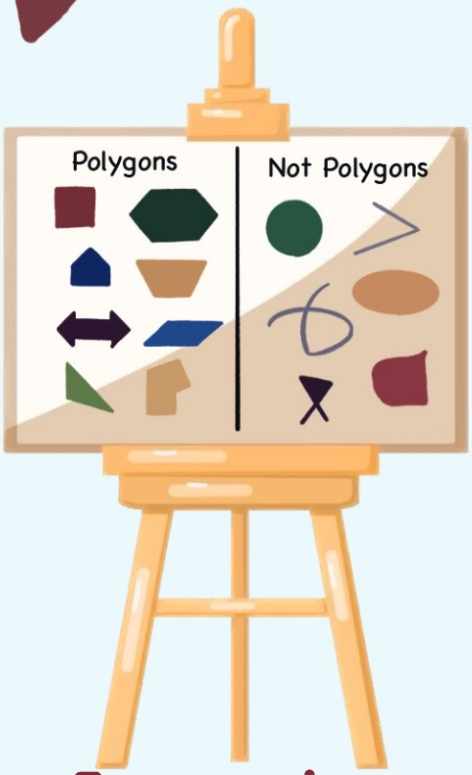
The Maths Society

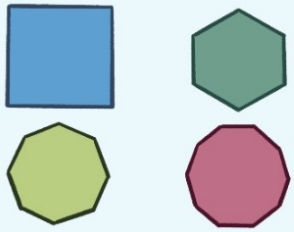
POLYGONS

Characteristics

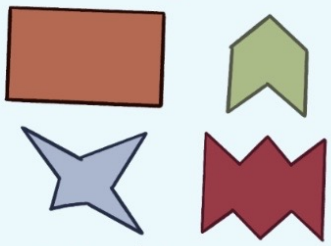
- two-dimensional
  - no curves
- no intersecting lines
  - closed figure
- sides are straight



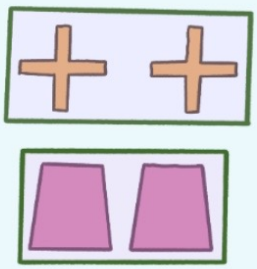
Regular



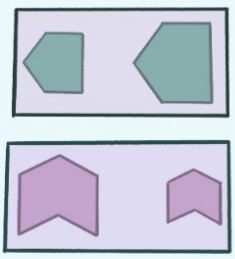
Irregular



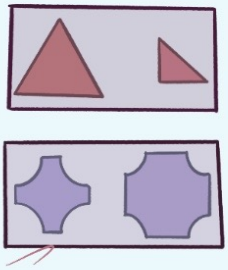
Congruent



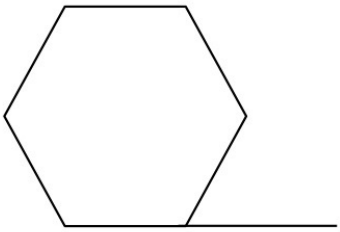
similar



Neither



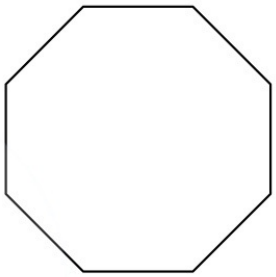
1 Work out the size of an exterior angle of a regular hexagon.



60 °

(Total for question 1 is 2 marks)

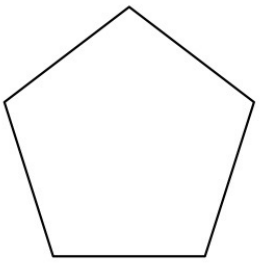
2 Work out the size of each interior angle in a regular octagon.



135 °

(Total for question 2 is 2 marks)

3 Work out the size of each interior angle in a regular pentagon



108 °

(Total for question 3 is 2 marks)

4 The size of each exterior angle in a regular polygon is 20°.
Work out how many sides the polygon has.

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

18 .....

(Total for question 4 is 2 marks)

---

5 The size of each exterior angle in a regular polygon is 18°.
Work out how many sides the polygon has.

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

20 .....

(Total for question 5 is 2 marks)

---

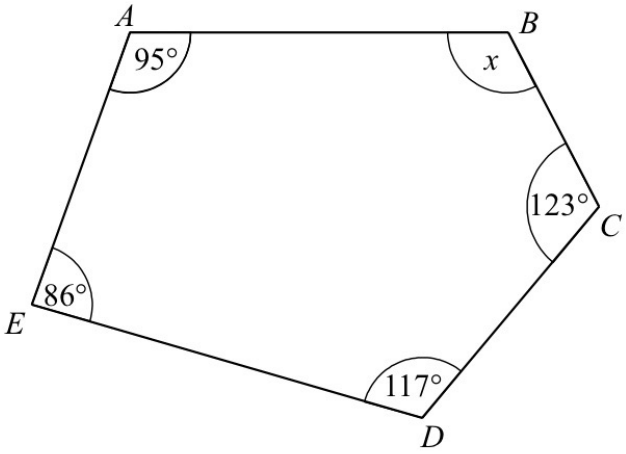
6 The size of each interior angle in a regular polygon is 165°.
Work out how many sides the polygon has.

$\frac{360}{15} = 24$

24 .....

(Total for question 6 is 2 marks)

7



ABCDE is a pentagon.

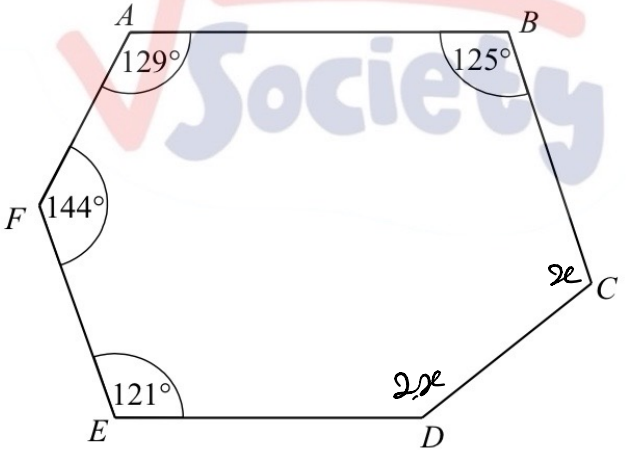
Work out the size of angle *ABC*.

$x = 540 - (95 + 86 + 117 + 123) = 119°$

119°

(Total for question 7 is 2 marks)

8



ABCDEF is a hexagon.

Angle *CDE* = 2 × Angle *BCD*

Work out the size of angle *CDE*.

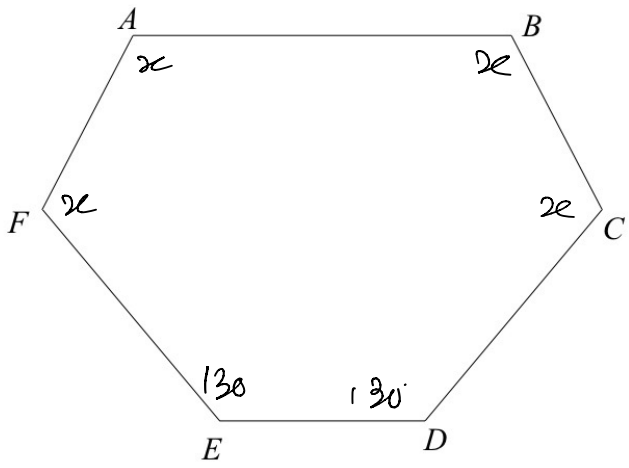
$x = \frac{720 - (129 + 125 + 144 + 121)}{3} = 67$

$2x = 67 \times 2 = 134$

134°

(Total for question 8 is 3 marks)

9



ABCDEF is a hexagon.

Angle *BAF* = Angle *ABC* = Angle *AFE* = Angle *BCD*.
Angle *DEF* = Angle *CDE* = 130°

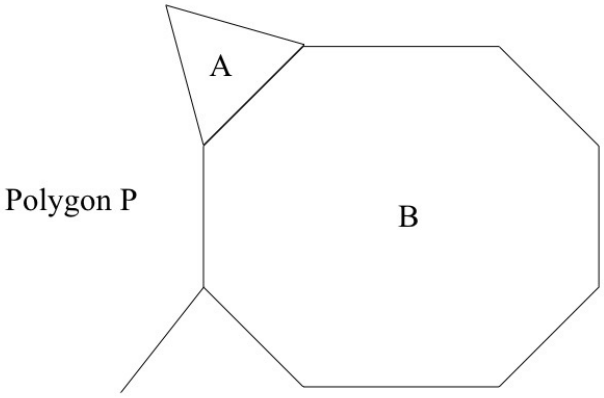
Work out the size of angle *BAF*.
You must show all your working.

$x = \frac{720 - 260}{4} = 115$

115 .....°

(Total for question 9 is 3 marks)

10



Shape A is a regular triangle. Shape B is a regular octagon.

Another regular polygon, P, is shown on the diagram.

How many sides does polygon P have?

You must show your working.

exterior angle of octagon $= \frac{360}{8} = 45$

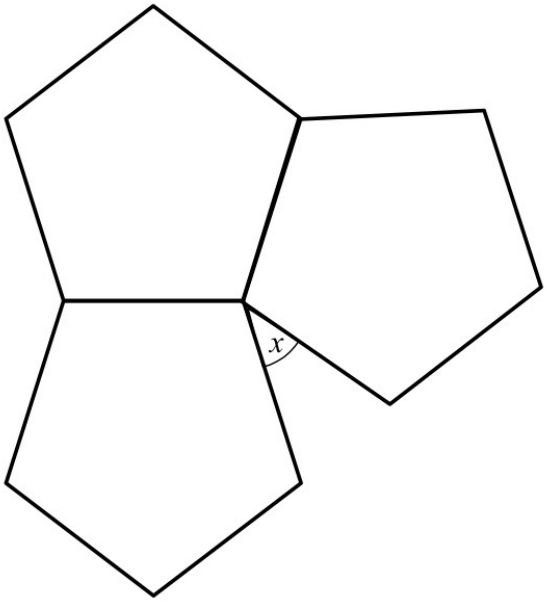
exterior angle of polygon P $= 60 - 45 = 15$

number of sides of polygon P $= \frac{360}{15} = 24$

24

(Total for question 10 is 4 marks)

11



The diagram shows three regular pentagons meeting at a point.

Work out the size of the angle marked x.
You must show all your working.

exterior angle of pentagon $= \frac{360}{5} = 72$

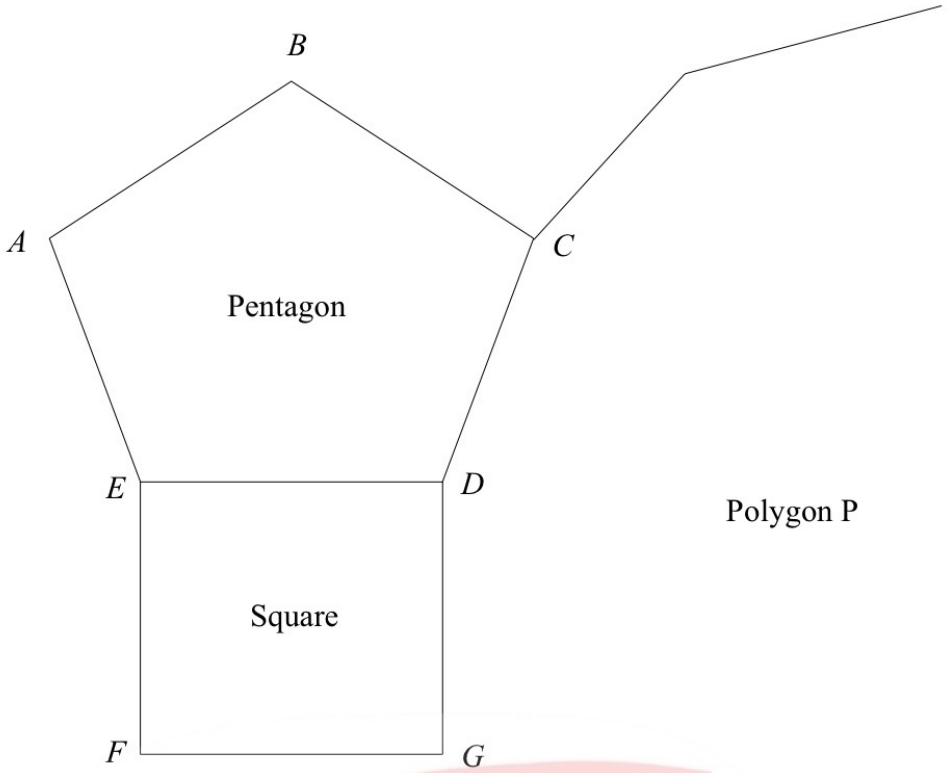
interior angle of pentagon $= 180 - 72 = 108$

$x = 360 - (3 \times 108) = 36$

.....36.....°

(Total for question 11 is 3 marks)

12



Polygon P

The diagram shows a regular pentagon, ABCDE, and a square, EDFG.

The lines CD and DG are both sides of another regular polgon, P.

How many sides does polygon P have?

You must show how you got your answer.

exterior angle of pentagon $= \frac{360}{5} = 72$.

exterior angle of polygon P $= 90 - 72 = 18$.

number of sides of polygon $= \frac{360}{18} = 20$

20

(Total for question 12 is 4 marks)

1. Each exterior angle of a regular polygon is 30°.

Work out the number of sides of the polygon.

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

12

(2 marks)

2.

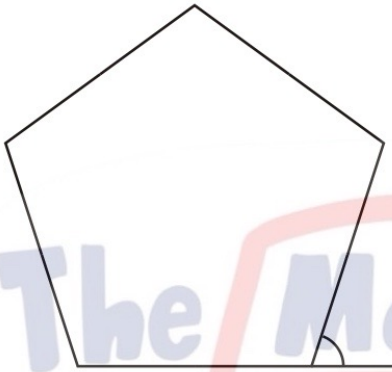


Diagram **NOT** accurately drawn

Work out the size of an exterior angle of a regular pentagon.

$\frac{360}{5} = 72°$

72°

(2 marks)

3.

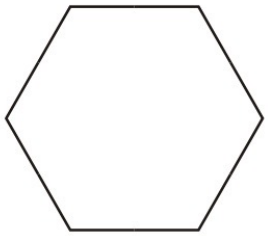


Diagram **NOT** accurately drawn

Calculate the size of the exterior angle of a regular hexagon.

$\frac{360}{6} = 60$

60°

(2 marks)

4. The size of each exterior angle of a regular polygon is 40°.

Work out the number of sides of the regular polygon.

$n = \frac{360}{40} = 9$

.....9.....

(2 marks)

5. The size of each interior angle of a regular polygon is 156°.
Work out the number of sides of the polygon.

$n = \frac{360}{180-156} = 15$

.....15.....

(3 marks)

6. Here is a regular polygon with 9 sides.

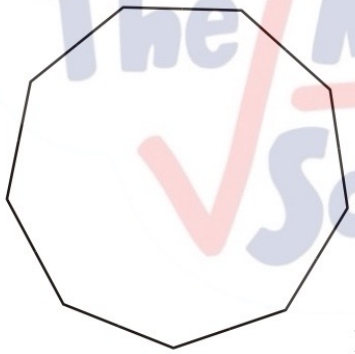


Diagram **NOT** accurately drawn

Work out the size of an exterior angle.

$\frac{360}{9} = 40$

.....40.....°

(2 marks)

7.

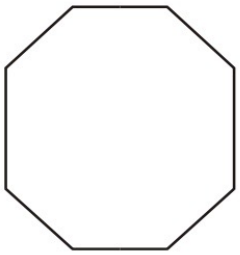


Diagram **NOT** accurately drawn

(a) Work out the size of each interior angle of a regular octagon.

$$180 - \frac{360}{8} = 180 - 45 = 135$$

135

(3)

The size of each exterior angle of a regular polygon is 30^0

(b) Work out the number of sides of the polygon.

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

12

(2)

(5 marks)

8.

Diagram **NOT** accurately drawn

The diagram shows part of a **regular** 10-sided polygon.

Work out the size of the angle marked x.

$$180 - \frac{360}{10} = 180 - 36 = 144$$

144 °

(3 marks)

9.

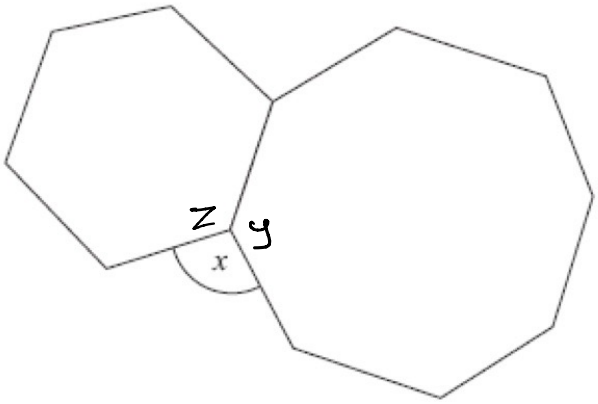


Diagram **NOT** accurately drawn

The diagram shows a regular hexagon and a regular octagon.

Calculate the size of the angle marked x.
You must show all your working.

$y = 180 - \frac{360}{8} = 180 - 45 = 135$

$z = 180 - \frac{360}{6} = 180 - 60 = 120$

$x = 360 - (135 + 120) = 105$

105 .....°

(4 marks)

10.

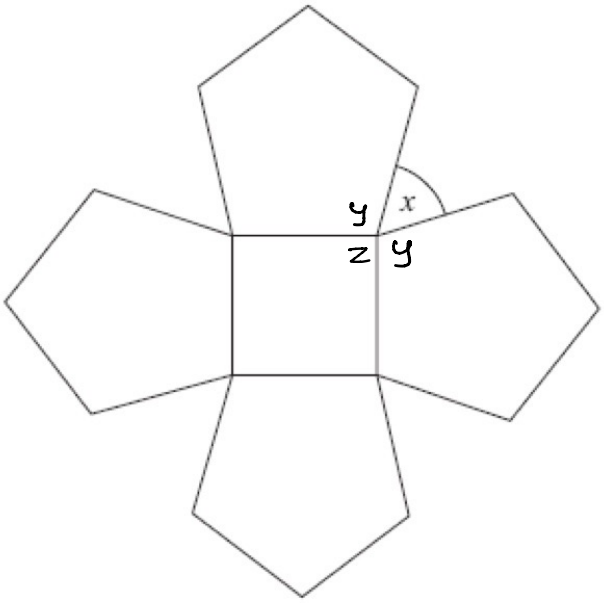


Diagram **NOT** accurately drawn

The diagram shows a square and 4 regular pentagons.

Work out the size of the angle marked x.

$y = 180 - \frac{360}{5} = 180 - 72 = 108$

$x = 360 - (2 \times 108) + 90) = 54$

54 .....°

(4 marks)

11.

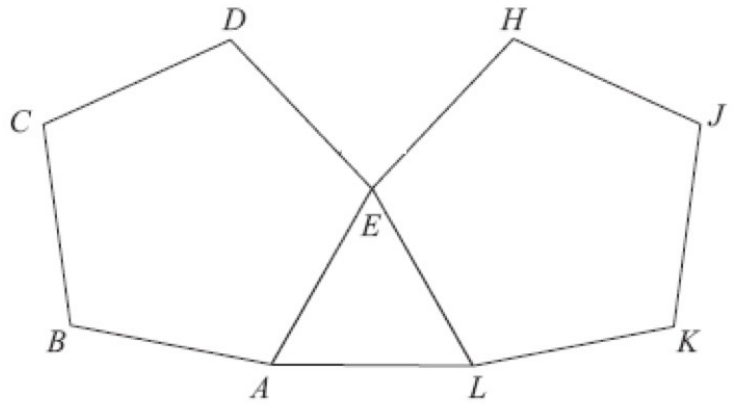


Diagram **NOT** accurately drawn

ABCDE and *EHJKL* are regular pentagons.
AEL is an equilateral triangle.

Work out the size of angle *DEH*.

$360 - 108 - 108 - 60 = 84$

84 .....°

(4 marks)

12. The diagram shows part of a pattern made from tiles.

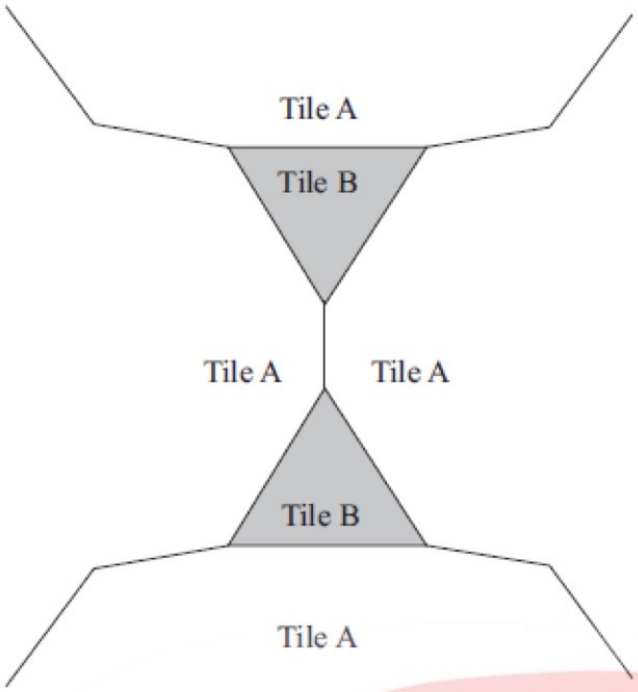


Diagram **NOT** accurately drawn

The pattern is made from two types of tiles, tile A and tile B.

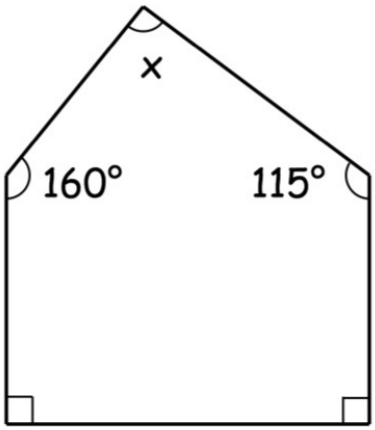
Both tile A and tile B are regular polygons.

Work out the number of sides tile A has.

.....

(4 marks)

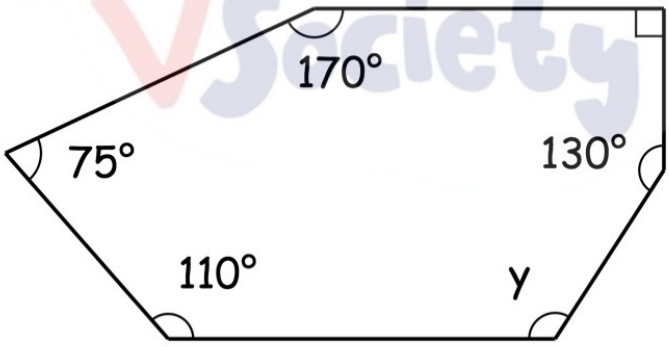
1.



(a) Calculate the size of angle x.

x = 85 °

(2)

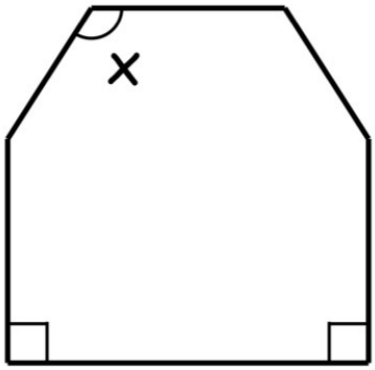


(b) Calculate the size of angle y.

y = ... °

(2)

2. The hexagon below has two right angles.
The other four angles are all equal.

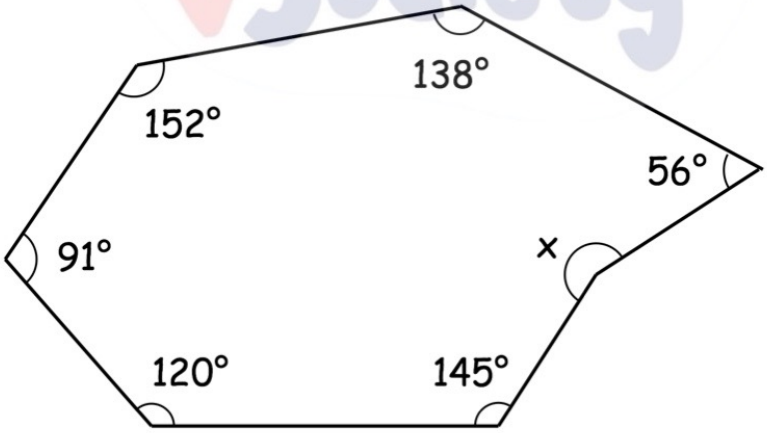


Work out the size of angle x.

.....°

(3)

3. Shown below is a heptagon.

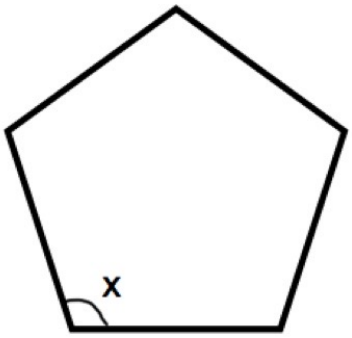


Calculate the size of angle x.

.....°

(2)

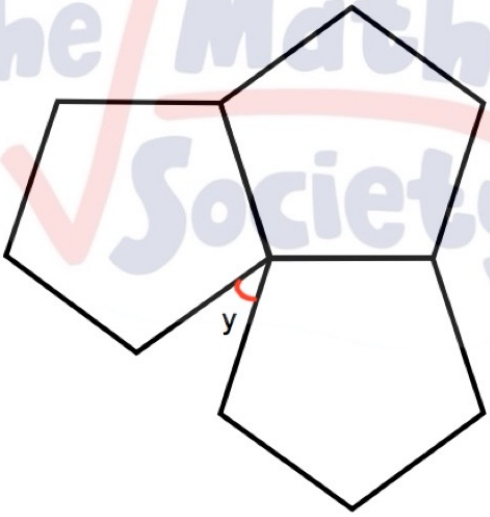
4. Shown below is a regular pentagon.



(a) Find the size of each interior angle.

x = ...°

(2)



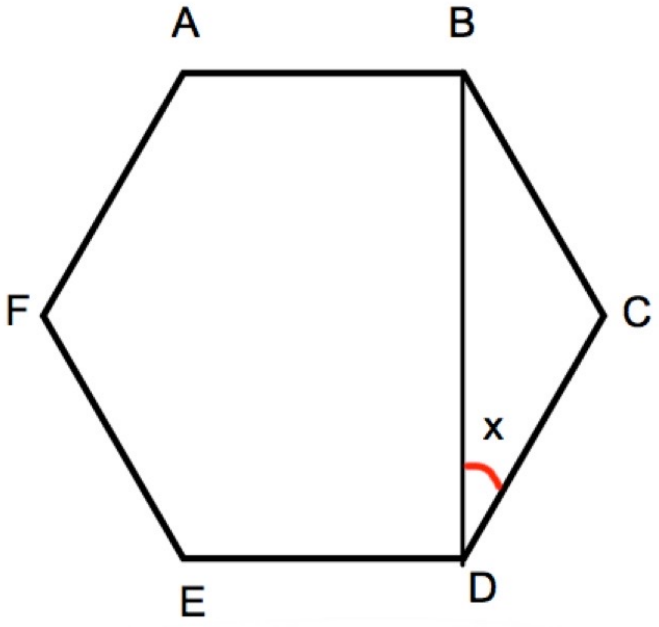
Three identical regular pentagons are joined as shown above.

(b) Work out the size of angle y.

y = ...°

(2)

5. Shown below is a regular hexagon ABCDEF.

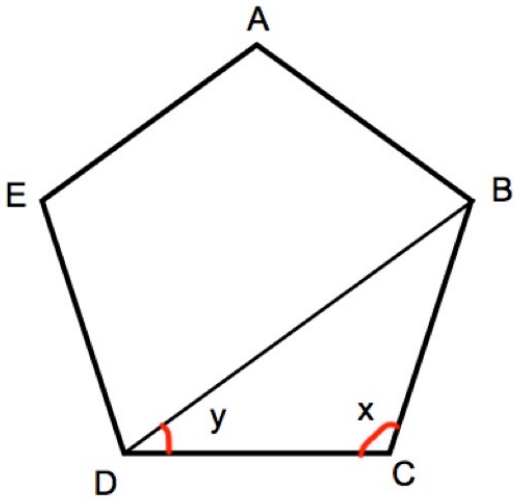


Calculate angle x.

x = ...°

(3)

6. Shown below is a regular pentagon ABCDE.



(a) Work out angle x.

x = ...°

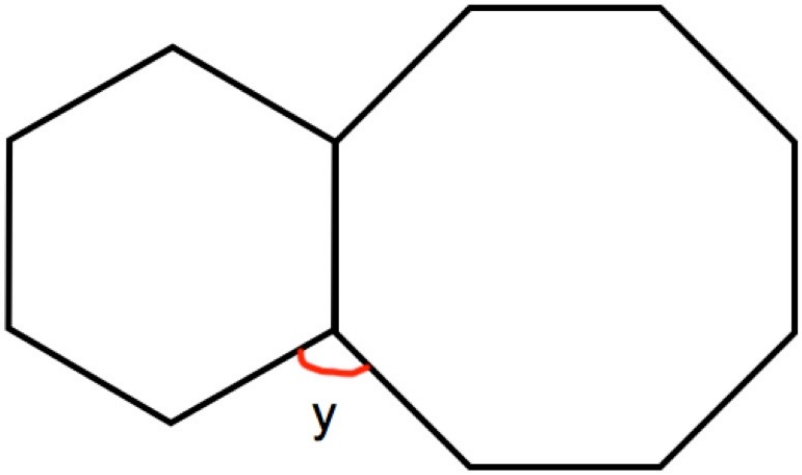
(2)

(b) Work out angle y.

y = ...°

(2)

7. Shown is a regular hexagon and a regular octagon.



Calculate the size of angle y.

y = ...°

(3)

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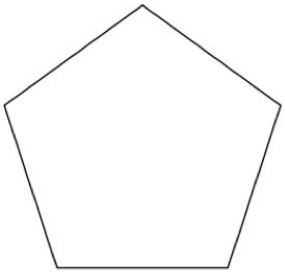
8. A regular polygon has 12 sides.

Work out the size of each interior angle.

.....°

(2)

9.



Explain why the sum of the interior angles in a regular pentagon is 540°

.....

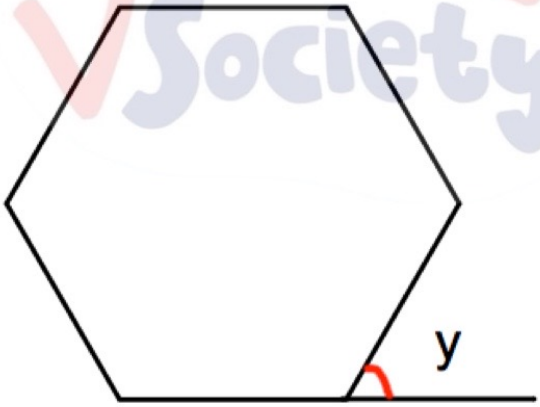
.....

.....

.....

(2)

10. Shown below is a regular hexagon, with an exterior angle labeled y.



Work out the size of each exterior angle.

y = ...°

(2)

11. A regular polygon has 24 sides.

Work out the size of each exterior angle.

..... °

(2)

---

12. Each exterior angle of a regular polygon is 20°

Work out the number of sides of the polygon.

.....

(2)

---

13. Each interior angle of a regular polygon is 174°

Work out the number of sides of the polygon.

.....

(2)

14. The interior angle of a regular polygon is 135°

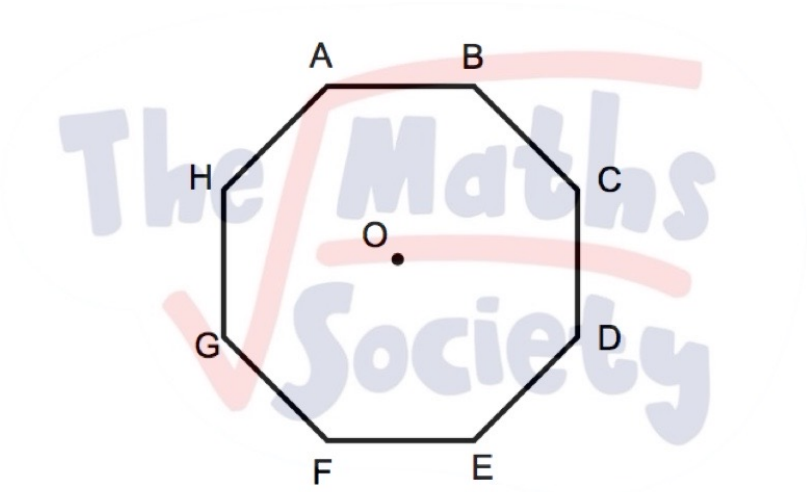
Work out the number of sides of the polygon.

.....

(2)

---

15. ABCDEFGH is a regular octagon.



(a) Calculate the size of angle AOB.

..... °

(2)

(b) Calculate the size of angle ABC.

..... °

(2)

16. Martin has drawn a regular nonagon (9 sided polygon).

(a) What size is each exterior angle?

..... °

(2)

(b) What size is each interior angle?

..... °

(2)

---

17. Shown below is an interior angle from a regular polygon.

Calculate the number of sides the polygon has.

.....

(2)

18. Isaac wants to work out the size of each exterior angle of a regular 12 sided polygon.

Here is Isaac's working out.

$(12 - 2) \times 180 = 1800°$

$1800 \div 12 = 150°$

$360 - 150 = 210°$

Answer: 210°

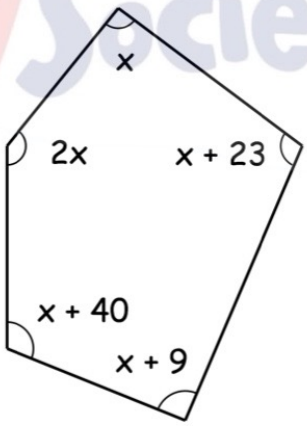
Explain Isaac's mistake.

.....

.....

(2)

19. The diagram shows a pentagon.



Work out the size of the largest angle in the pentagon.

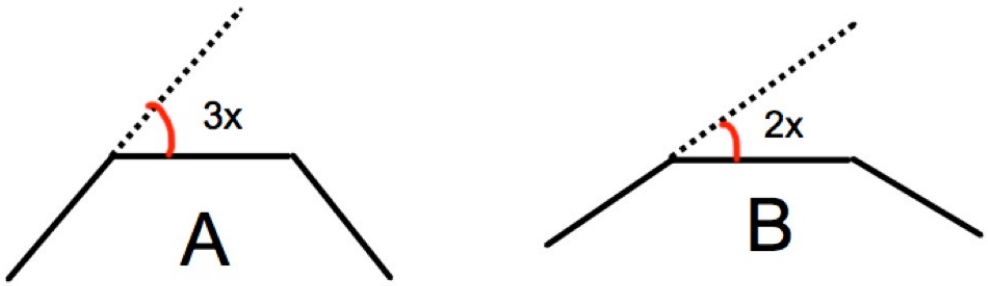
.....°

(5)

20. The diagram shows parts of two regular polygons A and B.

A has 10 sides and exterior angle 3x.
B has exterior angle 2x.

Not to scale



Work out the number of sides regular polygon B has.

.....

(5)

23. Work out the sum of the interior angles for a 40 sided polygon.

.....°

(2)

---

24. The sum of the interior angles in a polygon is 7380°

Calculate the number of sides the polygon has.

.....

(2)

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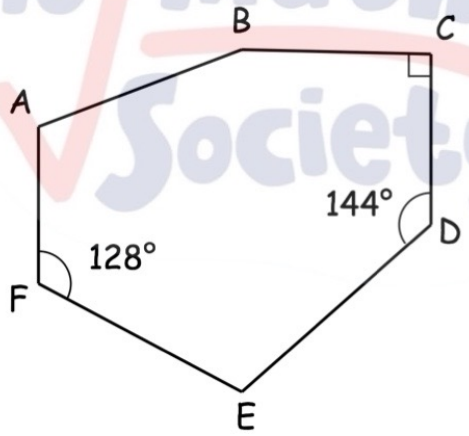
25. ABCDEF is a hexagon.



Angle BAF : Angle DEF = $6 : 5$

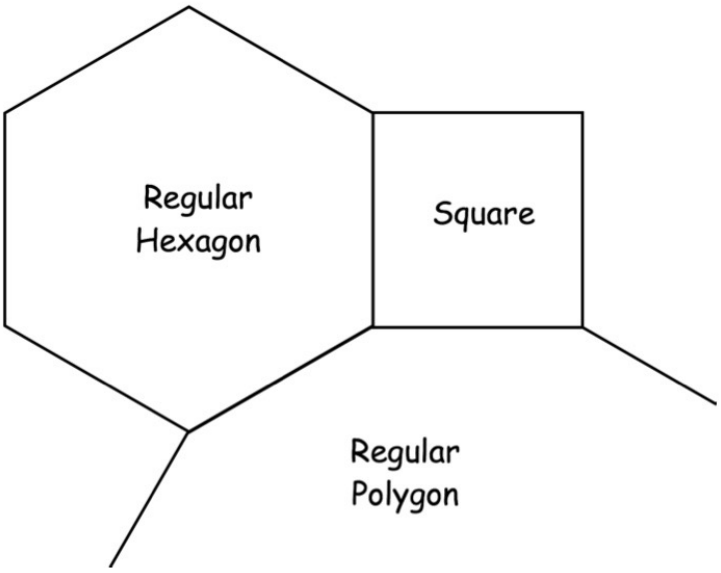
Angle AFE : Angle ABC = $4 : 5$

Work out the sizes of angles BAF, DEF and ABC

Angle BAF = ... Angle DEF = ... Angle ABC = ...

(5)

26. Shown below is part of a regular polygon, a regular hexagon and a square.

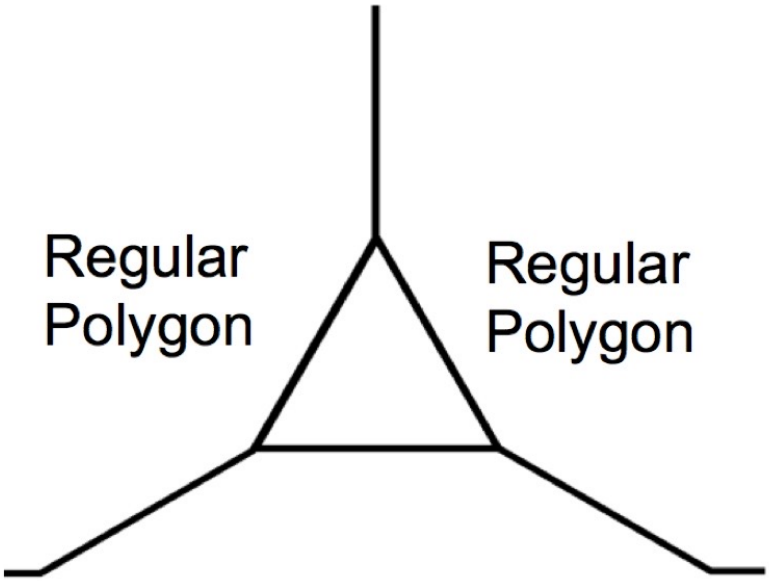


Work out how many sides the regular polygon has.

.....

(4)

27. Shown below are two identical regular polygons and an equilateral triangle.



Calculate the number of sides each regular polygon has.

.....

(3)

28. A regular polygon has interior angles that are 5 times larger than each of its exterior angles.

Calculate how many sides it has.

.....

(4)