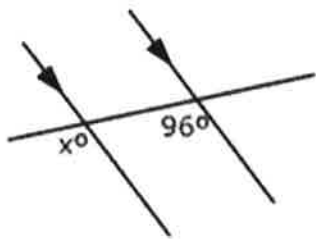


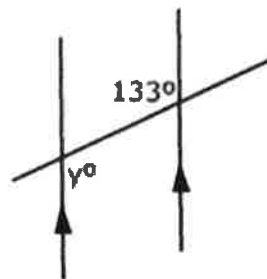
## Year 9 Higher – Angles; parallel lines and polygons

1. Find the missing angle – give a reason for your answer.



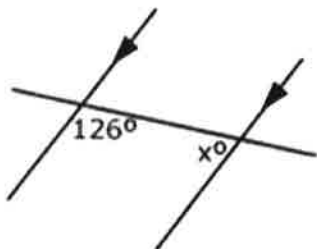
$x = 96^\circ$   
Corresponding angles are equal

2. Find the missing angle – give a reason for your answer.



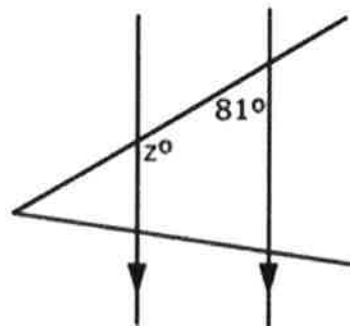
$y = 133^\circ$   
alternate angles are equal.

3. Find the missing angle – give a reason for your answer.



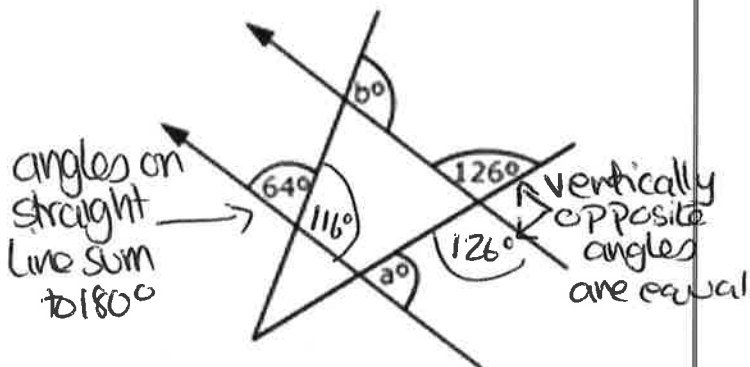
$x = 180 - 126$   
 $= 54^\circ$   
allied angles sum to  $180^\circ$

4. Find the missing angle – give a reason for your answer.



$z = 180 - 81$   
 $= 99^\circ$   
allied angles sum to  $180^\circ$

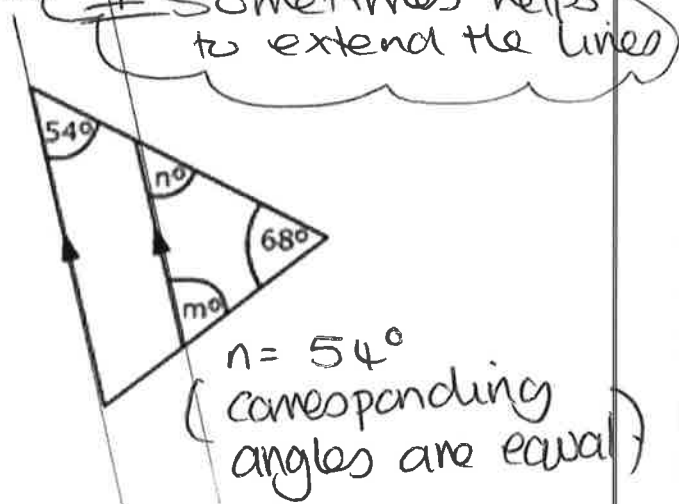
5. Find the missing angles – give reasons for your answer.



angles on straight line sum to  $180^\circ$   
 $a = 180 - 126$   
 $= 54^\circ$  (allied angles sum to  $180^\circ$ )

$b = 116^\circ$  (corresponding angles are equal).

6. Find the missing angles – give reasons for your answer.



$n = 54^\circ$   
(corresponding angles are equal)

$m = 180 - 68 - 54$   
 $= 58^\circ$   
(angles in a triangle sum to  $180^\circ$ )

7 Complete the table

Name of regular polygon	Number of Sides	Size of exterior angle	Sum of all interior angles	Size of interior angle
Equilateral triangle	3	$360^\circ \div 3 = 120^\circ$	$1 \times 180^\circ = 180^\circ$	$180 \div 3 = 60^\circ$
Square	4	$360^\circ \div 4 = 90$	$2 \times 180^\circ = 360^\circ$	$360 \div 4 = 90^\circ$
Pentagon	5	$72^\circ$	$540^\circ$	$540 \div 5 = 108^\circ$
Hexagon	6	$60^\circ$	$720^\circ$	$720 \div 6 = 120^\circ$
Heptagon	7	$51.43^\circ$	$900^\circ$	$900 \div 7 = 128.57^\circ$
Octagon	8	$45^\circ$	$1080^\circ$	$1080 \div 8 = 135^\circ$
Nonagon	9	$40^\circ$	$1260$	$1260 \div 9 = 140^\circ$
Decagon	10	$36^\circ$	$1440$	$1440 \div 10 = 144^\circ$
n-sided polygon	n	$360^\circ \div n$	$(n-2) \times 180^\circ$	$\frac{(n-2) \times 180}{n}$

8. What is each interior angle of a regular polygon with 14 sides?

$$\frac{(14-2) \times 180}{14} = 154.29^\circ$$

9. Calculate the sum of the interior angles of a polygon with 22 sides.

$$\begin{aligned} &(n-2) \times 180 \\ &= (22-2) \times 180 \\ &= 20 \times 180 \\ &= 3600^\circ \end{aligned}$$

9. Each interior angle of a regular polygon is  $168^\circ$ . How many sides does the polygon have?

$$180 - 168 = 12^\circ \text{ (exterior angle)}$$

$$360 \div 12 = 30$$

30 sides.

10. How many sides do these regular polygons have if their exterior angles are...?

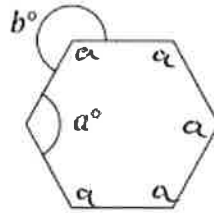
a)  $30^\circ$  b)  $18^\circ$

a)  $360 \div 30 = 12$  sides

b)  $360 \div 18 = 20$  sides.

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The diagram shows a regular hexagon.  
What are the sizes of angles  $a$  and  $b$ ?



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

$$= \frac{(6-2) \times 180}{6}$$

$$= 120^\circ$$

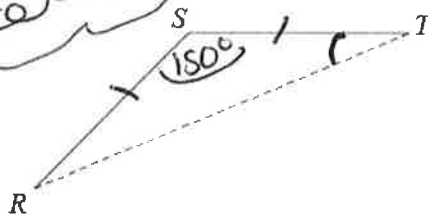
$$\therefore a = 120^\circ$$

$$b = 360 - 120$$

$$= 240^\circ \quad (\text{angles around a point sum to } 360^\circ)$$

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regular polygon,  
so side lengths  
are equal so  $RST$  is  
an isosceles triangle



$RS$  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.

$$\frac{(n-2) \times 180}{n} = \frac{1800}{12}$$

$$= 150^\circ \quad (\text{angle } RST)$$

$$\text{angle } STR = \frac{180 - 150}{2}$$

$$= 15^\circ \quad (\text{base angles in an isosceles triangle are equal})$$