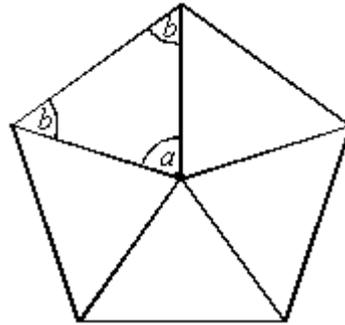


**Q1. Turning triangles – task 1**

- (a) This regular pentagon is made from 5 isosceles triangles that fit together around a point.

The triangles fit with no gaps and no overlaps.

Work out the angles in one of the triangles.



- (b) A regular decagon can be made from 10 isosceles triangles that fit together around a point with no gaps and no overlaps.

Work out the angles in one of these triangles.

- (c) All regular polygons can be made from isosceles triangles that fit together around a point with no gaps and no overlaps.

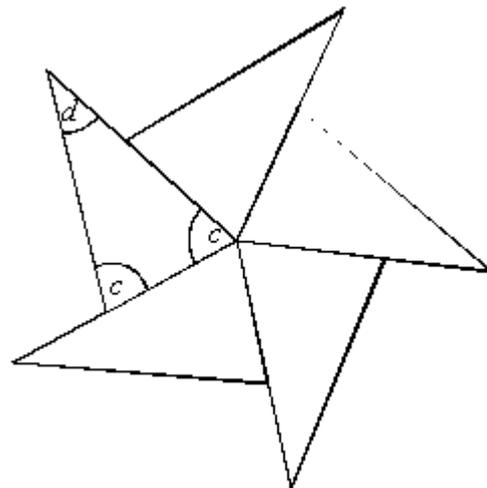
**Only 12** of these regular polygons have isosceles triangles in which all the angles are whole numbers, and all the angles are whole numbers than or equal to  $10^\circ$ .

How many sides do these polygons have, and how can you be certain that there are no more than 12 of these polygons?

**Turning triangles – task 2**

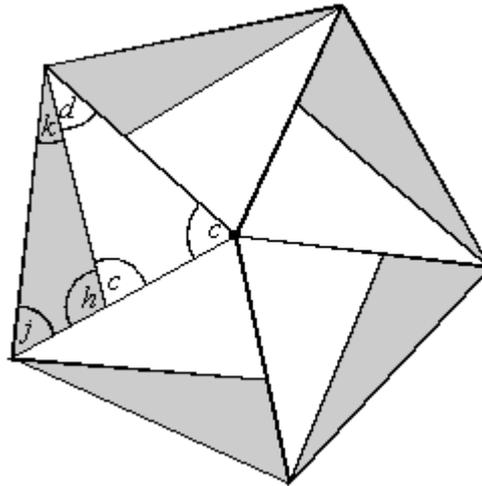
- (a) Isosceles triangles can fit together around a point in a different way to make 'windmill' patterns. The triangles fit with no gaps and no overlap.

Work out the angles in the triangle.



- (b) This windmill pattern has been made into a regular pentagon by drawing five extra triangles.

Work out the angles in each triangle.



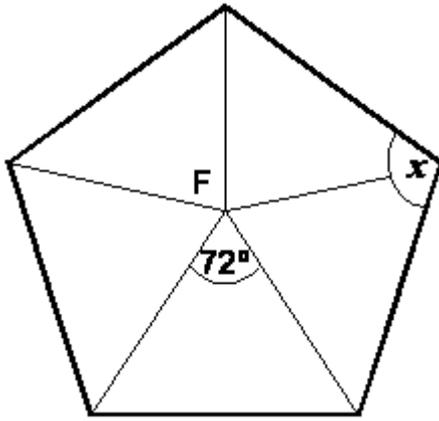
- (c) Other windmill patterns can be made into regular polygons in the same way by drawing extra triangles, with angles  $h$ ,  $j$  and  $k$ .

Can you predict what angles  $h$ ,  $j$  and  $k$  will be when you know angles  $c$  and  $d$ ?

Without working it out for every windmill pattern, how can you be certain your prediction will always work?

##

**F** is the centre of a **regular** pentagon.



Work out the value of **angle  $x$**  without using an angle measurer.

You **MUST** explain how you worked out your answer.

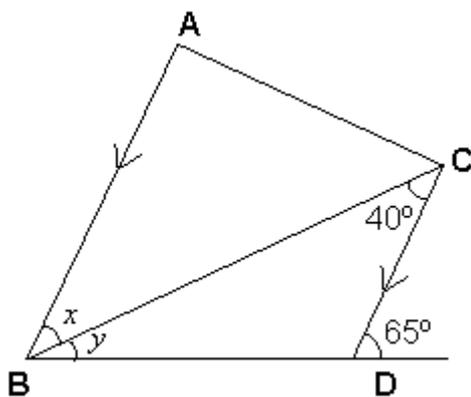


$x =$   °

2 marks

##

In this diagram **AB** is parallel to **CD**.



The diagram is not to scale

Work out the value of angle  $x$ .

**Do not** use an angle measurer.



1 mark

Calculate the value of angle  $y$ .

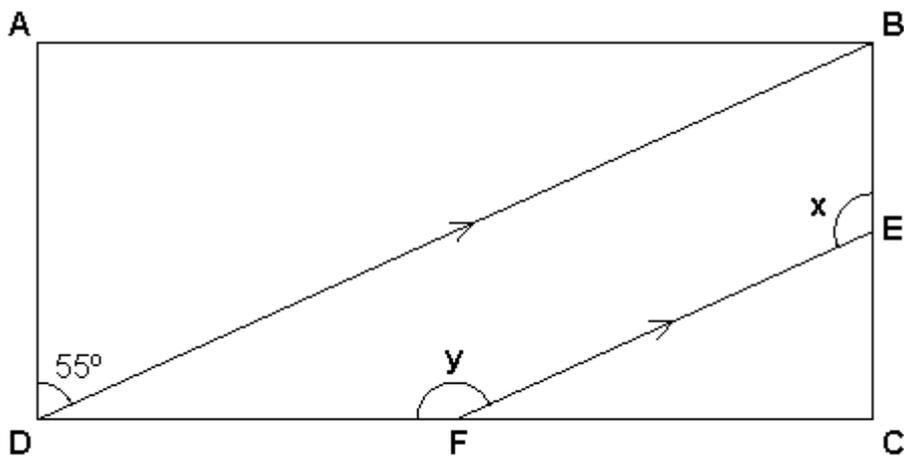
**Do not** use an angle measurer.



1 mark

**Q4.** The shape **ABCD** is a rectangle.

**BD** is parallel to **EF**.



Not to scale

Calculate the sizes of the angles  $x$  and  $y$ .

**Do not** use an angle measurer (protractor).

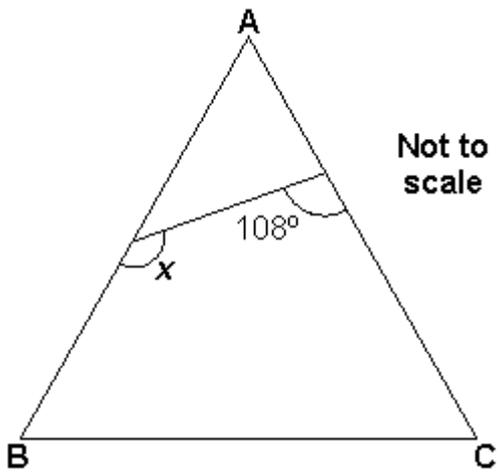


$x = \boxed{\phantom{00}}^{\circ}$

$y = \boxed{\phantom{00}}^{\circ}$

2 marks

**Q5.** Triangle **ABC** is **equilateral**.



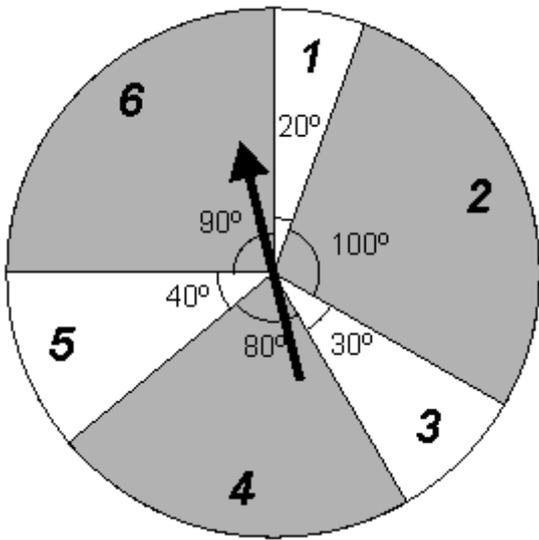
Calculate the size of **angle x**.

Do not use an angle measurer (protractor).

$x = \boxed{\phantom{000}}$

1 mark

**Q6.** Rajiv makes this circular spinner.

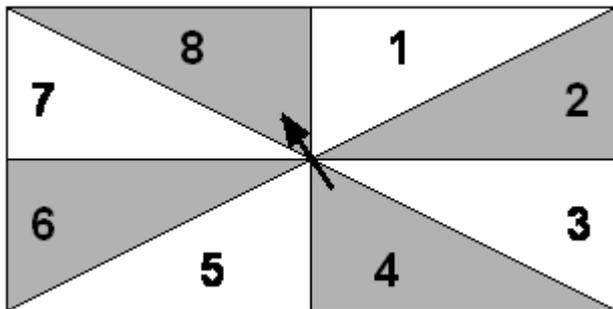


Calculate the probability of **scoring 5** on Rajiv's spinner.

Give your answer as a fraction.

1 mark

Vicky makes this **rectangular** spinner.



All the sections have **equal areas**.

She says,

***'All the numbers on my spinner have the same probability of coming up'.***

Explain why Vicky is **not** correct.



.....

.....

.....

1 mark

**Q7.** This is a centimetre grid.

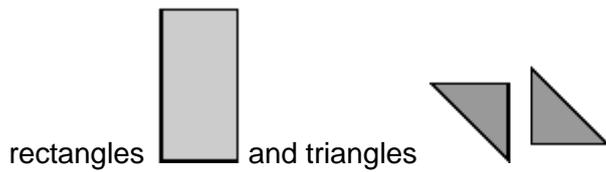
On the grid draw a **triangle** which has an **area of  $7.5\text{cm}^2$**  and which has an **obtuse angle**.

Use a ruler.

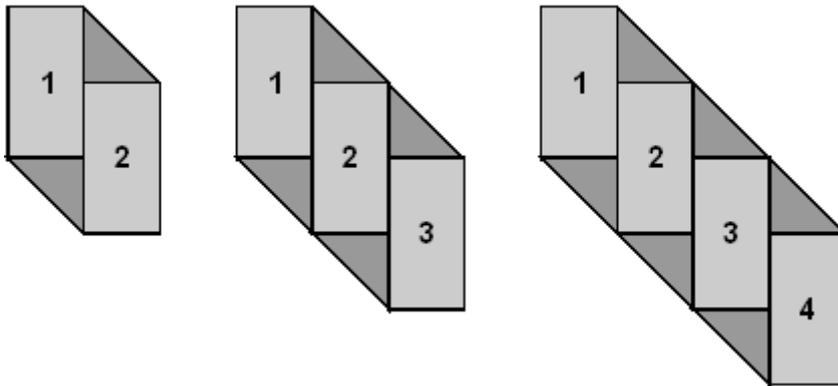



2 marks

**Q8.** Here is the start of a sequence of shapes using



Each rectangle has been numbered.



The pattern continues to grow in this way.

How many triangles will there be in the shape that has **50 rectangles** in it?



1 mark

**T** stands for the number of triangles in each shape.

**R** stands for the number of rectangles in each shape.

What is the rule connecting **T and R**?

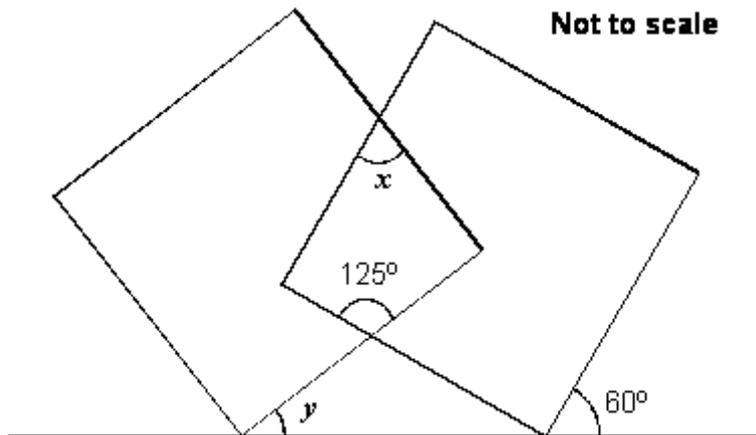
 .....

.....

.....

1 mark

**Q9.** The diagram shows two overlapping squares and a straight line.



Calculate the value of **angle x** and the value of **angle y**.

Do **not** use a protractor (angle measurer).

$x =$

$y =$

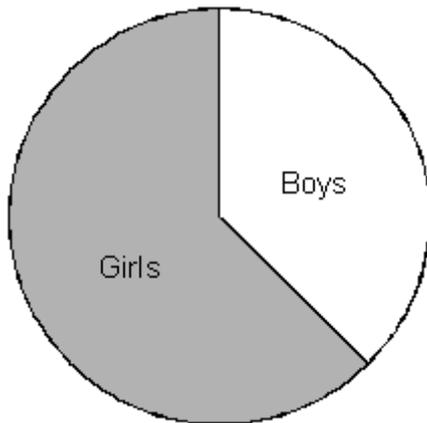
1 mark

1 mark

**Q10.** Sarah makes a pie chart to show the proportion of boys and girls in her class.

	Number in class	Size of angle on pie chart
Boys	14	144°

<b>Girls</b>	21	216°
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The next day another **boy** joins Sarah's class.

She makes a new pie chart.

Calculate the angle for **boys** on the new pie chart.

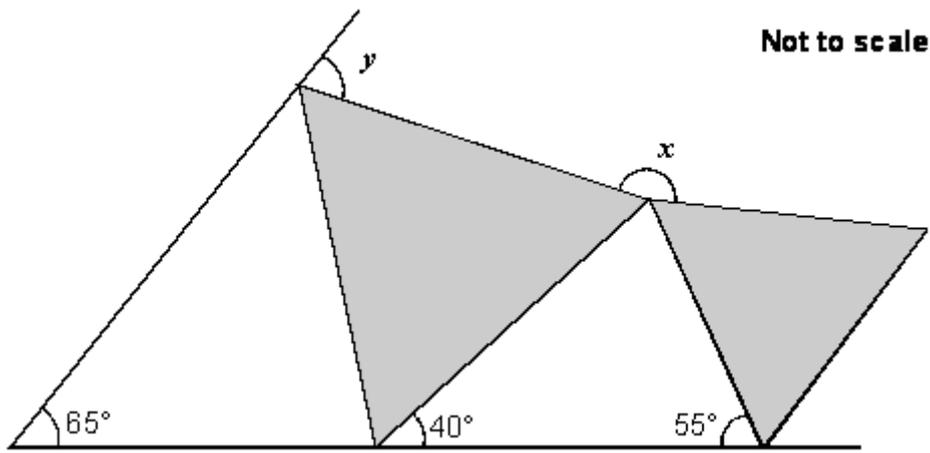


Show  
your **working**.  
You may get  
a mark

○

2 marks

**Q11.** The diagram shows two shaded **equilateral triangles**.



Calculate the size of the **angle  $x^\circ$**  and **angle  $y$** .

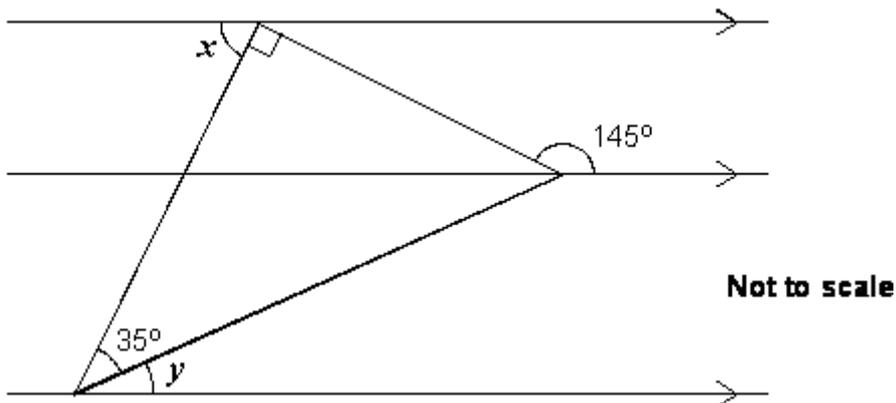
Do **not** use a protractor (angle measurer).



$x =$    $\quad y =$

2 marks

**Q12.** The diagram shows a right-angled triangle and three parallel lines.



Calculate the size of angle  $x$  and angle  $y$

Do **not** use a protractor (angle measurer).



1 mark

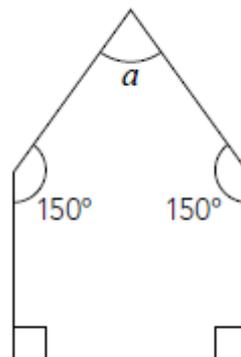


1 mark

**Q13.**

The diagram shows a pentagon.

Not drawn accurately



Each side of the pentagon is the **same length**.

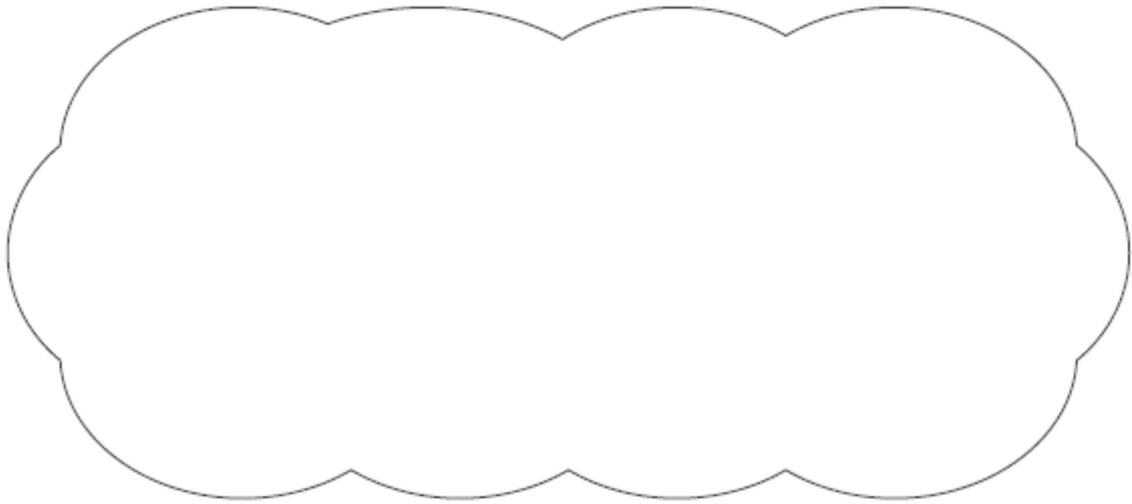
Is the shape a **regular** pentagon?

Circle Yes or No.

 Yes / No

Explain your answer.





1 mark

Work out the size of angle  $a$

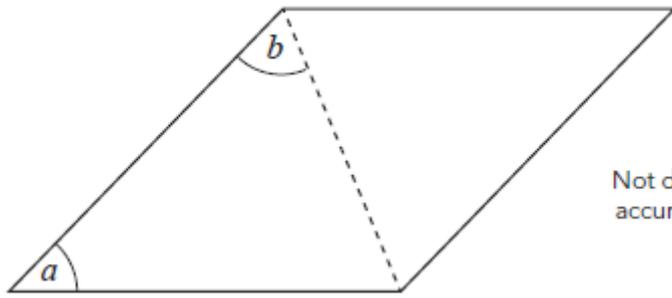


Show your working

$a =$

2 marks

**Q14.** The dotted line is a diagonal of this **rhombus**.



Not drawn accurately

If angle  $a = 80^\circ$ , what is angle  $b$ ?

Show  
your  
method



If angle  $b = 80^\circ$ , what is angle  $a$ ?



3 marks