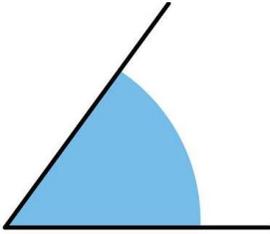
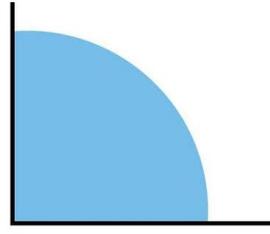


# Key Information

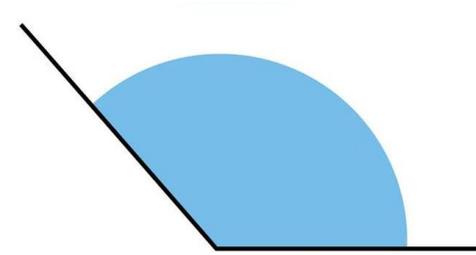
## Types of Angles



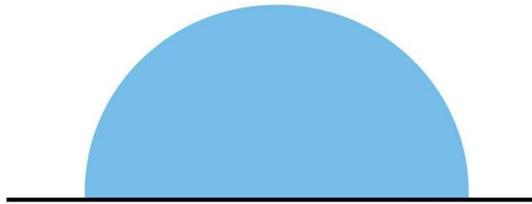
**Acute Angle**  
Less than  $90^\circ$



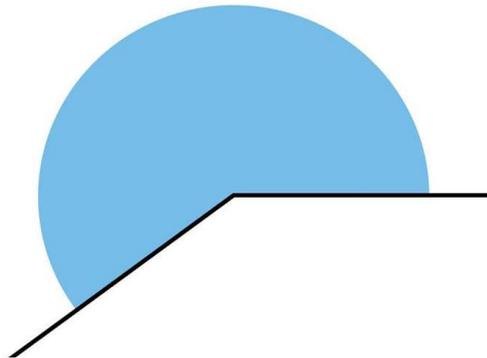
**Right Angle**  
Exactly  $90^\circ$



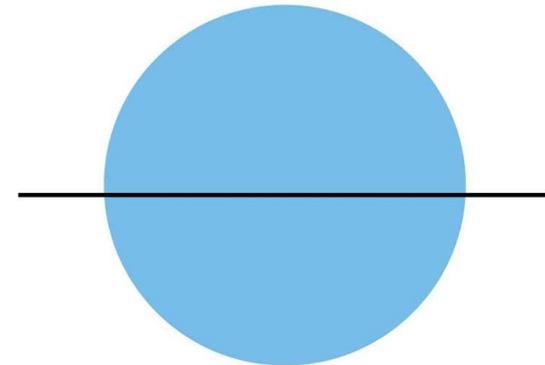
**Obtuse Angle**  
Greater Than  $90^\circ$  and less  
than  $180^\circ$  degrees



**Straight Line**  
Exactly  $180^\circ$

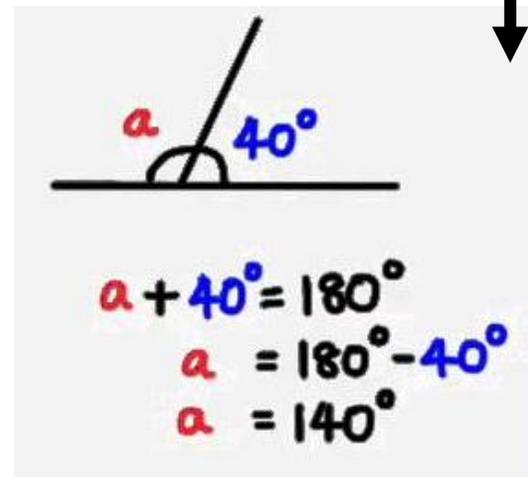
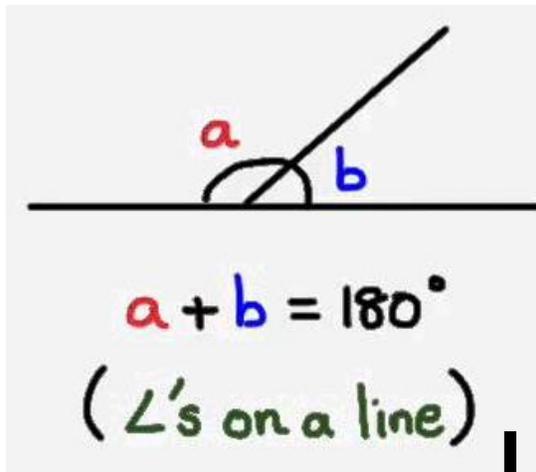


**Reflex Angle**  
Greater Than  $180^\circ$

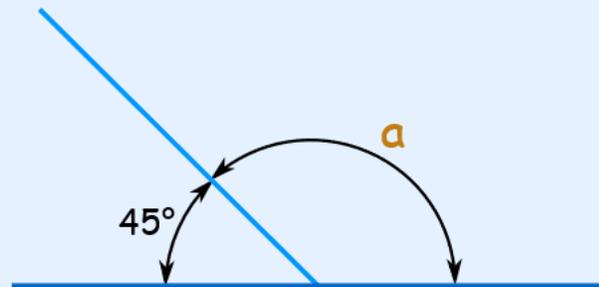


**Full Turn**  
Exactly  $360^\circ$

## Calculating Missing Angles on a Straight Line

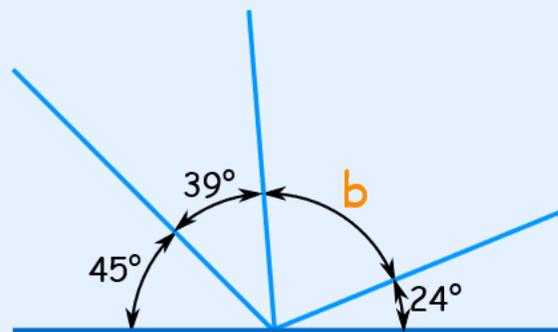


Example: We know one angle is  $45^\circ$ , what is the other angle "a" ?



Angle **a** is  $180^\circ - 45^\circ = 135^\circ$

Example: What is angle "b" ?



Angle **b** is  $180^\circ$  minus the sum of the other angles.

Sum of known angles =  $45^\circ + 39^\circ + 24^\circ$

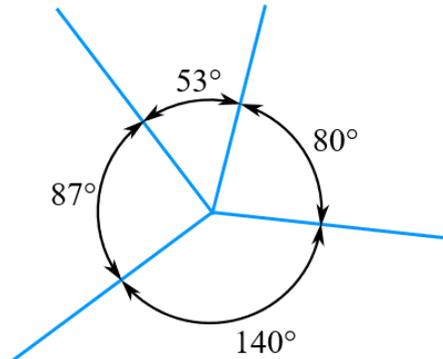
Sum of known angles =  $108^\circ$

Angle **b** =  $180^\circ - 108^\circ$

Angle **b** =  $72^\circ$

## Calculating Missing Angles Round a Point

Angles around a point will always add up to 360 degrees

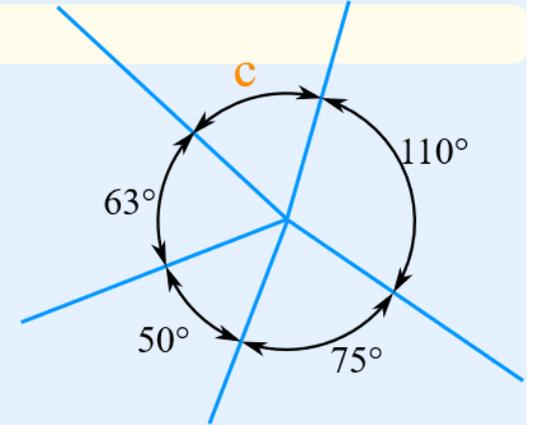


The angles above all add to 360°

$$53^\circ + 80^\circ + 140^\circ + 87^\circ = 360^\circ$$

Example: What is angle "c"?

To find angle **c** we take the sum of the known angles and subtract that from 360°



$$\begin{aligned}\text{Sum of known angles} &= 110^\circ + 75^\circ + 50^\circ + 63^\circ \\ &= 298^\circ\end{aligned}$$

$$\begin{aligned}\text{Angle } \mathbf{c} &= 360^\circ - 298^\circ \\ &= 62^\circ\end{aligned}$$

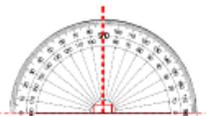
# Practice Activities

## Activity 1 – Recapping Angles

### Varied Fluency



There are  degrees in a right angle.



There are  right angles on a straight line.



There are  degrees on a straight line.

Complete the table.

Angle	Fraction of a full turn	Degrees
Right angle	$\frac{1}{4}$	90°
Straight line		
Three right angles		
Full turn		

Use a compass to identify how many degrees there are between:

- North & South (turning clockwise)
- South & East (turning anti-clockwise)
- North-East and South-West (turning clockwise)

Dora and Eva are asked how many degrees there are between North-West and South-West.

Dora says,



There are 90 degrees between NW and SW.

Eva says,



There are 270° between NW and SW.

Who do you agree with?

Explain why.

## Activity 2 – Introducing New Angle Rules

### Mathematical Talk

What do we know about  $a$  and  $b$ ? How do we know this?

Which angle fact might you need to use when answering this question?

Which angles are already given? How can we use this to calculate unknown angles?

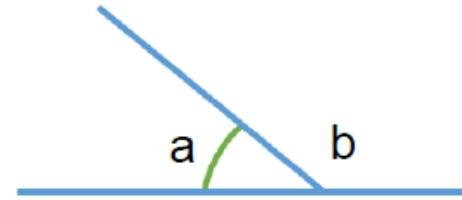
### Varied Fluency

$a + b = \square$

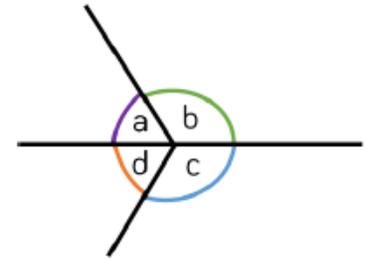
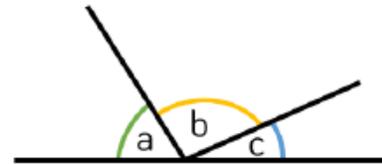
$b + a = \square$

$\square - a = b$

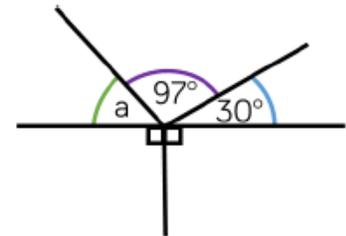
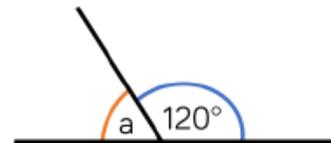
$\square - b = a$



How many number sentences can you write from the images?



Calculate the missing angles.



## Activity 3 – Angles on a Straight Line

### Mathematical Talk

How many degrees are there in a right angle?

How many will there be in two right angles?

If we place two right angles together, what do we notice?

How can we calculate the missing angles?

How can we subtract a number from 180 mentally?

### Varied Fluency



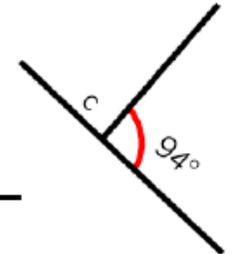
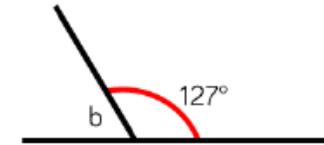
There are \_\_\_\_\_ degrees in a right angle.

There are \_\_\_\_\_ right angles on a straight line.

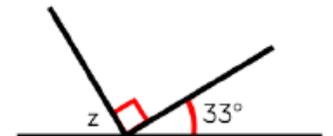
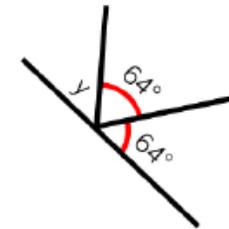
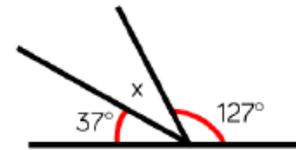
There are \_\_\_\_\_ degrees on a straight line.



Calculate the missing angles.



Calculate the missing angles.



Is there more than one way to calculate the missing angles?

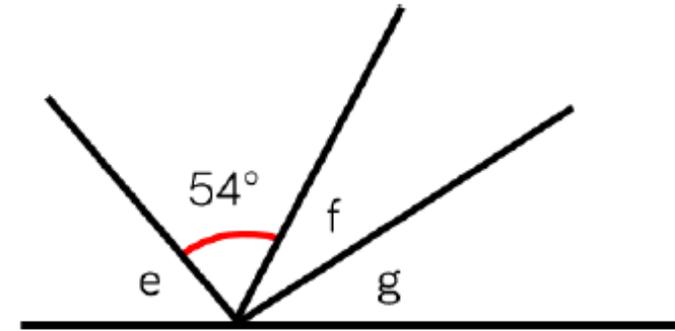
## Activity 4 – Angles on a Straight Line

Jack is measuring two angles on a straight line.

My angles measure  $73^\circ$  and  $108^\circ$



Explain why at least one of Jack's angles must be wrong.



- The total of angle f and g are the same as angle e
- Angle e is  $9^\circ$  more than the size of the given angle.
- Angle f is  $11^\circ$  more than angle g

Calculate the size of the angles.

Create your own straight line problem like this one for your partner.

## Activity 5 – Angles Round a Point

### Mathematical Talk

How many right angles are there in  $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}$  of a full turn?

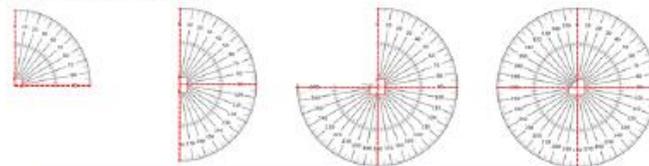
If you know a half turn/full turn is 180/360 degrees, how can this help you calculate the missing angle?

What is the most efficient way to calculate a missing angle?  
Would you use a mental or written method?

When you have several angles, is it better to add them first or to subtract them one by one?

### Varied Fluency

Complete the sentences.



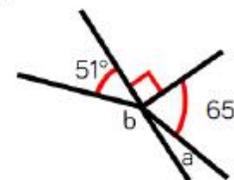
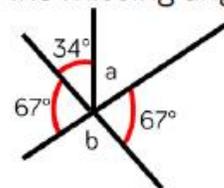
$\frac{1}{4}$  of a turn = 1 right angle =  $90^\circ$

$\frac{1}{2}$  of a turn = \_\_\_ right angles = \_\_\_ $^\circ$

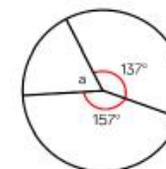
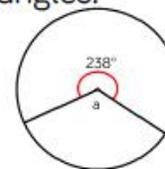
$\frac{3}{4}$  of a turn = 3 right angles = \_\_\_ $^\circ$

A full turn = \_\_\_ right angles = \_\_\_ $^\circ$

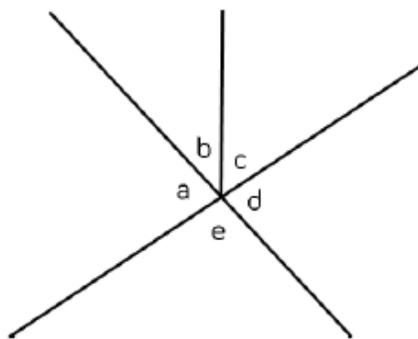
Calculate the missing angles.



Calculate the missing angles.



## Activity 6 – Angles Round a Point



$$a + b + c + d + e = 360^\circ$$

$$d + e = 180^\circ$$

Write other sentences about this picture.

Three angles measure  $97^\circ$ ,  $145^\circ$  and  $118^\circ$ .

Do these three angles fit exactly around a point?

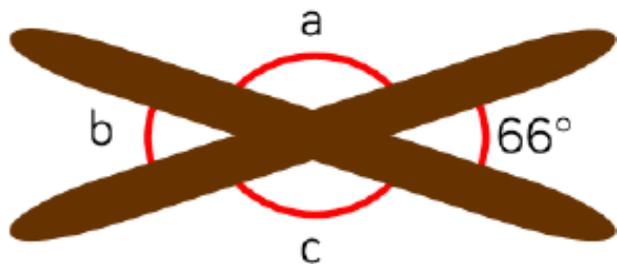
Explain your answer.

Five angles measure  $78^\circ$ ,  $95^\circ$ ,  $113^\circ$ ,  $162^\circ$  and  $187^\circ$ .

Which of them can be put together to fit exactly around a point?

Two sticks are on a table.

Without measuring, find the three missing angles.



Three angles fit exactly around a point.

The second angle is  $20^\circ$  more than the first angle.

The third angle is twice the size of the second angle.

Find the size of each of the three angles.