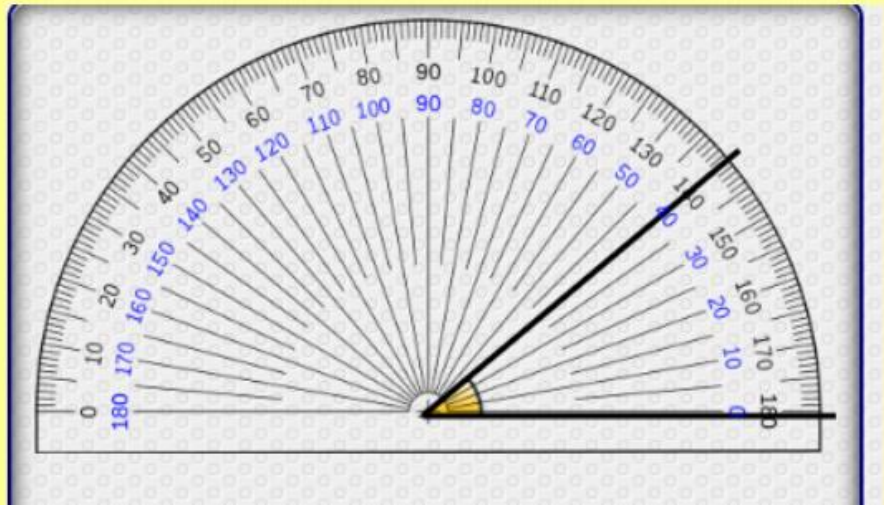
Year 6 - Angles

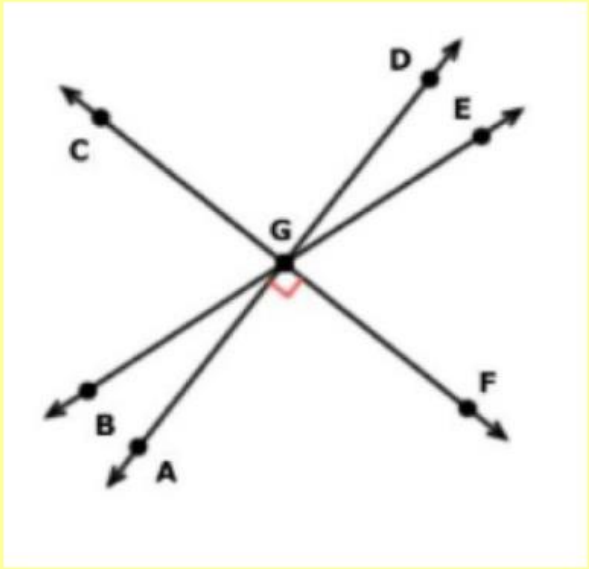
Year 6

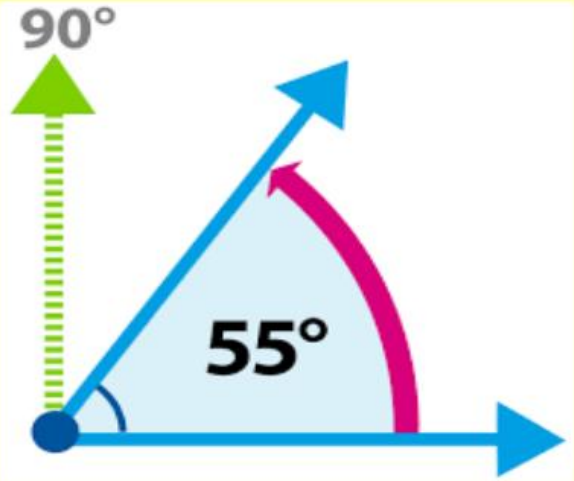
recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons



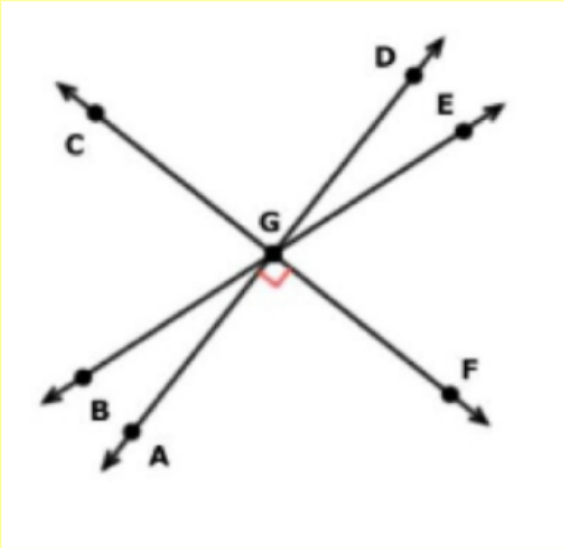
What is an angle?

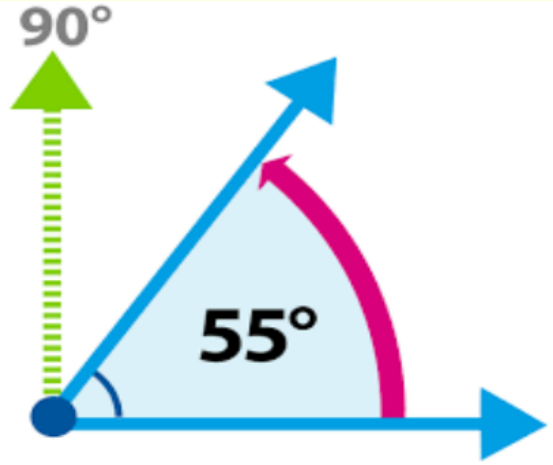




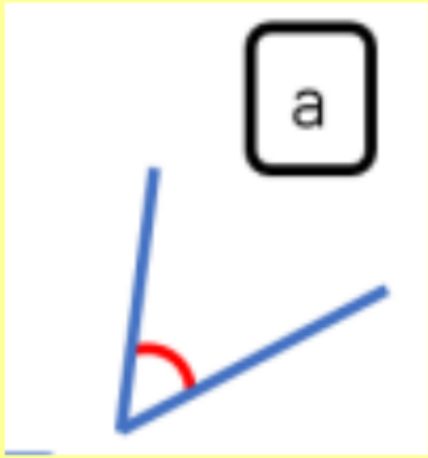
What is an angle?

The space (usually measured in degrees) between two intersecting lines or surfaces at or close to the point where they meet.

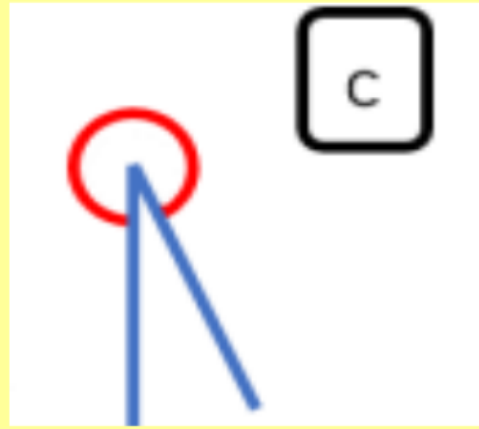




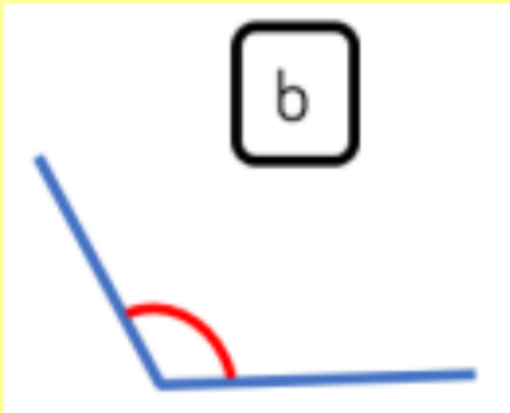
4 types of angle...



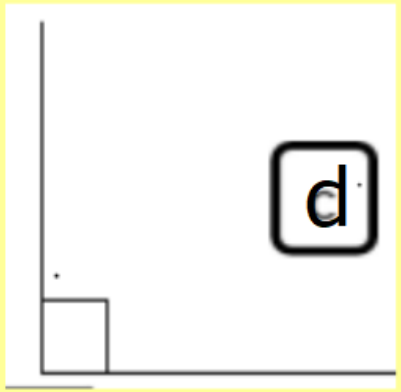
acute = less than 90°



reflex = larger than 180° and less than 360°



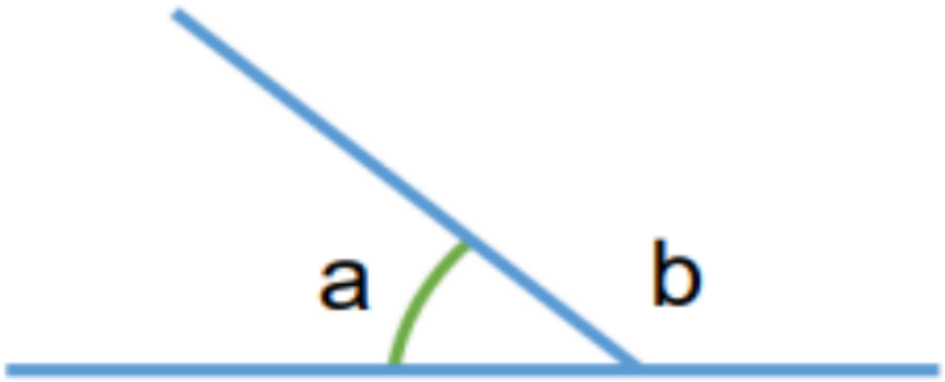
obtuse = between 90° and 180°



right = exactly 90°

I do:

Degrees of a straight line:



Key recall point no. 1:

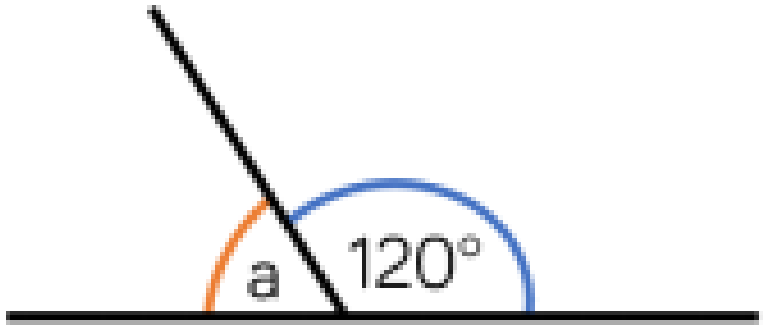
Angles on a straight line **always** add up to 180°

So

a + b = 180°

I do

Calculate the missing angles.

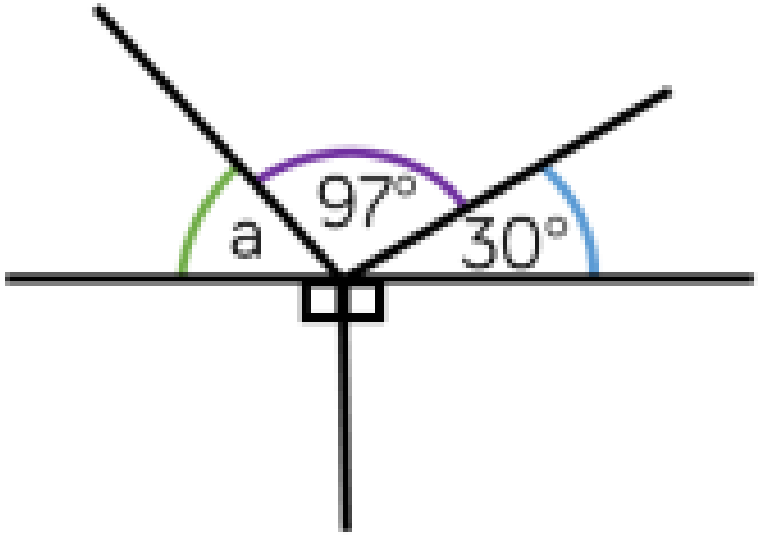


We know that the total must be 180°.

If we already have one number, we can work backwards and do the inverse.

180° – 120° = 60°

So angle *a* must be 60°



Don't be put off by the two right angles underneath! This just shows that the total of all the parts would be 360°.

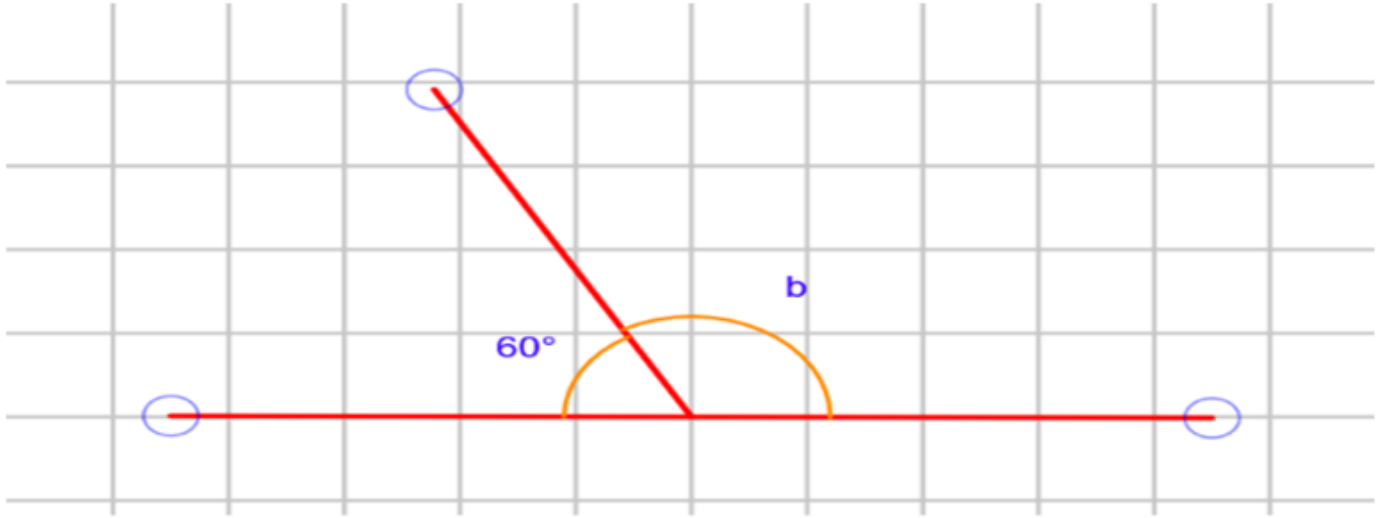
The total of the straight line is still 180°. Do you notice a link?

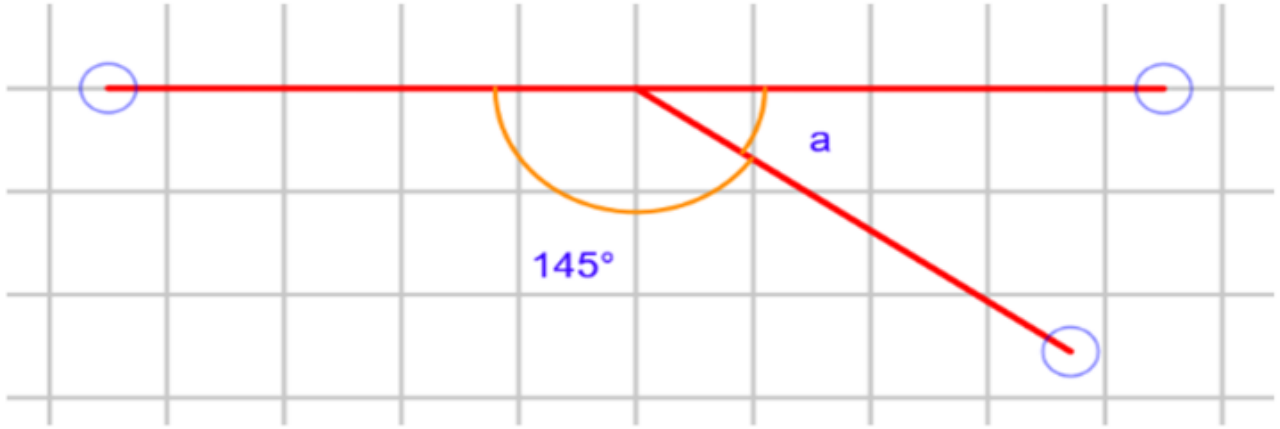
Again we can do the inverse. The two angles we are given add up to 127°.

180° – 127° = 53° so angle *a* = 53°

You do:

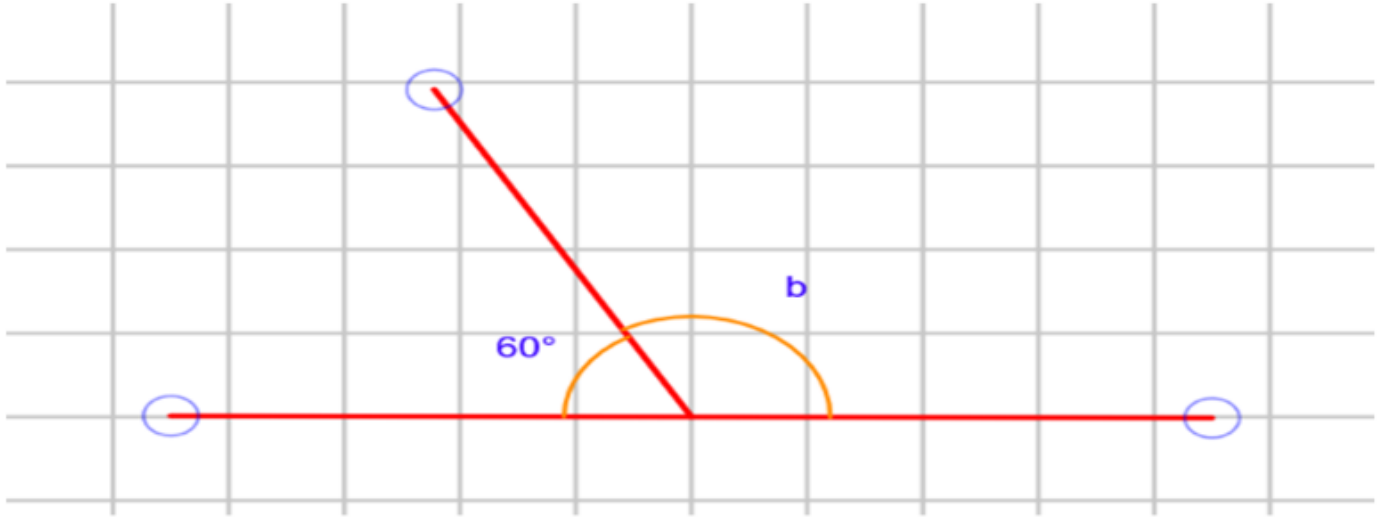
- Answers on next page



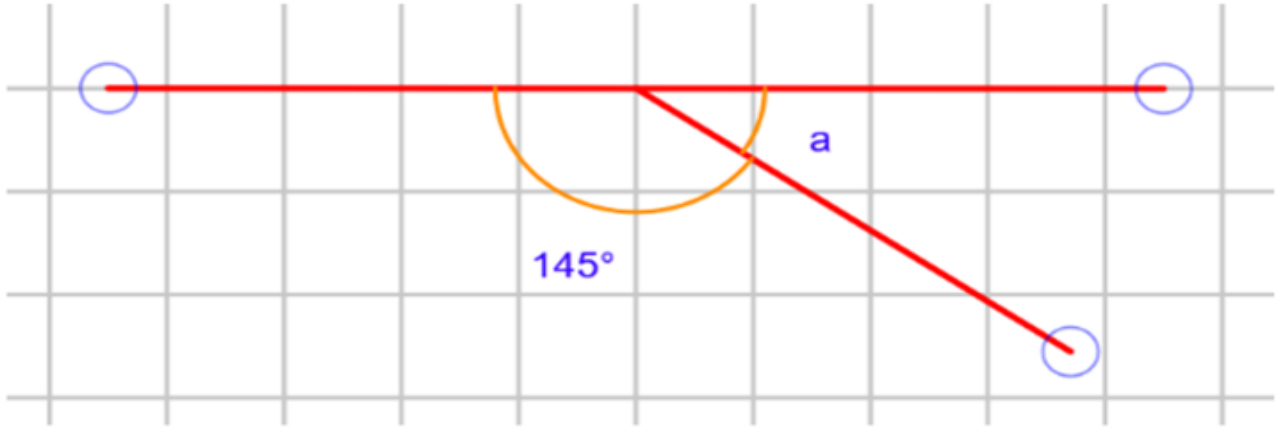


You do:

- B = 120°



- A = 35°



You do

- Solution on next page

Four angles meet at the same point on a straight line.

One angle is 81°

The other three angles are equal.

What size are the other three angles?

Draw a diagram to prove your answer.

You do

- There are four angles but we still know the total will be 180°. If one of the angles is 81°, we can subtract that from the total.
- 180° – 81° = 99°. The sum of the 3 missing angles is 99°.
- All three angles are equal so we can divide 99° by 3.
- 99° ÷ 3 = 33°

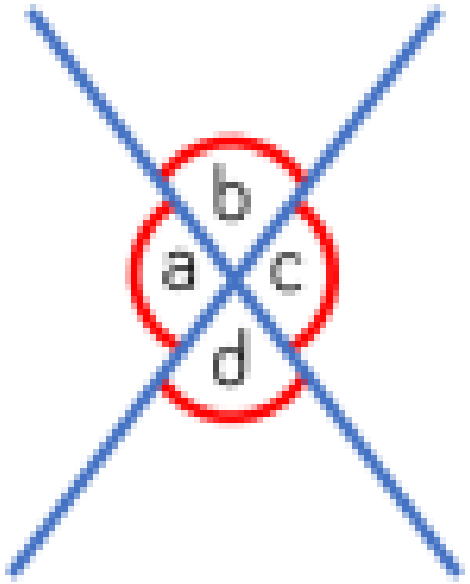
Four angles meet at the same point on a straight line.

One angle is 81°

The other three angles are equal.

What size are the other three angles?

Draw a diagram to prove your answer.



Key recall point no. 2:

Opposite angles are always **equal**

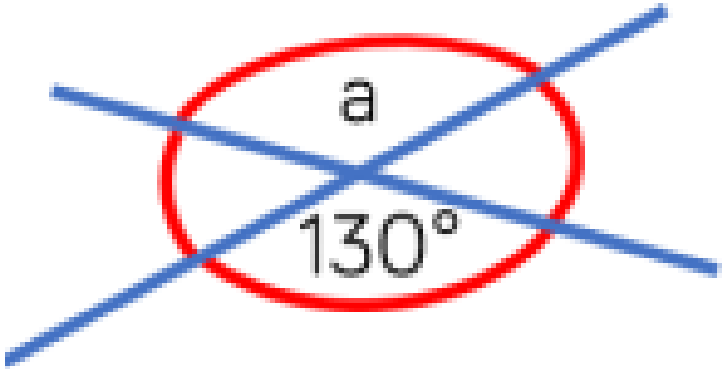
This means that angle *b* and *d* are the same and

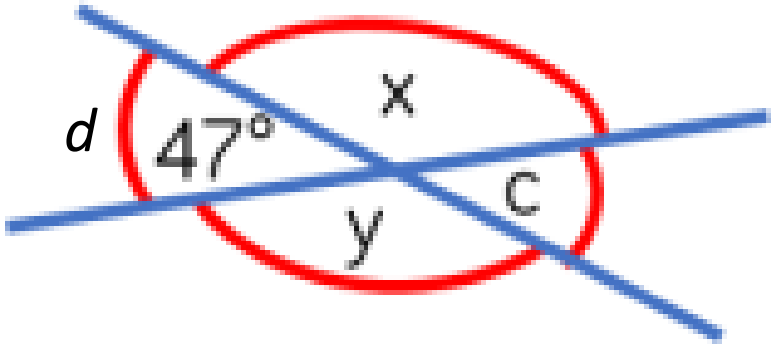
Angle *a* and *c* are the same

So if $a = 75°$, $c = 75°$ too

I do

Find the size of the missing angles.





Remember that opposite angles are equal.

a is opposite 130°, so *a* = 130° too.

Is there more than one way to find them?

We can use this information to calculate the two blank angles too.

The **whole circle** = 360°. The two angles that we know = 260° added together. This means the two blank angles have a sum of 360° – 260° = 100°.

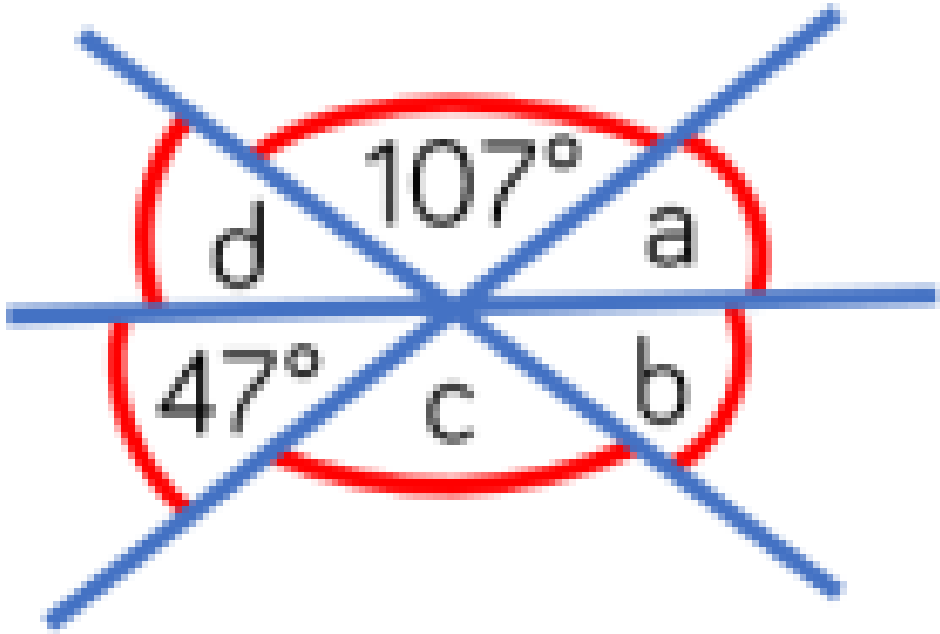
They are opposite each other so they are equal. Both angles must be 50°.

In this example, angle *c* must also be 47°.
Angles *d* and *c* added together = 94°.
The **whole circle** will again be 360°.
To find the value of *x* and *y*, we can do
360° – 94° = 266°
x and *y* together = 266° and they are equal so
266° ÷ 2 = 133°

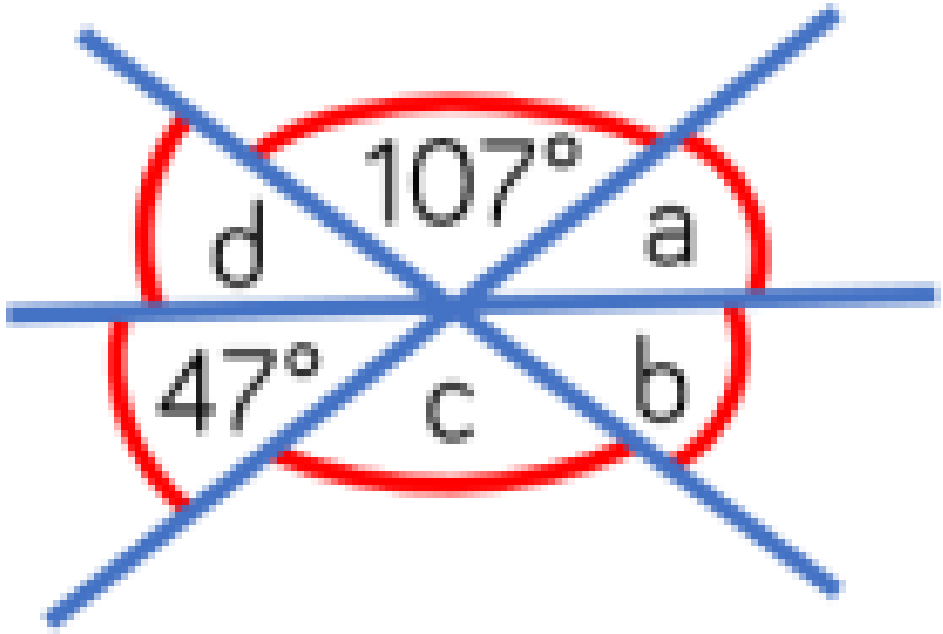
You do

- Solution on next page

- Hint: How many degrees must the **whole circle** be?



You do



- *c* is opposite 107° so it must

also be 107°

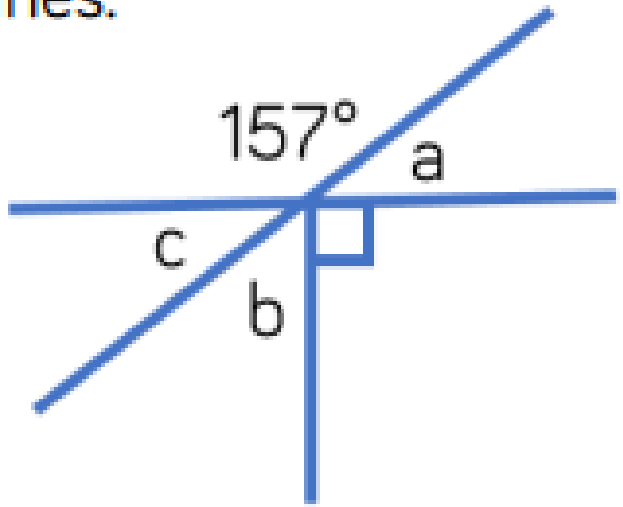
- *a* is opposite 47° so it must

also be 47°

- We are left with just *b* and *d* to find
- So far, we have got **107° + 107° + 47° + 47° = 308**
- The sum of the two missing numbers must be 360° – 308° = 52°
- *b* = 52° ÷ 2 = 26° and *d* = 52° ÷ 2 = 26°

Extension ‘You do’ if you want a challenge!

The diagram below is drawn using three straight lines.



Whitney says that it’s not possible to calculate all of the missing angles.

Do you agree? Explain why.

Extension ‘You do’ if you want a challenge!

- We can work it out because

b + 90 (right angle) = 157° because they are opposite the angle marked 157°

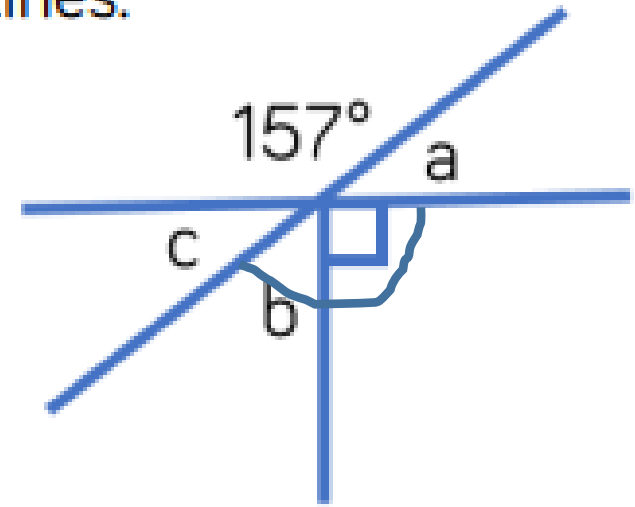
b = 67 °

The two opposite sides (157 ° x 2) = 314

c + *a* = 360 ° - 314 = 46 °

46 divided by 2 = 23 °

The diagram below is drawn using three straight lines.

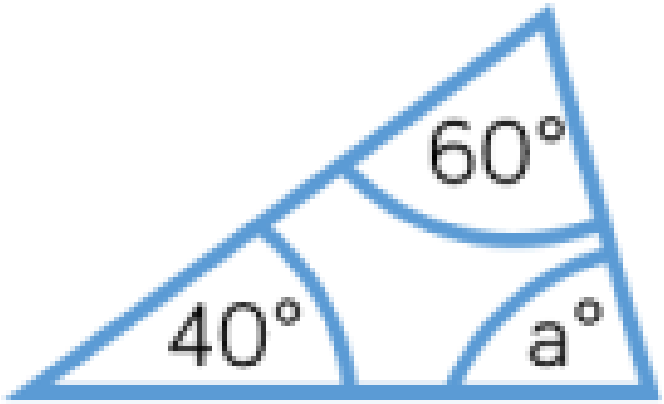


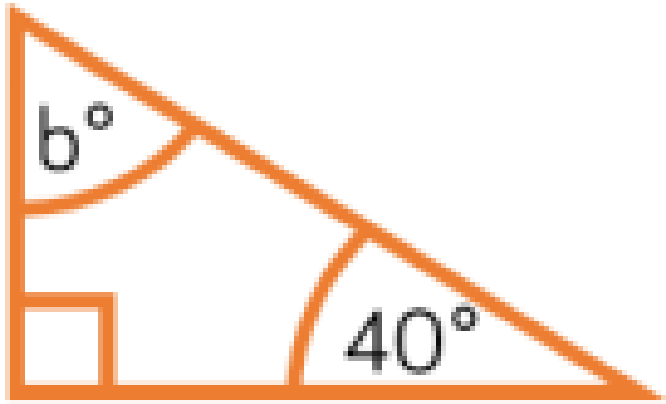
Whitney says that it’s not possible to calculate all of the missing angles.

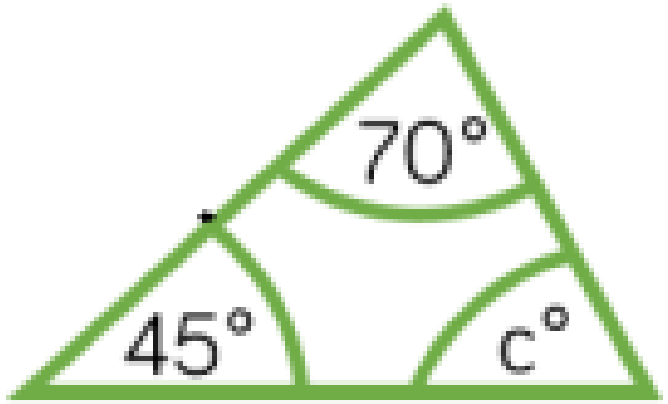
Do you agree? Explain why.

Angles in a triangle always = 180 °

Calculate the missing angles.



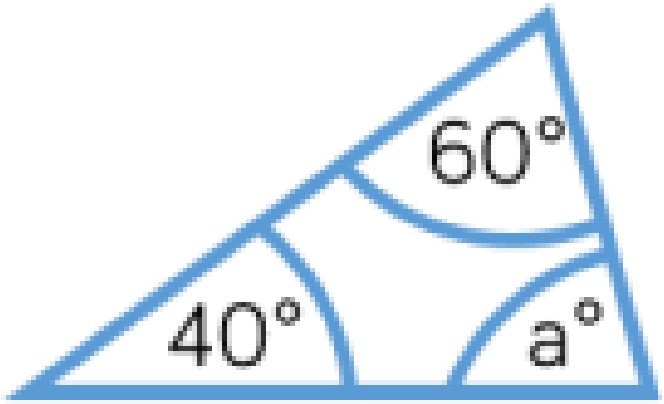




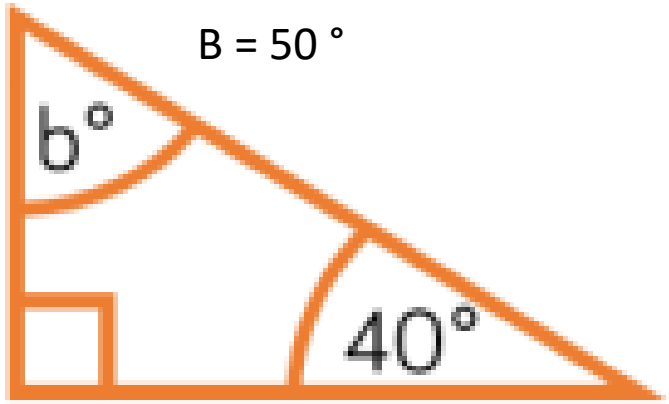
- Answers on next page

Angles in a triangle always = 180 °

Calculate the missing angles.

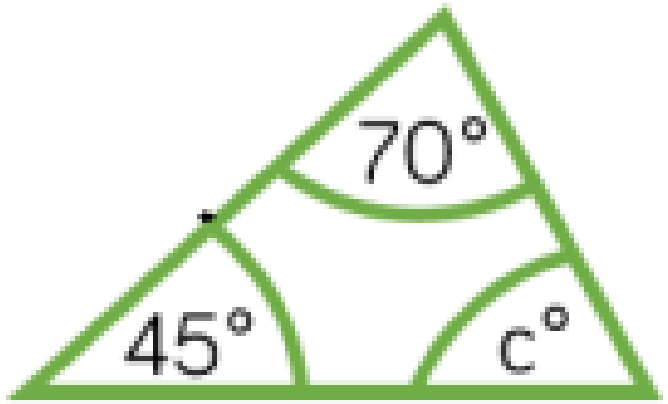


A = 80 °



B = 50 °

Right angle = 90 °



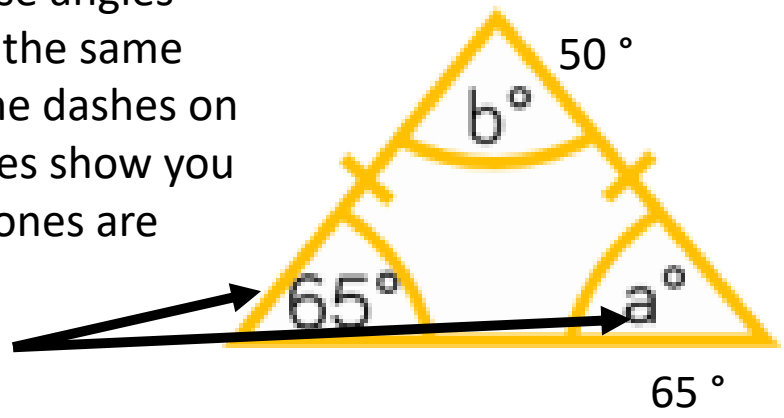
C = 65 °

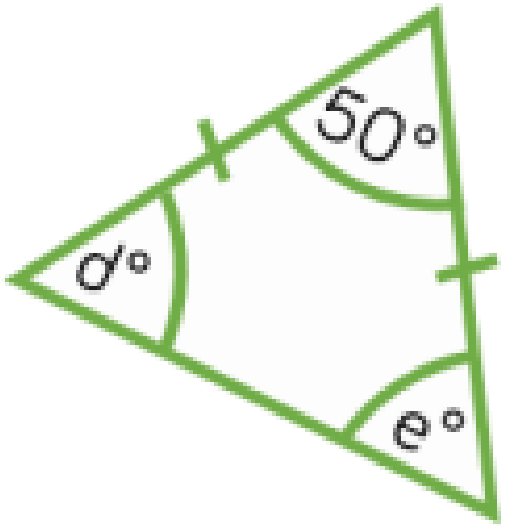
Angles in a triangle always = 180

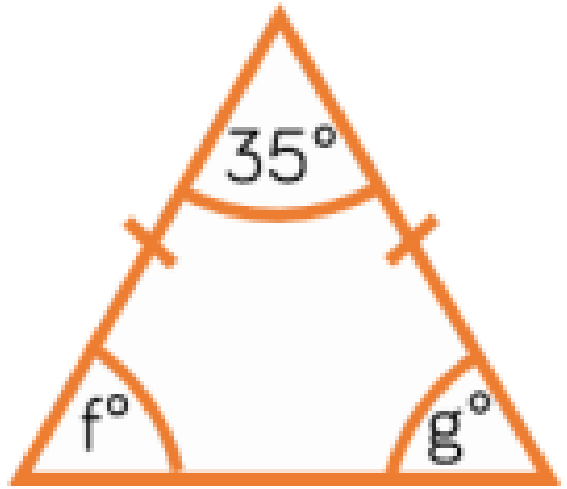
- In an isosceles triangle, two of the sides are the same length. This means two of the angles will be the same too.

Calculate the missing angles in the isosceles triangles.

The base angles will be the same size. The dashes on the sides show you which ones are equal.







Try these two!

Angles in a triangle always = 180 °

- In an isosceles triangle, two of the sides are the same length. This means two of the angles will be the same too.

Calculate the missing angles in the isosceles triangles.

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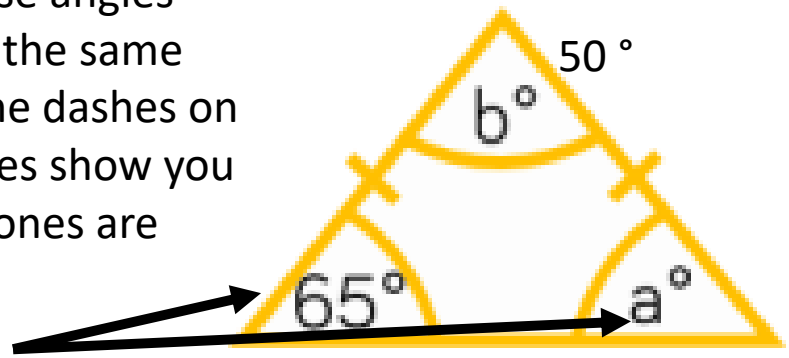
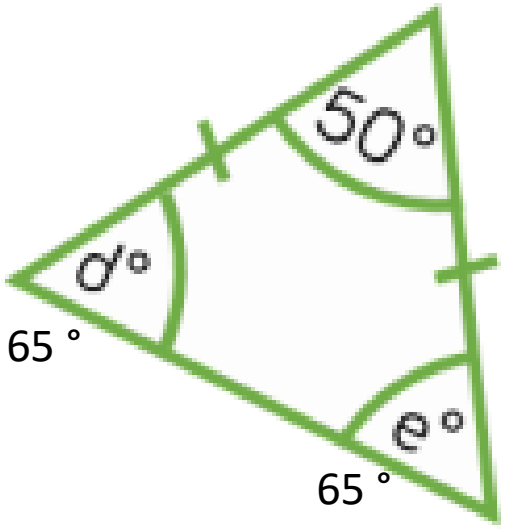
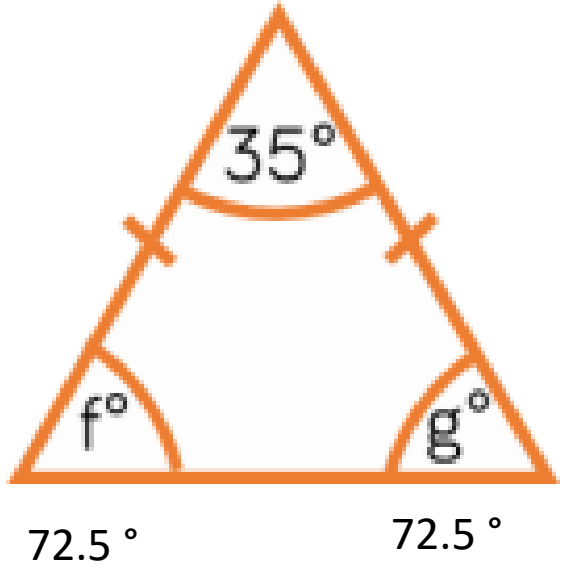
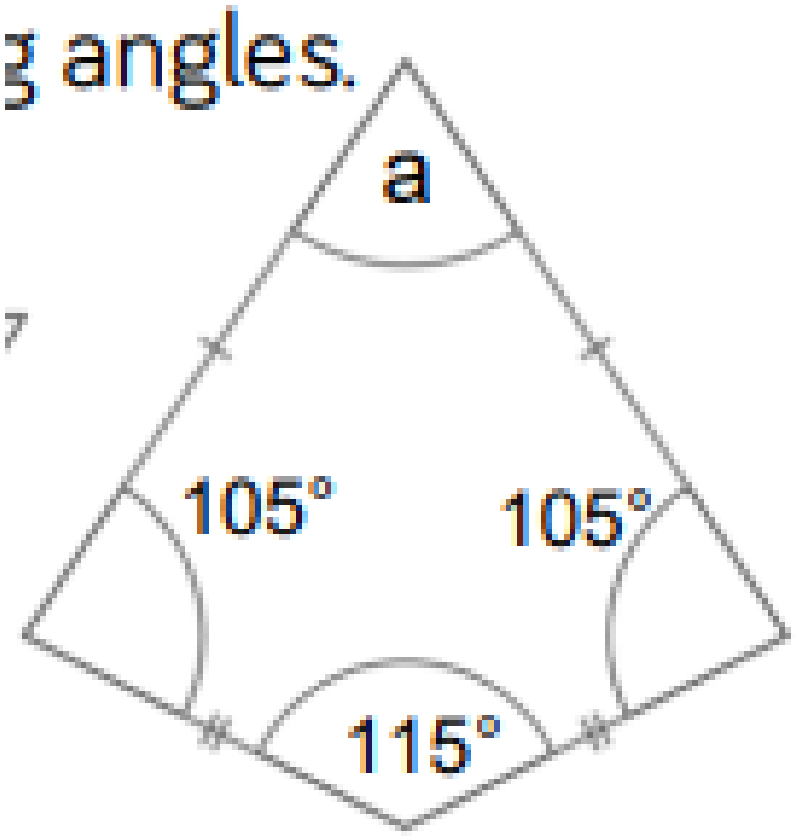




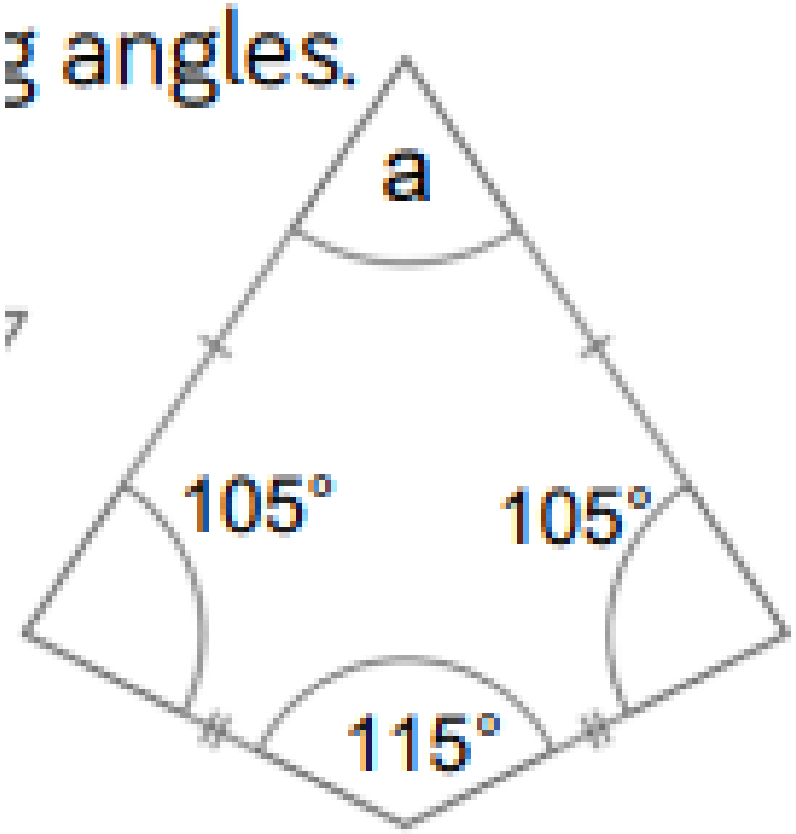


Angles in a quadrilateral (any 4 sided shape) always equal 360 °



Answer on the next page

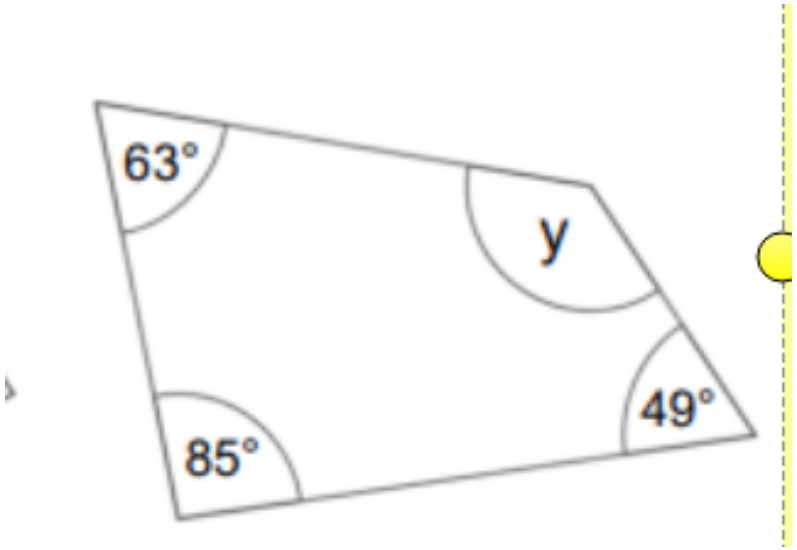
Angles in a quadrilateral (any 4 sided shape) always equal 360 °

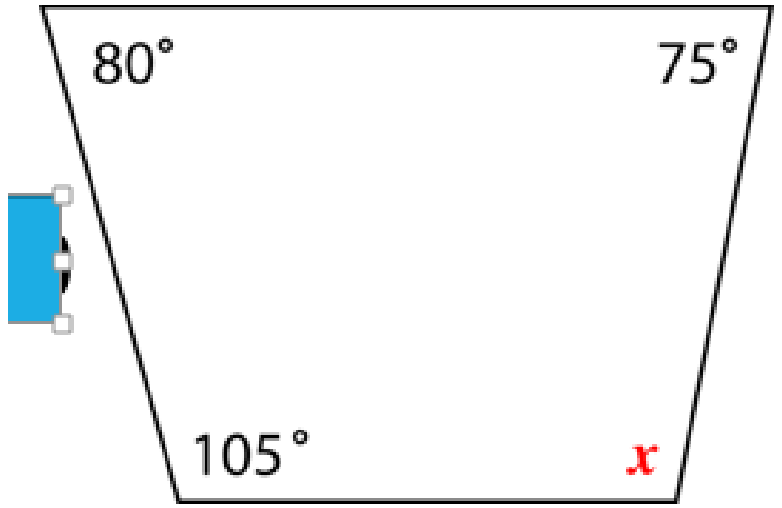


The four angles have to add up to 360 °. We are told 3 of the angles; their total is 325 °. We need to find the difference, so we do 360 ° – 325 ° = 35 °

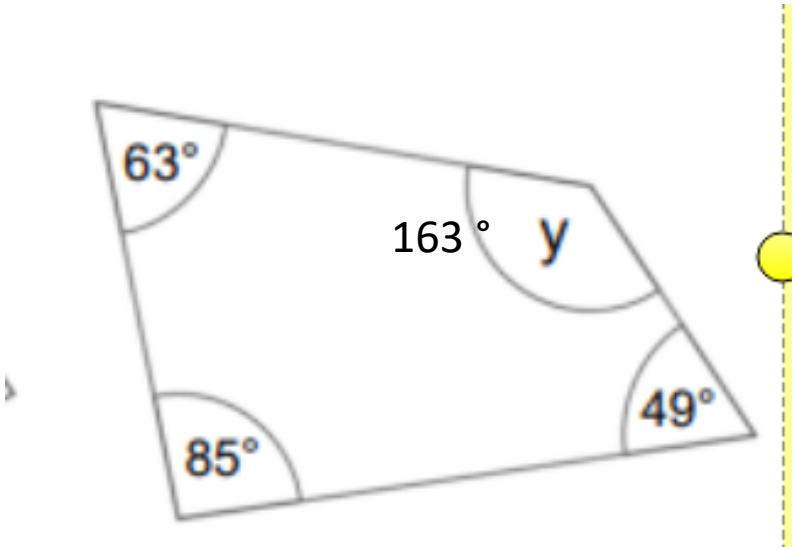
Missing angle *a* = 35 °

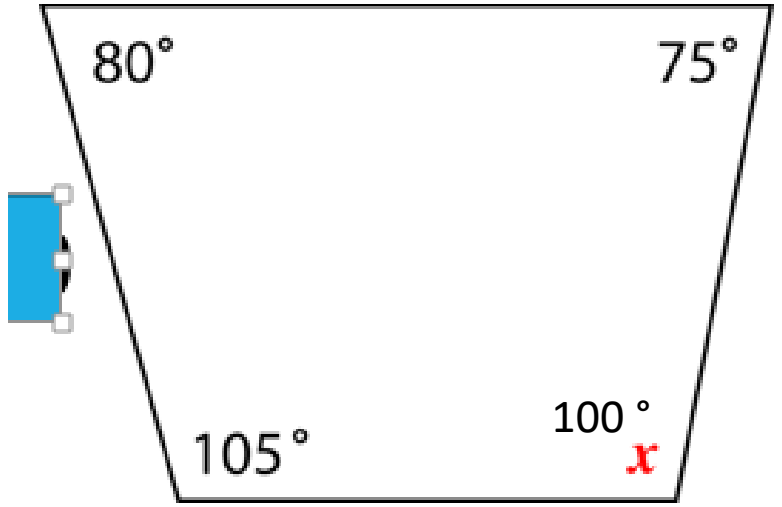
You do – remember how many degrees are in a quadrilateral!





You do – remember how many degrees are in a quadrilateral!

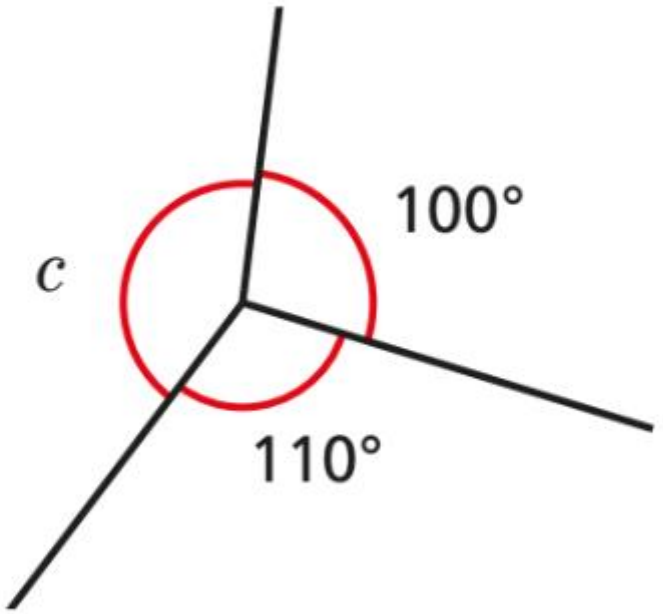




Final point – Angles in a circle always add up to 360°

Work out the unknown angles.

a)



$c =$ ☐

Together, all 3 angles make a circle so we know the total must be 360 °.

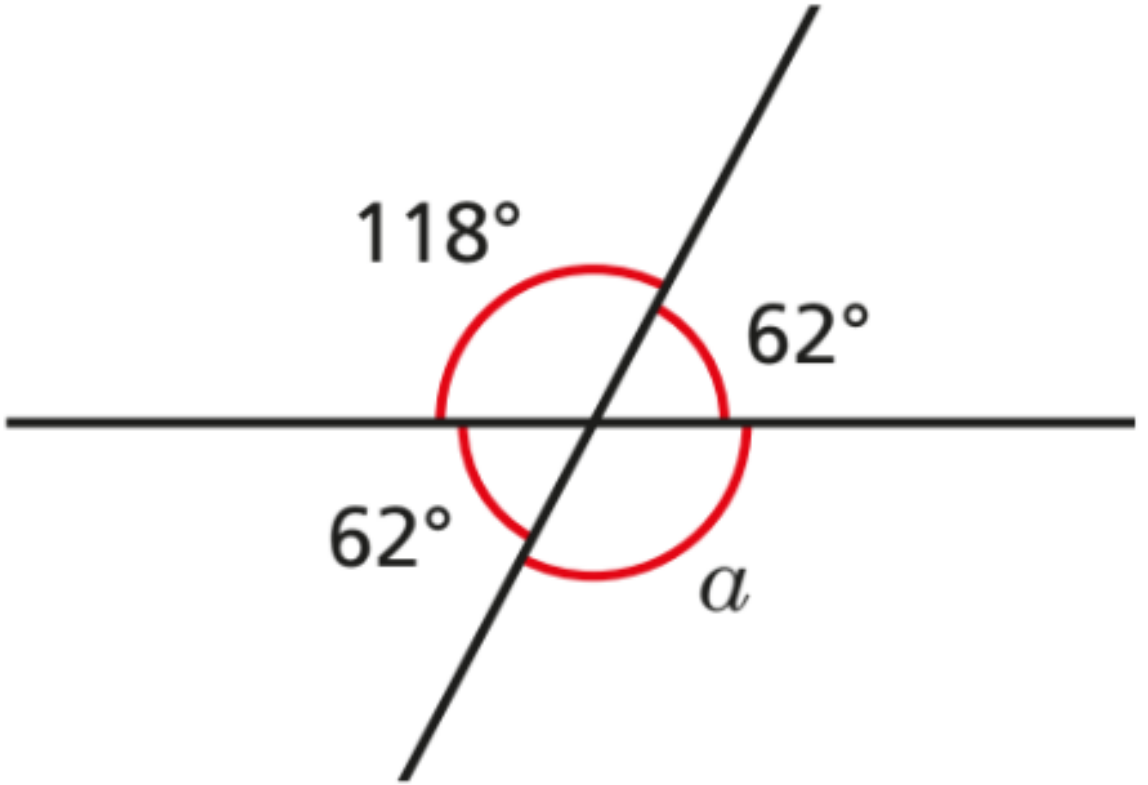
To find the missing value, we work back wards.

100 ° + 110 ° = 210 °

360 ° – 210 ° = **150 °**

You do

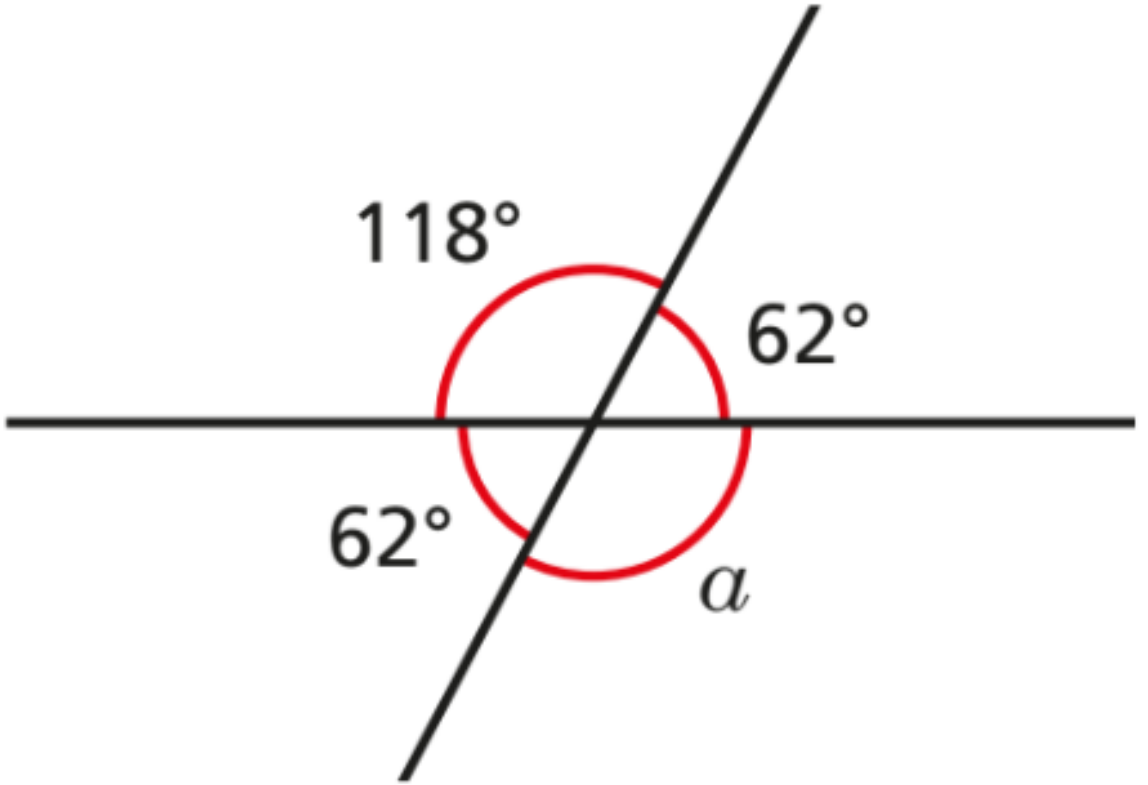
- Answer on next page



$a =$ ☐

You do

- Answer on next page



$a =$ 118°

- This week there are 3 sets of questions. There are still practise and evidence questions but there are also a selection of extension questions, particularly for those who may have already done a few of the evidence questions before.