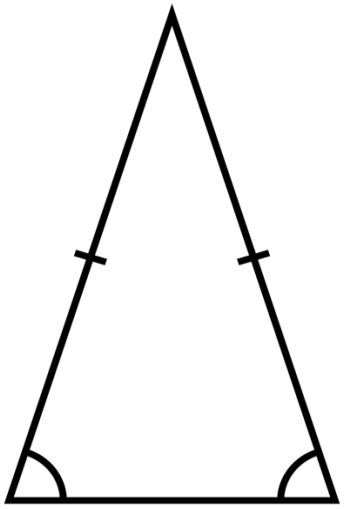
SHQ: How can I use the properties of an isosceles triangle to help with missing angle calculations?

Look at the picture of the triangle. What facts can you list about this triangle? Have a go before looking at the ideas below:



Here are some facts you may have considered:

- All the angles in the triangle are acute (less than 90°)
- Two of the angles are the same - the two at the base marked
- Two of the sides (the two longer sides) are the same length- marked /
- Because it has two angles and two sides the same, it is an ISOSCELES triangle
- When added together, the three angles in the triangle total 180°

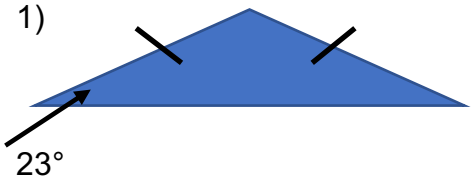
When working with isosceles triangles, it is important to use the correct notation to indicate which two sides are the same length – you will need to put a short line through each side, as shown on the diagram above.

In an isosceles triangle, if you know one angle's measurement, you can work out the other two without a protractor because :

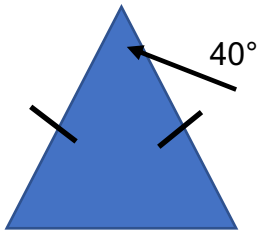
a) two of the angles are the same and
b) the angles will add up to 180°

Try finding the two missing angles on each of these triangles, then look at page 2 of the worksheet for the answers and see if you have used the correct method.

1)



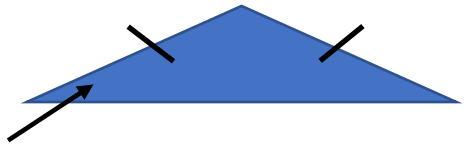
2)



Solution

Note: in both triangles, a pair of sides are marked / which shows us that these two sides are the same length and therefore the two angles at the base will be the same size.

1)



Here, because we know that one of the angles at the base is 23°, the other 'base angle' must be the same.

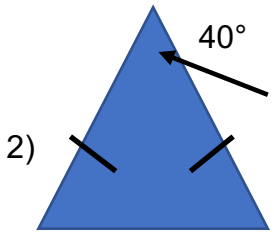
We now know that two of the three angles together measure 46°

We know that angles in a triangle total 180° so if we subtract from 180° the 46° that we already know, we will find the size of the remaining angle (at the top of the triangle) : 134°

To check, we add the three angles together to make sure that they total 180°

23° + 23° + 134° = 180°

2)



Here, we know that the top angle is 40°. We also know that the remaining two angles at the base are both the same size.

If we subtract from 180° the measurement that we know, we are left with 140° (180 – 40 = 140)

As both remaining angles are the same size, if we divide 140° by 2, we will find the size of each 'base' angle.

140° ÷ 2 = 70°

To check, we add the three angles together to make sure that they total 180°

40° + 70° + 70° = 180°

Now it's your turn:

You need to refer to the Power Maths questions (see worksheet 7 resource). To answer the questions, you will be using calculations like the ones shown in the examples above. Remember, angles in a triangle add up to 180° and an isosceles triangle has two sides the same (shown by a short dash on each of the two sides) and two angles the same.