**Lesson 4**

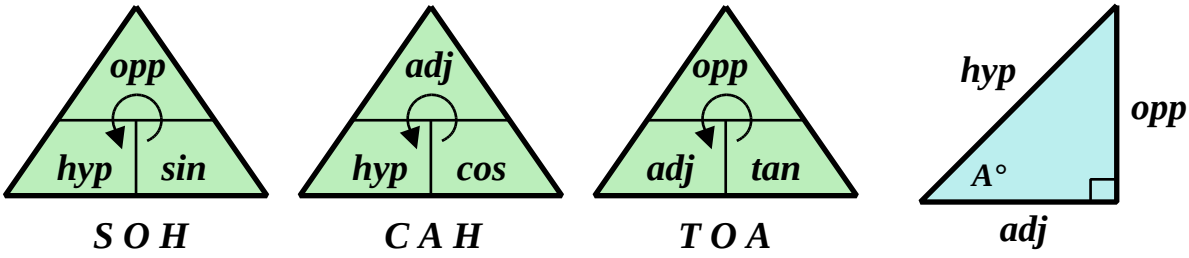
**Trigonometry : Year 9**

## 4.1 Right-Angled Triangle Theory #RAT Theory

**First** *hyp* Look for the *right-angle*.
The *hypotenuse* does not touch the *right-angle*.

**Second** *opp* Look for the *angle-of-focus*.
The *opposite* does not touch the *angle-of-focus*.

**Third** *adj* The *adjacent* touches both the *right-angle*
and the *angle-of-focus*.




***S O H*** ***C A H*** ***T O A***

$$\sin A^\circ = \frac{opp}{hyp} \qquad \text{which gives} \qquad A^\circ = \arcsin\left(\frac{opp}{hyp}\right)$$

$$opp = hyp \times \sin A^\circ$$

$$hyp = \frac{opp}{\sin A^\circ}$$

$$\cos A^\circ = \frac{adj}{hyp} \qquad \text{which gives} \qquad A^\circ = \arccos\left(\frac{adj}{hyp}\right)$$

$$adj = hyp \times \cos A^\circ$$

$$hyp = \frac{adj}{\cos A^\circ}$$

$$\tan A^\circ = \frac{opp}{adj} \qquad \text{which gives} \qquad A^\circ = \arctan\left(\frac{opp}{adj}\right)$$

$$opp = adj \times \tan A^\circ$$

$$adj = \frac{opp}{\tan A^\circ}$$

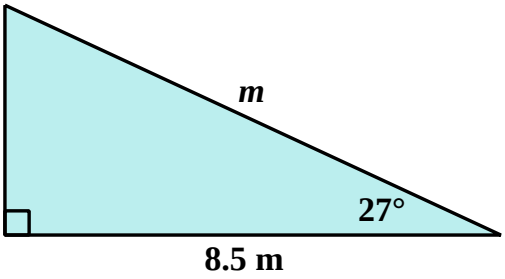
**Theorem of Pythagoras**

$$hyp^2 = opp^2 + adj^2$$

$$opp^2 = hyp^2 - adj^2 \qquad adj^2 = hyp^2 - opp^2$$

**4.2 Example**

*Calculator Needed !*

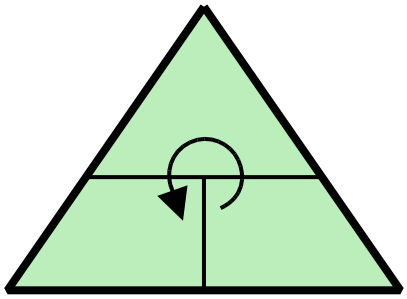



**( i )** Label the triangle sides *hyp*, *opp*, and *adj*.

**( ii )** Write down *the GET YOUR TRIGONOMETRY CORRECT word*.

**( iii )** Cross out the side of *no interest* in your **part ( ii )** answer.

**( iv )** Draw the relevant formula triangle.



**( v )** Write out the formula that you will use to find *m*, then use it to calculate *m*.

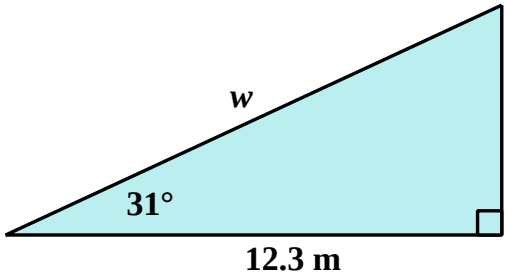
**( vi )** Use the theorem of Pythagoras to calculate the remaining unknown side.

**( vii )** Hence determine the perimeter of the triangle.

## 4.3 Exercise

**Question 1**

*This question is very similar to the example.*

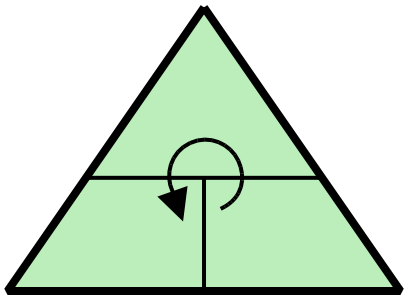



**( i )** Label the triangle sides *hyp*, *opp*, and *adj*.

**( ii )** Write down *the GET YOUR TRIGONOMETRY CORRECT word*.

**( iii )** Cross out the side of *no interest* in your **part ( ii )** answer.

**( iv )** Draw the relevant formula triangle.

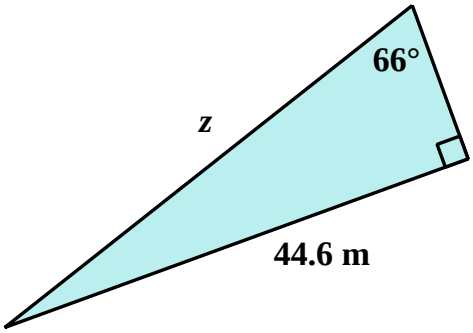


**( v )** Write out the formula that you will use to find *w*, then use it to calculate *w*.

**( vi )** Use the theorem of Pythagoras to calculate the remaining unknown side.

**( vii )** Hence determine the perimeter of the triangle.

**Question 2**

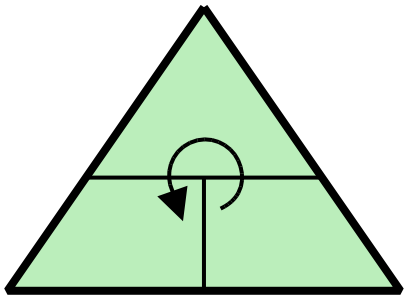



**( i )** Label the triangle sides *hyp*, *opp*, and *adj*.

**( ii )** Write down *the GET YOUR TRIGONOMETRY CORRECT word*.

**( iii )** Cross out the side of *no interest* in your **part ( ii )** answer.

**( iv )** Draw the relevant formula triangle.

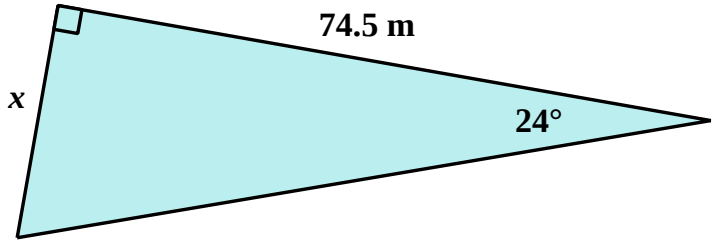


**( v )** Write out the formula that you will use to find *z*, then use it to calculate *z*.

**( vi )** Use the theorem of Pythagoras to calculate the remaining unknown side.

**( vii )** Hence determine the perimeter of the triangle.

**Question 3**

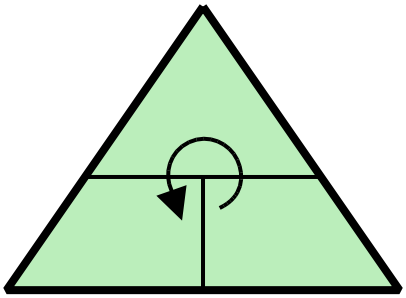



**( i )** Label the triangle sides *hyp*, *opp*, and *adj*.

**( ii )** Write down *the GET YOUR TRIGONOMETRY CORRECT word*.

**( iii )** Cross out the side of *no interest* in your **part ( ii )** answer.

**( iv )** Draw the relevant formula triangle.

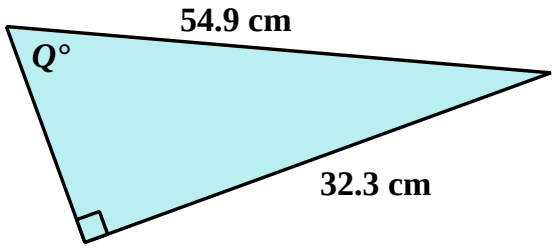


**( v )** Write out the formula that you will use to find *x*, then use it to calculate *x*.

**( vi )** Use the theorem of Pythagoras to calculate the remaining unknown side.

**( vii )** Hence determine the perimeter of the triangle.

**Question 4**

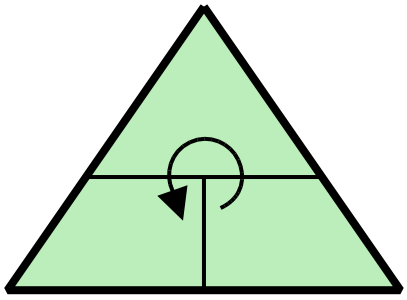



**( i )** Label the triangle sides *hyp*, *opp*, and *adj*.

**( ii )** Write down *the GET YOUR TRIGONOMETRY CORRECT word*.

**( iii )** Cross out the side of *no interest* in your **part ( ii )** answer.

**( iv )** Draw the relevant formula triangle.

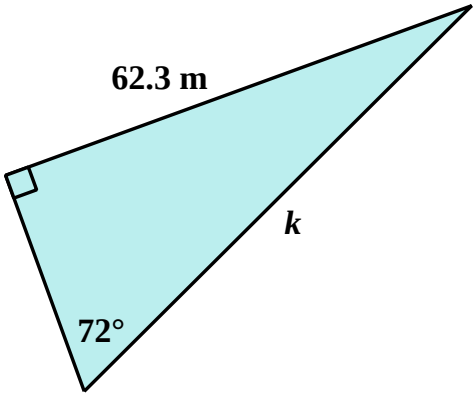


**( v )** Write out the formula that you will use to find *Q*, then use it to calculate *Q*.

**( vi )** Use the theorem of Pythagoras to calculate the remaining unknown side.

**( vii )** Hence determine the perimeter of the triangle.

**Question 5**

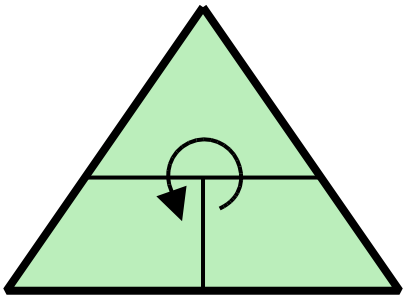



**( i )** Label the triangle sides *hyp*, *opp*, and *adj*.

**( ii )** Write down *the GET YOUR TRIGONOMETRY CORRECT word*.

**( iii )** Cross out the side of *no interest* in your **part ( ii )** answer.

**( iv )** Draw the relevant formula triangle.



**( v )** Write out the formula that you will use to find *k*, then use it to calculate *k*.

**( vi )** Use the theorem of Pythagoras to calculate the remaining unknown side.

**( vii )** Hence determine the perimeter of the triangle.