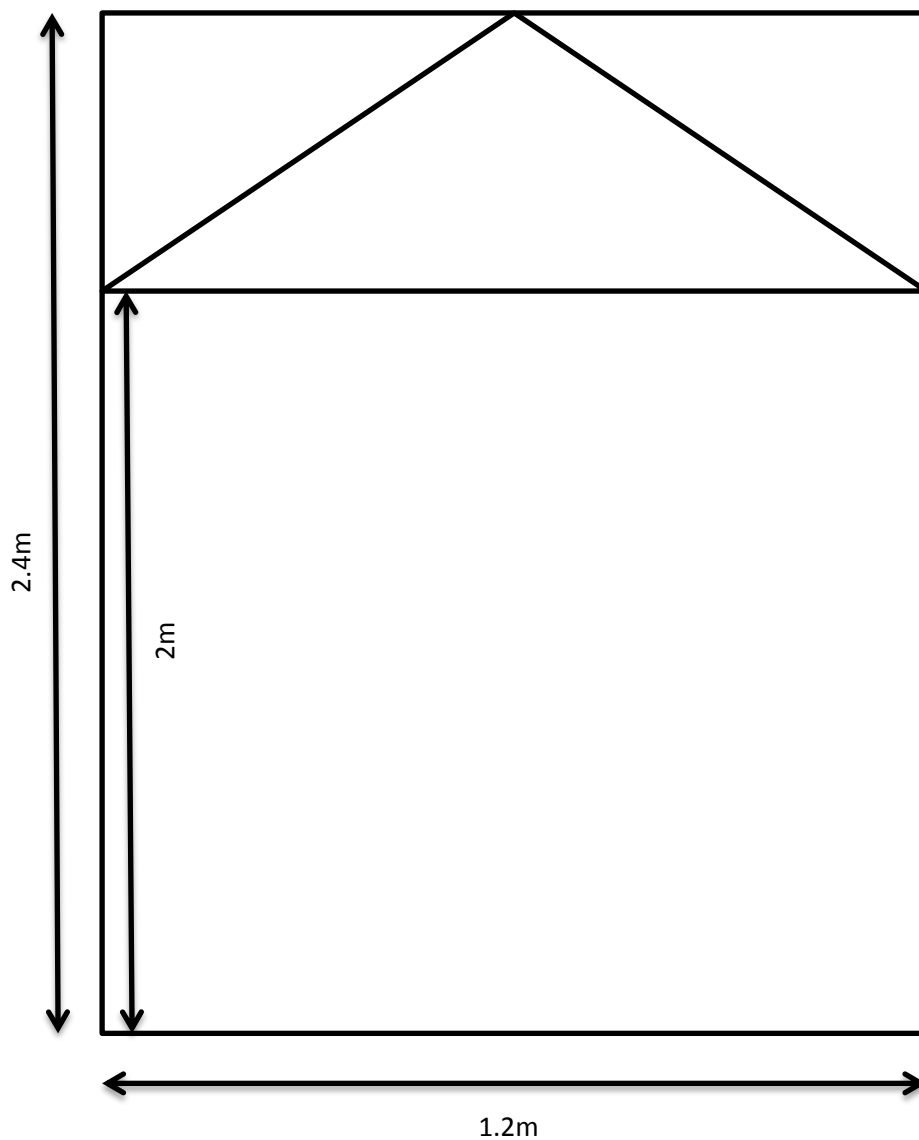


Calculating the amounts of material needed for building projects

Today's maths problem is that we have a sheet of wooden board which we are making into the end of a greenhouse. The board is 2.4m by 1.2m. We want to cut the board as little as possible to make the end of the shed which needs to be 1.2m wide by 2m high at the lowest point. We also have clear polycarbonate sheets to make the roof and the walls which are 3000mm long and we need to know whether there is enough of these left after cutting the 2m piece to make the walls to use for the roof. Can we do this and how long is the minimum length of clear sheet we need for a roof panel? [Here is a drawing](#) of the wooden sheet with the measurements and the shape we will need to cut out to help you.



Answer to our problem

To know the length of the roof panel we need to work out the length marked c as this is where the roof will sit. To work out this length we can use Pythagoras' Theorem which says that in a right angled triangle: the square of the hypotenuse is equal to the sum of the squares of the other two sides.

We can make a right angled triangle by dividing the width of the wood sheet in half. The hypotenuse is the longest side which is c .

We know the length of the other sides

a is half of the width of the sheet so is 1.2m divided by 2m which is 0.6m

$$1.2/2 = 0.6$$

b is the length of the whole sheet minus the height of the shed at its lowest point so is 2.4m minus 2m which is 0.4m

$$2.4 - 2 = 0.4$$

Then we can use Pythagoras' Theorem $a^2 + b^2 = c^2$

$$0.6^2 + 0.4^2 = c^2$$

Using a calculator

$$0.36 + 0.16 = c^2$$

$$0.52 = c^2$$

$$\sqrt{0.52} = c$$

$$0.721 = c$$

So we need 0.721m left from the clear polycarbonate sheet this is the minimum length for a roof panel.

The polycarbonate sheet is 3000mm we need to convert the units of measurement so they are the same as we have been using. There are 1000mm in a metre so we divide 3000 by 1000 to get this length in metres.

$$3000/1000 = 3$$

Now we can work out how much is left after the wall piece is cut.

$$3 - 2 = 1$$

1m is more than 0.721 m so we can use this piece for the roof.

