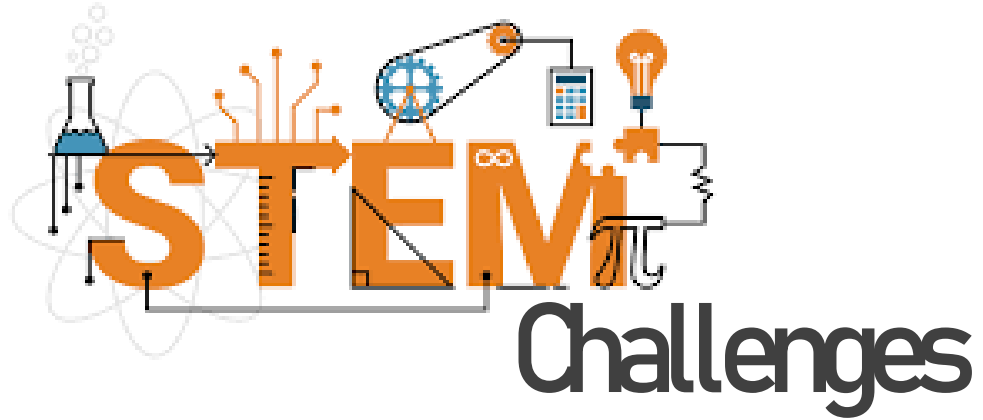


# THE JCB ACADEMY



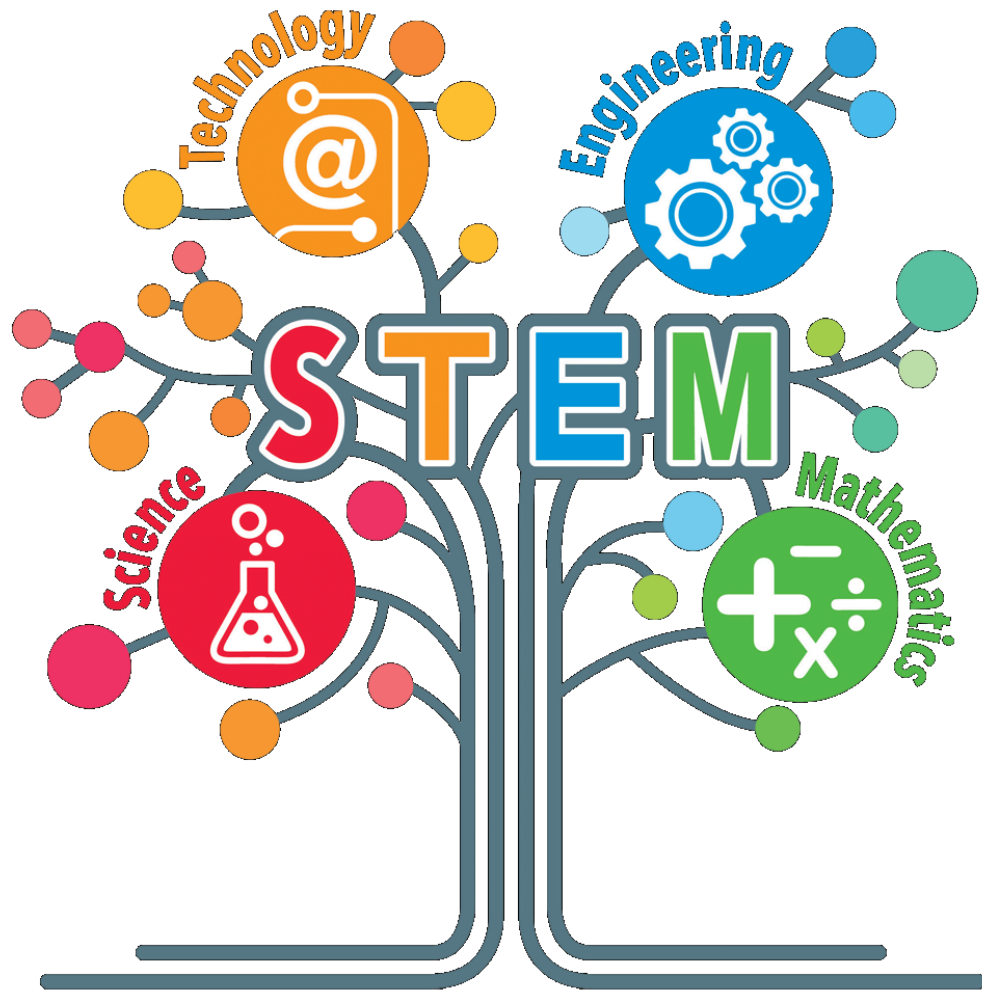
What's it like at the JCB Academy?

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# STEM Challenge

What is STEM?



STEM stands for -

**Science**

**Technology**

**Engineering**

**Mathematics**

These subjects are linked directly to each other and this task will highlight your skills in each of these subject areas.

## Objectives

To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

# Classroom STEM Challenge

Manufacture an igloo from card by following a production plan



## The Challenge

You are going to manufacture an igloo using geometric shapes, measured to a specific size.

The shapes will be joined together to make a 3D igloo structure.

You can think about additions to your design to make it look better (aesthetics)? You could have a theme to make it interesting.

## Objectives

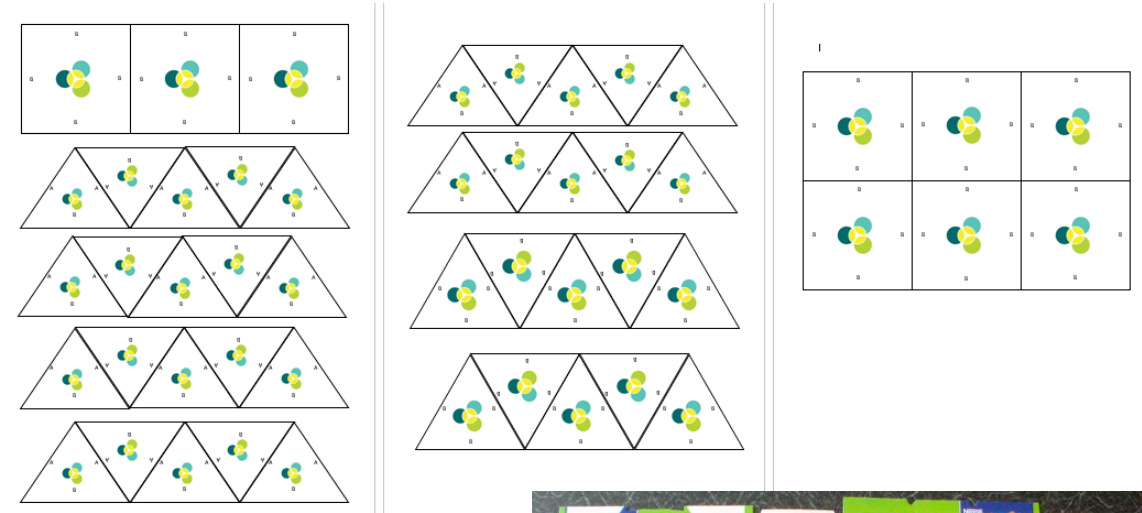
To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

# STEM Challenge

Manufacture an igloo from card by following a production plan

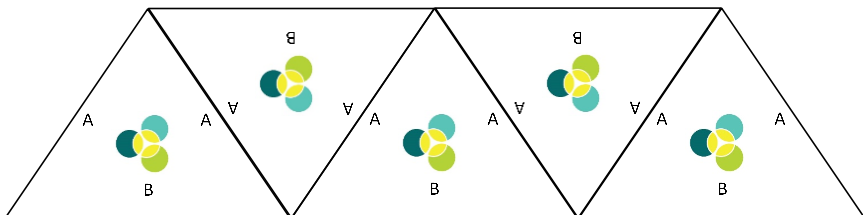
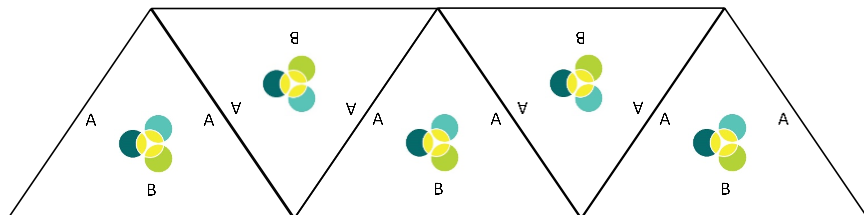
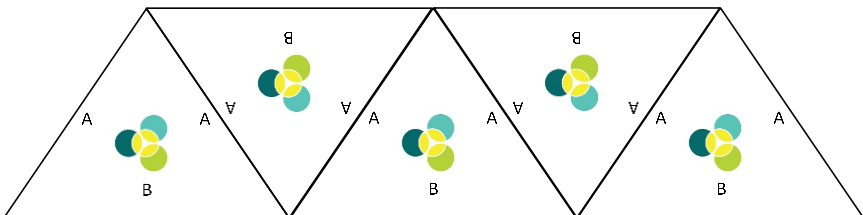
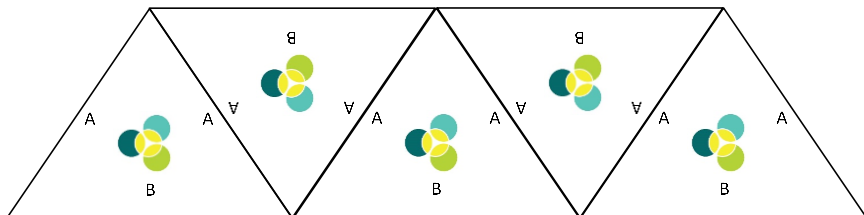
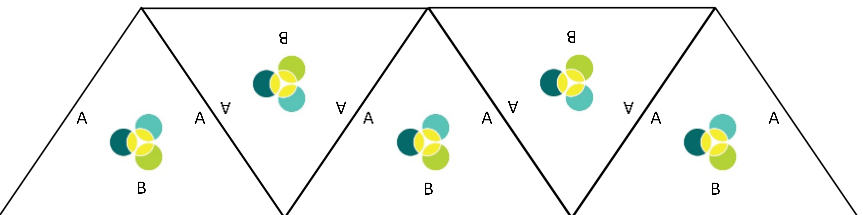
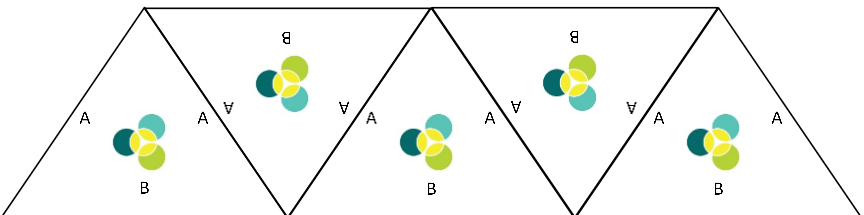
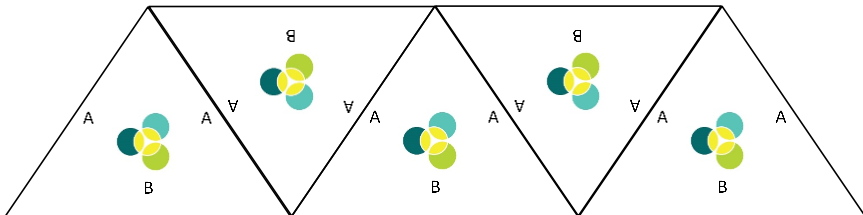
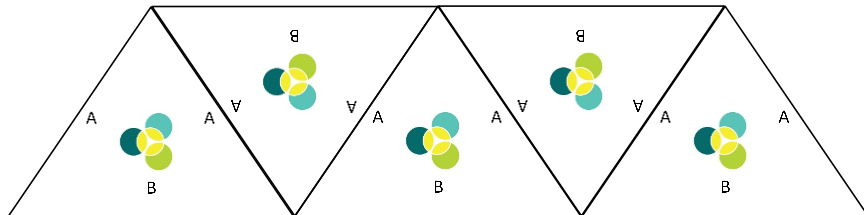
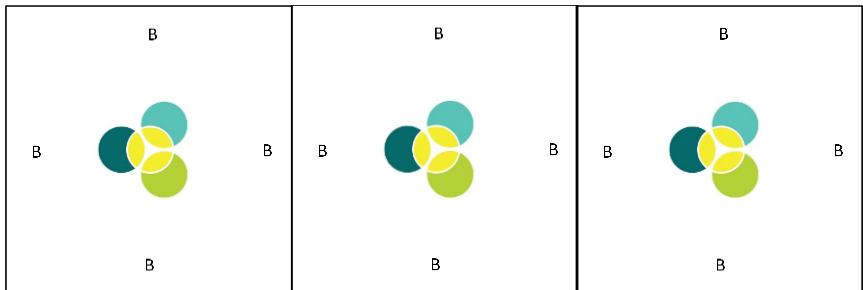
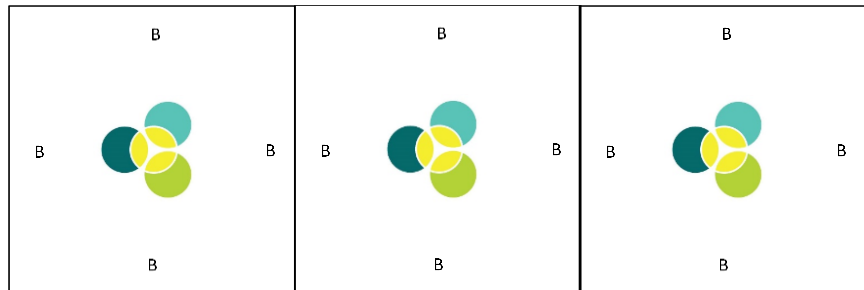
## What you will need –

- Printed templates (see next slide)
- Cardboard (cereal boxes are the perfect thickness)
- Scissors
- Tape
- Materials to decorate (optional)



## Objectives

To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing



# STEM Challenge

Manufacture an igloo from card by following a production plan

## Job Roles

During this task, you will fulfil many roles –

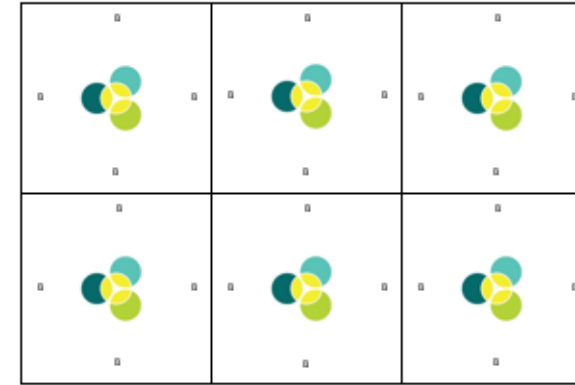
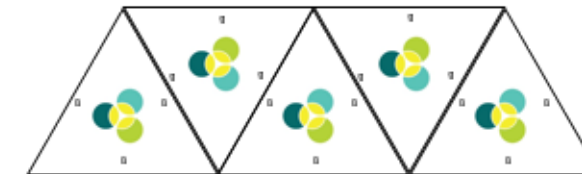
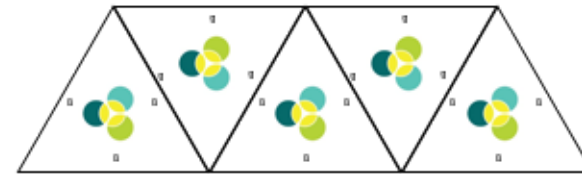
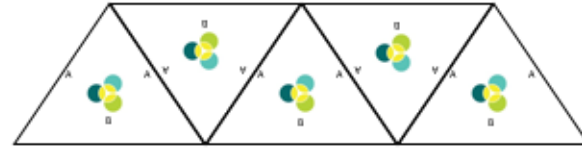
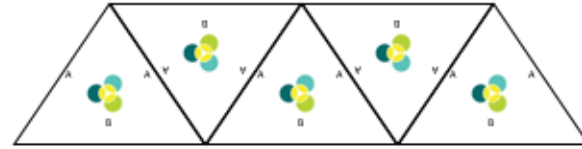
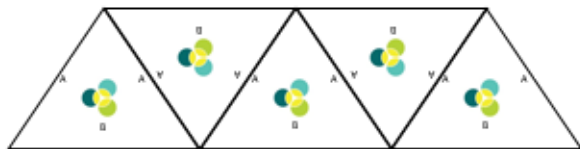
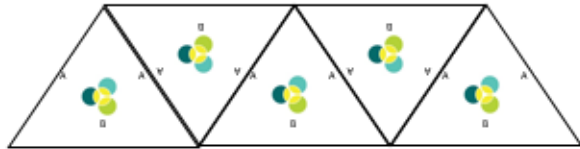
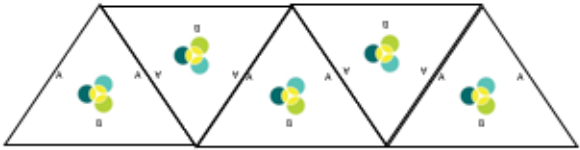
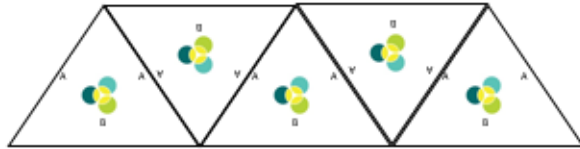
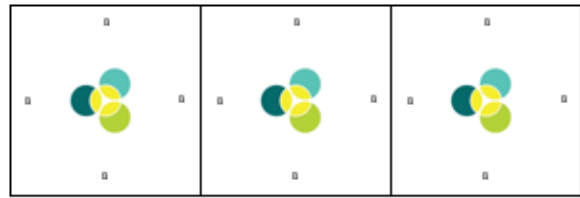
- Come up with ideas to decorate the igloo (creative designer)
- Cut out the templates (manufacturing engineer)
- Check the shapes are correct to the templates (quality control engineer)
- Tape the shapes together (assembly engineer)
- Support the structure when its getting erected (structural engineers)
- Decorate the structure (architectural designer)



## Objectives

To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

# STEM Challenge - Printed templates



If there is one door and no windows in this dome, it would consist of:

30 AAB triangles

10 BBB triangles

9 BBBB squares.

In this instance  $A=53\text{mm}$  and  $B=60\text{mm}$



## Top Tip

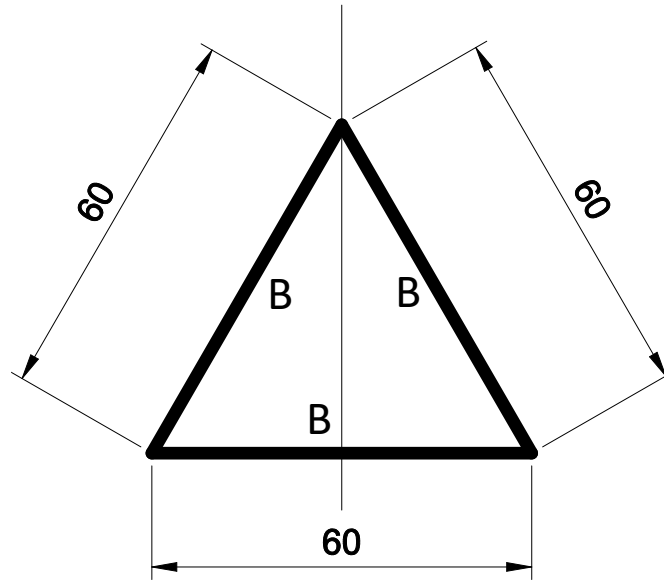
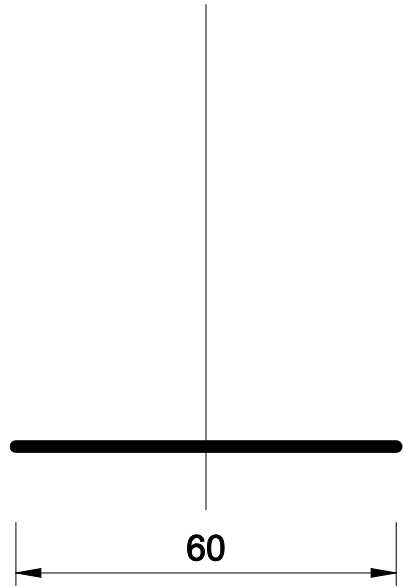
Engineers measure in mm as they are more accurate than cm.

## Objectives

To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

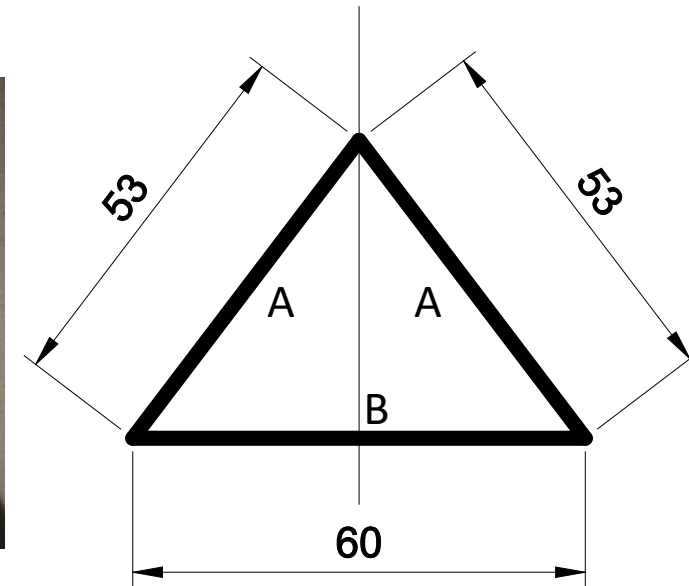
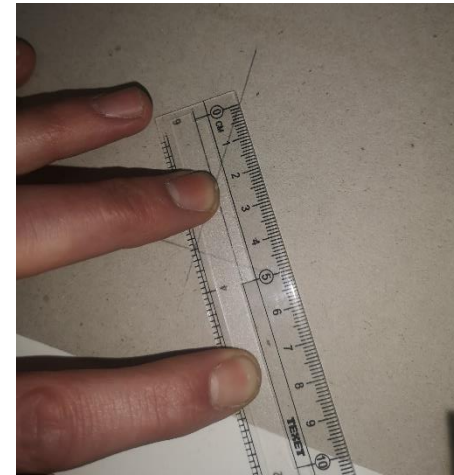
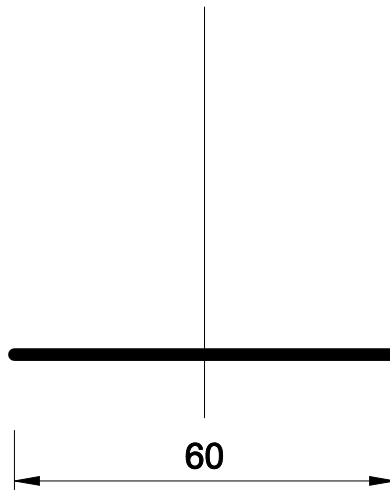
# STEM Challenge

Make your own templates



For the BBB triangles - Draw the 60mm line as the base and draw a line 90 degrees from the centre. Then measure 60mm from the corner of the base to a point on the centre line.

For the AAB triangles - Draw the 60mm line at the base and draw a line 90 degrees from the centre. Then measure 53mm from the corner of the base to a point on the centre line.

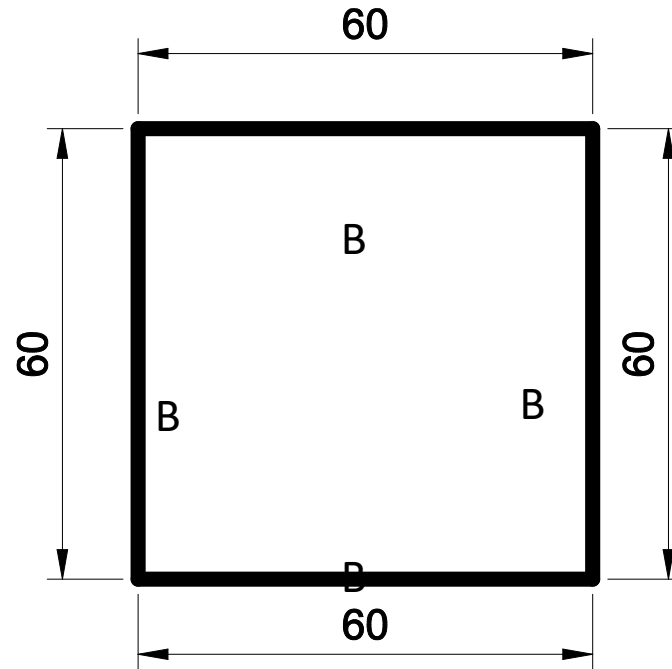
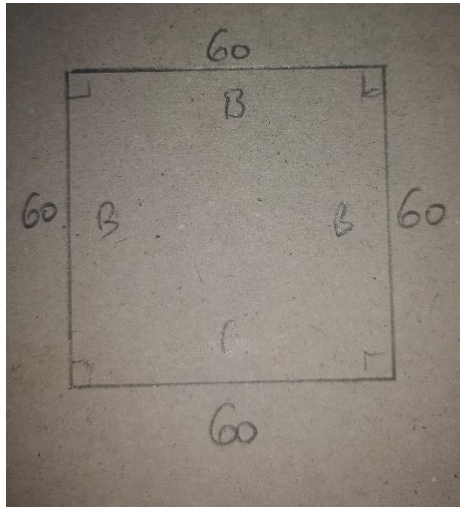


## Objectives

To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing



# STEM Challenge - Make your own templates



For the BBBB Squares - Draw the 60mm line as the base and draw a line 90 degrees from the ends. Join them to make the square. Check it is accurate!

If there is one door and no windows in this dome, it would consist of:

30 AAB triangles

10 BBB triangles

9 BBBB squares

You will need to draw around your templates until you have the correct amount of each shape.

Mark each edge of each shape with an A or B.



## Top Tip

Engineers measure in mm as they are more accurate than cm.

## Objectives

To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

# STEM Challenge

Manufacture an igloo from card by following a production plan

## Production Plan - Stage 1

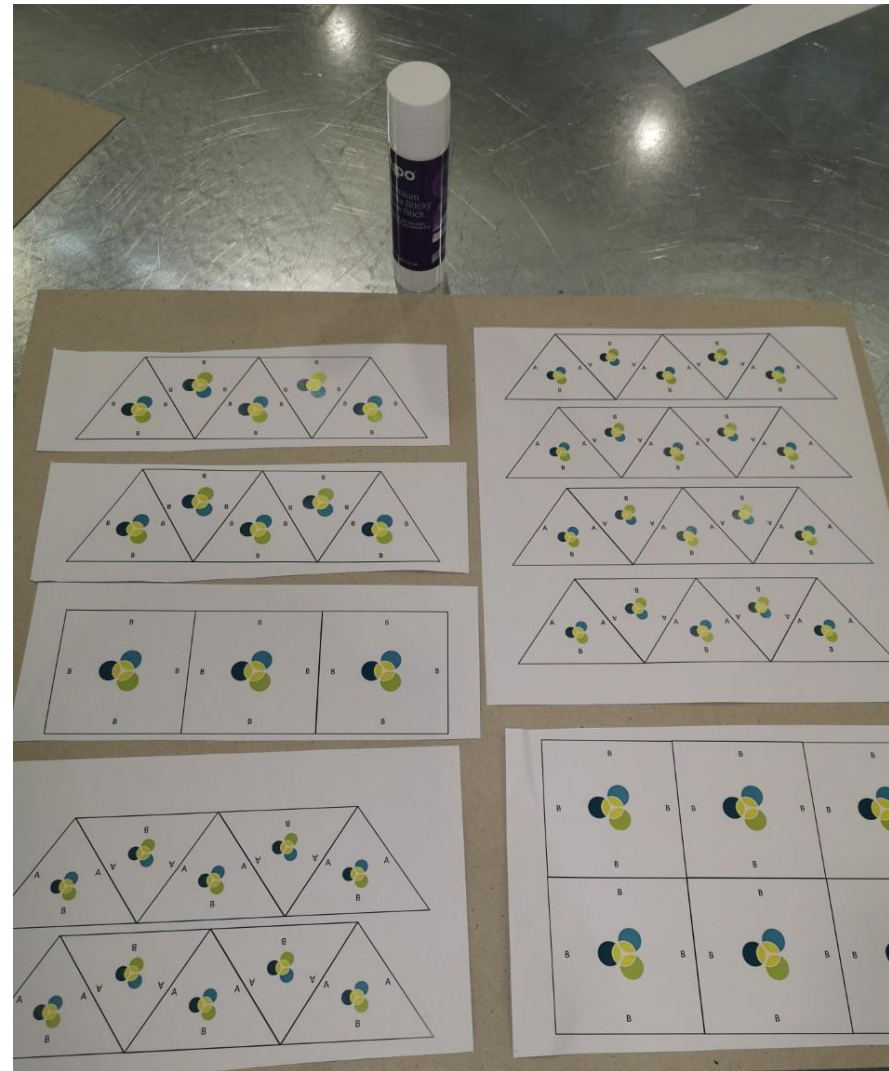
Place the templates on the cardboard so that they will all fit on the flattened box/sheet.

Or, if you have made your own templates, draw round your templates onto the cardboard – remember to mark each edge A or B.



### Top Tip

You can cut the A4 paper up to make the most of the box you use.



### Nesting

Nesting is when you put shapes as close together as possible to make the most out of the material you have. It also means that you can use less cuts which saves time.

Less time and less waste saves money and is better for the environment.

### Objectives

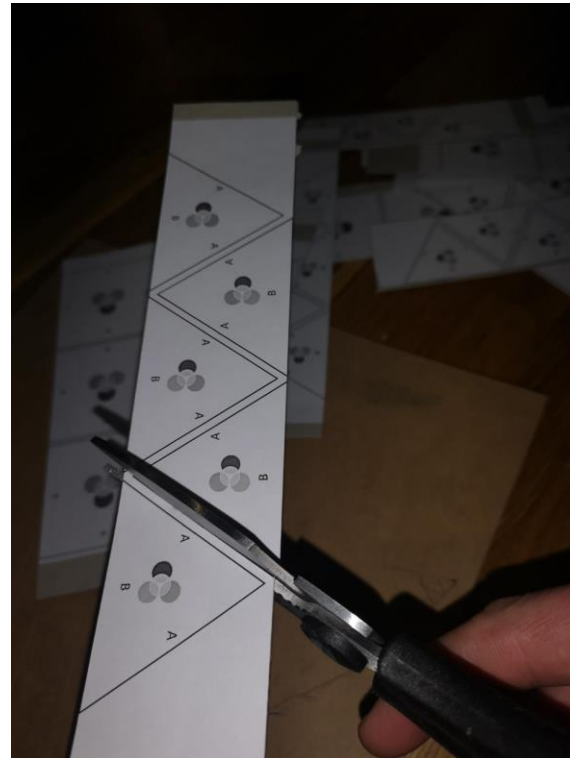
To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

# STEM Challenge

Manufacture an igloo from card by following a production plan

## Production Plan - Stage 2

Use a glue (stick, spray glue or PVA) to glue the paper to the cardboard.



## Production Plan - Stage 3

Cut out the shapes using scissors. Try to be as accurate as possible.

If you made your own template, cut your shapes out directly from the markings on the card.



## Environmental Considerations

Recycle the waste material. Click on the YouTube logo to find out how cardboard is recycled.



## Objectives

To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

# STEM Challenge

Manufacture an igloo from card by following a production plan

## Production Plan - Stage 4

Tape the AAB triangles together along edge A in groups of 5.

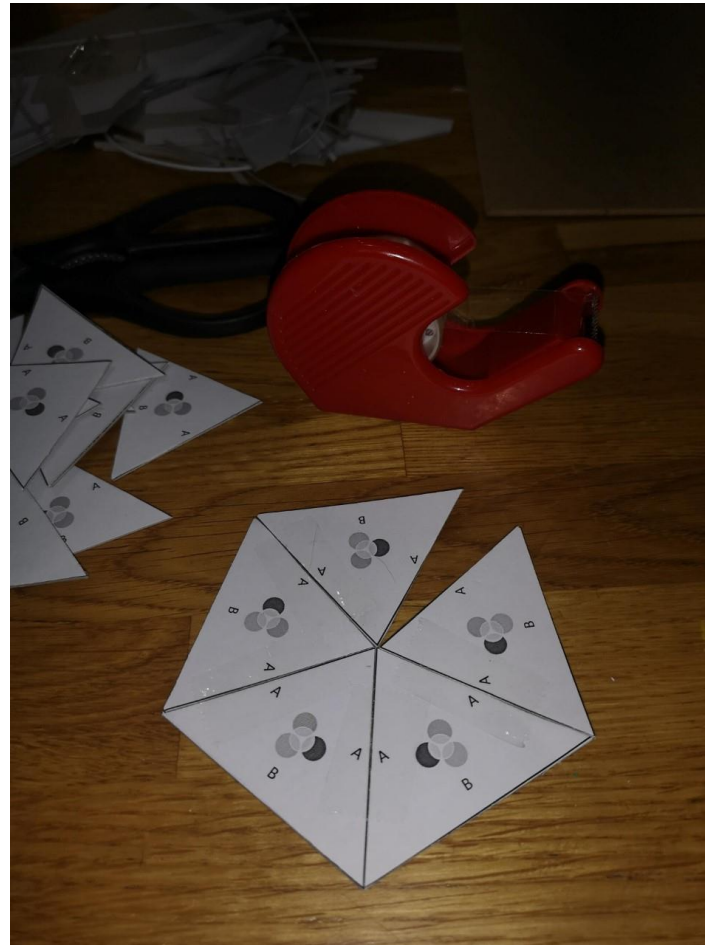
This can get tricky for one person to do on your own so you might need help.

Tape both sides as this will make the structure stronger.



### Top Tip

Get the tape ready so you can stick the parts together easily.



## Objectives

To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

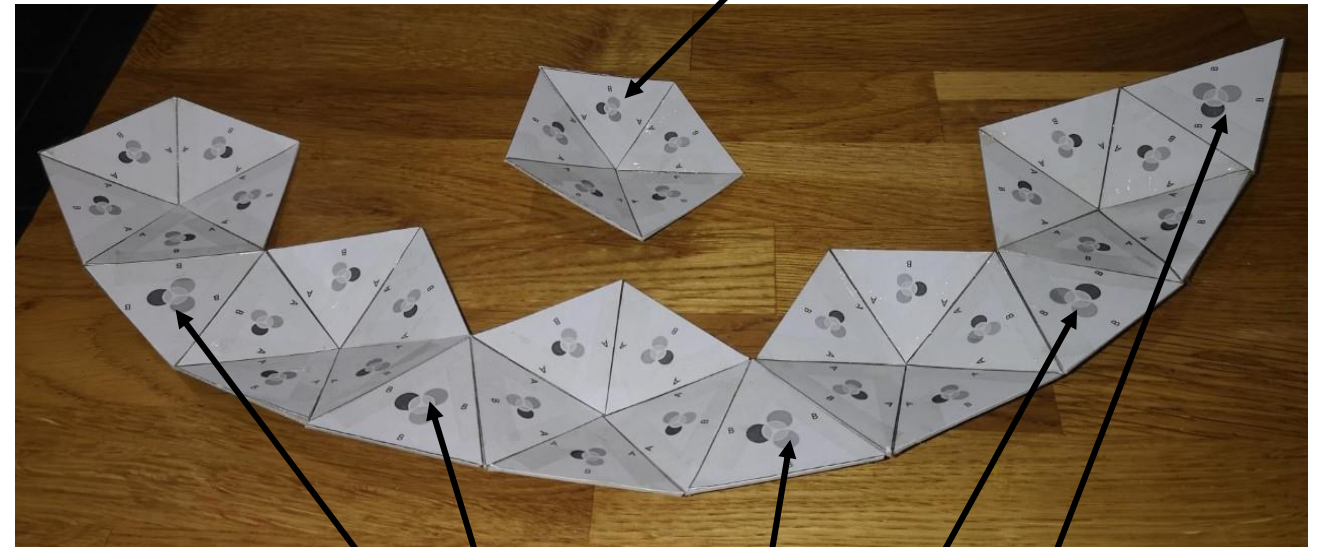
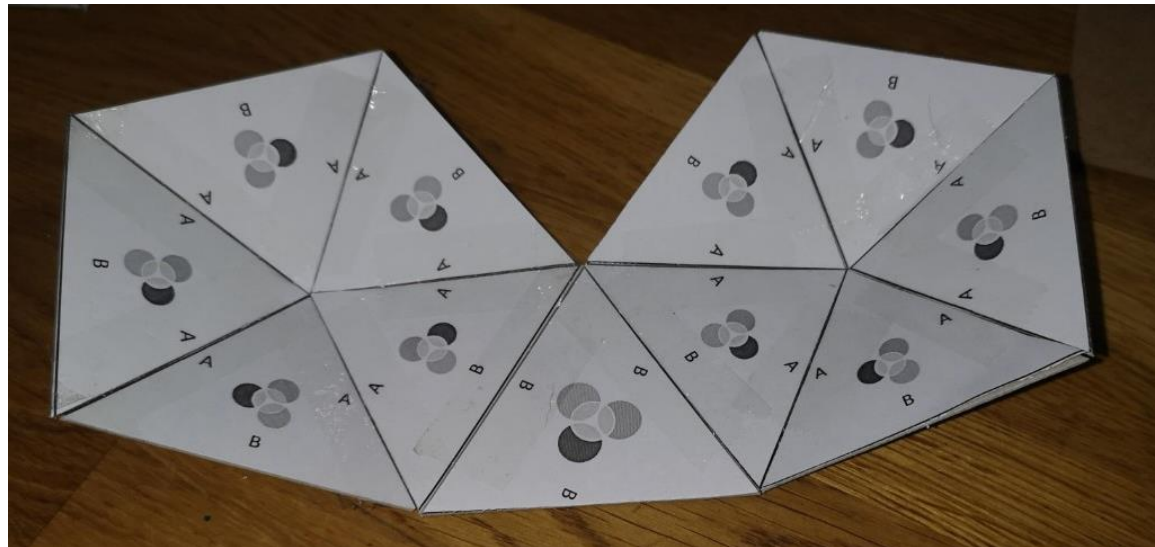
# STEM Challenge

Manufacture an igloo from card by following a production plan

## Production Plan - Stage 5

Join 5 of the 6 pentagons together using 5 of the BBB triangles. Tape both sides for strength.

Leave 1 pentagon spare



5 BBB Triangles

### Objectives

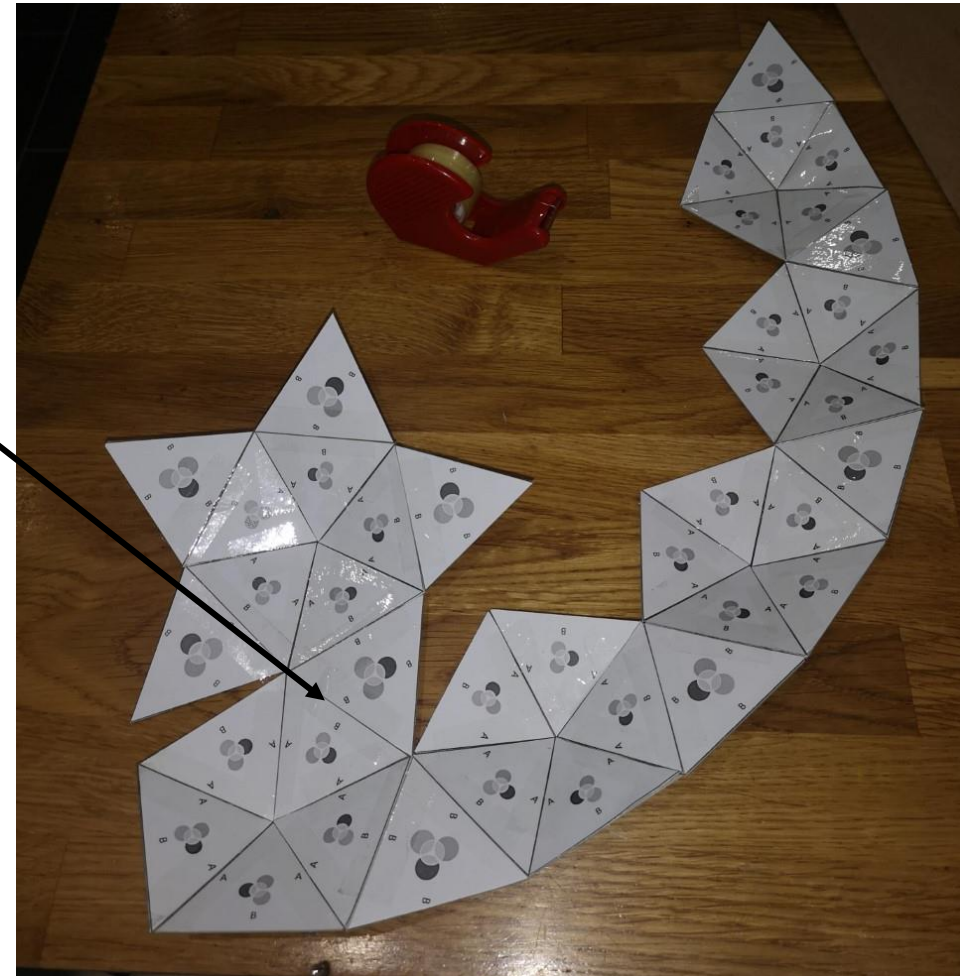
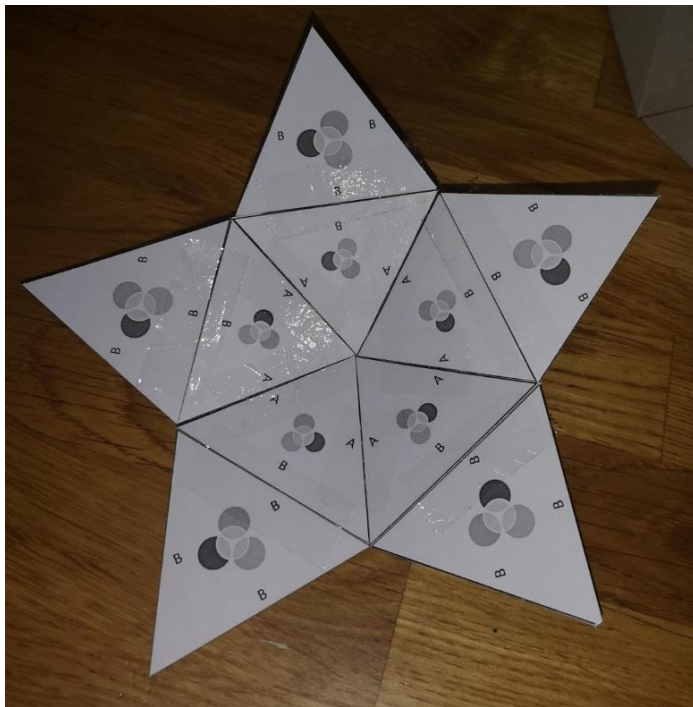
To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

# STEM Challenge

Manufacture an igloo from card by following a production plan

## Production Plan - Stage 6

Add the other 5 BBB triangles to the last Pentagon. Then join that to the other part.



### Objectives

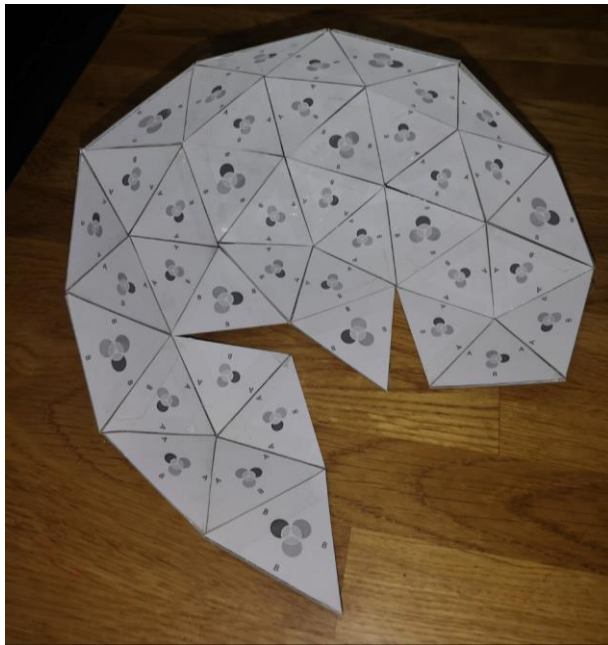
To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

# STEM Challenge

Manufacture an igloo from card by following a production plan

## Production Plan - Stage 7

Join the B edges together to make a dome shape. Tape both the inside and outside for strength.



## Objectives

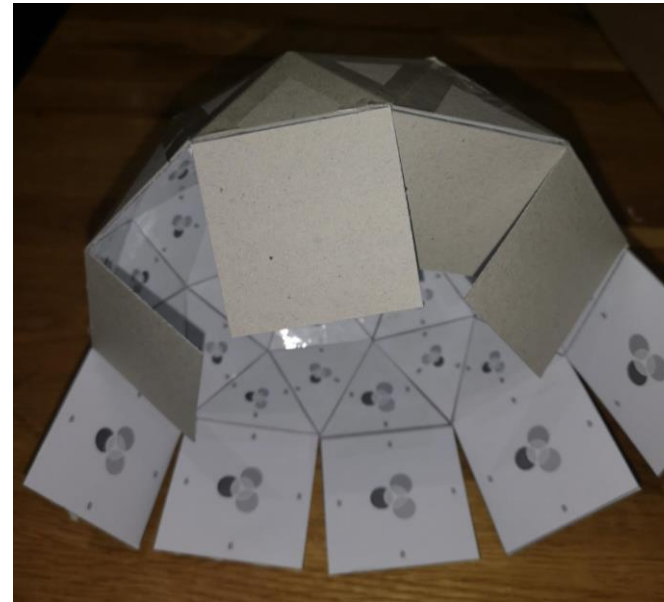
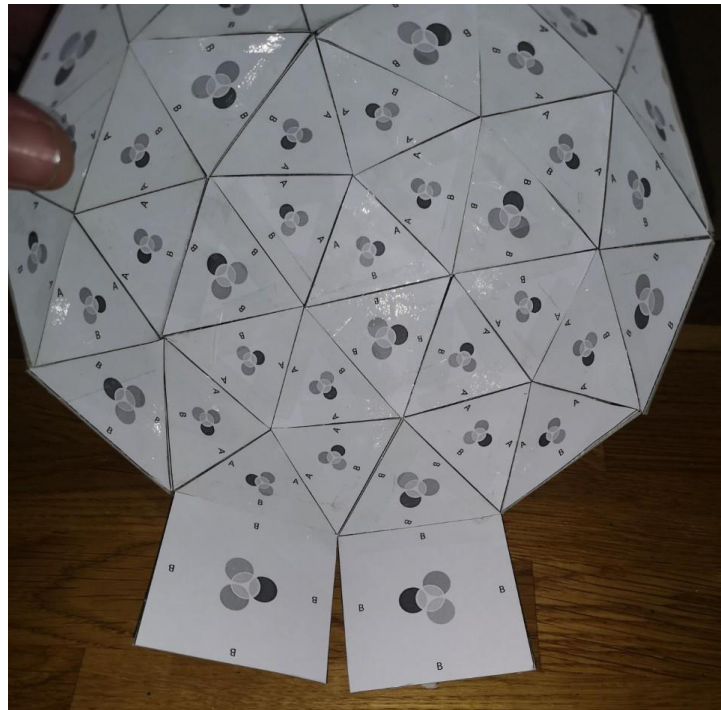
To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

# STEM Challenge

Manufacture an igloo from card by following a production plan

## Production Plan - Stage 8

Join the base of the dome to the squares.  
Tape both sides for strength.



Leave one side open to  
make a door.



## Objectives

To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing



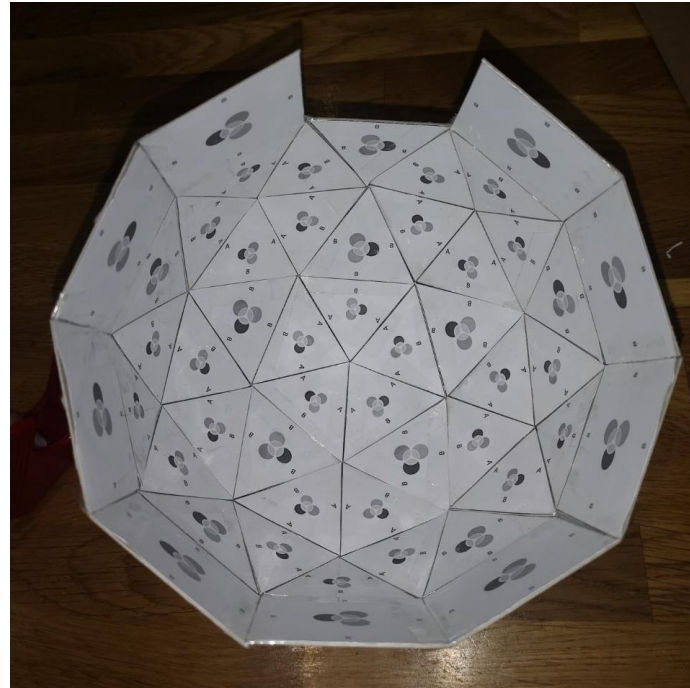
# STEM Challenge

Manufacture an igloo from card by following a production plan

## Production Plan - Stage 9

Quality check.

- Is it strong enough?
- Could you add more tape to make it stronger?
- What else could you use to make it stronger?



## Objectives

To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

# STEM Challenge

Manufacture an igloo from card by following a production plan

## Production Plan - Stage 10 (optional)

Can you decorate your igloo to make it look better?

Designers use the word 'aesthetics' when they talk about how something looks.

- Could you give your igloo a theme?
- Could it be used for other toys or in other games? Maybe for a younger sibling?



### Top Tip

Plan the design before decorating your structure



### Objectives

To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

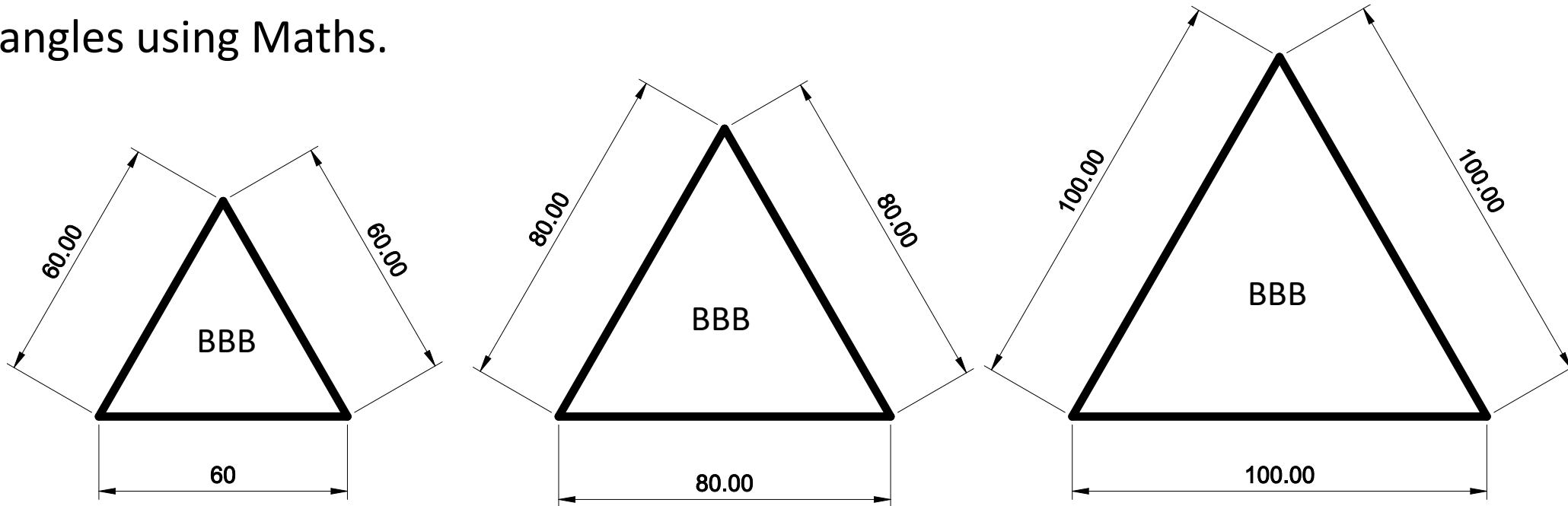
# STEM Challenge

Manufacture an igloo from card by following a production plan

## Extension task

How could you modify (change) your design to make it better?

- Could you add another section or extension to your igloo?
- Could you make another igloo that is bigger? You would have to scale up the size of the triangles using Maths.



## Objectives

To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

# STEM Challenge

Manufacture an igloo from card by following a production plan

## Time to evaluate

Engineers always evaluate a process when they have completed it. It helps them to improve their processes next time. Here are some things to think about -

Did you enjoy making it?

Why?

How accurate is your structure?

Did it fit together?

What went Well?  
How could you improve?

Is it sturdy enough?

How could you increase the strength?

Is your structure creative?

Did you add decoration?

## Objectives

To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

# STEM Challenge

## What's next?

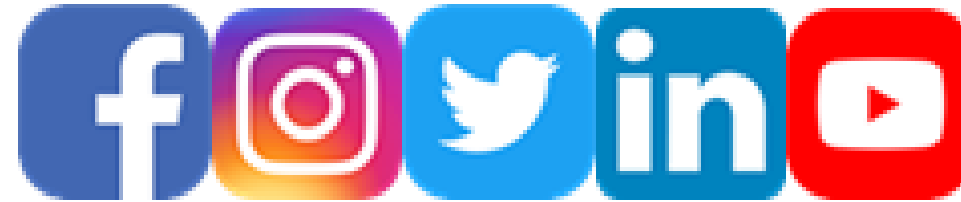
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