Tenbury High Ormiston Academy
Maths Department

Stage 7 Home Learning project.
Autumn Term

Name: …………………………………………………….

Maths teacher: ……………………………………………

LMG: ………………………………………………………

Deadlines:

Task 1:_____ Task 2:_____

Task 3:_____ Task 4: _____

Task 5:_____ Task 6: _____

TASK 1.   Temporary home.

Investigate the different shapes of temporary homes:
- What shapes are frequently seen?
- Why are these shapes good for the design of a temporary home?
- Why is the igloo igloo-shaped?
- What about tepees?

Using the paper provided in class write a short report to show what you have found. Remember to include diagrams or pictures.

Look through an outdoor equipment catalogue or go online to investigate the shapes of modern tents. What considerations have the designers taken into account? What factors limit the size of a tepee?

Construct a model of a tepee to see what happens if you try to make a very tall, narrow tepee. Be ready to report to the rest of the class about what you discovered either by adding to your original report or you could make a short video or presentation.

TASK 2. Three of a kind.
From Bowland Trust.
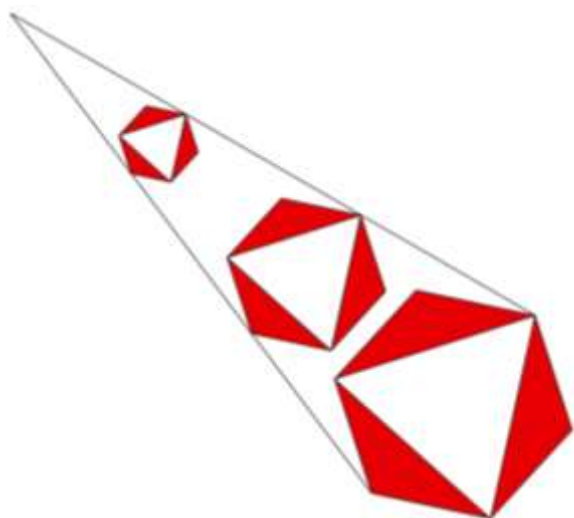
Ask your teacher for a worksheet with the diagram on.

The picture shows three regular

hexagons.

What is the **same** and what is **different**

about them?

What can you say about the lengths,

angles, sizes, areas, symmetry?

Anything else?

TASK 3.   Dancing with mathematics.

In formal dances such as country dancing there are often simple mathematical transformations. These are 'spiced up' with other steps such as twirling on the spot.

First, investigate different dance steps. Which ones are based on the mathematics of transformations.
Can you find any that have no mathematical basis to them?

Invent a system of notation (a way of writing down the steps using symbols eg. ↻ *could* mean turn clockwise) and make up a dance or a group of dancers that goes with it. Start with steps that are mathematical transformations such as rotations and reflections. Remember that some of them may only need one or two people to move while others may require the whole group to move. If the idea of a dance does not appeal to you how about writing some instructions for a group of synchronised gymnasts or motorcyclists or swimmers.

Use the paper provided in class to record your instructions and then give your dance to a friend to call and see if you and some of your friends can dance it! Your teacher will arrange for a class performance once you have had a chance to practise.

How many pairs of dancers can you write a dance for? Does adding more change your notation?

TASK 4. Bunting

Kim runs her own business; she uses fabric to make hanging decorations called bunting.

A customer orders purple bunting to go round his garden.

His garden is a rectangle of 24m by 18m.

Kim asks you to advise her about how much material she should buy.

Follow these two steps that Kim normally uses to work out how much fabric to buy. Use the paper provided in class to record show how you worked out the material needed. Remember to show all calculations and include diagrams to help you explain.

Step 1.

First I work out **how many triangular flags** to make.

- I work out the total length the customer wants.
- Then I **add about 10%** so that it hangs properly.
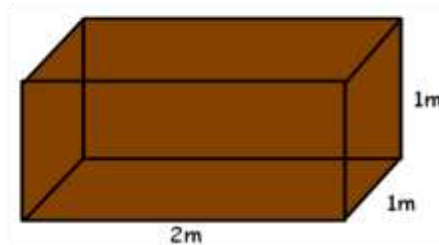- I put 4 triangular flags on each metre of tape.

<----- 1m ----->
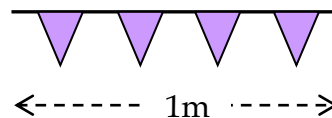
Step 2.

Then I work out **how much fabric to buy**.

12cm

20cm

- Each isosceles triangular flag is cut to these dimensions.
- Fabric is expensive, so I arrange the triangles carefully.
- The fabric is sold in widths of 120cm.
- Then I work out the length I need to buy.
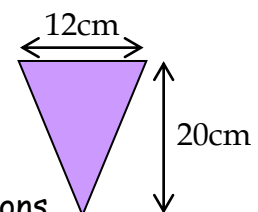
TASK 5. Around the world – China.

One soldier = 0.125m³ of clay

1m
1m
2m

How many soldiers can be made from this block of clay?

An animation company has asked you to make a model of Kung Fu Panda using clay. You need to calculate how much clay you will need for each model. To help with the calculations, you decide to make his body from mathematical shapes, these can eventually be mellowed to make him look more realistic. Don't forget to include his hat!!

Use the paper provided in class show how you calculated the clay for both the soldier and Kung Fu Panda. Include the formulae you used and diagrams.

TASK 6. Candle box.

From Bowland Trust.

Top View

Hinge

Thumb hole for opening
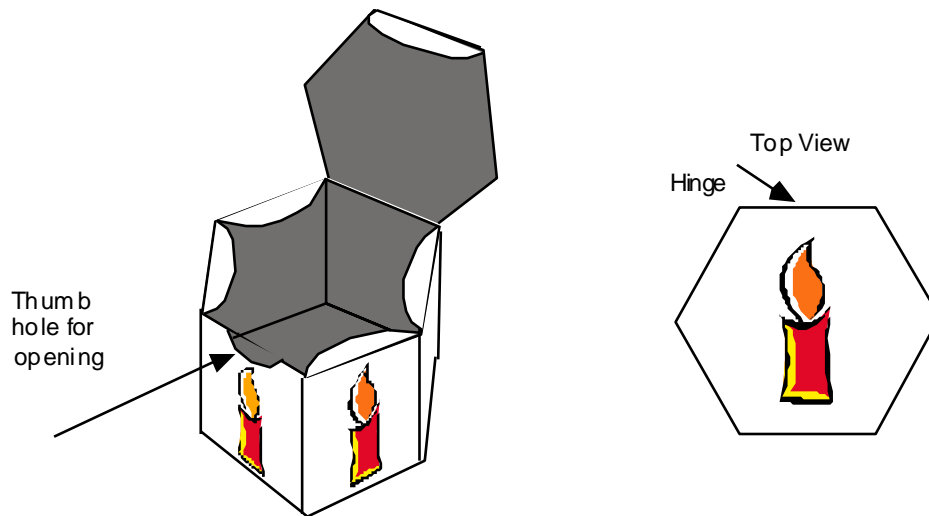
Tom is making a little gift box to hold a big candle.

I want the top and the base to be regular hexagons.
The sides will be rectangles.
A little candle design will go on each side.
There will be a thumb hole to help you open the box.

Please help Tom by drawing an <u>accurate</u> plan, on the paper provided in class, to record for making his box using the dotted paper. It is a good idea to make the box yourself, an old cereal box could be used to do this.
It should be drawn so that when it is cut out it will all be in one piece.

Remember:

- *flaps are needed for gluing the box together; shade these in*
- *flaps are needed for fastening the lid, but these will not be glued! – so don't shade them*
- *draw the candle on the lid and the thumb hole*
- *draw a picture of the Birthday Candle on each side – get it right way up!*

(Do you have a better idea for the shape of the box? What about a box for a different gift?)