7-9: REMOTE MATHS

EDITION 7

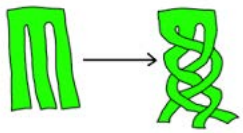
NUMBER AND ALGEBRA: CRAFT AND MATHEMATICS

Mathematical language: Parallel, quarter, square , rectangle, dimension, minimum.

TASK 1: MATHS AND BRAIDS

For this task you will require a piece of felt (24cm x 8cm should suffice), a pencil, ruler and scissors.

- Watch the video showing the knotty magical challenge presented mathematician James Tanton. http://www.mathaware.org/mam/2014/calendar/braids.html
- To make a braid you usually start with three parallel strands joined together at one end but kept loose at the other.



James asks "do you need to bother with those messy loose ends"?

- Is it possible to make a make a braid with no free ends?
- Use a piece of felt cut two slits (as shown in Figure 1)

Enabling prompt: use a pencil and ruler measure accurately and evenly where you will draw the 2 lines before cutting with scissors.

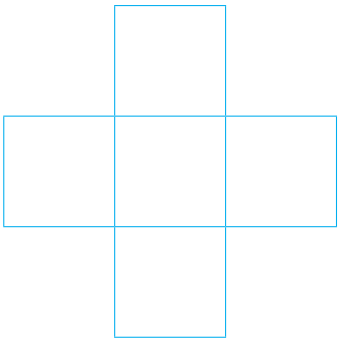
- Try to make a braid, as shown in Figure 2

Figure 1 Figure 2

- Watch the first video shows that these magical braids do exist!
- Then watch the second gives their secret away.

Extending prompt: Why stop at three strands? Can you make a no-free-end version of a four-strand braid? Try it!

TASK 2: QUARTER THE CROSS



- Colour in one quarter of the cross, shown below. You have to be sure it's exactly one quarter.
- Now colour another cross in a different way. You may choose to download the Quarter the Cross template.

Extending prompt: How many different ways can you quarter the cross?

TASK 3: MONDRIAN ART PUZZLES

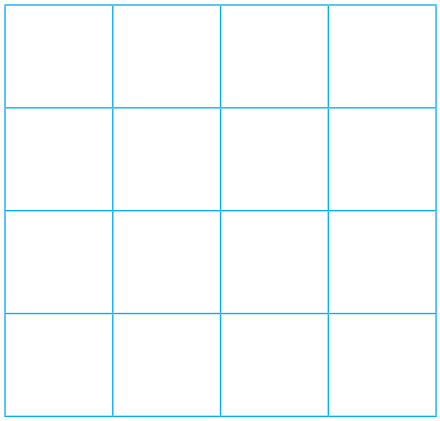
This task explores geometry with number and algebra applications.

Piet Mondrin was a Dutch artist best known for his abstract paintings. A number of these paintings were made from squares and rectangles (such as the one shown here which is exhibited at NGV). He generally only used the primary colours.

Using a piece of graph paper, create your own piece of Mondrian art, following the specifications below:

- Start with a 4 x 4 grid (see the example below right)
- Cover the grid with rectangles
- Each rectangle **must** be of different dimensions, so you cannot include a 3 x 4 and a 4 x 3

Enabling prompt: Remember a square is a special rectangle, with sides of equal length, hence, a square can be used.



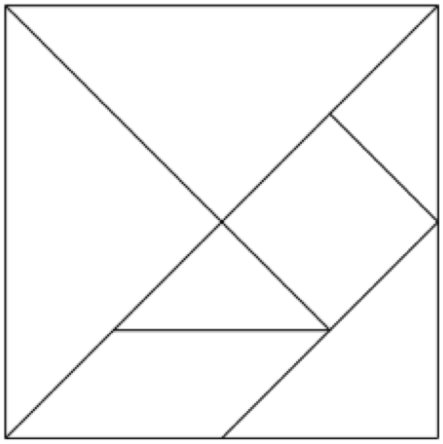
- Colour your work, using the least possible colours, primary colours plus black and white may be included.
- Score your rectangle. This is done by calculating the area of the largest rectangle and then subtracting the area of the smallest rectangle
- What is the minimum score for a 4 x 4 grid?

Extending prompt: Now try with larger grids such as 5x5 grid, 6 x 6, 7 x 7, 8 x 8. What are the minimum scores for these.

GEOMETRY

Mathematical language: tangrams, angle, quadrilateral, consecutive, Pythagoras, hypotenuse.

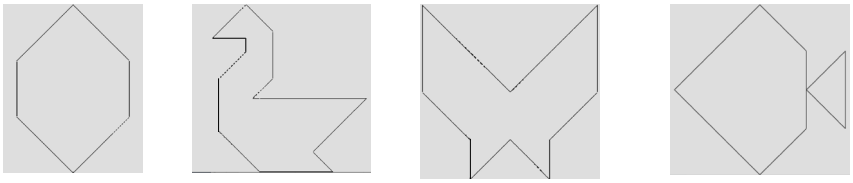
TASK 1: TANGRAMS



For this task you will require a set of Tangram pieces and a pair of scissors.

- Cut along all of the lines to create your seven-piece puzzle set.
- You may choose to download the Tangram template.
- Use all of the pieces to create each of the following images.
- Each picture uses all 7 pieces of the tangram puzzle
- No extra pieces are used to create each image.

Extending prompt: Can you create your own pictures as puzzles for others to solve?



TASK 2: ANGLES IN QUADRILATERALS

Source: Peter Sullivan, Challenging Mathematical Tasks

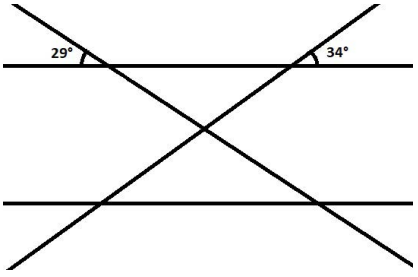
The 4 angles of a quadrilateral are labelled *A*, *B*, *C* and *D*.

- Angle *A* is one third of angle *B*
- Angle *D* is half of angle *B*
- What might be the size of angle *C*? Draw what your quadrilateral might look like. Give as many possibilities as you can.

Extending prompt: Draw a quadrilateral where the sizes of the angles are consecutive multiples of 10.

TASK 3: MISSING ANGLES

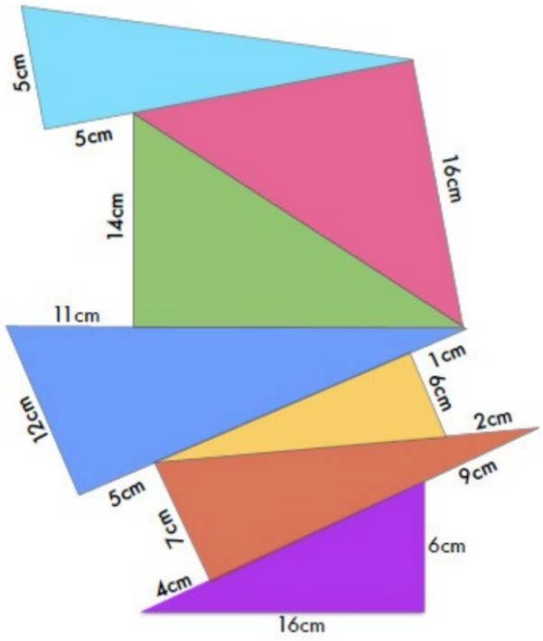
Find all the missing angles in the diagram.
Remember this diagram is not to scale.



EDITION 7: GEOMETRY (CONT.)

TASK 4: PYTHAGORAS PILE UP

What is the length of the hypotenuse of the top triangle? This diagram is not drawn to scale and all triangles are right-angled.



MAV would love your feedback on these resources. Click on the link or scan the QR code.

https://www.surveymonkey.com/r/MAHhomelearning

MATHS APP OF THE WEEK: TANGRAM KING

Complete tangram puzzles, ordered in levels of increasing difficulty, with 7 different puzzle pieces.

Google Play

https://play.google.com/store/apps/details?id=com.mobirix.tangram&hl=en_AU

iOS

https://apps.apple.com/us/app/tangram-king/id1124017784

Look out for more tasks next week!