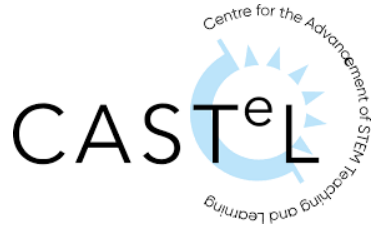


Fostering Metacognition

Developing critical numeracy skills of first-year post-primary students through engaging in problem-posing and mathematical writing

Lorraine Harbison, Judith Callan-Gough, Nora Nic Con Ultaigh



Context

- Engage with mathematical problems that require students to make decisions, explain and justify their thinking, create new ideas and represent their thinking in multiple ways
- Performance on items that assess problem-solving remains a cause of concern
- Students often develop negative attitudes towards mathematics when they enter secondary school
- Correlation between students' attitudes towards mathematics and their achievement in the subject
- To develop positive attitudes and motivation to learn, mathematics needs to be presented as a sense-making activity to which students can have agency and ownership in producing their own mathematical content





Edmund Rice College, Carrigaline, Co.Cork

- Newly established mixed voluntary secondary school under the Edmund Rice Schools Trust.
- 7 feeder schools from the local area
- Currently 570 students with capacity for 600 students
- 4 First year class groups: total of 100 students
- Three autism special classes with 18 students

Learning Area: Literacy & Numeracy

Edmund Rice College, Co. Cork, will focus on the use of “Maths Eyes” to offset the regression of first year students to promote greater positivity towards Maths.

This project will be led by Cinnire Taighde, Judith Callan Gough, Post-primary teacher, with the support of Principal, Adele Flynn.





Developing Maths Eyes

A Resource Pack

An Innovative Approach to
Building a Positive Image of Mathematics



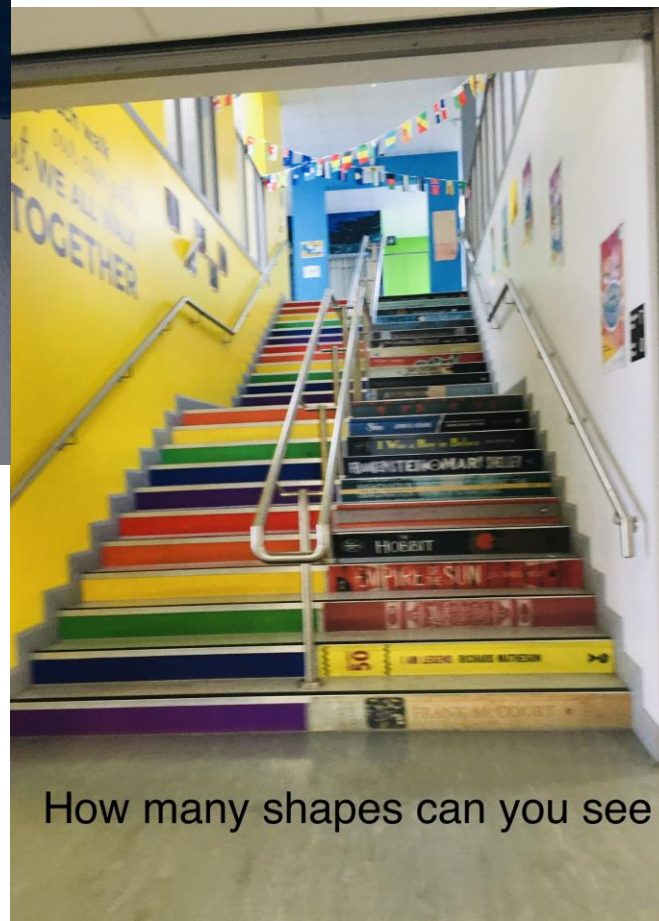
**What
shapes can
you see?**



How many shapes can you
see?



What shapes can you see?



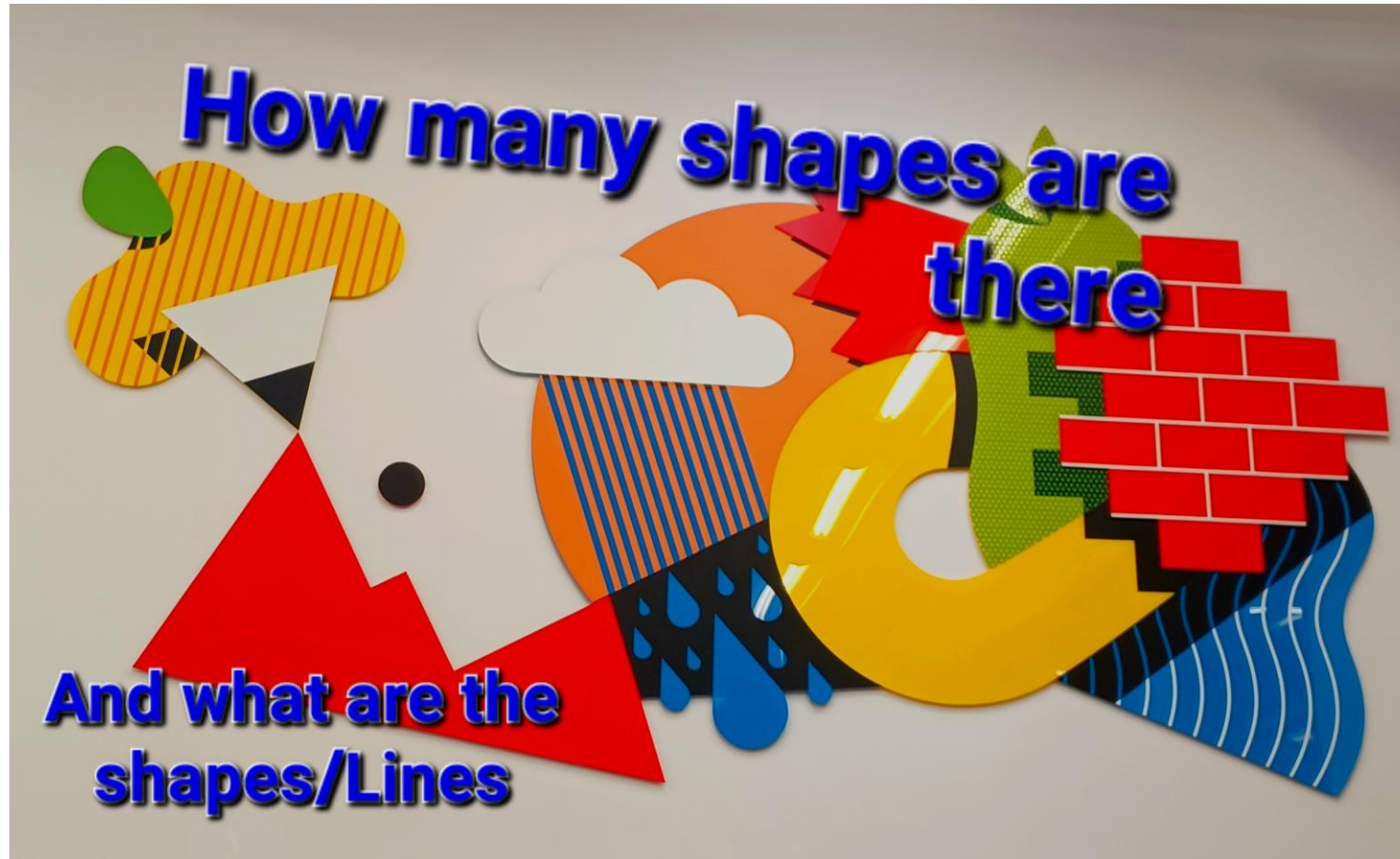
How many shapes can you see



How many shapes can you see!



What are the exact shapes? What lines can you see?



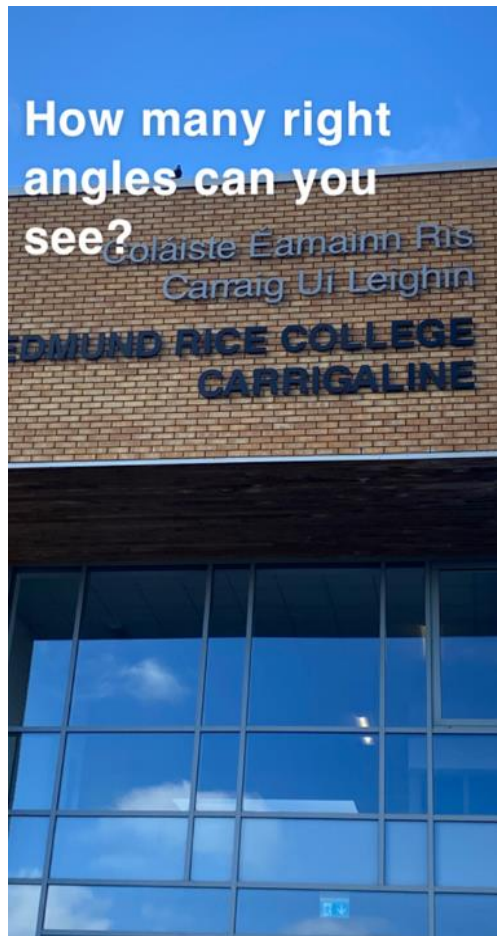


There are 8 wheels on
one table how many
wheels are there in total



How tall are the
steps?

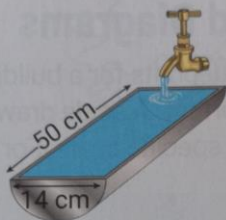
What kind of angles do you see?



From Textbook to the Real World

Sample Question (Keating, Mulvany and O'Loughlin, *Active Maths 1*, Folens, 2018)

6. A half-cylindrical trough is filled with water from a tap. ($\pi = \frac{22}{7}$)



- (a) Find the volume of water in the trough.
- (b) If water leaks from the trough at a rate of 550 ml every 15 minutes, how long will it take for the trough to empty?



How much ml does this release a day?

32.3

Some garden lights consist of a solar panel, which charges a battery by day. By night the energy of the battery is used to light a bulb.

State the energy conversion taking place by day in the garden light.

State the energy conversion happening by night in the garden light.



Figure 32.27 A solar lamp

Kennedy, Lawlor and Finn, *Essential Science*, Folens, 2016



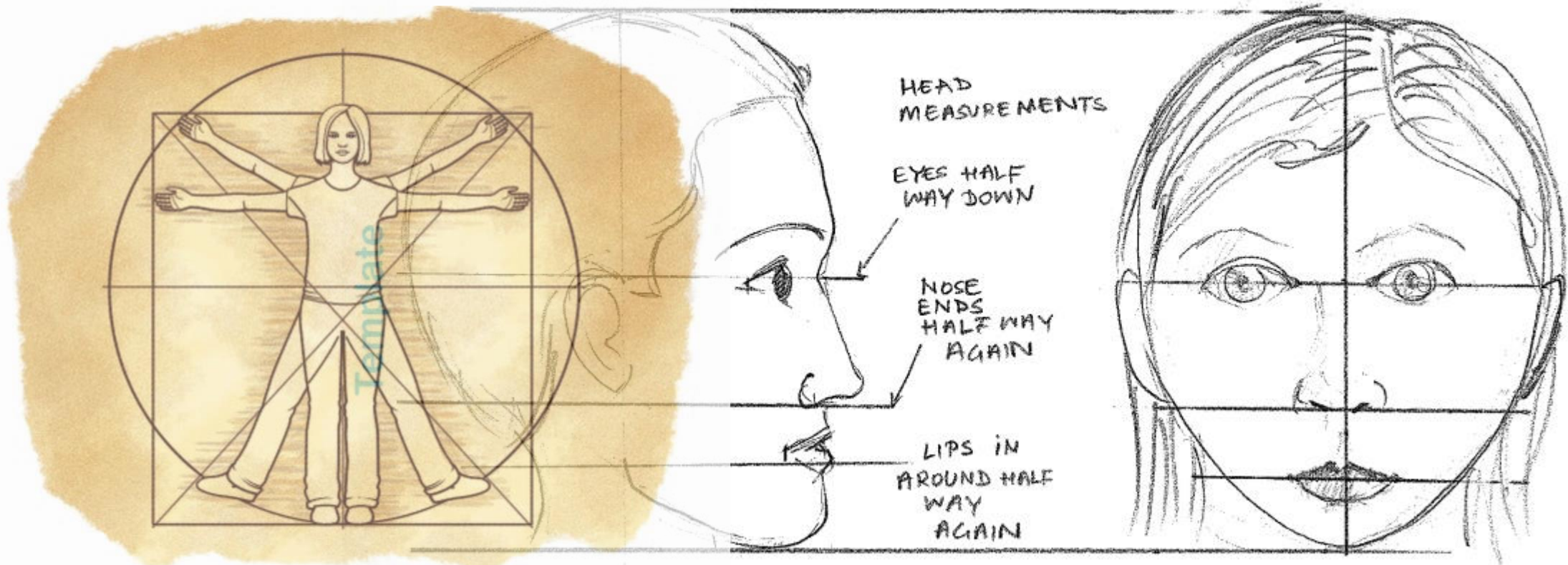
Estimate how much power these produce

Going Beyond Mathematics



What speed is the light
travelling at?

Maths of The Human Body



Geometry Sense of Proportion 2 Worksheet - Investigate these statements about the human body

-
4. The length of your face is about equal to the length of your hand.

Answer: _____

How did you investigate this?

5. Your eyes are separated by a distance of one eye width.

Answer: _____

How did you investigate this?



Survey Question

Give two specific examples of how Maths Eyes activities have helped you with maths this term?

- Recognition of shapes, height and measure.
- It made me really think about the question it is asking me and how to answer it.
- The proportions has helped me with Art.
- Before I never really talked to people while doing Maths. I was just quiet and did it myself. Now I can solve things with others.
- It taught me to socialise and become a maths genius ❤️ − + =

Creative Mathematical Writing

The following story starter was written by the participants at the workshop

- Maths World – Algebra
- Main character – X, Ms Unknown, AI, Co-efficient
- Greatest wish – to find out who she is, what are her values, is there a solution to her crisis
- Greatest fear – to be a variable, to remain unknown, to be imaginary
- Best Friend - AI



Once upon a time in an EQUIVALENT universe, there was a lonely girl called Ms Unknown. She asked herself “what is my value?” She asked others too.

Most people were very confident about their identity. Some people thought they were GREATER than her. Some people thought they were EQUAL to her. Some people thought they were LESS than her. How might she square this one?

So, she set off on an exploratory journey to find out. To her delight she came across a Function Machine. “This is it!” she exclaimed and scrambled inside.

Moments later, she was spat out as a Seven. Not bad, she said, at least I’m a PRIME. I wonder what would happen if I jumped back in...

(At this point, the students continue the story individually, in pairs, or groups)



Access a repository of tasks designed to support and assess
key mathematical and scientific skills



Understanding and
Connecting



Communicating



Reasoning



Applying and
Problem-solving

SCAN ME



www.mathscify.org

info@mathscify.org

Thank You!

lorraine.harbison@dcu.ie