Above and Beyond – Mathematics (Year 8)

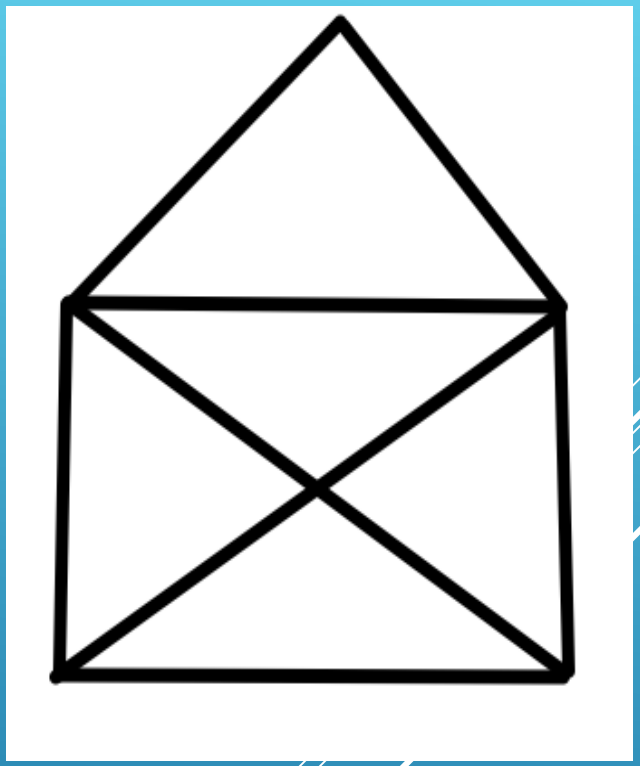
1	**Title: Graph Theory Introduction** **Details: See slide for image.** **I figured we would ease you into extra tasks in year 8, so here is a nice little task.** **The drawing below was made with a single line. In other words, the pencil was placed on the paper, it never left the paper until the drawing was complete, and at no time did the pencil go back over any line that had previously been drawn. Can you recreate this and explain the following:** **How did you go about solving the problem?** **What problems did you face?** **Curriculum link:** Problem Solving **House Points: 25**	**5**	**Title: Practice makes Permanent** **Details: This is a chance to hone your skills from lesson.** **Find your class teacher and ask them to find a worksheet that focusses on a topic you have been working on in lesson.** **Complete this and present as your homework** **Curriculum link: Recall** **House Points:** 10-25
2	**Title: The Graceful Tree** **Details:** It's graceful tree kind of day… Fill in the circles with consecutive odd numbers so 1,3,5,7,9 in this example. You win the game if the differences between each node is different! Make a different arrangement using 7 nodes and put in the consecutive odd numbers (1,3,5,7,9,11,13). You cannot have loops. See slide for image. **Curriculum link:** **House Points:**	**6**	**Title:** Problem Solving **Details: See slide.** **Curriculum link: Problem Solving** **House Points:** 25
3	**Title:** Perimeter and Area **Details:** Se slide for details and images. **Curriculum link: Perimeter and Area** **House Points:** 25	**7**	**Title:** Problem Solving **Details:** The numbers 2, 3, 4, 5, 6, 7 and 8 are placed in the squares in this diagram. The four numbers in the horizontal row add up to 21, and the four numbers in the vertical column also add up to 21. Which number should replace x? See slide for image. **Curriculum link:** Problem Solving **House Points:** 25
4	**Title: Mathemagic** **Details:** Follow this process with two or three different starting numbers: Think of a number -> Add 3 □ Multiply by 2 -> Add 4 -> Divide by 2 -> Take away your starting number. What do you notice? Can you show why this happens? **Curriculum link: Algebra** **House Points: 25**	**8**	**Title: Perimeter** **Details: See slide.** **Curriculum link: Perimeter** **House Points: 25**

I figured we would ease you into extra tasks in year 8, so here is a nice little task.

The drawing below was made with a single line. In other words, the pencil was placed on the paper, it never left the paper until the drawing was complete, and at no time did the pencil go back over any line that had previously been drawn. Can you recreate this and explain the following:

How did you go about solving the problem?

What problems did you face?

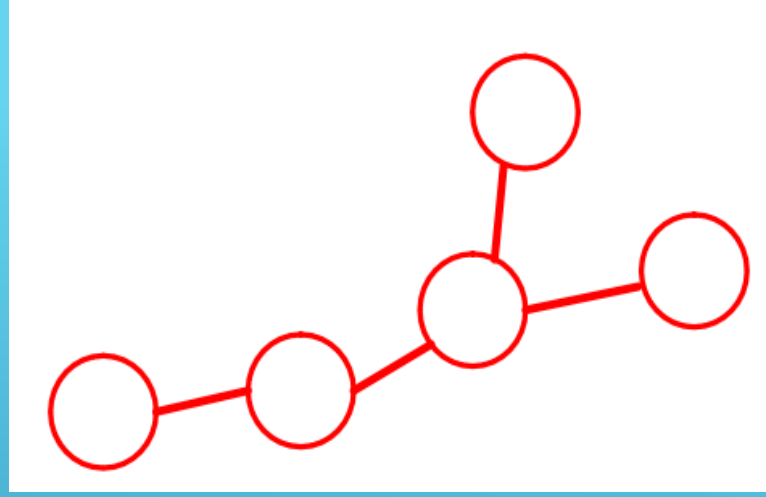


TASK 1

It’s graceful tree kind of day…

Fill in the circles with consecutive odd numbers so 1,3,5,7,9 in this example. You win the game if the differences between each node is different!

Make a different arrangement using 7 nodes and put in the consecutive odd numbers (1,3,5,7,9,11,13). You cannot have loops.



TASK 2

Ok, so Charlie has been drawing rectangles and become a little obsessed with them… He drew the following:

The first rectangle has a perimeter of 30 units and an area of 50 square units.

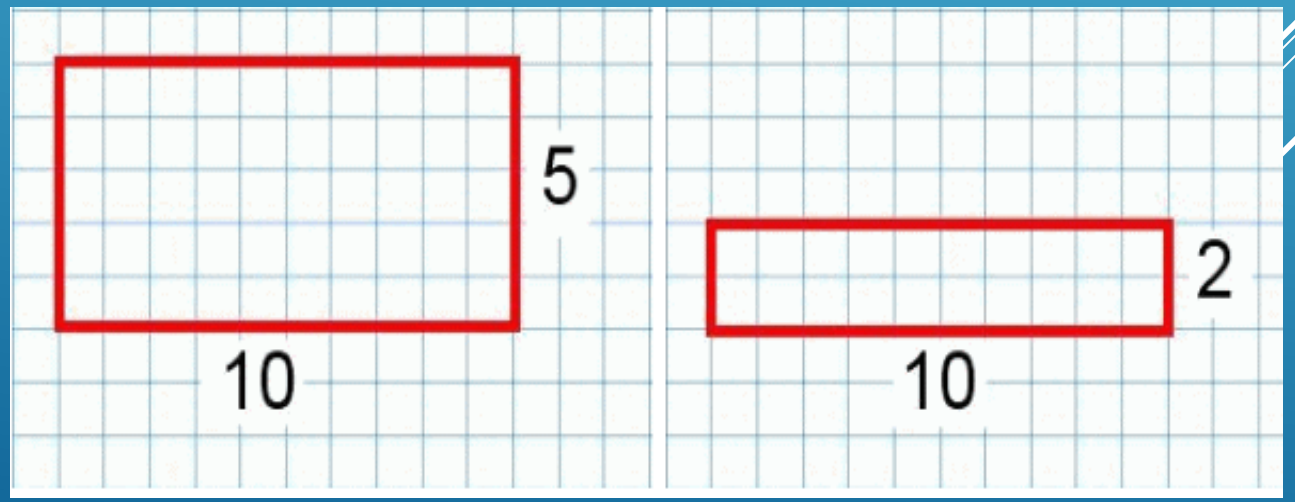
The second rectangle has a perimeter of 24 units and an area of 20 square units.

Charlie wondered if he could find a rectangle, with a side of length 10 units, whose perimeter and area have the same numerical value.

Can you find a **rectangle** that satisfies this condition?

How many different ways can this be achieved?

TASK 3



Follow this process with two or three different starting numbers:

Think of a number -> Add 3 → Multiply by 2 -> Add 4 -> Divide by 2 -> Take away your starting number.

What do you notice?

Can you show why this happens?

TASK 4

TASK 5

This is a chance to hone your skills from lesson.

Find your class teacher and ask them to find a worksheet that focusses on a topic you have been working on in lesson.

Complete this and present as your homework ☺

TASK 6

In the set of equations below, how many △s are equal to ◊?

△ + △ = □

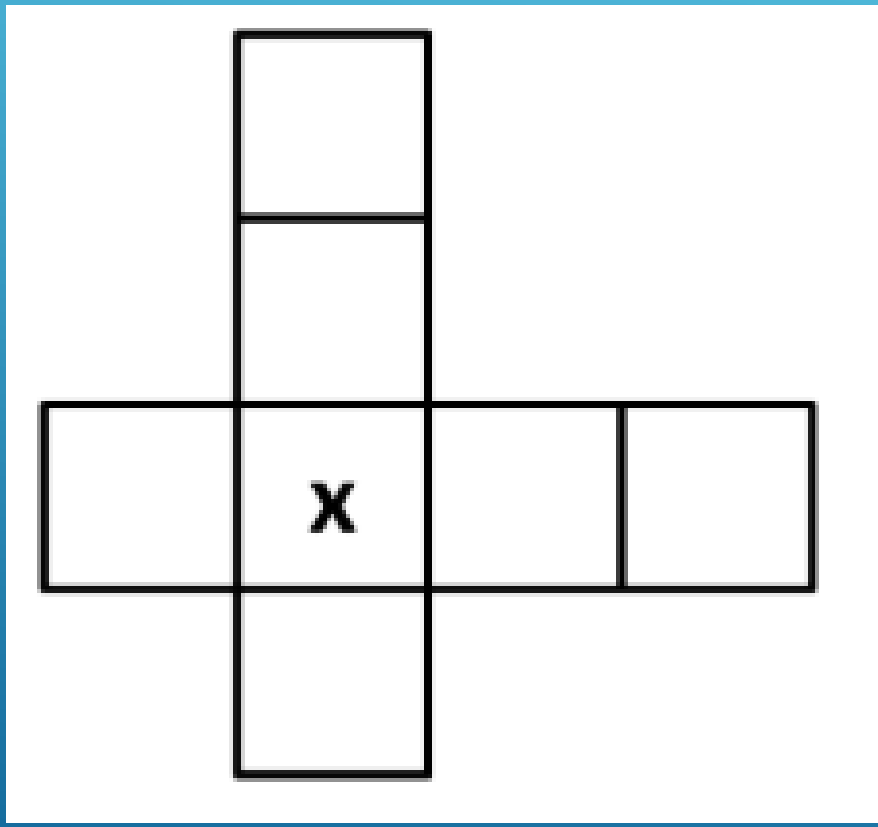
□ + △ = ○

◊ = ○ + □ + △

The numbers 2, 3, 4, 5, 6, 7 and 8 are placed in the squares in this diagram.

The four numbers in the horizontal row add up to 21, and the four numbers in the vertical column also add up to 21.

Which number should replace x?



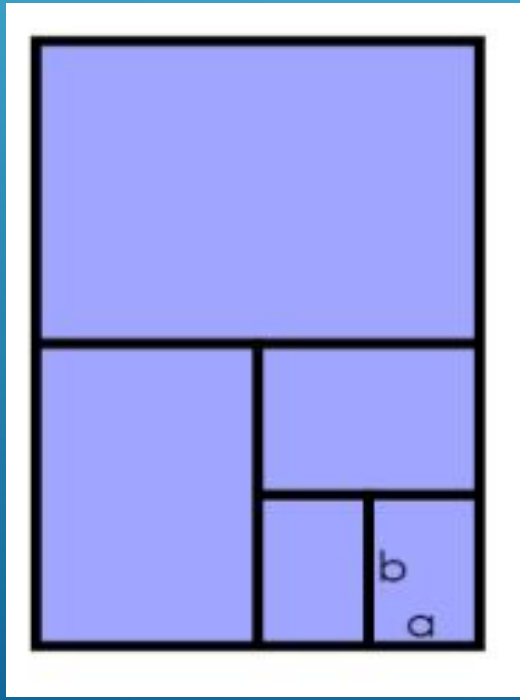
TASK 7

TASK 8

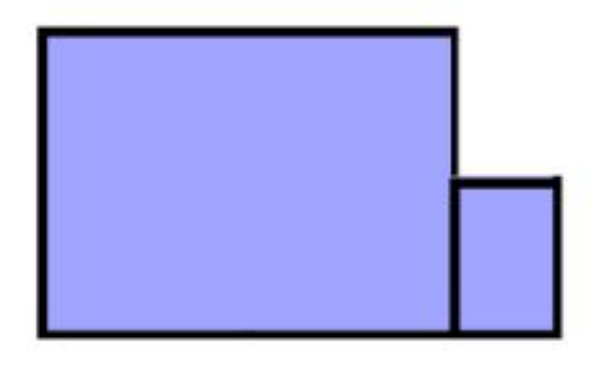
Charlie took a sheet of paper and cut it in half.

Then he cut one of those pieces in half, and repeated until he had five pieces altogether.

He labelled the sides of the smallest rectangle, a for the shorter side and b for the longer side.



Here is a shape that Charlie made by combining the largest and smallest rectangles:



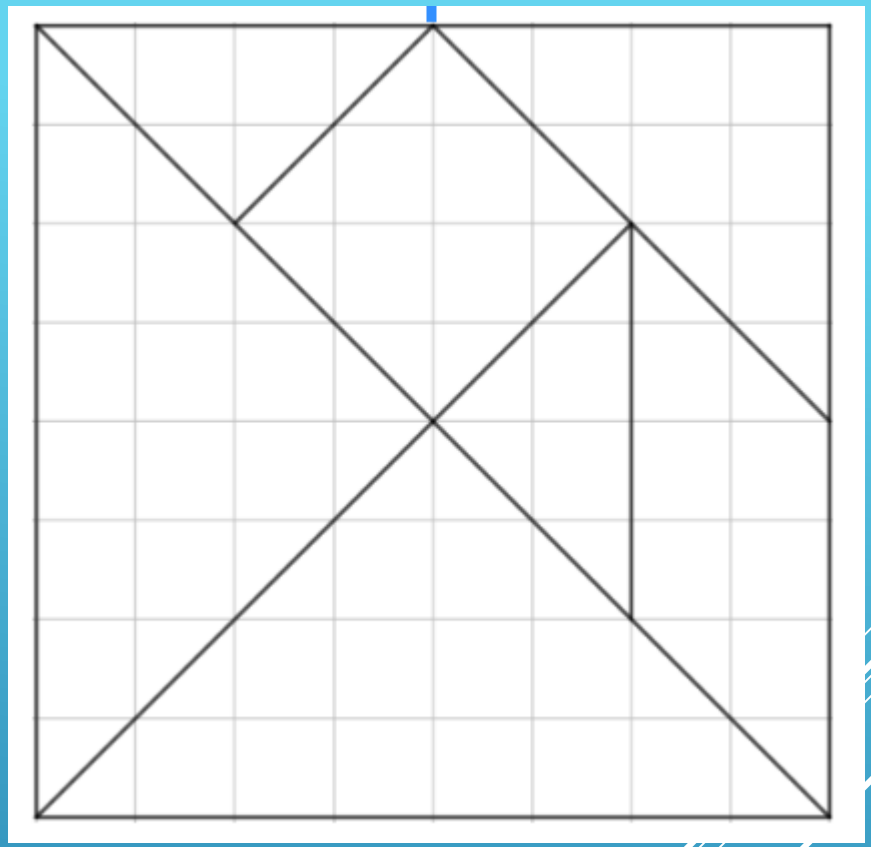
What is the perimeter of Charlie's new shape?

TASK 9

The final task is known as a Tangram.

A tangram is an ancient Chinese puzzle where you make pictures using mathematical shapes.

Make a set of tangram pieces from squared paper as shown below (cut them all out to have 7 pieces total)



Can you make each of the following images using only these 7 pieces?