Choose Three Numbers

6
3 8

INTRODUCTION

Here is an idea I 'invented' on the train which is a list of problems intended to have increasing levels of complexity. Accessible for KS1 children with extensions that would challenge KS4 or even KS5 students

MATHEMATICAL CONTENT

- Numeracy

APPLICABILITY

KS2 - KS5

Q1	**Addition problem**
	Choose three numbers and find all the totals when added in pairs. E.g. if the numbers are 13, 7 and 18, the totals will be 20, 25 and 31. Give these three totals to someone else and see if they can work out what your original three numbers were.
Q2	**Multiplication problem**
	Find all products when the numbers are multiplied together in pairs. If the numbers are 6, 3, 8 the products will be 18, 24 and 48 Give these three products to someone else and see if they can work out what your original three numbers were. You might choose numbers which contain a fraction, e.g. 1/3, 12 and 21, so the products will be 4, 7 and 254 – but you might want to 'hide' the fact you have chosen 1/3 by making the other numbers multiples of 3.
Q3	**Multiplication and addition problem**
	Multiply the numbers, as before, in pairs but this time add the third one, e.g. choosing 6, 3 and 8 we gain the answers 26, 30 and 51
Q4	**Multiplication and subtraction problem**
	Multiply the numbers, as before, in pairs but this time subtract the third one, e.g. choosing 6, 3 and 8 we gain the answers 10, 18 and 45

Q5   **Co-ordinate pairs problems**

What kind of triangle is formed if the numbers are turned into co-ordinate pairs and plotted on a grid, e.g. using the numbers 3, 6, 8 to form co-ordinate pairs (3, 6), (3, 8) and (6, 8)?

Notice order matters, so in the first instance I am not 'allowing' the points (6, 3), (8, 6) or (8, 3) – (but see below).

What is the area of the triangle so formed?
How can the area of the triangle be calculated without plotting the points?
What happens if the points are plotted the other way around, e.g. (6, 3), (8, 6) and (8, 3)?
How does the position of the earlier triangle compare to the position of this new triangle?
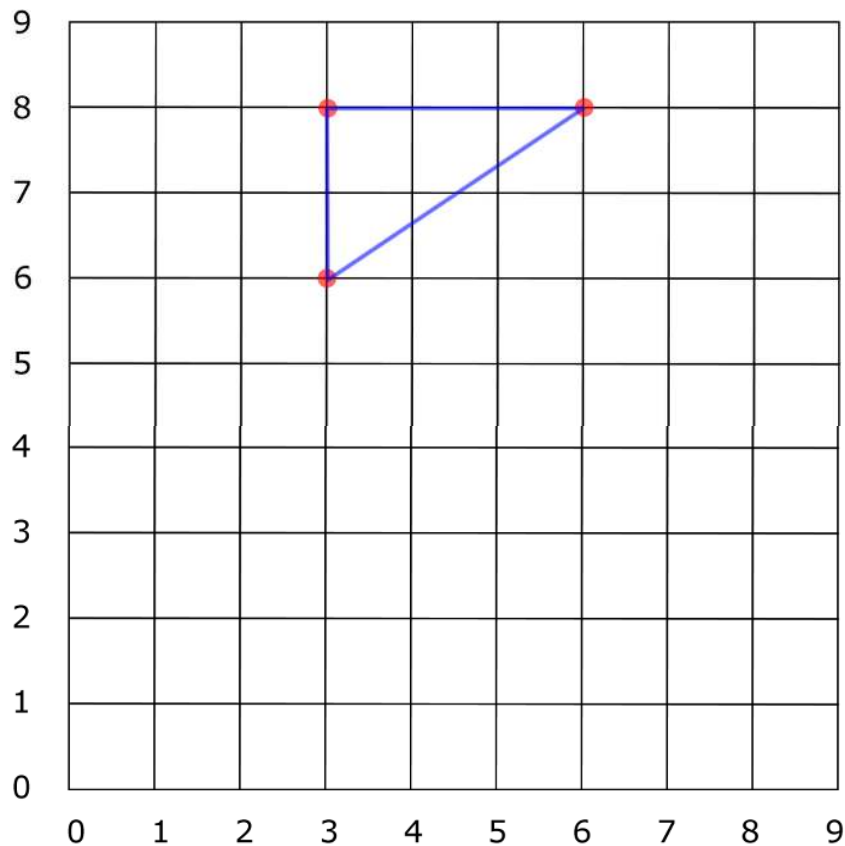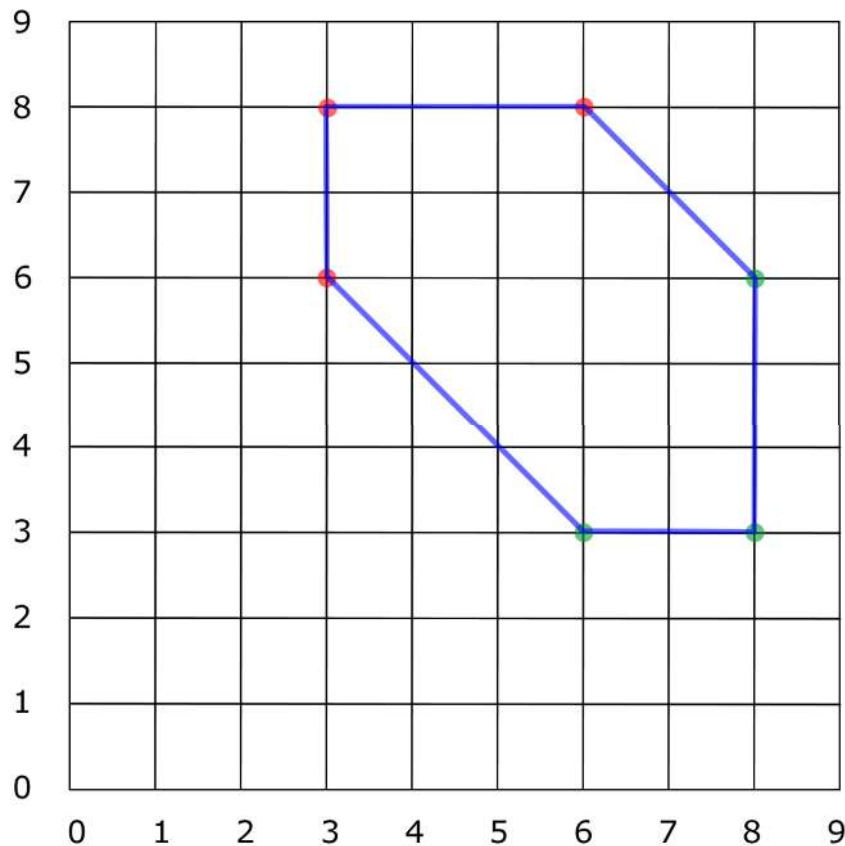
Choose Three Numbers

By plotting the six points a hexagon can be formed.
What is its area?

Q6   **3D co-ordinate problem**

a) Plot the six points (a,b,c), (a,c,b), (b,a,c), (b,c,a), (c,a,b), (c,b,a) and use these as the vertices of a triangular-based prism.

b) What is the surface area of the solid ?

c) What is the volume of the solid?

d) Determine vectors joining pairs of the six vertices.

e) What will the perimeter of the hexagon be ?

f) What will the area and the perimeter of the hexagon be in terms of the three chosen values being a, b and c ?