

Mixed-attainment mathematics

Task design for use in KS3 & KS4 classrooms

With a touch of AS level thrown in for good measure

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*The ability to solve
problems is at the
heart of mathematics.*

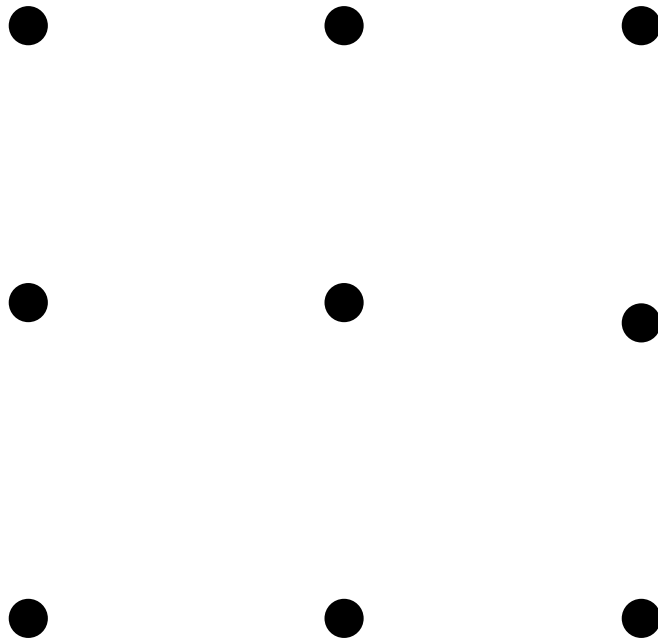
Cockcroft (1982) para 249

Y7 – Y12

Same starting question leading to
different learning outcomes

Triangles on a 9-pin Geoboard

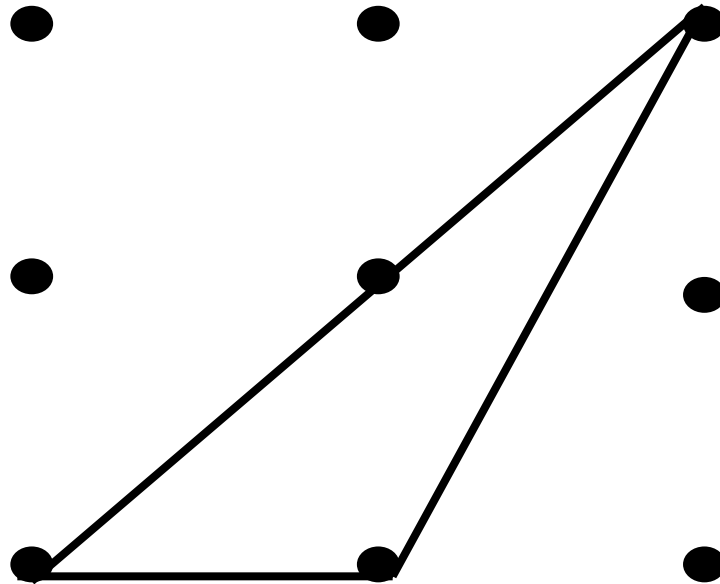
How many different triangles can we make on this grid?



Some questions could be:

- What can we say about our collection?
- What are the names of the triangles?
- What are their areas?
- What sizes are their angles?
- What are their perimeters?
- How do we know we have them all?

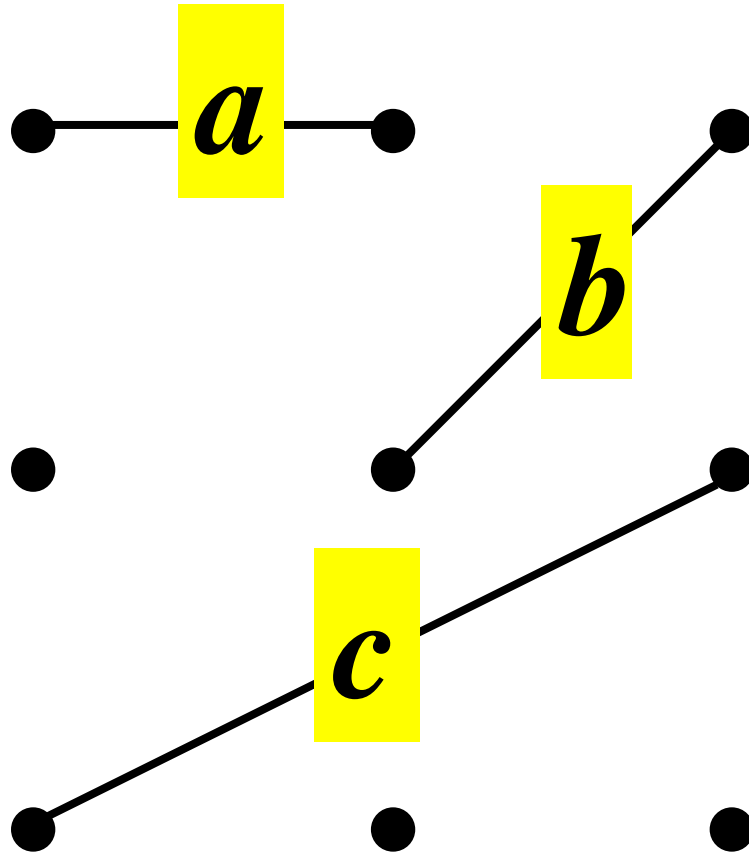
The triangle below can be drawn on the grid in 8 different places



There are many questions a teacher might pose; even better if learners are encouraged to pose questions themselves.

How many different congruent triangles can be drawn on the grid altogether?

Journal writing



Further questions:

Arrange the perimeters of the eight triangles algebraically, in length order, from maximum to minimum.

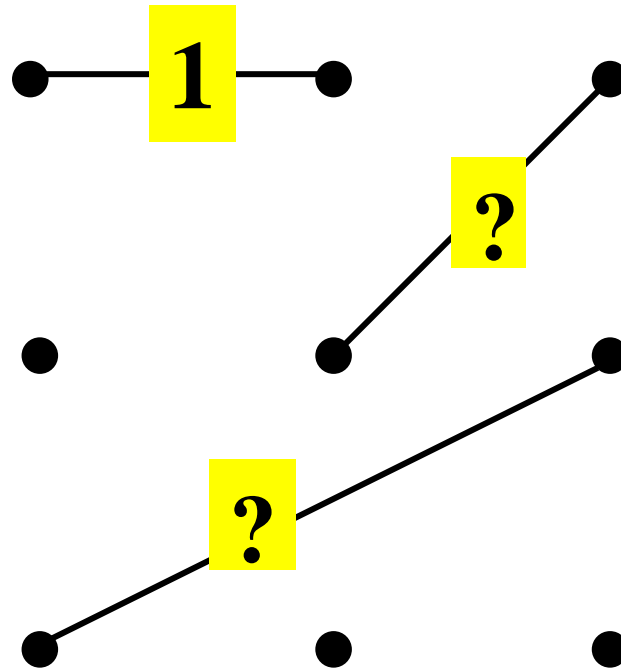
Write the differences between adjacent perimeters algebraically

$$\text{E.g. Maximum} = 4a + 2b$$

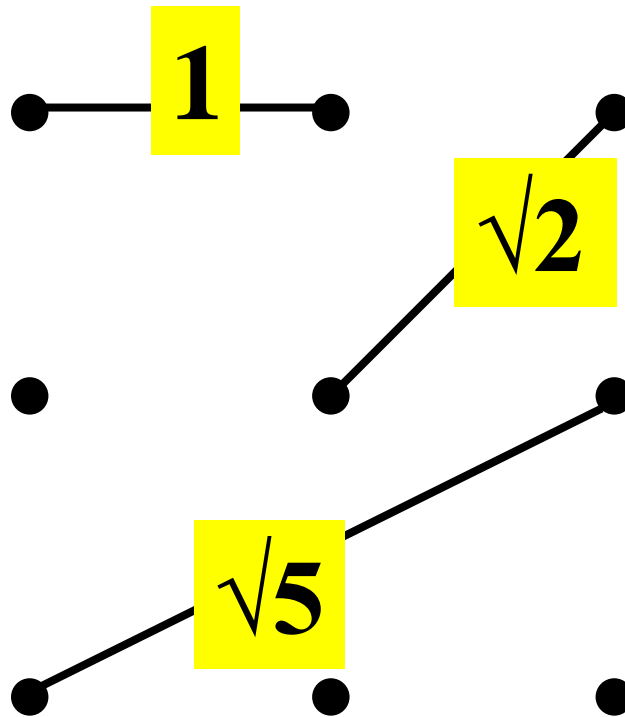
$$\text{Next largest} = 2a + 2c$$

$$\text{Difference} = ?$$

For “post-Pythagorean” students
calculate perimeters to 2 decimal
places using the following:



Leading to the development of surds



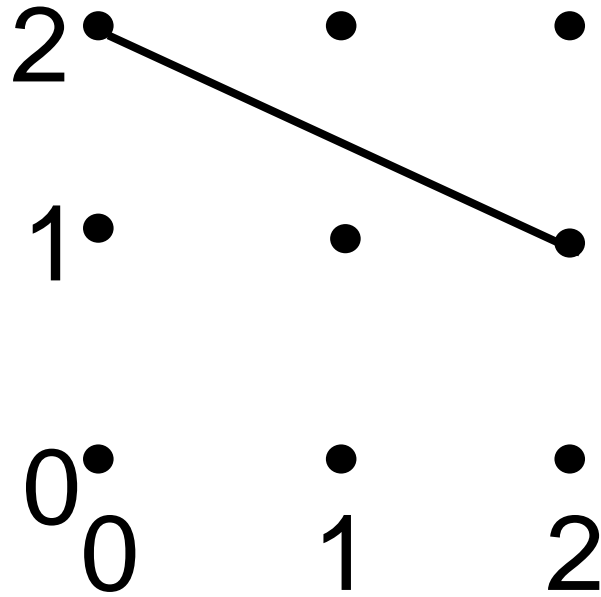
Suppose we turn the grid into
a co-ordinate grid?

2• • •

1• • •

0• • •
0 1 2

Find the equations of all possible
straight lines



How many different vectors
can be drawn on a
9-dot square grid?

What about a 16-dot square grid

What about an n -dot by n -dot grid?

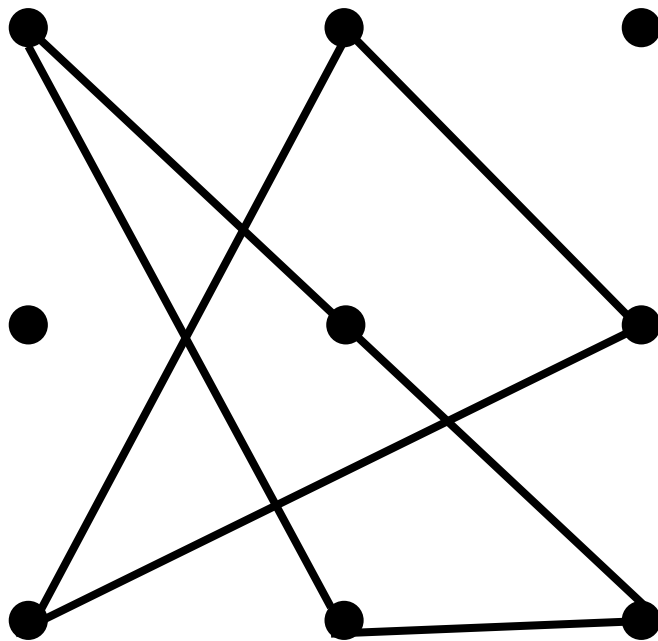
How many different magnitudes of these vectors are there on different sizes of grids?

For “post-trigonometricians”

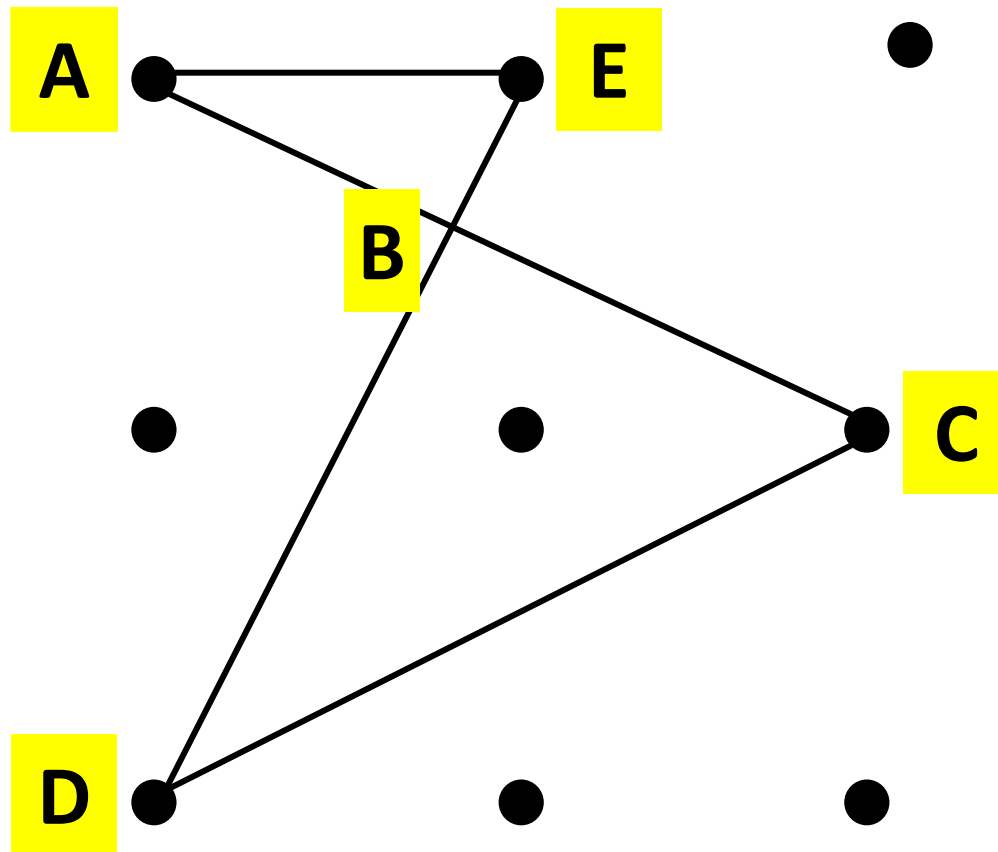
Calculate the angles of the
triangles to the nearest
0.1 of a degree

For AS level students

Calculate the area of intersection.



What are the areas of triangles
ABE and BCD?



Prove sides $BC:BD:CD$
are in the ratio of $3:4:5$

