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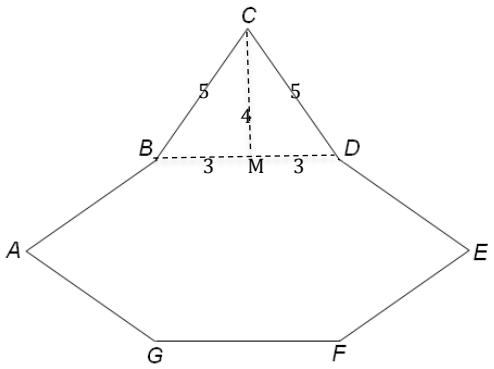
AFRICAN INSTITUTE FOR MATHEMATICAL SCIENCES
SCHOOLS ENRICHMENT CENTRE
TEACHER NETWORK

Title: Riding on Pythagoras 1 (Grades 8 to 10)



The diagram shows a septagon ABCDEFG in which the lengths GA, AB, BC, CD, DE, EF are all equal and FG = 6 units. The area of the square BDFG is half the area of the septagon. Find the perimeter of the septagon.

Solution

As GA=AB=BC=CD=DE=EF the triangles ΔBCD, ΔDEF and ΔGAB are all isosceles triangles
As area of square BDFG = 36 sq units so
area ΔBCD = area ΔDEF = area ΔGAB = 12 sq units.
If M is the midpoint of BD, as BD=FG=6 then BM = 3.
So CM=4 to give an area of 12 sq. units.
From the right angled 3-4-5 triangle BCM we see BC=5 units so the perimeter of the septagon is 36 units.

Notes for teachers

Why do this activity?

This activity provides a simple rider that uses what the learners know about isosceles triangles and areas of squares and triangles and also uses Pythagoras Theorem. The problem is not just routine so that learners are involved in mathematical thinking.

Possible approach

Draw the diagram on the board or give copies to the learners. Tell the learners to read the question, to copy the diagram, to mark the information given on the diagram, and to work individually to solve the problem. As learners need lots of practice in reading questions teachers should avoid doing this for them in class. There should be no need for the use of calculators in doing this question.

After allowing time for most of the learners to finish the question, then ask the learners to check their working and their answers with the learner next to them.

Then for the whole class, ask learners to explain how they worked out the answers. Remind learners that they should spot the 3-4-5 triangle and save time spent doing calculations.

Key questions

What do you need to know to find the perimeter?
Can you find the areas of the triangles that stick out around the square?
What could you add to the diagram to help you?
If you know the area how do you find the length?
What do you know about right angled triangles?

Possible extension

See https://aiminghigh.aimssec.ac.za/grades-8-to-10-riding-on-pythagoras-1/

Here is another question: If two of the sides of a right-angled triangle are 5cm and 7cm long, how many possibilities are there for the length of the third side?

Possible support

You could suggest that the learner draws the diagram and joins GB, BD and DF so as to see the square and the 3 triangles that makeup the polygon. Then suggest that they read the question again and mark the information from it on the diagram.