

**BACCALAURÉAT GÉNÉRAL ET TECHNOLOGIQUE**  
**ÉPREUVE SPÉCIFIQUE DES SECTIONS EUROPÉENNES**  
**MATHEMATIQUES – ANGLAIS**

**SUJET 5 – Pythagoras and equations**

**Thème : Geometry**

**Ce sujet comporte 1 page. L'usage de la calculatrice est autorisé.**

A Pythagorean triple is a group of three positive integers  $a$ ,  $b$  and  $c$ , satisfying the following equation :  $a^2 + b^2 = c^2$ . This group is written  $(a, b, c)$ .

When you choose any two whole numbers, Diophantus (c.200-284 AD) found a method to calculate three natural numbers forming a Pythagorean triple.

5 Here is his method: take any two positive whole numbers, and form :

- Twice their product,
- The difference between their squares,
- The sum of their squares.

10 Then, the resulting three numbers are the sides of a Pythagorean triangle. For example, if you choose the numbers 1 and 2, you will find the famous Pythagorean triple (3,4,5).

When you have a Pythagorean triple, another thing is that you can multiply the three numbers by the same natural number and the results will also form a Pythagorean triple!

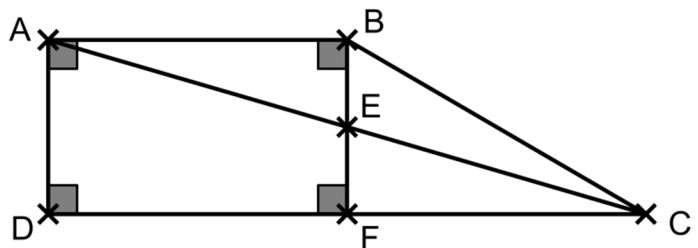
Taking the (3,4,5) Pythagorean triple, we can find (9,12,15) and (15,20,25) for example.

*Extract adapted from "Professor Stewart's cabinet of mathematical curiosities"  
by Ian Stewart (2008)*

1. Start the interview by reading the first four lines of the text ending with "triple".
2. Explain what the text deals with and comment on it.

**Exercise**

Let's consider the following geometrical figure where :  $AD = 7$  in;  
 $AC$  is 1 inch longer than  $DC$ ; and  
 $F$  is the midpoint of the line segment  $[DC]$ .



1.
  - a. Calculate the lengths  $AC$  and  $DC$ .
  - b. Prove that  $DC = 24$  and  $AC = 25$
2.
  - a. Calculate the area of the polygon  $ABCD$ .
  - b. What percentage of the total area does the area of  $ABFD$  represent (give your answer with 1 decimal place)?
3.
  - a. Calculate the perimeter of the polygon  $AEFD$ .
  - b. Give this perimeter in cm, knowing that  $1 \text{ in} \approx 2.54 \text{ cm}$ .