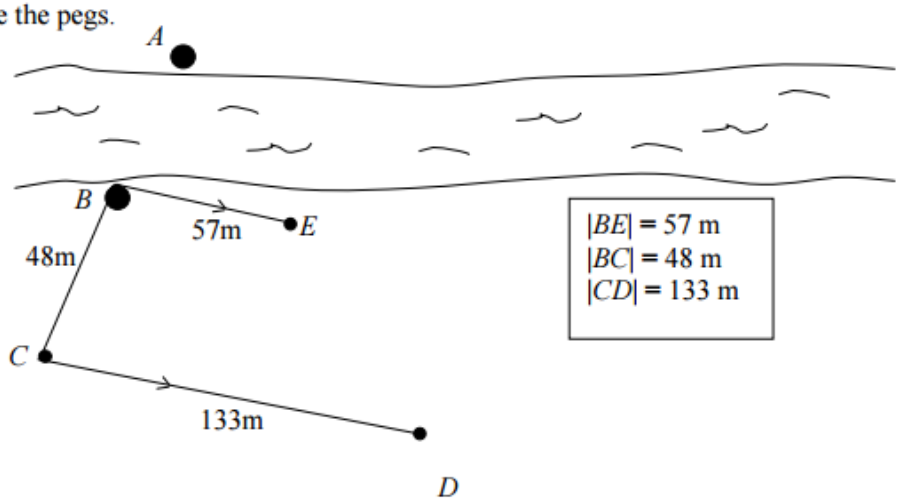
Application of Theorem 13:

If two triangles are similar, then their sides are proportional in order

A group of students were trying to find the distance between two trees on opposite sides of a river using pegs, a measuring tape and a large amount of string. They align the pegs in a particular way, take several measurements and sketch this diagram. On the diagram, A and B are the trees and C, D and E are the pegs.



(a) In what way must the pegs and the trees be aligned if the students are to use these measurements to calculate $|AB|$.

(b) Calculate the distance between the trees.

(c) Another group of students repeats the activity. They have a similar diagram but different measurements. Their measurements are $|BE| = 40$ m and $|BC| = 9$ m. Based on the value of $|AB|$ that the first group got, what measurement will this second group have for $|CD|$.

(d) Suggest how the group of students might have ensured that $[BE]$ was parallel to $[CD]$.

Teacher/Student Interaction

Rewrite possible questions/instructions/dialogue for the tree problem using this guide:

Knowledge: ***If two triangles are similar, then their sides are proportional in order***

- When we compare €60 to €20, using the idea of how many "times" €60 is "more" than €20 instead of the difference between €60 and €20, we call this the ratio 60:20.

- How does 60 compare to 20?

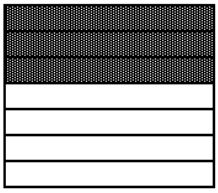
- Write as a ratio.

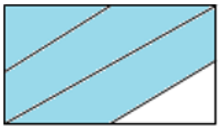
- The current standard pupil-teacher ratio is 1:19. What is wrong with this statement?

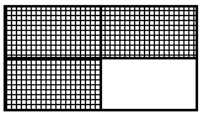
- When we have a statement of equivalent ratios, we have a proportion.

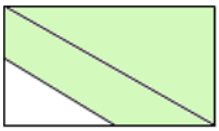
- Set up a proportion for 6:4.

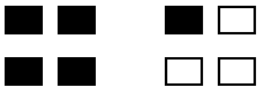
1. Which of these rectangles has $\frac{3}{4}$ shaded in? Is it more than one rectangle?

(i) 

(ii) 

(iii) 

(iv) 

2. 

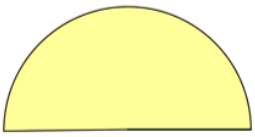
The shaded part of this diagram could represent the numbers

A: 5 **B**: $2\frac{1}{2}$ **C**: $\frac{5}{8}$ **D**: $1\frac{1}{4}$

Identify the **unit** in each case by drawing:

A: B: C: D:

3. The shaded area below represents $\frac{2}{3}$ of a patio area. What shape would represent the whole patio?



Question 3 **(Suggested maximum time: 10 minutes)**

Eleanor has a **gross** income of €38 500 for the year.
She has an annual tax credit of €3300.
The standard rate cut-off point is €33 800.
The standard rate of income tax is 20% and the higher rate is 40%.

(a) Find Eleanor's **net** income for the year (i.e. after tax is paid).

Eleanor receives a pay rise. As a result, her **net** income for the year is €34 780.

(b) Find Eleanor's new **gross** income for the year.

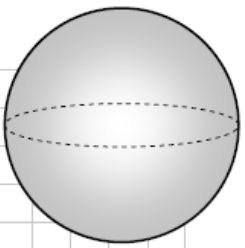
Project Maths Fractions Diagnostic Test

http://www.projectmaths.ie/for-teachers/workshop-3-problem-solving-and-number/

Question 14 **(Suggested maximum time: 5 minutes)**

A small sphere has a radius of 1·5 cm.

(a) Find the **volume** of the small sphere. Give your answer in cm^3, in terms of π.



The volume of a large sphere is three times the volume of the small sphere.

(b) Find the **radius** of the large sphere.

Give your answer in cm, in the form $\frac{a\sqrt[3]{a}}{b}$, where $a, b \in \mathbb{N}$.