



# UNIVERSITY *of* LIMERICK

O L L S C O I L   L U I M N I G H

Department of Mathematics & Statistics

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*Literacy and Numeracy for Mathematics Teaching in Ireland Survey*

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**Time:** 1 hour

**Instructions:**

- Answer Section A: General Information and Section B: 8 Questions
- You will be asked to rate each question in Section B as Easy/Moderate/Difficult
- Please show ALL work
- Calculators may be used

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## Section A: General Information

### 1. Personal Identification Code

Create a personal identification code that will be used to ensure all surveys are anonymous by choosing an answer for each of the options below:

First letter of your first name

Day of the month you were born (1 – 31)

Month you were born (1 = January, 2 = February etc.)

First letter of the county where you were born (Use X if born outside of Ireland)

### 2. Second Level Mathematics Education (Answer 2A or 2B)

**2A (i) :** What year did you complete your Leaving Certificate? \_\_\_\_\_

**2A (ii):** Indicate the level (higher level/ordinary level) and grade you achieved in mathematics in the Leaving Certificate

Level	Grade
<input type="text"/>	<input type="text"/>

**2B:** If you did not sit the Leaving Certificate examination, list the equivalent examination you completed and grade achieved:

Examination	Grade
<input type="text"/>	<input type="text"/>

### 3. Third Level Education

**3A:** What year did you complete your undergraduate degree? \_\_\_\_\_

**3B:** Do you have a graduate level degree in mathematics? Yes/No \_\_\_\_\_

**3C:** If the answer to the above question is No, please name the degree(s) you have completed:

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Section B: Answer All 8 Questions

Question 1

The class are discussing rational and irrational numbers. One student claims that  $\frac{23}{43}$  is an irrational number because his calculator shows 0.53488372 when 23 is divided by 43 and there is no repeating pattern of digits.

In the role of the teacher, write the response you would make to this student’s claim?

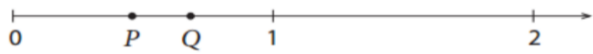
*[Source: Zazkis, R., Dialogues on Number Theory]*

<i>Rate the question</i>	<i>Easy</i>	<i>Moderate</i>	<i>Difficult</i>

Question 2

The following question appeared in a first year summer test:

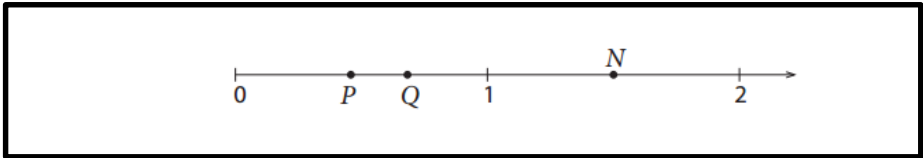
P and Q represent two fractions on the number line.



$P \times Q = N$ . Show the location of N on the number line.

Evaluate this student's answer to the question.

Student's Answer:

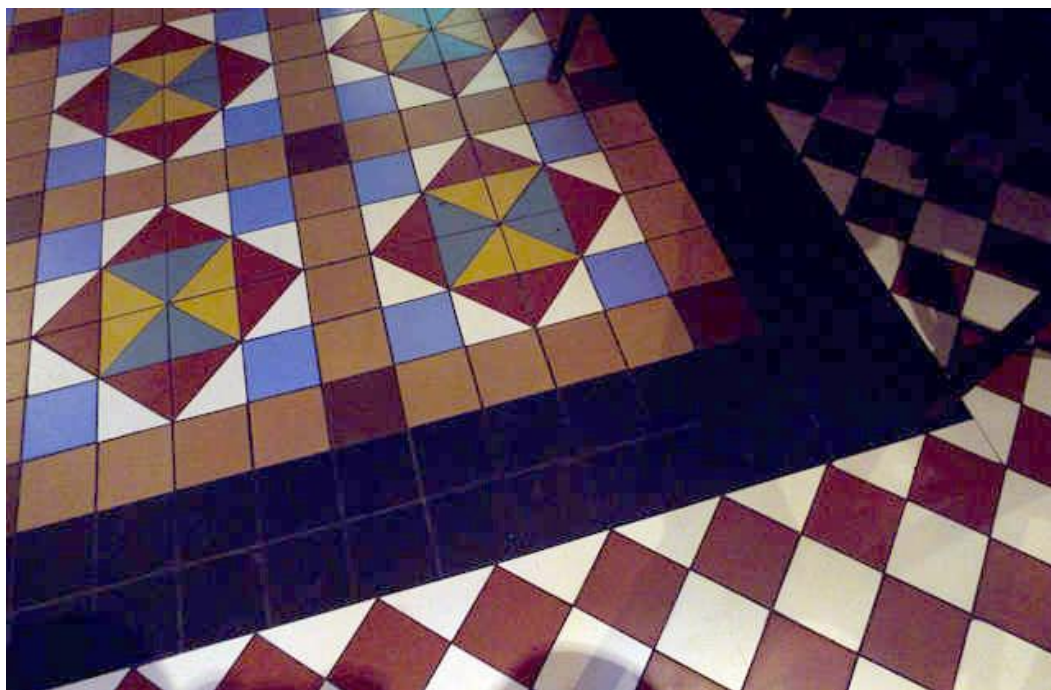


[Source: TIMSS 2011 Assessment. Copyright © 2013 (IEA)]

Rate the question	Easy	Moderate	Difficult

### Question 3

Examine the photograph of this tiled floor and answer the following questions:



*[Source: have you got mathseyes resource pack]*

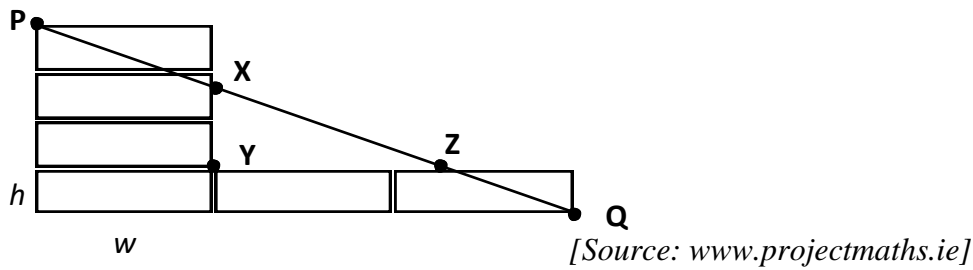
(a) Identify the shapes in this tiled floor

(b) Define each shape

<i>Rate the question</i>	<i>Easy</i>	<i>Moderate</i>	<i>Difficult</i>

Question 4

Six identical rectangles with height  $h$  and width  $w$  are arranged as shown. The line segment  $[PQ]$  intersects the vertical side of one rectangle at  $X$  and the horizontal side of another rectangle at  $Z$ . If the right-angled triangle  $XYZ$  is such that  $|YZ| = 2|XY|$ :



(a) Find the value of  $\frac{h}{w}$

(b) Write a response to this statement: This question is suitable for Junior Certificate Higher Level

Rate the question	Easy	Moderate	Difficult

### Question 5

A teacher gives his/her students the following problem:

*A toy train has 100 cars. The first car is red, the second is blue, the third is yellow, the fourth is green, and the fifth is red and sixth is blue, and so on. What is the colour of the 39<sup>th</sup> car?*

The teacher is moving through the room observing how the students are progressing. S/he stops and points at one student's work and says:

**Teacher:** Why is the 39<sup>th</sup> car yellow?

**Student:** Because the 3<sup>rd</sup> car is yellow and 39 is a multiple of 3.

*[Source: Zazkis, R., Dialogues on Number Theory]*

(a) Identify the student error/misconception in this instance

(b) Outline how you would help the student correct the error/misconception.

<i>Rate the question</i>	<i>Easy</i>	<i>Moderate</i>	<i>Difficult</i>

### Question 6

Ciara is a second year Junior Certificate student with good mathematical ability. She simplifies the following rational algebraic expression correctly:

$$\frac{2x - 1}{2x^2 + 5x - 3}$$

[Source: [www.projectmaths.ie](http://www.projectmaths.ie)]

(a) Show how she does this:

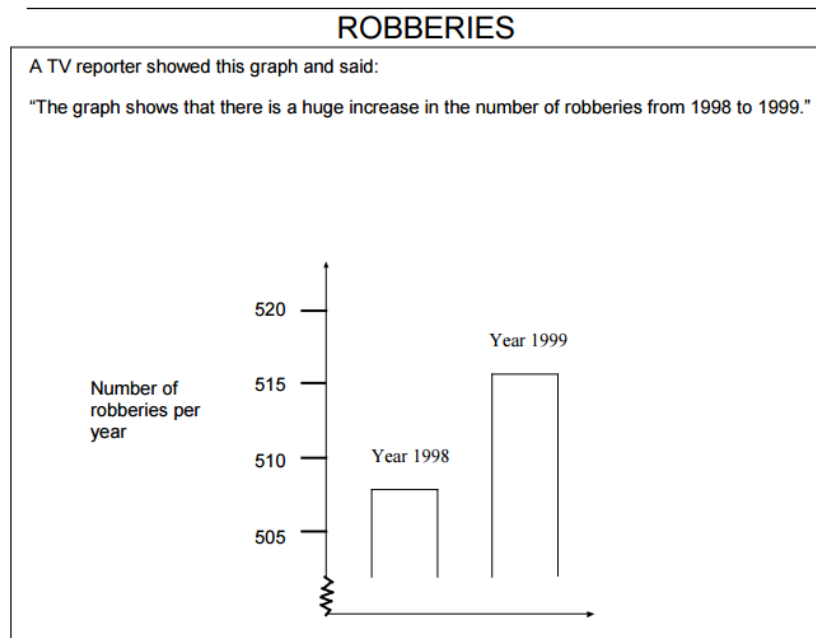
(b) Explain the reason for each step in simplifying the above expression as you would to a student preparing for Junior Certificate Higher Level

<i>Rate the question</i>	<i>Easy</i>	<i>Moderate</i>	<i>Difficult</i>



### Question 7

Read the following:



[Source: Shiel, G. et al, Pisa Mathematics: a Teacher's Guide]

- (a) Represent this data numerically
- (b) Comment on the reasonableness of the reporter's statement using mathematical evidence to support your answer.

<i>Rate the question</i>	<i>Easy</i>	<i>Moderate</i>	<i>Difficult</i>

### Question 8

The following problem appears in a Leaving Certificate Ordinary Level Examination Paper, 2013:

Katie tossed a coin 200 times and threw 109 heads. Joe tossed the same coin 400 times and threw 238 heads. Lucy tossed the same coin 500 times and threw 291 heads.

Lucy uses all the above data and calculates that the best estimate of the probability of throwing a head with this coin is 0.58. Show how Lucy might have calculated this probability

*[Source: SEC, Leaving Certificate Mathematics (Project Maths-Phase 3) Ordinary Level Paper 2]*

One student works through the problem in the following way:

Step 1	Step 2	Step 3
Katie: $\frac{109}{200} = 0.545$  Joe: $\frac{238}{400} = 0.595$  Lucy: $\frac{291}{500} = 0.582$	$0.545 + 0.595 + 0.582$ $= 1.722$	$0.1722 \div 3 = 0.574$  0.58 is an estimate of 0.574

Evaluate this student's method and final answer:

<i>Rate the question</i>	<i>Easy</i>	<i>Moderate</i>	<i>Difficult</i>