Edexcel International AS/A Level Mathematics

Teaching and Learning Strategies: Module 1

First teaching in 2018, first assessment 2019

Pearson Edexcel

Session agenda

10:00	Welcome & introductions
10:05	Overview of exams
10:20	Understanding mark schemes
11:00	How students perform in exams
11:20	What determines performance?
11:55	Summary and a brief look ahead
12.00	Finish

Aims and objectives

Delegates will:

- learn from analysis of how students have performed in examinations to identify those areas of learning which students have found most challenging

- have an opportunity to share best practice of what has worked well with students studying these specifications

- be introduced to a range of teaching and learning strategies particularly applicable to mathematics

- discuss strategies for optimising the learning of students in number, algebra, geometry and statistics

- discuss the implications of that analysis for teaching and learning strategies.

Pearson
Edexcel

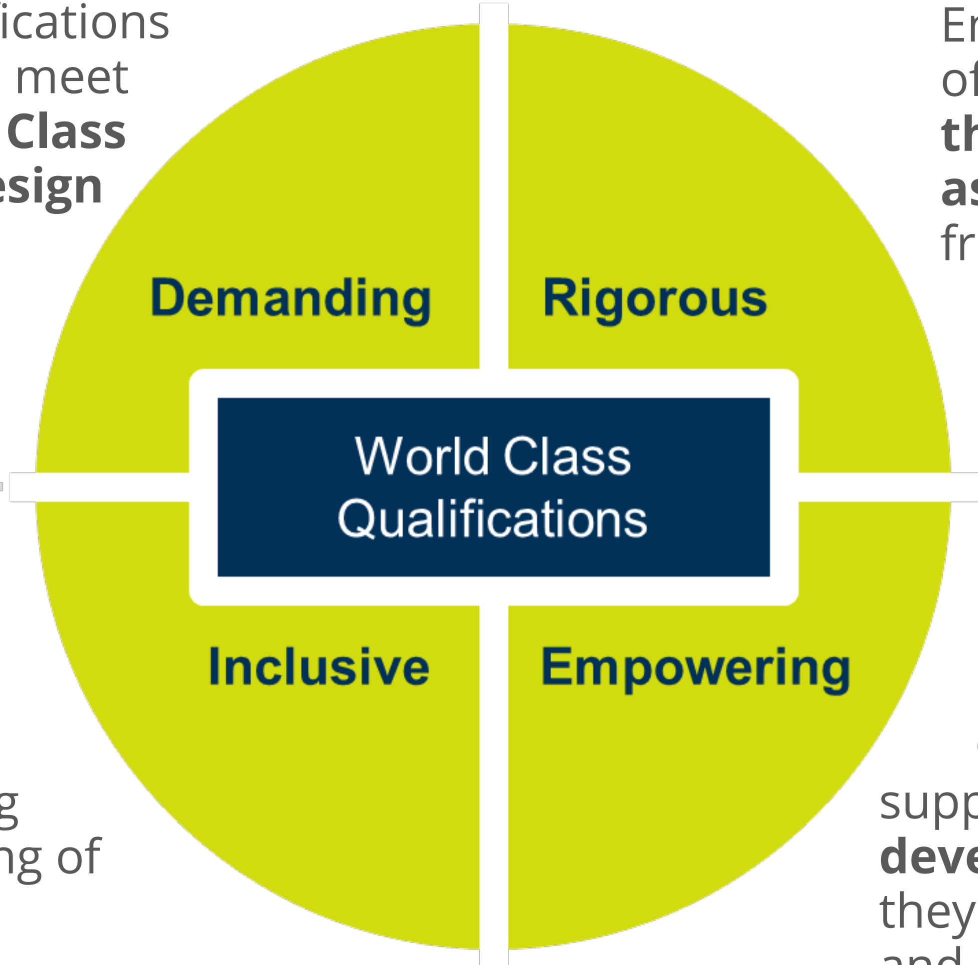
Polls to get to know the delegates

Pearson Edexcel

World Class Qualifications

All Edexcel qualifications are developed to meet Pearson's **World Class Qualification design principles**

Endorsement of educational **thought-leaders and assessment experts** from across the globe



Developed using an understanding and benchmarking of **all educational systems**

Qualifications that support young people to **develop the capabilities** they need to **progress** and prosper in their lives

Pearson edexcel

Support overview

Free support	Getting Started Guide & Scheme of Work	Getting Ready to Teach events	Subject interpretation of transferable skills
	Subject Advisor	**ResultsPlus**	Regional Support Manager
Additional support for selected subjects	**Curriculum Matched Publishing**	Lesson plans	Exemplar Marked Responses
	Topic booklets & Subject guides	Additional SAMs	**examWizard**

Pearson
Edexcel

Examinations

The defining features of an examination are:

Usually 'time' is not a major issue with our maths papers

- content – facts, techniques and concepts
- assessment objectives (AOs) – the means by which the exam is written so that the student demonstrates their ability

5 AOs at A level

3 AOs at International GCSE

International GCSE has also Problem Solving and Mathematical Reasoning as overarching concepts

- demand – roughly how 'hard' the paper is.

Pearson Edexcel

Examinations

Demand is determined by:

- the complexity of elements of knowledge or task – linked to the expectation of the content standards of the qualification level
- the number of steps involved in a response
- the level of familiarity students may have of the content or procedures required
- the predictability of a question – from series to series
- the manner in which marks are awarded
- the use of verbs or command words – clearly a factor – but very dependent on the previous five above.

Pearson Edexcel

Source: Pearson Edexcel Research Department

Examinations

Activity 1

- Look at the questions on the sheet.
- Rank the questions in each set in order of demand, with the lowest demand within each set given 1, the next lowest given 2 and so on.
- One set consists of A level standard questions.
- One set consists of International GCSE standard questions.
- Share the results in the poll and add any comments in Chat.

Pearson
Edexcel

Examinations

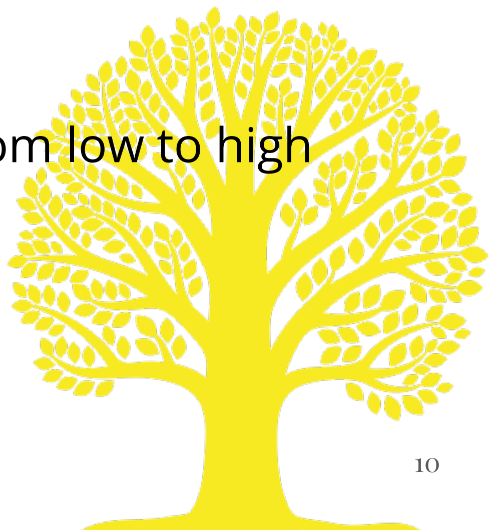
What happens in practice:

- All main content areas are tested nearly every paper.
  All content areas are tested over a short period of time.

- Each paper has AOs allocated roughly the same number of marks as previous papers of the same type.

- Papers are set to cover the full demand range with lower demand generally at the start of the paper but also in the first parts of more complex questions nearer the end of the A level paper.

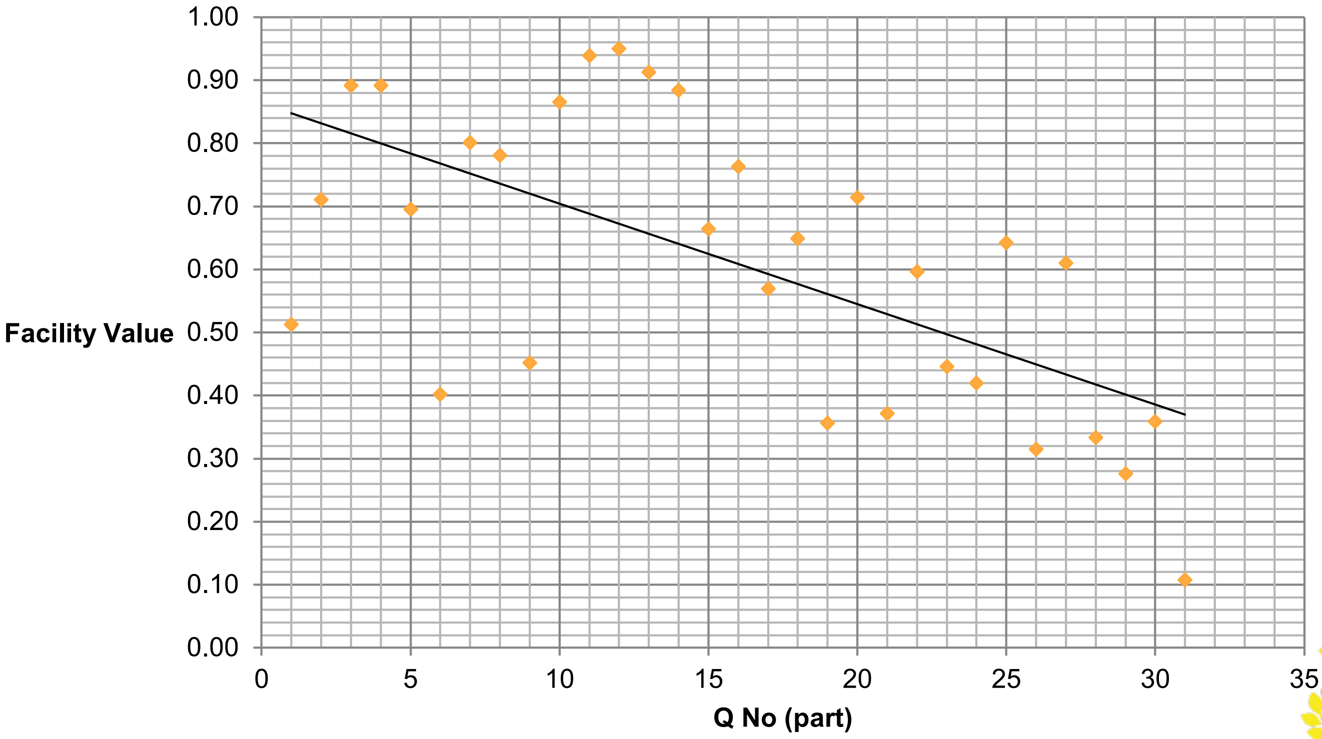
- For International GCSE there is an incline of demand from low to high through the paper.



Pearson Edexcel

Examinations

This shows the facility value of questions from the June 2019 International GCSE paper.



IAL Pure 1, for example, has a similar graph, although less steep.

Pearson Edexcel

Understanding mark schemes

Examinations

- How mark schemes relate to the mathematical task:

The line with equation $y = 4x + c$, where c is a constant, meets the curve with equation $y = x(x - 3)$ at only one point.

(a) Find the value of c.

(4)

(b) Hence find the coordinates of the point of intersection.

(3)

(Total for Question 6 is 7 marks)

Think about the processes involved in doing this question.

Examinations

- $x(x - 3) = 4x + c$
- $x^2 - 3x = 4x + c$
- $x^2 - 7x - c = 0$
- $\Delta = (-7)^2 + 4c = 0$
- $c = -49/4$

- $(x - 7/2)^2 = 0$
- $x = 7/2$
- $y = 7/2\ (7/2 - 3) = 7/4$

5 processes but only 4 marks

3 processes here?

Examinations

- $x(x - 3) = 4x + c$
- $x^2 - 3x = 4x + c$
- $x^2 - 7x - c = 0$ M1
- $\Delta = (-7)^2 + 4c = 0$ dM1, A1
- $c = -49/4$ A1
- ………………………………….
- $(x - 7/2)^2 = 0$ M1
- $x = 7/2$
- $y = 7/2\,(7/2 - 3) = 7/4$ M1 A1 for both values

Examinations mark schemes

- There are various types of marks and processes used to mark Edexcel IAL.
- M marks – for correct methods (as defined by the mark scheme).
- A marks – for accurate and correct answers following a correct method.

So M0A1 can NEVER be awarded

Also to get a method mark, a process must be carried out (describing what you would do does **NOT** get the mark).

Pearson
Edexcel

Examinations

Sometimes at the start of an answer

- Others are:

B marks – unconditional accuracy marks

dM marks – method marks that depend on the award of a previous method mark.

In addition “ “ are used around values to denote answers which may be wrong but are carried through a solution (‘follow through’).

Pearson Edexcel

Examinations

One concept and one process for the first mark

6.(a)	Sets $4x + c = x(x-3)$ and attempts to write as a 3TQ Uses $b^2 = 4ac$ for their $x^2 - 7x - c = 0$ Correct equation $49 = -4c$ or $49 + 4c = 0$ $c = -12.25$ oe	M1 dM1 A1 A1 **(4)**

The first M must be earned

Pearson Edexcel

Examinations

(b)	Attempt to solve $x^2 - 7x - c = 0$ with their c	M1
	Attempt to find the y coordinate for their x coordinate	dM1
	$\left(\frac{7}{2}, \frac{7}{4}\right)$ oe	A1
		(3)

‘Attempt’ - this is defined in the initial notes.

The first M must be earned

Pearson Edexcel

Examinations

How many marks is this worth?

Mark scheme and response is in your delegate pack.

$x(x-3) = 4x + c$

$x^2 - 3x = 4x + c$

$x^2 - 7x - c = 0$

$(-7)^2 - 4c = 0$

$c = 49/4$

$x^2 - 7x - 49/4 = 0$

$x = 8.45$

$y = 8.45(8.45 - 3) = 46.1$

?

Pearson Edexcel

Examinations

How many marks is this worth?

Mark scheme and response is in your delegate pack.

$x(x-3) = 4x + c$

$x^2 - 3x = 4x + c$

$x^2 - 7x - c = 0$ M1

$(-7)^2 - 4c = 0$ dM1 A0

$c = 49/4$ A0

....

$x^2 - 7x - 49/4 = 0$

$x = 8.45$ M0

$y = 8.45(8.45 - 3) = 46.1$ dM0 A0

Pearson Edexcel

Examinations

International GCSE mark schemes are more straightforward, with M, A and B marks, along with the use of inverted commas to denote follow through.

Question	Working	Answer	Mark	Notes
10	$2 \times 3.50 + 4 \times 4.25$ (=24)	216	4	M1
	"24" – 7.60 (=16.4) or $\frac{\text{"24"}}{7.60} \times 100$ (=315.7..)			M1
	$\frac{\text{"16.4"}}{7.6} \times 100$ or "315.7" – 100			M1 for a complete method
				A1 for 215.7 – 216

It's important to know that the follow through on "24" depends on the <u>method</u> in the line above being correct and not just on any old number.

Pearson
Edexcel

Examination performance

Some general advice from the A level papers:

Use of a formula

- Where a method involves using a formula that has been learnt, the advice is that the formula should be quoted first.

Normal marking procedure is as follows:

- **Method mark for quoting a correct formula and attempting to use it, even if there are small mistakes in the substitution of values.**
- Where the formula is not quoted, the method mark can be gained by implication from correct working with values, but may be lost if there is any mistake in the working.

Pearson
Edexcel

Examination performance

Some general advice:

Exact answers

- Examiners’ reports have emphasised that where, for example, an exact answer is asked for, or working with surds is clearly required, marks will normally be lost if the candidate resorts to using rounded decimals.

Answers without working

- The rubric says that these may not gain full credit. Individual mark schemes will give details of what happens in particular cases. General policy is that if it could be done ‘in your head’, detailed working would not be required.

Examination performance

For International GCSE the situation is similar but the conditions for showing working can be more stringent.

The key phrases are:

Show clear algebraic working – solving equations

Show your working clearly – solving problems
operations with fractions
operations with surds
expressing a number as the product of its prime factors

In all these cases, if full working is not shown then **NO** marks will be awarded.

Pearson
Edexcel

Examination performance

23 Boris has a bag that only contains red sweets and green sweets.

Boris takes at random 2 sweets from the bag.

The probability that Boris takes exactly 1 red sweet from the bag is $\frac{12}{35}$

Originally there were 3 red sweets in the bag.

Work out how many green sweets there were originally in the bag.
Show your working clearly.

June 2019 2H

Students were required to use an algebraic approach to answer this question.
Trial and error, even if shown, was not acceptable.

Pearson
Edexcel

Examinations

Activity 2

- Use the mark scheme provided to mark these samples of students' work.

- There are two questions from a recent Pure A level paper and one from a recent International GCSE paper.

Pearson Edexcel

Examinations

Activity 2 answers

The actual marks given were:

Q3			Q8			
A	B	C	D	E	F	G
3	3	1	2, 4	2, 1	1, 4	2,4

Q5		
I	J	K
5	3	2

How students perform in exams

Pearson Edexcel

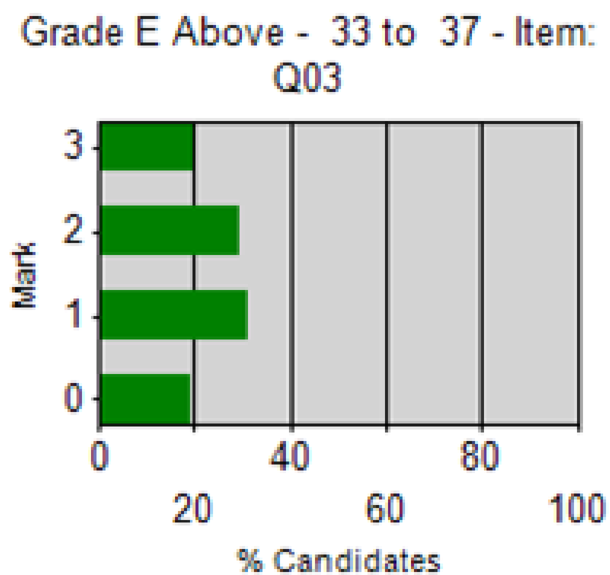
Examination performance

Q03

Mark	No Candidates	% Candidates
0	42	19.4%
1	67	31.0%
2	64	29.6%
3	43	19.9%
Total	216	

Many students at this level made a good attempt… but nobody scored full marks

Mean = 1.5



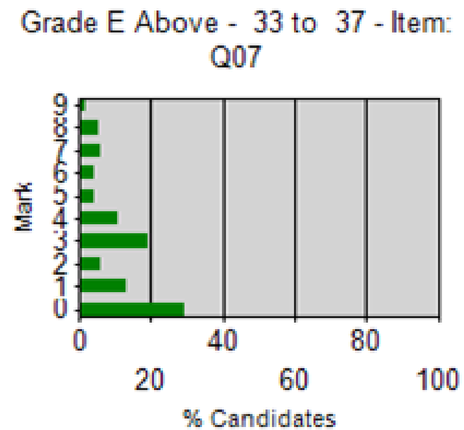
June 2019
Pure paper 2

Pearson
Edexcel

Examination performance

Q07

Mark	No Candidates	% Candidates
0	63	29.2%
1	29	13.4%
2	13	6.0%
3	42	19.4%
4	23	10.6%
5	9	4.2%
6	9	4.2%
7	13	6.0%
8	11	5.1%
9	4	1.9%
Total	216	



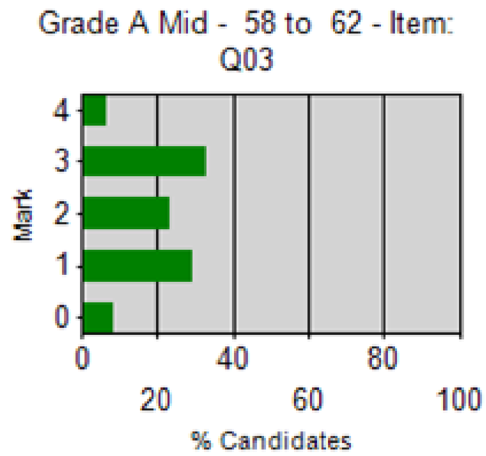
But found it harder here…

Mean = 2.72

Examination performance

Q03

Mark	No Candidates	% Candidates
0	46	8.2%
1	165	29.5%
2	130	23.2%
3	184	32.9%
4	35	6.3%
Total	560	



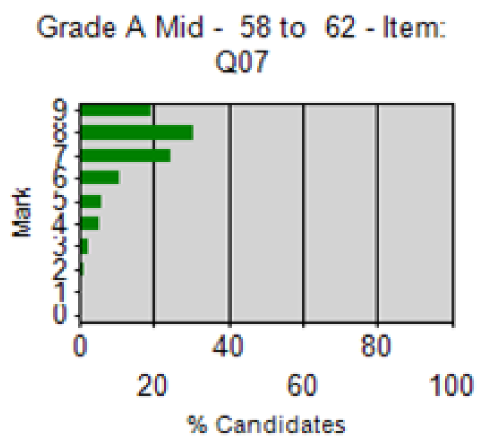
Grade A students did this…

Mean = 1.99

Examination performance

Q07

Mark	No Candidates	% Candidates
0	1	0.2%
1	4	0.7%
2	6	1.1%
3	12	2.1%
4	31	5.5%
5	32	5.7%
6	59	10.5%
7	138	24.6%
8	171	30.5%
9	106	18.9%
Total	560	



...and did this

Mean = 7.10

Pearson
Edexcel

Examination performance

The situation is very different for International GCSE.

The paper is designed so that the earliest questions (about 40 marks) are set at grades 4 and 5. After that, the questions are set at increasingly higher grades so that there is little chance for scoring further marks unless a student has grade 7 ability (say).

Pearson Edexcel

Examination performance

Mistakes students make that lose marks at A level:

4. Find

$$\int \frac{4x^2 + 1}{2\sqrt{x}}\,dx$$

giving the answer in its simplest form.

(5)

Just take a minute to work through this question taken from paper 1 June 2019.
What mistakes did students make?

Pearson
Edexcel

Examination performance

Here is an extract from the principal examiner's report which shows the two most common errors.

- $\dfrac{4x^2+1}{2\sqrt{x}} = 4x^2 + \dfrac{1}{2}x^{-\frac{1}{2}}$
- $\dfrac{4x^2+1}{2\sqrt{x}} = \left(4x^2+1\right)2x^{-\frac{1}{2}} = 8x^{\frac{3}{2}} + 2x^{-\frac{1}{2}}$

Another error was to omit the constant of integration +c.

Pearson Edexcel

Examination performance

Activity 3

- Make a list of common errors that students often make at A level…

- …and/or for International GCSE.

- There are lots, but try and get a minimum of five.

Examination performance

Some common misconceptions which often appear in examiner reports (at A level):

- Mishandling powers
- Cancelling in equations instead of factorising $x^2 = 3x$ so $x = 3$
  $2\sin^2 x = \sin x \cos x$ so $2 \sin x = \cos x$
- Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$ evaluated ignoring Bidmas
  rearranged incorrectly to $\cos A =$
- Sine rule – obtuse angle answer not recognised as being needed
- Differentiation – confusing with integration
  $y = x^2 + k^2$ so $y' = 2x + 2k$
  $y = a^x$ so $y' = xa^{x-1}$
- Integration – omitting the $+c$ especially in DEs

$$\int \frac{1}{(x-a)^n}\,dx = \log(x-a)^n$$

Pearson
Edexcel

Examination performance

…and possibly how to avoid these misconceptions (1)

Build awareness of these into planning lessons:

e.g. Write reciprocals as powers e.g.. 1/4x $= x^{-1}/4$ *

Relate graphs of $y = x^2$ to graphs of $y = ax^2 + bx + c$*
Link repeated roots with tangency and show it

Ensure the use of the quadratic formula <u>correctly</u> – a common error is that the −b drifts away from the square root *

Also that their calculator probably works out -3^2 as -9*

Desmos is a free graphics program that students can access https://www.desmos.com/calculator

Similar points can be made for each unit (this one is Pure 1) by using examiner reports and the Edexcel SOW.

The * denotes that this happens at International GCSE too.

Examination performance

…and possibly how to avoid these misconceptions (2)

Build awareness of these into planning lessons:

Simultaneous equations, one quadratic – look at relationship with the graphs.

How does the number of solutions vary?

Successful students substitute and check in the original equations. *

When solving quadratic equations be clear about the range –

$$2x^2 - 17x + 36 < 0 \Rightarrow \quad x < 4.5, x < 4$$

Check mode of calculator at the start of every test *

Make links $2x^2 - 17x + 36 = 0$ and $2y^4 - 17y^2 + 36 = 0$ *

Pearson Edexcel

Examination performance

Some common misconceptions which often appear in examiner reports (at International GCSE level):

Mishandling powers $(2a^2b^3)^{-1}$

Cancelling in simultaneous equations instead of subtracting

$6x - 3y = 10$
$5x - 3y = 12$
$11x = 22$

All sorts of sign errors with brackets and especially fractions

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$
evaluated ignoring BIDMAS

Examination performance

Looking in greater detail we see these types of errors on questions set at around the grade 4/5 level.

Mishandling negative numbers	$a = -3$, $b = 4$ so $a^2b = -36$
Expanding brackets	$(m - 5)(m + 8) = m^2 + 3m - 3$
	$2(2y + 3) - 3(y + 1) = y + 9$
Linear equations	$8t + 8 = 3t - 3$ so $5t = 5$
Algebraic notation	$2 \times n + 1$ instead of $2(n + 1)$

Pearson Edexcel

Examination performance

The following example of a grade 4 question is very instructive.

Line **L** has equation $y = 2 - 3x$

(c) Does the point with coordinates (100, −302) lie on line **L**?
You must give a reason for your answer.

$y = 2 - 3(100)$

$y = 2 - 300$ NO

$y = 298$

(c) Does the point with coordinates (100, −302) lie on line **L**?
You must give a reason for your answer.

NO because $302 \div 3 = 100.67$ which is not a whole number

No

$y = 2 - 3x$

$\neq 2 - 3(100)$

(-302)

(1)

(Total for Question 1 is 4 marks)

Pearson
Edexcel

What determines performance?

Examination performance

What makes a question difficult?

One feature is familiarity.

If a student recognises a question as being like one which they have seen and understood before, they are more likely to get it correct.

This is particularly true for problems.

Examination performance

Look at these two examples, both considered grade 8 or 9 at International GCSE.

21 The functions f and g are such that

$$f(x) = x^2 - 2x \qquad g(x) = x + 3$$

The function h is such that $h(x) = fg(x)$ for $x \geqslant -2$

Express the inverse function $h^{-1}(x)$ in the form $h^{-1}(x) = \ldots$

Jan 4MA1 paper 1H

24

The function g is such that $g(x) = 2x^2 - 20x + 9$ where $x \geqslant 5$

(b) Express the inverse function g^{-1} in the form $g^{-1}(x) = \ldots$

June 4MA1 paper 2H

Pearson Edexcel

Examination performance

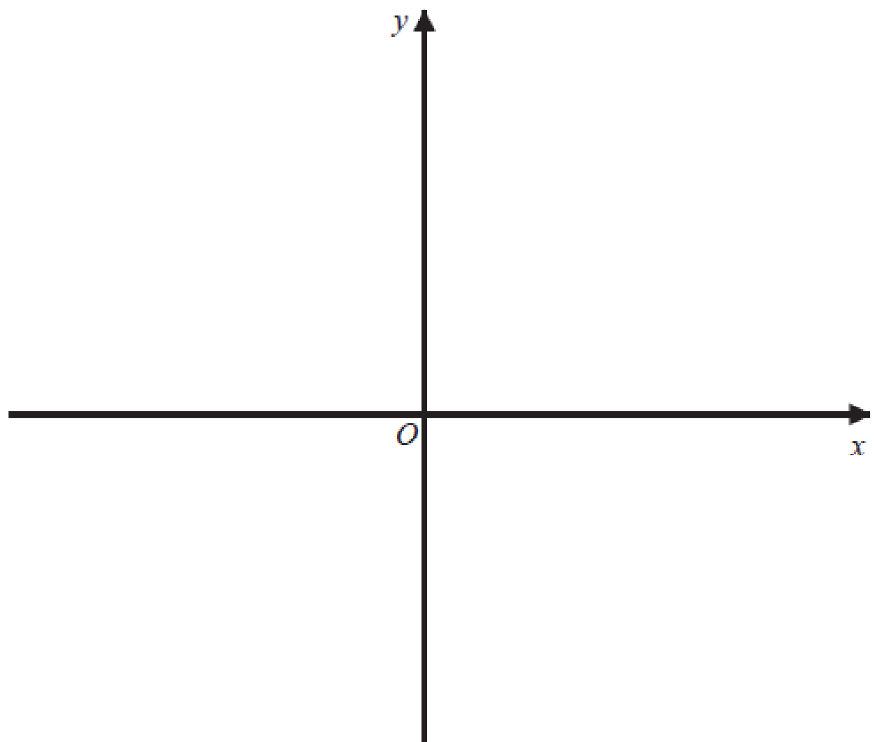
However, students were not able to make the link between this question…

20 The curve C has equation $y = 4(x - 1)^2 - a$ where $a > 4$

Using the axes below, sketch the curve **C**.
On your sketch show clearly, in terms of a,

(i) the coordinates of any points of intersection of **C** with the coordinate axes,

(ii) the coordinates of the turning point.



Jan 4MA1
paper 1H

Pearson
Edexcel

Examination performance

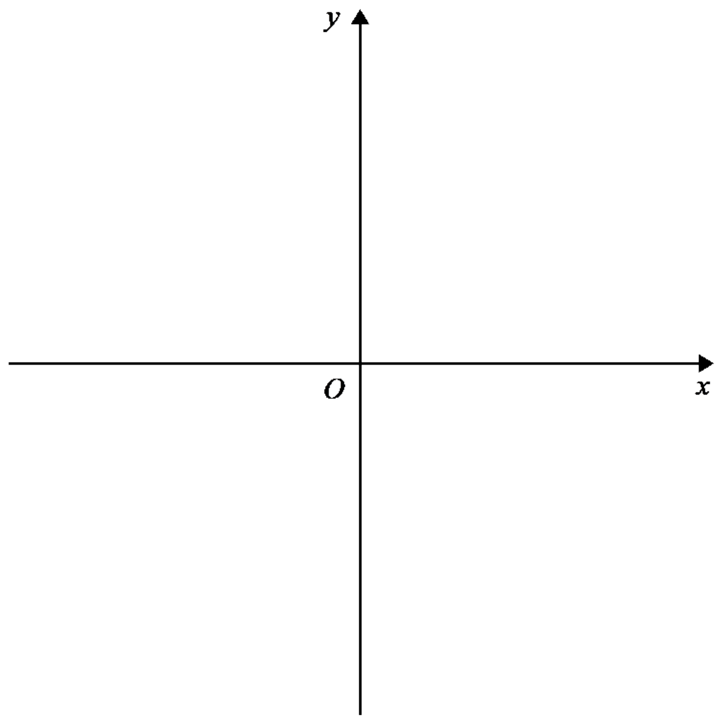
…and this one…

The curve C has equation $\quad y = x^2 - 6x + 4$

Using the axes below, sketch the curve C.
On your sketch show clearly

(i) the exact coordinates of any points of intersection of C with the coordinate axes,

(ii) the coordinates of the turning point.

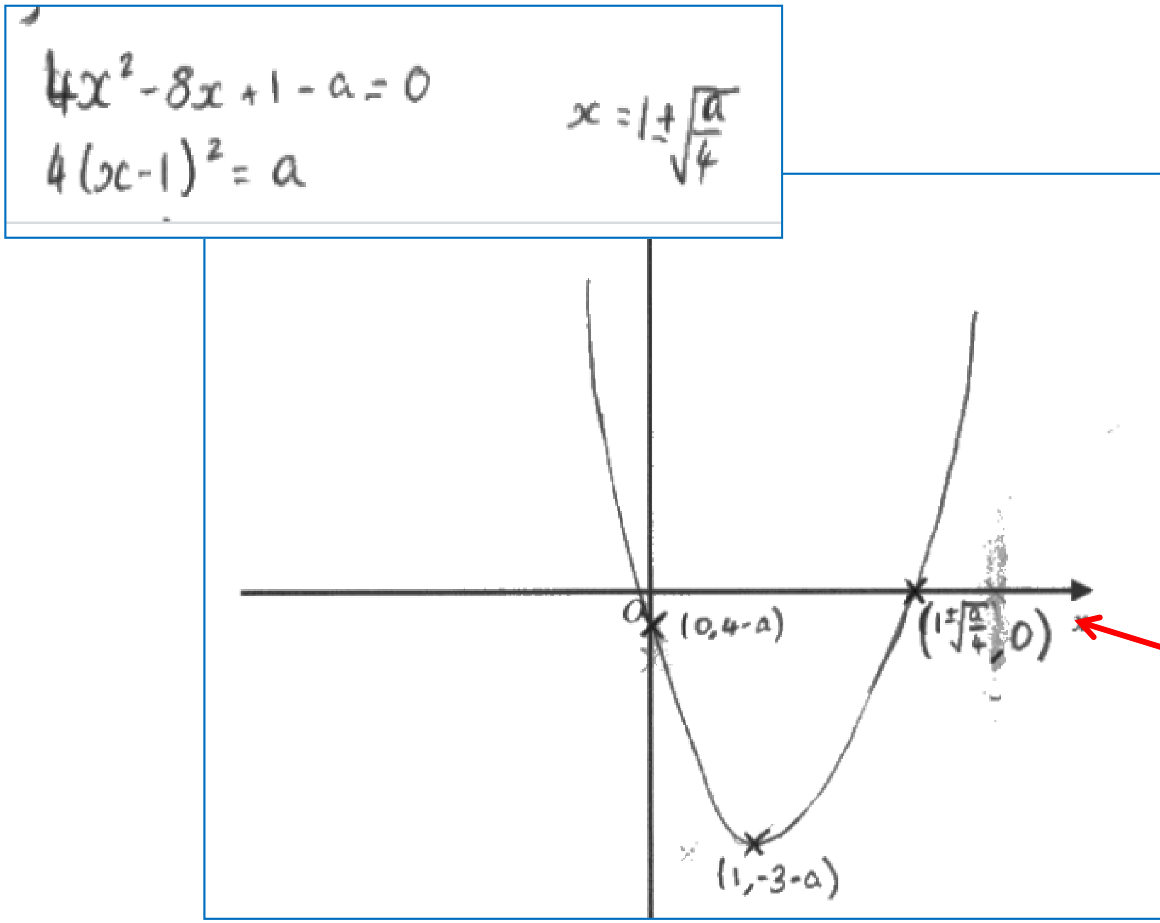


Problem solving and reasoning practice papers

Pearson
Edexcel

Examination performance

Some students had a good idea of what to do…



This good response came from use of calculus (so <u>familiar</u> from many past papers) rather than knowledge of the graphs of quadratic functions.

Even so, there must be a fundamental misunderstanding for them to write this.

Examination performance

Another determiner of demand is the number of steps involved in a response.
This question was set at grade 4. It is clearly a multi-step problem.

5 120 children go on an activity holiday.
The ratio of the number of girls to the number of boys is 3 : 5

On Sunday, all the children either go sailing or go climbing.

$\frac{16}{25}$ of the boys go climbing.

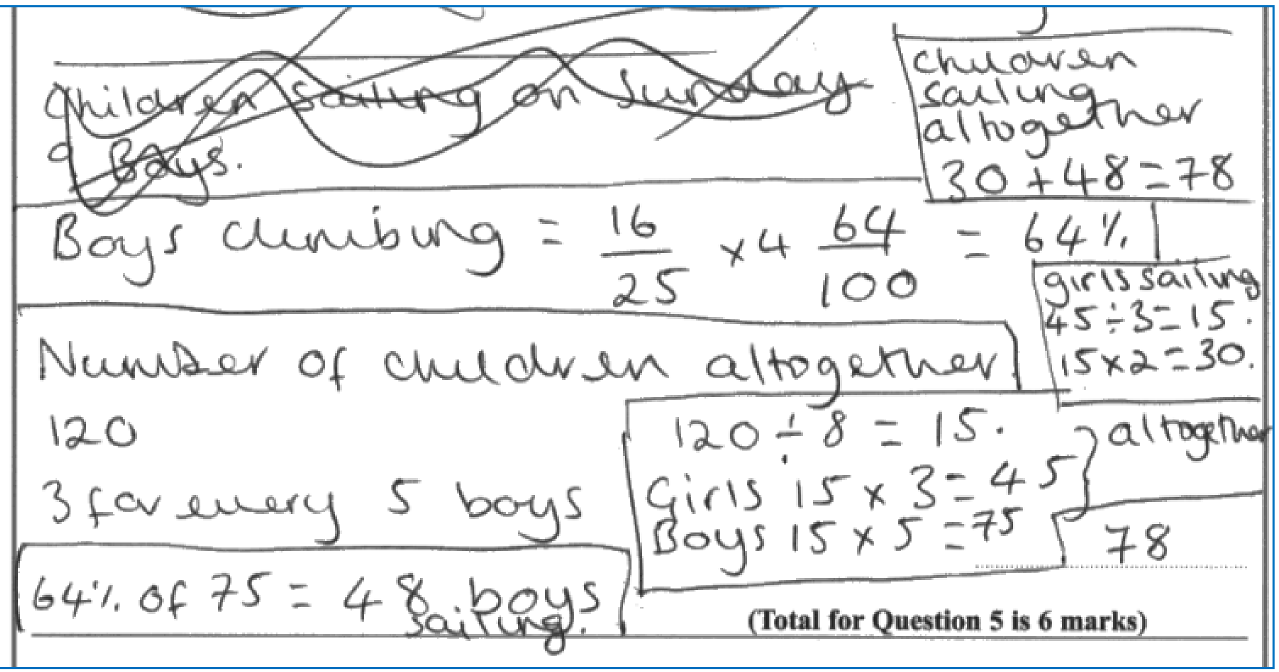
Twice as many girls go sailing as go climbing.

Work out how many children go sailing on Sunday.

Think about the steps needed to get an answer…
and also the mathematical skills required.

Examination performance

Another determiner of demand is the number of steps involved in a response.


~~Children sailing on Sunday 9 Boys.~~

Children sailing altogether $30+48=78$

Boys climbing $= \frac{16}{25} \times 4 \; \frac{64}{100} = 64\%$

girls sailing $45 \div 3 = 15.$ $15 \times 2 = 30.$

Number of children altogether

120

3 for every 5 boys

$120 \div 8 = 15.$

Girls $15 \times 3 = 45$

Boys $15 \times 5 = 75$

altogether

78

64% of 75 = 48 boys sailing.

(Total for Question 5 is 6 marks)

The student carries out all of the technical aspects…

...however, fails to keep track of how their answers relate to the problem.

(Many students were even poorer, only writing down calculations.)

Pearson Edexcel

Examination performance

Another determiner of demand is the number of steps involved in a response.

Mechanics questions often have several steps to carry out.

2.

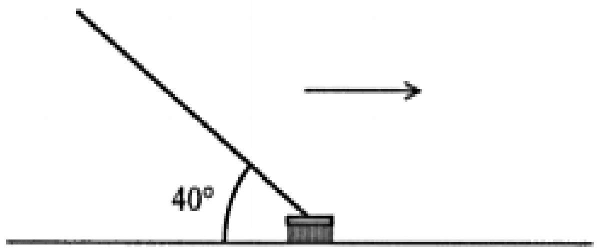


Figure 1

A broom is being used to sweep a rough horizontal floor. The handle of the broom makes a constant angle of 40° with the horizontal, as shown in Figure 1. The broom head is modelled as a particle of mass 0.5 kg and the handle of the broom is modelled as a light rod. The coefficient of friction between the broom head and the floor is $\frac{1}{4}$. The broom head is pushed along the floor in a straight line at constant speed. Find the magnitude of the force that is being applied along the handle of the broom to the broom head.

(6)

Mechanics 1 June 2019

Think what steps are needed to answer this question.

Pearson Edexcel

Examination performance

Another determiner of demand is the number of steps involved in a response.

2)

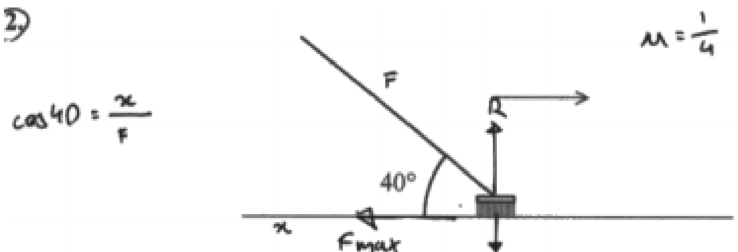


Figure 1

A broom is being used to sweep a rough horizontal floor. The handle of the broom makes a constant angle of 40° with the horizontal, as shown in Figure 1. The broom head is modelled as a particle of mass 0.5 kg and the handle of the broom is modelled as a light rod. The coefficient of friction between the broom head and the floor is $\frac{1}{4}$. The broom head is pushed along the floor in a straight line at constant speed. Find the magnitude of the force that is being applied along the handle of the broom to the broom head.

(6)

CONSTANT SPEED $\therefore a = 0\ \text{ms}^{-2}$ AND $(\uparrow +)\ R - 0.5g - F\sin 40 = 0$

$R = 0.5g + F\sin 40$ 1

$F = ma$

$(\overset{+}{\rightarrow})\ F\cos 40 - F_{max} = 0.5(0)$ 2

$F\cos 40 - \mu R = 0$ 3

$F\cos 40 - \frac{1}{4}(0.5g + F\sin 40) = 0$

$F\cos 40 - \frac{1}{8}g - \frac{F}{4}\sin 40 = 0$

$F\sin 40 = 4F\cos 40 - \frac{1}{2}g$

$F = \dfrac{4F\cos 40 - \frac{1}{2}g}{\sin 40}$

This type of (quite familiar) question needs 3 equations to be written down, followed by elimination of variables to leave F the force in the handle.

The first stages are carried out correctly but then the student cannot rearrange the equation.

Pearson Edexcel

Examination performance

2.

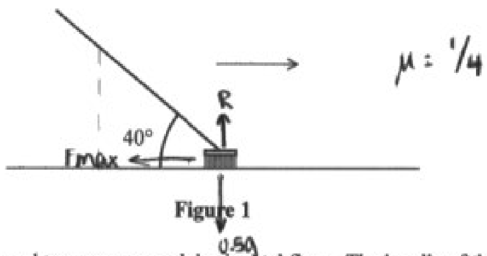


Figure 1

A broom is being used to sweep a rough horizontal floor. The handle of the broom makes a constant angle of 40° with the horizontal, as shown in Figure 1. The broom head is modelled as a particle of mass 0.5 kg and the handle of the broom is modelled as a light rod. The coefficient of friction between the broom head and the floor is $\frac{1}{4}$. The broom head is pushed along the floor in a straight line at constant speed. Find the magnitude of the force that is being applied along the handle of the broom to the broom head.

(6)

~~$(\rightarrow +)$ $-Fmax - 0.5$~~

$(\uparrow +)$ ~~$R - 0.5g = 0$~~

~~$R = 0.5g$~~

~~$R = 4.9$~~

$R - 0.5g - R\sin 40 = 0$

$R - R\sin 40 = 4.9$

$R = 4.9 + R\sin 40$

~~$Fmax = \mu \times R$~~

~~$Fmax = 1/4 \times 4.9 + R\sin 40$~~

~~$Fmax = 1.2 + 0.16R$~~

$Fmax = R\sin 40$

$R\sin 40 = \mu \times R$

$R\sin 40 = 1/4\,(4.9 + R\sin 40)$

$R\sin 40 = 1.2 + 0.16R$

In this case, the crossed-out work hints that the student had not thought carefully enough.

They would have had a better start if they had fully labelled the forces in the diagram.

They might not then have written down an incorrect equation.

$Fmax = R\sin 40$

$R\sin 40 = \mu \times R$

$R\sin 40 = 1/4\,(4.9 + R\sin 40)$

$R\sin 40 = 1.2 + 0.16R$

$0.64R = 1.2 + 0.16R$

$1.2 + 0.16R - 0.64R = 0$

$1.2 = 0.48R$

$R = 2.5$

Examination performance

5. (a) Find, using algebra, all real solutions of

$$2x^3 + 3x^2 - 35x = 0$$

(3)

(b) Hence find all real solutions of

$$2(y-5)^6 + 3(y-5)^4 - 35(y-5)^2 = 0$$

(4)

a) $2x^3 + 3x^2 - 35x = 0$

$x(2x^2 + 3x - 35) = 0$

$2x^2 + 10x - 7x - 35 = 0$

$2x(x+5) - 7(x+5) = 0$

$(2x-7)(x+5) = 0$

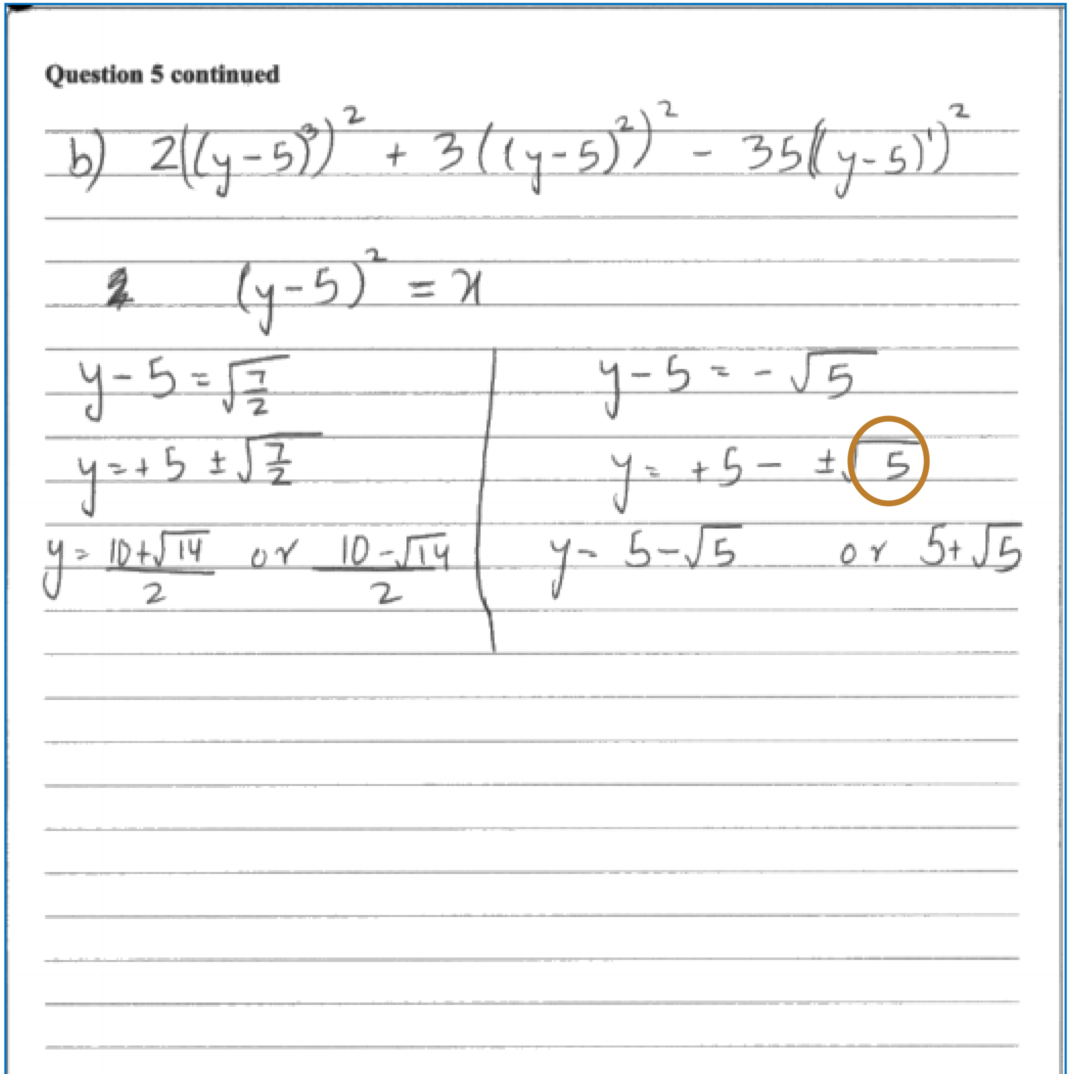
$x = \frac{7}{2}$ or $x = -5$

Factored, but then not used as the solution $x = 0$

Finally June 2019, Pure paper 1

Part (a) is not classified as a problem, but part (b) does require some original thought – even with the 'hence'.

Examination performance



Question 5 continued

b) $2((y-5)^{3})^{2} + 3((y-5)^{2})^{2} - 35((y-5)^{1})^{2}$

$(y-5)^2 = x$

$y-5 = \sqrt{\frac{7}{2}}$ $\qquad$ $y-5 = -\sqrt{5}$

$y = +5 \pm \sqrt{\frac{7}{2}}$ $\qquad$ $y = +5 - \pm\sqrt{5}$

$y = \frac{10+\sqrt{14}}{2}$ or $\frac{10-\sqrt{14}}{2}$ $\qquad$ $y = 5-\sqrt{5}$ or $5+\sqrt{5}$

June 2019, Pure paper 1

The student does make the connection with part (a), but is let down (again) by poor technique.

Examination performance

Mathematical reasoning:

- an overarching concept in International GCSE
- a specific assessment objective (AO2) in A level.

A key idea in mathematical reasoning is communication.

Often the student has to establish a result that is given, so it is very important that every step is shown.

Pearson
Edexcel

Examination performance

Mathematical reasoning:

We looked at this example earlier on…

Line **L** has equation $y = 2 - 3x$

(c) Does the point with coordinates $(100, -302)$ lie on line **L**?
You must give a reason for your answer.

No

$y = 2 - 3x$

$\neq 2 - 3(100)$

(-302)

(1)

(Total for Question 1 is 4 marks)

This is incomplete because the calculation has not been carried out.

Examination performance

Mathematical reasoning:

...and at this example...

2. Answer this question showing each stage of your working.

(a) Simplify $\dfrac{1}{4-2\sqrt{2}}$

giving your answer in the form $a + b\sqrt{2}$ where a and b are rational numbers.

(2)

2.(a)	$\dfrac{1}{4-2\sqrt{2}} = \dfrac{1}{4-2\sqrt{2}} \times \dfrac{4+2\sqrt{2}}{4+2\sqrt{2}}$	M1
	$= \dfrac{4+2\sqrt{2}}{16-8} = \dfrac{1}{2} + \dfrac{1}{4}\sqrt{2}$ oe	A1

This step, or equivalent, MUST be shown

This is incomplete because the calculation has not been carried out.

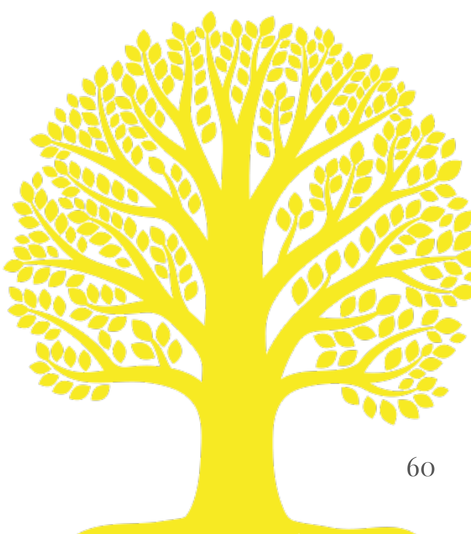
Pearson Edexcel

Examination performance

Activity 4

There are six student responses for delegates to look at:

- three from a Pure 1 paper
- three from a Mechanics 1 paper
- In each case, answer the questions on the responses sheet so that they can be anonymously shared.
- Questions and mark schemes are available in your pack, but you are not required to mark the responses.
- Record your own responses on the delegate response sheet.



Examination performance

Activity 4 outcomes

A (a) is good – does not understand how (b) links with (a); one correct answer, one wrong.

B Loses x = 0 in (a); Starts well with (b) but then fails to solve the resulting 3TQs.

C Loses x = 0 in (a); Does make the connection in (b) and solves the 3TQ correctly but will have lost 2 marks. Of course they did not have to do part (a) all over again.

Pearson Edexcel

Examination performance

Activity 4 outcomes

D Starts off with with a good labelled diagram. Equations are correct (has run 3 into 2) and manipulation good.

E Good labelled diagram. Equations are correct. (Has run 3 into 2) and manipulation good.

F Diagram was not labelled. Confused the weight of the body with the force in the handle. Introduces an *x* and an *a* and then ignores them.

Pearson Edexcel

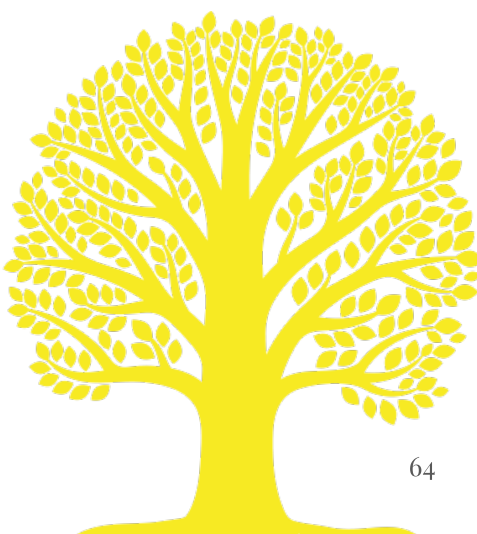
Summary

Pearson
Edexcel

Summary

In this module we have looked at:

- how mark schemes work
- how some students go about answering questions
- some common errors in techniques students use
- some issues with mathematical problems
- errors in mathematical reasoning.



Summary

In the next module we shall look at ways to raise student achievement by using the range of Pearson resources available to our centres:

- the Maths Emporium
- examiner reports
- ResultsPlus
- examWizard
- Access to Scripts.

Pearson
Edexcel

ALWAYS LEARNING