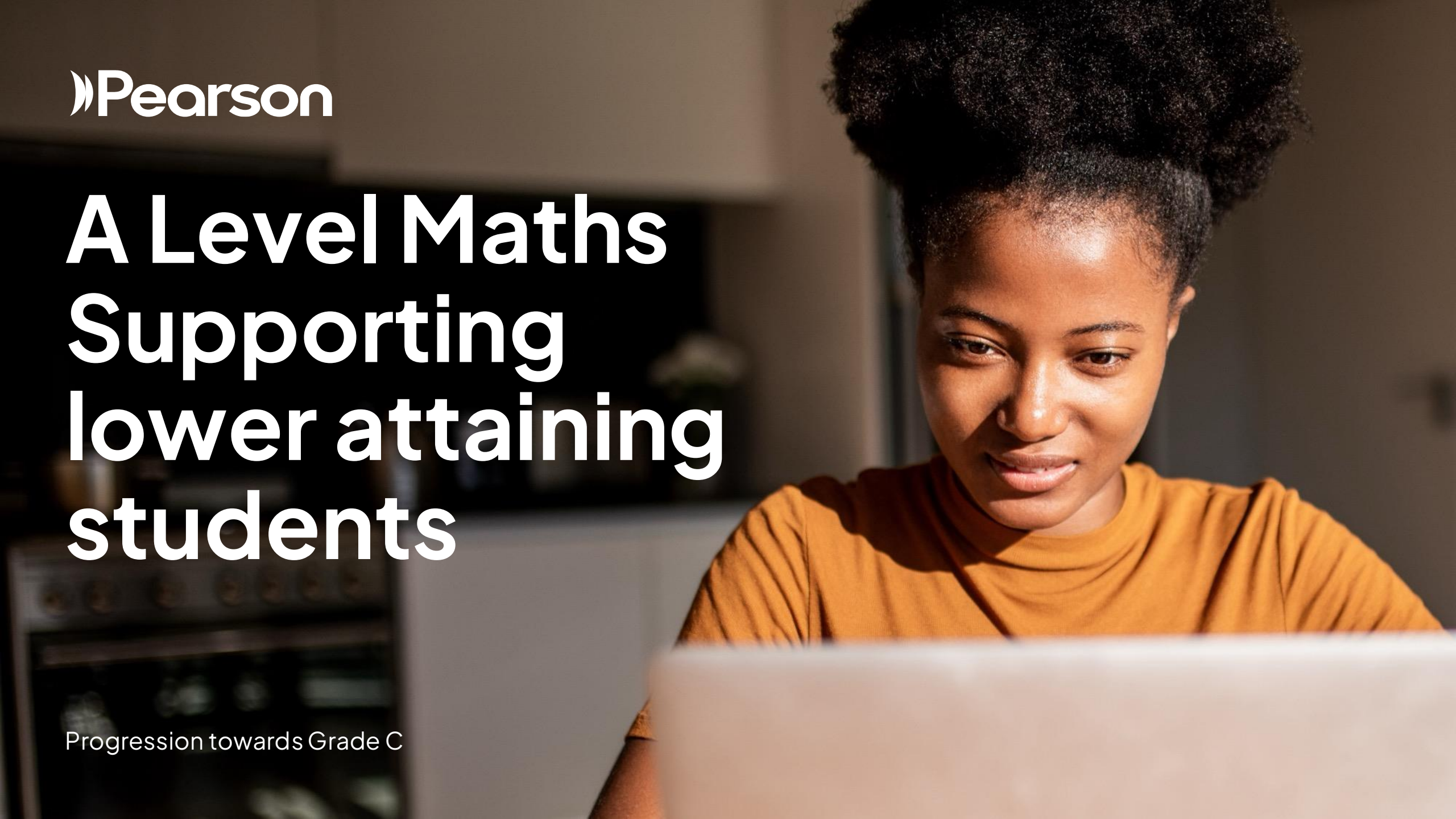


Pearson

A Level Maths Supporting lower attaining students

Progression towards Grade C

Agenda

01

Supporting transition from GCSE

02

Making a positive start to Year 12

03

Supporting students to access content

04

Effective exam preparation

01

Supporting transition from GCSE

The most effective support starts before Year 12

Who are your students?	What are their academic goals, their personal motivations and individual circumstances?
Who supports them at home?	What does your student's support network outside of school look like?
How can we support them now?	Having a clear and structured programme to engage students and families and support their transition from GCSE to A Level

Goals

Support pack

- KEEPING A TRACK

September 2025 intake A Level Maths Tracker

Name	Prev. school/class	Predicted GCSE grade	Actual GCSE grade	Further Maths?	SEND	SEND support	Pastoral	Pastoral support	1-1 notes	Other subjects	Info evening attended?	Transition support pack provided	Transition work submitted	Calc	Textbook
Amelie Andrews	11X1 (VJW)	8		Y					Excited for Further Maths. Aim is to study biosciences at uni. Confident in ability to work independently. Good support at home (mum did A Level maths).	Further Maths Biology Chemistry	Y	Further Mathematician			
Bobby Briggs	11X1 (VJW)	8			ASD	See one page profile	Y	Mentor (Mr Hall) Student Support Centre	Worried about change and how he will need to organise his work. Very capable but will need help with staying on top of workload in an organised way. Friends with Glyn. Not sure what he wants to do after Y13 yet. Good support at home.	Physics Geography	Y	Confident Mathematician			
Charlie Collins	Bridgewood Academy	9		Y							N	Further Mathematician			
Dylan Dobbs	11Y1 (AWI)	7					Y	Attendance low. HoY and attendance officer monitoring.	Maths is best subject, feels confident in maths lessons. Spoke about attendance and impact of missing even one A level lesson. Aim is to get onto engineering appreticeship. Not very forthcoming about support at home, did say he does all work off his phone.	Design Tech Psychology	N	Developing Mathematician			
Esther Edge	Bridgewood Academy	6			Dyslexia	Needs non-white background. Uses overlay.			Phone chat with Esther and dad. Excited to come here in September. Aim is to work in the health and sports industry in some way (e.g. sports scientist/physiotherapist). Confident in managing dyslexia, requested any displays/powerpoints have non-white background. Home are supportive although not confident about helping with the maths having only ever done GCSE level.	PE Psychology	Y	Developing Mathematician			

Transition to A Level – Support Packs

DEVELOPING MATHEMATICIAN

Goal:
Work towards mastery of key skills from GCSE

- Transition worksheets
- Free videos to assist the transition from GCSE to A level Maths | Pearson UK
- Provide all students with a blank workbook. Tell them to write any maths they do over the summer in it and bring it in on Day 1 in September.

CONFIDENT MATHEMATICIAN

Goal:
Extend mastery of key skills from GCSE through problem-solving

- Level 2 Extended Maths Certificate resources and past papers
- Intermediate or Senior Maths Challenge past papers

FURTHER MATHEMATICIAN

Goal:
Use connections from GCSE to explore relevant A Level content

- Rich task investigations (nrich)
- Underground Maths investigations
- Senior Maths Challenge past papers

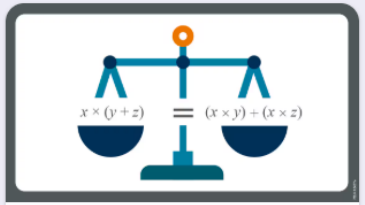
- 02 TRANSITION WORKSHEETS – MATHS EMPORIUM

Category: 02 Transition Worksheets

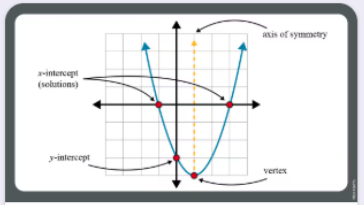
A series of worksheets to help students make the transition form GCSE to GCE AS and A level.

- 00 All GCSE to GCE Transition Worksheets.zip
- 1a-1 Expanding brackets and simplifying expressions.docx
- 1a-2 Surds.docx
- 1a-3 Rules of Indices.docx
- 1b-1 Factorising expressions.docx
- 1b-2 Completing the square.docx
- 1b-3 Solving quadratic equations.docx
- 1b-4 Sketching quadratic graphs.docx
- 1c-1 Solving linear simultaneous equations.docx
- 1c-2 Solving linear and quadratic simultaneous equations.docx
- 1c-3 Solving simultaneous equations graphically.docx
- 1d-1 Linear inequalities.docx
- 1d-2 Quadratic inequalities.docx
- 1e Sketching cubic and reciprocal graphs.docx
- 1f Translating graphs.docx
- 2a-1 Straight line graphs.docx
- 2a-2 Parallel and perpendicular lines.docx
- 2a-3 Pythagoras theorem.docx
- 2a-4 Proportion.docx
- 2b Circle theorems.docx
- 4a Trigonometry.docx
- 6a Rearranging equations.docx
- 6b Volume and surface area of 3D shapes.docx
- 7b Area under a graph.docx

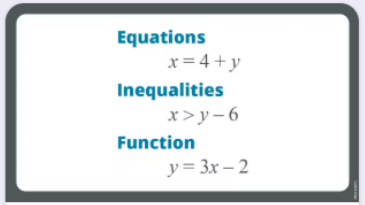
- [FREE VIDEOS TO ASSIST THE TRANSITION FROM GCSE TO A LEVEL MATHS | PEARSON UK]



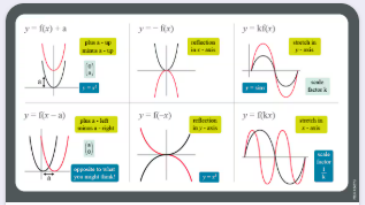
Chapter 1 - Algebraic expressions



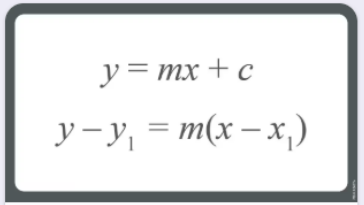
Chapter 2 - Quadratics



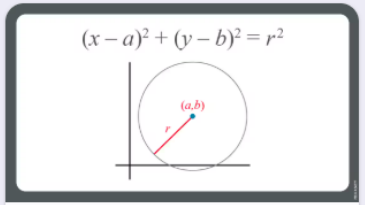
Chapter 3 - Equations and inequalities



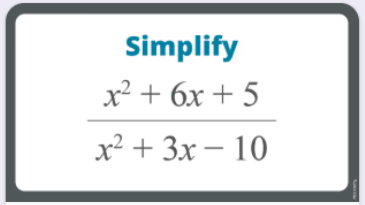
Chapter 4 - Graphs and transformations



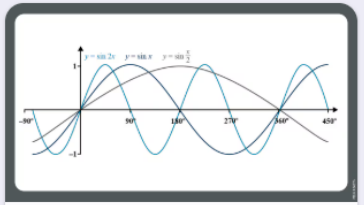
Chapter 5 - Straight line graphs



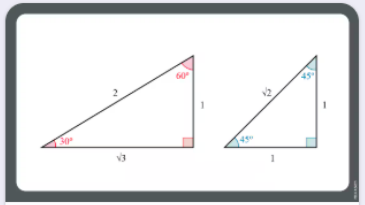
Chapter 6 - Circles



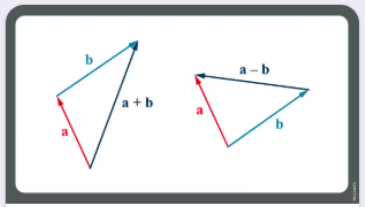
Chapter 7 - Algebraic methods



Chapter 9 - Trigonometric ratios



Chapter 10 - Trigonometric identities and equations



Chapter 11 - Vectors

- FREE VIDEOS TO ASSIST THE TRANSITION FROM GCSE TO A LEVEL MATHS | PEARSON UK

Chapter 4 – Graphs and Transformations

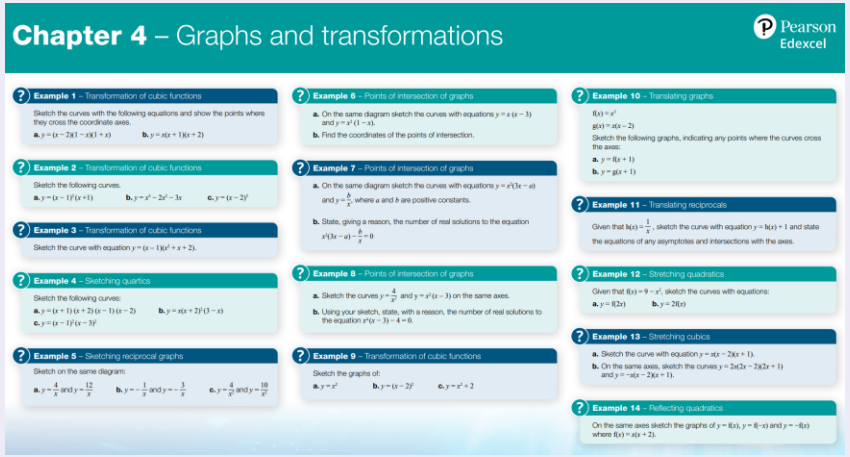
Chapter 4 covers the topic of Graphs and Transformations. Don't forget to follow the steps below:

1. Download and complete the example questions (PDF | 570.12 KB) for each chapter

2. Watch the video to check your solution

3. Once you have completed the question and watched the video, try the Practice Questions to help consolidate that skill and concept

4. Once you have done this for all examples in the chapter, try the End of Chapter Exam Questions.

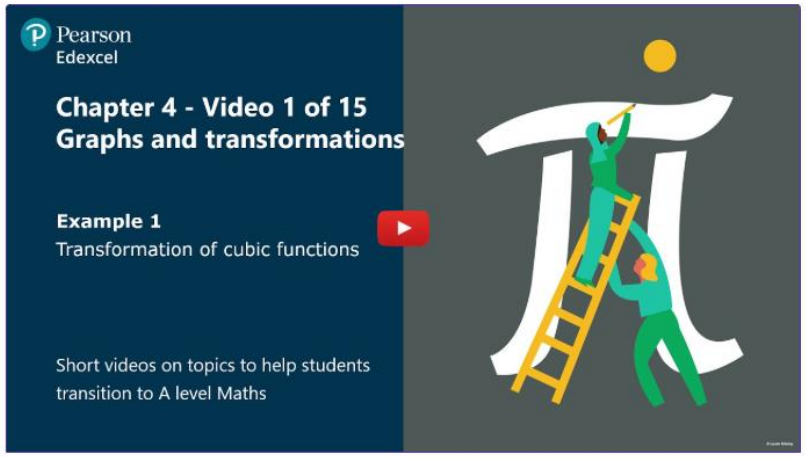


- Example 1 – Transformation of cubic functions
- Example 2 – Transformation of cubic functions
- Example 3 – Transformation of cubic functions
- Example 4 – Sketching quartics
- Example 5 – Sketching reciprocal graphs
- Example 6 – Points of intersection of graphs
- Example 7 – Points of intersection of graphs
- Example 8 – Points of intersection of graphs
- Example 9 – Translating quadratics
- Example 10 – Translating graphs
- Example 11 – Translating reciprocals
- Example 12 – Stretching quadratics
- Example 13 – Stretching cubics
- Example 14 – Reflecting quadratics
- Example 15 – Transforming functions
- End of Chapter Exam Questions

Example 1 – Transformation of cubic functions

Step 1. Complete example 1 from the chapter 4 example question document. (PDF | 570.12 KB)

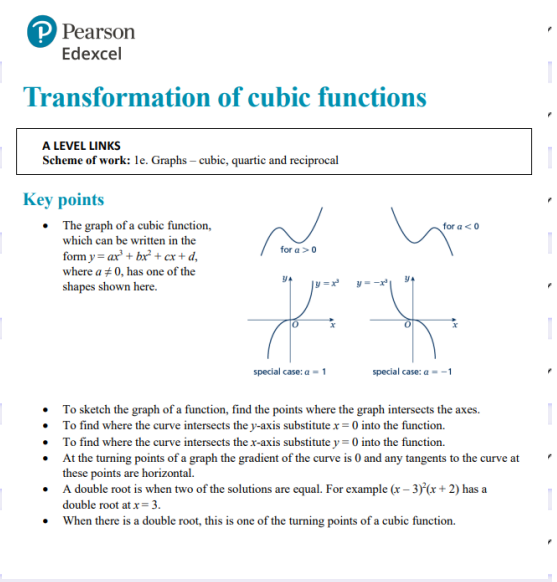
Step 2. Watch the video below to check your solution:



Step 3. Complete the practice questions:

Transformation of cubic functions practice questions (PDF | 290.48 KB)

Step 4. Move on to the next example.



Pearson Edexcel

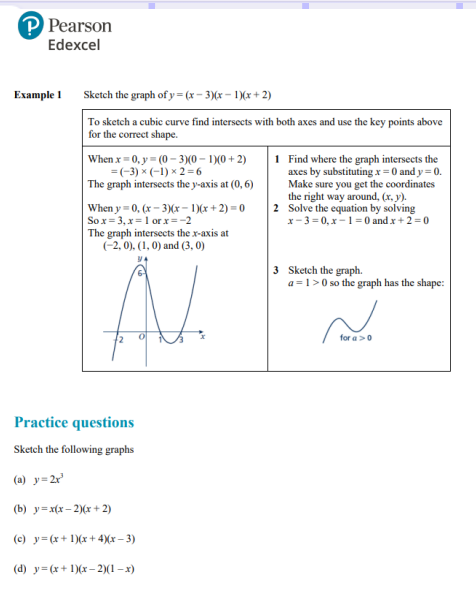
Transformation of cubic functions

A LEVEL LINKS
Scheme of work: 1e. Graphs – cubic, quartic and reciprocal

Key points

- The graph of a cubic function, which can be written in the form $y = ax^3 + bx^2 + cx + d$, where $a \neq 0$, has one of the shapes shown here.

- To sketch the graph of a function, find the points where the graph intersects the axes.
- To find where the curve intersects the y-axis substitute $x = 0$ into the function.
- To find where the curve intersects the x-axis substitute $y = 0$ into the function.
- At the turning points of a graph the gradient of the curve is 0 and any tangents to the curve at these points are horizontal.
- A double root is when two of the solutions are equal. For example $(x-3)^2(x+2)$ has a double root at $x = 3$.
- When there is a double root, this is one of the turning points of a cubic function.



Pearson Edexcel

Example 1 Sketch the graph of $y = (x-3)(x-1)(x+2)$

To sketch a cubic curve find intersects with both axes and use the key points above for the correct shape.

When $x = 0$, $y = (0-3)(0-1)(0+2)$
$= (-3) \times (-1) \times 2 = 6$
The graph intersects the y-axis at $(0, 6)$

When $y = 0$, $(x-3)(x-1)(x+2) = 0$
So $x = 3$, $x = 1$ or $x = -2$
The graph intersects the x-axis at $(-2, 0)$, $(1, 0)$ and $(3, 0)$

1 Find where the graph intersects the axes by substituting $x = 0$ and $y = 0$. Make sure you get the coordinates the right way around, (x, y).
2 Solve the equation by solving $x - 3 = 0$, $x - 1 = 0$ and $x + 2 = 0$
3 Sketch the graph.
$a = 1 > 0$ so the graph has the shape:

Practice questions

Sketch the following graphs

(a) $y = 2x^3$

(b) $y = x(x-2)(x+2)$

(c) $y = (x+1)(x+4)(x-3)$

(d) $y = (x+1)(x-2)(1-x)$

Next: Chapter 5

- FREE VIDEOS TO ASSIST THE TRANSITION FROM GCSE TO A LEVEL MATHS | PEARSON UK

Using the transition videos and resources

Pre Y12 transition work

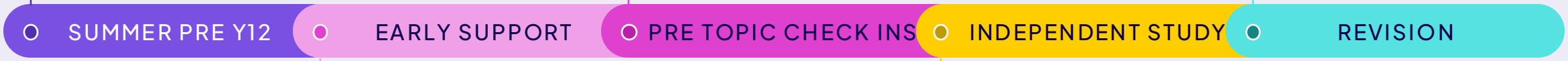
Set a selection as transition tasks, or instruct students to use videos as complement to transition worksheets

Pre-topic skills check

Could print off example questions and set as quick skills check (e.g. as Wednesday exit ticket).

Accessible revision resource

Targeted videos allow students to re-visit key skills they need to revise. Practice questions in addition to textbook.



Targeted support plans

Set specific tasks following initial assessment of gaps identified from baseline testing (see example support plan in next section).

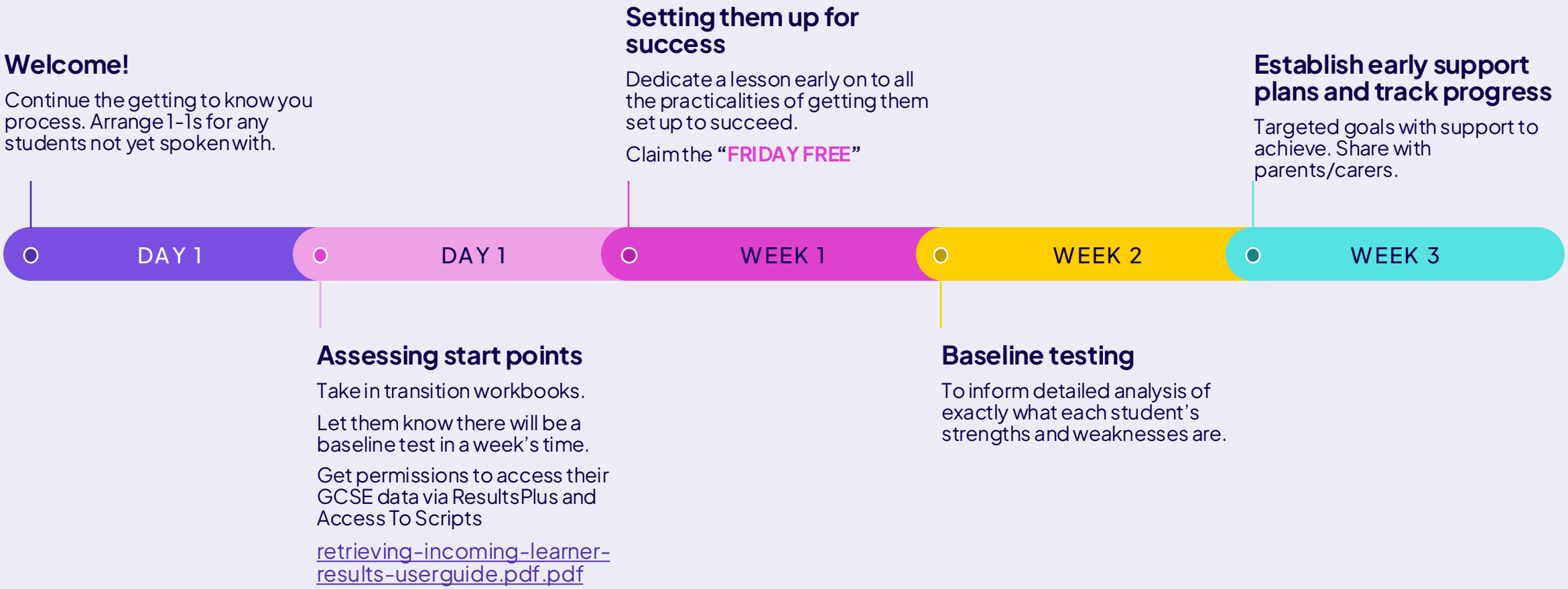
Maximise efficacy of lesson time

Set certain sections and corresponding textbook exercises as independent work to focus lesson time on developing depth of understanding of new content.

02

Making a positive start to Year 12

Making a positive start to Year 12



Welcome!

Continue the getting to know you process. Arrange 1-1s for any students not yet spoken with.

Assessing start points

Take in transition workbooks.

Let them know there will be a baseline test in a week's time.

Get permissions to access their GCSE data via ResultsPlus and Access To Scripts

retrieving-incoming-learner-results-userguide.pdf.pdf

Setting them up for success

Dedicate a lesson early on to all the practicalities of getting them set up to succeed.

Claim the **"FRIDAY FREE"**

Baseline testing

To inform detailed analysis of exactly what each student's strengths and weaknesses are.

Establish early support plans and track progress

Targeted goals with support to achieve. Share with parents/carers.

Setting them up for success

Check they have all the gear!

Check that each student has an appropriate calculator(s), their own copies of the textbooks, is signed up to access any digital resources (e.g. e-books, Google Classroom). Find out what devices they will be using.

Give them a bound copy of the Formulae Booklet & appendix of notation

Give clear instructions on ways of working

How are you going to set work? Are they expected to submit work on paper / digitally? How should they store paper/digital copies? Give them a filing structure.

Provide an easy way of accessing resources and support

Ensure they have a 'one-stop shop' of useful resources and links that you want them to be using throughout the course and their exam prep. Can you also give them a private, easy to access way of asking for help?

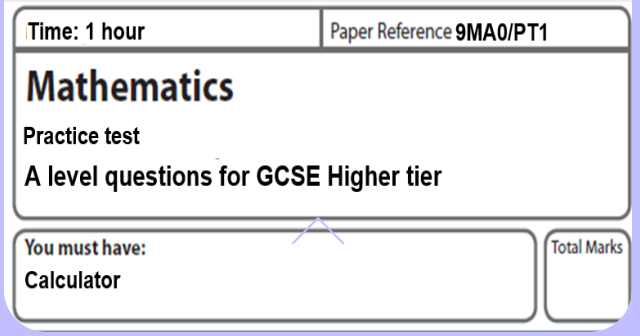
Options for baseline testing

01

ActiveLearn baseline tests for AS/A Level Maths and Further Maths

02

- 04 GCE Questions for GCSE Higher tier – Maths Emporium



03

Create your own assessment using ExamWizard

GCSE/EMC/8MA0 questions

examWizard

GCE Questions for GCSE Higher Tier

3. (*a*) Rearrange the equation $1 - \frac{x^2}{2} - 2x - \frac{1}{2} = 0$ into the form $ax^2 + bx + c = 0$.

(1)

(*b*) Solve the equation found in part (*a*).

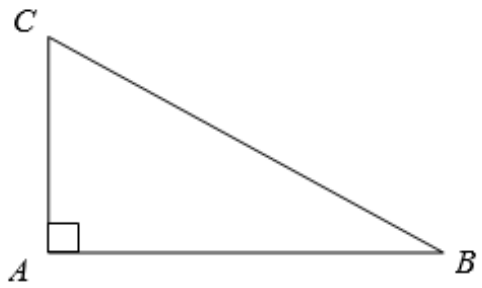
(1)

4. Show that $\frac{(x+1)^2 \times (10x+10) - (5x^2+10x) \times 2(x+1)}{(x+1)^4} = \frac{A}{(x+1)^n}$ where A and n are integers to be found.

(2)

6. (*a*) Find x when $\frac{4-3x}{1+2x} = -\frac{4}{3}$

(*b*)



The diagram shows a right-angled triangle ABC where $AB = x^2 - x$ and $AC = \frac{3}{2}x^2 - 4x$.

Find the distance BC when $x = 4$.

(2)

7. (*a*) Write $f(x) = 2x^2 + 4x + 9$ in the form $a(x + b)^2 + c$.

(3)

(*b*) Sketch the curve with equation $y = 2x^2 + 4x + 9$, showing any points of intersection with the coordinate axis and the coordinates of any turning point.

(3)

8. Find x when $10 (\cos x)^2 = 9, \quad 0° < x < 90°$.

(2)

Dylan Dobbs

Support Plan

Goal	Action	Support	Review
Close gaps in GCSE knowledge, specifically: * algebraic fractions * completing the square * surds	Work through the relevant transition videos and practice questions for these topics	Weekly 1-1 with Miss Wood Maths Clinic every Tues lunchtime Emailed plan and video links home	Review in 2 weeks time with a short assessment (3 questions).

03

Supporting students to access the content

Common challenges for students and what we can do to help

Insecure prior learning

- Identify gaps and implement Early Support Plans
- Use pre-topic check ins/ skills checks
- Provide retrieval and repetition through starters and homework, EMC/GCSE Higher Topic Revision Papers are great for this.

Complicated notation & formulae

- Provide a bound copy of the Formulae Booklet and appendix of notation at the start of the course
- Plan what annotations to the formulae sheet you want them to make and teach this explicitly
- Use 'fill in the gap' activities all the time

Fast pace of content delivery

- Adopt a 50:50 approach to lesson time, 50% new content, 50% practice
- Get students to annotate worked examples with hints/tips/rationale (show this in your modelled answer). Consider a 'Notes' book.
- The **"Friday Free"**

Feeling overwhelmed

- Establish a clear set of instructions of what to do if they miss a lesson.
- Use differentiated resources (e.g. BSG worksheets)
- Give them simple problem-solving strategies A Level Maths – Deep dive into problem solving (Bitesize) – Maths Emporium

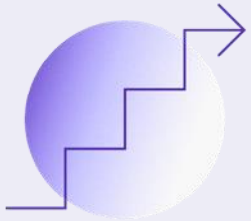
The “Friday Free”

Resources

- Prior knowledge checks from textbook
- Transition worksheets
- Transition videos and tasks (1 page example Q docs are great)
- GCSE Higher topic themed papers
- EMC Topic Papers
- GCSE/EMC Revision Papers
- Unit tests

Wednesday Skills Check

10-15 min exit ticket of key skills and prior learning needed to access next week’s topic.



Set the “Friday Free” task

Based on their exit ticket, assign a task to complete in their “Friday Free”

Check in during 50:50 time

Check in early with learners to ensure they have skills and support to succeed with current week’s work.

Example 1 – Simplifying expressions

Simplify these expressions:

a. $x^2 \times x^5$ **b.** $2r^2 \times 3r^3$ **c.** $\frac{b^7}{b^4}$ **d.** $6x^5 \div 3x^3$ **e.** $(a^3)^2 \times 2a^2$ **f.** $(3x^2)^3 \div x^4$

Example 3 – Simplifying fractions

Solve the following equations:

a. $\frac{x^7 + x^4}{x^4}$ **b.** $\frac{3x^2 - 6x^5}{2x}$ **c.** $\frac{20x^7 - 15x^3}{5x^2}$

Example 4 – Expanding double brackets

Expand these expressions and simplify if possible:

a. $(x + 5)(x + 2)$ **b.** $(x - 2y)(x^2 + 1)$ **c.** $(x - y)^2$ **d.** $(x + y)(3x - 2y - 4)$

Example 5 – Expanding Trinomials

Expand these expressions and simplify if possible:

a. $x(2x + 3)(x - 7)$ **b.** $x(5x - 3y)(2x - y + 4)$ **c.** $(x - 4)(x + 3)(x + 1)$

Example 7 – Factorising quadratics

Factorise:

a. $x^2 - 5x - 6$ **b.** $x^2 + 6x + 8$ **c.** $6x^2 - 11x - 10$ **d.** $x^2 - 25$ **e.** $4x^2 - 9y^2$

Example 9 – Simplifying indices

Simplify:

a. $\frac{x^3}{x^{-3}}$ **b.** $x^{\frac{1}{2}} \times x^{\frac{3}{2}}$ **c.** $(x^3)^{\frac{2}{3}}$ **d.** $2x^{1.5} \div 4x^{-0.25}$ **e.** $\sqrt[3]{125x^6}$ **f.** $\frac{2x^2 - x}{x^5}$

Example 10 – Fractional indices

Evaluate:

a. $9^{\frac{1}{2}}$ **b.** $64^{\frac{1}{3}}$ **c.** $49^{\frac{3}{2}}$ **d.** $25^{-\frac{3}{2}}$

Example 11 – Indices – problem solving

Given that $y = \frac{1}{16}x^2$ express each of the following in the form kx^n, where k and n are constants.

a. $y^{\frac{1}{2}}$ **b.** $4y^{-1}$

Example 12 – Simplifying surds

Simplify:

a. $\sqrt{12}$ **b.** $\frac{\sqrt{20}}{2}$ **c.** $5\sqrt{6} - 2\sqrt{24} + \sqrt{294}$

Example 13 – Expanding brackets and surds

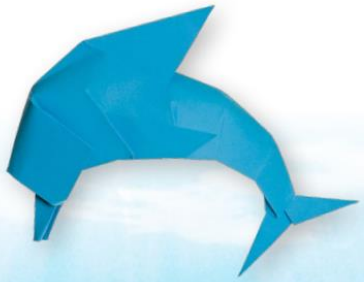
Expand and simplify if possible:

a. $\sqrt{2}(5 - \sqrt{3})$ **b.** $(2 - \sqrt{3})(5 + \sqrt{3})$

Example 14 – Rationalising the denominator

Rationalise the denominator of:

a. $\frac{1}{\sqrt{3}}$ **b.** $\frac{1}{3 + \sqrt{2}}$ **c.** $\frac{\sqrt{5} + \sqrt{2}}{\sqrt{5} - \sqrt{2}}$ **d.** $\frac{1}{(1 - \sqrt{3})^2}$



- BSG WORKSHEETS

Differentiated resources

Pearson

Topic 5: Radians

Bronze, Silver and Gold Worksheets for

A Level Mathematics

ALWAYS LEARNING PEARSON

Pearson

Teacher Notes

These Bronze, Silver and Gold worksheets are designed to be used either straight after the content has been taught or as part of a skills gap analysis, especially as students move into year 13.

They are drawn from the latest specification questions and legacy questions. The papers are between 20 and 35 marks.

The topic number on this worksheet relates to the corresponding chapter number in the 'Pearson Edexcel A Level Mathematics: Pure Mathematics Year 2' textbook.

Please note the questions in this topic are calculator questions.

Quick Links

(Press Ctrl, as you click with your mouse to follow these links)

- Bronze Questions
- Bronze Mark Scheme
- Silver Questions
- Silver Mark Scheme
- Gold Questions
- Gold Mark Scheme

Extension and Enrichment

If you have students that have enjoyed the challenge of the Gold questions, then they should have a go at the more challenging question from our Advanced Extension Award (AEA) papers. The Mathematics AEA is a single, 3 hour non-calculator paper, taken at the end of year 13. It helps students to develop high level problem solving and proof skills. It is entirely based on the content of the A Level Mathematics Course. No extra material needs to be covered to take the AEA in Mathematics. A second important difference is that marks are awarded for the clarity and quality of their solution. Developing this key skill, alongside the extra problem-solving experience, can pay dividends in the way they approach A Level Mathematics and Further Mathematics problems.

More information about the Advanced Extension Award can be found here on the Pearson Edexcel Website, or here on the Maths Emporium

ALWAYS LEARNING PEARSON

Bronze Questions

Calculator

The total mark for this section is 25

Q1

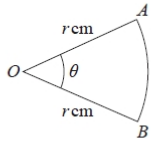


Figure 1

Figure 1 shows a sector AOB of a circle with centre O and radius r cm.

The angle AOB is θ radians.
The area of the sector AOB is 11 cm^2.

Given that the perimeter of the sector is 4 times the length of the arc AB, find the exact value of r.

(4)

(Total for Question 1 is 4 marks)

Q2

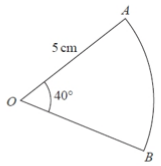


Figure 1

Figure 1 shows a sector AOB of a circle with centre O, radius 5 cm and angle $AOB = 40°$

The attempt of a student to find the area of the sector is shown below.

$$\text{Area of sector} = \frac{1}{2}r^2\theta$$
$$= \frac{1}{2} \times 5^2 \times 40$$
$$= 500\,\text{cm}^2$$

(a) Explain the error made by this student.

(1)

(b) Write out a correct solution.

(2)

(Total for Question 2 is 3 marks)

Q3

(a) Sketch, for $0 \leq x \leq 2\pi$, the graph of $y = \sin\left(x + \frac{\pi}{6}\right)$.

(2)

(b) Write down the exact coordinates of the points where the graph meets the coordinate axes.

(3)

(c) Solve, for $0 \leq x \leq 2\pi$, the equation

$$\sin\left(x + \frac{\pi}{6}\right) = 0.65,$$

giving your answers in radians to 2 decimal places.

(5)

(Total for Question 3 is 10 marks)

Q4

(i) Solve, for $0 \leq \theta < 180°$, the equation

$$\frac{\sin 2\theta}{(4\sin 2\theta - 1)} = 1$$

giving your answers to 1 decimal place.

(3)

(ii) Solve, for $0 \leq x < 2\pi$, the equation

$$5\sin^2 x - 2\cos x - 5 = 0$$

giving your answers to 2 decimal places.
(*Solutions based entirely on graphical or numerical methods are not acceptable.*)

(5)

(Total for Question 4 is 8 marks)

End of Questions

Silver Questions

20 Marks

Calculator

The total mark for this section is 20

Q1

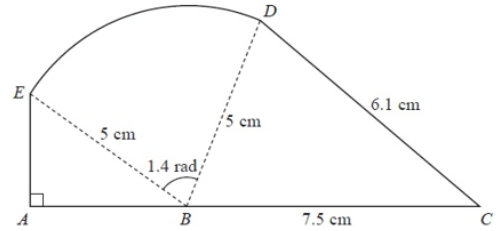


Figure 2

The shape $ABCDEA$, as shown in Figure 2, consists of a right-angled triangle EAB and a triangle DBC joined to a sector BDE of a circle with radius 5 cm and centre B.

The points A, B and C lie on a straight line with $BC = 7.5$ cm.

Angle $EAB = \frac{\pi}{2}$ radians, angle $EBD = 1.4$ radians and $CD = 6.1$ cm.

(a) Find, in cm^2, the area of the sector BDE.

(2)

(b) Find the size of the angle DBC, giving your answer in radians to 3 decimal places.

(2)

(c) Find, in cm^2, the area of the shape $ABCDEA$, giving your answer to 3 significant figures.

(5)

(Total for Question 1 is 9 marks)

Pearson

Gold Questions

Calculator

The total mark for this section is 30

Q1

A circle C has centre $M(6, 4)$ and radius 3.

(a) Write down the equation of the circle in the form

$$(x - a)^2 + (y - b)^2 = r^2.$$

(2)

Figure 3

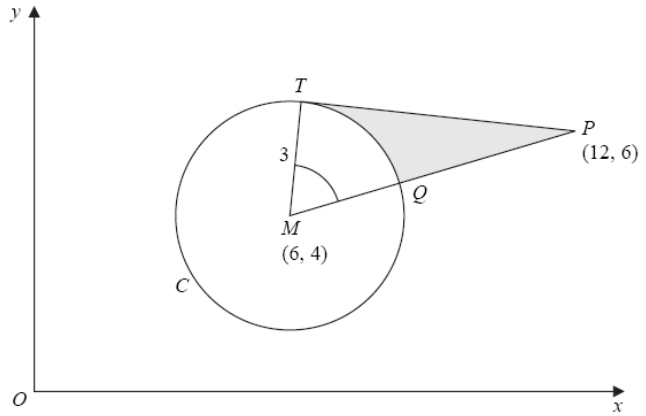


Figure 3 shows the circle C. The point T lies on the circle and the tangent at T passes through the point P (12, 6). The line MP cuts the circle at Q.

(b) Show that the angle TMQ is 1.0766 radians to 4 decimal places.

(4)

The shaded region TPQ is bounded by the straight lines TP, QP and the arc TQ, as shown in Figure 3.

(c) Find the area of the shaded region TPQ. Give your answer to 3 decimal places.

(5)

(Total for Question 1 is 11 marks)

Pearson

“Show me what you’re working on.”

04

Effective exam preparation

Exam Experience

Series	Question Ref	Question Total	C %	D %	E %	U %
2024	AL Maths 2024 Paper 1 - Question: 01	3	94.7%	91.3%	85.7%	64.0%
2024	AL Maths 2024 Paper 1 - Question: 02	4	65.0%	54.3%	39.3%	16.3%
2024	AL Maths 2024 Paper 1 - Question: 03	6	66.3%	53.5%	36.3%	15.3%
2024	AL Maths 2024 Paper 1 - Question: 04	3	77.7%	65.3%	44.3%	17.0%
2024	AL Maths 2024 Paper 1 - Question: 05	6	44.8%	34.7%	22.7%	7.2%
2024	AL Maths 2024 Paper 1 - Question: 06	6	46.5%	39.2%	29.8%	18.7%
2024	AL Maths 2024 Paper 1 - Question: 07	8	48.6%	31.1%	16.8%	4.8%
2024	AL Maths 2024 Paper 1 - Question: 08	11	67.9%	60.7%	49.5%	29.7%
2024	AL Maths 2024 Paper 1 - Question: 09	6	50.0%	33.5%	18.8%	5.7%
2024	AL Maths 2024 Paper 1 - Question: 10	9	74.8%	58.9%	35.9%	14.7%
2024	AL Maths 2024 Paper 1 - Question: 11	4	10.3%	6.0%	3.5%	1.5%
2024	AL Maths 2024 Paper 1 - Question: 12	11	36.5%	22.4%	11.2%	2.5%
2024	AL Maths 2024 Paper 1 - Question: 13	8	8.4%	3.4%	1.0%	0.1%
2024	AL Maths 2024 Paper 1 - Question: 14	9	28.1%	15.6%	9.7%	6.0%
2024	AL Maths 2024 Paper 1 - Question: 15	6	11.0%	8.3%	6.2%	3.5%

Series	Question Ref	Question Total	C %	D %	E %	U %
2024	AL Maths 2024 Paper 2 - Question: 01	5	98.2%	97.6%	96.6%	87.4%
2024	AL Maths 2024 Paper 2 - Question: 02	5	79.8%	68.6%	54.0%	37.2%
2024	AL Maths 2024 Paper 2 - Question: 03	4	73.0%	64.5%	52.0%	30.0%
2024	AL Maths 2024 Paper 2 - Question: 04	5	82.0%	71.8%	56.8%	28.2%
2024	AL Maths 2024 Paper 2 - Question: 05	3	67.3%	57.0%	45.3%	25.3%
2024	AL Maths 2024 Paper 2 - Question: 06	7	68.3%	56.3%	43.1%	22.3%
2024	AL Maths 2024 Paper 2 - Question: 07	5	32.4%	29.0%	24.4%	17.2%
2024	AL Maths 2024 Paper 2 - Question: 08	7	38.4%	22.6%	10.3%	3.1%
2024	AL Maths 2024 Paper 2 - Question: 09	7	28.7%	15.7%	8.6%	4.3%
2024	AL Maths 2024 Paper 2 - Question: 10	6	65.0%	42.0%	19.7%	5.3%
2024	AL Maths 2024 Paper 2 - Question: 11	5	42.6%	25.2%	10.2%	1.6%
2024	AL Maths 2024 Paper 2 - Question: 12	12	22.4%	13.7%	8.0%	3.0%
2024	AL Maths 2024 Paper 2 - Question: 13	9	49.7%	32.9%	15.0%	2.9%
2024	AL Maths 2024 Paper 2 - Question: 14	8	37.6%	35.5%	30.5%	17.9%
2024	AL Maths 2024 Paper 2 - Question: 15	12	32.3%	21.3%	10.9%	3.1%

A level notional component grade boundaries			Max Mark	A*	A	B	C	D	E	U
9MA0	A Level Mathematics Paper 1	Raw	100	81	66	53	40	28	16	0
9MA0	A Level Mathematics Paper 2	Raw	100	81	65	53	42	31	20	0
9MA0	A Level Mathematics Paper 3	Raw	100	89	74	60	46	33	20	0

Exam Experience

Series	Question Reference	Question Total	C %	D %	E %	U %
2024	AL Maths 2024 Stats - Question: 01	11	49.6%	37.8%	25.1%	10.5%
2024	AL Maths 2024 Stats - Question: 02	6	32.8%	21.2%	12.8%	5.3%
2024	AL Maths 2024 Stats - Question: 03	6	62.8%	56.2%	46.3%	27.7%
2024	AL Maths 2024 Stats - Question: 04	6	31.8%	21.2%	12.3%	4.5%
2024	AL Maths 2024 Stats - Question: 05	10	47.3%	28.9%	13.7%	3.8%
2024	AL Maths 2024 Stats - Question: 06	11	42.7%	29.2%	16.9%	7.3%

Series	Question Reference	Question Total	C %	D %	E %	U %
2024	AL Maths 2024 Mech - Question: 1	3	86.3%	76.3%	56.0%	30.3%
2024	AL Maths 2024 Mech - Question: 2	8	76.6%	69.5%	60.0%	40.0%
2024	AL Maths 2024 Mech - Question: 3	7	76.9%	55.6%	27.0%	6.9%
2024	AL Maths 2024 Mech - Question: 4	11	53.3%	36.9%	20.5%	7.1%
2024	AL Maths 2024 Mech - Question: 5	12	65.0%	40.1%	17.8%	5.2%
2024	AL Maths 2024 Mech - Question: 6	9	25.4%	9.6%	2.4%	0.1%

A level notional component grade boundaries			Max Mark	A*	A	B	C	D	E	U
9MA0	A Level Mathematics Paper 1	Raw	100	81	66	53	40	28	16	0
9MA0	A Level Mathematics Paper 2	Raw	100	81	65	53	42	31	20	0
9MA0	A Level Mathematics Paper 3	Raw	100	89	74	60	46	33	20	0

Performance Data – Grade D differentiators

Series	Question Ref	1. Proof	2. Alg and Funct	3. Coord Geom	4. Sequences and Series	5. Trigonometry	6. Exp and Logs	7. Differentiation	8. Integration	9. Numerical Methods	10. Vectors	Question Total	D	E	D %	E %	D/E performance diff
2022	AL Maths 2022 Paper 2 - Question: 04							✓				**3**	1.59	0.81	53.0%	27.0%	26.0%
2018	AL Maths 2018 Paper 1 - Question: 05					✓		✓				**5**	2.45	1.25	49.0%	25.0%	24.0%
2023	AL Maths 2023 Paper 1 - Question: 05									✓		**6**	3.80	2.36	63.3%	39.3%	24.0%
2022	AL Maths 2022 Paper 2 - Question: 06					✓		✓		✓		**7**	2.81	1.15	40.1%	16.4%	23.7%
2022	AL Maths 2022 Paper 2 - Question: 01		✓									**4**	2.63	1.70	65.8%	42.5%	23.3%
2024	AL Maths 2024 Paper 1 - Question: 10		✓					✓	✓			**9**	5.30	3.23	58.9%	35.9%	23.0%
2023	AL Maths 2023 Paper 2 - Question: 07		✓	✓				✓				**7**	3.24	1.65	46.3%	23.6%	22.7%
2024	AL Maths 2024 Paper 2 - Question: 10			✓				✓				**6**	2.52	1.18	42.0%	19.7%	22.3%
2024	AL Maths 2024 Paper 1 - Question: 04							✓				**3**	1.96	1.33	65.3%	44.3%	21.0%
2023	AL Maths 2023 Paper 1 - Question: 08					✓						**10**	5.50	3.42	55.0%	34.2%	20.8%

JUNE 2022, PAPER 2, Q4

4. Given that

$$y = 2x^2$$

use differentiation from first principles to show that

$$\frac{dy}{dx} = 4x$$

1.59/3

JUNE 2018, PAPER 1, Q5

5. Given that

$$y = \frac{3\sin\theta}{2\sin\theta + 2\cos\theta} \qquad -\frac{\pi}{4} < \theta < \frac{3\pi}{4}$$

show that

$$\frac{dy}{d\theta} = \frac{A}{1+\sin 2\theta} \qquad -\frac{\pi}{4} < \theta < \frac{3\pi}{4}$$

where A is a rational constant to be found.

2.45/5

JUNE 2024, PAPER 1, Q4

4. Given that $y = x^2$, use differentiation from first principles to show that $\frac{dy}{dx} = 2x$

1.96/3

JUNE 2023, PAPER 2, Q7

7. **In this question you must show all stages of your working.**

Solutions relying on calculator technology are not acceptable.

A curve has equation

$$x^3 + 2xy + 3y^2 = 47$$

(a) Find $\frac{dy}{dx}$ in terms of x and y

(4)

The point $P(-2, 5)$ lies on the curve.

(b) Find the equation of the normal to the curve at P, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers to be found.

3.24/7

(3)

JUNE 2024, PAPER 1, Q10

10.

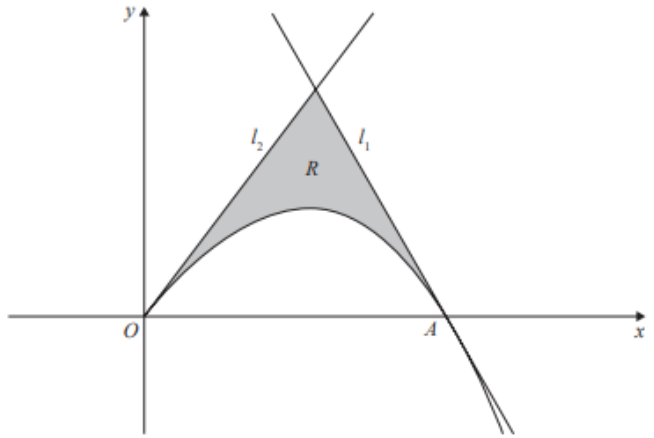


Figure 3

In this question you must show all stages of your working.

Solutions relying entirely on calculator technology are not acceptable.

Figure 3 shows a sketch of part of the curve with equation

$$y = 8x - x^{\frac{5}{2}} \qquad x \geqslant 0$$

The curve crosses the x-axis at the point A.

(a) Verify that the x coordinate of A is 4

(1)

The line l_1 is the tangent to the curve at A.

(b) Use calculus to show that an equation of line l_1 is

$$12x + y = 48$$

(3)

The line l_2 has equation $y = 8x$

5.30/9

The region R, shown shaded in Figure 3, is bounded by the curve, the line l_1 and the line l_2

(c) Use algebraic integration to find the exact area of R.

(5)

June 2023 Paper 2 Q7

7. **In this question you must show all stages of your working.**

Solutions relying on calculator technology are not acceptable.

A curve has equation

$$x^3 + 2xy + 3y^2 = 47$$

(a) Find $\frac{dy}{dx}$ in terms of x and y

(4)

The point $P(-2, 5)$ lies on the curve.

(b) Find the equation of the normal to the curve at P, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers to be found.

(3)

Question	Scheme	Marks	AOs
7(a)	$x^3 \to \ldots x^2$ and $3y^2 \to \ldots y\frac{dy}{dx}$	M1	1.1b
	$2xy \to 2y + 2x\frac{dy}{dx}$	B1	1.1b
	$3x^2 + 2x\frac{dy}{dx} + 2y + 6y\frac{dy}{dx} = \ldots \Rightarrow \frac{dy}{dx} = \ldots$	M1	2.1
	$\frac{dy}{dx} = -\frac{2y+3x^2}{2x+6y}$	A1	1.1b
		(4)	
(b)	$\frac{dy}{dx} = -\frac{2(5)+3(-2)^2}{2(-2)+6(5)}$ or e.g. $3(-2)^2 + 2(-2)\frac{dy}{dx} + 2\times5 + 6\times5\frac{dy}{dx} = 0 \Rightarrow \frac{dy}{dx} = \ldots \left(-\frac{11}{13}\right)$	M1	1.1b
	$y - 5 = "\frac{13}{11}"(x+2)$	dM1	1.1b
	$13x - 11y + 81 = 0$	A1	2.2a
		(3)	
			(7 marks)

Grade D students scored a mean average of 3.24 out of 7.

46.3%

Grade C students scored a mean average of 4.71 out of 7.

67.3%

Performance Data – Grade C differentiators

Series	Question Ref	1. Proof	2. Alg and Funct	3. Coord Geom	4. Sequences and Series	5. Trigonometry	6. Exp and Logs	7. Differentiation	8. Integration	9. Numerical Methods	10. Vectors	Question Total	C	D	C %	D %	C/D performance diff
2024	AL Maths 2024 Paper 2 - Question: 10			✓				✓				6	3.90	2.52	65.0%	42.0%	23.0%
2018	AL Maths 2018 Paper 1 - Question: 07						✓		✓			7	3.65	2.09	52.1%	29.9%	22.3%
2018	AL Maths 2018 Paper 1 - Question: 13								✓			7	3.70	2.22	52.9%	31.7%	21.1%
2018	AL Maths 2018 Paper 1 - Question: 10					✓	✓		✓			8	3.31	1.62	41.4%	20.3%	21.1%
2023	AL Maths 2023 Paper 2 - Question: 07		✓	✓				✓				7	4.71	3.24	67.3%	46.3%	21.0%
2022	AL Maths 2022 Paper 1 - Question: 12						✓	✓	✓			5	1.67	0.68	33.4%	13.6%	19.8%
2019	AL Maths 2019 Paper 2 - Question: 04			✓		✓						6	3.49	2.31	58.2%	38.5%	19.7%
2023	AL Maths 2023 Paper 1 - Question: 05									✓		6	4.96	3.80	82.7%	63.3%	19.3%
2023	AL Maths 2023 Paper 1 - Question: 12	✓				✓		✓				5	3.30	2.35	66.0%	47.0%	19.0%
2023	AL Maths 2023 Paper 1 - Question: 01		✓						✓			4	2.04	1.29	51.0%	32.3%	18.8%
2022	AL Maths 2022 Paper 1 - Question: 04						✓		✓			3	1.49	0.93	49.7%	31.0%	18.7%
2024	AL Maths 2024 Paper 1 - Question: 07						✓		✓			8	3.89	2.49	48.6%	31.1%	17.5%
2022	AL Maths 2022 Paper 2 - Question: 01		✓									4	3.33	2.63	83.3%	65.8%	17.5%

June 2024 Paper 2 Q10

Grade D students scored a mean average of 2.52 out of 6.

42.0%

Grade C students scored a mean average of 3.90 out of 6.

65.0%

Question	Scheme	Marks	AOs
10(a)	$x=4, y=2 \Rightarrow t=-1$	B1	2.2a
	$\frac{dy}{dx}=\frac{dy}{dt}\times\frac{dt}{dx}=-3t^2\times\frac{1}{2(t+3)}$	M1	1.1b
	$\frac{dy}{dx}=-3(-1)^2\times\frac{1}{2(-1+3)}=-\frac{3}{4}$	M1	1.1b
	$\Rightarrow y-2=-\frac{3}{4}(x-4)$ or $\Rightarrow y=-\frac{3}{4}x+c \rightarrow 2=-\frac{3}{4}\times 4+c \Rightarrow c...$	ddM1	2.1
	$y-2=-\frac{3}{4}(x-4)\Rightarrow 4y-8=-3x+12$ or $c=5\Rightarrow y=-\frac{3}{4}x+5$ $\Rightarrow 3x+4y=20^*$	A1*	1.1b
		(5)	
(b)	Maximum height is 9m	B1	3.4
		(1)	
			(6 marks)

10.

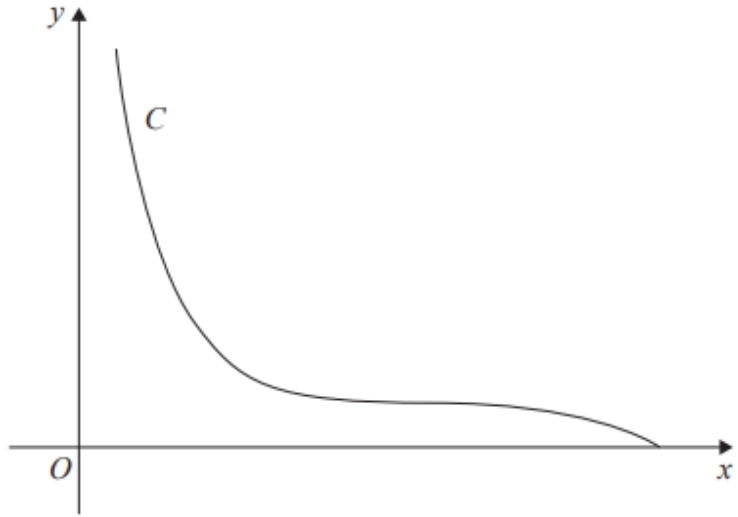


Figure 4

Figure 4 shows a sketch of the curve C with parametric equations

$$x=(t+3)^2 \qquad y=1-t^3 \qquad -2 \leqslant t \leqslant 1$$

The point P with coordinates (4, 2) lies on C.

(a) Using parametric differentiation, show that the tangent to C at P has equation

$$3x + 4y = 20$$

(5)

The curve C is used to model the profile of a slide at a water park.

Units are in metres, with y being the height of the slide above water level.

(b) Find, according to the model, the greatest height of the slide above water level.

(1)

Performance Data – Highest Performing Qs at Grade D

Series	Question Ref	1. Proof	2. Alg and Funct	3. Coord Geom	4. Sequences and Series	5. Trigonometry	6. Exp and Logs	7. Differentiation	8. Integration	9. Numerical Methods	10. Vectors	Question Total	C	D	C %	D %	E %	U %	C/D performance diff
2024	AL Maths 2024 Paper 2 - Question: 01							✓				5	4.91	4.88	98.2%	97.6%	96.6%	87.4%	0.6%
2024	AL Maths 2024 Paper 1 - Question: 01		✓									3	2.84	2.74	94.7%	91.3%	85.7%	64.0%	3.3%
2018	AL Maths 2018 Paper 1 - Question: 02							✓				7	6.20	6.06	88.6%	86.6%	82.3%	63.7%	2.0%
2022	AL Maths 2022 Paper 2 - Question: 02						✓					4	3.49	3.25	87.3%	81.3%	67.8%	38.8%	6.0%
2019	AL Maths 2019 Paper 1 - Question: 01		✓									3	2.56	2.36	85.3%	78.7%	69.0%	51.0%	6.7%
2023	AL Maths 2023 Paper 2 - Question: 01		✓					✓				4	3.16	3.03	79.0%	75.8%	71.0%	53.3%	3.3%
2022	AL Maths 2022 Paper 1 - Question: 02		✓									3	2.43	2.21	81.0%	73.7%	59.0%	31.0%	7.3%
2019	AL Maths 2019 Paper 2 - Question: 03					✓						3	2.52	2.17	84.0%	72.3%	53.7%	29.7%	11.7%
2024	AL Maths 2024 Paper 2 - Question: 04		✓		✓							5	4.10	3.59	82.0%	71.8%	56.8%	28.2%	10.2%
2022	AL Maths 2022 Paper 1 - Question: 05		✓									6	4.56	4.22	76.0%	70.3%	60.5%	36.7%	5.7%
2018	AL Maths 2018 Paper 2 - Question: 02										✓	5	3.96	3.45	79.2%	69.0%	59.4%	26.0%	10.2%
2024	AL Maths 2024 Paper 2 - Question: 02		✓		✓							5	3.99	3.43	79.8%	68.6%	54.0%	37.2%	11.2%
2018	AL Maths 2018 Paper 1 - Question: 03					✓						4	3.21	2.72	80.3%	68.0%	62.0%	29.3%	12.3%
2018	AL Maths 2018 Paper 1 - Question: 06		✓	✓							✓	10	7.16	6.77	71.6%	67.7%	53.6%	31.3%	3.9%
2022	AL Maths 2022 Paper 2 - Question: 01		✓									4	3.33	2.63	83.3%	65.8%	42.5%	20.3%	17.5%
2023	AL Maths 2023 Paper 2 - Question: 05							✓	✓			5	3.88	3.28	77.6%	65.6%	48.8%	26.6%	12.0%
2024	AL Maths 2024 Paper 1 - Question: 04							✓				3	2.33	1.96	77.7%	65.3%	44.3%	17.0%	12.3%
2024	AL Maths 2024 Paper 2 - Question: 03		✓									4	2.92	2.58	73.0%	64.5%	52.0%	30.0%	8.5%
2023	AL Maths 2023 Paper 1 - Question: 05									✓		6	4.96	3.80	82.7%	63.3%	39.3%	15.2%	19.3%
2023	AL Maths 2023 Paper 1 - Question: 03	✓									✓	3	1.98	1.90	66.0%	63.3%	56.7%	36.3%	2.7%
2018	AL Maths 2018 Paper 2 - Question: 09					✓		✓				5	3.62	3.12	72.4%	62.4%	48.6%	11.6%	10.0%
2024	AL Maths 2024 Paper 1 - Question: 08		✓									11	7.47	6.68	67.9%	60.7%	49.5%	29.7%	7.2%

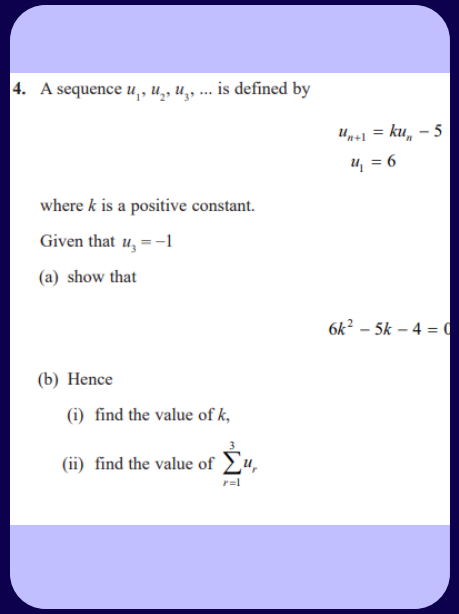
Breakout Activity

Choose a question to focus on.

In your group you will have 10 mins to discuss how you might support students in accessing Grade C or higher for your chosen question.

You may wish to discuss strategies/resources for;

- initial content delivery
- retrieval practice
- preparing for exam Qs
- exam technique



4. A sequence $u_1, u_2, u_3, \ldots$ is defined by

$$u_{n+1} = ku_n - 5$$
$$u_1 = 6$$

where k is a positive constant.

Given that $u_3 = -1$

(a) show that

$$6k^2 - 5k - 4 = 0$$

(b) Hence

(i) find the value of k,

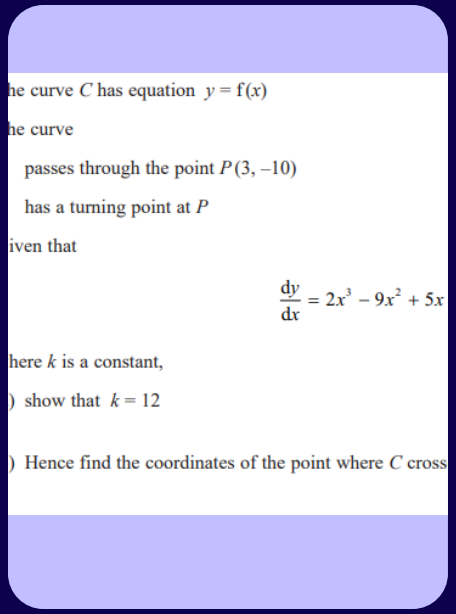
(ii) find the value of $\sum_{r=1}^{3} u_r$

June 2024 Paper 2 Q4

Sequences and series
5 marks

C average : 4.10/5 (82%)
D average : 3.59/5 (72%)
E average: 2.84/5 (57%)

Mark scheme



he curve C has equation $y = f(x)$

he curve

passes through the point $P(3, -10)$

has a turning point at P

iven that

$$\frac{dy}{dx} = 2x^3 - 9x^2 + 5x$$

here k is a constant,

) show that $k = 12$

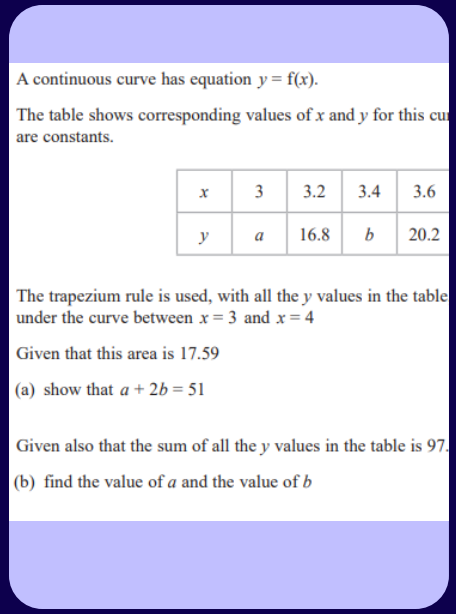
) Hence find the coordinates of the point where C cross

June 2023 Paper 2 Q5

Differentiation and Integration 5 marks

C average : 3.88/5 (78%)
D average : 3.28/5 (65%)
E average: 2.44/5 (49%)

Mark scheme



A continuous curve has equation $y = f(x)$.

The table shows corresponding values of x and y for this cu
are constants.

x	3	3.2	3.4	3.6
y	a	16.8	b	20.2

The trapezium rule is used, with all the y values in the table
under the curve between $x = 3$ and $x = 4$

Given that this area is 17.59

(a) show that $a + 2b = 51$

Given also that the sum of all the y values in the table is 97.

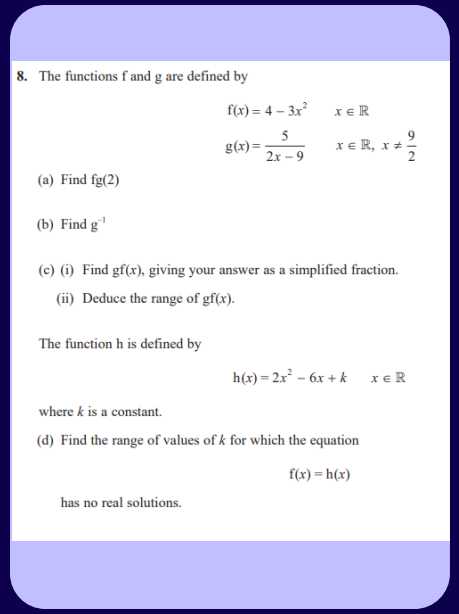
(b) find the value of a and the value of b

June 2023 Paper 1 Q5

Trapezium Rule
6 marks

C average : 4.96/6 (83%)
D average : 3.80/6 (63%)
E average: 2.36/6 (39%)

Mark scheme



8. The functions f and g are defined by

$$f(x) = 4 - 3x^2 \qquad x \in \mathbb{R}$$
$$g(x) = \frac{5}{2x - 9} \qquad x \in \mathbb{R},\ x \neq \frac{9}{2}$$

(a) Find fg(2)

(b) Find g^{-1}

(c) (i) Find gf(x), giving your answer as a simplified fraction.

(ii) Deduce the range of gf(x).

The function h is defined by

$$h(x) = 2x^2 - 6x + k \qquad x \in \mathbb{R}$$

where k is a constant.

(d) Find the range of values of k for which the equation

$$f(x) = h(x)$$

has no real solutions.

June 2024 Paper 1 Q8

Functions
11 marks

C average : 7.47/11 (68%)
D average : 6.68/11 (61%)
E average: 5.44/11 (50%)

Mark scheme

Key topics and skills

Topic Based Revision and Exam Prep Resources:

- BSG worksheets
- Modelling Questions
- Topic Tests
- 14 Large Data Set
- Exam style questions – applied only

Grade D

Pure

- Algebra and Functions
- Simple differentiation
- Sequences and series

Statistics

- Probability
- Data presentation and interpretation

Mechanics

- Forces and Newton's laws

Grade C

Pure

- Trigonometry
- Differentiation
- Simple integration
- Exponentials and logs

Statistics

- Statistical distributions
- Hypothesis testing

Mechanics

- Kinematics (simple projectiles)

Grade B

Pure

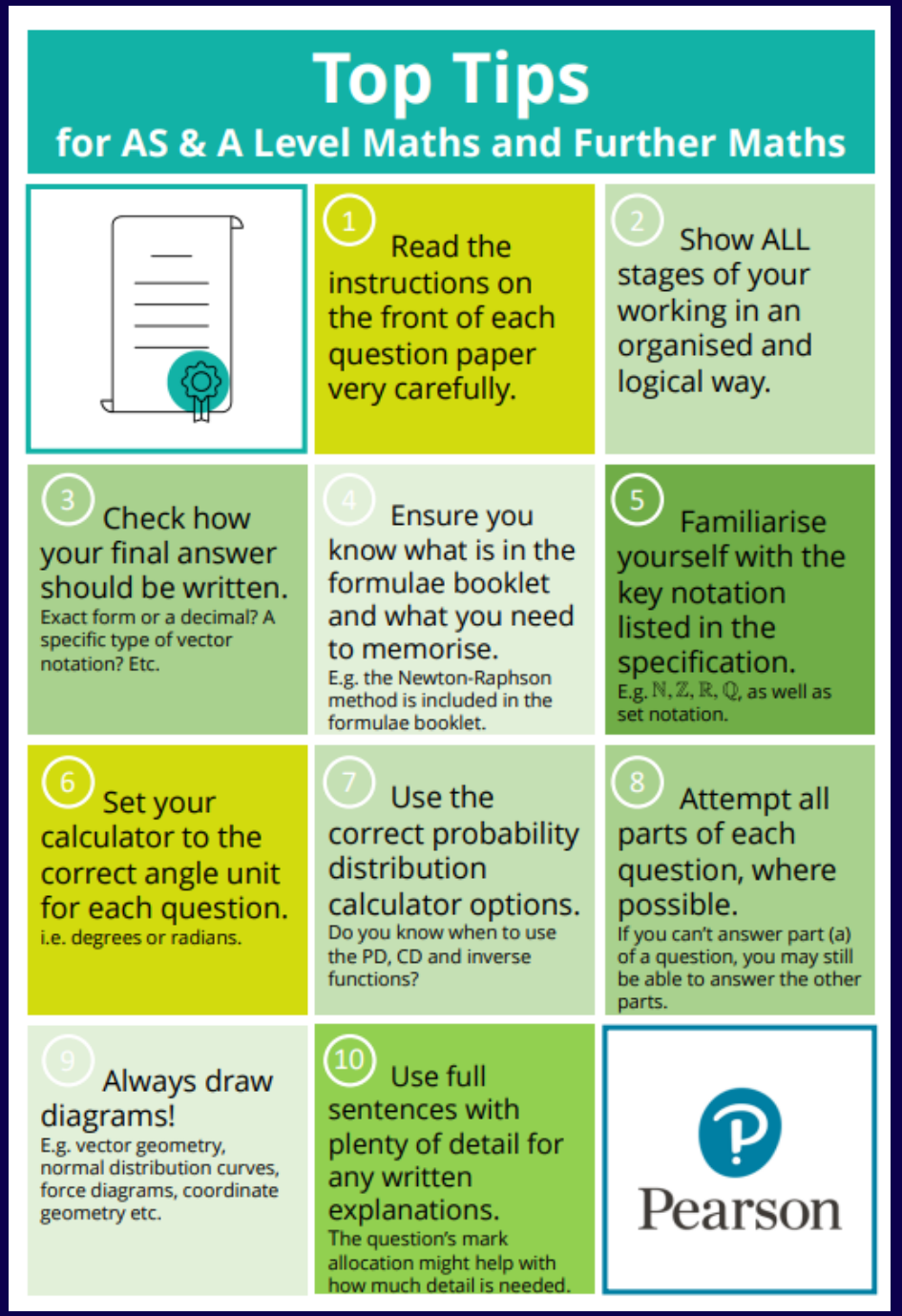
- Advanced differentiation
- Advanced integration

Statistics

- Hypothesis testing

Mechanics

- Making a start with moments
- "Q5" kinematics



Top Tips poster for AS/A Level Maths and Further Maths

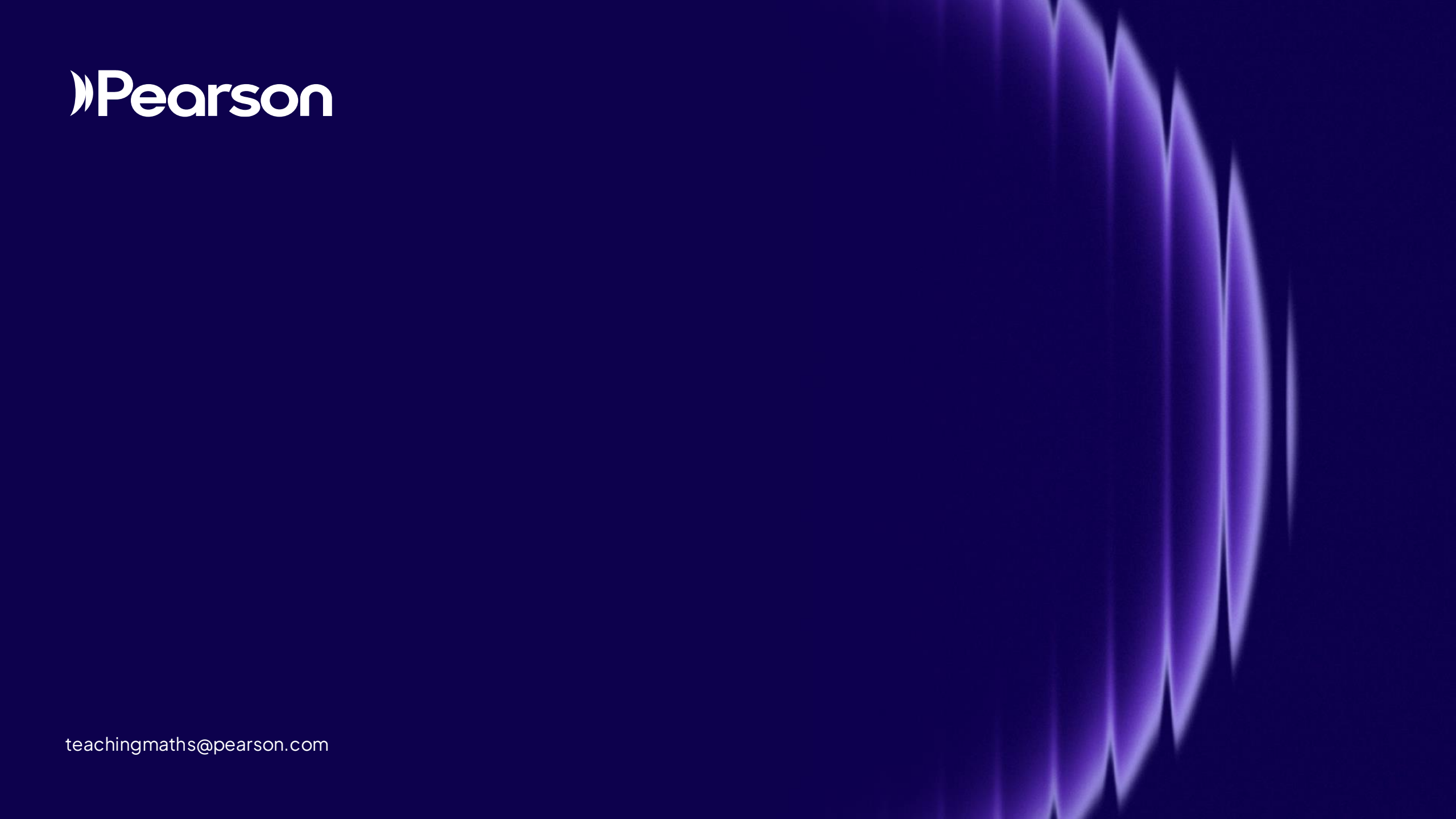
A Level Maths Accessibility Review

Following feedback from teachers, our own research and analysis on every exam series since 2017, we have made continuous improvements on the accessibility of our papers to ensure that we keep on improving students' exam experience.

These include but are not limited to:

- **Helping candidates get off to a good start**
- **Providing more restart opportunities**
- **Unlocking trapped marks assessing standard techniques (AO1)**
- **Making language more accessible and reducing reading time**

A level Mathematics: Review of the question paper improvements



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