



Maths Department

Instructions to all prospective

Maths A level students

Year 11 into 12

 $(x,\theta)dx = M\left(T(\xi)\cdot\frac{\partial}{\partial t}\right)$

The completion of the Sparx booklet is <u>mandatory</u>. You should complete this booklet during the summer prior to starting the course as preparation for an initial assessment during the first week. Your teachers will ask to see your completed work with all your working out. You will be given the opportunity to mark your work in class as part of your first lesson.

You should take this as an opportunity which will ensure a smoother start of your A level Mathematics course. All topics are GCSE grade 7/8/9.

If you are struggling with a topic, the Sparx video/task number is listed on page 2 of your booklet.

When you join us in September, prepare yourself for:

- More Maths lessons per week.
- A different style of teaching.
- A lot more homework.
- Taking more responsibility for your learning, catching up & understanding.
- Organising your resources use a ring binder with dividers.

Let's consider the implications of each of these:

More Maths lessons per week

On average, you will have six lessons per week (12 lessons over a two-week period). This means that topics will be covered at a faster pace than you are used to, and there will be much less time to review course content. Therefore, if you miss a lesson, the next lesson usually builds on content covered in that lesson, so it is important that you catch up as quickly as possible.

A different style of teaching

More lesson time is used for explanation by your teacher. There will be less time in lessons for you to practice new techniques, so you will have to ensure that you get adequate practice outside lessons.

A lot more homework

Your homework will be longer and more complicated. You will be expected to spend between 5 and 6 hours per week on homework, organizing your work, and reviewing material covered. The homework deadline will usually be from lesson to lesson.

Taking more responsibility for your learning

It is up to you to seek help if you do not understand something; this may have to be dealt with outside of lesson time. If you get stuck on a homework question, it is up to you to ensure there is no gap in your understanding. You can do this by checking through your notes, looking in your text book for a similar example, looking at the additional resources on Teams, asking a friend or your teacher for help. If you get back an assessment with a low grade, it is your responsibility to do corrections and follow up work to ensure your understanding of the topic is secure. Your teachers are always approachable and happy to help when you ask them.

Organising your resources

You will need a ring-binder folder with many dividers to accommodate all the different chapters of the book. Your teachers will be handing out notes, which you will need to file in the correct place in your folder. You will also be working on paper so ensure you always have enough in all your

lessons.



Transition Workbook

GCSE to A-Level



sparxmaths.com

In this booklet, there are a range of questions from key topics that you will have seen in GCSE and will be helpful for AS Level and A-Level.

Each topic has three sections:

- Introduce questions allow you to practise the key concepts.
- **Strengthen** questions build on your knowledge of the key concepts.
- **Deepen** questions will challenge your understanding.

Unless otherwise indicated, you may use a calculator.

Use the grid below to keep track of your progress in each topic. Tick the sections you have attempted. If you use Sparx Maths you can find even more questions by searching for the Sparx topic codes in Independent Learning.

	1	S	D	Sparx topic codes	Teacher comment
Surds	0	0	0	U499 U707 U281	
Expanding brackets	0	0	0	U768 U606	
Factorising quadratics	0	0	0	U178 U858	
Simplifying expressions	0	0	0	U662 U437	
Operations with algebraic fractions	0	0	0	U685 U457 U824	
Solving quadratic equations	0	0	0	U228 U960 U665 U150	
Quadratic graphs	0	0	0	U589 U769 U601	
Linear simultaneous equations	0	\bigcirc	\bigcirc	U760 U757	
Straight-line graphs	0	0	\bigcirc	U315 U477 U848 U669 U377 U898	
Right-angled trigonometry	\bigcirc	0	0	U283 U545 U170	
Further trigonometry	0	0	\bigcirc	U952 U591	

Key facts and formulae:

The Quadratic formula:

The solution of
$$ax^2 + bx + c = 0$$

where $a \neq 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Trigonometry:

In any right-angled triangle ABC where a, b and c are the length of the sides and c is the hypotenuse:

$$\sin A = \frac{a}{c}$$
 $\cos A = \frac{b}{c}$ $\tan A = \frac{a}{b}$





sine rule:
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$





Introduce

Q4	Write $(5 + \sqrt{12})(11 + \sqrt{3})$ in the form $a + b\sqrt{3}$, where a and b are integers.
	Answer:
Q5	Rationalise the denominator of $\frac{1+\sqrt{2}}{\sqrt{2}}$
	$\sqrt{2}$ Give your answer as a fraction in its simplest form.
	Answer:

Q1	Expand and fully simplify $(2\sqrt{6} - 5\sqrt{2})^2$
	Answer:
Q2	Rationalise the denominator of $\frac{15 + \sqrt{3}}{10\sqrt{3}}$
	Give your answer as a fraction in its simplest form.
	Answer:

Strengthen



Q3	Rationalise the denominator of $\frac{2\sqrt{7}}{3+\sqrt{7}}$
	Give your answer in its simplest form.
	Answer:
Q4	Write $\sqrt{12} + \frac{33}{\sqrt{3}}$ in the form $r\sqrt{3}$, where r is an integer.
	Angular
	Answer.



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Expand and fully simplify $(4 + \sqrt{7})^2 - (4 - \sqrt{7})^2$ Q1 Answer: Q2 Work out the value of x in the equation below. $x(\sqrt{11} - 2) = 21$ Give your answer in the form $a + b\sqrt{11}$, where a and b are integers. Answer:



Q1	Expand and fully simplify $(m + 9)(m + 2)$
	Answer:
Q2	Expand and fully simplify (2 a + 3)(4 a + 5)
	Answer:

Introduce

Q3	Expand and fully simplify (x - 3)(4 x + 9)
	Answer:
Q4	Expand and fully simplify (6 n - 5) 2
	Answer:

Introduce

Q1 Expand and fully simplify $2(4d + 5)(3d + 1)$ Answer: Answer: Q2 Expand and fully simplify $(x + 1)(x^2 + 3x + 5)$	
Q2 Expand and fully simplify $(x + 1)(x^2 + 3x + 5)$	
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Q2 Expand and fully simplify $(x + 1)(x^2 + 3x + 5)$	
Answer:	

Strengthen

Q3	Expand and fully simplify $(3n + 4)(5n + 2) + 5(n + 7)$
	Answer:
04	$\mathbf{F}_{i} = \mathbf{F}_{i} = \mathbf{F}_{i} + \mathbf{F}_{i} $
G4	Expand and fully simplify $(l - 2)(l + 3)(l - 4)$
	Answer:





Q4

Write the following expression in the form $\frac{1}{ax^b} + \frac{1}{cy^d}$ where a, b, c, and d are integers.

$$\left(\frac{1}{5x} + \frac{1}{4y}\right) \left(\frac{1}{25x^2} - \frac{1}{20xy} + \frac{1}{16y^2}\right)$$

Answer:

Show that $(x^{2} + 1)(y^{2} + 4) \equiv (xy - 2)^{2} + (2x + y)^{2}$

Introduce

Q1	Fully factorise y^2 + 9 y + 20	
		Answer:
-		
Q2	Fully factorise x^2 - x - 20	
		Answer:
Q3	Fully factorise w^2 - 15 w + 54	
		Answer:

Strengthen

Q1	Fully factorise x^2 - 16	
		Answer.
Q2	Fully factorise $2r^2$ + 15 r + 7	
		Answer:
Q3	Fully factorise $5x^2 + 22x + 8$	
		A
		Answer:



Q1	Fully factorise 49 h^2 - m^2	
		Answer:
Q2	Fully factorise 7 b - b^2 - 10	
	,	
		Answer
-		Allswei.
Q3	Fully factorise 4 k^2 - 25 n^2 - (2 k -	$(5n)^2$
		Answer:



Fully simplify the expression $4y^5$ x $3y^2$ Q1 Answer: Simplify $(h^{-5})^3$ Q2 Give your answer without any negative indices. Answer: Write $\frac{2t^6u}{8t^3}$ as a fraction in its simplest form. Q3 Answer:

Simplifying expressions

Introduce

Fully simplify $\left(\frac{t^3}{u^5}\right)^2$ Q4 Answer: Write $\frac{33xy + 9x}{18x}$ as a fraction in its simplest form. Q5 Answer: Fully simplify $\frac{6a + 42}{a^2 + 11a + 28}$ Q6 Answer:

Simplifying expressions

Strengthen







Q1	Fully simplify $\frac{14a}{b} \times \frac{b}{2}$
	Answer:
Q2	Fully simplify $\frac{6a}{v} \div \frac{2a}{5}$ Give your answer as a fraction.
	Answer:
Q3	Fully simplify the expression below to give a single fraction. $\frac{n+2}{5} + \frac{6n}{7}$
	Answer:

Introduce

Answer:

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Sparx Maths

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Q3	Write the following as a single fraction in its simplest form: $\frac{2x^2 - 11x + 12}{x + 5} \div (4x^2 - 6x)$
	x + 5 Give your answer fully factorised.
	Answer:
Q4	Fully simplify $\frac{4ab^2}{k} \times \frac{3ak}{12k} \times \frac{7}{5ab}$
	Give your answer as a fraction.
	Answer:

Strengthen

Q2

Fully simplify
$$\frac{7}{36-x^2} - \frac{3}{6+x}$$

Give your answer fully factorised.

Answer:

Write the following as a single fraction in its simplest form:

6 - $(x + 4) \div \frac{x^2 + 11x + 28}{x - 7}$

Give your answer fully factorised.

Answer:

Introduce

Q3	Using the quadratic formula, so	live $6x^2 - 35 = -11x$	
		Answer:	
Q4	Solve $3r(3r - 4) = 2$ Give your answers to 2 d.p.	Answer:	
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Q1	Solve $x(x+4) - 4(5x+9) = 0$
	Answer:
Q2	Jessica thinks of a positive number, n , which is less than 1 She adds this number to its reciprocal and gets 2.9
	Work out the value of m
	Give your answer as a fraction in its simplest form.
	Answer:

G3 Solve
$$\frac{4}{y-1} - \frac{5}{y+2} = \frac{3}{y}$$

Answer: ______
G4 $x = \frac{-3 \pm \sqrt{29}}{2}$
There is only one equation of the form $x^2 + bx + c = 0$ that gives these values of x as solutions.
Work out the values of b and c .

Introduce

P is the turning point of the curve.

Work out the coordinates of P.

Work out the coordinates of the turning point of the curve y = x^2 - 5x + 1

Answer: (_____, ____)

Q1

P is the turning point of the curve.

Work out the coordinates of P.

The diagram below shows the graph of $y = 2x^2 - 5x - 3$

Use the diagram to estimate the solutions to $2x^2 - 5x - 3 = -2x + 2$ Give any decimal answers to 1 d.p.

Answer:

Q3

The diagram below shows the graph of $y = 2x^2 + 4x - 1$ The equation $2x^2 + 4x - 1 = k$ has solutions at x = -3 and x = 1

What is the value of k?

- A curve has the equation $y = -x^2 + 16x 65$
- a) Work out the turning point of the curve.

Answer: a) (_____, ____)

b) By considering the position of the turning point and the shape of the curve, work out how many real roots $y = -x^2 + 16x - 65$ has.

Answer: b)

Q3	Solve the following simultaneo	ous equatic	ons:	
	15a - 4b = 25			
	5a + 2b = 25			
		Answer:	<i>a</i> =	<i>b</i> =
Q4	Solve the following simultaneo	ous equatic	ons:	
	2x + 3y = 8			
	3x + 4y = 11			
		Answer:	<i>x</i> =	<i>y</i> =

Q4

Solve the following simultaneous equations:

$$7y + 2x = \frac{23}{2}$$

$$5y + 3x = 9$$
Answer: $x = \dots \qquad y = \dots$
Solve the following simultaneous equations:
$$4.6t + 8.1u = 104$$

$$3.8t - 2.7u = -8$$
Answer: $t = \dots \qquad u = \dots$

Q4

Solve the following simultaneous equations:

$$\frac{4}{7x \cdot 4} = \frac{1}{6y}$$

$$\frac{5x}{3y + 2} = 4$$
Answer: $x = \dots \quad y = \dots$
Solve the following simultaneous equations:
$$2^{x} = 4^{(7 - 2y)}$$

$$3^{(5x - 13y)} = 81$$
Answer: $x = \dots \quad y = \dots$

Introduce

Q4	A straight line has a gradient of 3 and passes through the point (2, 10)
	Work out the equation of the line.
	Answer
Q5	Work out the equation of the straight line that passes through (2, 3) and (5, 18)
	Answer:

Introduce

Strengthen

Q1	A straight line has a gradient of $-\frac{3}{4}$, and passes through the point (32, 12)
	Work out the equation of the line.
	Answer:
Q2	The diagram below shows point P and Line A. Line B is perpendicular to line A and passes through point P.
	What is the equation of line B?
	$ \begin{array}{c} $
	Answer:

Strengthen

Q1 Write an expression, in terms of h, for the gradient of a line perpendicular to the line segment joining (3h, 20) to (6h, 8)
Give your answer as a fully simplified fraction.

Answer:

Q2

The triangle ABC has an area of 24 square units.

What are the coordinates of point B?

Line A has the equation y + 2x = 14The gradient of line B is twice the gradient of line A.

Work out the ratio of the length of OQ to the length of OR. Give your answer in its simplest form.

A circle, centre O, passes through the point (6, -12), as shown.

Work out the equation of the tangent to the circle at this point. Give your answer in the form y = mx + c, where m and c are integers or fractions in their simplest form.

Q4

Q3

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Q4

The graph below shows the line with equation y = 5x + 2The axes both have the same scale.

Calculate the size of angle θ . Give your answer in degrees to the nearest integer.

Q2

Using the sine rule, calculate the length x. Give your answer to 1 d.p. 40 \boldsymbol{x} 57° 9 cm Not drawn accurately Answer: _____ cm Using the cosine rule, work out the length y. Give your answer to 1 d.p. 65° 6 m 11 m y Not drawn accurately Answer: _____ m

Use the sine rule to calculate angle θ . Give your answer to 1 d.p. 72° 7 cm 10 cm Not drawn accurately Answer: Use the cosine rule to calculate the size of angle x. Give your answer to the nearest degree. 17 cm 19 cm \boldsymbol{x} 13 cm Not drawn accurately Answer:

Strengthen

1 hour of Sparx Maths a week significantly improves student grades

Can save up to 200 hours of teacher time per year

Covers ages 11–16 for UK and international mathematics curricula

Provides powerful, actionable insights for school leaders and teachers

The market leaders in maths

Also includes a tables module which includes a baseline assessment for your year 7s

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