

SIXTH FORM BRIDGING WORK & YEAR 11 DISCOVERY



Get Ready for Maths & Further Maths

Subject mind-set and BIG picture thinking & links...

As technology continues to advance so too does mathematics, increasing its essential role in both everyday and corporate life. If you have a flair for numbers and enjoy maths you will have an opportunity to forge a career at the forefront of technological advancement.

A Level Maths is an interesting and challenging course which extends the methods you learned at GCSE and includes other applications such as Statistics, Mechanics and Decision Mathematics.

Please explore the following tasks:

Work to complete

Sparx Maths GCSE to A-level Transition booklet

You can access supportive videos through your Sparx school accounts

Recommended text books

Maths:

- Pearson Edexcel AS and A level Mathematics Pure Mathematics Year 1/AS Textbook
- Pearson Edexcel AS and A level Mathematics Statistics and Mechanics Year 1/AS Textbook

Further Maths:

- Pearson Edexcel AS and A level Further Mathematics Core Pure Mathematics Book 1/AS Textbook
- Pearson Edexcel AS and A level Further Mathematics Decision Mathematics Book 1/AS Textbook

Recommended websites you should be familiar with

www.physicsandmathstutor.com

- Whole past papers
- Questions by topic
- Cheat Sheets and instructional videos

www.alevelmathsrevision.com

- Exam questions by topic
- Specific A* exam questions

www.madasmaths.com

• Maths booklets with exam questions by topic and worked solutions

www.studywell.com

- Exam questions by topic
- Videos and tutorials for questions
- Whole practice papers

https://www.youtube.com/c/hindsmaths

https://www.youtube.com/c/BicenMaths

• Video lessons on each subchapter of the textbook if you need a topic retaught

Related magazines, blogs subject experts

Alex Bellos - Alex's adventures in numberland (Royal society talk on BBC iPlayer, Google talk on YouTube) https://www.youtube.com/watch?v=WBqWYJUc_rc Hans Rosling - The Joy of stats (full episode sometimes on BBC iPlayer, clips on YouTube) https://www.youtube.com/watch?v=en2ix9f8ceM&list=PLBE30C2B39FE4BD1C Hans Rosling - The best stats you've ever seen. (YouTube Ted talks) https://www.youtube.com/watch?v=hVimVzgtD6w Richard P. Feynman- Character of Physical law (Series of 7 lectures) https://www.youtube.com/watch?v=j3mhkYbznBk&list=PLez3PPtnpncQLg_H7f6T9yJmJ2aCIBUHS Short interesting clips about Maths https://www.youtube.com/@numberphile

Recommended books & revision guides

There are lots of great books on maths including;

- How Not to Be Wrong: The Power of Mathematical Thinking by Jordan Ellenberg
- Humble Pi: A Comedy of Maths Errors Paperback by <u>Matt Parker</u>
- Alex's Adventures in Numberland by Alex Bellos
- Godel, Escher, Bach: An Eternal Golden Braid Paperback by <u>Douglas Hofstadter</u>
- From Here To Infinity Paperback by <u>lan Stewart</u>
- The Man Who Loved Only Numbers: The Story of Paul Erdos and the Search for Mathematical Truth: The Story of Paul Erdös and the Search for Mathematical Truth Paperback by Paul Hoffman
- The Code Book: The Secret History of Codes and Code-breaking by <u>Simon Singh</u>
- A Mathematician's Apology (Canto Classics) Paperback by <u>G. H. Hardy</u>

Possible virtual places to visit

https://www.mrbartonmaths.com/blog/links-best-maths-websites-world/

 ${\it Corin. Allen @shoreham-academy.org}$

It is time to look forward and explore the courses you planning to study in the future.

Getting organised: Begin to set up a Learning folder digital or at home for your chosen subjects.

(Shoreham Sixth Form has a way of organising this)



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	\bigcirc	U768 U606	
Factorising quadratics	0	0	\bigcirc	U178 U858	
Simplifying expressions	0	0	0	U662 U437	
Operations with algebraic fractions	0	0	\bigcirc	U685 U457 U824	
Solving quadratic equations	0	0	0	U228 U960 U665 U150	
Quadratic graphs	0	0	\bigcirc	U589 U769 U601	
Linear simultaneous equations	0	0	\bigcirc	U760 U757	
Straight-line graphs	0	0	0	U315 U477 U848 U669 U377 U898	
Right-angled trigonometry	0	0	\bigcirc	U283 U545 U170	
Further trigonometry	\bigcirc	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:

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



In any triangle ABC where a, b and c are the length of the sides:

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 $\frac{1+\sqrt{2}}{\sqrt{2}}$
	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 $\frac{15 \pm \sqrt{3}}{10\sqrt{3}}$ 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.
	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 $(2a + 3)(4a + 5)$
	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:
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:
-	
Q4	Expand and fully simplify $(t - 2)(t + 5)(t - 4)$
	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	
		Angulari
		Answer:
Q2	Fully factorise $2r^2$ + 15 r + 7	
		Answer:
Q3	Fully factorise $5x^2 + 22x + 8$	
		Answer:



Q1	Fully factorise 49 h^2 - m^2	
	Ans	ver:
Q2	Fully factorise 7 b - b^2 - 10	
	Ans	ver:
-	2 - 2 -	с
Q3	Fully factorise $4k^2$ - $25n^2$ - ($2k$ - $5n$	2
	Ans	ver:



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







(Introduce

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.
Q3	Fully simplify the expression below to give a single fraction.
	$\frac{n+2}{5} + \frac{6n}{7}$ Answer:



Answer:

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Q3	Write the following as a single fraction in its simplest form: $\frac{2x^2 - 11x + 12}{x + 5} \div (4x^2 - 6x)$
	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:















Q3	Using the quadratic formula, so	blve $6x^2 - 35 = -11x$	
		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 n . 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.



Q4

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)















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:
$$4.6t + 8.1u = 104$$

$$3.8t - 2.7u = -8$$







Q4

Solve the following simultaneous equations:

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

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

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



Introduce

	Straight-line graphs 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:

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
	Alswel.
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?
	(y) = (3, 5) $(y) = (3, 5)$
	Answer:



Strengthen

Straight-line graphs Deepen Write an expression, in terms of h_i , for the gradient of a line **perpendicular** to the Q1 line segment joining (3h, 20) to (6h, 8)Give your answer as a fully simplified fraction. Answer: The triangle ABC has an area of 24 square units. Q2 What are the coordinates of point B? \boldsymbol{y}





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.



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













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