Preparation for A level Mathematics

Bridging Booklet

Before you return in September, you are required to complete all the questions in this Bridging Booklet to the best of your ability. These will be marked in lesson during your first lesson.

The skills used in this task will be used in your Mathematics A Level. To be successful in this subject and enjoy studying at A level, you should aim to be fluent in most of these skills in this booklet and be confident to reflect and identify successes, troubles and where to go to seek advice. Your teacher will be able to guide you through everything available to you in your first lesson.

If you are struggling to answer any of the questions you are free to seek assistance to aid you. You will see MathsWatch clip number(s) on each question should you need support. If you are a Wootton student, you should still have your login details. If you are an external student, or otherwise, you can use the following login details below:

> Website: vle.mathswatch.co.uk
> Username: Student1@wootton (There will be 5 logins set up from 1-5)
> Password: year12

During the second week of the course you will be tested on some of these skills. Your completion of this work, and your grade in the test, will be strong indicators as to your suitability for this subject. Please keep this in mind.

A reflection sheet can be found on the penultimate page to keep track of progress and summarise the contents of this Bridging Booklet.

Key details of the A Level Mathematics course can be found on the last page.

1. Expanding Brackets – clips 93, 134 & 178

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

2. Factorising Expressions – clips 94, 157 & 192

a) $16x^2 - 20x$	**b)** $x^2 - 7x - 18$	**c)** $4x^2 - 16x + 15$

3. Solving Linear Equations – clip 135

a)	**b)**
$$3(2x - 7) = 4x + 12$$	$$\frac{3x - 4}{5} = \frac{2x + 7}{3}$$

4. Solving Quadratic Equations – clips 157 & 191

a) $x^2 - 2x - 24 = 0$	**b)** $3x^2 - 17x + 10 = 0$	**c)** $2x^2 + 10x - 5 = 0$

5. Completing the Square – clip 209a

a) $x^2 + 8x - 5$	**b)** $x^2 - 5x + 2$	**c)** $2x^2 + 8x - 14$

6. Solving Inequalities – clips 139 & 212

a)	**b)**
$8(3x - 7) < 10x - 5$	$x^2 - 2x - 32 \geq 0$

7. Solving Simultaneous Equations – clip 162 & 211

a)

$$4x + 7y = 36$$
$$3x - 5y = -14$$

b)

$$y = 3x - 7$$
$$y = x^2 + 8x - 21$$

8. Laws of Indices (Evaluate) – clips 154 & 188

a)

$$5^{-3}$$

b)

$$81^{\frac{1}{2}}$$

c)

$$27^{\frac{2}{3}}$$

d)

$$\left(\frac{9}{4}\right)^{-\frac{3}{2}}$$

9. Laws of Indices (Simplifying) – clip 131

a)

$$3a^3b^2 \times 7a^4b^6$$

b)

$$\frac{8x^4y^7}{4x^6y^5}$$

c)

$$(5x^2)^3$$

10. Surds (Simplifying) – Clips 207a & b

a) $\sqrt{5} \times \sqrt{7}$	b) $\sqrt{18} \div \sqrt{2}$	c) $\sqrt{72}$	d) $5\sqrt{3} + 6\sqrt{3}$

11. Surds (Rationalising) – clip 207c

a)	b)	c)
$\dfrac{5}{\sqrt{7}}$	$\dfrac{3 - \sqrt{5}}{\sqrt{5}}$	$\dfrac{4}{2 + \sqrt{3}}$

12. Algebraic Fractions (Simplifying) – clip 210a

a)	b)	c)
$\dfrac{4(2x + 1)(x - 3)}{(2x + 1)}$	$\dfrac{x^2 + x - 12}{x^2 - 9}$	$\dfrac{2x^2 - 7x - 15}{x^2 - 12x + 35}$

13. Functions (Composite) – clip 215

$f(x) = 3x + 7 \quad g(x) = x^2 + 5$	$f(x) = x^2 + 6 \quad g(x) = 2x - 3$
a) $fg(5) =$	**a)** $gf(x) =$
b) $gf(1) =$	**b)** $fg(x) =$

14. Functions (Inverse) – clip 214

a)	**b)**
$f(x) = \dfrac{3x-2}{5}$, find $f^{-1}(x)$	$g(x) = \dfrac{2x}{x-5}$, find $g^{-1}(x)$

15. Equations of Circles – clip 196

a) Find the radius of the circle, $$x^2 + y^2 = 30$$	**b)** State the equation of a circle centred at the origin and with a diameter of 20cm.

16. Equations of Straight Lines – clips 159 & 208

a) A straight line passes through the point through the point (3,7) and (6,16). Find the equation of this line?	**b)** A straight line passes through the point (4, 5) and is perpendicular to the line y = 0.5x + 9. Work out the equation of the line?

17. Sketching Graphs – clips 76 & 194

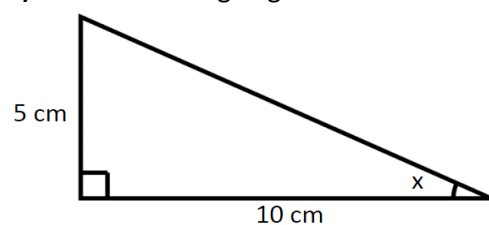| **a)** Labelling all intersections, sketch $$y = \frac{1}{x}$$	**b)** Labelling all intersections, sketch $$y = 2^x$$

18. Trigonometry (SOHCAHTOA) – clip 168

a) Find the missing length x	**b)** Find the missing angle x
14 cm x 37°	5 cm 10 cm x
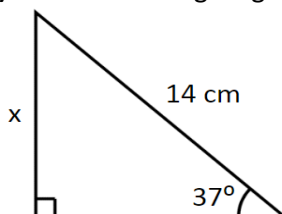
19. Trigonometry (Sine & Cosine Rules) – clips 201 & 202

a) Find $x°$

6.7 cm

5.5 cm

41°

x°
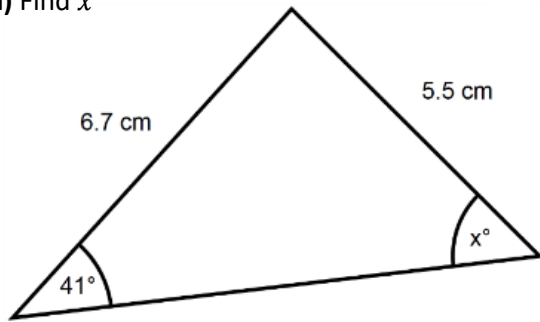
b) ABC is a triangle with sides 9.2cm, 8.6cm and 6.7cm. Find the size of the largest angle.

20. Vector Geometry – clip 219
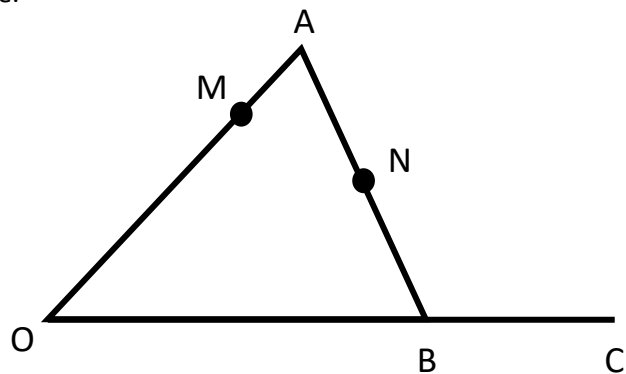
OAB is a triangle and OBC is a straight line.

$\overrightarrow{OA} = 4\boldsymbol{a}$
$\overrightarrow{OB} = 2\boldsymbol{b}$
$\overrightarrow{BC} = \boldsymbol{b}$
$\overrightarrow{OM} = 3\boldsymbol{a}$

N is the midpoint of AB.

a) Work out $\overrightarrow{AN}$ in terms of **a** and **b**. Simplify your answer.

A
M
N
O
B
C

b) Work out $\overrightarrow{MN}$ in terms of **a** and **b**. Simplify your answer.

c) Show that M, N AND C lie on a straight line.

21. Vectors – clip 174

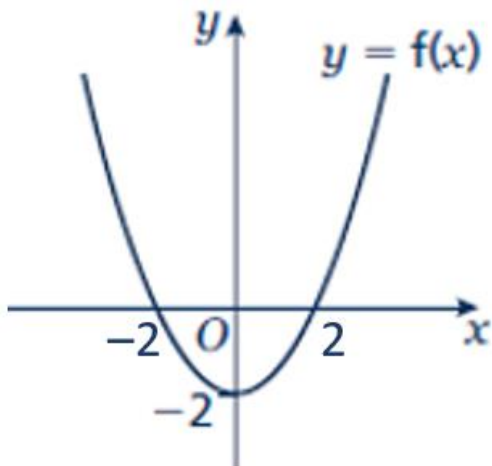| a)	b) To 3sf, find the magnitude of
$$\mathbf{a} = \begin{pmatrix} 3 \\ 5 \end{pmatrix} \qquad \mathbf{b} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$$ Find $3\mathbf{a} - 4\mathbf{b}$	$$\begin{pmatrix} 6 \\ 3 \end{pmatrix}$$

22. Transformations of Graphs – clips 196a and 196b

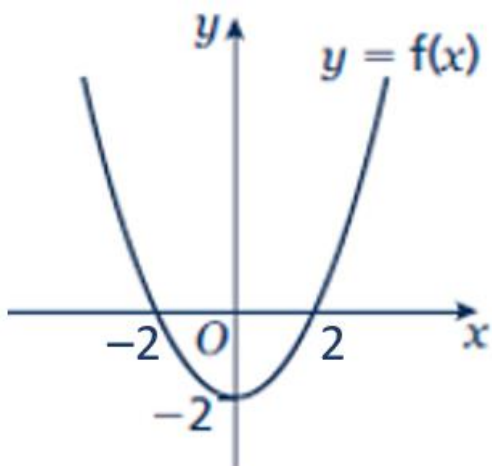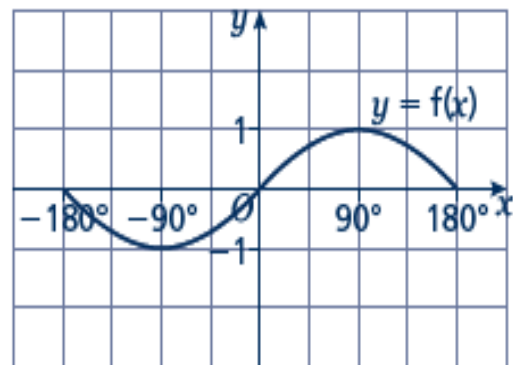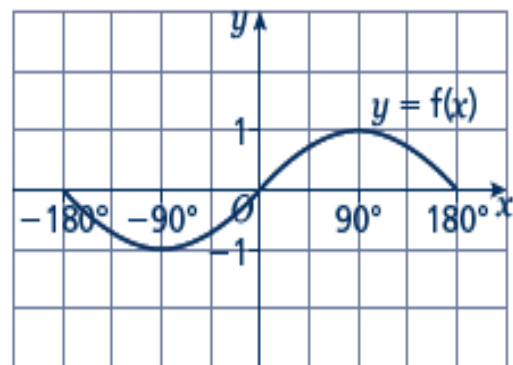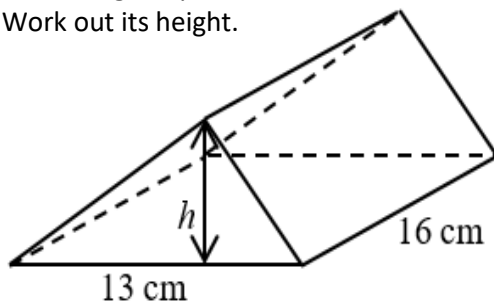| a) The graph shows the function $y = f(x)$. On the axes sketch and label the graphs of: **i)** $y = f(x) + 4$	b) The graph shows the function $y = f(x)$. On the axes sketch and label the graphs of: **i)** $y = 2f(x)$
ii) $y = f(x + 2)$	**ii)** $y = -f(x)$

23. Surface Area and Volume – clip 114a and 119

a) The triangular prism has volume 1768 cm³. Work out its height.

h

13 cm

16 cm

b) The diagram shows a solid triangular prism. All the measurements are in centimetres. The volume of the prism is V cm³. Find a formula for V in terms of x. Give your answer in simplified form.

x

$x + 8$

$2x + 1$
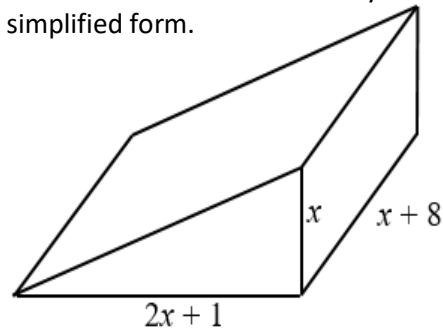
24. Rearranging Equations – clips 136 and 190

a) Make a the subject.

$$s = ut + \frac{1}{2}at^2$$
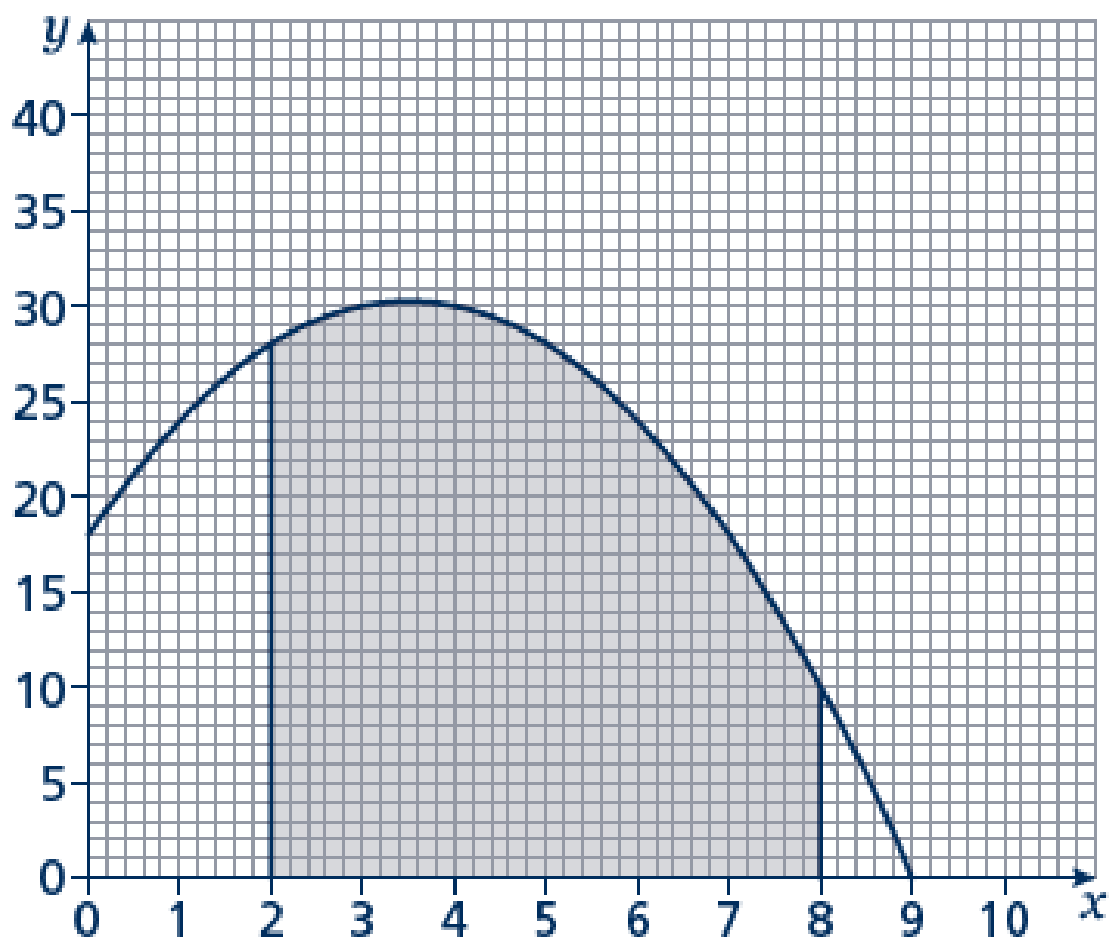
a) Make t the subject.

$$s = ut + \frac{1}{2}at^2$$

25. Area Under a Curve – clip 216

Estimate the shaded area shown on the axes.
Use six strips of width 1 unit.

Comment whether your estimate is an overestimate or underestimate. Justify your answer.

SELF REFLECTION

Once the work is completed, fill in the self-reflection table below.

After going through the work in class, you will revisit and update this reflection table, including adding an MRI – targets moving forward.

Question. Topic – MathsWatch Clip(s)	WWW ☺				EBI ☹
1. Expanding Brackets – clips 93, 134 & 178					
2. Factorising Expressions – clips 94, 157 & 192					
3. Solving Linear Equations – clip 135					
4. Solving Quadratic Equations – clips 157 & 191					
5. Completing the Square – clip 209a					
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9. Laws of Indices (Simplifying) – clip 131					
10. Surds (Simplifying) – clip 209a & b					
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14. Functions (Inverse) – clip 214					
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21. Vectors – clip 174					
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25. Area Under a Curve – clip 216a					

MRI:

A level Mathematics Key Information

What is A-Level Mathematics?

- More in-depth than GCSE
- Contain Pure Mathematics (67%) and
  Statistics and Mechanics (33%) components.
- Integrated use of technology
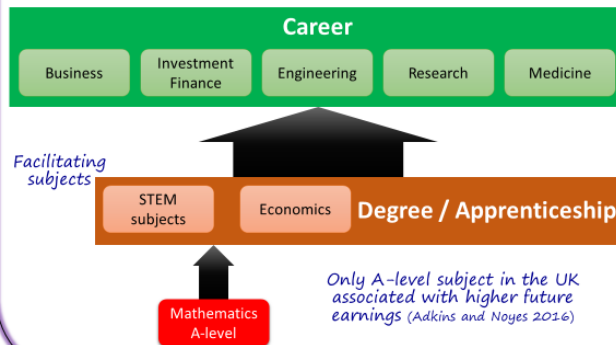
New topics not seen before:
- Accurate Gradients of Curves
- Accurate Areas with Curves
- Mechanics for Mathematicians
- In-depth Statistical Applications
- Trigonometry like you've never seen it before!

KIMBERLEY SIXTH FORM COLLEGE

Mathematics Induction 2022

Wootton Academy Trust

Where can Mathematics lead?

Career

| Business | Investment Finance | Engineering | Research | Medicine |

Facilitating subjects

| STEM subjects | Economics | **Degree / Apprenticeship** |

Mathematics A-level

Only A-level subject in the UK associated with higher future earnings (Adkins and Noyes 2016)

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Equipment & Technical Specifications

Essential:
- Black pens
- 15cm ruler
- A4 paper / A4 notepad
- Folders * and associated folder organisers
- CASIO FX-CG50 Graphic Calculator **
- Microsoft Teams phone application (and photo capability)

Recommended:
- Black dry wipe pens

Optional:
- Class textbooks ***
- Access to Excel 2016 (or newer) ****

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Year 1/AS

* An electronic analogue is also suitable

** These can be bought at a reduced price (approx. £70) from Kimberley college through Wisepay. Minimum requirements for an alternative calculator must involve Statistical Distribution functions, however, the course will be tailored for the Graphical Calculator above in mind.

*** Online access will be provided by the college. The first book in the series of textbooks you will need for your course has the ISBN 978-1292183398 in case you would like a physical copy.

**** Access will be provided within your college IT account. The College has Remote Desktop functionality. Older versions of Excel are supported but some functionality will not be available.