

A1 Maths Starting With Confidence Booklet

Name:

Are you ready for A1 Maths Test %


Welcome to BHASVIC Maths. We are an Outstanding Department and we aim for you to be outstanding too! This booklet has been designed to help you to bridge the gap between GCSE Maths and A1 Maths. Be sure to complete it all and bring it to your first lesson!

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Read the below carefully before you start this booklet

Things to do before enrolment

1. You must complete **all** of this booklet and bring it to your **first lesson**. Your teacher will expect this to be **100% complete and correct** when you arrive. Write all your working in the booklet.
2. Check all of your answers to the questions against those on the answer sheet (Page 3) and tick them off as you go.
3. Developing strong Algebra is very important in A level maths. When you see this icon  the exercises should be completed **without** using a calculator. These questions will help you practice and hone your skills.
4. Get help when you are stuck! Maths can be tough and getting stuck is normal. What makes a successful BHASVIC maths student is one who proactively seeks help to solve problems.

How to get help: Watch the videos on any concept you need help with and join BHASVIC Maths Facebook to ask for advice. You could email your transition mentor or **attend the support sessions on September 1st, 4th, and 5th** after enrolment.

5. Make sure you are confident with all of the concepts in this booklet. There will be a **test** in your second maths lesson on the topics in this booklet to assess your skills.
6. A level Maths is a big step up from GCSE and your calculator needs to step up too! You will need at least the **CASIO FX-991EX** calculator for this course (£20-£25). Better still, especially if you are going to be studying Further Maths and/or considering a degree in Maths, Physics or Engineering, we recommend a **graphical calculator** such as the CASIO FX-CG50 (approx. £120). *(Please contact our Welfare Co-ordinator Aoife Tobin if you think you might be eligible for financial assistance)*

WHEN (NOT IF) YOU GET STUCK

Studying Maths at Advanced Level is all about Problem Solving. This is a skill that takes work and development. The first stage of solving problems is being stuck. You may get stuck for a short while, or you may find that if you leave the problem for a day or so something clicks and you figure it out (which is a great feeling!). Sometimes you will be stuck to the point that you need help. This is perfectly normal. In fact, it is **expected** that you will get stuck and will need help at some point.

Some of these topics may seem unfamiliar to you, but they are all GCSE level topics and you need to be able to perform all of these techniques **before** you begin studying A level here.

So, when you get stuck:

- Watch the 'Need Help?' YouTube videos by scanning the QR codes for more explanation and examples, or type the video titles directly into YouTube to access them
- Look again at the examples in the booklet and work through them to make sure you understand each step they have taken.
- Post a question on the Facebook 'BHASVIC Maths' wall
- Try looking up the topic in a GCSE higher tier textbook or revision guide (your local library will have one) or look online
- E mail your transition mentor (the letter you got on Moving On Day) to ask for help
- Meet up with a friend if you know they too are studying maths here and work through the problem together
- Attend the Drop In help sessions in the days after enrolment on 31st August, 1st September, and 4th September from 9am until midday in room 3 (if you go Reception, they will show you where to go)
- If you have any questions about the course you could also e mail Scott (Head of Maths) on s.cosby@bhasvic.ac.uk

SECTION 1, 2, 3, 4, & 5 ANSWERS

SECTION 1 – INDICES

EX 1A:

1) $\frac{1}{64}$ 2) $\frac{1}{3}$ 3) $\frac{1}{3}$ 4) 32 5) 8 6) $\frac{1}{128}$

EX 1B:

1) $\frac{1}{5}x$ 2) $\frac{3}{2}x^{-\frac{1}{2}}$ 3) $\frac{1}{3}x^{-\frac{3}{2}}$ 4) $2x^{\frac{2}{3}}$ 5) $2x^{-\frac{3}{2}} + 4x^{-2}$

6) $\frac{2}{3}x^{-1} - \frac{4}{3}x^{-2}$ 7) $\frac{1}{4}x^{-3} - x^{-2}$ 8) $x^{-1} - 4x^{-\frac{1}{2}}$ 9) $x^{\frac{3}{2}} - 3x^{-\frac{1}{2}}$

10) $x^{-1} - 2x^{-2}$ 11) $2x^{-\frac{1}{2}} + 1$ 12) $\frac{1}{2} + x^{-1}$ 13) $\frac{1}{3}x^{-\frac{3}{2}} + 2x^{-2}$

14) $2x^{-1} - x^{-2}$

EX 1C:

1) $x = \frac{1}{27}$ 2) $x = \frac{1}{25}$ 3) $x = 32$ 4) $x = 64$ 5) $x = \frac{1}{81}$ 6) $x = \frac{1}{125}$

SECTION 2 – FRACTIONS

EX 2A:

1) $3x$ 2) $\frac{2x+3}{x^2}$ 3) $\frac{3x}{10}$ 4) 2 5) $\frac{27}{8}$ 6) $-\frac{8}{11}$

7) $\frac{3x-4}{2x}$ 8) $\frac{2x^2+25}{5x}$

EX 2B:

1) $x = \frac{10}{33}$ 2) $x = \frac{23}{2}$ 3) $x = \frac{6}{5}$ 4) $x = \frac{5}{9}$ 5) $x = \frac{14}{45}$ 6) $x = \frac{1}{4}$

SECTION 3 – SURDS

EX 3A:

1) $3\sqrt{3}$ 2) $3\sqrt{5}$ 3) $2\sqrt{3}$ 4) $4\sqrt{3}$ 5) $5\sqrt{3}$ 6) $\sqrt{3}$

7) $\sqrt{2}$ 8) 3 9) 3

EX 3B:

1) $17\sqrt{3}$ 2) $\sqrt{2}$ 3) $-4\sqrt{5}$ 4) $-4\sqrt{7} - 14\sqrt{2}$

EX 3C:

1) $\frac{\sqrt{2}}{2}$ 2) $\frac{2\sqrt{7}}{7}$ 3) $-\frac{7\sqrt{5}}{20}$ 4) $\frac{\sqrt{6}}{9}$ 5) $-1 + \sqrt{2}$

6) $10 + 5\sqrt{3}$ 7) $2 + 2\sqrt{3}$ 8) $\frac{-4+6\sqrt{2}}{7}$

SECTION 4 – EXPANDING BRACKETS

EX 4:

1) $2x^3 - 11x^2 - 21x$

2) $10x^3 - 11x^2y + 20x^2 + 3xy^2 - 12xy$

3) $x^3 - 13x - 12$

4) $18x^3 - 15x^2 - 4x + 4$

5) $x^3 - xy^2 - x^2 + y^2$

6) $8x^3 - 36x^2y + 54xy^2 - 27y^3$

7) $abc + abd + c^2a + cad + b^2c + b^2d + bc^2 + bcd$

SECTION 5 – FACTORISING

EX 5A:

1) $(x + 1)(x - 1)$

2) $(2x - 3)(2x + 3)$

3) $(7 - 3x)(7 + 3x)$

4) $(2\sqrt{2} - \sqrt{2}x)(2\sqrt{2} + \sqrt{2}x)$

5) $(b^2 - c^4)(b^2 + c^4)$

6) $(\sqrt{a} - \sqrt{b})(\sqrt{a} + \sqrt{b})$

EX 5B:

1) $x(3x + 4)$

2) $2y(2y + 5)$

3) $x(x + y + y^2)$

4) $2xy(4y + 5x)$

5) $(x + 1)(x + 2)$

6) $(2x - 3)(x + 1)$

7) $(5x + 2)(x - 3)$

8) $(1 - x)(6 + x)$

9) $x(x + 6)(x - 6)$

10) $x(2x - 3)(x + 5)$

MINI TEST 1 - SECTIONS 1, 2, 3, 4 & 5 ANSWERS

1) a) $\frac{1}{3}$ b) $\frac{1}{128}$

2) a) $\frac{2}{3}x^{-1} - \frac{4}{3}x^{-2}$ b) $x^{\frac{3}{2}} - 3x^{-\frac{1}{2}}$

3) a) $x = \frac{1}{25}$ b) $x = \frac{1}{125}$

4) a) $\frac{2x^2+25}{5x}$ b) 2

5) $x = \frac{1}{4}$

6) $10 + 5\sqrt{3}$

7) $18x^3 - 15x^2 - 4x + 4$

8) a) $2xy(5x + 4y)$ b) $x(x - 6)(x + 6)$

SECTION 1 – INDICES



WRITE YOUR ANSWERS DIRECTLY INTO THIS BOOKLET, AND TICK THE BOXES WHEN YOU HAVE CHECKED THAT YOU ARE CORRECT

At BHASVIC we use a lot of video learning for students to feel prepared before classes and to access help. Scan the QR codes using your SmartPhone or Tablet (or type in the video title into Youtube) and we can get started 😊

EXERCISE 1A – SIMPLIFYING INDICES

Evaluate the following:



Need help? [BHASVICMATHS SWC HELP EX1A](#)

1) $2^{-6} =$ <input type="text"/>	2) $9^{-\frac{1}{2}} =$ <input type="text"/>	3) $81^{-\frac{1}{4}} =$ <input type="text"/>
4) $4^{\frac{5}{2}} =$ <input type="text"/>	5) $32^{\frac{3}{5}} =$ <input type="text"/>	6) $16^{-\frac{7}{4}} =$ <input type="text"/>

EXERCISE 1B

Write these in the form of $ax^n + bx^m$:



Need help? [BHASVICMATHS SWC HELP EX1B](#)

1) $\frac{x}{5} =$ <input type="text"/>	2) $\frac{3}{2\sqrt{x}} =$ <input type="text"/>	3) $\frac{\sqrt{x}}{3x^2} =$ <input type="text"/>
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<p>4) $\sqrt[3]{8x^2} =$</p> <p style="text-align: right;"><input type="text"/></p>	<p>5) $\frac{2\sqrt{x}+4}{x^2} =$</p> <p style="text-align: right;"><input type="text"/></p>	<p>6) $\frac{2x-4}{3x^2} =$</p> <p style="text-align: right;"><input type="text"/></p>
<p>7) $\frac{1-4x}{4x^3} =$</p> <p style="text-align: right;"><input type="text"/></p>	<p>8) $\frac{(1-4\sqrt{x})}{x} =$</p> <p style="text-align: right;"><input type="text"/></p>	<p>9) $\frac{(x^2-3)}{\sqrt{x}} =$</p> <p style="text-align: right;"><input type="text"/></p>
<p>10) $\frac{x-2}{x^2} =$</p> <p style="text-align: right;"><input type="text"/></p>	<p>11) $\frac{(2+\sqrt{x})}{\sqrt{x}} =$</p> <p style="text-align: right;"><input type="text"/></p>	<p>12) $\frac{2x+4}{4x} =$</p> <p style="text-align: right;"><input type="text"/></p>
<p>13) $\frac{\sqrt{x}+6}{3x^2} =$</p> <p style="text-align: right;"><input type="text"/></p>	<p>14) $\frac{2x-1}{x^2} =$</p> <p style="text-align: right;"><input type="text"/></p>	

EXERCISE 1C – MANIPULATING INDICES TO SOLVE FOR X

Solve each of the following equations for x . Remember to tick your answers once you have checked you are correct.



Need help?

BHASVICMATHS SWC HELP EX1C

1) $x^{-\frac{2}{3}} = 9$

2) $x^{-\frac{1}{2}} = 5$

3) $x^{\frac{2}{5}} = 4$

4) $x^{\frac{2}{3}} = 16$

5) $x^{\frac{3}{4}} = \frac{1}{27}$

6) $x^{\frac{2}{3}} = \frac{1}{25}$

SECTION 2 – FRACTIONS



Fractions play an extremely important role in mathematics, and being able to manipulate them fluidly will really help you when working with more complicated problems.

EXERCISE 2A – WRITING AS A SINGLE FRACTION

Write the following as a single fraction



Need help?

BHASVICMATHS SWC HELP EX2A

1) $\frac{3x}{5} \times 5 =$

2) $\frac{2}{x} + \frac{3}{x^2} =$

3) $\frac{3x}{2} \div 5 =$

4) $\frac{3}{2} \div \frac{1}{4} \div 3 =$

5) $\left(\frac{3}{2} \times \frac{1}{4}\right) + 3 =$

6) $\left(\frac{12}{11} - \frac{4}{3}\right) \div \frac{1}{3} =$

$$7) -\frac{2}{x} + \frac{3}{2} =$$

$$8) \frac{5}{x} + \frac{2x}{5} =$$

EXERCISE 2B – SIMPLIFYING FRACTIONS & SOLVING FOR X

Let's combine everything we have done so far.

Put the following into a single fraction and solve each of the following equations for x .



Need help?

BHASVICMATHS SWC HELP EX2B

$$1) 3 - \frac{x+2}{4} = 8x$$

$$2) \frac{x+1}{3} + \frac{4x}{12} = 8$$

$$3) \frac{2x}{3} - \frac{x-2}{4} = 1$$

$$4) \frac{4-x}{x} - \frac{3-x}{2x} = 4$$

$$5) \frac{\sqrt{16x^2}}{3x^2} - 4 = \frac{2}{7}$$

$$6) 3x^{-\frac{1}{2}} - \frac{2\sqrt{x}+4}{5x} = \frac{1}{\sqrt{x}}$$

SECTION 3 – SURDS



A surd is an example of an irrational number where the $\sqrt{\quad}$ sign remains. An irrational number means that the number cannot be written as a whole number or as a fraction. So $\sqrt{4}$ is not a surd, as $\sqrt{4} = 2$, and 2 is a rational number.

However, $\sqrt{3}$ is a surd because it cannot be broken down any further and the $\sqrt{\quad}$ sign has remained.

EXERCISE 3A – SIMPLIFYING SURDS

Simplify the below into surd form as far as possible, writing your answers as $a\sqrt{b}$

Remember to tick off your answers as you go.



Need help? [BHASVICMATHS SWC HELP EX3A](#)

1) $\sqrt{27} =$ <input type="text"/>	2) $\sqrt{45} =$ <input type="text"/>	3) $\sqrt{12} =$ <input type="text"/>
4) $\sqrt{48} =$ <input type="text"/>	5) $\sqrt{75} =$ <input type="text"/>	6) $\frac{\sqrt{12}}{2} =$ <input type="text"/>
7) $\frac{\sqrt{98}}{7} =$ <input type="text"/>	8) $\frac{\sqrt{18}}{\sqrt{2}} =$ <input type="text"/>	9) $\frac{\sqrt{27}}{\sqrt{3}} =$ <input type="text"/>

EXERCISE 3B – COLLECTING SURD TERMS

Collect the terms and simplify the below into a single surd, broken down as far as possible into the form $a\sqrt{b}$



Need help? [BHASVICMATHS SWC HELP EX3B](#)

1) $\sqrt{12} + 3\sqrt{75} =$

2) $\sqrt{200} + \sqrt{18} - 2\sqrt{72} =$

3) $\sqrt{20} + 2\sqrt{45} - 3\sqrt{80} =$

4) $4\sqrt{7} - 2\sqrt{98} - 4\sqrt{28} =$

EXERCISE 3C – RATIONALISING DENOMINATORS

Rationalise the denominators and then simplify to put the following in the form $a\sqrt{b}$



Need help?

BHASVICMATHS SWC HELP EX3C

1) $\frac{1}{\sqrt{2}} =$ <input type="text"/>	2) $\frac{2}{\sqrt{7}} =$ <input type="text"/>
3) $\frac{-7}{4\sqrt{5}} =$ <input type="text"/>	4) $\frac{\sqrt{2}}{3\sqrt{3}} =$ <input type="text"/>
5) $\frac{1}{1+\sqrt{2}} =$ <input type="text"/>	6) $\frac{5}{2-\sqrt{3}} =$ <input type="text"/>
7) $\frac{4}{\sqrt{3}-1} =$ <input type="text"/>	8) $\frac{2\sqrt{2}}{\sqrt{2}+3} =$ <input type="text"/>

SECTION 4 – EXPANDING BRACKETS



Knowing how to manipulate algebra really quickly is SO important in A level maths. Whether this is through expanding brackets and collecting terms, or through finding common factors and factorising into brackets.

EXERCISE 4 – EXPANDING BRACKETS & COLLECTING TERMS

Expand the following brackets and collect like-terms:



Need help?

BHASVICMATHS SWC HELP EX4

1) $x(2x + 3)(x - 7) =$

2) $x(5x - 3y)(2x - y + 4) =$

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

4) $(3x - 2)(2x + 1)(3x - 2) =$

5) $(x + y)(x - y)(3x - 2) =$

6) $(2x - 3y)^3 =$

7) $(a + b)(b + c)(c + d) =$

SECTION 5 – FACTORISING



EXERCISE 5A – FACTORISING USING THE DIFFERENCE OF TWO SQUARES

Factorise the following by splitting these expressions into the difference of two squares – using the rule that $a^2 - b^2 = (a + b)(a - b)$



Need help?

BHASVICMATHS SWC HELP EX5A

1) $x^2 - 1 =$ <input type="text"/>	2) $4x^2 - 9 =$ <input type="text"/>
3) $49 - 9x^2 =$ <input type="text"/>	4) $8 - 2x^2 =$ <input type="text"/>
5) $b^4 - c^8 =$ <input type="text"/>	6) $a - b =$ <input type="text"/>

EXERCISE 5B – FACTORISING EXPRESSIONS

Factorise the following completely:



Need help?

BHASVICMATHS SWC HELP EX5B

1) $3x^2 + 4x =$ <input type="text"/>	2) $4y^2 + 10y =$ <input type="text"/>
3) $x^2 + xy + xy^2 =$ <input type="text"/>	4) $8xy^2 + 10x^2y =$ <input type="text"/>
5) $x^2 + 3x + 2 =$ <input type="text"/>	6) $2x^2 - x - 3 =$ <input type="text"/>
7) $5x^2 - 13x - 6 =$ <input type="text"/>	8) $6 - 5x - x^2 =$ <input type="text"/>
9) $x^3 - 36x =$ <input type="text"/>	10) $2x^3 + 7x^2 - 15x =$ <input type="text"/>

MINI TEST 1 - SECTIONS 1, 2, 3, 4 & 5



You've completed all the exercises in Sections 1, 2, 3, 4 & 5, well done!

The important question now is whether your brain has really learned the techniques covered so far. To find out, use this mini-test in exam conditions then mark it yourself using the answers at the back of the booklet and give yourself a score. You should aim for 13/13 of course but certainly anything less than 8/13 should be a worry. Go back to the exercises containing the questions you got wrong then try this test again in a few days' time. If you feel you need help, follow the tips on pages 3 and 4 of this booklet, or watch the video help again for more explanation.

Time: 30 minutes. No Calculator allowed. Good Luck!

FROM SECTION 1

1) Evaluate the following:

a) $81^{-\frac{1}{4}}$ b) $16^{-\frac{7}{4}}$

2) Write these in the form of $ax^n + bx^m$:

a) $\frac{2x-4}{3x^2}$ b) $\frac{(x^2-3)}{\sqrt{x}}$

3) Solve each of the following equations for x .

a) $x^{-\frac{1}{2}} = 5$ b) $x^{\frac{2}{3}} = \frac{1}{25}$

FROM SECTION 2

4) Write the following as a single fraction

a) $\frac{5}{x} + \frac{2x}{5}$ b) $\frac{3}{2} \div \frac{1}{4} \div 3$

5) Put the following into a single fraction and solve each of the following equations for x .

$$3x^{-\frac{1}{2}} - \frac{2\sqrt{x} + 4}{5x} = \frac{1}{\sqrt{x}}$$

FROM SECTION 3

6) Rationalise the denominators and then simplify to put the following in the form $a\sqrt{b}$ or $c + a\sqrt{b}$

$$\frac{5}{2 - \sqrt{3}}$$

FROM SECTION 4

7) Expand the following brackets and collect like-terms:

$$(3x - 2)(2x + 1)(3x - 2)$$

FROM SECTION 5

8) Factorise the following completely:

a) $8xy^2 + 10x^2y$ b) $x^3 - 36x$

Out of 13

SECTION 6, 7, & 8 ANSWERS

SECTION 6 – QUADRATICS

EX 6A:

2) Discriminant = 0, repeated real roots

3) Discriminant = 52, two distinct real roots

4) Discriminant = -36, no real roots

5) Discriminant = 25, two distinct real roots

6) Discriminant = -248, no real roots

EX 6B:

1) $x = -1, x = -2$

2) $x = 5, x = 3$

3) $x = 0, x = 4$

4) $x = -\frac{1}{2}, x = -3$

5) $x = \frac{3}{2}, x = -\frac{2}{3}$

6) $x = \frac{5}{2}, x = \frac{3}{2}$

EX 6C:

1) $x = \frac{3+\sqrt{17}}{2}, x = \frac{3-\sqrt{17}}{2}$

2) $x = -3 + \sqrt{3}, x = -3 - \sqrt{3}$

3) $x = \frac{-9+\sqrt{101}}{10}, x = \frac{-9-\sqrt{101}}{10}$

4) $x = \frac{3+3\sqrt{17}}{4}, x = \frac{3-3\sqrt{17}}{4}$

5) $x = \frac{8+2\sqrt{10}}{3}, x = \frac{8-2\sqrt{10}}{3}$

6) $x = \frac{11+\sqrt{337}}{6}, x = \frac{11-\sqrt{337}}{6}$

EX 6D:

1) $\frac{3+\sqrt{17}}{2}, x = \frac{3-\sqrt{17}}{2}$

2) $x = -3 + \sqrt{3}, x = -3 - \sqrt{3}$

3) $x = \frac{-9+\sqrt{101}}{10}, x = \frac{-9-\sqrt{101}}{10}$

4) $x = \frac{3+3\sqrt{17}}{4}, x = \frac{3-3\sqrt{17}}{4}$

5) $x = \frac{8+2\sqrt{10}}{3}, x = \frac{8-2\sqrt{10}}{3}$

6) $x = \frac{11+\sqrt{337}}{6}, x = \frac{11-\sqrt{337}}{6}$

SECTION 7 – LINE GEOMETRY

EX 7A:

1) $m = -\frac{1}{3}$

2) $m = -2$

3) $m = \frac{11}{7}$

EX 7B:

1) $x - y + 2 = 0$

2) $4x - y - 23 = 0$

3) $x - 2y + 2 = 0$

4) $8x + y + 33 = 0$

SECTION 8 – GCSE STATISTICS REVISION

EX 8A:

1) $Mode = 9, Mean = 9.5, Q_1 = 2.5, Q_2 = 6, Q_3 = 9$

2) $Mode = \text{no mode}, Mean = 39.3, Q_1 = 9, Q_2 = 44, Q_3 = 76$

3) $Mode = 86, Mean = 143.8, Q_1 = 86, Q_2 = 87, Q_3 = 9$

EX 8B:

1) $\bar{x} = 34.5$

2) $\bar{x} = 345.1$

3) $\bar{x} = 82.3$

MINI TEST 2 - SECTIONS 6, 7, & 8 ANSWERS

1) a) $discriminant = 0, repeated\ real\ roots$

b) $discriminant = 52, 2\ distinct\ real\ roots$

2) a) $x = -\frac{1}{2}, x = -3$

b) $x = \frac{3}{2}, x = -\frac{2}{3}$

3) a) $x = \frac{3+3\sqrt{17}}{4}$, $x = \frac{3-3\sqrt{17}}{4}$

b) $x = \frac{8+2\sqrt{10}}{3}$, $x = \frac{8-2\sqrt{10}}{3}$

4) a) $\frac{3+\sqrt{17}}{2}$, $x = \frac{3-\sqrt{17}}{2}$

b) $x = -3 + \sqrt{3}$, $x = -3 - \sqrt{3}$

5) a) $m = -2$

b) $m = \frac{11}{7}$

6) a) $4x - y - 23 = 0$

b) $x - 2y + 2 = 0$

7) *Mode* = no mode, *Mean* = 39.3, $Q_1 = 9$, $Q_2 = 44$, $Q_3 = 76$

8) $\bar{x} = 345.1$

SECTION 6 – QUADRATICS

You should already know what a quadratic is, but in order to start A Level you need to REALLY understand how to manipulate and interpret quadratics. That's why this time, we've made videos for each exercise to help out!

EXERCISE 6A – FINDING THE DISCRIMINANT

Write down the discriminant of each of these quadratics, and state whether each equation has one repeated real root, two distinct real roots, or no real roots



Need help?

BHASVICMATHS SWC HELP EX6A

Quadratic	Discriminant	Number of roots (circle)
1) EXAMPLE $x^2 + 8x + 7 = 0$	$(8)^2 - 4(1)(7) = 36$ > 0	Repeated real roots Two distinct real roots No real roots <input type="checkbox"/>
2) $4x + 2x^2 + 2 = 0$		Repeated real roots Two distinct real roots No real roots <input type="checkbox"/>
3) $4x - 3x^2 = -3$		Repeated real roots Two distinct real roots No real roots <input type="checkbox"/>
4) $2x = 2x^2 + 5$		Repeated real roots Two distinct real roots No real roots <input type="checkbox"/>

5) $-5x + 4x^2 = 0$		Repeated real roots Two distinct real roots No real roots <input type="checkbox"/>
6) $-2x + 9x^2 = -7$		Repeated real roots Two distinct real roots No real roots <input type="checkbox"/>

EXERCISE 6B – SOLVING QUADRATICS THROUGH FACTORISING

Solve the following quadratics by factorising



Need help? BHASVICMATHS SWC HELP EX6B

1) $x^2 + 3x + 2 = 0$ <input type="checkbox"/>	2) $x^2 - 8x + 15 = 0$ <input type="checkbox"/>
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3) $x^2 = 4x$

4) $2x^2 + 7x + 3 = 0$

5) $6x^2 - 5x - 6 = 0$

6) $4x^2 - 16x + 15 = 0$

EXERCISE 6C – SOLVING QUADRATICS BY COMPLETING THE SQUARE

Solve the following quadratics **by Completing the Square** i.e. writing the quadratic in $(x + p)^2 + q = 0$ form and solving for x



Need help?

BHASVICMATHS SWC HELP EX6C

1) $x^2 - 3x - 2 = 0$

2) $x^2 + 6x + 6 = 0$

3) $5x^2 + 9x - 1 = 0$

4) $2x^2 - 3x - 18 = 0$

5) $3x^2 + 8 = 16x$

6) $2x^2 + 11x = 5x^2 - 18$

EXERCISE 6D – SOLVING QUADRATICS USING THE QUADRATIC FORMULA

Solve the same quadratics as in EX 6C, but this time using **the quadratic formula** $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$



Need help?

BHASVICMATHS SWC HELP EX6D

1) $x^2 - 3x - 2 = 0$

2) $x^2 + 6x + 6 = 0$

3) $5x^2 + 9x - 1 = 0$

4) $2x^2 - 3x - 18 = 0$

5) $3x^2 + 8 = 16x$

6) $2x^2 + 11x = 5x^2 - 18$

2) $(5, -3)$ and $(7, 5)$

3) $(-4, -1)$ and $(6, 4)$

4) $(-4, -1)$ and $(-3, -9)$

SECTION 8 – GCSE STATISTICS REVISION

The New A Level requires you to learn both Statistics and Mechanics. To get you back into the swing of Stats, we will revise some work on averages here.

EXERCISE 8A – FINDING AVERAGES OF DISCRETE DATA

By listing the following numbers in ascending order, write down the mean, median (Q_2) and upper and lower quartiles (Q_1 and Q_3), and the mode.



Need help? [BHASVICMATHS SWC HELP EX8A](#)

1) 3, 7, 1, 40, 5, 9, 2, 9

Mode =

Mean =

Q_2 =

Q_1 =

Q_3 =

2) 76, 56, 44, 77, 12, 1, 9

Mode =

Mean =

Q_2 =

Q_1 =

Q_3 =

3) 101, 90, 91, 87, 86, 86, 86, 94, 104, 1000, 3, 20, 21

Mode =

Mean =

Q_2 =

Q_1 =

Q_3 =

EXERCISE 8B – FINDING THE MEAN OF GROUPED DATA

Find the mean of the following grouped data:



Need help?

BHASVICMATHS SWC HELP EX8B

1)

Length of Pine Cone (mm)	Frequency (f)	Mid value (x)	fx
30 – 31	2		
32 – 33	25		
34 – 36	30		
37 - 39	13		

Mean \bar{x} =

2)

Weekly wage (£)	Frequency (f)	Mid value (x)	fx
175 – 225	4		
226 – 300	8		
301 – 350	18		
351 - 400	28		
401 - 500	7		

Mean \bar{x} =

3)

Noise (decibels)	Frequency (f)	Mid value (x)	fx
65 – 69	1		
70 – 74	4		
75 – 79	6		
80 – 84	6		
85 - 89	8		
90 – 94	4		
95 - 99	1		

Mean \bar{x} =

MINI TEST 2 - SECTIONS 6, 7, & 8



You've completed all the exercises in Sections 6, 7, & 8, well done!

The important question now is whether your brain has really learned the techniques covered so far. To find out, use this mini-test in exam conditions then mark it yourself using the answers at the back of the booklet and give yourself a score. You should aim for 14/14 of course but certainly anything less than 9/14 should be a worry. Go back to the exercises containing the questions you got wrong then try this test again in a few days' time. If you feel you need help, follow the tips on pages 3 and 4 of this booklet, or watch the video help again for more explanation.

Time: 30 minutes. Are **are** allowed a calculator for this test. Good Luck!

FROM SECTION 6

1) Write down the discriminant of each of these quadratics, and state whether each equation has one repeated real root, two distinct real roots, or no real roots

a) $4x + 2x^2 + 2 = 0$ b) $4x - 3x^2 = -3$

2) Solve the following quadratics **by factorising**

a) $2x^2 + 7x + 3 = 0$ b) $6x^2 - 5x - 6 = 0$

3) Solve the following quadratics **by Completing the Square**

a) $2x^2 - 3x - 18 = 0$ b) $3x^2 + 8 = 16x$

4) Solve the following quadratics **using the quadratic formula**

a) $x^2 - 3x - 2 = 0$ b) $x^2 + 6x + 6 = 0$

FROM SECTION 7

5) Work out the gradient of the line joining the following points:

a) $(2, -5)$ and $(3, -7)$ b) $(-3, -1)$ and $(4, 10)$

6) Using the formula $y - y_1 = m(x - x_1)$, write the following line equations passing through the two given points in the form $ax + by + c = 0$ where $a, b,$ and c are integers

a) $(5, -3)$ and $(7, 5)$ b) $(-4, -1)$ and $(6, 4)$

FROM SECTION 8

7) By listing the following numbers in ascending order, write down the mean, median (Q_2) and upper and lower quartiles (Q_1 and Q_3), and the mode.

76, 56, 44, 77, 12, 1, 9

8) Find the mean of the following grouped data:

Weekly wage (£)	Frequency (f)	Mid value (x)	fx
175 – 225	4		
226 – 300	8		
301 – 350	18		
351 – 400	28		
401 – 500	7		

Out of 14

ARE YOU READY FOR A1 MATHS TEST?

This is your last task. In order to be confident starting A1 maths you need to be confident with the techniques in this booklet. When you start the course we will give you a test like this one to check that you are ready to start A1. Do this test in exam conditions, write your answers on file paper, then mark it using the answers at the back of the booklet; record your result on the front cover sheet. You should aim for over 80% (at least 15 answers completely correct) but certainly anything less than 60% should be a worry and you should go back to the exercises containing the questions you got wrong then try this test again in a few days' time. In addition, attend the drop in help sessions on 31st August, 1st September, and 4th September.

Time: 1 hour. Calculator

1) Evaluate the following:

a) $\left(\frac{1}{27}\right)^{-\frac{1}{3}}$ b) $\left(\frac{64}{25}\right)^{\frac{3}{2}}$

2) Write these in the form of $ax^n + bx^m$:

a) $\frac{\sqrt{16x^2} - \sqrt[3]{27x^2}}{\sqrt{x}}$ b) $\frac{5x^3 + \sqrt[4]{81x^2}}{3x}$

3) Solve the following equation for x :

$$2x^{-\frac{3}{2}} = 54$$

4) Write the following as a simplified, single fraction

a) $\frac{4}{x-2} - \frac{2x}{x+1}$ b) $\frac{x}{x^2-1} + \frac{3}{x+1}$

5) By rationalising the denominator, write the below in the form $c + a\sqrt{b}$:

$$\frac{2}{\sqrt{3} + 1}$$

6) Expand the following brackets and collect like-terms:

$$(2x + 3)(3x - 1)(x + 2)$$

7) Fully factorise the following:

a) $(36 - 4x^2)$ b) $3x^3 + 27x^2 + 60x$

8) Consider the quadratic $x^2 - 4x - 12 = 0$:

a) Write the value of the discriminant. What does this tell you about the number of solutions you should expect?

b) Solve the equation, finding values of x using:

i) Completing the square ii) Factorisation iii) The quadratic formula

9) Consider the points $A(9, -1)$ and $B(-2, -3)$

a) Write down the gradient m of the line passing through these two points

b) Hence, find the equation of the line passing through A and B in the form $ax + by + c = 0$ where $a, b,$ and c are integers

10) Find the mean, mode, median and upper and lower quartiles of:

4, 7, 1, 0, 13, 15, 90, 12, 7

11) Find the mean of the following:

Length of oak leaves (mm)	Frequency (f)
20 – 22	4
23 – 26	20
27 – 30	23
31 – 50	5

Out of 19

ARE YOU READY FOR A1 TEST? - ANSWERS

1) a) 3

b) $\frac{512}{125}$

2) a) $4x^{\frac{1}{2}} - 3x^{\frac{1}{6}}$

b) $\frac{5}{3}x^2 + x^{-\frac{1}{2}}$

3) $x = \frac{1}{9}$

4) a) $\frac{-2x^2+8x+4}{(x+1)(x-2)}$

b) $\frac{4x-3}{(x+1)(x-1)}$

5) $-1 + \sqrt{3}$

6) $6x^3 + 19x^2 + 11x - 6$

7) a) $(6 - 2x)(6 + 2x)$

b) $3x(x + 5)(x + 4)$

8) a) $b^2 - 4ac = 64$, 2 distinct real solutions

b) all 3 versions should give $x = 6$, $x = -2$

9) a) $m = \frac{2}{11}$

b) $2x - 11y - 29 = 0$

10) $mode = 7, mean = 16.6, Q_1 = 4, Q_2 = 7, Q_3 = 13$

11) $\bar{x} = 27.5$