Ashcombe Maths Department
Summer Workbook

Welcome to A level Maths, we are delighted to have you join us!

This document will give you some ideas about what you can do to prepare really well for success at A level Maths. Before you read this document, please refer to #OneStepAhead Maths as that gives you an overview of what we expect for all Maths A level courses.

Summer Workbook

As part of the induction day, we will run a taster session and will issue you with a Summer Workbook. **The aim of this booklet is to reactivate your GCSE knowledge and so it is important that you do these questions on your own, without assistance**. This is compulsory pre-course work, which you will need to do in the booklet, showing full working and ready to be handed in on the first Maths A level lesson in September. It is our first assessment of how well you will cope with the A level Maths course, so complete it with care, paying attention to when you can/cannot use a calculator and ensuring you leave your answer in the required format. It's a good idea to complete this pack at some point **after results day but before you return in September**.

Additional Preparation & Support

Try the Transition course

The transition course Transition to A level Mathematics: Essential Skills - AMSP is specifically designed to help you brush up on all the skills you will need to be successful at A level Maths. Email (term time) beggs.rebecca@ashcombe.surrey.sch.uk to get a username and password and then your account will be linked to the school and we'll be able to see what you have done. Alternatively, if you are doing this right at the end of the summer holidays, you can do the course without signing up with us – just google the title above.

Buy the CGP 'Head Start to A-Level Maths' book

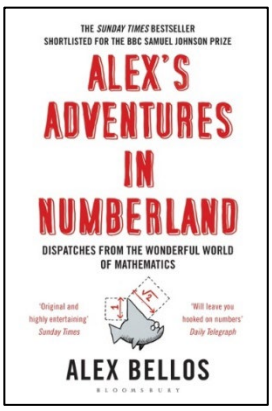
The questions below all come from the GCP book 'Head Start to A-Level Maths' you can get yourself a copy online if you want come examples and explanations which match these questions.

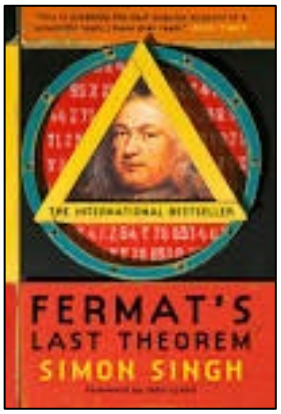
Panic

No no, don't panic, but ask your friends, your brothers and sisters or your parents for some help.

I'm done, I'm bored. What else can I do?

Fancy reading a little bit about maths more generally? Try these books.





Or watch some of these Maths Youtube channels:

https://www.youtube.com/standupmaths
Rob Eastaway - Home
SparksMaths - YouTube

They might not help you pass your A-level Maths, but they will make maths more interesting for you.

AQA

GCSE MATHEMATICS

Higher tier

Number

Topic test – Indices

v1.0

Name _____

Materials

For this paper you must have:
- Mathematical instruments
- You must not use a calculator

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 29

Advice
- In all calculations, show clearly how you work out your answer.

For Teacher's Use	
Pages	Mark
2 - 3	
4 - 5	
6	
TOTAL	

1 (a) Work out $9^{\frac{1}{2}}$

[1 mark]

Answer _____

1 (b) Work out 3^{-3}

[1 mark]

Answer _____

1 (c) Work out 2^5

[1 mark]

Answer _____

1 (d) Work out $8^{\frac{1}{3}}$

[1 mark]

Answer _____

1 (e) Work out $8^{-\frac{1}{3}}$

[1 mark]

Answer _____

1 (f) Write 1 million as a power of 10.

[1 mark]

Answer _____

2 (a) Write $6^2 \times 6^7$ as a single power of 6

[1 mark]

Answer _____

2 (b) Write $8^{10} \div 8^2$ as a single power of 8

[1 mark]

Answer _____

2 (c) Write $\left(3^{12}\right)^3$ as a single power of 3

[1 mark]

Answer _____

2 (d) Work out $2^8 \div 2^3$ as a whole number

[2 marks]

Answer _____

11

3 Write as a single power of 2 $16 \times 2^5 \times 2^3$

[2 marks]

Answer _____

4 Work out the value of $\left(4^{10} \div 4^4\right) \div \left(4^2 \times 4\right)$

[3 marks]

Answer _____

5 Between which two integers does the square root of 130 lie?

[1 mark]

Answer _____

6 Work out the exact value of $\left(\frac{2}{3}\right)^{-4}$

[2 marks]

Answer _____

7 Write $\sqrt{(x^9 \times x^{-3})}$ as a single power of x

[2 marks]

Answer _____

8 (a) Write down the value of 8^0

[1 mark]

Answer _____

8 (b) Work out the value of $32^{\frac{2}{5}}$

[2 marks]

Answer _____

9 Write $\sqrt[3]{\left(15\frac{5}{8}\right)}$ as an improper fraction.

[2 marks]

Answer _____

15

10 Simplify $16^3 \times 32^{-\frac{3}{5}}$ give your answer as a power of 2

[3 marks]

Answer _____

END OF QUESTIONS

3

Copyright © 2022 AQA and its licensors. All rights reserved.

AQA

GCSE MATHEMATICS

Higher tier

Number

Topic test – Surds

v1.0

Name _____

Materials

For this paper you must have:
- Mathematical instruments
- You must not use a calculator

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 28.

Advice
- In all calculations, show clearly how you work out your answer.

For Teacher's Use	
Pages	Mark
2 - 3	
4 - 5	
6	
TOTAL	

1 Simplify $\left(\sqrt{15}^{4}\right)$

[1 mark]

Answer _____

2 Simplify $\frac{\sqrt{96}}{\sqrt{8}}$

Give your answer in the form $a\sqrt{3}$, where a is an integer.

[2 marks]

Answer _____

3 Simplify $\sqrt{18} \times \sqrt{50}$

[1 mark]

Answer _____

4 Simplify $\sqrt{20} + \sqrt{45}$

[1 mark]

Answer _____

5 Simplify $6\sqrt{15} \div 3\sqrt{5}$

[1 mark]

Answer _____

6 Show that $\left(\sqrt{3}+\sqrt{27}\right)^2$ can be written as an integer.

[2 marks]

7 Rationalise the denominator and simplify $\frac{24}{\sqrt{6}}$.

[2 marks]

Answer _____

8 Show that $\frac{2\sqrt{10}}{\sqrt{3}} - \frac{\sqrt{5}}{\sqrt{6}}$ can be written in the form $\frac{\sqrt{a}}{2}$

[3 marks]

13

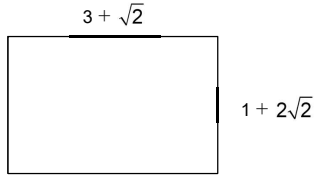
9 Work out $2\sqrt{30} \times \sqrt{12} \times \sqrt{90}$

Give your answer as an integer.

[3 marks]

Answer _____

10



Work out the area of this rectangle.

Give your answer in the form $a + b\sqrt{2}$, where a and b are integers.

[2 marks]

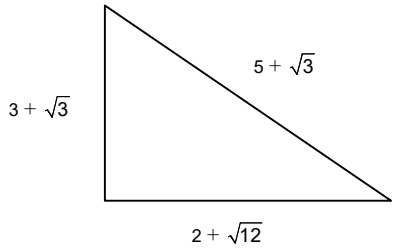
Answer _____

11 Simplify fully $\dfrac{\sqrt{160}-\sqrt{10}}{\sqrt{2}\sqrt{5}}$

[3 marks]

Answer _____

12



Is this triangle right angled?

Tick a box.

Yes ☐ No ☐

You must show your workings.

[4 marks]

12

13 Show that $\left(7\sqrt{2}-\sqrt{8}\right)^2$ simplifies to an integer.

[3 marks]

END OF QUESTIONS

3

Copyright © 2022 AQA and its licensors. All rights reserved.

AQA

GCSE MATHEMATICS

Higher tier

Algebra

Topic test – Algebraic fractions

v1.0

Name _____

Materials

For this paper you must have:
- Mathematical instruments
- You must not use a calculator

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 32.

Advice
- In all calculations, show clearly how you work out your answer.

For Teacher's Use	
Pages	Mark
2 - 3	
4 - 5	
6	
TOTAL	

1 (a) Simplify fully $\frac{2x^2}{24x}$

[1 mark]

Answer _____

1 (b) Simplify fully $\frac{6de}{15de^2}$

Circle your answer.

$\frac{6e}{15}$ $\frac{6}{15e}$ $\frac{2e}{5}$ $\frac{2}{5e}$

[1 mark]

1 (c) Simplify fully $\frac{2a}{b} + \frac{3b}{a}$

Circle your answer.

$\frac{6ab}{a+b}$ $\frac{2a+3b}{a+b}$ $\frac{2a^2+3b^2}{a+b}$ $\frac{2a^2+3b^2}{ab}$

[1 mark]

1 (d) Simplify fully $\frac{3x^2}{4y} \times \frac{8y^3}{6x^4}$

[2 marks]

Answer _____

2 Simplify fully $\frac{5x-10}{x-2}$

[2 marks]

Answer _____

3 (a) Factorise $x^2 - 16$

[1 mark]

Answer _____

3 (b) Hence, simplify fully $\frac{x^2-16}{x^2+9x+20}$

[3 marks]

Answer _____

Turn over ▶

4 Show that for $x \neq -1$ the expression $\frac{6x^2-6}{2x+2}$ can be written in the form $ax+b$ where a and b are integers.

[3 marks]

Answer _____

5 Simplify fully $\frac{2y-6y^2}{15y-5}$

[3 marks]

Answer _____

11

6 Solve $\frac{2x+1}{7} = \frac{1-x}{3}$

[3 marks]

Answer _____

7 Simplify fully $\frac{x^2-x-6}{x^2-9}$

[3 marks]

Answer _____

12

8 Solve $\frac{2y}{y+2} + \frac{3}{y-1} = 2$

[4 marks]

Answer _____

9 Solve $\frac{4}{3x+1} = \frac{3x}{x^2+2}$

[5 marks]

Answer _____

END OF QUESTIONS

9

Copyright © 2023 AQA and its licensors. All rights reserved.

AQA

GCSE MATHEMATICS

Higher tier

Algebra

Topic test – Factorising harder quadratics

v1.0

Name _____

Materials

For this paper you must have:
- Mathematical instruments
- You must not use a calculator.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 25.

Advice
- In all calculations, show clearly how you work out your answer.

For Teacher's Use	
Pages	Mark
2 - 3	
4 - 5	
6	
TOTAL	

1 Factorise $2x^2 + 15x + 7$

[2 marks]

Answer _____

2 Factorise $4x^2 + x - 3$

[2 marks]

Answer _____

3 Factorise fully $18y^3 - 8y$

[2 marks]

Answer _____

8300 GCSE Maths
Topic test – Higher tier – Algebra – Factorising harder quadratics

4 Factorise $16a^2 - b^2$

[2 marks]

Answer _____

5 (a) Factorise fully $5x^2 - 45$

[2 marks]

Answer _____

5 (b) Factorise $5x^2 + 4xy - 12y^2$

[3 marks]

Answer _____

13

Turn over ▶

6 Simplify fully $\dfrac{x^2 - 9}{2x^2 - 5x - 3}$

[4 marks]

Answer _____

7 (a) Factorise fully $10m^2 - 160p^2$

[3 marks]

Answer _____

7 (b) You are given that $p = 2$ and $10m^2 - 160p^2 = 0$

Using your answer to part **(a)** work out the values of m.

[2 marks]

Answer _____

9

Turn over ▶

8 Factorise fully $(a + b)^2 + (a + b)(2a + 5b)$

[3 marks]

Answer _____

END OF QUESTIONS

3

Copyright © 2023 AQA and its licensors. All rights reserved.

AQA

GCSE MATHEMATICS

Higher tier

Algebra

Topic test – Rearranging harder formulae practice

v1.0

Name _____

Materials

For this paper you must have:
- Mathematical instruments
- You must not use a calculator.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 25.

Advice
- In all calculations, show clearly how you work out your answer.

For Teacher's Use	
Pages	Mark
2 - 3	
4	
TOTAL	

1 Make s the subject of $v^2 = u^2 + 2as$

[2 marks]

Answer _____

2 Make x the subject of $y = 9 - 2x$

[2 marks]

Answer _____

3 Make x the subject of $ax - by = cx - dy$

[3 marks]

Answer _____

4 Rearrange $P + 2x = 5(x - 2)$ to make x the subject.

[3 marks]

Answer _____

5 Rearrange $y = \frac{5x + 9}{x}$ to make x the subject.

[4 marks]

Answer _____

6 Rearrange $y = \frac{2x - 1}{4x + 5}$ to make x the subject.

[5 marks]

Answer _____

19

7 Rearrange $V = \frac{4}{3}\pi r^3$ to make r the subject.

[3 marks]

Answer _____

8 Rearrange $T = 2\pi\sqrt{\frac{l}{g}}$ to make l the subject.

[3 marks]

Answer _____

END OF QUESTIONS

6

Copyright © 2022 AQA and its licensors. All rights reserved.

AQA

GCSE MATHEMATICS

Higher tier

Algebra

Topic test – Equation of a circle

v1.0

Name _____

Materials

For this paper you must have:
- Mathematical instruments
- A calculator.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 15.

Advice
- In all calculations, show clearly how you work out your answer.

For Teacher's Use	
Pages	Mark
2 - 3	
4 - 5	
6 - 7	
8 - 9	
10	
TOTAL	

1 The equation of a circle is $x^2 + y^2 = 81$

1 (a) State the coordinates of the centre of the circle.

[1 mark]

Answer (_____ , _____)

1 (b) Work out the length of the **diameter**.

[1 mark]

Answer _____

2 The equation of a circle is $x^2 + y^2 = \frac{1}{9}$

Work out the length of the **radius**.

[1 mark]

Answer _____

3 The equation of a circle is $x^2 + y^2 = 29$

3 (a) Work out the length of the **diameter**.

[1 mark]

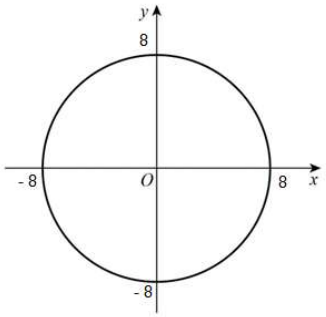
Answer _____

3 (b) Find the coordinates of a point where $x = 2$

[2 marks]

Answer (_____ , _____)

4 A circle, centre O, passes through (8, 0)



Not drawn accurately

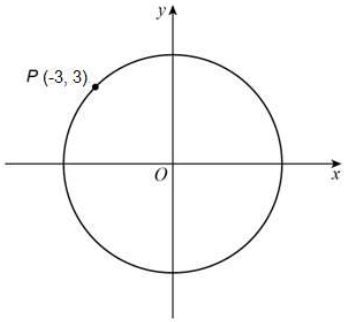
What is the equation of the circle?

[1 mark]

Answer _____

7

5 P (–3, 3) is a point on the circle, centre O, radius r.



Not drawn accurately

Work out the value of r

Give your answer as a surd in its simplest form.

[2 marks]

Answer _____

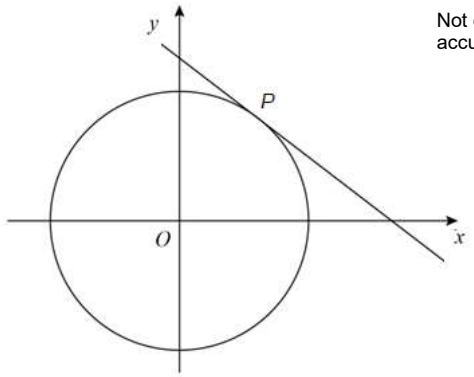
6 The circumference of the circle is 26π

Work out the equation of the circle.

[3 marks]

Answer _____

7 The diagram shows a circle with centre O and tangent to the circle the point $P(6, 8)$ on the circle.



Not drawn accurately

Find the equation of the tangent at the point P.

[3 marks]

Answer _____

8

AQA

GCSE MATHEMATICS

Higher tier

Algebra

Topic test – Quadratic formula

v1.0

Name _____

Materials

For this paper you must have:
- Mathematical instruments
- A calculator.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 32.

Advice
- In all calculations, show clearly how you work out your answer.

For Teacher's Use	
Pages	Mark
2 - 3	
4 - 5	
6 - 7	
TOTAL	

1 Solve the equation $x^2 + 2x - 9 = 0$

Give your answers to 2 significant figures.

[3 marks]

Answer _____ and _____

2 Solve the equation $x^2 - 7 = 0$

Give your answers to 1 decimal place

[2 marks]

Answer _____ and _____

3 Solve $5x^2 + x - 10 = 0$

Give your answers to 2 decimal places.

[3 marks]

Answer _____ and _____

4 Solve $3x^2 - 2x - 6 = 0$

Give your answer in the form $\frac{p \pm \sqrt{q}}{r}$ where p, q and r are the smallest possible integers.

[4 marks]

Answer _____

12

5 Solve $4x^2 = 8x + 2$.

Give your answers to 2 decimal places. You **must** show your working.

[4 marks]

Answer _____ and _____

6 (a) Jo wants to work out the solutions of $x^2 + 2x - 7 = 0$

She says,

"The solutions **cannot** be worked out because

$x^2 + 2x - 7$ does **not** factorise to $(x + a)(x + b)$ where a and b are integers."

Is Jo correct?

Tick a box.

Yes ☐ No ☐

Give a reason for your answer.

[1 mark]

6 (b) **Without** expanding any brackets, show how to work out the **exact** solutions of

$$4(x + 1)^2 = 16$$

[4 marks]

9

7 Solve $\frac{6}{3x+2} = \frac{3x}{x^2+1}$

Give your solutions to 3 significant figures.

You **must** show your working.

[5 marks]

Answer _____ and _____

8 Solve the equation $\frac{5}{x+2} + \frac{2}{4x-1} = 9$

Give your answers to 2 decimal places.

[6 marks]

Answer _____ and _____

END OF QUESTIONS

11

Copyright © 2023 AQA and its licensors. All rights reserved.

AQA

GCSE MATHEMATICS

Higher tier

Algebra

Topic test – Simultaneous equations linear and quadratic

v1.0

Name _____

Materials

For this paper you must have:
- Mathematical instruments
- A calculator.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 19.

Advice
- In all calculations, show clearly how you work out your answer.

For Teacher's Use	
Pages	Mark
2 - 3	
4 - 5	
6 - 7	
TOTAL	

1 Here are two simultaneous equations

$$3x + y = 4$$

$$x - 2y = 13$$

Is $x = 2.5$ and $y = 3.5$ a solution to these equations?

Tick a box.

Yes ☐ No ☐

Explain how you know.

[2 marks]

2 Solve the simultaneous equations

$$2x - y = 8$$

$$3x + y = 22$$

You **must** show your working.

Do **not** use trial and improvement.

[2 marks]

$x =$ _____ $y =$ _____

3 Solve the simultaneous equations

$$x + y = 9$$

$$y = 2x - 3$$

You **must** show your working.

Do **not** use trial and improvement.

[3 marks]

$x =$ _____ $y =$ _____

4 Solve the simultaneous equations

$$2x - 3y = 1$$

$$8x - 3y = 10$$

You **must** show your working.

Do **not** use trial and improvement.

[3 marks]

$x =$ _____ $y =$ _____

10

5 In a coffee shop

2 cups of coffee and 1 muffin cost £10.45 and
3 cups of coffee and 4 muffins cost £22.55

Work out the cost of a cup of coffee and the cost of a muffin.

[4 marks]

Cup of coffee £ _____

Muffin £ _____

6 Solve the simultaneous equations

$$y = x^2 + 2$$
$$x + y = 4$$

Do not use trial and improvement.

You **must** show your working.

[5 marks]

$x =$ _____ $y =$ _____

or

$x =$ _____ $y =$ _____

9

AQA

GCSE MATHEMATICS

Higher tier

Algebra

Topic test – Solving quadratics practice

v1.0

Name _____

Materials

For this paper you must have:
- Mathematical instruments
- A calculator.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 29.

Advice
- In all calculations, show clearly how you work out your answer.

For Teacher's Use	
Pages	Mark
2 - 3	
4 - 5	
6	
TOTAL	

1 Solve $x^2 - x - 6 = 0$

[2 marks]

Answer _____

2 A quadratic equation factorises to

$$(3x + 1)(7x - 2) = 0$$

Write down the exact roots as fractions.

[2 marks]

Answer _____

3 Find the solutions of $2y^2 - 3y = 0$

[2 marks]

Answer _____

4 Find the solutions of $p^2 - 169 = 0$

[2 marks]

Answer _____

5 Solve $m^2 + 5m - 10 = 0$

Give your solutions as decimals.

[2 marks]

Answer _____

6 How many solutions does this quadratic equation have?

$$x^2 + 3x + 5 = 0$$

You **must** explain your answer.

[2 marks]

Answer _____

12

Turn over ▶

7 Solve $2x^2 + 9x + 4 = 0$

You **must** show your working.

[3 marks]

Answer _____

8 Solve $3x^2 = 7x + 2$

Give your answers to two decimal places.

You **must** show your working.

[4 marks]

Answer _____

9 Solve $x(2x - 5) = 8$

Give your answers to two decimal places.

You **must** show your working.

[2 marks]

Answer _____

10 Find the roots of $3x^2 - 10x - 4 = 0$

Give your answers to 3 significant figures.

You **must** show your working.

[2 marks]

Answer _____

11

Turn over ▶

11 Without expanding any brackets show how to work out the exact solutions of

$$9(x - 2)^2 = 16$$

Give the solutions to the equation.

[3 marks]

Answer _____

12 The equation $x^2 + bx + c = 0$ has roots $x = -3$ and $x = -6$

Work out the values of b and c.

[3 marks]

Answer _____

END OF QUESTIONS

6

Copyright © 2022 AQA and its licensors. All rights reserved.