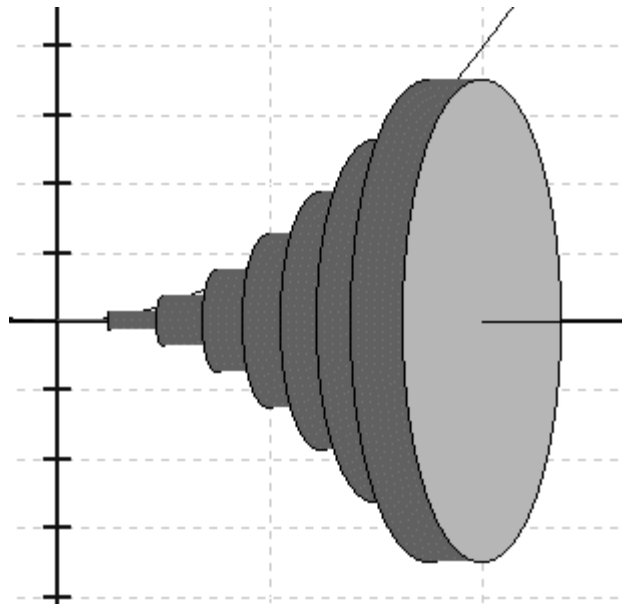


**ROOKS HEATH SCHOOL**

**DEPARTMENT OF MATHEMATICS**

**Introduction to A' level Maths**



**INDUCTION BOOKLET**

**SUMMER 2022**

## INTRODUCTION TO A' LEVEL MATHS AT RHS

Thank you for choosing to study Mathematics in the sixth form hopefully at Rooks Heath School. You will sit two modules in Pure Mathematics as well as Statistics and Mechanics at the end of year 12. The Mathematics Department is committed to ensuring that you make good progress throughout your A level or AS course. In order that you make the best possible start to the course, we are providing you with this preparatory work.

It is vitaly important that you spend time working through the questions in this and on the given Website over the summer - you will need to have a good knowledge of these topics before you commence your course in September. You should have met all the topics before at GCSE. You must complete both tasks and bring the completed work to your first Maths lesson in September. Students who will be taking Further Maths have an additional piece of work which they must also complete.

We will test you at the start of September to check your understanding of the A/A\* GCSE topics. If you do not pass this test, you will be provided with a programme of additional work in order to bring your basic algebra skills to the required standard. You will then be re-tested in October. A mock test is provided at the back of this booklet.

We hope that you will use this introduction to give you a good start to your AS work and that it will help you enjoy and benefit from the course more.

**Mrs N. Takhar**

**Head of Mathematics**

You may find the following book useful

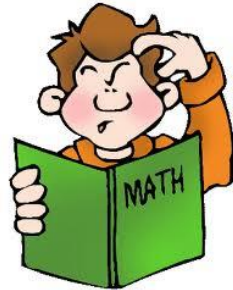
### New Head Start to A-Level Maths

- Product code: MBR71
- ISBN: 9781782947929

## A' Level Maths Preparation

One of the most important things if you are to succeed at A Level Maths is to ensure you understand all the **algebra** you have met at GCSE. The purpose of this task is to check your understanding, and also to see if you can understand why students struggle with some of the higher level GCSE algebra concepts.

### Task 1



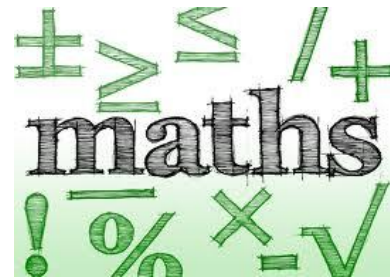
- Choose **three** of the questions on the next sheet
- Create a PowerPoint that explains:
  - 1) How to do the question
  - 2) Any notes and comments that might be helpful to someone struggling with the question
  - 3) Common mistakes that people may make when answering a question like this
- Make sure you have one slide for each question – so your completed presentation will be three slides long

### How you will be marked

- You will be judged on:
  - How clearly you present your answer
  - How useful your notes are
  - How well you can anticipate what difficulties people may have
  - The overall quality and clarity of your presentation
  - The amount of effort you have put in
- Have your PowerPoints ready for the first lesson of term, and your teacher will tell you which email address to send it to

I ♥<sup>2</sup>  
Maths

**Choose any 3 of the following questions:**



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

Make  $T$  the subject of the formula  $W = \sqrt{\frac{3T+7}{2T}}$

The cost of sweets is £2 per kg. The cost of chocolate is £5 per kg.

Jim buys  $x$  kg of sweets and  $y$  kg of chocolate.

He buys at least 2 kg of sweets.

He buys at least 3 kg of chocolate.

He spends at most £20.

- a Write down 3 inequalities in  $x$  and/or  $y$ .
- b Draw a suitable graph and show, by shading, the region that satisfies all 3 inequalities.

Write  $4x^2 + 24x$  in the form  $a(x+p)^2 + q$ . State the values of  $a$ ,  $p$  and  $q$ .

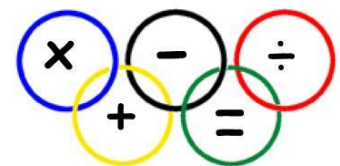
Show that any straight line that passes through the point  $(1, 2)$  must intersect the curve with equation  $x^2 + y^2 = 16$  at two points.

June 2006

- a Show that the equation  $\frac{5}{x+2} = \frac{4-3x}{x-1}$  can be rearranged to give  $3x^2 + 7x - 13 = 0$ .
- b Solve  $3x^2 + 7x - 13 = 0$ .  
Give your solutions correct to 2 decimal places.

Solve these simultaneous equations.

- a  $2x + 3y = 10$   
 $3x + 5y = 16$
- b  $5x + 4y = 8$   
 $2x - 3y = -6$



$3 \times \sqrt{27} = 3^n$  Find the value of  $n$ .

Calculate  $\frac{1}{\sqrt{2}+1} + \frac{1}{\sqrt{3}+\sqrt{2}} + \frac{1}{\sqrt{4}+\sqrt{3}} + \dots + \frac{1}{10+\sqrt{99}}$

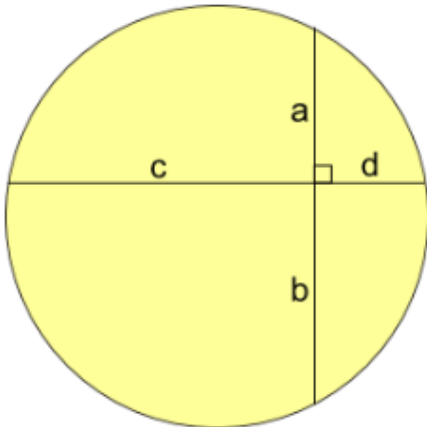
Show that  $25 - \frac{(x-8)^2}{4} = \frac{(2+x)(18-x)}{4}$

Prove that  $(3n+1)^2 - (3n-1)^2$  is a multiple of 4, for all positive integer values of  $n$ .

## A' Level Further Maths Preparation

Attempt each of these three problems. All the knowledge you need, you knew at GCSE. The key is can you select the correct knowledge required to solve each problem – this is a skill that is crucial for studying Further Maths! Write your answers, together with lots of lovely working, on paper ready to hand in during your first maths lesson.

Can you solve them and describe ways in which each might be connected to one or both of the others?

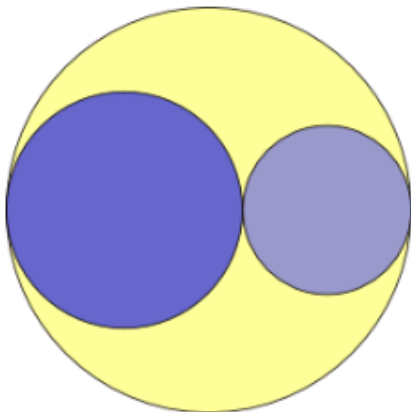
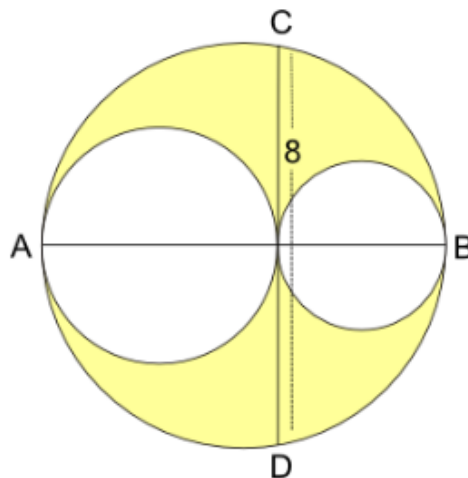


**Firstly :**

Why does  $ab = cd$ ?

**Secondly:**

These three circles are drawn so that they touch each other and their centres are all on the line AB. If CD is 8 units in length, what is the area of the part that is shaded yellow?



**Lastly:**

If the area shaded yellow is equal to the area of the larger of the two circles that are shaded blue, what is the relationship between the radii of the three circles?

## Practice Test

Your test will ask similar questions to this one.

You may NOT use a calculator

If  $ax^2 + bx + c = 0$  then  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

1. Expand and simplify

(a)  $(2x + 3)(2x - 1)$                       (b)  $(a + 3)^2$                       (c)  $4x(3x - 2) - x(2x + 5)$

2. Factorise

(a)  $x^2 - 7x$             (b)  $y^2 - 64$             (c)  $2x^2 + 5x - 3$     (d)  $6t^2 - 13t + 5$

3. Simplify

(a)  $\frac{4x^3y}{8x^2y^3}$             (b)  $\frac{3x+2}{3} + \frac{4x-1}{6}$

4. Solve the following equations

(a)  $\frac{h-1}{4} + \frac{3h}{5} = 4$             (b)  $x^2 - 8x = 0$     (c)  $p^2 + 4p = 12$

5. Write each of the following as single powers of  $x$  and /  $y$

(a)  $\frac{1}{x^4}$     (b)  $(x^2y)^3$             (c)  $\frac{x^5}{x^{-2}}$

6. Work out the values of the following, giving your answers as fractions

(a)  $4^{-2}$             (b)  $10^0$             (c)  $\left(\frac{8}{27}\right)^{\frac{1}{3}}$

7. Solve the simultaneous equations

$$3x - 5y = -11$$

$$5x - 2y = 7$$

8. Rearrange the following equations to make  $x$  the subject

(a)  $v^2 = u^2 + 2ax$     (b)  $V = \frac{1}{3}\pi x^2h$     (c)  $y = \frac{x+2}{x+1}$

9. Solve  $5x^2 - x - 1 = 0$  giving your solutions in surd form

## SOLUTIONS TO PRACTICE BOOKLET TEST

1) a)  $4x^2 + 4x - 3$    b)  $a^2 + 6a + 9$    c)  $10x^2 - 13x$

2) a)  $x(x - 7)$    b)  $(y + 8)(y - 8)$    c)  $(2x - 1)(x + 3)$    d)  $(3t - 5)(2t - 1)$

3) a)  $\frac{x}{2y^2}$    b)  $\frac{10x + 3}{6}$

4) a)  $h = 5$    b)  $x = 0$  or  $x = 8$    c)  $p = -6$  or  $p = 2$

5) a)  $x^4$    b)  $x^6y^3$    c)  $x^7$

6) a)  $\frac{1}{16}$    b)  $1$    c)  $\frac{2}{3}$

7)  $x = 3, y = 4$

8) a)  $x = \frac{v^2 - u^2}{2a}$    b)  $x = \sqrt{\frac{3V}{\pi h}}$    c)  $x = \frac{2 - y}{y - 1}$

9)  $x = \frac{1 \pm \sqrt{21}}{10}$