

A level Maths & Further Maths Induction Work: Phase 3

Welcome to the third and final phase of the Hardenhuish A level Maths and Further Maths induction work. The topics for this phase are listed below. These topics should all be familiar but there will be some interesting approaches and applications that you might not have seen before. Please work through each topic section listed, you will need a paper and pen to write down your working.

If there are any topics you would like a reminder on then a MyMaths location is given www.mymaths.co.uk Please email [Mrs Cobb](mailto:MrsCobb) if you need the login and password.

Maths Students

You should complete the essential **skills checks** and spend time doing the **practice** and **explore** questions, we suggest a minimum of 45 minutes for each section. Although additional time may be spent to complete all the tasks if you wish. Once complete, please work through the online check in quiz (details below).

Further Maths Students

Further Mathematicians should complete all of the tasks within each section and also explore the *Still Want More* activities, spending around 90 minutes on each section. Once complete, please work through the online check in quiz (details below).

Topic Sections:

- Solving linear equations https://amsp.org.uk/uploads/files/Solving_Linearv1_5.pdf
(MyMaths – Algebra, Equations, Linear)
- Solving quadratic equations https://amsp.org.uk/uploads/files/SolvingQuadratics1_3.pdf
(MyMaths – Algebra, Equations, Quadratic)
- Solving other equations https://amsp.org.uk/uploads/files/SolvingOtherEqns1_1.pdf
(MyMaths – Shape, Trigonometry, Missing angles/missing sides)
- Linear sketching https://amsp.org.uk/uploads/files/Linearsketchingv1_7.pdf
(MyMaths – Algebra, Graphs)
- Quadratic sketching https://amsp.org.uk/uploads/files/Sketching_Quadratics1_6.pdf
(MyMaths – Algebra, Graphs)
- Other sketching <https://amsp.org.uk/uploads/files/OtherSketching.pdf>
(MyMaths – Algebra, Graphs)

You will be given an induction test in your single maths lesson on the week beginning 7th Sept. You need to achieve 70% (80% for further mathematicians) to pass this induction test. A practice test (with solutions) can be found at the end of this document. We strongly suggest that you work through this ahead of the induction test to check that you are happy with all the concepts.

After working through the sections above and the practice induction test, please complete the short online check in quiz, linked below, by **Thursday 2nd September**.

<https://forms.office.com/Pages/ResponsePage.aspx?id=ALV0CGtJAKCS-T05uDMt-q9hj1h1AxdIo539Q2A2teFUQ1haQjNOQTJFSkpaS01PWINXRji4RVITVi4u>

Calculators

You will require a Casio FX-991EX Advanced Scientific Calculator (<https://education.casio.co.uk/products/991EX>) in September. These are available from our Resource Centre in school at a cost of £22.70. Alternatively, you may wish to source one online before then.

Suggested reading and mathematical apps/games

Please note that these are not compulsory, but if you are planning to study A level maths it is reasonable to assume you are interested in the subject!

- Sumaze – maths puzzle game, free Windows/Apple app

- Why Do Buses Come In Threes? (Rob Eastaway and Jeremy Wyndham)
- Humble Pi: A Comedy of Maths Errors (Matt Parker)
- The Num8er My5teries (Marcus du Sautoy)
- How Not To Be Wrong (Jordan Ellenberg)

If you read any of the books above, or any of the other excellent mathematical books available, we'd love to hear your thoughts (or recommendations) in September!

If you have completed all the work listed above and are still keen for more to prepare for next year then you may wish to explore the online Year 11 to 12 transition course from the AMSP. This is optional and students can sign themselves up using the link here https://2017.integralmaths.org/management/self_reg_students.php

If you have any questions, or need the login for MyMaths, please email...

Mrs Cobb – rcx@hardenhuish.wilts.sch.uk or Mr Cobb - pxc@hardenhuish.wilts.sch.uk

Lead Teachers for Key Stage 5 Mathematics

Practice Test

Your induction test will ask similar questions to this one.

You may NOT use a calculator

1. Expand and simplify

(a) $4x(3x - 2) - x(2x + 5)$ (b) $(2x + 3)(2x - 1)$ (c) $(a - 12)^2$

2. Factorise

(a) $x^2 - 7x$ (b) $x^2 + 9x - 36$ (c) $y^2 - 64$ (d) $25y^3 - 9y$

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) $k^2 - 7k - 18 = 0$ (d) $p^2 + 4p = 12$

5. Write each of the following as single powers of x and/or 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 where appropriate

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

7. Solve the simultaneous equations

$$\begin{aligned} 3x - 5y &= -11 \\ 5x - 2y &= 7 \end{aligned}$$

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 $x^2 + 4x + 1 = 0$, giving your solutions in surd form

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

ANSWERS TO PRACTICE TEST

1) a) $10x^2 - 13x$ b) $4x^2 + 4x - 3$ c) $a^2 - 24a + 144$

2) a) $x(x-7)$ b) $(x+12)(x-3)$ c) $(y+8)(y-8)$ d) $y(5y-3)(5y+3)$

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

4) a) $h=5$ b) $x=0$ or $x=8$ c) $k=9$ or $k=-2$ d) $p=-6$ 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) $x = \frac{-4 \pm \sqrt{12}}{2}$ ($= -2 \pm \sqrt{3}$)

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