

NAME:

YOUR 'FLYING START' IN

AS / A LEVEL MATHEMATICS

Welcome to AS / A Level Maths — the most popular AS / A Level nationwide! This course will challenge your thinking, sharpen your mind and open doors to an extraordinary range of opportunities.

Maths is often described as the language of the universe. It helps us understand and analyse everything from the motion of planets and the behaviour of particles to economic trends, medical breakthroughs, psychological behaviour and technological innovation. Along the way, you will develop powerful analytical and logical thinking skills that are valued by universities, employers and every profession that relies on solving complex problems.

A Level Maths is essential for many degree courses. Expect plenty of algebra, trigonometry, calculus and problem-solving. These ideas underpin much of modern science, technology and engineering — but maths is also a fascinating subject in its own right!

The questions and resources inside this booklet will refresh key skills, introduce important ideas and help you begin in September with confidence. Don't worry — we will not formally mark the work, and we do not expect you to know everything before you arrive — but we are interested in your ideas and what you have found easy or difficult. This helps us to support you right from the beginning.

We look forward to welcoming you to North Devon College!

Ruth and Dave, Maths Department

TO GET YOU STARTED...

This document includes:

- **Links to resources you may find useful**
- **A list of frequently asked questions (FAQs) about the Flying Start and A Level Maths**
- **A list of recommended calculators for A Level Maths**
- **A set of practice questions with example solutions**
- **A set of hand-in questions**

We would like you to complete the questions at the end of this document and hand them to your teacher in your first maths lesson.

Please complete them on a **separate piece of A4 paper** and **write your name** on the top.

You do not need to complete or hand in any solutions to the practice questions – the purpose of these is to remind you of the techniques involved to help you with the hand-in questions. You could also click on the Jack Brown YouTube videos below for a further reminder.

LINKS TO RESOURCES

The following YouTube Jack Brown videos would be useful to watch to not only remind you of GCSE Maths techniques, but also to introduce you to some A level content.

- [**A-Level Maths B3: Quadratics - YouTube**](#)
- [**A-Level Maths E1: Trigonometry - YouTube**](#)
- [**A-Level Maths B1: Indices - YouTube**](#)

If you would like a more basic recap of the material from GCSE, please look at the following resource:

- [**TLMaths – GCSE to A-Level Maths – Bridging the Gap**](#)

Have you completed the Flying Start and want something more challenging? Have a go at some of the UKMT Senior Maths Challenge Papers. Maths students at North Devon College take part in the UKMT Senior Maths Challenge every year, with the opportunity to win certificates – these are great to mention in university applications!

- [**UKMT – Senior Maths Challenge – Past Papers and Solutions**](#)

FREQUENTLY ASKED QUESTIONS (FAQS)

Q. Will the Flying Start be marked? When is it due?

A: This work may not be formally marked but will be discussed during your first classes with us in September. Just bring along what you have completed to your timetabled sessions.

Q. I am not sure if I have the right answers, what should I do?

A: Don't worry! Just have a go at getting something down and bring it along to the first lessons where we can talk it through. There is no need to get anxious about the tasks, we are not expecting you to know everything at the start. We are mainly interested in how you tackle the challenge and how we can support you during the course.

Q. Do I have to do it?

A: Flying Start is not compulsory, but many students find it useful for getting them used to thinking about subjects at the next level. Particularly in maths, it helps to bridge the gap between GCSE and A Level. Early classroom sessions will also reflect on some of the Flying Start activities.

Q. Which exam board is used for A Level Maths?

A: At North Devon College, we use AQA as our examining body for AS / A Level Mathematics.

Q. What is the course content like? How will it be assessed?

A: In A Level maths you will expand your knowledge of Pure maths, and you will also explore some important applications of these concepts in Mechanics and Statistics. At the end of the first year (AS Level) you will complete an exam on pure maths only as well as an exam on all of pure, statistics and mechanics together. At the end of the second year (A Level) you will complete three exams: one on pure maths only, one on pure and mechanics, and one on pure and statistics.

For a more detailed breakdown of the course content, [click here](#).

Q. Do I need a specific calculator for A Level Maths?

A: For the questions in the Flying Start, and for the first few weeks of the course, you can continue to use the same calculator you had at GCSE. However you will most likely need an upgrade after the first few weeks of the course. The next page contains a list of recommended calculators and average prices.

Q. What else do I need to bring to lessons?

A: You will need a place to write your notes and to complete questions. It is a good idea to prepare by bringing a notebook – ideally one with squared or dotted paper. You will also need a pen, pencil and a ruler for diagrams. You may also bring an iPad / tablet / laptop to lessons if they are not distracting.

Q. Something else?

A: If you have any other questions about the Flying Start or A Level Maths more generally, please email Ruth at ruth.matthews@petroc.ac.uk.

RECOMMENDED CALCULATORS

For A Level maths, you will need an **advanced scientific calculator**. You do not need to buy a brand new one – you could try online marketplaces such as Vinted or Ebay for used calculators at a fraction of the original price. Some high-street stores such as CeX may also have used calculators for sale.

You may opt for a more expensive graphical calculator. These can offer some peace of mind during exams – e.g. checking that you have correctly sketched a graph – but please note that you are only awarded marks in A Level Maths where you have demonstrated understanding. The exam papers are carefully written to ensure that students using a graphical calculator will not gain an unfair advantage.

Please don't worry if you do not have an advanced calculator in time for your first maths lesson. You will not need to use the advanced features in these calculators until after the first few weeks of the course.

Examples of recommended calculators for A Level Maths

- **Casio fx-991CW** (≈ £30)
This model replaced the fx-991EX
- **Casio fx-991EX** (≈ £20)
No longer in production, but still sold in some places
- **Graphical calculator: Casio fx-CG100** (≈ £120)
This model replaced the fx-CG50
- **Graphical calculator: Casio fx-CG50** (≈ £120)
No longer in production, but still sold in most places



Examples of calculators that are outdated and not advanced enough for AS / A Level maths:

- fx-83GTX / fx-85GTX
- fx-83GT Plus / fx-85GT Plus
- fx-83GTCW / fx-83GTCW+
- fx-85GTCW / fx-85GTCW+
- fx-83MS / fx-85MS
- fx-991ES PLUS
- Budget / Non-CASIO models



If you have a calculator which is not listed here, and you are not certain that it is suitable for A Level Maths, please email Ruth via ruth.matthews@petroc.ac.uk.

FLYING START - PRACTICE QUESTIONS

Practice questions – **do not hand these in** – solutions are on the next page

1) Showing your working, evaluate (without a calculator):

(i) $3 \times (6 + 2)$

(ii) $-2^2 + 5$

(iii) $5 - (3 - 7)$

2) Write the following in the form kx^n :

(i) $3x^2 \times (2x^2)^3$

(ii) $\frac{x^4}{2\sqrt{x} \times x^2}$

(iii) $\frac{5/x^2}{\sqrt[3]{x}}$

3) Factorise the following expressions, then simplify if possible:

(i) $x^2 - 7x + 10$

(ii) $3x^2 - 12$

(iii) $\frac{2x^2 - 13x - 7}{4x^2 - 1}$

4) Solve the following equations:

(i) $2n^2 - 5n - 3 = 0$

(ii) $2x^2 - 8x = 0$

(iii) $3(x + 2)^2 - 1 = 0$

5) Make x the subject of the following:

(i) $\sqrt{x^2 + y^2} = 4$

(ii) $ax - d = 3c - bx$

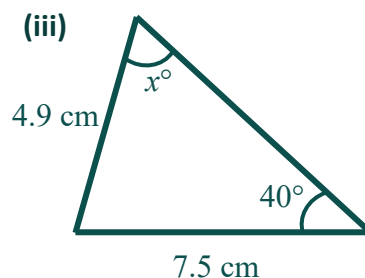
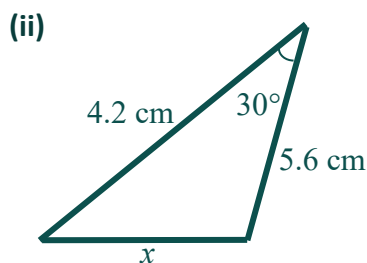
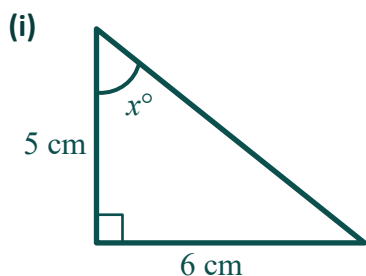
(iii) $y = \frac{4}{3 - x}$

6) Write the following in the form $a(x + b)^2 + c$ where a , b and c are to be determined:

(i) $x^2 + 8x - 13$

(ii) $2x^2 - 12x + 5$

7) Find the value of x in each of the following questions (give your answers to 3 significant figures):



8) Solve these pairs of simultaneous equations:

(i) $3x - 5y = 6$
 $2x - y = -3$

(ii) $y = 6 - x$
 $4x - 2y = 5$

SOLUTIONS TO PRACTICE QUESTIONS

1. Showing your working, evaluate (without a calculator):

(i) $3 \times (6 + 2) = 3 \times 8 = 24$

(ii) $-2^2 + 5 = -2 \times 2 + 5 = -4 + 5 = 1$ (do indices before $\pm$)

(iii) $5 - (3 - 7) = 5 - -4 = 9$

2. Write the following in the form kx^n :

(i) $3x^2 \times (2x^2)^3 = 3x^2 \times 2^3(x^2)^3 = 3x^2 \times 8x^6 = 24x^8$

Recall the rules of indices: $(a^m)^n = a^{m \times n}$ and $a^m \times a^n = a^{m+n}$.

(ii) $\frac{x^4}{2\sqrt{x} \times x^2} = \frac{x^4}{2x^{1/2} \times x^2} = \frac{x^4}{2x^{5/2}} = \frac{1}{2}x^{3/2}$

Recall the rules of indices: $a^m \times a^n = a^{m+n}$ and $a^m \div a^n = a^{m-n}$.

(iii) $\frac{5/x^2}{\sqrt[3]{x}} = \frac{5/x^2}{\sqrt[3]{x}} \times \frac{x^2}{x^2} = \frac{5}{x^{1/3} \times x^2} = \frac{5}{x^{1/3+6/3}} = \frac{5}{x^{7/3}} = 5x^{-7/3}$

Multiplying top and bottom by x^2 removes the fraction within a fraction.

Also recall that $\sqrt[n]{a} = a^{1/n}$.

3. Factorise the following expressions, then simplify if possible:

(i) $x^2 - 7x + 10 = x^2 - 5x - 2x + 10 = x(x - 5) - 2(x - 5) = (x - 5)(x - 2)$

(ii) $3x^2 - 12 = 3(x^2 - 4) = 3(x + 2)(x - 2)$

(iii) $\frac{2x^2 - 13x - 7}{4x^2 - 1} = \frac{2x^2 - 14x + 1x - 7}{(2x + 1)(2x - 1)} = \frac{2x(x - 7) + 1(x - 7)}{(2x + 1)(2x - 1)} = \frac{(x - 7)(2x + 1)}{(2x + 1)(2x - 1)} = \frac{x - 7}{2x - 1}$

4. Solve the following equations:

(i) $2n^2 - 5n - 3 = 0$

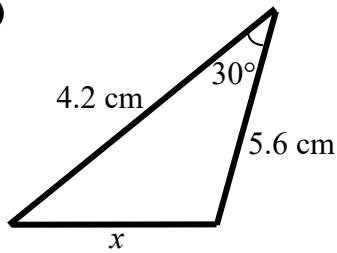
$2n^2 - 6n + n - 3 = 0$

$2n(n - 3) + 1(n - 3) = 0$

$(2n + 1)(n - 3) = 0$

$n = \frac{-1}{2} \quad \text{or} \quad n = 3$

(ii)

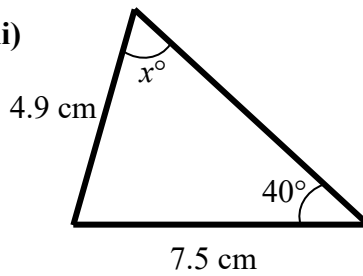


$$x^2 = 4.2^2 + 5.6^2 - 2 \times 4.2 \times 5.6 \cos 30^\circ$$

$$x^2 = 8.26...$$

$$x = 2.87 \text{ cm (3 s.f.)}$$

(iii)



$$\frac{\sin x}{7.5} = \frac{\sin 40^\circ}{4.9}$$

$$\sin x = \frac{7.5 \times \sin 40^\circ}{4.9}$$

$$x = 79.7^\circ$$

8. Solve these pairs of simultaneous equations:

(i) $3x - 5y = 6$ so $6x - 10y = 12$ then subtracting the equations:

$$2x - y = -3 \quad 6x - 3y = -9$$

$$-10y - (-3y) = 12 - -9$$

$$-7y = 21 \quad \text{hence } y = -3$$

subbing back in $2x - y = -3$ gives $2x - -3 = -3$ so $x = -3$

The lines meet at the point $(-3, -3)$

(ii) $y = 6 - x$

$$4x - 2y = 5$$

Using substitution (subbing 1st equation into the second):

$$4x - 2(6 - x) = 5 \quad \text{so} \quad 4x - 12 + 2x = 5 \quad \text{so} \quad 6x = 17 \quad x = \frac{17}{6}$$

$$\text{Hence } y = 6 - \frac{17}{6} \quad \text{so} \quad y = \frac{36}{6} - \frac{17}{6} = \frac{19}{6}.$$

The lines meet at the point $\left(\frac{17}{6}, \frac{19}{6}\right)$

FLYING START – HAND IN QUESTIONS

1) Write the following in the form kx^n :

(i) $4x^4 \times 2x^3$

(ii) $5x^4 \times (2x)^2$

(iii) $\frac{6x^9}{\frac{1}{2}x^3 \times x^2}$

(iv) $\sqrt[3]{8x^6}$

(v) $\frac{1}{3x^2}$

(vi) $\frac{6x^2}{2x^4}$ [12]

2) Factorise the following expressions, then simplify if possible:

(i) $x^2 - 4x - 21$

(ii) $25x^2 - 9$

(iii) $\frac{x^2 - 4}{(4x + 8)(x - 1)}$ [6]

3) Solve the following equations:

(i) $32n^2 - 24n = 0$

(ii) $2x^2 - 9x - 5 = 0$

(iii) $(x - 1)^2 - 3 = 0$ [6]

4) Make x the subject of the following:

(i) $\frac{a}{(x - b)^2} = c$

(ii) $p = \sqrt{\frac{x + y}{5}}$

(iii) $y = ap + \frac{1}{3}xy^2$ [9]

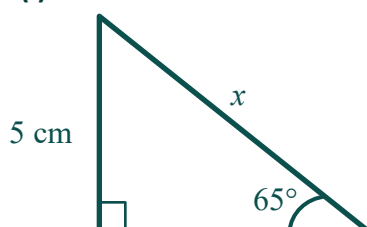
5) Write the following in the form $a(x + b)^2 + c$ where a , b and c are to be determined:

(i) $x^2 - 6x + 1$

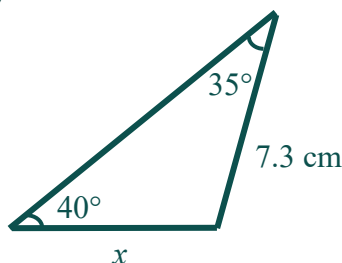
(ii) $3x^2 + 12x - 5$ [5]

6) Find the value of x in each of the following questions (give your answers to 3 significant figures):

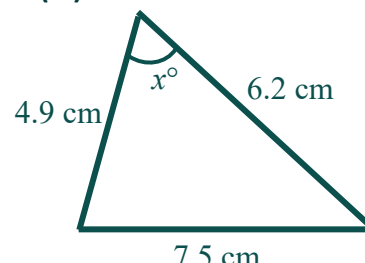
(i)



(ii)



(iii)



[6]

7) Solve these pairs of simultaneous equations:

(i) $x = 1 - 2y$
 $x + y = \frac{1}{4}$

(ii) $4x - 3y = 6$
 $5x - 2y = -3$

[6]

Total marks: 50