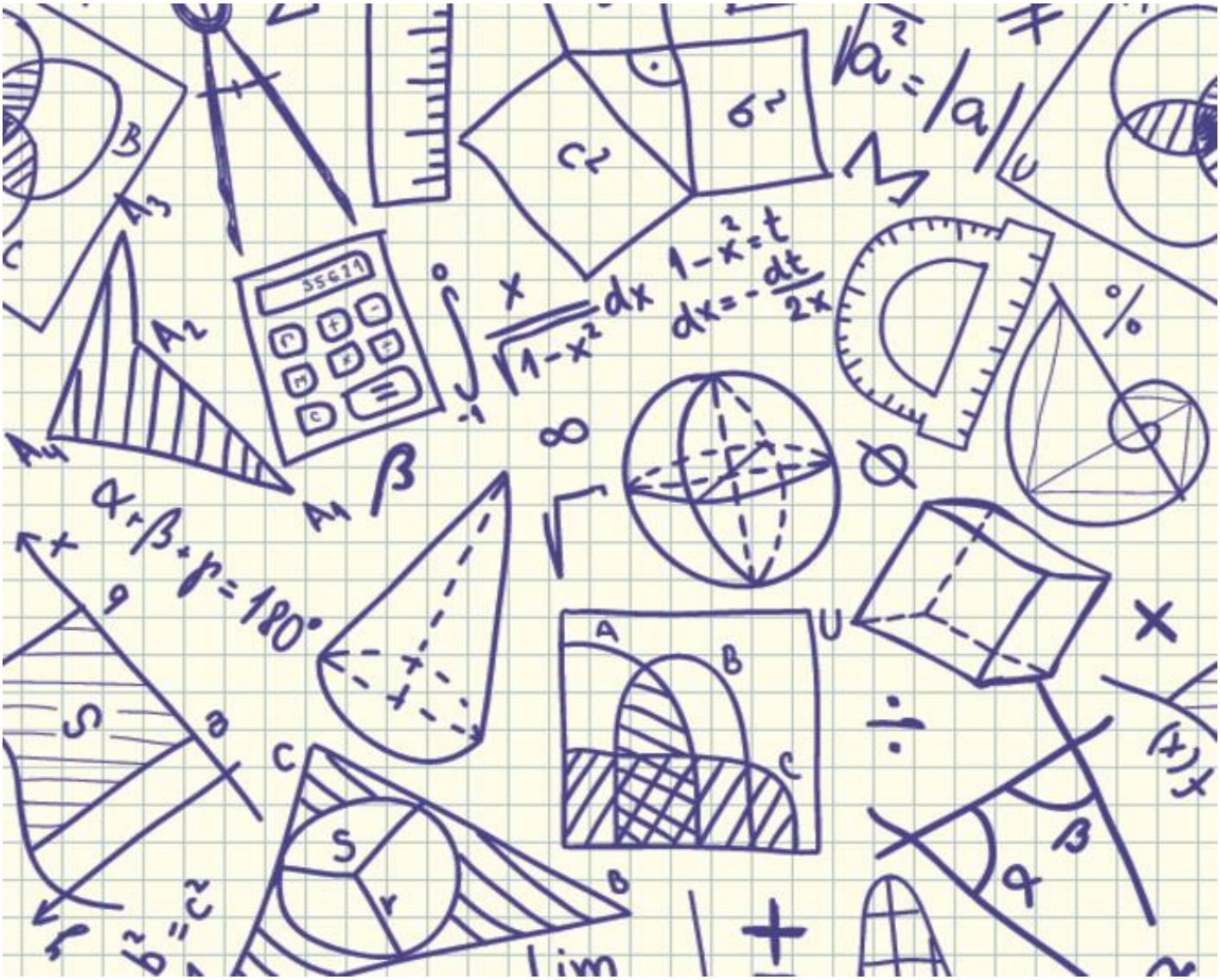
Welcome to RVHS Mathematics A-Level

Name :



We offer the following

- Pure A2 (AQA)
- Further A2 (Edexcel)
- Core AS (AQA)

We have attached some information about the courses and expecting you to complete some essential bridging work before you start in the new academic year. You need to have a solid foundation of GCSE Maths to be able to access the A-Level content.

Pure Maths	AQA	5 Lessons per week	3 Written Papers
Further Maths	Edexcel	4 Lessons per week	4 Written Papers
Core Maths	AQA	2 Lessons per week	3 Written Papers

Other Essentials

- A4 Folder with dividers
- Maths equipment (including a graphical calculator)
- Enthusiasm and resilience

Content List for Core Maths

Compulsory (Paper1 and Paper2)

- Analysis of Data
- Personal Finance
- Modelling and Estimation
- Critical Analysis

Extra Choice (Paper3)

- Critical Path Analysis
- Expectation
- Cost Benefit Analysis

This Course will be offered over two years and you will receive an AS qualification at the end of Year 13.

Contents list for Pure Maths

Core Pure

- Algebra
- Polynomials and the binomial theorem
- Trigonometry and identities
- Differentiation and Integration
- Differential equations
- Exponentials and logarithms
- Sequences
- Numerical Methods
- Vectors

Applied Maths (Mechanics and Statistics)

- Units and Kinematics
- Forces and Newton's laws
- Motion in two dimensions
- Forces
- Collecting, representing and interpreting data
- Probability and discrete random variables
- Hypothesis testing
- Continuous random variables

Holiday Task:
Work through the essential bridging topics and submit the answers to the Maths Office within the first week of the new academic year. The rest of the work will be beneficial and we strongly advise you to answer all the questions and consolidate your GCSE knowledge before term starts.

Content list for Further Maths

Core Pure Further Maths

- Complex Numbers
- Argand Diagrams
- Series
- Roots of Polynomials
- Volumes of revolution
- Matrices
- Linear Transformation
- Proof by Induction
- Vectors

Decision Maths

- Algorithms
- Graphs and Networks
- Algorithms on Graphs
- Route Inspection
- The Travelling Salesman Problem
- Linear Programming
- The Simplex Algorithm
- Critical Path Analysis

Holiday Task:
Prepare a 5 minute presentation on your favourite Mathematician and be ready to present it to the rest of the A-Level Maths students during the first week of the new academic year.

Suggested Reading List

- A Concise Introduction to Pure Maths – Liebeck
- The Mathematical Universe – William Dunham
- From the Birth of Numbers – Jan Gullberg
- Music of the Primes – Marcus du Sautoy
- Finding Moonshine – Marcus du Sautoy
- Letters to a Young Mathematician – Ian Stewart
- From here to Infinity – Ian Stewart
- Introduction to Mathematical Philosophy – Bertrand Russell
- Mathematics: Queen and Servant of Science – Eric Temple Bell

Any Problem solving and Logic thinking books as well.

Personalised Learning Checklist		R	A	G	Gap Closed
1	**Proof**				
1.1	Understand and use the structure of mathematical proof, proceeding from given assumptions through a series of logical steps to a conclusion; use methods of proof, including proof by deduction, proof by exhaustion, proof by counterexample.				
2	**Algebra and functions**				
2.1	Understand and use the laws of indices for all rational exponents.				
2.2	Use and manipulate surds, including rationalising the denominator.				
2.3	Work with quadratic functions and their graphs.				
	The discriminant of a quadratic function, including the conditions for real and repeated roots.				
	Completing the square.				
	Solution of quadratic equations, including solving quadratic equations in a function of the unknown.				
2.4	Solve simultaneous equations in two variables by elimination and by substitution, including one linear and one quadratic equation.				
2.5	Solve linear and quadratic inequalities in a single variable and interpret such inequalities graphically, including inequalities with brackets and fractions.				
	Express solutions through correct use of 'and' and 'or', or through set notation.				
	Represent linear and quadratic inequalities such as $y > x + 1$ and $y > ax^2 + bx + c$ graphically.				
2.6	Manipulate polynomials algebraically, including expanding brackets and collecting like terms, factorisation and simple algebraic division; use of the factor theorem.				
2.7	Understand and use graphs of functions; sketch curves defined by simple equations including polynomials. $y = \frac{a}{x}$ and $y = \frac{a}{x^2}$ (including their vertical and horizontal asymptotes).				
	Interpret algebraic solution of equations graphically; use intersection points of graphs to solve equations.				
	Understand and use proportional relationships and their graphs.				
2.8	Understand the effect of simple transformations on the graph of $y = f(x)$, including sketching associated graphs: $y = af(x)$, $y = f(x) + a$, $y = f(x + a)$, $y = f(ax)$.				
3	**Coordinate geometry in the (x, y) plane**				
3.1	Understand and use the equation of a straight line, including the forms $y - y_1 = m(x - x_1)$ and $ax + by + c = 0$.				
	Gradient conditions for two straight lines to be parallel or perpendicular.				
	Be able to use straight line models in a variety of contexts.				
3.2	Understand and use the coordinate geometry of the circle including using the equation of a circle in the form $(x - a)^2 + (y - b)^2 = r^2$.				
	Completing the square to find the centre and radius of a circle; use of the following properties:				
	· the angle in a semicircle is a right angle				
	· the perpendicular from the centre to a chord bisects the chord				
	· the radius of a circle at a given point on its circumference is perpendicular to the tangent to the circle at that point.				
4	**Sequences and series**				
4.1	Understand and use the binomial expansion of $(a + bx)^n$ for positive integer n; the notations $n!$ and ${}^nC_r$ link to binomial probabilities.				

5	**Trigonometry**				
5.1	Understand and use the definitions of sine, cosine and tangent for all arguments; the sine and cosine rules; the area of a triangle in the form $\frac{1}{2}$ ab sin C.				
5.2	Understand and use the sine, cosine and tangent functions; their graphs, symmetries and periodicity.				
5.3	Understand and use tan $q = \frac{\sin\theta}{\cos\theta}$				
	. Understand and use $\sin^2\theta + \cos^2\theta = 1$.				
5.4	Solve simple trigonometric equations in a given interval, including quadratic				
6	**Exponentials and logarithms**				
6.1	Know and use the function a^x and its graph, where a is positive. Know and use the function e^x and its graph.				
6.2	Know that the gradient of e^{kx} is equal to $k e^{kx}$ and hence understand why the exponential model is suitable in many applications.				
6.3	Know and use the definition of $\log_a x$ as the inverse of a^x, where a is positive and $x \geq 0$, $a \neq 1$.				
	Know and use the function $\ln x$ and its graph. Know and use $\ln x$ as the inverse function of e^x.				
6.4	Understand and use the laws of logarithms:				
	$\log_a x + \log_a y = \log_a (xy)$				
	$\log_a x - \log_a y = \log_a$				
	$k \log_a x = \log_a x^k$ (including, for example, $k = -1$ and $k = -1/2$				
6.5	Solve equations of the form $ax = b$.				
6.6	Use logarithmic graphs to estimate parameters in relationships of the form				
6.7	Understand and use exponential growth and decay; use in modelling.				
7	**Differentiation**				
7.1	Understand and use the derivative of f(x) as the gradient of the tangent to				
	Sketching the gradient function for a given curve.				
	Differentiation from first principles for small positive integer powers of x.				
	Understand and use the second derivative as the rate of change of gradient.				
7.2	Differentiate x^n, for rational values of n, and related constant multiples, sums and differences.				
7.3	Apply differentiation to find gradients, tangents and normals. maxima and minima and stationary points.				
	Identify where functions are increasing or decreasing.				
8	**Integration**				
8.1	Know and use the Fundamental Theorem of Calculus.				
8.2	Integrate x^n (excluding $n = -1$) and related sums, differences and constant multiples.				
8.3	Evaluate definite integrals; use a definite integral to find the area under a curve.				
9	**Vectors**				
9.1	Use vectors in two dimensions.				
9.2	Calculate the magnitude and direction of a vector and convert between component form and magnitude/direction form.				
9.3	Add vectors diagrammatically and perform the algebraic operations of				
9.4	Understand and use position vectors; calculate the distance between two points represented by position vectors.				
9.5	Use vectors to solve problems in pure mathematics and in context (including forces).				

This summer work is **compulsory**.

Your maths teacher will ask to see your work (and method) in your first maths lesson, where you will also sit a skills test to assess whether the course is right for you. Students who do not pass the test are unlikely to be successful in A level maths

Purpose
This work gives you the opportunity to practice the skills that will be required to start A Level Mathematics successfully and identify any areas where you may need to spend additional time. We want to ensure you do not feel overwhelmed when you begin your Sixth Form studies.

You have done well in your GCSE mathematics course so we have high expectations of your algebra and number skills. Now, as an A level student, we have very high expectations for the effort you will put into the course, only through an excellent attitude to learning and work ethic can students succeed in A level maths; use this summer work as an example of the effort you plan to put into the course.

These websites may be useful

- vle.mathswatch.com
- www.mathcentre.ac.uk/students/topics
- www.physicsandmathstutor.com

We hope that you will use this introduction to give you a good start to you're a Level work and that it will help you enjoy and benefit from the course.

Enjoy your summer break.

Contents:

Laws of Indices

Things to remember:

$a^m \times a^n = a^{m+n}$ $\qquad$ $a^{-n} = \frac{1}{a^n}$

$a^m \div a^n = a^{m-n}$ $\qquad$ $(a^m)^n = a^{mn}$

$a^0 = 1$ $\qquad$ $a^{\frac{m}{n}} = \sqrt[n]{a^m}$

Questions:

1. (a) Simplify $m^5 \div m^3$

……

(1)

(b) Simplify $5x^4y^3 \times x^2y$

……

(2)

(Total for Question is 3 marks)

2. Write these numbers in order of size.
Start with the smallest number.

5^{-1} $\qquad$ 0.5 $\qquad$ -5 $\qquad$ 5^0

……

(Total for Question is 2 marks)

3. Write down the value of $125^{\frac{2}{3}}$

……

(Total for question is 1 mark)

4. (a) Write down the value of 10^{-1}

……

(1)

(b) Find the value of $27^{\frac{2}{3}}$

……

(2)

(Total for Question is 3 marks)

5. (a) Find the value of 5°

……

(1)

(b) Find the value of $27^{1/3}$

……

(1)

(c) Find the value of 2^{-3}

……

(1)

(Total for Question is 3 marks)

6. (a) Write down the value of $27^{1/3}$

……

(1)

(b) Find the value of $27^{-1/2}$

……

(2)

(Total for Question is 3 marks)

7. (a) Write down the value of $64^{\frac{1}{2}}$

……

(1)

(b) Find the value of $\left(\frac{8}{125}\right)^{-\frac{2}{3}}$

……

(2)

(Total for question = 3 marks)

8. (a) Write down the value of 6^0

……

(1)

(b) Work out $64^{-\frac{2}{3}}$

……

(2)

(Total for question = 3 marks)

Surds

Things to remember:

- √ means square root;
- To simplify surds, find all its factors;
- To rationalise the denominator, find an equivalent fraction where the denominator is rational.

Questions:

1. Work out

$$\frac{(5+\sqrt{3})(5-\sqrt{3})}{\sqrt{22}}$$

Give your answer in its simplest form.

.....

(Total 3 marks)

2. (a) Rationalise the denominator of $\frac{1}{\sqrt{3}}$

.....

(1)

(b) Expand $(2+\sqrt{3})(1+\sqrt{3})$

Give your answer in the form $a+b\sqrt{3}$ where *a* and *b* are integers.

.....

(2)

(Total 3 marks)

3. (a) Rationalise the denominator of $\frac{1}{\sqrt{7}}$

.....

(2)

(b) (i) Expand and simplify $(\sqrt{3} + \sqrt{15})^2$
Give your answer in the form $a + b\sqrt{3}$ where *a* and *b* are integers.

.....

(ii) All measurements on the triangle are in centimetres.
ABC is a right-angled triangle.
k is a positive integer.

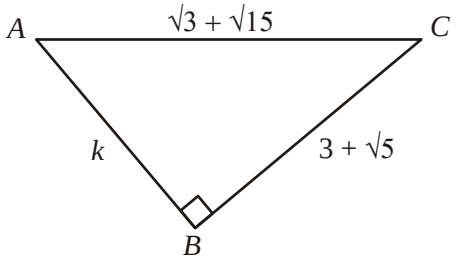


Diagram **NOT** accurately drawn

Find the value of *k*.

k = ...

(5)

(Total 7 marks)

4. Expand and simplify $(\sqrt{3} - \sqrt{2})(\sqrt{3} - \sqrt{2})$

.....

(Total 2 marks)

5. (a) Write down the value of $49^{1/2}$

.....

(1)

(b) Write $\sqrt{45}$ in the form $k\sqrt{5}$, where *k* is an integer.

.....

(1)

(Total 2 marks)

6. Write $\dfrac{\sqrt{18} + 10}{\sqrt{2}}$ in the form $a + b\sqrt{2}$ where *a* and *b* are integers.

a = ...

b = ...

(Total 2 marks)

7. Expand and simplify $(2 + \sqrt{3})(7 - \sqrt{3})$
Give your answer in the form $a + b\sqrt{3}$ where *a* and *b* are integers.

.....

(Total 3 marks)

8. Rationalise the denominator of $\frac{(4 + \sqrt{2})(4 - \sqrt{2})}{\sqrt{7}}$

Give your answer in its simplest form.

.....

(Total for question = 3 marks)

9. Show that $\frac{(4 - \sqrt{3})(4 + \sqrt{3})}{\sqrt{13}}$ simplifies to $\sqrt{13}$

(Total for question = 2 marks)

Expanding and Factorising (Single Brackets)

Things to remember:

- Expand brackets means to multiply what is outside the bracket with everything inside the bracket.
- Factorising is the opposite of expanding – put the HCF outside the brackets to factorise fully.

Questions:

1. (a) Expand $5(m + 2)$

.....

(1)

(b) Factorise $y^2 + 3y$

.....

(1)

(c) Simplify $a^5 \times a^4$

.....

(1)

(Total for Question is 3 marks)

2. (a) Expand $2m(m + 3)$

.....

(1)

(b) Factorise fully $3xy^2 - 6xy$

.....

(2)

(Total for Question is 3 marks)

3. (a) Expand $3(x + 4)$

.....

(1)

(b) Expand $x(x^2 + 2)$

.....

(2)

(c) Factorise $x^2 - 6x$

.....

(1)

(Total for Question is 4 marks)

4. (a) Expand and simplify $5(x + 7) + 3(x – 2)$

.....

(2)

(b) Factorise completely $3a^2b + 6ab^2$

.....

(2)

(Total for Question is 4 marks)

5. (a) Expand $3(2y – 5)$

.....

(1)

(b) Factorise completely $8x^2 + 4xy$

.....

(2)

(Total for Question is 3 marks)

6. (a) Factorise $3x + 6$

.....

(1)

(b) Expand and simplify $5(y - 2) + 2(y - 3)$

.....

(2)

(Total for Question is 3 marks)

7. (a) Factorise $4x + 10y$

.....

(1)

(b) Factorise $x^2 + 7x$

.....

(1)

(Total for Question is 2 marks)

Solving Equations

Things to remember:

- "Solve" means to find the value of the variable (what number the letter represents).
- The inverse of + is – and the inverse of x is ÷
- Work one step at a time, keeping you = signs in line on each new row of working.

Questions:

1. Solve $4x + 3 = 19$

$x =$……

(Total 2 marks)

2. (a) Solve $6x – 7 = 38$

$x =$ .....

(2)

(b) Solve $4(5y – 2) = 40$

$y =$ .....

(3)

(Total 5 marks)

3. Solve $5(2y + 3) = 20$

$y =$ .....

(Total 3 marks)

4. (a) Solve $7x + 18 = 74$

$x =$ .....
(2)

(b) Solve $4(2y – 5) = 32$

$y =$ .....
(2)

(c) Solve $5p + 7 = 3(4 – p)$

$p =$ .....
(3)
(Total 7 marks)

5. (a) Solve $7p + 2 = 5p + 8$

$p =$ .....
(2)

(b) Solve $7r + 2 = 5(r – 4)$

$r =$ .....
(2)
(Total 4 marks)

6. Solve
$4y + 1 = 2y + 8$

$y =$……

(Total 2 marks)

7. Solve $4y + 3 = 2y + 8$

$y =$ .....

(Total 2 marks)

Rearranging Formulae

Things to remember:

- Firstly decide what needs to be on its own.
- Secondly move all terms that contain that letter to one side. Remember to move all terms if it appears in more than one.
- Thirdly separate out the required letter on its own.

Questions:

1. Make u the subject of the formula
$D = ut + kt2$

u = ...
(Total 2 marks)

2. (a) Solve $4(x + 3) = 6$

x = ...
(3)

(b) Make t the subject of the formula $v = u + 5t$

t = ...
(2)
(Total 5 marks)

3. (a) Expand and simplify
$(x – y)^2$

.....
(2)

(b) Rearrange $a(q – c) = d$ to make q the subject.

Q = ...
(3)
(Total 5 marks)

4. Make x the subject of
$5(x - 3) = y(4 - 3x)$

x = ...

(Total 4 marks)

5. $$P = \frac{n^2 + a}{n + a}$$

Rearrange the formula to make a the subject.

A =.....

(Total 4 marks)

6. $$\frac{x}{x + c} = \frac{p}{q}$$

Make x the subject of the formula.

X =.....

(Total 4 marks)

Linear Simultaneous Equations

Things to remember:

1. Scale up (if necessary)
2. Add or subtract (to eliminate)
3. Solve (to find x)
4. Substitute (to find y) (or the other way around)

Questions:

***1.** The Singh family and the Peterson family go to the cinema.
The Singh family buy 2 adult tickets and 3 child tickets.
They pay £28.20 for the tickets.
The Peterson family buy 3 adult tickets and 5 child tickets.
They pay £44.75 for the tickets.
Find the cost of each adult ticket and each child ticket.

(Total for question = 5 marks)

2. Solve the simultaneous equations

$3x + 4y = 5$
$2x - 3y = 9$

$x =$ ……

$y =$ ……

(Total for Question is 4 marks)

3. **S**olve the simultaneous equations

$4x + 7y = 1$

$3x + 10y = 15$

x = ...

y = ...

(Total for Question is 4 marks)

4. Solve

$$2x + 3y = \frac{2}{3}$$

$$3x - 4y = 18$$

x = ...

y = ...

(Total for Question is 4 marks)

5. Solve the simultaneous equations

$4x + y = 25$

$x - 3y = 16$

x = ...

y = ...

(Total for Question is 3 marks)

6. Solve the simultaneous equations

$3x - 2y = 7$

$7x + 2y = 13$

x = ...

y = ...

(Total for Question is 3 marks)

7. A cinema sells adult tickets and child tickets.
The total cost of 3 adult tickets and 1 child ticket is £30
The total cost of 1 adult ticket and 3 child tickets is £22
Work out the cost of an adult ticket and the cost of a child ticket.

adult ticket £….....

child ticket £….....

(Total for question = 4 marks)

***8.** Paper clips are sold in small boxes and in large boxes.
There is a total of 1115 paper clips in 4 small boxes and 5 large boxes.
There is a total of 530 paper clips in 3 small boxes and 2 large boxes.
Work out the number of paper clips in each small box and in each large box.

(Total for Question is 5 marks)

Expand and Factorise Quadratics

Things to remember:

- Use FOIL (first, outside, inside, last) or the grid method (for multiplication) to expand brackets.
- For any quadratic $ax^2 + bx + c = 0$, find a pair of numbers with a sum of b and a product of ac to factorise.

Questions:

1. Expand and simplify $(m + 7)(m + 3)$

……

(Total for question = 2 marks)

2. (a) Factorise $6 + 9x$

……

(1)

(b) Factorise $y^2 - 16$

……

(1)

(c) Factorise $2p^2 - p - 10$

……

(2)

(Total for Question is 4 marks)

3. Solve, by factorising, the equation $8x^2 - 30x - 27 = 0$

……

(Total for Question is 3 marks)

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

……

(Total for question is 2 marks)

5. Write $x^2 + 2x - 8$ in the form $(x + m)^2 + n$ where m and n are integers.

……

(Total for question is 2 marks)

6. (a) Expand $4(3x + 5)$

……

(1)

(b) Expand and simplify $2(x - 4) + 3(x + 5)$

……

(2)

(c) Expand and simplify $(x + 4)(x + 6)$

……

(2)

(Total for Question is 5 marks)

7. (a) Factorise $x^2 + 5x + 4$

……

(2)

(b) Expand and simplify $(3x - 1)(2x + 5)$

……

(2)

(Total for Question is 4 marks)

8. (a) Expand $3(2 + t)$

……

(1)

(b) Expand $3x(2x + 5)$

……

(2)

(c) Expand and simplify $(m + 3)(m + 10)$

……

(2)

(Total for Question is 5 marks)

9. (a) Factorise $x^2 + 7x$

……

(1)

(b) Factorise $y^2 – 10y + 16$

……

(2)

*(c) (i) Factorise $2t^2 + 5t + 2$

……

(ii) t is a positive whole number.
The expression $2t^2 + 5t + 2$ can never have a value that is a prime number.
Explain why.

……

……

……

(3)

(Total for Question is 6 marks)

Using the Quadratic Formula

Things to remember:

- For any quadratic, $ax^2 + bx + c = 0$,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Questions:

1. Solve $3x^2 + 7x - 13 = 0$
Give your solutions correct to 2 decimal places.

x = ... or x = ...
(3 marks)

2. Solve the equation
$2x^2 + 6x - 95 = 0$
Give your solutions correct to 3 significant figures.

x = ... or x = ...
(3 marks)

3. Solve $x^2 + 3x - 5 = 0$
Give your solutions correct to 4 significant figures.

.....

(3 marks)

4. Solve this quadratic equation.

$x^2 - 5x - 8 = 0$

Give your answers correct to 3 significant figures.

x = ...or x = ...

(3 marks)

5. (a) Solve $x^2 - 2x - 1 = 0$

Give your solutions correct to 2 decimal places.

.....

(3)

(b) Write down the solutions, correct to 2 decimal places, of $3x^2 - 6x - 3 = 0$

.....

(3)

(6 marks)

6. (a) Solve $x^2 + x + 11 = 14$

Give your solutions correct to 3 significant figures.

.....

(3)

$y = x^2 + x + 11$ The value of y is a prime number when x = 0, 1, 2 and 3

The following statement is not true.

'$y = x^2 + x + 11$ is always a prime number when x is an integer'

(b) Show that the statement is not true.

.....

.....

.....

.....

(1)

(4 marks)

Completing the Square

Things to remember:

- To complete the square:
    1. Halve the coefficient of x.
    2. Put in brackets with the x and square the brackets.
    3. Subtract the half-coefficient squared.
    4. Don't forget the constant on the end!
    5. Simply.
- For $(x - p)^2 + q = 0$, the turning point is (p, q).

Questions:

1. (i) Sketch the graph of $f(x) = x^2 - 5x + 10$, showing the coordinates of the turning point and the coordinates of any intercepts with the coordinate axes.

(ii) Hence, or otherwise, determine whether $f(x + 2) - 3 = 0$ has any real roots.

Give reasons for your answer.

(Total for question = 6 marks)

2. (a) Write $2x^2 + 16x + 35$ in the form $a(x + b)^2 + c$ where a, b, and c are integers.

.....

(3)

(b) Hence, or otherwise, write down the coordinates of the turning point of the graph of $y = 2x^2 + 16x + 35$

.....

(1)

(Total for question = 4 marks)

3. The expression $x^2 – 8x + 21$ can be written in the form $(x – a)^2 + b$ for all values of x.

(a) Find the value of a and the value of b.

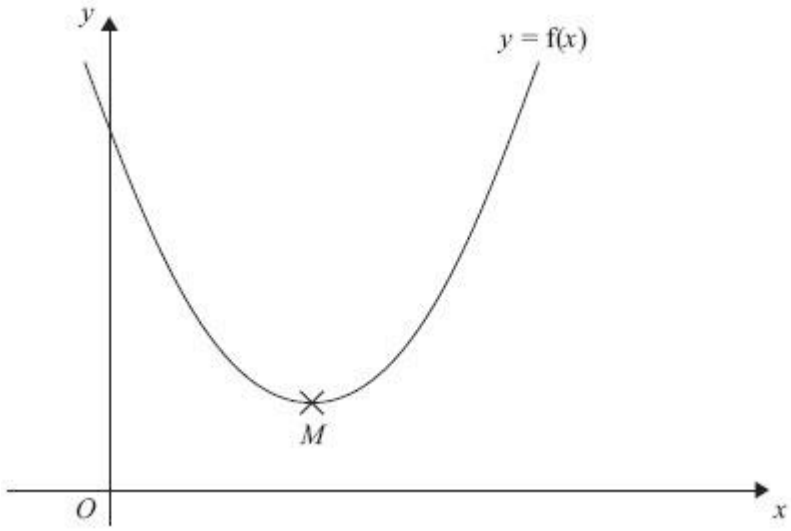
a = ...

b = ...

(3)

The equation of a curve is $y = f(x)$ where $f(x) = x^2 - 8x + 21$

The diagram shows part of a sketch of the graph of $y = f(x)$.



The minimum point of the curve is *M*.

(b) Write down the coordinates of *M*.

.....

(1)

(Total for Question is 4 marks)

Nonlinear Simultaneous Equations

Things to remember:

1. Substitute the linear equation into the nonlinear equation.
2. Rearrange so it equals 0.
3. Factorise and solve for the first variable (remember there will be two solutions).
4. Substitute the first solutions to solve for the second variable.
5. Express the solution as a pair of coordinate where the graphs intersect.

Questions:

1. Solve the equations

$$x^2 + y^2 = 36$$
$$x = 2y + 6$$

.....

(Total for Question is 5 marks)

3. Solve the simultaneous equations

$x^2 + y^2 = 25$

$y = 2x + 5$

x = ... and y = ...

or

x = ... and y = ...

(Total for Question is 6 marks)

4. Solve the simultaneous equations $x^2 + y^2 = 9$

$x + y = 2$

Give your answers correct to 2 decimal places.

x = ... y = ...

or x = ... y = ...

(Total for Question is 6 marks)

5. Solve algebraically the simultaneous equations

$x^2 + y^2 = 25$

$y - 2x = 5$

.....

(Total for Question is 5 marks)

Expanding more than two binomials

Things to remember:

- Start by expanding two pair of brackets using the grid or FOIL method.
- Then expand the third set of brackets.
- Use columns to keep x^3, x^2 etc in line to help with addition.

Questions:

1. Show that

   $(x - 1)(x + 2)(x - 4) = x^3 - 3x^2 - 6x + 8$

   for all values of x.

.....

(Total for question is 3 marks)

2. Show that

   $(3x - 1)(x + 5)(4x - 3) = 12x^3 + 47x^2 - 62x + 15$

   for all values of x.

.....

(Total for question is 3 marks)

3. Show that

$(x - 3)(2x + 1)(x + 3) = 2x^3 + x^2 - 18x - 9$

for all values of x.

.....

(Total for question is 3 marks)

4. $(2x + 1)(x + 6)(x - 4) = 2x^3 + ax^2 + bx - 24$

for all values of x, where a and b are integers.

Calculate the values of a and b.

a = ...

b = ...

(Total for question is 4 marks)