St John Bosco College
6th Form

A Level Maths

Year 11 → Year 12 Transition

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.

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

Contents:

RAG

For each of the following topics RAG rate yourself based on what you know from GCSE. Then complete the booklet and redo at the end. Having a secure understanding of these topics will mean that you are in the best possible position to start your A Level course.

Topic	Red	Amber	Green
Indices			
Surds			
Changing the subject			
Simultaneous equations			
Expand & factorising quadratics			
Quadratic formula			
Completing the Square			
Non-linear simultaneous equations			
Expanding two or more binomials			
Algebraic proofs			
Transformations of graphs			
Equations of circles			
Inverse & composite functions			

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.

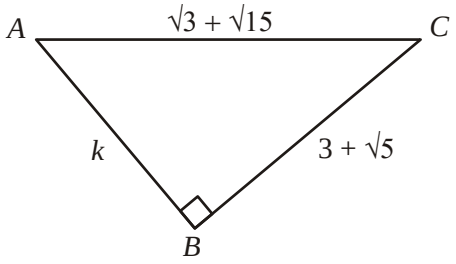


Diagram **NOT** accurately drawn

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)

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.

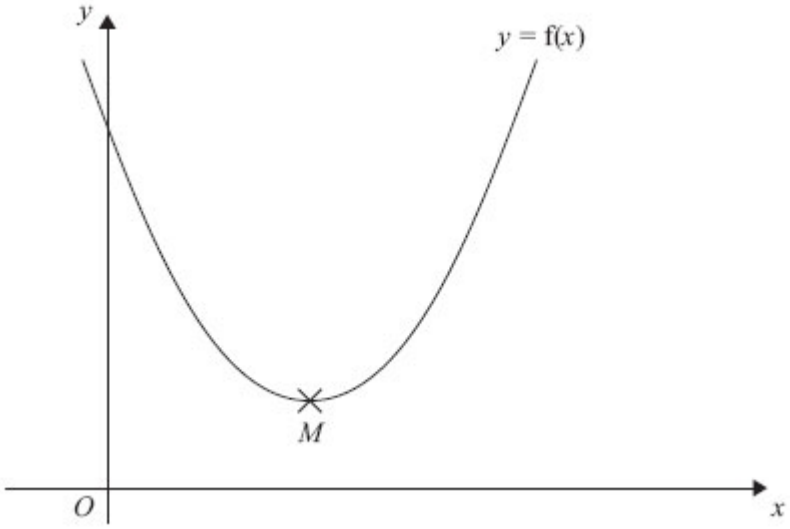
(a) Find the value of a and the value of b.

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)

Algebraic Proofs

Things to remember:

- Start by expanding the brackets, then factorise.
- Remember the following:
  1. $2n \rightarrow$ even number
  2. $2n + 1 \rightarrow$ odd number
  3. $a(bn + c) \rightarrow$ multiple of a
  4. Consecutive numbers are numbers that appear one after the other.

Questions:

1. (a) Expand and simplify $x(x + 1)(x - 1)$

……

(2)

In a list of three consecutive positive integers at least one of the numbers is even and one of the numbers is a multiple of 3

n is a positive integer greater than 1

(b) Prove that $n^3 - n$ is a multiple of 6 for all possible values of n.

(2)

$2^{61} - 1$ is a prime number.

(c) Explain why $2^{61} + 1$ is a multiple of 3

(2)

(Total for question = 6 marks)

2. Prove that

$(2n + 3)^2 – (2n – 3)^2$ is a multiple of 8

for all positive integer values of n.

(Total for Question is 3 marks)

3. (a) Expand and simplify $(y − 2)(y − 5)$

.....

(2)

*(b) Prove algebraically that

$(2n + 1)^2 − (2n + 1)$ is an even number

for all positive integer values of n.

(3)

(Total for Question is 5 marks)

4. * Prove algebraically that the difference between the squares of any two consecutive integers is equal to the sum of these two integers.

(Total for Question is 4 marks)

Transformations of graphs

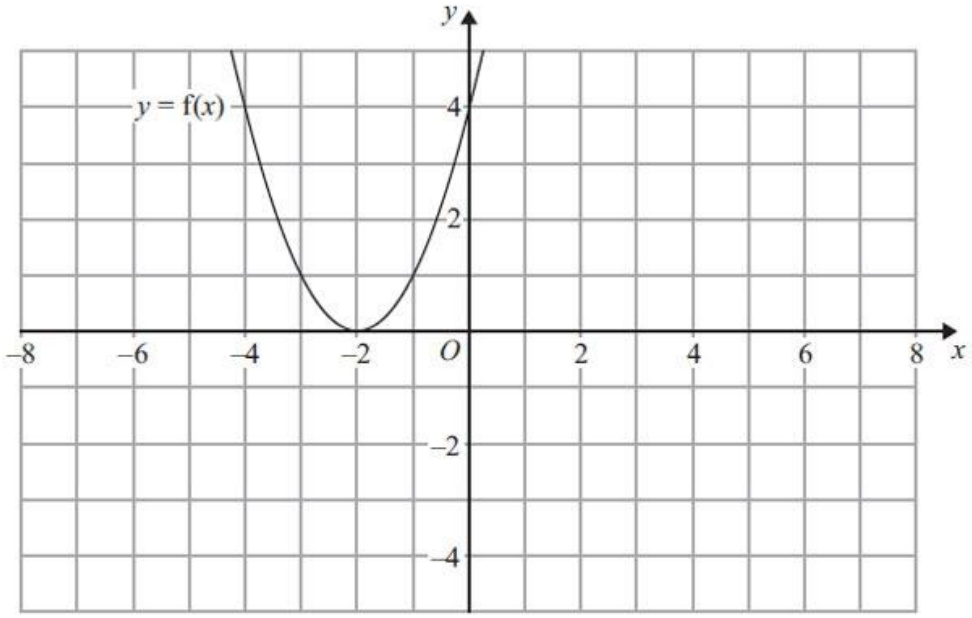
Things to remember:

1. f(x) means the function of x.
2. -f(x) is a reflection in the x-axis.
3. f(-x) is a reflection in the y-axis.
4. f(x – a) is a translation in the x-axis, a units.
5. f(x) + b is a translation in the y-axis, b units.
6. cf(x) is an enlargement in the y-axis, scale factor c.
7. f(dx) is an enlargement in the x-axis, scale factor $\frac{1}{d}$.

Questions:

1. $y = f(x)$

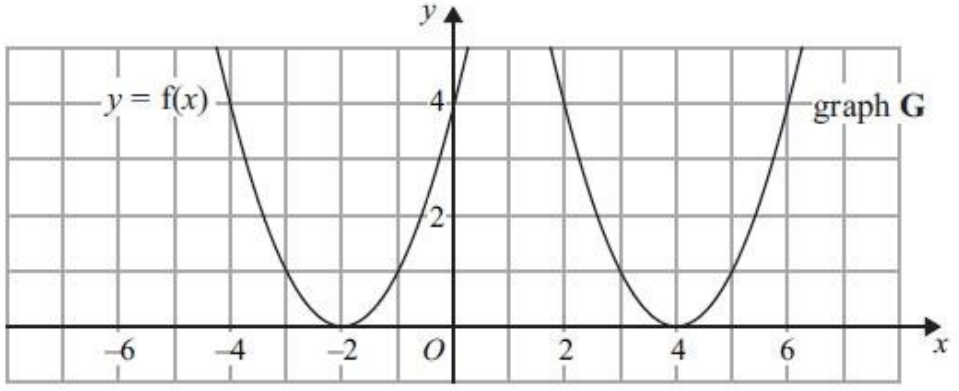
The graph of $y = f(x)$ is shown on the grid.



(a) On the grid above, sketch the graph of $y = – f(x)$.

(2)

The graph of $y = f(x)$ is shown on the grid.



The graph **G** is a translation of the graph of $y = f(x)$.

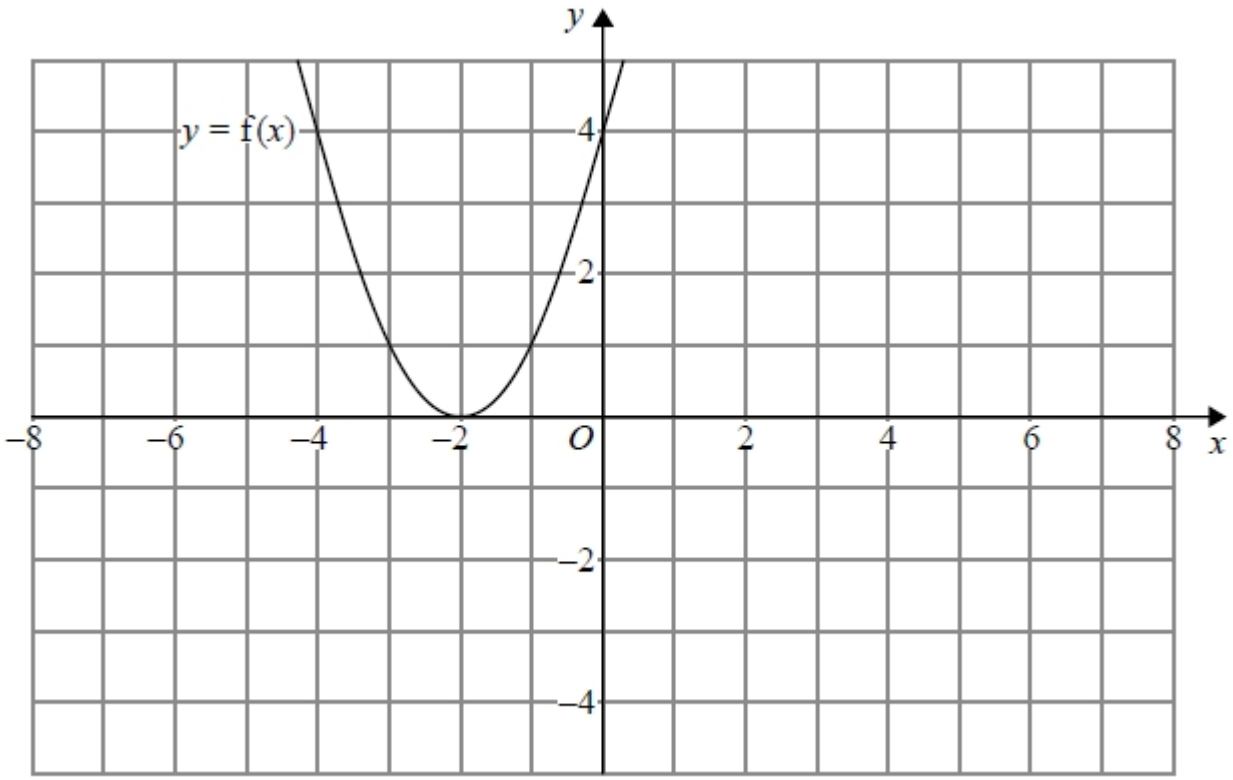
(b) Write down the equation of graph **G**.

.....

(2)

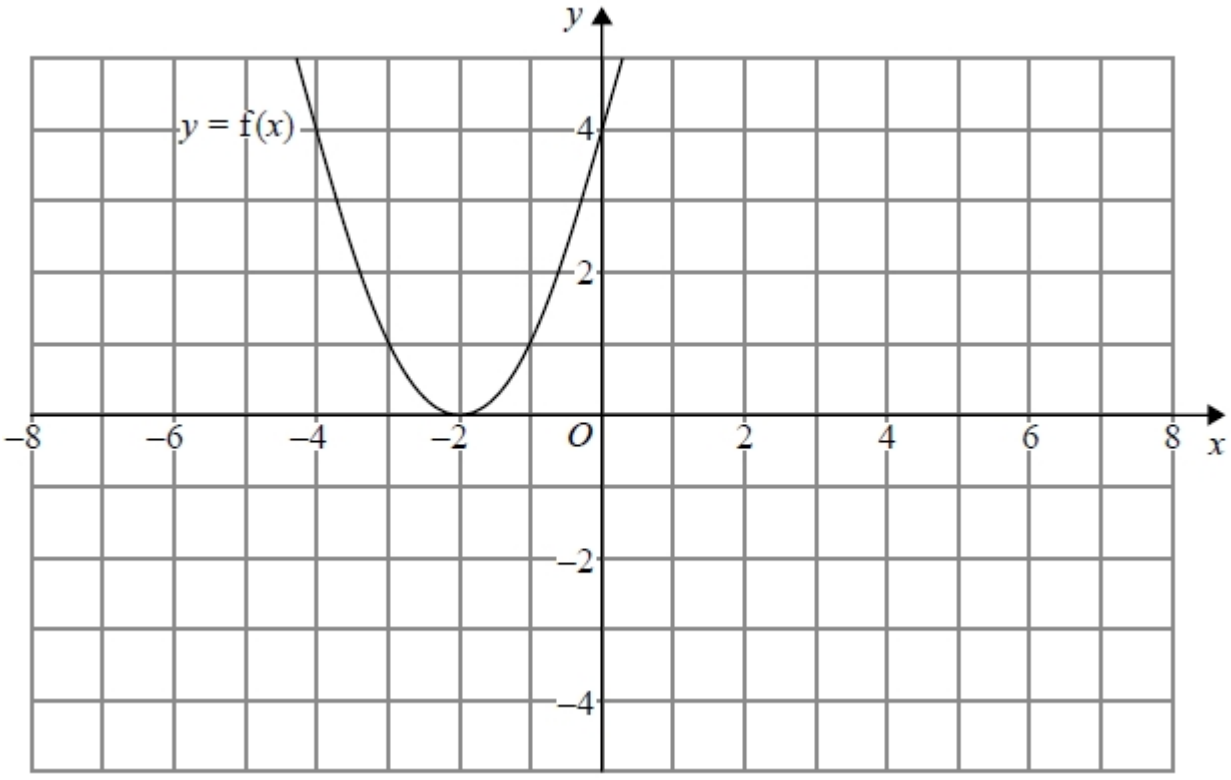
(Total for Question is 3 marks)

2. The graph of $y = f(x)$ is shown on both grids below.



(a) On the grid above, sketch the graph of $y = f(-x)$

(1)



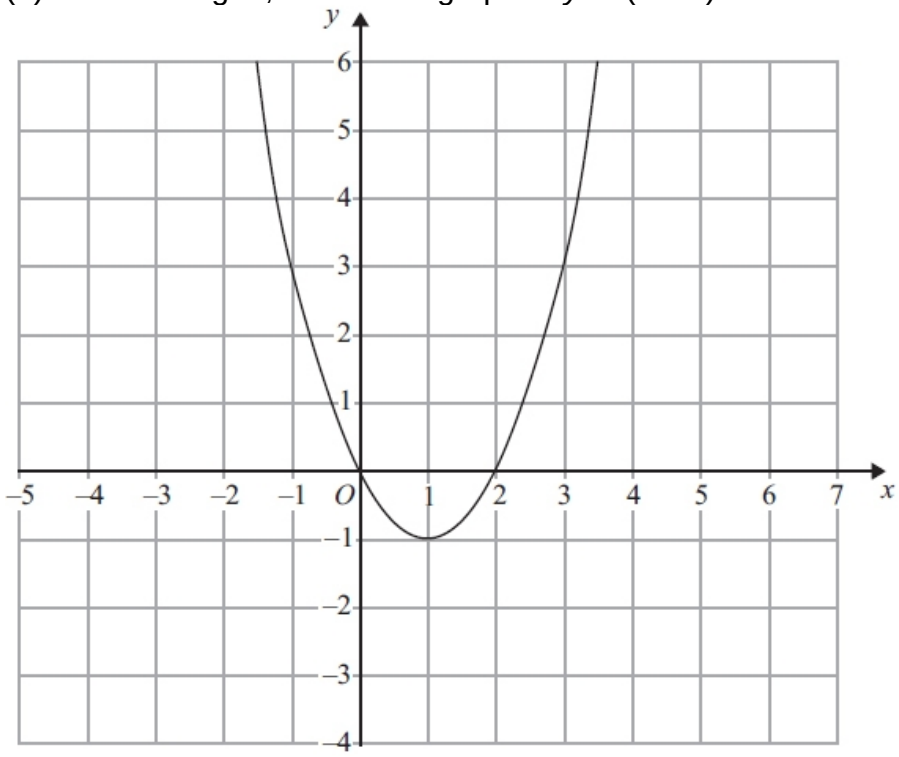
(b) On this grid, sketch the graph of $y = -f(x) + 3$

(1)

(Total for question = 2 marks)

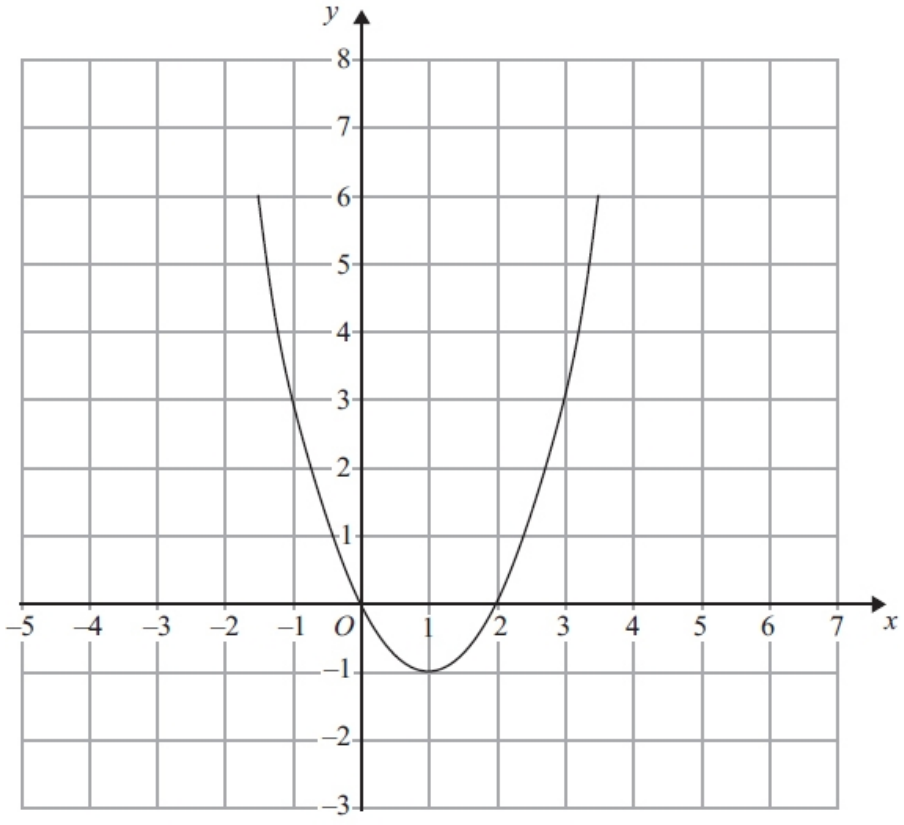
3. The graph of $y = f(x)$ is shown on each of the grids.

(a) On this grid, sketch the graph of $y = f(x - 3)$



(2)

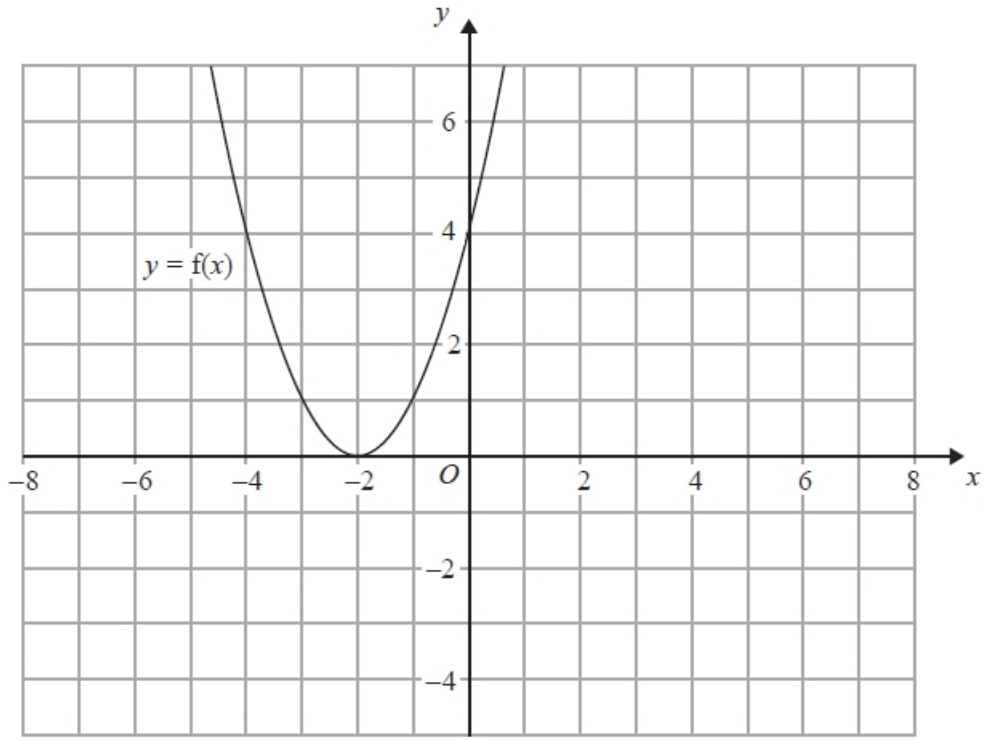
(b) On this grid, sketch the graph of $y = 2f(x)$



(2)

(Total for Question is 4 marks)

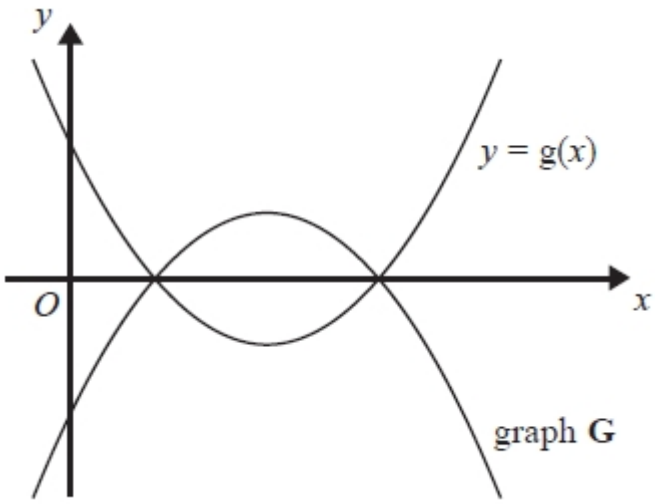
4. The graph of $y = f(x)$ is shown on the grid.



(a) On the grid above, sketch the graph of $y = f(x + 3)$

(2)

The graph of $y = g(x)$ is shown below.



The graph **G** is the reflection of $y = g(x)$ in the x-axis.

(b) Write down an equation of graph **G**.

.....

(1)

(Total for question = 3 marks)

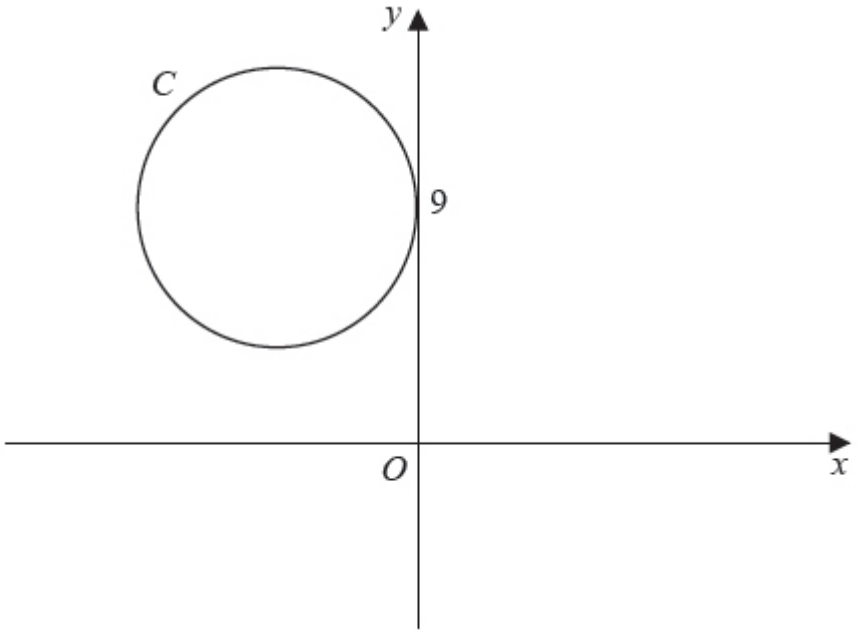
Equations of Circles

Things to remember:

8. The general equation of a circle is $(x – a)^2 + (y – b)^2 = r^2$, where (a, b) is the centre and r is the radius.
9. To calculate the equation of the tangent:
    1. Calculate the gradient of the radius of the circle.
    2. Calculate the gradient of the tangent of the circle.
    3. Substitute the given coordinate and the gradient of the tangent into y = mx + c to calculate the y-intercept.

Questions:

1. The circle C has radius 5 and touches the y-axis at the point (0, 9), as shown in the diagram.



(a) Write down an equation for the circle C, that is shown in the diagram.

.....

(3)

A line through the point P(8, − 7) is a tangent to the circle C at the point T.

(b) Find the length of PT.

(3)

(Total 6 marks)

2. A circle C has centre (−1, 7) and passes through the point (0, 0). Find an equation for C.

.....

(Total 4 marks)

3. The circle C has centre (3, 1) and passes through the point P(8, 3).

(a) Find an equation for C.

.....

(4)

(b) Find an equation for the tangent to C at P.

.....

(5)

(Total 9 marks)

Inverse and Composite Functions

Things to remember:

- y = f(x) means that y is a function of x.
- f(a) means the value of x is a, so substitute x with a.
- The graph of the inverse is the reflection of the graph in the line y = x
- We find the inverse function by putting the original function equal to y and rearranging to make x the subject.
- We use the notation $f^{-1}(x)$ for the inverse function.
- When a function is followed by another, the result is a composite function.
- fg(x) means do g first, followed by f.

Questions:

1. The functions f and g are such that

   $f(x) = 1 - 5x$ and $g(x) = 1 + 5x$

   (a) Show that gf(1) = − 19

(2)

   (b) Prove that $f^{-1}(x) + g^{-1}(x) = 0$ for all values of x.

(3)

(Total for question = 5 marks)

2. The function f is such that

$f(x) = 4x - 1$

(a) Find $f^{-1}(x)$

$f^{-1}(x) =$ .....

(2)

The function g is such that

$g(x) = kx^2$ where k is a constant.

Given that $fg(2) = 12$

(b) work out the value of k

$k =$ .....

(2)

(Total for question = 4 marks)

3. The functions f and g are such that

$f(x) = 3(x - 4)$ and $g(x) = \frac{x}{5} + 1$

(a) Find the value of f(10)

.....

(1)

(b) Find $g^{-1}(x)$

$g^{-1}(x) =$ .....

(2)

(c) Show that ff(x) = 9x – 48

(2)
(Total for question = 5 marks)

4. f(x) = $3x^2 - 2x - 8$
Express f(x + 2) in the form $ax^2 + bx$

.....

(Total for question is 3 marks)

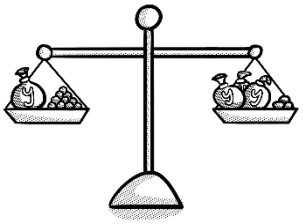
Test Yourself

1. Expand the brackets $(2x-4)(-4+x)$

2. Given $f(x)=x^2+5x-2$ find the value of $f(4)$

3. Solve the simultaneous equations.
$$3x-4y=20$$
$$5x+5y=10$$

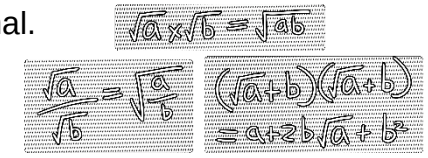
Solve each of these equations.



(i) $4x-3=15$
(ii) $\frac{y}{3}+4=9$
(iii) $5m-8=2m+13$

4. Simplify $(3+\sqrt{2})(3-\sqrt{2})$

5. Express $\frac{1+\sqrt{2}}{3-\sqrt{2}}$ in the form $a + b\sqrt{2}$ where a and b are rational.



6. Simplify $\frac{(x^2y^3z)^5}{4y^2z}$

7. A (0,2), B (7,9) and C (6,10) are three points.

(i) Show that AB and BC are perpendicular.
(ii) Find the length of AC.

8. Sketch the graph of $y=9-x^2$

9. The curve $y=x^2-4$ is translated by $\binom{2}{0}$
Write down an equation for the translated curve. You need not simplify your answer.

10. Given that $cos\theta=\frac{1}{3}$ and θ is acute, find the exact value of $tan\theta$.

11. Solve

(i) $x^2-36\leq 0$
(ii) $9x^2-25\geq 0$
(iii) $3x^2+10x<0$

12. Prove that the square of an odd number is also odd.

13. Caleb either walks to school or travels by bus.

    The probability that he walks to school is 0.75

    If he walks to school, the probability that he will be late is 0.3

    If he travels to school by bus, the probability that he will be late is 0.1

    Work out the probability that he will not be late.

Problem Solving

1. Two numbers have a product of 44 and a mean of 7.5

   Use an algebraic method to find the numbers.

   You must show all your working.

2. In a parallel circuit, the total resistance is given by the formula $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$

   Make R_1 the subject of the formula

3. Sarah intended to spend exactly £6.00 on prizes for her class but each prize cost her 10p more than expected, so she had to buy 5 fewer prizes.
   Calculate the cost of each prize.

4. Arthur and Florence are going to the theatre.
   Arthur buys 6 adult tickets and 2 child tickets and pays £39
   Florence buys 5 adult tickets and 3 child tickets and pays £36.50
   Work out the costs of both adult and child tickets.

5. Colin has made a mistake in his 'simplifying surds' homework. Explain his error and give the correct answer.

$$4\sqrt{3} \times 5\sqrt{12} = 20\sqrt{36}$$

6. Below is a sketch of $f(x)$.

   The coordinates of P are (0,-2)

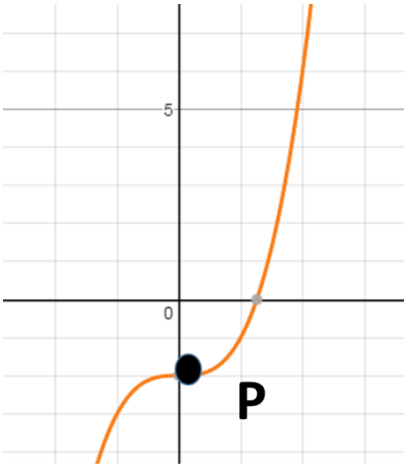
   State the coordinates of *P* after each translation:

   (i) $g(x) = f(x) + 1$

   (ii) $h(x) = f(x - 2)$

   (iii) $j(x) = -f(x)$

   (iv) $k(x) = f(-x)$



7. The equation of a curve is $y = f(x)$ where $f(x) = x^2 - 4x + 5$
   C is the minimum point of the curve.
   (i) Find the coordinates of C after the transformation $f(x + 1) + 2$

   (ii) Determine if $f(x - 3) - 1 = 0$ has any real roots.
   Give reasons for your answer.

8. A piece of land is the shape of an isosceles triangle with sides 7.5m, 7.5m and 11m.
   Turf can be bought for £11.99 per $5m^2$ roll.
   How much will it cost to turf the piece of land?

9. Plane A is flying directly toward the airport which is 20 miles away. The pilot notices a second plane, B, 45° to her right. Plane B is also flying directly towards the airport. The pilot of plane B calculates that plane A is 50° to his left. Based on that information how far is plane B from the airport? Give your answer to 3 significant figures.

10. A farmer has a triangular field. He knows one side measures 450m and another 320m. The angle between these two sides measures 80°. The farmer wishes to use a fertiliser that costs £3.95 per container which covers $1500m^2$. How much will it cost to use the fertiliser on this field?

11. Katie chooses a two-digit number, where the digits are different, reverses the digits, and subtracts the smaller number from the larger.

For example

42 – 24 = 18

She tries several different numbers and finds the answer is never a prime number.

Prove that Katie can never get an answer that is a prime number.

12. The Venn diagram shows the ice-cream flavours chosen by a group of 44 children at a party.

The choices are strawberry (S), choc-chip (C) and toffee (T). A child is picked at random.

Work out :

(i) $P(S)$
(ii) $P(T \cap C|C)$
(iii) $P(C|S \cup T)$