

A-LEVEL MATHEMATICS Y11/Y12 BRIDGING WORK

Things to sort before starting the course.

- Purchase these textbooks: 'Pearson Edexcel AS and A Level Mathematics Pure Mathematics Year 1' (ISBN 978-1292183398) and 'Pearson Edexcel AS and A Level Mathematics Statistics and Mechanics' (ISBN 978-1292232539)
- Get six lever arch folders (plus lots of dividers)
 - Four large folders titled 'Pure 1 – 5', 'Pure 6-10', 'Statistics' and 'Mechanics'
 - Two small folders titled 'Home Studies and Topic Tests' and 'Working Folder'
- Save a copy of the 'scheme of learning' (<https://www.ocr.org.uk/images/308723-specification-accredited-a-level-gce-mathematics-a-h240.pdf>) and print off the contents section of this if you can
- Purchase (if you don't already have one) a Casio FX Classwiz calculator

Week 1 (1st – 7th July: Writing Expressions in index form)

1. Watch this video: <https://www.youtube.com/watch?v=uuJL6GYU7Ds>

2. Express all of the following expressions in index form...

1) $\sqrt{x} =$

2) $3\sqrt{x} =$

3) $\frac{8}{x} =$

4) $\frac{3x}{\sqrt{x}} =$

5) $\frac{9}{3\sqrt{x}} =$

6) $\frac{6}{x^3} =$

7) $\frac{2x}{\sqrt[3]{x}} =$

8) $\frac{3}{(2x)^3} =$

9) $\frac{x^2-8}{\sqrt{x}} =$

10) $\frac{(3x^3)^2}{x\sqrt{x}} =$

11) $(2\sqrt{x})^3 =$

12) $\sqrt[4]{x} \div \frac{3}{x^2} =$

13) $\frac{3-4x}{4\sqrt[3]{x}} =$

14) $\frac{x^3}{x^2-6x+9} =$

15) $\left(\frac{\sqrt{10}}{x\sqrt{x}}\right)^2 =$

Week 2 (8th – 14th July: Functions)

Watch this video if you need a recap ([inverse functions](#) and [composite functions](#))

$$f(x) = x^2 - 1$$

$$g(x) = \frac{1}{2x}$$

$$h(x) = 3x - 2$$

Questions – give your answer in its simplest form

1) $f(x - 3)$

2) $2hf(x)$

3) $2g(x + 1) - 5$

4) $f(x^2 - 1)$

5) $3fh(x) - 5$

6) Given that $f(x) = 3x^2 - 4$, and $g(x) = \frac{1}{2x-1}$. Calculate $fg^{-1}(x)$

7) A function $f(x) = ax^2 + bx + 5$ where a, b are constants

It is given that $f(3) = 2f(2) - 4$

And that $f(-2) = 13$.

Find the values of a and b :

8) $f(x) = ax^2 + bx$, $g(x) = ax^2 - 3$

It is given that $f(x) = 8$ and $2g(x) = 18$

Hence calculate the values of a and b

9) $f(x) = 3x^2 - 2$, and $g(x) = \frac{2x-1}{x+3}$

Calculate the value of $fg^{-1}(x) = 25$

10) $f(x) = ax - 4$ and $g(x) = x^2 - 3a$ where a is a constant

It is given that $f^{-1}(x) = 2$

And that $fg(x) = -5a$

Find the values of a

Week 3 (15th – 21st July: Surds and Quadratic Simultaneous Equations)

Simplify fully:

$$1) \frac{3\sqrt{2}+2\sqrt{8}}{\left(\frac{4}{\sqrt{2}}\right)} =$$

$$2) \left(\frac{36}{4\sqrt{x}}\right)^{0.5}$$

$$3) \frac{4-\sqrt{3}}{1+\frac{3}{\sqrt{3}}} =$$

$$4) \text{ Solve to find } x: x(7 - 2\sqrt{8}) = 5$$

$$5) \frac{1-2\sqrt{2}}{3-\frac{1}{2\sqrt{3}}} =$$

$$6) \frac{13}{3\sqrt{18}} + \frac{6}{\sqrt[3]{8}^{2.5}} =$$

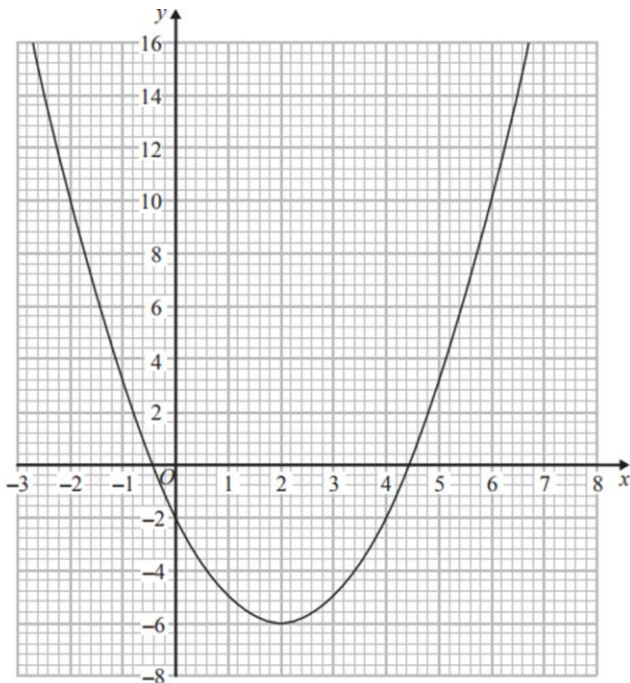
$$7) \begin{aligned} l_1 &= 3 - y^2 = -6 \\ l_2 &= 2xy + 15 = 3 \end{aligned}$$

a) Describe the shape of l_1 .

b) Solve to find the value(s) of x and y .

8) Show algebraically that $y - x = 8$ is a tangent to the curve $x^2 - y^2 = 32$

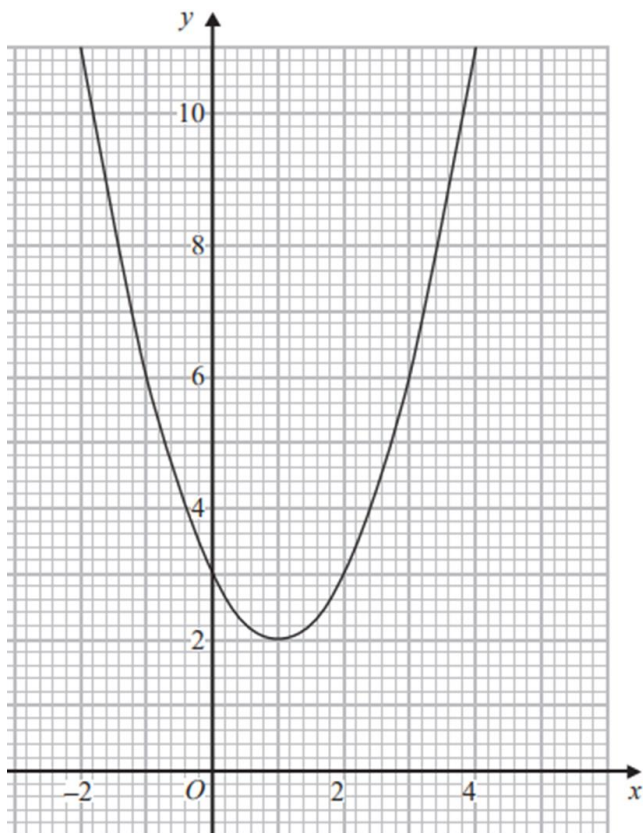
Week 4 (22nd – 28th July: Solving Graphically)



The graph shows $f(x) = x^2 - 4x - 2$

Using the graph:

- Write down the turning point
- Find an estimate for $f(2.5)$
- Find estimates for the roots of
 - $f(x) = 0$
 - $f(x) = 3$
- Find estimates for the solutions to $x^2 - 4x - 8 = 0$
- Find estimates for the values of x that satisfy the simultaneous equations $y = x^2 - 4x - 2$ and $3x + y = 5$
- Find estimates for the solutions to $x^2 - 6x + 3 = 0$



The graph shows $f(x) = x^2 - 2x + 3$

Using the graph:

- Write down the turning point
- Find an estimate for $f(-1)$
- Find estimates for the roots of $f(x) = 4$
- Why are there are no solutions to $f(x) = 0$?
- Estimate solutions to $x^2 - 2x - 5 = 0$
- Find estimates for the values of x that satisfy the simultaneous equations $y = x^2 - 2x + 3$ and $2x + y = 6$
- Estimate solutions to $x^2 - x - 3 = 0$
- Estimate solutions to $2x^2 - 6x - 3 = 0$

Week 5 (29th July – 4th Aug: Proportion)

- 1) f is inversely proportional to g^3 .
When $f = 4, g = 2$.
 f is directly proportional to h^2 .
When $f = 9, h = 6$.
Find a formula for h in terms of g . Leave your answer in its simplest form:

- 2) y is inversely proportional to x^3 .
 y is 4 when $x = 3$.
 x is directly proportional to the root of z . $x = 10$ when $z = 25$.
Find a formula for y in terms of z in its simplest form

- 3) r is directly proportional to the square of s .
When $r = 20, s = 4$
 s is inversely proportional to the root of t .
When $s = 3, t = 16$
Find a formula for r in terms of t giving your answer in its simplest form:

- 4) $y \propto \frac{1}{\sqrt{x}}$ when $x = \frac{1}{2}, y = 12$
 $x \propto z^2$ when $x = 110.25, z = 3.5$
Find a formula for y in terms of z .
Leave your answer in its simplest form

- 5) Y is proportional to the root of X and X is proportional to the cube of Z
When $z = 9, y = 108$. Find a formula for Y in terms of Z

- 6) Y is inversely proportional to X and $X \propto Z^2$
When $Z = 4, Y = 3$. Find a formula for Y in terms of Z

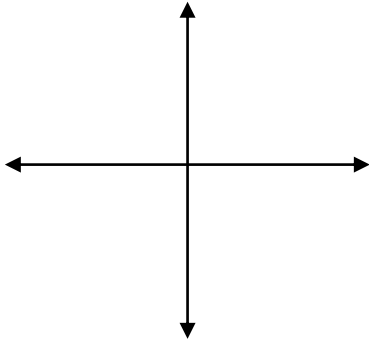
- 7) $P \propto \sqrt{x}$ and $x \propto \frac{1}{Q}$. When $Q = 16, P = 5$. Find a formula for P in terms of Q

- 8) Y is proportional to the cube-root of X and X is proportional to the square-root of t .
When $t = 64, Y = 1$. Find a formula for Y in terms of t

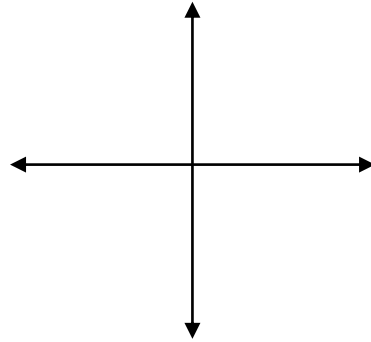
Week 6 (5th Aug – 11th Aug: Inequalities)

Find the roots of the graphs, then sketch the graphs and mark the region that satisfies the inequality.

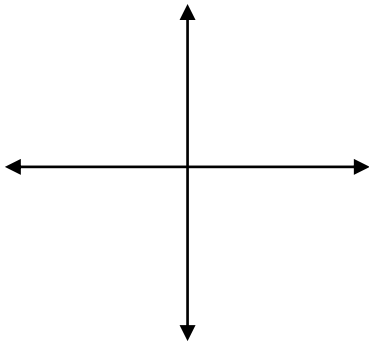
1) $y < 2x^2 - 5x - 12$



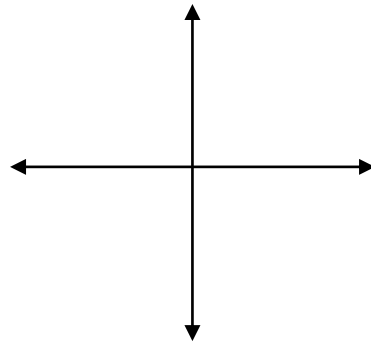
2) $y > 3x^2 - 6x$



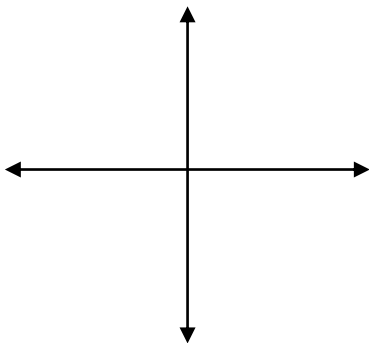
3) $y < -x^2 - 2x + 12$



4) $y > 17x - 20 - 3x^2$



5) $y < x^3 - x^2 - 12x$



6) $y > x^3 + 2x^2 - x - 2$

