

Pure 2 – Equations and inequalities

Please **complete** this homework by _____. Start it early. If you can't do a question you will then have time to ask your teacher for help or go to a drop in session.

Section 1 – Review of previous topics. Please complete all questions.

- Solve these quadratic equations. You may need to rearrange them first.
 - $x^2 = 5x$
 - $2x^2 + x = 15$
 - $2x^2 - 4x + 1 = 0$. Give your answers in the form $a \pm b\sqrt{2}$[6]
- Use the discriminant to determine the number of real roots of each of these quadratic equations.
 - $5x^2 - 3x + 7 = 0$
 - $6x^2 - 5x - 3 = 0$
 - $9x^2 - 12x + 4 = 0$[6]
- Sketch the graphs of these quadratic functions, in each case giving the coordinates of the vertex and the points of intersection with the axes.
 - $y = x^2 - 1$
 - $y = (x - 1)^2 + 3$[6]

Section 2 – Consolidation of this week's topic. Please complete all questions.

1. Solve the following sets of simultaneous equations.

- $2x + 3y = -7$
 $5x - 2y = 11$ [5]
- $y = x - 3$
 $y^2 + xy + 4x = 7$ [5]
- $x + 2y = 13$
 $x^2 - y^2 = 9$ [5]

2.

(a) On the same axes, draw the graphs of

(i) $y = x^2$

(ii) $y = x^2$

(iii) $y = x^2$

(iv) $y = x^2$

$y = -x + 12$

$x + y = -8$

$y = -x - \frac{1}{4}$

$x = 3$ [5]

(b) Use your graphs to determine the number of solutions to the simultaneous equations.

[4]

(c) Solve the simultaneous equations to verify your answers.

[15]

3. Find the set of values of x for which:

(a) $3(y - 1) \geq 5y - 8$

[3]

(b) $3(x - 2) > x - 4$ and $4x + 12 > 2x + 17$

[3]

(c) $15 - x < 2(11 - x)$ and $5(3x - 1) > 12x + 19$

[3]

4. On the same grid, shade the region that satisfies the inequalities:

(a) $x + y > -7$, $y \leq 2$, $x < 1$.

[4]

(b) $y > (x - 4)^2$, $y + x \geq 6$, $y < x$.

[4]

(Total 56 Marks)

Section 3 – Extension questions. If you are aiming for a top grade, you should attempt these questions.

1. The line $y = 5 - x$ intersects the curve $y = x^2 - 3x + 2$ at the points P and Q . Find the length PQ in the form $k\sqrt{2}$.

2. Solve the simultaneous equations:

$$3^{x-1} = 9^{2y}$$

$$8^{x-2} = 4^{1+y}$$