Pure 5 – Coordinate Geometry

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.

1

Sketch and label each pair of graphs on the same set of axes showing the coordinates of any points where the graphs intersect. Write down the equations of any asymptotes.

a $y = x^2$ and $y = x^3$ **b** $y = x^2$ and $y = x^4$ **c** $y = 1/x$ and $y = 1/x^2$

d $y = x$ and $y = \sqrt{x}$ **e** $y = x^2$ and $y = 3x^2$ **f** $y = 1/x$ and $y = 2/x$

2

$f(x) = (x - 1)(x - 3)(x - 4)$.

a Find $f(0)$.

b Write down the solutions of the equation $f(x) = 0$.

c Sketch the curve $y = f(x)$.

3 Sketch each graph showing the coordinates of any points of intersection with the coordinate axes.

a $y = (x + 1)(x - 1)(x - 3)$ **b** $y = 2x(x - 1)(x - 5)$ **c** $y = -(x + 2)(x + 1)(x - 2)$

d $y = x^2(x - 4)$ **e** $y = 3x(2 + x)(1 - x)$ **f** $y = (x + 2)(x - 1)^2$

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

1. The points A and B have coordinates (1, -2) and (3, -5) respectively.
   Find:
   a. The midpoint of AB   [2]
   b. The gradient of the line AB   [2]
   c. The length of the line AB   [2]

2. Find the equation of the line which passes through (5, 1) and has gradient of 2.   [3]

3. What is the equation of the line which joins A (5, 3) and B (2, 1)?   [3]

4. Find the coordinates of the points where $3x - 5y + 15 = 0$ cuts the coordinate axes.   [2]

5. Calculate the gradient of the line $5x + 9y - 12 = 0$ [2]

6. The line PQ passes through the point P (3, -5) and is perpendicular to the line RS, whose equation is x + y = 2. What is the equation of PQ? [3]

7. The line L passes through the points A (1, 3) and B (-19, -19).
   a. Calculate the distance between A and B. [2]
   b. Find the equation of L in the form ax + by + c = 0 where a, b and c are integers.

   [3]

8. The line l_1 has equation 2x – 3y + 6 = 0.

   a. Find the gradient of l_1 . [2]

   The line l_2 is perpendicular to l_1 and passes through the point (-1, 2).

   b. Find the equation of l_2 in the form y = mx + c, where m and c are constants. [4]

Total: 30 Marks

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

1. The line l_1 has equation $y = 3x + 2$ and the line l_2 has equation $3x + 2y - 8 = 0$.

   (*a*) Find the gradient of the line l_2 . **(2)**

   The point of intersection of l_1 and l_2 is *P*.

   (*b*) Find the coordinates of *P*. **(3)**

   The lines l_1 and l_2 cross the line $y = 1$ at the points *A* and *B* respectively.

   (*c*) Find the area of triangle *ABP*. **(4)**

2. The straight line *l* passes through the points *A* (1, 2√3) and *B* (√3 , 6).
a Find the gradient of *l* in its simplest form.
b Show that *l* also passes through the origin.
c Show that the straight line which passes through *A* and is perpendicular to *l* has equation
x + 2√3 *y* − 13 = 0.