FUNCTIONS: MODULUS FUNCTIONS

A2 Unit 3: Pure Mathematics B

WJEC past paper questions: 2010 – 2017

Total marks available 57 (approximately 1 hour 10 minutes)

1.

(a) Solve the inequality $|3x + 1| \leqslant 5$. [3]

(b) The function f is defined by $f(x) = |x|$.

(i) Sketch the graph of $y = f(x)$.

(ii) On a separate set of axes, sketch the graph of $y = f(x - 3) + 2$. On your sketch, indicate the coordinates of the point on the graph where the value of the y-coordinate is least and the coordinates of the point where the graph crosses the y-axis. [4]

(Summer 10)

2. Solve the following.

(a) $5|x| + 1 = 7 - 3|x|$ [2]

(b) $|3x - 1| > 5$ [3]

(January 11)

3.

(a) Show, by counter-example, that the statement

$$|a + b| \equiv |a| + |b|$$

is false. [2]

(b) Solve the equation

$$|2x + 1| = |3x - 4|$$ [3]

(Summer 11)

4. Solve the following.

(a) $|4x-5| \geqslant 3$, [3]

(b) $(3|x|+1)^{\frac{1}{3}} = 4$. [2]

(January 12)

5. Solve the following.

(a) $4|x-3|+2 = 8-5|x-3|$ [3]

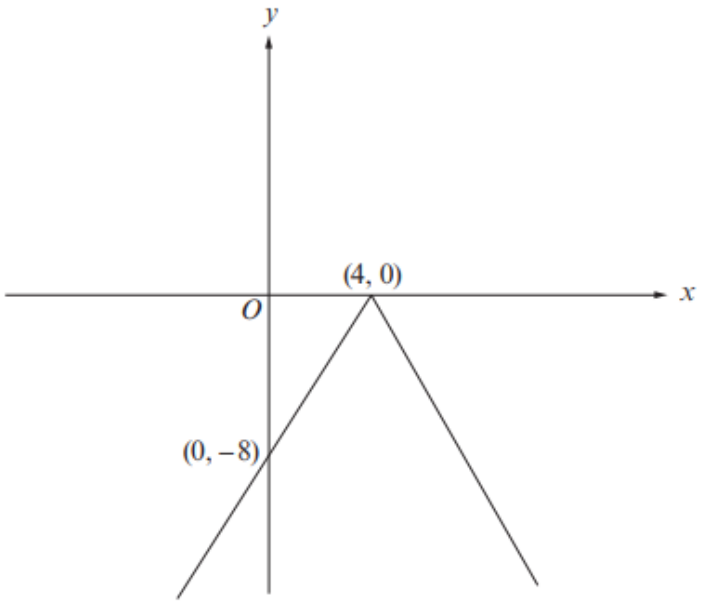
(b) $|5x-2| \leqslant 3$ [3]

(Summer 12)

6. (a) Solve the inequality $|3x-4| > 5$. [3]

(b) (i) Sketch the graph of $y = |x|$.

(ii) The diagram below shows a sketch of the graph of $y = a|x+b|$, where a and b are constants. The graph meets the x-axis at the point $(4, 0)$ and the y-axis at the point $(0, -8)$.



Find the value of a and the value of b. [3]

(January 13)

7. *(a)* Show, by counter-example, that the statement

'If $|a + 1| = |b + 1|$, then $a = b$'

is false. [2]

(b) Solve the inequality

$$|x^2 - 10| \leqslant 6.$$ [4]

(Summer 13)

8. Solve the equation

$$|3x + 4| = 2|x - 3|.$$ [3]

(January 14)

9. *(a)* Show, by counter-example, that the statement

$$|2a + 3b| \equiv 2|a| + 3|b|$$

is false. [2]

(b) Solve the equation

$$|3x - 2| = 7|x|.$$ [3]

(Summer 14)

10. *(a)* Find all values of x satisfying the inequality $|3x - 5| \leqslant 1$. [3]

(b) **Use your answer to part *(a)*** to find all values of y satisfying the inequality

$$\left|\frac{3}{y} - 5\right| \leqslant 1.$$ [2]

(Summer 15)

11. Solve the equation

$$|5x + 4| = -7x.$$ [4]

(Summer 16)