C3 Inequality Questions

Specimen

3. Solve the inequality

$$|2x - 5| < 9.$$ [4]

2005 Summer

5. *(a)* Sketch the graph of $y = |x|$ for values of x from $x = -2$ to $x = 2$. [2]

(b) Solve the equation $|2x| + 3 = 4$. [1]

(c) Solve the inequality $|3x + 4| > 5$. [3]

2006 Winter

6. *(a)* Solve the inequality $|3x - 8| \leqslant 5$. [3]

(b) Given that $f(x) = |x|$, sketch the graph of $y = f'(x)$. On the same diagram, sketch the graph of $y = f(x + 2) + 1$, indicating its position. [4]

2006 Summer

6. Solve the following.

(a) $3|x| + 4 = 6 - 2|x|$ [2]

(b) $|7x - 5| \geqslant 3$ [3]

2007 Summer

4. *(a)* Sketch the graphs of $y = x^2 - 4$ and $y = |x^2 - 4|$, indicating the points where the graphs meet the x-axis and the y-axis. [4]

(b) Solve the inequality

$$|5x - 3| > 4.$$ [3]

2008 Winter

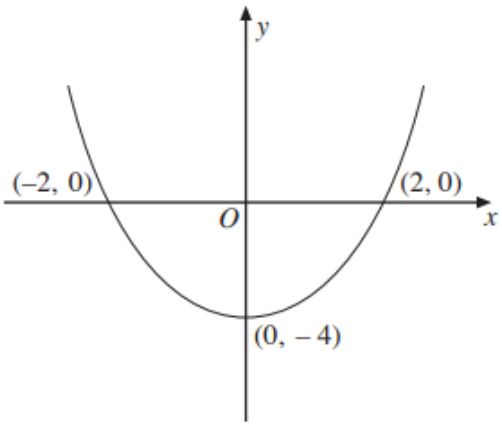
6. *(a)* (i) Sketch the graph of $y = \ln x$.

(ii) On a separate diagram, sketch the graph of $y = |\ln x|$. [4]

(b) Solve $|3x - 2| < 4$. [4]

2008 Summer

6. *(a)* The diagram shows the graph of $y = f(x)$. The graph has a stationary point at $(0, -4)$ and it intersects the x-axis at the points $(-2, 0)$ and $(2, 0)$.



Sketch the graph of $y = 3f(x - 1)$, indicating the coordinates of the stationary point and of the points where the graph crosses the x-axis. [3]

(b) Solve $3|x| + 1 = 2 - |x|$. [2]

(c) Solve $|2x - 9| > 3$. [4]

2009 Winter

6. Solve the following.

(a) $\dfrac{2|x|+9}{|x|+1} = 5$ [2]

(b) $|5x+7| \leqslant 4$ [3]

2009 Summer

6. Solve the following.

(a) $|9x-7| \leqslant 3$ [3]

(b) $\sqrt{5|x|+1} = 3$ [2]

2010 Winter

7. Solve the following.

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

(b) $|5x-8| \geqslant 3$ [3]

2010 Summer

7. *(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]

2011 Winter

7. Solve the following.

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

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

2011 Summer

7. *(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]

2012 Winter

7. Solve the following.

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

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

2012 Summer

7. Solve the following.

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

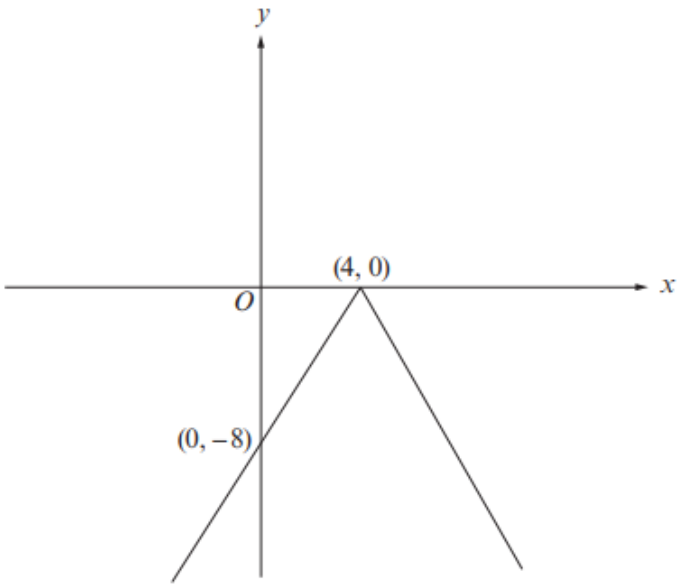
(b) $|5x-2|\leqslant 3$ [3]

2013 Winter

7. *(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]

2013 Summer

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]

2014 Winter

8. Solve the equation

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

2014 Summer

8. *(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]

2015

8. *(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]

2016

8. *(a)* Show, by counter-example, that the following statement is false.

'If the integers a, b, c, d are such that a is a factor of c and b is a factor of d, then $(a + b)$ is a factor of $(c + d)$.' [2]

(b) Solve the equation

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