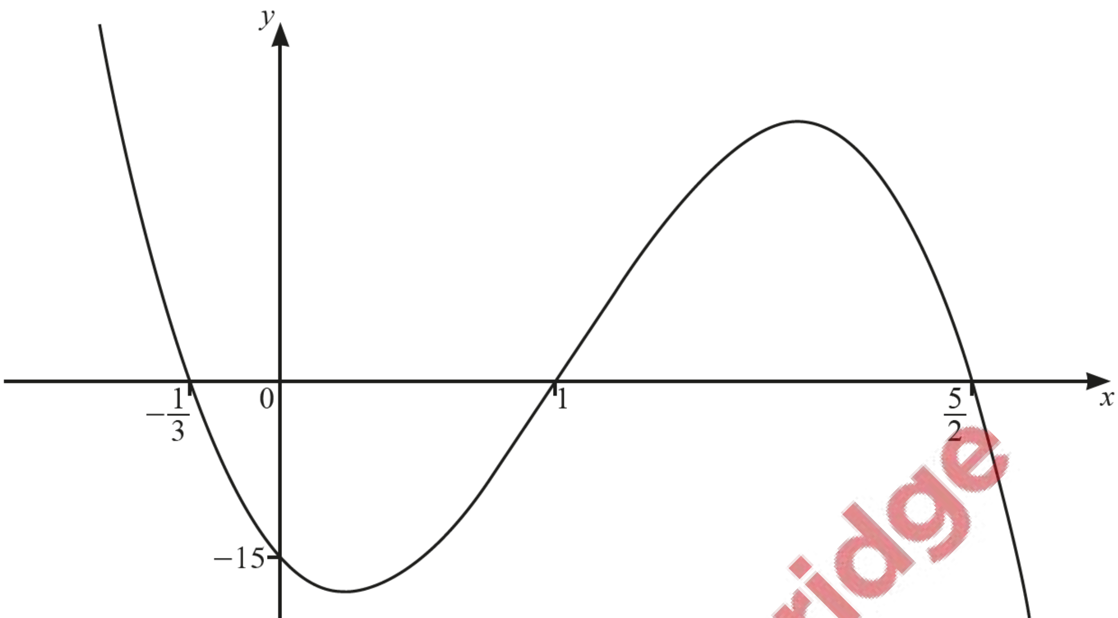
Equations, inequalities and graphs – 2023 Additional Math 0606

1. Nov/2023/Paper_0606/12/No.1



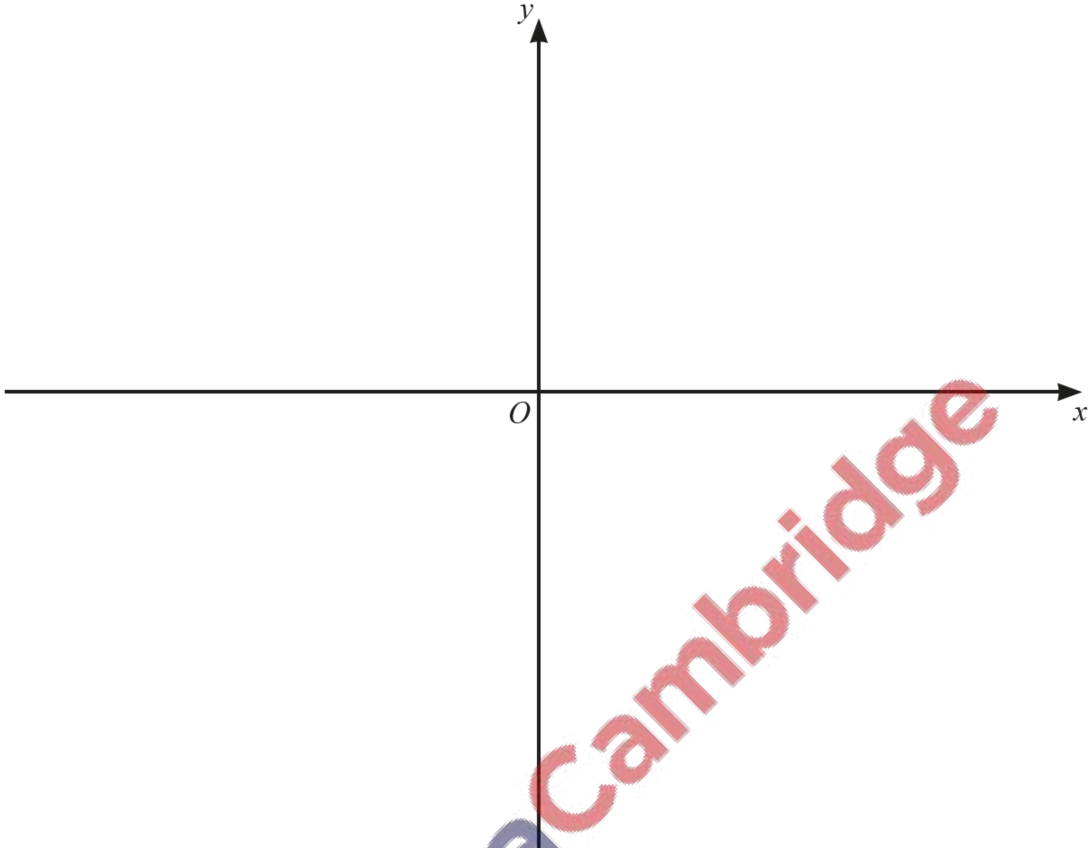
The diagram shows the graph of the cubic polynomial $y = f(x)$.

(a) Find an expression for $f(x)$ in factorised form. Write each linear factor with its coefficients as integers. [3]

(b) Write down the values of x such that $f(x) < 0$. [2]

2. Nov/2023/Paper_0606/13/No.1

(a) On the axes, sketch the graphs of $y = 2x + 5$ and $y = |4x - 3|$, stating the intercepts with the coordinate axes. [3]



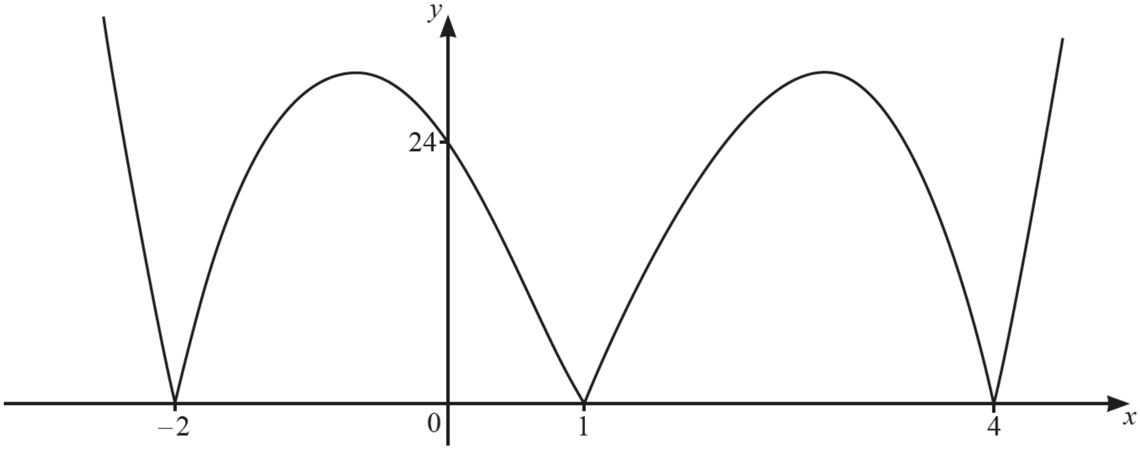
(b) Solve the inequality $|4x - 3| < 2x + 5$. [3]

3. March/2023/Paper_0606/22/No.3

Solve the inequality $|5x+4| \leqslant |2x-3|$. [4]

4. June/2023/Paper_0606/12/No.3

(a)



The diagram shows the graph of $y = |f(x)|$, where $f(x)$ is a cubic polynomial. Find, in factorised form, the possible expressions for $f(x)$. [3]

(b) Solve the inequality $|5x - 2| \leqslant |4x + 1|$. [4]

5. June/2023/Paper_0606/13/No.2

(a) Write $2x^2+5x+3$ in the form $2(x+a)^2+b$, where a and b are rational numbers. [2]

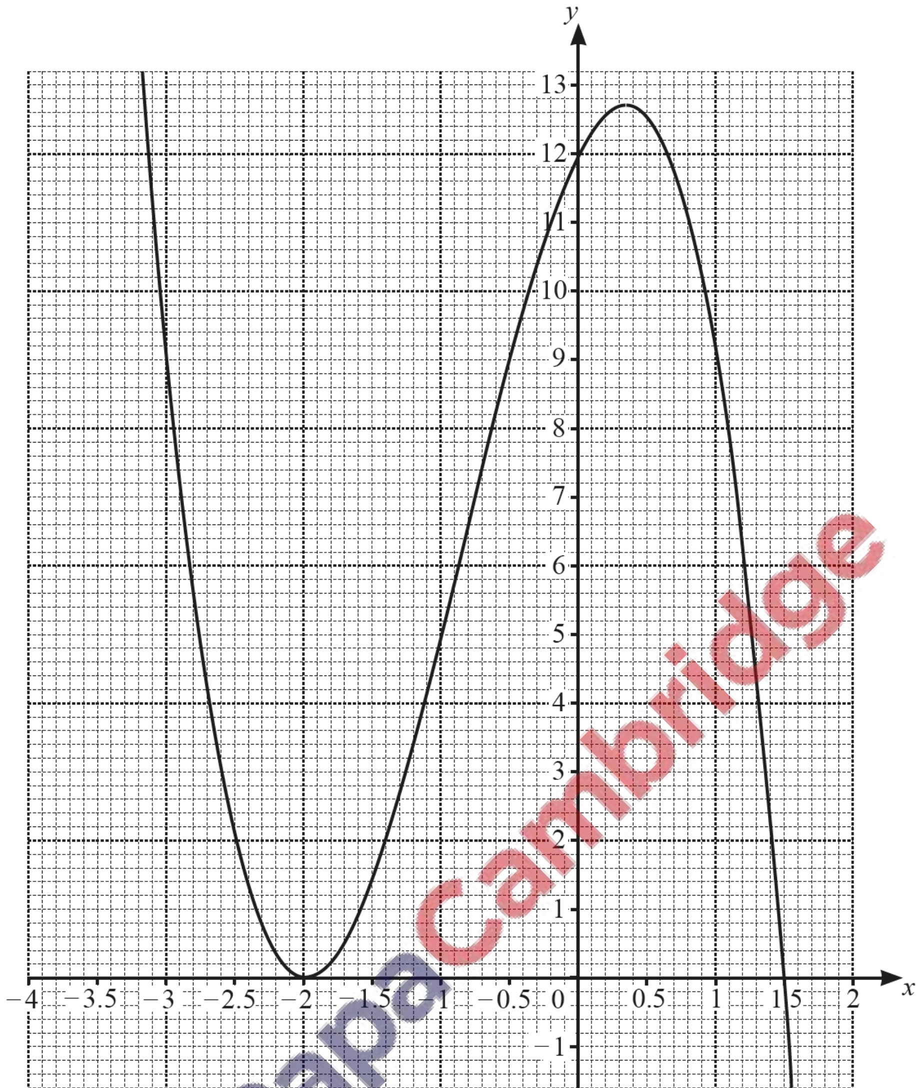
(b) Hence write down the coordinates of the stationary point on the curve $y=2x^2+5x+3$. [2]

(c) Solve the inequality $2x^2+5x+3<\frac{15}{8}$. [3]

6. June/2023/Paper_0606/13/No.4

The straight line $y = 3x - 11$ and the curve $xy = 4 - 3x - 2x^2$ intersect at the points A and B. The point C, with coordinates $(a, -8)$ where a is a constant, lies on the perpendicular bisector of the line AB. Find the value of a. [8]

7. June/2023/Paper_0606/21/No.3



The diagram shows the graph of $y = \mathrm{h}(x)$ where $\mathrm{h}(x) = (x+a)^2(b+cx)$ and a, b and c are integers. The curve meets the x-axis at the points $(-2, 0)$ and $(1.5, 0)$ and the y-axis at the point $(0, 12)$.

(a) Find the values of a, b and c. [2]

(b) Use the graph to solve the inequality $\mathrm{h}(x) \leqslant 9$. [3]

8. June/2023/Paper_0606/22/No.1

(a) Solve the inequality $3x^2 - 12x + 16 > 3x + 4$. [3]

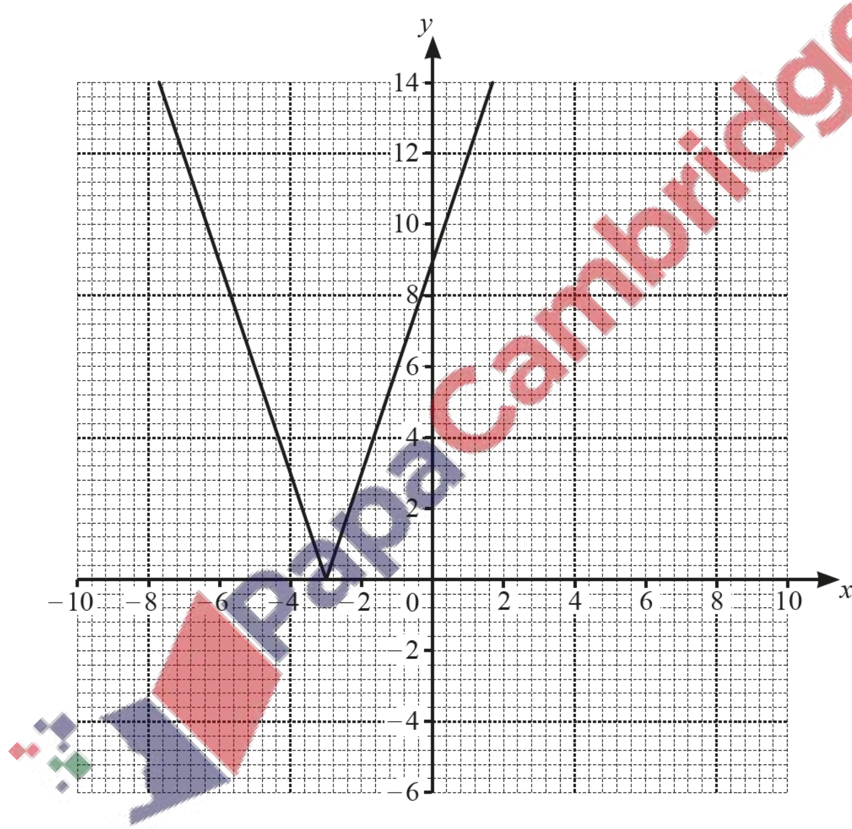
(b) **(i)** Write $3x^2 - 12x + 16$ in the form $a(x+b)^2 + c$ where a, b and c are integers. [3]

(ii) Hence, write down the equation of the tangent to the curve $y = 3x^2 - 12x + 16$ at the minimum point of the curve. [1]

9. June/2023/Paper_0606/23/No.1

(a) Solve the equation $\frac{|4x-5|}{7} = 1$. [2]

(b)



The diagram shows the graph of $y = |3x+9|$.

By drawing a suitable graph on the same diagram, solve the inequality $|3x+9| \leqslant |x-5|$. [3]

10. March/2023/Paper_0606/22/No.1

On the axes below, sketch the graph of $y = |4\cos 2x|$ for $0 \leqslant x \leqslant \pi$, giving the coordinates of any points where the graph meets the axes. [3]