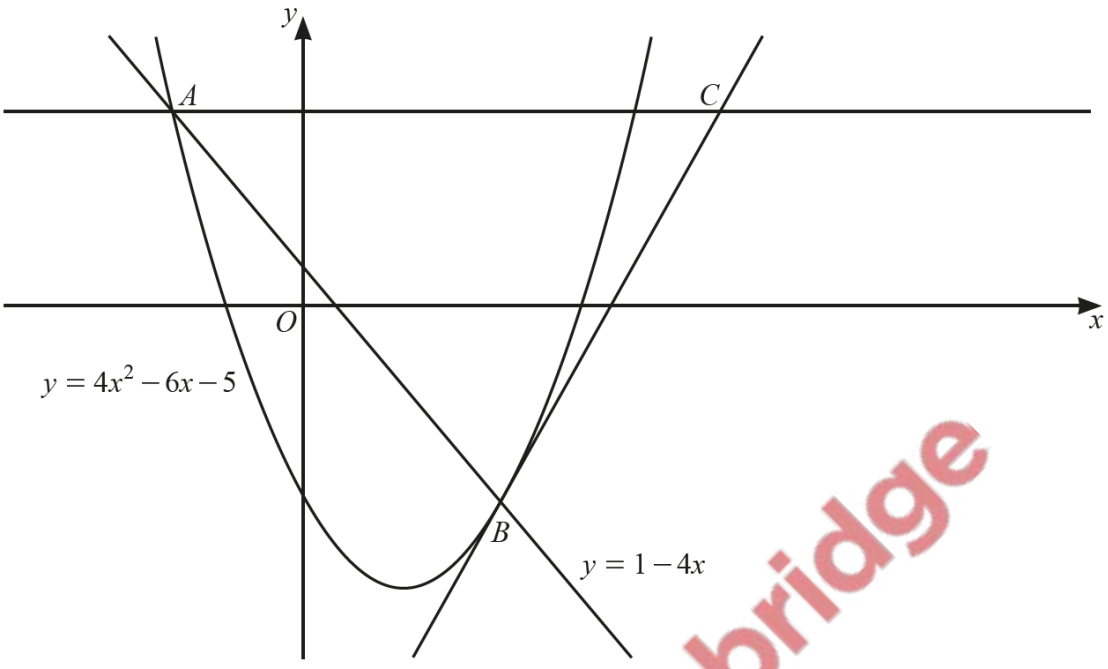
Quadratic functions – 2023 Additional Math 0606

1. Nov/2023/Paper_0606/11/No.8



The diagram shows the line $y = 1 - 4x$ meeting the curve $y = 4x^2 - 6x - 5$ at the points A and B. The tangent to the curve at B meets the horizontal line through A at the point C. Find the x-coordinate of C, giving your answer correct to 2 decimal places. [10]

2. Nov/2023/Paper_0606/13/No.7

Solve the equation $6x^{\frac{1}{3}} - 2x^{-\frac{1}{3}} - 1 = 0$. Give your answers in exact form. [4]

3. Nov/2023/Paper_0606/21/No.1

(a) Write $19-12x-3x^2$ in the form $a(x+b)^2+c$ where a, b and c are integers. [4]

(b) Hence find the maximum value of $19-12x-3x^2$ and the value of x at which this maximum occurs. [2]

(c) Use your answer to **part (a)** to solve the equation $19-12\sqrt{u}-3u=0$. [3]

4. Nov/2023/Paper_0606/21/No.6

Find the value of the constant a for which the line $y = (2a+1)x - 10$ is a tangent to the curve $y = ax^2 - 5x + 2$. [6]

5. Nov/2023/Paper_0606/21/No.8

DO NOT USE A CALCULATOR IN THIS QUESTION.

Solve the equation $(2-\sqrt{10})x^2+x+(2+\sqrt{10})=0$, giving your answers in the form $a+b\sqrt{10}$, where a and b are rational. [7]

6. Nov/2023/Paper_0606/22/No.2

Find the non-zero value of k for which the line $y = -2x - 6k - 1$ is a tangent to the curve $y = x(x + 2k)$. [5]

7. Nov/2023/Paper_0606/23/No.2

Find the values of k for which the curve $y = x^2 + kx + (4k - 15)$ is completely above the x-axis. [4]

8. March/2023/Paper_0606/12/No.1

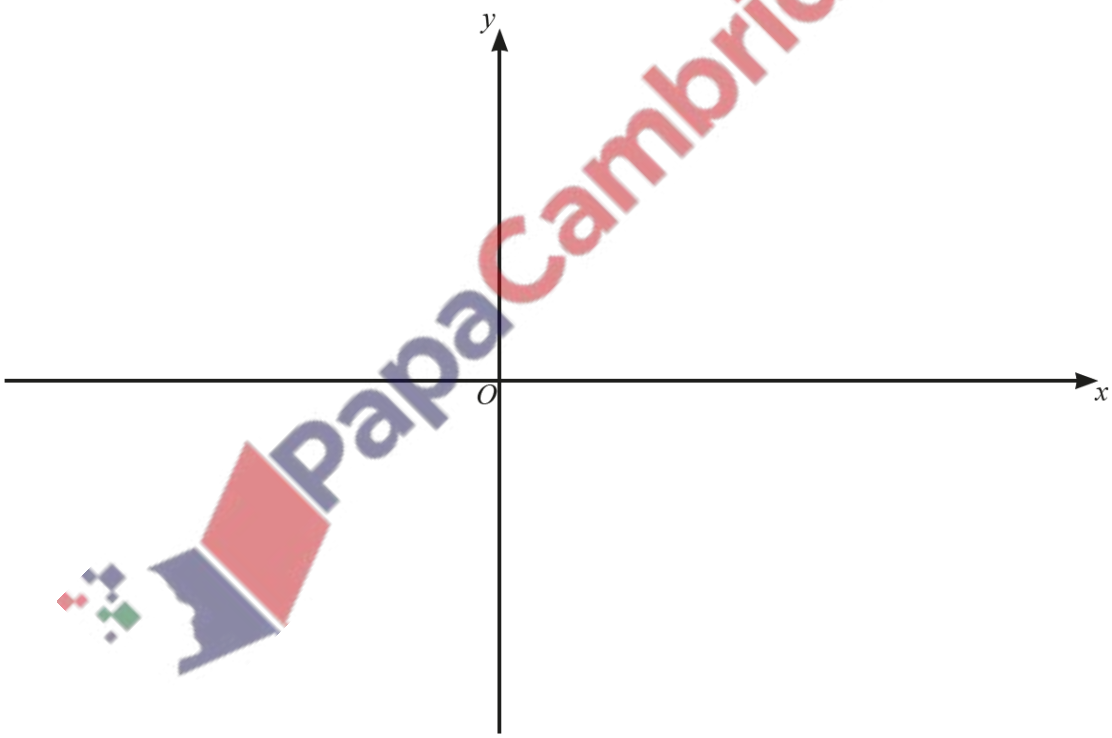
Find the exact values of k such that the straight line $y = 1 - k - x$ is a tangent to the curve $y = kx^2 + x + 2k$. [4]

9. June/2023/Paper_0606/11/No.1

(a) Write $5x^2 - 14x + 8$ in the form $a(x+b)^2 + c$, where a, b and c are constants to be found. [3]

(b) Hence write down the coordinates of the stationary point on the curve $y = 5x^2 - 14x + 8$. [2]

(c) On the axes below, sketch the graph of $y = |5x^2 - 14x + 8|$, stating the coordinates of the points where the graph meets the coordinate axes. [3]



(d) Write down the range of values of k for which the equation $|5x^2 - 14x + 8| = k$ has 4 distinct roots. [2]