Instructions to candidates

- Write your name on the answer booklet.
- It is recommended to use a calculator for this paper.
- A list of formulas is provided during the examination.
- The maximum mark for this paper is **60 marks.**
- The time allocated for this paper is **90 minutes.**

1. [Maximum mark: 4]

   Given that $y = \dfrac{6x^3}{2p - q}$

   (a) Find the exact value of y when $x = 10.5, p = 0.381$ and $q = 0.657$.
   Give your answer correct to 2 decimal places. [2]
   (b) Express q in terms of x, p, and y. [2]

2. [Maximum mark: 4]

   Solve the system of equations

   $$\begin{cases} 2x + y = 3 \\ x + 6y = 29 \end{cases}$$

3. [Maximum mark: 4]

   Solve the equation $x^2 - 4x + 1 = 0$ giving your answers in the form $a \pm \sqrt{b}$, where a and b are integers.
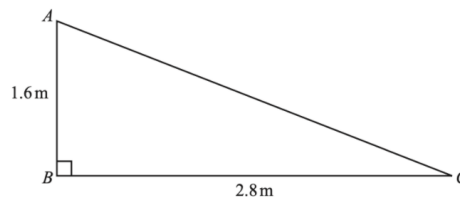
4. [Maximum mark: 3]

   Solve the inequality $6n + 3 > 8n$.

5. [Maximum mark: 6]

   Solve the inequality $\dfrac{1}{x - 2} - \dfrac{2}{x^2 - 4} \geq 0.$

6. [Maximum mark: 7]

   (a) Find the area of triangle ABC. [2]
   (b) Calculate the length of AC. [2]
   (c) Find $\sin C$ correct to 2 decimal places. [2]
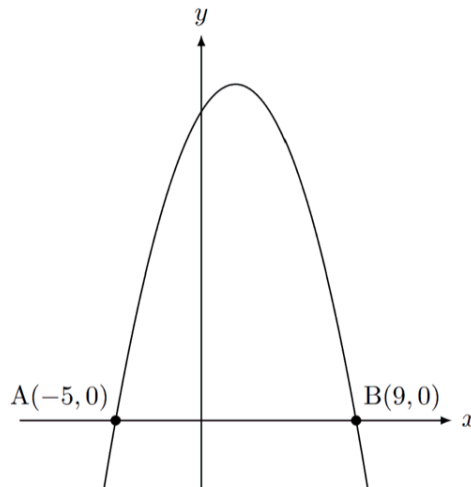   (d) Hence, find the degree measure of angle C.
   Give your answer correct to 1 decimal place. [3]

7. [Maximum mark: 8]

The graph shows the curve of a quadratic function of the form $f(x) = ax^2 + bx + 90$.

    (a) Write down the equation of the axis of symmetry of the curve. [2]

    (b) Hence, or otherwise, find the value of a and the value of b. [3]

    (c) Find the maximum value of the function $f(x)$. [3]

8. [Maximum mark: 10]
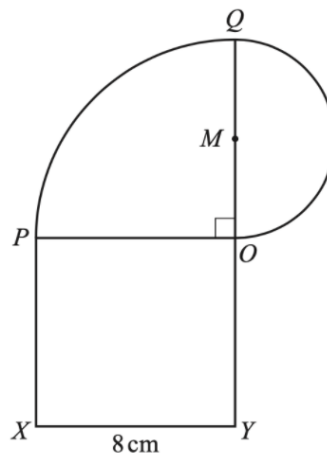
The first term of an arithmetic sequence u_n is 21 and the fourth term is 33.

    (a) Find the common difference of the sequence. [2]

    (b) Find u_{20}. [2]

    (c) Find the sum of the first 20 terms of the sequence. [2]

    (d) Find the value of k for which $k - 2, 2k - 1, 4k - 6$ are
        consecutive terms of an arithmetic sequence. [4]

9. [Maximum mark: 8]

The diagram shows a shape made from a square $OPXY$ with side 8 cm, sector POQ of a circle with centre O and $\angle POQ = 90^\circ$, and a semicircle built on its diameter QO with centre at point M.

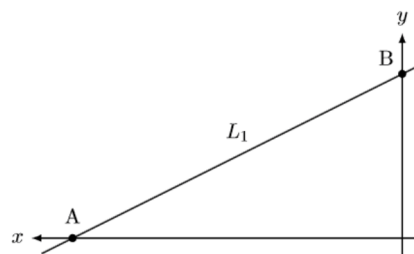

(a) Find the perimeter of the shape. [4]
(b) Find the area of the shape. [4]

10. [Maximum mark: 6]

The diagram shows the straight line L_1 which intersects the x-axis at $A(-8, 0)$ and the y-axis at $B(0, 4)$.

M is the midpoint of $[AB]$.

(a) Write down the coordinates of M. [2]
(b) Calculate the gradient of L_1. [2]

The line L_2 is perpendicular to the line L_1 and passes through point $P(1, 2)$.

(c) Find the equation of L_2. [2]