

REVISION (ADDITIONAL MATHEMATICS)

CHAPTER 2: QUADRATICS

1. Given that $f(x) = x^2 - 10x + 23$,
- (a) express $f(x)$ in the form of $(x + a)^2 + b$, where a and b are constants to be found, [2]
 - (b) write down the turning point of $f(x)$, [2]
 - (c) solve the exact solutions of $x^2 - 10x + 23 = 0$. [2]
 - (d) show the sketch the graph of f [3]
 - (e) write down the range of f [1]
 - (f) write down the domain of f for f to have an inverse [2]

2. Given the function $f(x) = x^2 - 8x + 19$,
- (a) express $f(x)$ in the form of $(x + a)^2 + b$, where a and b are constants [2]
 - (b) whose graph crosses the y -axis at the point P and has minimum point Q ,
 - (i) sketch the graph of f [3]
 - (ii) find the distance PQ , write your answer in surd (square root) form. [3]

3. Solve the simultaneous equations

$$\begin{aligned}y + 4x + 1 &= 0 \\y^2 + 5x^2 + 2x &= 0.\end{aligned} \quad [5]$$

4. The straight-line $y = 3x - 7$ does not cross or touch the curve $y = 2px^2 - 6px + 4p$, where p is a constant.
- (a) Show that $4p^2 - 20p + 9 < 0$. [4]
 - (b) Hence, find the set of possible values of p . [4]

5. Solve the simultaneous equations

$$\begin{aligned}y - 2x - 4 &= 0 \\4x^2 + y^2 + 20x &= 0.\end{aligned} \quad [5]$$

6. Find the set of values of x in

(a) $x^2 - 9x \leq 36$ [4]
(b) $3x^2 + 8x - 3 < 0$ [4]

7. Given the simultaneous equations

$$\begin{aligned} 2x + y &= 1 \\ x^2 - 4ky + 5k &= 0, \text{ where } k \text{ is a non-zero constant} \end{aligned}$$

- (a) show that $x^2 + 8kx + k = 0$ [2]
(b) given that $x^2 + 8kx + k = 0$ has equal roots, find the value of k [3]
(c) find the solution of the simultaneous equations. [3]

8. Given that $4x - 5 - x^2 = q - (x + p)^2$, where p and q are integers.

- (a) Find the value of p and of q . [3]
(b) Calculate the discriminant of $4x - 5 - x^2$. [2]
(c) Show the sketch of $y = 4x - 5 - x^2$, showing clearly the coordinates of the points on the axes. [3]

9. Given that $f(x) = x^2 + 2x - 15$,

- (a) show the factorized form of f [2]
(b) show the completed square form of f [3]
(c) show the sketch of f [3]
(d) show (separately) the sketch of $f(x) = |x^2 + 2x - 15|$ [2]

10. Solve $x^2 - 2x - 8 \geq 0$. [3]