

ADDITIONAL MATHEMATICS
QUADRATICS

1. Express the following functions in turning point form and hence sketch their graphs.

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|------------------------------------|----------------------------------|-------------------------|
| (a) $y = x^2 - 2x + 1$ | (b) $y = x^2 + 4x + 2$ | (c) $y = x^2 - 4x + 2$ |
| (d) $y = x^2 + x - 1$ | (e) $y = x^2 - x - 2$ | (f) $y = x^2 + 3x + 1$ |
| (g) $y = -x^2 + 2x + 1$ | (h) $y = -x^2 - 2x + 2$ | (i) $y = 2x^2 - 2x - 1$ |
| (j) $y = -\frac{1}{2}x^2 + 3x - 2$ | (k) $y = -\frac{x^2}{3} + x - 2$ | (l) $y = 3x^2 - 2x + 1$ |

2. Write the following in root form and hence sketch the graphs

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|----------------------------------|----------------------------------|-------------------------|
| (a) $y = x^2 + 3x + 2$ | (b) $y = x^2 - x - 6$ | (c) $y = 2x^2 - 5x - 3$ |
| (d) $y = x^2 - 4$ | (e) $y = x^2 + x - 5$ | (f) $y = -x^2 + x + 6$ |
| (g) $y = -x^2 + x + 1$ | (h) $y = -2x^2 - 3x + 5$ | (i) $y = 2x^2 + 5x - 3$ |
| (j) $y = \frac{x^2}{3} - 2x + 3$ | (k) $y = -\frac{x^2}{2} + x + 4$ | (l) $y = 3x^2 - 2x - 4$ |

3. For what value(s) of k will the graph of $y = x^2 - 3x + k$

(a) touch the x -axis (b) cut the x -axis (c) never meet the x -axis?

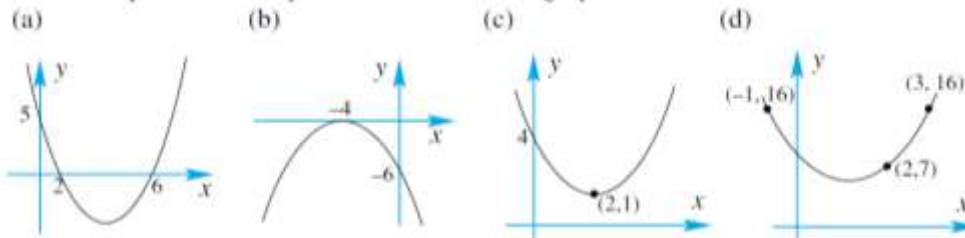
4. For what value(s) of k will the graph of $y = kx^2 + 5x + 2$

(a) touch the x -axis (b) cut the x -axis (c) never meet the x -axis?

5. For what value(s) of k will the graph of $y = kx^2 - 2x + k$

(a) touch the x -axis (b) cut the x -axis (c) never meet the x -axis?

6. Find the equation of the quadratic function with graph



7. Find the solution set for each of the following inequalities.

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|---------------------------|-----------------------------|----------------------------|
| (a) $x^2 + 3x + 2 > 0$ | (b) $x^2 - x - 6 < 0$ | (c) $2x^2 - 5x - 3 \geq 0$ |
| (d) $x^2 - 4 \leq 0$ | (e) $x^2 + x - 5 < 0$ | (f) $-x^2 + x + 6 \leq 0$ |
| (g) $-x^2 + x + 1 \geq 0$ | (h) $-2x^2 - 3x + 5 \geq 0$ | (i) $2x^2 + 5x - 3 > 0$ |
| (j) $x^2 - 4x + 3 < 0$ | (k) $2x^2 + x - 1 < 0$ | (l) $x^2 + 3 < 0$ |
| (m) $-x^2 - 2 > 0$ | (n) $2x^2 - 7x \leq 15$ | (o) $3x^2 + 5x > 2$ |

8. (a) For what value(s) of k is the inequality $x^2 + 2kx - k > 0$ true for all values of x ?

(b) For what value(s) of k is the inequality $x^2 - kx + 2 \geq 0$ true for all values of x ?

(c) For what value(s) of n is the inequality $x^2 + 2x \geq 2n$ true for all values of x ?

9. Find the distance between the points of intersection of the line with equation $y = 2x + 1$ and the parabola with equation $y = x^2 - 4x + 6$.
10. Find the value of a such that the line $y = 2x + a$ has exactly one intersection point with the parabola with equation $y = x^2 + 3x + 2$.
11. If the graph of the function $f(x) = 4x^2 - 20x - 4$ intersects the graph of the function $g(x) = 1 + 4x - x^2$ at the point (m, k) , show that the other point of intersection occurs where $x = -m^{-1}$.
12. For what value(s) of k is the line $2x = 3y + k$ a tangent to the parabola $y = x^2 - 3x + 4$?
13. Find the value for c , for some fixed value of m , so that the straight line $y = mx + c$ is a tangent to the parabola $y^2 = 4ax$, $a \neq 0$.