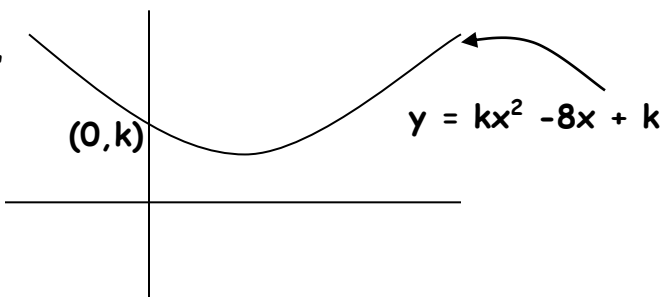# <u>Quadratic Theory</u> – Exam Level Questions/ Past Paper questions.

1. For what values of 'p' does the equation $x^2 - 2x + p = 0$ have equal roots.

2. Show that the roots of the quadratic $(k-2)x^2 - (3k-2)x + 2k = 0$ are always real.

3. If 'k' is a real number show that the roots of the equation
$$kx^2 + 3x + 3 = k$$
are always real.

4. The roots of the equation $(x+1)(x+k) = -4$ are equal. Find the value of 'k'.

5. Find the values of 'k' for which the equation $2x^2 + 4x - k = 0$ has equal roots.

6. Calculate the least positive integer 'k' so that the graph shown does not cut or touch the x axis.

(0,k) $y = kx^2 -8x + k$

7.   Show that the equation
$$(1-2k)x^2 - 5kx - 2k = 0$$
has real roots for all integer values of 'k'.

8. For what values of 'k' has the equation $x^2 - 5x + (k+6) = 0$ have equal roots?

9. If $f(x) = 2x+1$ and $g(x) = x^2 + k$, show that the equation $g(f(x)) - f(g(x)) = 0$ reduces to $2x^2 + 4x - k = 0$ and find the value of 'k' for which this equation has equal roots. What kind of roots does this equation have when k=6?

10. For what values of 'k' does the equation $5x^2 - 2x + k = 0$ have real roots?

11. For what value of 'a' does the equation $ax^2 + 20x + 40 = 0$ have equal roots?

12. Find 'p' given that the equation $x^2 + (px - 5)^2 = 9$, has equal roots.

13. Given that $\dfrac{x^2 + 4x + 10}{2x + 5} = n$, form a quadratic equation in x and hence show that if $n \le -3$ or $n \ge 2$ then the roots of the equation are real.

14. Find 'm' if the equation $(2m-1)x^2 + (m+1)x + 1 = 0$ has equal roots. If m lies between these values find the nature of the roots.

15. Show that the roots of the equation $k(x+1)(x+4) = x$ are not real if $\dfrac{1}{9} < k < 1$.

16. Find 'k' given that the equation $kx^2 + (2k+1)x + k = 0$ has equal roots.

17. If 'k' is a real number, show that the roots of the equation $\dfrac{x^2 - 2x + 21}{3x - 7} = 2k$, are always real.

18. For what values of 'k' does the equation $x(x-4) + 2 = k(2x - 3k)$ have real roots?

19. Show that the line $y = x + c$ meets the parabola $y = x^2 - 3x$ where $x^2 - 4x - c = 0$. Find the value of 'c' if the line is a tangent to the parabola.

20. Find the value of 'n' if the equation $\dfrac{(x-2)^2}{x^2 + 2} = n$, is to have equal roots.