

Extra Questions- Solving Equations, Inequalities

1. Write down a cubic polynomial having roots of $16, \frac{1 \pm \sqrt{5}}{2}$
2. Find the values of m and k so that $x - 1$ and $x + 1$ are both factors of $x^6 + mx^4 - kx + 5$
3. Solve: $x^3 \leq 6x^2 - 5x - 12$
4. a) Solve: $\sqrt{x+1} + \sqrt{x+6} = 5$
b) Solve: $\sqrt{x+1} + \sqrt{x+6} > 5$
5. Consider the graph of $y = x^3 - 3x^2 - 4x + 12$. A rectangle is drawn in the first quadrant where one edge of the rectangle lies along the x -axis, one edge along the y -axis and one vertex lies on the graph. The area of the rectangle is 6. Find the possible coordinates of a vertex of the rectangle which is on the curve.
6. $y = kx + k$ is tangent to $y = x^2 - 4x + 11$. Find the possible values of k .
7. Solve each of the following inequalities:
 - a) $x^3 + 6 \geq 7x$
 - b) $x^2 + \frac{6}{x} \geq 7$
 - c) $|\sqrt{x+6} - \sqrt{2x-2}| > 1$
 - d) $-2|x-3| - x = 9$
8. Find the possible values of the positive integer a and hence write down the possible equations for the resulting function, given that it bounces off the x -axis at $(-2a, 0)$ and again at $(a, 0)$ and has a y -intercept $(0, 64)$ and has no other x -intercepts.
9. When $x^2 + mx + 3$ is divided by $x - 1$, the remainder is k . When $x^2 + mx + 3$ is divided by $x + 1$, the remainder is $k^2 - 4$. Find the possible value(s) of m and k .
10. Consider the equation $|2x - 2| = -x + k$. Use a graphical solution to discuss for which values of k this equation will have two solutions.

Answers: 1. $x^3 - 17x^2 + 15x + 16 = 0$ 2. $m = -6, k = 0$ 3. $x \leq -1$ or $3 \leq x \leq 4$
4a) $x = 3$ b) $x > 3$ 5. (1,6) 6. $k = -14, 2$
7a) $x \geq 2$ or $-3 \leq x \leq 1$ b) $x \geq 2$ or $0 < x \leq 1$ or $x \leq -3$ 7 c) $x > 19$ or $1 \leq x < 3$
d) no solution 8. $a = 2$ or $a = 1$ and the possible equations are:
 $f(x) = 1(x + 4)^2(x - 2)^2$ or $f(x) = 16(x + 2)^2(x - 1)^2$ 9. $k = -4, 3$ and $m = -8, -1$ 10. $k > 1$