

Quadratic Expressions and Equations

1. Factorize the following:
 - a) $x^2 - 57x + 110$
 - b) $2x^2 + x - 1$
 - c) $2x^2 - x - 6$
2. Solve the equations:
 - a) $5x^2 - 31x + 6 = 0$
 - b) $12x^2 - x - 6 = 0$
 - c) $3x^2 + 7x - 6 = 0$
 - d) $6x^2 + 13x - 5 = 0$
 - e) $3x^2 - 13x - 10 = 0$
3. Solve the following equations using square root tables where necessary:
 - a) $(x + 3)^2 = 14$
 - b) $(x - \frac{7}{2})^2 = 13$
 - c) $(x - 4)^2 = 5$
 - d) $(x - 5)^2 = 25$
 - e) $(p - 5)^2 = 10$
4. Solve the following equations by the factors method:
 - a) $x^2 - 3x = 40$
 - b) $2x^2 - 7x + 6 = 0$
 - c) $2x^2 - 5x = 12$
 - d) $20x = 4x^2 + 25$
 - e) $2 - x - x^2 = 0$
5. Draw the curve of $y = x^2 - 4x + 4$ for values of x from -1 to $+5$. Solve from your graph the equations:
 - a) $x^2 - 4x + 4 = 0$
 - b) $x^2 - 4x + 1 = 0$
 - c) $x^2 - 4x - 1 = 0$
6. Draw the graph of the function $x^2 - 6x + 5$ for $-1 \leq x \leq 7$. Find the least value of this function and the corresponding value of x . Use your graph to solve the equations:
 - a) $x^2 - 6x + 5 = 0$
 - b) $x^2 - 6x = 11$
7. Draw the graph of the function of $y = 2x^2 - 7x - 2$ for values of x from -1 to $+5$. Find the minimum value of the function and the corresponding values of x . By drawing suitable lines on the same axes, solve, where possible, the following equations:
 - a) $2x^2 - 7x = 2$
 - b) $2x^2 - 8x + 4 = 0$
 - c) $2x^2 - 7x + 7 = 0$

Formulae and Variations

8. Make the letters given in brackets the subject of the formulae in the following question:
- $v = u + at$ (t)
 - $d = \frac{k-m}{t}$ (k)
 - $a = \frac{b+5c}{d}$ (c)
 - $A = \pi r^2 h$ (r)
 - $v^2 = u^2 + 2as$ (u)
9. Make q the subject of the formulae: $p = \frac{16a}{\sqrt{q}}$, Evaluate q if $a = \frac{1}{8}$ and $p = \frac{1}{4}$.
10. Make H the subject of the formulae: $V = d^2\sqrt{H}$. Find H if $V = 1.8 \times 10^3$ and 3.0×10^2
11. The time period of a pendulum is given by the formulae $T = 2\pi\sqrt{\frac{l}{g}}$, where T is the time in seconds, l is the length of the string in cm and g is the gravitation pull of the earth.
- Make l the subject of the formulae
 - Evaluate l if $T = 3.3$, $\pi = 3\frac{1}{7}$ and $g = 32$
12. A runner covers a distance d km in t hours. Obtain and simplify an expression for the time T, he would take to cover the same distance if he increased his speed by 1 km/h. Make d the subject of the expression you obtain.
13. From the formulae $(p + \frac{a}{b^2})(b - c) = d$, express p in terms of a, b, c and d without simplifying your answer. If $a = 8.0 \times 10^{-3}$, $b = 1.2 \times 10^{-6}$, $c = 2.0 \times 10^{-3}$ and $d=1$, evaluate p.

Simultaneous Equations

14. Solve the following pairs of simultaneous equations using Substitution method
- $a = b + 10$ **and** $a = 2b - 3$
 - $c - d = 5$ **and** $c + 2d = 7$
 - $8a + b = 21$ **and** $5a - 4b = -10$
 - $e = 16f + 1$ **and** $e = 7f - 26$
 - $g - 8h = 60$ **and** $g + 2h = 10$
 - $k + 25t = 8$ **and** $k + 5t = 4$
15. Solve the following pairs of simultaneous equations using Elimination method
- $u + v = 3$ **and** $u - v = 11$
 - $3x + y = 13$ **and** $x + y = 9$
 - $6c + 2d - 32 = 0$ **and** $4c + 3d - 18 = 0$
 - $7p + 2q = 15$ **and** $p - 2q = 9$
 - $12m + 6n + 1 = 0$ **and** $4m - 3n - 3 = 0$
 - $4g + h = 16$ **and** $g - 3h = -22$
16. Solve the following pairs of simultaneous equations using Graphical method
- $2x - 3y = 0$ **and** $x + 2y = 7$

b) $8x - y = 6$ **and** $3x + 2y = 26$

17. Six ball-point pens and twelve exercise books cost \$1020. Four ball-point pens and four exercise books cost \$480. Find the cost of one ball-point pen.
18. A shopkeeper pays sh 34000 for x kg of tea costing sh 1000 per kg and y kg of tea costing sh 800 per kg. He then mixes the two grades and sells the mixture at sh 1000 per kg. If he makes a profit of sh 6000. Find x and y .