ILLAWARRA TUTORING

In this worksheet you will learn to manipulate and solve equations derived from various formulas. You will practise isolating variables, rearranging equations, and substituting given values into formulas. Remember to show all steps and check that you clearly state any conditions (such as nonzero denominators).

Easy Questions

1. Solve for w in the formula $A = l\,w$ when $A = 20$ and $l = 5$.
2. Solve for x in the equation $x + 5 = 12$.
3. For the formula $P = 2(l + w)$, rearrange the equation to express w in terms of P and l.
4. Given the formula $E = \frac{1}{2}mv^2$, calculate E when $m = 4$ and $v = 3$.
5. If $A = \pi r^2$ and $A = 49\pi$, find the value of r.

Intermediate Questions

6. Given $V = IR$, solve for I when $V = 12$ and $R = 3$.
7. Rearrange the formula $F = \frac{ma}{k}$ to express a in terms of F, m, and k.
8. Given $y = mx + c$ and assuming $x \neq 0$, rearrange the equation to solve for m.
9. Express r in terms of A from the equation $A = \pi r^2$.
10. Given the equation $d = ut + \frac{1}{2}at^2$ (with $t \neq 0$), rearrange to solve for u.
11. From the formula $P = 2(l + w)$, isolate l in terms of P and w.
12. For the formula $A = \frac{1}{2}bh$, rearrange to solve for b in terms of A and h.
13. Given $F = mg$ (with $g \neq 0$), rearrange the equation to solve for m.
14. The formula $P = I^2R$ relates P, I, and R. Rearrange to solve for I (assume $R > 0$).
15. Rearrange $E = VIt$ to solve for t in terms of E, V, and I (assume $VI \neq 0$).
16. Given $Q = mc\Delta T$ (with $mc \neq 0$), rearrange the formula to solve for ΔT.

17. Using the formula $v = u + at$, calculate v when $u = 0$, $a = 2$, and $t = 5$.

18. From the formula $V = \frac{4}{3}\pi r^3$, solve for r in terms of V.

19. The surface area of a rectangular prism is given by $A = 2lw + 2lh + 2wh$. Express l in terms of A, w, and h (assume $2(w + h) \neq 0$).

20. Given $S = \frac{n}{2}\Big[2a+(n-1)d\Big]$, rearrange to solve for a in terms of S, n, and d (assume $n \neq 0$).

Hard Questions

21. A rectangle has a perimeter given by $P = 2(l + w)$ and its length is three times its width. Express the width in terms of P.

22. Given the equation $F = \frac{G(m_1\, m_2)}{r^2}$ (with $G > 0$ and $F > 0$), rearrange the formula to express r in terms of F, G, m_1, and m_2.

23. The ideal gas law is given by $PV = nRT$. Rearrange this equation to solve for n in terms of P, V, R, and T (with $RT \neq 0$).

24. The percent change formula is given by $\text{percent} = \frac{(N - O)}{O} \times 100$. Rearrange the equation to express N in terms of O and the percent change (denote the percent change by p).

25. For the formula $C = \frac{V^2}{R}$ (with $R \neq 0$), rearrange to solve for R in terms of V and C.

26. The volume of a cylinder is given by $V = \pi r^2 h$. Rearrange the formula to express h in terms of V and r (with $r \neq 0$).

27. Given $K = \frac{1}{2}mv^2$ (with $m > 0$), rearrange the formula to solve for v when K and m are known.

28. The area of a trapezium is given by $A = \frac{(b_1 + b_2)}{2}\, h$, and it is known that $b_2 = 2b_1$. Express b_1 in terms of A and h (with $h \neq 0$).

29. The period of a pendulum is given by $T = 2\pi\sqrt{\frac{L}{g}}$ (with $g > 0$). Rearrange the equation to solve for L in terms of T and g.

30. Density is given by $\rho = \frac{m}{V}$ (with $V \neq 0$). Rearrange this formula to express V in terms of m and ρ.