ILLAWARRA TUTORING

In this worksheet you will develop your ability to manipulate and solve equations derived from various formulas. Work carefully through each question and show all steps in your working.

Easy Questions

1. The formula for the area of a rectangle is $A = l \times w$. Given that $A = 20$ and $l = 5$, find w.
2. The perimeter of a rectangle is given by $P = 2(l + w)$. If $l = 4$ and $P = 20$, determine w.
3. The formula for distance is $d = r \times t$. If $d = 60$ and $t = 3$, find the value of r.
4. The formula $F = m \times a$ relates force, mass and acceleration. Rearrange this formula to express m in terms of F and a.
5. The area of a triangle is given by $A = \frac{1}{2}b \times h$. If $A = 20$ and $b = 8$, solve for h.

Intermediate Questions

6. Simplify and solve for x in the equation $3x + 2 = 2x + 7$.
7. The conversion from Celsius to Fahrenheit is given by $F = \frac{9}{5}C + 32$. If $F = 77$, solve for C.
8. The formula for the perimeter of a rectangle is $P = 2l + 2w$. Rearrange this formula to express l in terms of P and w.
9. The area of a parallelogram is given by $A = b \times h$. If $A = 45$ and $b = 9$, find h.
10. The volume of a cuboid is given by $V = l \times w \times h$. Given that $l = 2$, $w = 3$, and $V = 36$, solve for h.
11. The simple interest formula is $I = P \times r \times t$. If $I = 50$, $P = 200$, and $t = 0.5$, determine r.
12. Rewrite the formula $A = \pi r^2$ to solve for r in terms of A.
13. The formula for speed of a wave is $v = f\lambda$. If $v = 300$ and $f = 100$, find λ.

14. In the compound interest formula $A = P(1+r)^t$, if $P = 100$, $A = 121$, and $t = 2$, solve for $(1+r)$.

15. Given the density formula $\rho = \dfrac{m}{V}$, if $m = 50$ and $\rho = 5$, find V.

16. The area of a regular hexagon is given by $A = \dfrac{3\sqrt{3}}{2}s^2$. If $A = 18\sqrt{3}$, solve for s.

17. For a rectangle, the perimeter is $P = 2(l+w)$ and it is given that $l = w+3$. Express P solely in terms of w and simplify.

18. The area of a triangle can be expressed as $A = \dfrac{1}{3}b \times h$. Rearrange the formula to solve for b in terms of A and h.

19. The volume of a cylinder is given by $V = \pi r^2 h$. Express h in terms of V, π, and r.

20. The kinetic energy is given by $KE = \dfrac{1}{2}mv^2$. If $KE = 100$ and $m = 4$, solve for v (express your answer in simplest radical form).

Hard Questions

21. The formula for acceleration is $a = \dfrac{v-u}{t}$, where u is the initial velocity and v is the final velocity. Given that $t = 5$ and $a = 3$, express v in terms of u.

22. The surface area of a cube is given by $S = 6a^2$ and its volume by $V = a^3$. First, express a in terms of S and then substitute into the volume formula to write V solely in terms of S.

23. The total resistance R of three resistors in parallel is given by $\dfrac{1}{R} = \dfrac{1}{R_1} + \dfrac{1}{R_2} + \dfrac{1}{R_3}$. Given that $R_1 = 6$, $R_2 = 3$, and $R_3 = 2$, calculate R.

24. The gravitational potential energy is given by $U = mgh$. Rearrange the formula to solve for h in terms of U, m, and g, and then evaluate h when $U = 245$, $m = 5$, and $g = 9.8$.

25. The period of a pendulum is given by $T = 2\pi\sqrt{\dfrac{l}{g}}$. Solve for l in terms of T and g.

26. Ohm's law states that $V = IR$ and the resistance is given by $R = \dfrac{\rho L}{A}$, where ρ is the resistivity, L is the length, and A is the cross-sectional area. Express the current I in terms of V, ρ, L, and A.

27. The area of a trapezium is given by $A = \dfrac{1}{2}(a+b)h$, where a and b are the lengths of the parallel sides. Rearrange the formula to solve for h and then determine h if $A = 30$, $a = 4$, and $b = 6$.

28. The energy stored in a capacitor is given by $E = \frac{1}{2}CV^2$. Solve for V in terms of E and C.

29. The monthly payment on a loan is determined by the formula $M = P\frac{r(1+r)^n}{(1+r)^n - 1}$, where r is the monthly interest rate and n is the number of payments. Rearrange this formula to express P in terms of M, r, and n.

30. The formula for the final amount with continuous compounding interest is $A = Pe^{rt}$. Solve for t in terms of A, P, and r.