4-7 Transforming Formulas

Objective: To transform a formula.

Example 1   Solve the formula $F = ma$ for m. State the restrictions, if any, for the formula obtained to be meaningful.

Solution $F = ma$ To get m alone on one side, divide both sides by a.

$\dfrac{F}{a} = m, a \neq 0$ The denominator cannot be 0.

Solve the given formula for the indicated variable. State the restrictions, if any, for the formula obtained to be meaningful.

1. $C = \pi d$ for d $d = \dfrac{C}{\pi}$

2. $F = ma$ for a $a = \dfrac{F}{m}; m \neq 0$

3. $I = prt$ for t $t = \dfrac{I}{pr}; p \neq 0, r \neq 0$

4. $V = Bh$ for h $h = \dfrac{V}{B}; B \neq 0$

5. $d = rt$ for t $t = \dfrac{d}{r}; r \neq 0$

6. $s = gt^2$ for g $g = \dfrac{s}{t^2}; t \neq 0$

Example 2   The formula $A = \dfrac{1}{2}h(a + b)$ gives the area of a trapezoid with bases a units and b units and with height h units. Use this formula to solve for the variable b in terms of A, h, and a. State the restrictions, if any, for the formula obtained to be meaningful.

Solution $A = \dfrac{1}{2}h(a + b)$ To get clear of fractions, multiply both sides by 2.

$2A = h(a + b)$ Divide both sides by h.

$\dfrac{2A}{h} = a + b$ Subtract a from both sides.

$\dfrac{2A}{h} - a = b, h \neq 0$ The denominator cannot be 0.

Solve the given formula for the indicated variable. State the restrictions, if any, for the formula obtained to be meaningful.

7. $A = \dfrac{1}{2}bh$ for h $h = \dfrac{2A}{b}; b \neq 0$

8. $b = 2b + y$ for y $y = -b$

9. $A = \dfrac{1}{2}h(b + c)$ for h $h = \dfrac{2A}{b + c}; b \neq -c$

10. $A = P + Prt$ for r $r = \dfrac{A - P}{Pt}; P \neq 0, t \neq 0$

11. $a = 2(l + w)$ for l $l = \dfrac{a - 2w}{2}$

12. $C = \dfrac{5}{9}(F - 32)$ for F $F = \dfrac{9C + 160}{5}$

4-7 Transforming Formulas (continued)

Example 3   Solve the formula $C = \dfrac{mv^2}{r}$ for r. State the restrictions, if any, for the formula obtained to be meaningful.

Solution $C = \dfrac{mv^2}{r}$ To get r out of the denominator, multiply both sides by r.

$Cr = mv^2$ To get r alone on one side, divide both sides by C.

$r = \dfrac{mv^2}{C}, C \neq 0$ The denominator cannot be 0.

Solve the given formula for the indicated variable. State the restrictions, if any, for the formula obtained to be meaningful.

13. $s = \dfrac{v}{r}$ for v $v = rs$

14. $d = \dfrac{m}{v}$ for m $m = dv$

15. $C = \dfrac{mv^2}{r}$ for m $\dfrac{Cr}{v^2} = m, v \neq 0$

16. $2ax + 1 = ax + 5$ for x $x = \dfrac{4}{a}, a \neq 0$

17. $a = \dfrac{v - u}{t}$ for u $u = v - at, t \neq 0$

18. $v^2 = u^2 + 2as$ for a $a = \dfrac{v^2 - u^2}{2s}, s \neq 0$

19. $S = \dfrac{n}{2}(a + 1)$ for a $a = \dfrac{2S - n}{n}, n \neq 0$

20. $m = \dfrac{x + y + z}{3}$ for x $x = 3m - y - z$

21. $l = a + (n - 1)d$ for d $d = \dfrac{l - a}{n - 1}, n \neq 1$

22. $A = \dfrac{a + b + c + d}{4}$ for b $b = 4A - a - c - d$

23. $3by - 2 = 2by + 1$ for b $b = \dfrac{3}{y}, y \neq 0$

24. $3aw + 1 = aw - 7$ for a $a = -\dfrac{4}{w}, w \neq 0$

25. $ax + b = c$ for b $b = c - ax$

26. $D = \dfrac{a}{2}(2t - 1)$ for a $a = \dfrac{2D}{2t - 1}, t \neq \dfrac{1}{2}$

27. $am - bm = c$ for a $a = \dfrac{bm + c}{m}, m \neq 0$

28. $q = 1 + \dfrac{P}{100}$ for P $P = 100q - 100$

Mixed Review Exercises

Simplify.

1. $(y - 4)(y + 2)$ $y^2 - 2y - 8$

2. $(2n - 3)(3n - 4)$ $6n^2 - 17n + 12$

3. $a[3a - 2(4 + a)]$ $a^2 - 8a$

4. $xy(x - 2y)$ $x^2y - 2xy^2$

5. $3x(x^2 - 2x + 3)$ $3x^3 - 6x^2 + 9x$

6. $(-4x^2)^3$ $-64x^6$

7. $n^2 \cdot n^3 \cdot n^4$ n^9

8. $(2a^2)^3 \cdot (3a^3b^2)$ $24a^9b^2$

9. $(x + 6)(x - 5)$ $x^2 + x - 30$

10. $(a + 2b)ab$ $a^2b + 2ab^2$

11. $(4m + 5)(8m + 7)$ $32m^2 + 68m + 35$

12. $2y^2(y^3 + 2y - 1)$ $2y^5 + 4y^3 - 2y^2$