

Multiple Transformations

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- $\frac{x}{6} - 7 = 2$; $\frac{x}{6} - 7 + 7 = 2 + 7$; $\frac{x}{6} = 9$;
 $6 \cdot \frac{x}{6} = 6 \cdot 9$; $x = 54$
- $\frac{n}{3} - 5 = 12$; $\frac{n}{3} - 5 + 5 = 12 + 5$; $\frac{n}{3} = 17$;
 $3 \cdot \frac{n}{3} = 3 \cdot 17$; $n = 51$
- $4y + 13 = 37$; $4y + 13 - 13 = 37 - 13$; $4y = 24$;
 $\frac{4y}{4} = \frac{24}{4}$; $y = 6$
- $2 = \frac{5p - 7}{4}$; $4 \cdot 2 = 4 \cdot \frac{5p - 7}{4}$; $8 = 5p - 7$;
 $8 + 7 = 5p - 7 + 7$; $15 = 5p$; $\frac{15}{5} = \frac{5p}{5}$; $3 = p$
- $8(y - 5) + 2y = -10$; $8y - 40 + 2y = -10$;
 $(8y + 2y) - 40 = -10$; $10y - 40 = -10$;
 $10y - 40 + 40 = -10 + 40$; $10y = 30$; $\frac{10y}{10} = \frac{30}{10}$;
 $y = 3$
- $3(p + 2) - 7p = 18$; $3p + 6 - 7p = 18$;
 $(3p - 7p) + 6 = 18$; $-4p + 6 = 18$;
 $-4p + 6 - 6 = 18 - 6$; $-4p = 12$; $\frac{-4p}{-4} = \frac{12}{-4}$;
 $p = -3$
- $9s + 20 = -16$; $9s + 20 - 20 = -16 - 20$; $9s = -36$;
 $\frac{9s}{9} = \frac{-36}{9}$; $s = -4$
- $\frac{t}{5} + 3 = 9$; $\frac{t}{5} + 3 - 3 = 9 - 3$; $\frac{t}{5} = 6$; $5 \cdot \frac{t}{5} = 5 \cdot 6$;
 $t = 30$
- $\frac{y}{6} + 12 = 10$; $\frac{y}{6} + 12 - 12 = 10 - 12$; $\frac{y}{6} = -2$;
 $6 \cdot \frac{y}{6} = 6 \cdot (-2)$; $y = -12$
- $13 + \frac{m}{4} = 6$; $13 + \frac{m}{4} - 13 = 6 - 13$; $\frac{m}{4} = -7$;
 $4 \cdot \frac{m}{4} = 4 \cdot (-7)$; $m = -28$
- $4 = \frac{5z + 2}{3}$; $3 \cdot 4 = 3 \cdot \frac{5z + 2}{3}$; $12 = 5z + 2$;
 $12 - 2 = 5z + 2 - 2$; $10 = 5z$; $\frac{10}{5} = \frac{5z}{5}$; $2 = z$
- $\frac{3w + 8}{2} = 25$; $\frac{3w + 8}{2} \cdot 2 = 25 \cdot 2$; $3w + 8 = 50$;
 $3w + 8 - 8 = 50 - 8$; $3w = 42$; $\frac{3w}{3} = \frac{42}{3}$; $w = 14$
- $-5(2x - 6) + 8x = 22$; $-10x + 30 + 8x = 22$;
 $(-10x + 8x) + 30 = 22$; $-2x + 30 = 22$;
 $-2x + 30 - 30 = 22 - 30$; $-2x = -8$; $\frac{-2x}{-2} = \frac{-8}{-2}$;
 $x = 4$
- $-2n + 3 = 8$; $-2n + 3 - 3 = 8 - 3$; $-2n = 5$;
 $\frac{-2n}{-2} = \frac{5}{-2}$; $n = -\frac{5}{2}$
- $7 = \frac{3}{5}t - 2$; $7 + 2 = \frac{3}{5}t - 2 + 2$; $9 = \frac{3}{5}t$;
 $\frac{5}{3} \cdot 9 = \frac{5}{3} \cdot \frac{3}{5}t$; $\frac{45}{3} = t$; $15 = t$
- $21 = 5n - 2(n - 3)$; $21 = 5n - 2n + 6$; $21 = 3n + 6$;
 $21 - 6 = 3n + 6 - 6$; $15 = 3n$; $\frac{15}{3} = \frac{3n}{3}$; $5 = n$
- $15 - \frac{x}{8} = 4$; $15 - \frac{x}{8} - 15 = 4 - 15$; $-\frac{x}{8} = -11$;
 $-8 \cdot \left(-\frac{x}{8}\right) = -8 \cdot (-11)$; $x = 88$
- $16 - 3q = 10$; $16 - 3q - 16 = 10 - 16$; $-3q = -6$;
 $\frac{-3q}{-3} = \frac{-6}{-3}$; $q = 2$
- $2(5m + 3) - 8m = 4$; $10m + 6 - 8m = 4$;
 $(10m - 8m) + 6 = 4$; $2m + 6 = 4$;
 $2m + 6 - 6 = 4 - 6$; $2m = -2$; $\frac{2m}{2} = \frac{-2}{2}$; $m = -1$
- $12x - 4 = 32$; $12x - 4 + 4 = 32 + 4$; $12x = 36$;
 $\frac{12x}{12} = \frac{36}{12}$; $x = 3$
- $5 - \frac{3}{4}s = -1$; $5 - \frac{3}{4}s - 5 = -1 - 5$; $-\frac{3}{4}s = -6$;
 $-\frac{4}{3} \cdot \left(-\frac{3}{4}s\right) = -\frac{4}{3} \cdot (-6)$; $s = 8$
- $\frac{3\left(t - \frac{1}{3}\right)}{2} - 4 = 6$; $\frac{3t - 1}{2} - 4 = 6$;
 $\frac{3t - 1}{2} - 4 + 4 = 6 + 4$; $\frac{3t - 1}{2} = 10$;
 $2\left(\frac{3t - 1}{2}\right) = 2 \cdot 10$; $3t - 1 = 20$; $3t - 1 + 1 = 20 + 1$;
 $3t = 21$; $\frac{3t}{3} = \frac{21}{3}$; $t = 7$

23. $\frac{3x}{5} + 2 = 5.6$; $\frac{3x}{5} + 2 - 2 = 5.6 - 2$; $\frac{3x}{5} = 3.6$;
 $5 \cdot \frac{3x}{5} = 5 \cdot 3.6$; $3x = 18$; $x = 6$
24. (a) $P = 2l + 2w$; $P = 2(w + 5) + 2w$;
 $50 = 2w + 10 + 2w$; $50 = (2w + 2w) + 10$;
 $50 = 4w + 10$
- (b) $50 = 4w + 10$; $50 - 10 = 4w + 10 - 10$; $40 = 4w$;
 $\frac{40}{4} = \frac{4w}{4}$; $10 = w$
 $l = w + 5$; $l = 10 + 5$; $l = 15$
- (c) The length is 15 ft and the width is 10 ft.
25. (a) $P = 2l + 2w$; $54 = 2(3w + 3) + 2w$;
 $54 = 6w + 6 + 2w$; $54 = (6w + 2w) + 6$;
 $54 = 8w + 6$
- (b) $54 = 8w + 6$; $54 - 6 = 8w + 6 - 6$; $48 = 8w$;
 $\frac{48}{8} = \frac{8w}{8}$; $6 = w$
 $l = 3w + 3$; $l = 3 \cdot 6 + 3$; $l = 18 + 3$; $l = 21$
- (c) The length is 21 ft and the width is 6 ft.
26. (a) $P = 2l + 2w$; $36 = 2l + 2(2l - 12)$;
 $36 = 2l + 4l - 24$; $36 = 6l - 24$
- (b) $36 = 6l - 24$; $36 + 24 = 6l - 24 + 24$;
 $60 = 6l$; $\frac{60}{6} = \frac{6l}{6}$; $10 = l$
 $w = 2l - 12$; $w = 2 \cdot 10 - 12$; $w = 20 - 12$;
 $w = 8$
- (c) The length is 10 in. and the width is 8 in.
27. (a) $P = 2l + 2w$; $150 = 2(w - 7) + 2w$;
 $150 = 2w - 14 + 2w$; $150 = 2w + 2w - 14$;
 $150 = 4w - 14$
- (b) $150 = 4w - 14$; $150 + 14 = 4w - 14 + 14$;
 $164 = 4w$; $\frac{164}{4} = \frac{4w}{4}$; $41 = w$
 $l = w - 7$; $l = 41 - 7$; $l = 34$
- (c) The length is 34 ft and the width is 41 ft.
28. (a) $w + t + v + t = 24$;
 $w + (w + 2) + 2w + (w + 2) = 24$;
 $w + 2w + (w + 2) + (w + 2) = 24$;
 $3w + 2(w + 2) = 24$; $3w + 2w + 4 = 24$;
 $5w + 4 = 24$
- (b) $5w + 4 = 24$; $5w + 4 - 4 = 24 - 4$; $5w = 20$;
 $\frac{5w}{5} = \frac{20}{5}$; $w = 4$
 $t = w + 2$; $t = 4 + 2$; $t = 6$
 $v = 2w$; $v = 2 \cdot 4$; $v = 8$
- (c) Side t is 6 units long, side v is 8 units long, and side w is 4 units long.
29. (a) $x + y + z = 16$; $2y + y + z = 16$;
 $2(z - 4) + (z - 4) + z = 16$;
 $2z - 8 + z - 4 + z = 16$;
 $2z + z + z - 8 - 4 = 16$; $4z - 12 = 16$
- (b) $4z - 12 = 16$; $4z - 12 + 12 = 16 + 12$; $4z = 28$;
 $\frac{4z}{4} = \frac{28}{4}$; $z = 7$
 $y = z - 4$; $y = 7 - 4$; $y = 3$
 $x = 2y$; $x = 2 \cdot 3$; $x = 6$
- (c) Side x is 6 units long, side y is 3 units long, and side z is 7 units long.
30. (a) $a + b + c + c + b = 67$; $a + 2b + 2c = 67$;
 $a + 2b + 2(b - 7) = 67$; $a + 2b + 2b - 14 = 67$;
 $a + 4b - 14 = 67$; $a + 4 \cdot 2a - 14 = 67$;
 $a + 8a - 14 = 67$; $9a - 14 = 67$
- (b) $9a - 14 = 67$; $9a - 14 + 14 = 67 + 14$;
 $9a = 81$; $a = 9$
 $b = 2a$; $b = 2 \cdot 9$; $b = 18$
 $c = b - 7$; $c = 18 - 7$; $c = 11$
- (c) Side a is 9 cm long, side b is 18 cm long, and side c is 11 cm long.