

FOUNDATION ALGEBRA RECAP



metatutor

1.

Simplify:

$$(a) x + x = 2x$$

$$(b) y \times y = y^2$$

$$(c) a + a + a + a = 4a$$

$$(d) b \times b \times b = b^3$$

$$(e) c + c + c + c + c = 5c$$

$$(f) d \times e = de$$

$$(g) 4 \times f \times g = 4fg$$

$$(h) 5 \times h \times h = 5h^2$$

$$(i) 7 \times y \times z = 7yz$$

2.

Simplify:

$$(a) x + y + x + y = 2x + 2y$$

$$(b) 2a + b + 2a + b = 4a + 2b$$

$$(c) 3c + 4d + c + 3d = 4c + 7d$$

$$(d) 4m - n + 2m - n = 6m - 2n$$

$$(e) 5p - 3q + p + 2q = 6p - q$$

$$(f) 6x - 5y - x + 2y = 5x - 3y$$

$$(g) 7a + b - 3a - 2b = 4a - b$$

$$(h) -2x + 3y + x - y = -x + 2y$$

$$(i) x^2 + x^2 = 2x^2$$

3.

Simplify:

$$(a) x^3 \times x^3 = x^6$$

$$(b) x^4 \times x^6 = x^{10}$$

$$(c) x^6 \times x = x^7$$

$$(d) x^{10} \div x^8 = x^2$$

$$(e) x^{12} \div x^6 = x^6$$

$$(f) x^8 \div x = x^7$$

$$(g) x^{10} \times x^4 = x^{14}$$

$$(h) x^{15} \div x^7 = x^8$$

4.

Simplify:

- (a) $3a \times 3a = 9a^2$
(b) $4b \times 5b = 20b^2$
(c) $6c^2 \times 3c^2 = 18c^4$
(d) $5d^5 \times 4d^4 = 20d^9$
(e) $8e^3 \times 4e = 32e^4$
(f) $7x^5 \times 5x^6 = 35x^{11}$
(g) $6y^7 \times 7y^6 = 42y^{13}$

5.

Expand:

- (a) $2(4x + 3) = 8x + 6$
(b) $3(5x - 2) = 15x - 6$
(c) $4(4x + 5) = 16x + 20$
(d) $x(x - 7) = x^2 - 7x$
(e) $x(x + 10) = x^2 + 10x$
(f) $2x(5x - 6) = 10x^2 - 12x$
(g) $5x(4x + 3) = 20x^2 + 15x$
(h) $8(3x + 4) = 24x + 32$
(i) $x(x - 11) = x^2 - 11x$
(j) $3x(6x - 7) = 18x^2 - 21x$

6.

Simplify:

- (a) $20x^6 \div 5x^2 = 4x^4$
(b) $18x^{10} \div 6x^7 = 3x^3$
(c) $16x^{11} \div 4x^4 = 4x^7$
(d) $24x^8 \div 8x = 3x^7$
(e) $\frac{32x^9}{4x^7} = 8x^2$
(f) $\frac{42x^{11}}{6x^8} = 7x^3$
(g) $\frac{36x^7}{9x} = 4x^6$
(h) $\frac{48x^{16}}{12x^{10}} = 4x^6$

7.

Factorise:

$$(a) 10x + 12 = 2(5x + 6)$$

$$(b) 9x - 12 = 3(3x - 4)$$

$$(c) 30x + 35 = 5(6x + 7)$$

$$(d) x^2 + 4x = x(x + 4)$$

$$(e) x^2 + 11x = x(x + 11)$$

$$(f) 2x^2 + 3x = x(2x + 3)$$

$$(g) 6x^2 - 10x = 2x(3x - 5)$$

$$(h) 12x^2 + 30x = 6x(2x + 5)$$

$$(i) 24x^2 - 9x = 3x(8x - 3)$$

$$(j) 20x + 28 = 4(5x + 7)$$

8.

Solve $2x + 11 = 23$

$$\begin{array}{r} -11 \qquad -11 \\ 2x = 12 \\ \div 2 \qquad \div 2 \\ x = 6 \end{array}$$

9.

Solve $3x - 10 = 14$

$$\begin{array}{r} +10 \qquad +10 \\ 3x = 24 \\ \div 3 \qquad \div 3 \\ x = 8 \end{array}$$

10.

Solve $5x + 13 = 48$

$$\begin{array}{r} -13 \qquad -13 \\ 5x = 35 \\ \div 5 \qquad \div 5 \\ x = 7 \end{array}$$

11.

Solve $6x - 7 = 29$

$$\begin{array}{r} +7 \qquad +7 \\ 6x = 36 \\ \div 6 \qquad \div 6 \\ x = 6 \end{array}$$

12.

Solve $7x + 6 = 5x + 18$

$$\begin{array}{r} -5x \qquad -5x \\ 2x + 6 = 18 \\ -6 \qquad -6 \\ \hline 2x = 12 \\ \div 2 \qquad \div 2 \\ x = 6 \end{array}$$

13.

Solve $8x + 3 = 4x + 35$

$$\begin{array}{r} -4x \qquad -4x \\ 4x + 3 = 35 \\ -3 \qquad -3 \\ \hline 4x = 32 \\ \div 4 \qquad \div 4 \\ x = 8 \end{array}$$

14.

Solve $9x - 10 = 6x + 5$

$$\begin{array}{r} -6x \qquad -6x \\ 3x - 10 = 5 \\ +10 \qquad +10 \\ \hline 3x = 15 \\ \div 3 \qquad \div 3 \\ x = 5 \end{array}$$

15.

Expand and simplify:

$$\begin{aligned} \text{(a) } (x + 2)(x + 3) &= x^2 + 2x + 3x + 6 \\ &= x^2 + 5x + 6 \end{aligned}$$

$$\begin{aligned} \text{(b) } (x + 4)(x + 5) &= x^2 + 4x + 5x + 20 \\ &= x^2 + 9x + 20 \end{aligned}$$

$$\begin{aligned} \text{(c) } (x - 3)(x + 6) &= x^2 - 3x + 6x - 18 \\ &= x^2 + 3x - 18 \end{aligned}$$

$$\begin{aligned} \text{(d) } (x - 5)(x + 2) &= x^2 - 5x + 2x - 10 \\ &= x^2 - 3x - 10 \end{aligned}$$

$$\begin{aligned} \text{(e) } (2x + 1)(x + 4) &= 2x^2 + x + 8x + 4 \\ &= 2x^2 + 9x + 4 \end{aligned}$$

16.

Factorise:

$$(a) x^2 + 7x + 6 = (x + 1)(x + 6)$$

$$(b) x^2 + 8x + 12 = (x + 6)(x + 2)$$

$$(c) x^2 + 10x + 16 = (x + 8)(x + 2)$$

$$(d) x^2 + 9x + 20 = (x + 4)(x + 5)$$

$$(e) x^2 - 2x - 8 = (x - 4)(x + 2)$$

$$(f) x^2 + 3x - 10 = (x + 5)(x - 2)$$

$$(g) x^2 - x - 12 = (x - 4)(x + 3)$$

$$(h) x^2 + 10x + 24 = (x + 6)(x + 4)$$

$$(i) x^2 - 7x - 18 = (x - 9)(x + 2)$$

17.

$$\text{Solve } 3(x + 6) = 33$$

$$\begin{array}{r} 3x + 18 = 33 \\ -18 \quad -18 \\ \hline 3x = 15 \\ \div 3 \quad \div 3 \\ \hline x = 5 \end{array}$$

18.

$$\text{Solve } 5(2x - 5) = 35$$

$$\begin{array}{r} 10x - 25 = 35 \\ +25 \quad +25 \\ \hline 10x = 60 \\ \div 10 \quad \div 10 \\ \hline x = 6 \end{array}$$

19.

Expand and simplify:

$$(a) 4(2x + 3) = 8x + 12$$

$$(b) x(x - 14) = x^2 - 14x$$

$$(c) 3x(5x - 6) = 15x^2 - 18x$$

$$(d) (x + 5)(x - 4) = x^2 + 5x - 4x - 20 \\ = x^2 + x - 20$$

$$(e) 5x(5x + 9) = 25x^2 + 45x$$

$$(f) (x + 2)(x - 6) = x^2 + 2x - 6x - 12 \\ = x^2 - 4x - 12$$

$$(g) (3x - 1)(x + 3) = 3x^2 - x + 9x - 3 \\ = 3x^2 + 8x - 3$$

$$(h) 8(3x + 5) = 24x + 40$$

$$(i) (2x + 3)(x - 5) = 2x^2 + 3x - 10x - 15 \\ = 2x^2 - 7x - 15$$

$$(j) (x - 4)(x - 1) = x^2 - 4x - x + 4 \\ = x^2 - 5x + 4$$

$$(k) 5x(10 - 3x) = 50x - 15x^2$$

$$(l) (2x + 3)(2x + 5) = 4x^2 + 6x + 10x + 15 \\ = 4x^2 + 16x + 15$$

$$(m) (4x - 1)(x - 4) = 4x^2 - x - 16x + 4 \\ = 4x^2 - 17x + 4$$

20.

Factorise:

$$(a) 10x + 16 = 2(5x + 8)$$

$$(b) x^2 + 10x = x(x + 10)$$

$$(c) x^2 + 13x + 12 = (x + 1)(x + 12)$$

$$(d) 12x^2 - 18x = 6x(2x - 3)$$

$$(e) x^2 + x - 20 = (x + 5)(x - 4)$$

$$(f) 15x + 35 = 5(3x + 7)$$

$$(g) x^2 + 11x + 24 = (x + 8)(x + 3)$$

$$(h) x^2 + 5x - 14 = (x + 7)(x - 2)$$

$$(i) 20x^2 - 28x = 4x(5x - 7)$$

$$(j) 30x + 50 = 10(3x + 5)$$

$$(k) x^2 + 7x - 30 = (x + 10)(x - 3)$$

$$(l) x^2 + 12x = x(x + 12)$$

$$(m) x^2 - 8x + 16 = (x - 4)(x - 4)$$

21.

Expand and simplify:

$$\begin{aligned} \text{(a) } 2(3x + 4) + 5(2x + 5) &= 6x + 8 + 10x + 25 \\ &= 16x + 33 \end{aligned}$$

$$\begin{aligned} \text{(b) } 6(x + 3) + 3(5x - 1) &= 6x + 18 + 15x - 3 \\ &= 21x + 15 \end{aligned}$$

$$\begin{aligned} \text{(c) } 2x(4x + 3) + x(x - 10) &= 8x^2 + 6x + x^2 - 10x \\ &= 9x^2 - 4x \end{aligned}$$

$$\begin{aligned} \text{(d) } 3x(x + 5) - 4(2x + 3) &= 3x^2 + 15x - 8x - 12 \\ &= 3x^2 + 7x - 12 \end{aligned}$$

$$\begin{aligned} \text{(e) } 3x(2x + 7) - x(3x - 2) &= 6x^2 + 21x - 3x^2 + 2x \\ &= 3x^2 + 23x \end{aligned}$$

22.

$$\text{(a) Solve } \frac{x}{6} = 3 \quad x = 18$$

$$\begin{aligned} \text{(b) Solve } \frac{x+1}{4} = 6 & \quad x+1 = 24 \\ -1 & \quad -1 \\ x = 23 & \end{aligned}$$

$$\begin{aligned} \text{(c) Solve } \frac{2x-5}{3} = 5 & \quad 2x-5 = 15 \\ +5 & \quad +5 \\ 2x = 20 & \\ \div 2 & \quad \div 2 \\ x = 10 & \end{aligned}$$

23.

(a) Simplify $\frac{16a^6b^7}{4a^5b} = 4ab^6$

(b) Expand $4x(5x - 6) = 20x^2 - 24x$

(c) Factorise $8x^2 + 12x = 4x(2x + 3)$

(d) Solve $4x + 23 = 67$

$$\begin{array}{r} -23 \\ 4x + 23 = 67 \\ \hline 4x = 44 \\ \div 4 \quad \div 4 \end{array} \quad x = 11$$

24.

(a) Simplify $4a^5b^2 \times 5ab = 20a^6b^3$

(b) Expand $(2x + 3)(x - 4) = 2x^2 + 3x - 8x - 12$
 $= 2x^2 - 5x - 12$

(c) Factorise $20x - 35 = 5(4x - 7)$

(d) Solve $6x + 17 = 5$

$$\begin{array}{r} -17 \\ 6x + 17 = 5 \\ \hline 6x = -12 \\ \div 6 \end{array} \quad x = -2$$

25.

(a) Simplify $\frac{x^6 \times x^7}{x^{11}} = \frac{x^{13}}{x^{11}} = x^2$

(b) Expand and simplify $5x(2x - 1) - x(x - 12) = 10x^2 - 5x - x^2 + 12x$
 $= 9x^2 + 7x$

(c) Factorise $x^2 - 6x - 16 = (x - 8)(x + 2)$

(d) Solve $11x - 14 = 7x - 46$

$$\begin{array}{r} -7x \\ 11x - 14 = 7x - 46 \\ \hline 4x - 14 = -46 \\ +14 \quad +14 \end{array} \quad x = -8$$

$$\begin{array}{r} 4x - 14 = -46 \\ \hline 4x = -32 \\ \div 4 \quad \div 4 \end{array}$$

26.

(a) Simplify $4x - 2y + x - 5y = 5x - 7y$

(b) Expand and simplify $(3x - 1)(x - 4) = 3x^2 - x - 12x + 4$
 $= 3x^2 - 13x + 4$

(c) Factorise $14ab - 18a^2 = 2a(7b - 9a)$

(d) Solve $21 - 4x = 5$

$$\begin{array}{r} -21 \quad -21 \\ -4x = -16 \quad x = 4 \\ \div -4 \quad \div -4 \end{array}$$

27.

(a) Simplify $\frac{32a^{10}b^9}{8a^7b^6} = 4a^3b^3$

(b) Expand and simplify $(x + 3)(5 - x) = 5x + 15 - 3x - x^2$
 $= 2x + 15 - x^2$

(c) Factorise $24c^2d + 32c^3d = 8c^2d(3 + 4c)$

(d) Solve $9x - 20 = -2$

$$\begin{array}{r} +20 \quad +20 \\ 9x = 18 \quad x = 2 \\ \div 9 \quad \div 9 \end{array}$$

28.

(a) Simplify $(x^3)^4 = x^{12}$

(b) Expand $(x + 2)^2 = x^2 + 4x + 4$

(c) Factorise $x^2 - 12x + 35 = (x - 7)(x - 5)$

(d) Solve $6(3x + 7) = 24$

$$\begin{array}{r} 18x + 42 = 24 \\ -42 \quad -42 \\ 18x = -18 \\ \div 18 \quad \div 18 \\ x = -1 \end{array}$$