

1. Write down algebraic expression for the following:
  - (a) Twice the sum of  $x$  and  $y$ .
  - (b) The total cost of  $b$  books at  $x$  dollars each and 3 books at  $y$  dollars each.
  - (c) The next even number after the even number  $b$ .
2. Evaluate these expressions if  $a = -2$ ,  $b = \frac{2}{3}$  and  $c = 11$ :
  - (a)  $a + c$ ,
  - (b)  $a^2 + c^2$ ,
  - (c)  $\frac{1}{c} - \frac{1}{a}$ ,
  - (d)  $\frac{c}{a} \times b$ .
3. Expand and simplify these expressions:
  - (a)  $3x(4x - 5)$ ,
  - (b)  $x(2x + 3) - x$ ,
  - (c)  $7(x - 3) + 3(5 - 2x)$ ,
  - (d)  $(x + 7)(x - 7)$ ,
  - (e)  $(3x + 4)^2$ ,
  - (f)  $(2x - 5)^2 - (2x + 5)^2$ ,
  - (g)  $(2x - 5)(3x + 7)$ ,
  - (h)  $(5a - 3b)(5a + 3b)$ .
4. Simplify these fractions:
  - (a)  $\frac{3a}{5} + \frac{2a}{10}$ ,
  - (c)  $\frac{6ac}{5b} \times \frac{15b}{2a}$ ,
  - (b)  $\frac{4}{9x} - \frac{1}{6x}$ ,
  - (d)  $\frac{abc^2}{2} \div \frac{ab}{6}$ .
5. (a) Simplify:
  - (i)  $\frac{x-2}{x} \cdot \frac{(x-2)(x+2)}{x(x+2)}$ ,
  - (ii)  $\frac{x+1}{x(x-1)} - \frac{3-x}{(x-1)(x+3)}$ .
6. (a) Expand and simplify  $(3x - 2)(2x - 3) - (2x + 3)(2x - 3)$ .  
(b) Expand and simplify  $(x - 4)^2 + (x - 2)^2 + x^2 + (x + 2)^2 + (x + 4)^2$ .  
(c) Expand and simplify  $3x^2 - (x - 4)[3(x - 5) - 4(2 + x)]$ .  
(d) Simplify  $\frac{x}{2} \times \frac{2^2}{x^2} \times \frac{x^3}{2^3} \times \frac{2^4}{x^4} \times \frac{x^5}{2^5} \times \frac{2^6}{x^6} \times \frac{x^7}{2^7} \times \frac{2^8}{x^8}$ .

1. (a) Twice the sum of  $x$  and  $y$  is  $2(x + y)$  (or  $2x + 2y$ ).  
 (b) The total cost of  $b$  books at  $x$  dollars each and 3 books at  $y$  dollars each is  $bx + 3y$  dollars.  
 (c) The next even number after the even number  $b$  is  $b + 2$ .

2. If  $a = -2$ ,  $b = \frac{2}{3}$  and  $c = 11$ :

$$(a) \quad a + c = -2 + 11 \\ = 9.$$

$$(b) \quad a^2 + c^2 = (-2)^2 + 11^2 \\ = 4 + 121 \\ = 125.$$

$$(c) \quad \frac{1}{c} - \frac{1}{a} = \frac{1}{11} - \frac{1}{-2} \\ = \frac{2}{22} + \frac{11}{22} \\ = \frac{13}{22}.$$

$$(d) \quad \frac{c}{a} \times b = \frac{11}{-2} \times \frac{2}{3} \\ = -\frac{11}{3} \quad (\text{or } -3\frac{2}{3}).$$

3. (a)  $3x(4x - 5) = 12x^2 - 15x$ .

$$(b) \quad x(2x + 3) - x = 2x^2 + 3x - x \\ = 2x^2 + 2x.$$

$$(c) \quad 7(x - 3) + 3(5 - 2x) = 7x - 21 + 15 - 6x \\ = x - 6.$$

$$(d) \quad (x + 7)(x - 7) = x^2 - 49.$$

$$(e) \quad (3x + 4)^2 = 9x^2 + 24x + 16.$$

$$(f) \quad (2x - 5)^2 - (2x + 5)^2 = 4x^2 - 20x + 25 - (4x^2 + 20x + 25) \\ = 4x^2 - 20x + 25 - 4x^2 - 20x - 25 \\ = -40x$$

$$(g) \quad (2x - 5)(3x + 7) = 6x^2 + 14x - 15x - 35 \\ = 6x^2 - x - 35.$$

$$(h) \quad (5a - 3b)(5a + 3b) = 25a^2 - 9b^2.$$

$$4. (a) \quad \frac{3a}{5} + \frac{2a}{10} = \frac{3a}{5} + \frac{a}{5} \\ = \frac{4a}{5}.$$

$$(b) \quad \frac{4}{9x} - \frac{1}{6x} = \frac{8}{18x} - \frac{3}{18x} \\ = \frac{5}{18x}.$$

$$(c) \quad \frac{6ac}{5b} \times \frac{15b}{2a} = 9c.$$

$$(d) \quad \frac{abc^2}{2} \div \frac{ab}{6} = \frac{abc^2}{2} \times \frac{6}{ab} \\ = 3c^2.$$