Algebra Skills

LLE – Mathematics and Statistics

Expanding Brackets

1. For each of the following, expand and simplify

   (a) $5(4x + 3)$

   (b) $2x(3 + 4y)$

   (c) $5(2x + 1) + x(3x - 2)$

   (d) $x(4x + y) + y(3x - 1)$

   (e) $(x + 5)(x + 2)$

   (f) $(3x - 4)(2x + 1)$

Solving Linear Equations

2. For each equations below, solve for x

   (a) $4x - 1 = 21$

   (b) $18 - 7x = 4$

   (c) $5(2x - 3) = 11$

   (d) $5x - 3 = 3x + 7$

   (e) $9x + 7 = 5x - 9$

   (f) $\frac{10}{x+1} = 4$

Rearranging Expressions

3. Make the variable in the square brackets the subject of the formula

(a) $[x]$ $y = 3x + 5$

(b) $[t]$ $4t - 8s = 20$

(c) $[Q]$ $P = 4Q + 3$

(d) $[Q]$ $P = 20 - 2Q$

(e) $[P]$ $\frac{P+Q}{5} = 2$

(f) $[Q]$ $5(Q - 3) = 10P$

(g) $[T]$ $MV = PT$

(h) $[L]$ $Q = 0.25L^2K^3$

(i) $[M]$ $S = \frac{1}{1-M}$

(j) $[x]$ $z = \frac{x-\mu}{\sigma}$

(k) $[\mu]$ $z = \frac{x-\mu}{\sigma}$

(l) $[E(X)]$ $Var(X) = E(X^2) - (E(X))^2$

(m) $[P(A \cap B)]$ $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

(n) $[P(B)]$ $P(A|B) = \frac{P(A \cap B)}{P(B)}$

Laws of Indices

4. Use the laws of indices to simplify the following expressions

(a) x^5x^{10}

(b) $\frac{t \cdot t^9}{t^6}$

(c) $(xy^2)^5$

(d) y^4tyt^{-5}

(e) $xy^2\sqrt{xy}$

(f) $\frac{xy^2}{\sqrt{xy}}$

(g) $\frac{a^4b^{-4}a^8}{(a^{-3}b)^{-4}}$

Factorising

5. Fully factorise the following expressions

   (a) $10t + 25$

   (b) $8x - 32y$

   (c) $7pt + 12pk$

   (d) $5y^4 - 8xy^2$

   (e) $12xy^3 + 30x^3y^3$

   (f) $9a^2b + 27a^3b^2$

   (g) $16ab^2c - 4a^2b^2c^3 + 12a^5b^2c^4$

6. Use factorising to simplify these algebraic fractions

   (a) $\frac{5x+20}{10}$

   (b) $\frac{12y-30}{2y-5}$

   (c) $\frac{8t+40}{6t+30}$

   (d) $\frac{8x^3-8x^2}{16x-16}$

   (e) $\frac{10a^2b}{a^2b-ab}$

Algebraic Fractions

7. Simplify the following algebraic fractions

   (a) $\frac{x}{5} + \frac{2x}{5}$

   (b) $\frac{5}{x} + \frac{2}{x}$

   (c) $\frac{10}{x} - \frac{5}{2x}$

   (d) $\frac{2}{x} + \frac{1}{y}$

   (e) $\frac{2a}{b} \times \frac{3c}{5d}$

(f) $\frac{5m}{2p} \times \frac{4m}{3k}$

(g) $\frac{8t}{5k} \times \frac{10k}{5t^2}$

(h) $\frac{8x}{3} \div \frac{2y}{5x}$

(i) $\frac{x+1}{5} \div \frac{2x+2}{3}$

(j) $\frac{5}{x}\left(\frac{x^2}{4} + \frac{x}{5}\right)$