Section 1: Basic algebra and simple linear equations

Exercise

1. Work out:
   (i) $3\frac{3}{4} - 2\frac{2}{3}$ (ii) $1\frac{2}{5} \times 2\frac{1}{3}$ (iii) $3\frac{3}{5} \div 2\frac{2}{3}$

2. Three quantities x, y and z are such that $x : y = 2 : 5$ and $y : z = 3 : 4$.
   Express the following ratios in their simplest form.
   (i) $x : z$ (ii) $2y : 5z$ (iii) $x + 2y : y$

3. $x : y = y : 4$
   Find a possible pair of positive whole number values of x and y for each of the following possibilities.
   (a) $x = y$ (b) $x > y$ (c) $y > x$.

4. (i) A laptop is priced at £230 plus VAT at 20%. What is the full price of the laptop including VAT?
   (ii) A sofa is reduced from £800 to £680. By what percentage has the price of the sofa been reduced?

5. Simplify the following expressions:
   (i) $2x + 3y - x + 5y + 4x$
   (ii) $5a - 2b + 3c - 2a + 5b$
   (iii) $4p + q - 6p - 5q + 5p + 4q$

6. Multiply out the brackets and simplify where possible:
   (i) $3(2x + 3y)$
   (ii) $4(3a - 2b) - 3(a + 2b)$
   (iii) $p(2p - q) + 2q(p - 3q)$

7. Multiply out these expressions.
   (i) $(x + 1)(x - 3)$ (ii) $(x + 2)(2x + 1)$
   (iii) $(x - 3)(x - 4)$ (iv) $(3x + 2)(x - 2)$
   (v) $(2x + 1)(4x - 1)$ (vi) $(1 - 2x)(1 + x)$
   (vii) $(3 + 2x)(x - 1)$ (viii) $(5x - 3)(2x + 5)$
   (ix) $(x + 3)^2$

8. Expand the brackets and simplify the following as far as possible:
   (i) $(x-2)(2x^2-3x+1)$
   (ii) $(3x-2)(x^3-2x+4)$
   (iii) $(2x+1)(x^3+2x^2-3x-5)$
   (iv) $(x+3)(2x-1)(x-4)$
   (v) $(2x - 1)^3$

9. Solve the following equations:
   (i) $2x - 3 = 8$ (ii) $3y + 2 = y - 5$
   (iii) $3 - 2a = 3a - 1$ (iv) $3(p - 3) = 2(2p + 1)$

(v) $2(1 - z) + 3(z + 3) = 4z + 1$ (vi) $\frac{2b+1}{5} = \frac{3-b}{4}$

10. The largest angle of a triangle is three times as big as the smallest angle.
The third angle is 20° greater than the smallest angle.
Find all three angles of the triangle.

11. In a restaurant, there are 24 tables, some of which seat four people, and the rest seat 6 people. The restaurant can hold 114 people altogether.
How many tables seat four people?

12. Lien is doing a Statistics project on the heights of students in her class.
She has written:
Mean height of boys = 165 cm
Mean height of girls = 159 cm
Mean height of whole class = 162.2 cm
There are 30 students in Lien's class.
How many boys and how many girls are there?