

# Introduction to Algebra

## Problem Set 2

1. Simplify:

(a)  $5x - 3y - 6x + 2y$

(b)  $4a - (-3a) + 2ab$

(c)  $6x \times -3x \times 2x$

(d)  $-6xy \times -4yz$

(e)  $\frac{x}{2} \times 2x^2$

(f)  $\sqrt{3}x \times \sqrt{3}xyz$

2. Expand and Simplify:

(a)  $2x - (7x + 3)$

(b)  $2(x + y) - 2(x - y)$

(c)  $(x - y)(x + y - 2)$

(d)  $(x - 5)(2x + 6)$

(e)  $(3x + 4)(2x - 7)$

(f)  $(2x - 5)^2$

3. Solve the following equations.

(a)  $3 - 5x = 22$

(b)  $6x - 2 = 7 - 3x$

(c)  $8 - x = 3 - 6x$

(d)  $7(2x - 1) = 42$

(e)  $2(3x - 4) = 3(4x - 3)$

(f)  $3(2x + 5) = 5(x + 2)$

(g)  $\frac{x}{7} - 4 = 6$

(h)  $\frac{x + 3}{5} = 2$

(i)  $\frac{3x + 2}{4} = 5$

(j)  $\frac{x + 1}{3} = \frac{x - 2}{2}$

(k)  $\frac{x + 4}{10} = \frac{x - 3}{15}$

4. The relationship between Fahrenheit(F) and Celcius(C) is given by the formula  $C = \frac{5}{9}(F - 32)$ . Find the temperature in Fahrenheit when it is 45 degrees C.

5. A car rental charges \$45 per day, and 20c per kilometre after the first 100 kilometres. If the bill for the day was \$67, how far has the car driven?

6. The power P from a windmill is proportional to the cube of the wind speed, s.

(a) Write down an equation to represent this relationship.

(b) If 96 Watts are produced at a wind speed of 32 kilometres per hour, calculate the constant of proportionality.

(c) How much power is produced when the wind speed is 48 kilometres per hour?

7. A drink manufacturer sells an orange juice as "naturally flavoured" - with orange juice content of 5%. New laws stipulate that for this advertising tag to be used, a minimum juice content must be 10%. How much pure orange juice must be added to a 400L container to satisfy the new law?

8. Simplify

$$(a) \frac{x^2 - 2x}{x - 2}$$

$$(b) \frac{x^2 - 2x}{x - 2} \times \frac{3}{x}$$

$$(c) \frac{x^2 + 6x}{x} \times \frac{x^2}{x + 6}$$

$$(d) \frac{5xy - 15y}{6y^2} \times \frac{x + y}{4x - 12}$$

$$(e) \frac{x^2 - 5x}{2x + 10} \times \frac{3x + 15}{4x}$$

$$(f) \frac{x^2 + 2x}{5} \div \frac{2x + 4}{20}$$

$$(g) \frac{\frac{8x + 24}{9}}{\frac{4x + 12}{12x + 12}}$$

9. Write as a single fraction

$$(a) \frac{x + 1}{3} + \frac{y}{2}$$

$$(b) \frac{x + 1}{3y} - \frac{4}{3x}$$

$$(c) \frac{4}{3x} - \frac{x}{x + 2}$$

$$(d) \frac{4}{x^2 + 2x} - \frac{x}{x - 2}$$

$$(e) \frac{p}{p - q} + \frac{q}{q - p}$$

$$(f) \frac{1 + x^{-1}}{1 - x^{-1}}$$

10. Solve

$$(a) \frac{x - 2}{3} - \frac{4x - 1}{5} = 2$$

$$(b) \frac{1}{x} = \frac{4}{3x} + 1$$

$$(c) \frac{2x - 7}{2x + 4} = \frac{2}{3}$$

11. Solve for x in terms of y

$$(a) \frac{1 + 3xy}{4y} = x + 1$$

$$(b) \frac{3 + x}{4y^2} = \frac{2x + 1}{3y}$$

12. Solve

$$(a) x^2 = 25$$

$$(b) x^2 = 7$$

$$(c) (x - 1)^2 = 49$$

13. Solve for r if  $F = G \frac{m_1 m_2}{r^2}$

---

Ans:1a)  $-x - y$ , b)  $7a + 2ab$ , c)  $-36x^3$ , d)  $24xy^2z$ , e)  $x^3$ , f)  $3x^2yz$ , 2a)  $-5x - 3$ , b)  $4y$ , c)  $x^2 - y^2 - 2x + 2y$ ,  
d)  $2x^2 - 4x - 30$ , e)  $6x^2 - 13x - 28$ , f)  $4x^2 - 20x + 25$ , 3a)  $-\frac{19}{5}$ , b)  $1$ , c)  $-1$ , d)  $\frac{7}{2}$ , e)  $\frac{1}{6}$ , f)  $-5$ , g)  $70$ , h)  $7$ , i)  $6$ , j)  $8$ ,  
k)  $-18$