

# SHARP

## Worksheet 9 Memorandum: Algebraic Equations Term 1

### Grade 9 Mathematics

1. Please note that students might write the equations slightly differently, however, the final answers should be the same. If they are not, either the initial equation is not correct, or the working out of the equation was not done correctly.

- a) let George =  $x$  then Sarah =  $4x$
- $$\therefore x + 4x = 25$$
- $$\therefore 5x = 25$$
- $$\therefore \frac{5x}{5} = \frac{25}{5}$$
- $$\therefore x = 5$$
- b)  $\frac{x}{8} = 3$
- $$\therefore \frac{x}{8} \times 8 = 3 \times 8$$
- $$\therefore x = 24$$
- c)  $73 = b + 31$
- $$\therefore 73 - 31 = b + 31 - 31$$
- $$\therefore 42 = b$$
- d)  $5x = 60$
- $$\therefore \frac{5x}{5} = \frac{60}{5}$$
- $$\therefore x = 12$$
- e)  $x + \frac{2}{3}x = 600$
- $$\therefore \frac{5}{3}x = 600$$
- $$\therefore \frac{5}{3}x \times 3 = 600 \times 3$$
- $$\therefore 5x = 1800$$
- $$\therefore \frac{5x}{5} = \frac{1800}{5}$$
- $$\therefore x = 360$$
- f)  $\frac{42}{x} = 3$
- $$\therefore \frac{42}{x} \times x = 3 \times x$$
- $$\therefore 42 = 3x$$
- $$\therefore \frac{42}{3} = \frac{3x}{3}$$
- $$\therefore 14 = x$$



$$g) \quad 36 + x + \frac{3}{4}x = 120$$

$$\therefore 36 - 36 + \frac{7}{4}x = 120 - 36$$

$$\therefore \frac{7}{4}x \times 4 = 84 \times 4$$

$$\therefore \frac{7x}{7} = \frac{336}{7}$$

$$\therefore x = 48$$

$$h) \quad 8x - 5 = 995$$

$$\therefore 8x - 5 + 5 = 995 + 5$$

$$\therefore 8x = 1000$$

$$\therefore \frac{8x}{8} = \frac{1000}{8}$$

$$\therefore x = 125$$

$$i) \quad \text{Let boys} = x \quad \text{and girls} = 3x$$

$$\therefore x + 3x = 32$$

$$\therefore 4x = 32$$

$$\therefore \frac{4x}{4} = \frac{32}{4}$$

$$\therefore x = 8$$

$$j) \quad \frac{x}{25} = 5$$

$$\therefore \frac{x}{25} \times 25 = 5 \times 25$$

$$\therefore x = 125$$

$$2. \quad a) \quad 3x + 7 = 19$$

$$3x + 7 - 7 = 19 - 7$$

$$3x = 12$$

$$\frac{3x}{3} = \frac{12}{3}$$

$$x = 4$$

$$b) \quad \frac{45}{x} + 2 = 11$$

$$\frac{45}{x} + 2 - 2 = 11 - 2$$

$$\frac{45}{x} = 9$$

$$\frac{45}{x} \times x = 9 \times x$$

$$45 = 9x$$

$$\frac{45}{9} = \frac{9x}{9}$$

$$5 = x$$

$$c) \quad \frac{x}{4} - 5 = 0$$

$$\frac{x}{4} - 5 + 5 = 0 + 5$$

$$\frac{x}{4} = 5$$

$$\frac{x}{4} \times 4 = 5 \times 4$$

$$x = 20$$

$$d) \quad 48 - 3x = 84$$

$$48 - 3x - 48 = 84 - 48$$

$$-3x = 36$$

$$-\frac{3x}{-3} = \frac{36}{-3}$$

$$x = -12$$



$$e) \quad \frac{72}{x} - 12 = 4$$

$$\frac{72}{x} - 12 + 12 = 4 + 12$$

$$\frac{72}{x} = 16$$

$$\frac{72}{x} \times x = 16 \times x$$

$$72 = 16x$$

$$\frac{72}{16} = \frac{16x}{16}$$

$$4\frac{1}{2} = x$$

$$g) \quad 7x - 10 = 3(2x + 12)$$

$$7x - 10 = 6x + 36$$

$$7x - 10 + 10 = 6x + 36 + 10$$

$$7x = 6x + 46$$

$$7x - 6x = 6x - 6x + 46$$

$$x = 46$$

$$i) \quad 3(2 - x) + 4 = 5(x - 7)$$

$$6 - 3x + 4 = 5x - 35$$

$$10 - 3x = 5x - 35$$

$$10 - 3x - 5x - 10 = 5x - 35 - 10 - 5x$$

$$-8x = -45$$

$$-\frac{8x}{-8} = \frac{-45}{-8}$$

$$x = 5\frac{5}{8}$$

$$f) \quad 5(x + 3) = 15$$

$$5x + 15 = 15$$

$$5x + 15 - 15 = 15 - 15$$

$$5x = 0$$

$$\therefore x = 0$$

$$h) \quad \frac{2}{3}x - 4 = 2(x - 3)$$

$$\frac{2}{3}x - 4 = 2x - 6$$

$$\frac{2}{3}x - 4 + 4 = 2x - 6 + 4$$

$$\frac{2}{3}x = 2x - 2$$

$$\frac{2}{3}x - 2x = 2x - 2x - 2$$

$$-1\frac{1}{3}x = -2$$

$$-1\frac{1}{3}x \div -1\frac{1}{3} = -2 \div -1\frac{1}{3}$$

$$x = 1\frac{1}{2}$$

$$j) \quad \frac{x}{-5} + 7 = 1$$

$$\frac{x}{-5} + 7 - 7 = 1 - 7$$

$$\frac{x}{-5} = -6$$

$$\frac{x}{-5} \times -5 = -6 \times -5$$

$$x = 30$$



$$\text{k) } \frac{48}{x} + 10 = 4$$

$$\frac{48}{x} + 10 - 10 = 4 - 10$$

$$\frac{48}{x} = -6$$

$$\frac{48}{x} \times x = -6 \times x$$

$$48 = -6x$$

$$\frac{48}{-6} = \frac{-6x}{-6}$$

$$-8 = x$$

$$\text{m) } \frac{4x+7}{5} = 2$$

$$\frac{4x+7}{5} \times 5 = 2 \times 5$$

$$4x + 7 = 10$$

$$4x + 7 - 7 = 10 - 7$$

$$4x = 3$$

$$\frac{4x}{4} = \frac{3}{4}$$

$$x = \frac{3}{4}$$

$$\text{o) } 7(x - 3) + 4 = 5(3 - x)$$

$$7x - 21 + 4 = 15 - 5x$$

$$7x + 5x = 15 + 21 - 4$$

$$12x = 32$$

$$\frac{12x}{12} = \frac{32}{12}$$

$$x = 2\frac{2}{3}$$

$$\text{l) } 5(x + 2) = 3(7 - 2x)$$

$$5x + 10 = 21 - 6x$$

$$5x + 10 - 10 + 6x = 21 - 6x - 10$$

$$11x = 11$$

$$\frac{11x}{11} = \frac{11}{11}$$

$$x = 1$$

$$\text{n) } \frac{91}{x+1} - 2 = 5$$

$$\frac{91}{x+1} - 2 + 2 = 5 + 2$$

$$\frac{91}{x+1} = 7$$

$$\frac{91}{x+1} \times (x+1) = 7(x+1)$$

$$91 = 7x + 7$$

$$91 - 7 = 7x$$

$$84 = 7x$$

$$\frac{84}{7} = \frac{7x}{7}$$

$$12 = x$$

$$\text{p) } x^3 + 1 = 9$$

$$x^3 + 1 - 1 = 9 - 1$$

$$x^3 = 8$$

$$x = \sqrt[3]{8}$$

$$x = 2$$



q)  $5^x - 1 = 124$

$$5^x - 1 + 1 = 124 + 1$$

$$5^x = 125$$

$$5^x = (5)^3$$

$$x = 3$$

r)  $\frac{1}{2}x + \frac{2}{3}x = 4$

$$\frac{7}{6}x = 4$$

$$\frac{7}{6}x \div \frac{7}{6} = 4 \div \frac{7}{6}$$

$$x = 3\frac{3}{7}$$

s)\*  $ax + b = c$

$$ax + b - b = c - b$$

$$ax = c - b$$

$$\frac{ax}{a} = \frac{c-b}{a}$$

$$x = \frac{c-b}{a}$$

t)  $120 = 4\pi x^2$

$$\frac{120}{4\pi} = \frac{4\pi x^2}{4\pi}$$

$$\frac{30}{\pi} = x^2$$

$$x = \sqrt{\frac{30}{\pi}}$$

$$x \approx 3.09$$

3. a) Let cost for movie ticket be =  $x$

$$\therefore \text{cost of children under 12} = \frac{1}{2}x$$

$$\therefore 4x + 6\left(\frac{1}{2}x\right) = 224$$

$$\therefore 4x + 3x = 224$$

$$\therefore 7x = 224$$

$$\therefore \frac{7x}{7} = \frac{224}{7}$$

$$\therefore x = 32$$

$\therefore$  Each ticket for Thabang and her friends costs R32

b)  $Area = l^2$

$$\therefore 36 = l^2$$

$$\therefore l = \sqrt{36}$$

$$\therefore l = 6$$

$$Perimeter = 4l$$

$$\therefore P = 4(6)$$

$$\therefore P = 24cm$$



c)  $Volume = lbh$

$$\therefore 252 = 7 \times 9 \times x$$

$$\therefore 252 = 63x$$

$$\therefore \frac{252}{63} = \frac{63x}{63}$$

$$\therefore x = 4cm$$

d)  $Speed = \frac{distance}{time}$

$$\therefore Speed = \frac{15+15}{45+20}$$

$$\therefore Speed = \frac{30}{65min} \quad \text{But } 65 \text{ min} = 1 \frac{1}{12} \text{ hr}$$

$$\therefore Speed = \frac{30}{1 \frac{1}{12}}$$

$$\therefore \text{Average Speed} = 27.69km/h$$

e)  $3x + 4x + 15^\circ + 2x - 30^\circ = 180^\circ$

$$\therefore 9x - 15^\circ = 180^\circ$$

$$\therefore 9x - 15^\circ + 15^\circ = 180^\circ + 15^\circ$$

$$\therefore 9x = 195^\circ$$

$$\therefore \frac{9x}{9} = \frac{195^\circ}{9}$$

$$\therefore x = 21 \frac{2}{3}^\circ \text{ or } 21.67^\circ$$

