

# SHARP

## Worksheet 8: Solving Equations

### Grade 10 Technical Mathematics

1. Solve the following linear equations for the unknown:

a)  $3x + 7 = 12$

b)  $3(x + 7) - 4 = 2(x - 2)$

c)  $\frac{4}{x} + 2 = 8$

d)  $m(m + 3) - 7 = m^2 + 2m - 1$

e)  $\frac{p+3}{5} - 8 = 1$

f)  $\frac{1}{2}(q + 3) - 4 = \frac{1}{4}(q - 3)$

g)  $\frac{y}{3} + \frac{y+1}{2} = 7$

h)  $\frac{1}{x} + 8 = 3$

i)  $t(t + 4) - 5t = t(6 + t) - 8$

j)  $(m + 3)(m - 6) = (m - 4)(m - 7)$

2. Solve the following equations for the unknown:

a)  $\frac{y+4}{3} - \frac{2y-3}{5} = \frac{y}{15}$

b)  $\frac{3y+1}{4} - \frac{\frac{3}{4}y^2-1}{y} = 7$

c)  $\frac{(y+3)(y-9)}{y+1} = \frac{3y-7}{3}$

d)  $\frac{m-9}{m+3} - \frac{2m+8}{m-5} + 1 = 0$

e)  $\frac{2a-7}{b} - \frac{3a-4}{4} = 7b$  solve for a in terms of b.

3. Solve the following equations for the unknown:

a)  $x^2 + 14x - 240 = 0$

b)  $x^2 - 7x + 10 = 0$

c)  $x(x + 7) = -4(2x + 11)$

d)  $m^2 - 19 = 5(m + 1)$

e)  $(p + 6)(p + 1) = 24$

f)  $m(m + 4) = 4(m + 4)$

g)  $t(t - 15) = 12\left(t - 10\frac{1}{2}\right)$

h)  $(w - 7)(w + 7) = 3(5 - 4w)$

i)  $(y - 3)(y - 15) = -20$

j)  $(a + 3)(a + 1) = 2(69 - a)$



4. Solve for the two unknown values in each of the following simultaneous equations:

a)  $y = 3x - 5$                       and     $x = 5y - 3$

b)  $0 = 2x + 7y$                       and     $8 = 2x - y$

c)  $\frac{m+n}{3} = 4$                               and     $3m - 2n = 8$

d)  $-\frac{1}{3}m - 2n = 5$                       and     $-\frac{1}{2}n + 2m + 3 = 0$

e)  $2a + 8b = \frac{1}{3}$                               and     $\frac{1}{4}(a + 12b) = -3$

5. Solve for the given unknown:

a) In  $v = u + at$     find  $a$

b) In  $s = \frac{1}{2}(u + v)t$     find  $u$

c) In  $d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$     find  $x_1$

d) In  $S_n = \frac{n}{2}[2a + (n - 1)d]$     find  $a$

e) In  $(x - a)^2 + (y - b)^2 = r^2$     find  $b$

6. Solve for the unknown in the following equations:

a)  $x + 3 = 2^3$

b)  $3^x + 6 = 87$

c)  $m^3 - 2 = 341$

d)  $8^n + 2 = 6$

e)  $p^3 - 7 = 118$

f)  $\frac{q^4}{3} = 27$

g)  $7^r = 1$

h)  $6^t + 2 = 38$

i)  $4^v = \frac{1}{2}$

j)  $w^{-3} = \frac{1}{125}$

7. Solve the following word problems for the unknown given:

- a) Two trains are travelling towards each other. The first train is travelling at a speed of 100km/h and is 68km from the train station. The second train is travelling at a speed of 120km/h and is 30km from the train station on a parallel track. When will the trains pass each other?



- b) Amy's money doubles every three years. How long will it take for Amy to grow her money to 16 times the amount it is now?
- c) A ball is thrown in the shape of a curve, with the formula  $h = d^2 - 15d + 54$ , where  $h$  is the height of the ball and  $d$  is the distance from a tree. How far is the ball thrown from the tree (if it is launched from the ground) and where does it land? Assume that the ball starts closer to the tree.
- d) Sipho hires a tuxedo for his matric dance. The tuxedo has a flat hire rate of R50 plus an additional R30 per day until the tuxedo is returned. If Sipho paid R230 for his tuxedo, how many days did he keep the tuxedo for?
- e) A company is working out when it will start to make a profit on a keyring. It first works out that it costs R5 to make a keyring and a flat rate of R2000 per month regardless of how many keyrings are made for the machinery hire. They also plan to sell the keyrings for R14 each. How many keyrings does the company need to sell in order to start making a profit?
- f) Vusi would like to buy a T.V. on hire purchase. The T.V. costs R5999. The company says that Vusi can make 24 equal payments of R400 if he doesn't pay a deposit. What interest rate is the company charging Vusi? Use the formula – Total paid = Original Cost (1 + interest x number of years).
- g) A square box needs to have an extra 8mm along the length of the base and an extra 7mm along its width. How wide is the object if the total area of the base of the box is  $210\text{mm}^2$ ?
- h) You and your friend go into a burger store. Your friend buys 3 burgers and 2 cans of Coke. He pays R138. You buy 5 burgers and 6 cans of Coke and pay R254. How much would one burger and one can of Coke cost?

