SHARP

Worksheet 12 – Solve for x

1. *Solve for x by factorising the following:*

a) $x^2 + 3x - 18 = 0$
b) $x^2 - 10x - 56 = 0$
c) $x^2 - 12x + 32 = 0$
d) $x^2 + 22x + 85 = 0$
e) $x^2 - 9 = 0$
f) $x^2 + 8 = 0$
g) $2x^2 - 33x + 45 = 0$
h) $18x^2 - 3x - 10 = 0$
i) $6x^2 + 19x + 3 = 0$
j) $4x^2 + 8x - 5 = 0$
k) $x^2 - 6x - 91 = 0$
l) $x^2 - 9x + 20 = 0$
m) $3x^2 + 18x - 81 = 0$
n) $\frac{1}{2}x^2 + \frac{7}{6}x - 1 = 0$

2. *Solve for x by completing the square (round off to three decimal places where necessary):*

a) $x^2 + 9x - \frac{1}{5} = 0$
b) $2x^2 + x - 8 = 0$
c) $-2x^2 + 2x + \frac{2}{3} = 0$
d) $x^2 - 6x - 39 = 0$
e) $-3x^2 - 6x + 4 = 0$
f) $-\frac{3}{4}x^2 + \frac{375}{4} = 0$
g) $x^2 - 16x - 16 = 0$
h) $-4x^2 + 40x - 44 = 0$
i) $2x^2 - 36x - 5 = 0$
j) $\frac{1}{3}x^2 - \frac{1}{4}x - \frac{3}{4} = 0$

3. *Solve the following inequalities:*

a) $5(x^2 - 1) \leq 2(19x - 13)$
b) $16x(x + 1) > 5(7 - 6x)$
c) $-3x(3x - 1) \geq -56$
d) $4x(8x + 7) \leq 81 - 8x$
e) $-5x^2 + \frac{x}{3} + 13\frac{1}{3} \leq 0$
f) $8x(x + 1) \geq 4(9 - x)$
g) $3x(x - 1) \geq 10(2x - 4)$
h) $5x(4x + 5) < 4(x - 1)$
i) $4x\left(2x + \frac{1}{2}\right) \leq 21$
j) $-x(x + 3) \geq 4(2x + 7)$
k) $\frac{4}{x} \leq \frac{7}{x-1}$
l) $\frac{x-2}{x+2} > \frac{7}{x-2}$
m) $-3 \geq \frac{1}{x-2}$
n) $\frac{x^2}{x+3} \leq 0$

4. *Solve the following simultaneous questions*:

a) $y = 3x - 9$ and $x^2 - 4x + y^2 + 6y = 77$

b) $y = 4x + 9$ and $x^2 + 3x + y^2 - 6y = \frac{227}{4}$

c) $2y = 2x + 14$ and $x^2 + 8x + y^2 - 4y = 41$

d) $16y = 2x - 55$ and $4x^2 - 20x + 4y^2 - 40y = 395$

e) $4y = -5x + 38$ and $x^2 - 12x + y^2 - 4y = 1$

f) $y + x + 3 = 0$ and $x^2 - 2x + y^2 + 10y - 155 = 0$

g) $10y + 8x = 49$ and $4x^2 - 32x + 4y^2 + 4y = 147$

h) $5y = 4x + 14\frac{1}{2}$ and $2x^2 - 14x + 2y^2 + 10y - 127 = 0$

i) $3y = 4x - 7$ and $x^2 - 5x + y^2 - 2y = \frac{71}{4}$

j) $y = 13x - 3$ and $x^2 - 14x + y^2 - 6y = 27$

5. *Solve for x:*

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

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

c) $\frac{6}{x-1} + \frac{6}{x-6} = 0$

d) $\frac{-4}{x-5} = \frac{3}{x+1} - \frac{5}{2x}$

e) $\frac{1}{x+2} = \frac{5}{3x}$

f) $\frac{2}{x-6} + \frac{6}{x-1} = -\frac{2}{3x}$

g) $\frac{6}{x-2} = -\frac{1}{2x-1}$

h) $\frac{1}{x-5} + \frac{7}{x-6} = \frac{4}{-5x}$

i) $\frac{1}{x-10} - \frac{1}{3x+1} = 3$

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

6. *Solve for x:*

a) $4^x = 8$

b) $4^{x+2} - 4^x = 960$

c) $7.5^x - 5^{2+x} = -3\frac{3}{5}$

d) $x^4 = 16$

e) $x = 52^0$

f) $3.(-5)^x = -375$

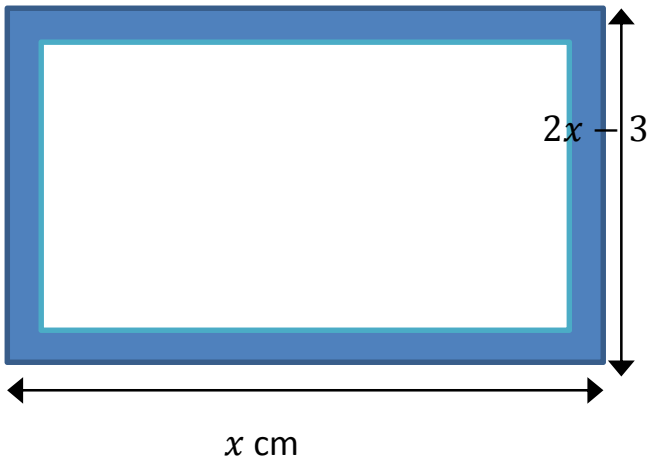
g) $3^x.2^{x+1} = 72$

h) $3^{x+1} + 2.3^{x+1} = 3$

i) $3.2^{x-1} - 2^x = 1$

j) $5^x - 5^{x-1} = 500$

Story Sums:

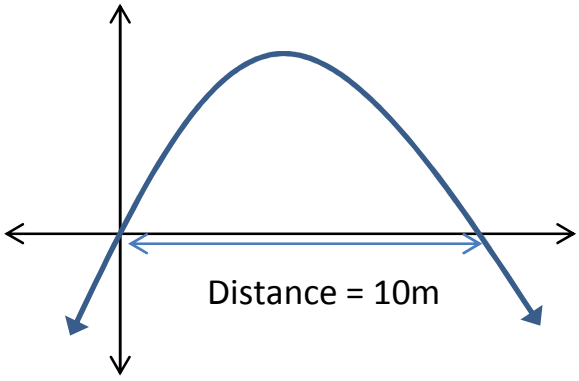
7. 

A photo-frame with a width of x cm and a height of $(2x - 3)cm$ is shown alongside. The frame has a small strip of wood 1,5cm wide running around the entire frame. If the inner area of the frame is 99cm^2, determine two possible values of x and determine which of the values are appropriate.

8. A princess from imagination-land wants to win the prince of her dreams and asks her fairy godmother to make her 10 times more beautiful than she was before. The fairy godmother gives her two potions to drink which contain factor x. The first potion contains $2x - 1$ of the factor and the second potion contains $3x + 4$ of the factor. The fairy godmother says that the potions have a multiplicative effect and that the princess will wake up in the morning 10 times as beautiful as she was the day before. The princess wants to know what the value of factor x is. Can you help her?

9. In a box of mixed chocolate chips (milk chocolate and white chocolate), that weighs 500g, there are x number of milk chocolate chips, and and the amount of white chocolate chips equals 3 times the number of milk chocolate chips minus 10. If every chocolate chip weighs 2g, determine the number of milk chocolate chips and the number of white chocolate chips.

10. Mr Ian Venter invents a travel machine that's strength is measured as a parabola given below:



Determine the formula for determining the strength of Mr Ian Venter's travel machine and then determine at what distance the strength of the travel machine will be at a maximum and what that maximum is.