

Lesson 3b : Solving
 . Translating Equations
 (and Inequalities) to Solve May 1st
2024


Recall:



→ The toonie

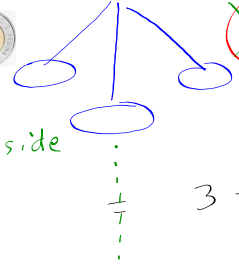


→ the loonie



1st side

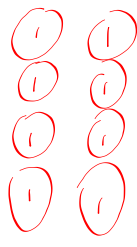
 $7t$



2nd side

 $3t + 8$

~~2~~ 2 2



$ra^n + sa^n$
 $= (r+s)a^n$

$7t = 3t + 8$
 $-t \quad -t$
 $6t = 2t + 8$
 $-2t \quad -2t$
 $4t = 8$
 $\frac{4t}{4} = \frac{8}{4}$

$t = 2$

"Solve for t"
 . find the value of t.
 . isolate $t = 2$
 . w.o.o.

ex - a fiver (cinq piasses)







$+$

0	0
0	0
0	0
0	0

Solve :

$$6f = 4f + 10$$

$$-4f \quad -4f$$

$$\frac{2f}{2} = \frac{10}{2}$$

$$f = 5$$

Solve for f.
 $f = 5$
 bring f terms together

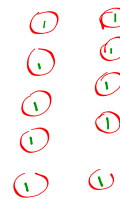
4 fivers



2 fivers



10 loonies



Solve for f.

$$4f = 2f + 10$$

$$\begin{matrix} -2f & & -2f \end{matrix}$$

$$2f = \frac{10}{2}$$

$$f = 5$$

bring unknown terms together

isolate f w/ o.o.

Practice Solving!

P 114 #3.1
P 216 - 218 #5.4

Handout 5 from yesterday

$$1 \cdot x = 2(x + 2)$$

. solve

$$x = 2x + 4$$

$$\begin{matrix} -2x & -2x \end{matrix}$$

$$-x = 4$$

$$\frac{-1 \cdot x}{-1} = \frac{4}{-1}$$

$$x = -4$$

$$\frac{1}{4} \times \frac{y}{2} = 6 + y$$

. sub
evaluate/
simplify

$$\frac{y}{8} = 6 + y$$

$$\begin{matrix} -y & -y \end{matrix}$$

. solve

$$\frac{1}{8}y - y = 6$$

$r a^n + s a^n = (r+s) a^n$

$$\frac{1}{8}y - 1y = 6$$

$$\frac{-7}{8}y = \frac{6}{1}$$

$$\frac{-7}{8}y = 6$$

$$y = \frac{-48}{7}$$

or

$$y = -6.86$$

Solve the rest of the equations

new stuff

@ 12:40

Translating Sentences into Equations

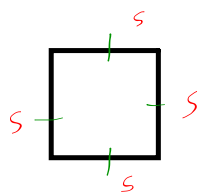
2 unknowns. Substitution to make 1 Equation 1 Unknown

Lesson 3b) – handout 1: Practice

First translate the following English sentences into algebraic equations. Then use substitution method with the appropriate equation to make one equation with one unknown. Finally solve for the values of the unknowns.

1. The perimeter of a square is 10 more than double the side (s) of that square:

$P = 2s + 10$ ← 2 unk



equation/tool

① $P = 2s + 10$

things to sub in!

② $P = 4s$

$4s = 2s + 10$
 ~~$-2s$~~ ~~$-2s$~~

$\frac{2s}{2} = \frac{10}{2}$

$s = 5$ units

$P = 4s$ $s = 5$
 (sub)

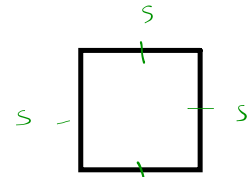
$P = 4(5)$

$P = 20$ units

- Tip:**
- label sentence
 - draw diagram
- step i: Translate sentence
- step ii: Rewrite the 2nd unk. in terms of 1st
 ex. $P = 4s$
- step iii: sub 2nd unk.'s value into 1st equation.
- step iv: bring the unknown terms together and solve.
 w/ o.o.
- step v: Find value of 2nd unk by subbing value of 1st unk into equation (2)

2. Quadruple the area of a square is 14 more than half of the side (s) to the power two of that square:

$$4A = \frac{s^2}{2} + 14$$



① $4A = \frac{1}{2}s^2 + 14$

② $A = s^2$

$$4s^2 = \frac{s^2}{2} + 14$$

~~$-\frac{1}{2}s^2$~~ ~~$-\frac{1}{2}s^2$~~

$$\frac{7}{2}s^2 = \frac{14}{7/2}$$

$$s^2 = \sqrt{4}$$

$s = 2 \text{ units}$

You do:
#3 - #6

solve w/ o.o.

(square root)

$$A = s^2 \quad s = 2$$

$$A = 2^2 \quad (\text{two to the two})$$

$$A = 4 \text{ units}^2 \quad (\text{two squared})$$



3. 35 less than a square's side (s) to the exponent 2 is the area of that square out of 36:

$$s^2 - 35 = A \div 36 \text{ true}$$

$$s^2 - 35 = \frac{A}{36}$$

$$s^2 - 35 = \frac{1}{36} A$$



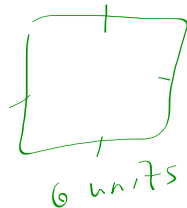
easier ✓
A = s²

$$\frac{36}{36} \cdot s^2 - 35 = \frac{1}{36} s^2 - \frac{1}{36} s^2$$

$$\frac{35}{36} s^2 - 35 = 0 \leftarrow \text{Solve w.o.o.}$$

B
E
D
S
S
solve

$$\frac{35}{36} s^2 = \frac{35}{36}$$



Area?

$$A = s^2$$

$$A = 6^2$$

$$A = 36 \text{ units}^2$$

$$\sqrt{s^2} = \sqrt{36}$$

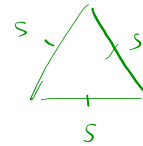
$$s = 6 \text{ units}$$

-3

$= \frac{1}{3} \times (\quad + \quad)$

4. 3 less than double the side (s) of an equilateral triangle is one-third the sum of the perimeter of that triangle and 9:

$$2s - 3 = \frac{1}{3} (P + 9)$$



$$2s - 3 = \frac{1}{3} (3s + 9)$$

- sub
- simplify
- evaluate
- solve

$$P = 1s + 1s + 1s$$

$$P = 3s$$

$$\textcircled{2} + \textcircled{2} + \textcircled{2}$$

$$2s - 3 = 1s + 3$$

$$1s - 3 = 3$$

$$s = 6 \text{ units}$$

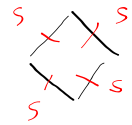
$$P = ?$$

$$P = 3s$$

$$P = 3(6)$$

$$P = 18 \text{ units}$$

5. Triple the perimeter of a rhombus gives 8 less than the product of 14 and the side (s) of that rhombus:



$$3 \times P = 14s - 8$$

$$3P = 14s - 8$$

$$P = s + s + s + s$$

$$3(4s) = 14s - 8$$

$$P = 4s$$

$$12s = 14s - 8$$

$$\begin{array}{r} -14s \\ \hline -2s = -8 \end{array}$$

- sub
- simplify
- bring s's together
- solve

$$\begin{array}{r} -2s = -8 \\ \hline -2 \\ \hline s = 4 \end{array}$$

$$s = 4$$

$$\therefore P = 4s$$

$$s = 4 \text{ units}$$

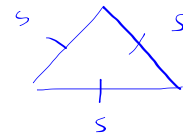
$$P = 4(4)$$

$$P = 16 \text{ units}$$

$$-\frac{1}{8}s \quad \xrightarrow{\text{green arrow}} \quad = P$$

6. One-eighth of the side (s) of an equilateral triangle subtracted from 25 gives the perimeter of that triangle

$$25 - \frac{1}{8}s = P \quad \xrightarrow{\text{green arrow}} \quad P = 3s$$



$$25 - \frac{1}{8}s = 3s - 3s$$

$-3s$

$$25 - \frac{25}{8}s = 0 - 25$$

$\nearrow -25$

BEDMAS

$$\begin{array}{r} -\frac{25}{8}s = -25 \\ \hline -\frac{25}{8} \\ \hline s = 8 \end{array}$$

$s = 8$ units

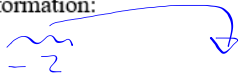
$P = 3s$

$P = 3(8)$

$P = 24$ units

Using Substitution Method for Mini-tasks

Question 1: You build a firepit in the shape of an equilateral triangle. You note the following information:

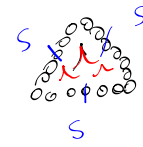


- Two less than the side (s) of a firepit is one-sixth the sum of a lap around that firepit and 24.

$$s - 2 = \frac{1}{6}(P + 24)$$

Determine the dimensions of the firepit.

- WANT:** s
- TOOL:** 1 equation (translate sentences)
+ solving (properties of shapes)
(info from diagram)



- tip:**
- read
 - draw diagram
 - look up unknown words

① $s - 2 = \frac{1}{6}(P + 24)$

sub ② into ①

INFO

① $P = ?$

② $P = 3s$

$$s - 2 = \frac{1}{6}(3s + 24)$$

$$s - 2 = \frac{1}{6} \cdot 3s + \frac{1}{6} \cdot 24$$

- sub
- simplify
- bring s's together
- solve

$$1 \cdot s - 2 = \frac{1}{2}s + 4$$

$$-\frac{1}{2}s \quad -\frac{1}{2}s$$

$$\frac{1}{2}s - 2 = 4 + 2$$

∴ the firepit is $12 \times 12 \times 12$ units
dimensions
 $l \times w \times h$

$$\frac{1}{2}s = \frac{6}{1/2}$$

$$s = 12 \text{ units}$$

You do:

- Question 2
- Ex. 7 ticket
- read P9
247
- do P9 #5, 17

Question 2: You are making a square window. You note the following information:

Twice the sum of the length of the frame and six is eight less than 12 times the side (s) of the window.

Determine the dimensions of the window.