UNIT REVIEW

1. Solve each of the following equations. SAMDEB

a) $5x + 3 = 13$

SA 1) eliminate +3 by subtracting 3 from both sides

$$-3 \quad -3$$
$$\frac{5x}{5} = \frac{10}{5}$$

MD 2) eliminate 5 by dividing both sides by 5

$$\boxed{x = 2}$$

b) $5 - 4x = 17$ *rearrange*

$$-4x + 5 = 17$$
$$-5 \quad -5$$

1) eliminate +5 by subtracting 5 from both sides } SA

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

2) eliminate -4 by dividing both sides by -4 } MD

$$\boxed{x = -3}$$

c) $2x^2 - 7 = 193$ SAMDEB

$$+7 \quad +7$$

SA 1) eliminate -7 by adding 7 to both sides

$$\frac{2x^2}{2} = \frac{200}{2}$$

MD 2) divide both sides by 2

$$\sqrt{x^2} = \sqrt{100}$$

E 3) square root both sides

$$x = 10$$

d) $15y - 6 = 9 + 10y$

$$-10y \qquad -10y$$

1) eliminate 10y from right side by subtracting 10y from both sides

$$5y - 6 = 9$$
$$+6 \quad +6$$

2) eliminate -6 by adding 6 to both sides

$$\frac{5y}{5} = \frac{15}{5}$$

3) divide both sides by 5

$$y = 3$$

e) $4(m + 3) + 2(m - 3) = 3(m - 2)$

$$4m + 12 + 2m - 6 = 3m - 6$$

1) apply distributive law

$$4m + 2m + 12 - 6 = 3m - 6$$

2) rearrange left side

$$6m + 6 = 3m - 6$$
$$-3m \qquad -3m$$

3) collect like terms

4) eliminate 3m from RS

$$3m + 6 = -6$$
$$-6 \quad -6$$

5) eliminate +6 from LS

$$\frac{3m}{3} = \frac{-12}{3}$$

6) divide both sides by 3

$$\boxed{m = -4}$$

f) $7(2x^2 + 3x) - (21x - 5) - 3(4x^2 + 7) = 2$

$$14x^2 + 21x - 21x + 5 - 12x^2 - 21 = 2$$

1) apply distrib. law

$$14x^2 - 12x^2 + 21x - 21x + 5 - 21 = 2$$

2) rearrange left side

3) collect like terms

$$2x^2 - 16 = 2$$
$$+16 \quad +16$$

4) eliminate -16

$$\frac{2x^2}{2} = \frac{18}{2}$$

5) divide both sides by 2

$$\sqrt{x^2} = \sqrt{9}$$

6) sq root both sides

$$\boxed{x = 3}$$

(handwritten at top: $2,4,6,8,10,(12)$; $3,6,9,(12)$ LCD=12; $4,8,(12)$ *)*

g) $12 \cdot \dfrac{1}{2} + 12 \cdot \dfrac{(x-5)}{3} = 12 \cdot \dfrac{(x+4)}{4}$ 1) multiply every term by LCD=12

$6 \cdot 1 + 4(x-5) = 3(x+4)$ 2) apply distributive law

$6 + 4x - 20 = 3x + 12$ 3) simplify LS

$4x - 14 = 3x + 12$
$-3x \qquad\quad -3x$ 4) eliminate $3x$ from RS

$1x - 14 = 12$
$+14 \qquad +14$ 5) eliminate -14 from LS

$x = 26$

h) $12 \cdot \dfrac{1}{4}(3y-2) = 12 \cdot \dfrac{2}{3}(y+1)$ 1) multiply both sides by LCD=12

$3 \cdot 1(3y-2) = 4 \cdot 2(y+1)$ 2) simplify

$3(3y-2) = 8(y+1)$ 3) apply distributive law

$9y - 6 = 8y + 1$
$-8y \qquad\quad -8y$ 4) solve for y

$1y - 6 = 1$
$+6 \qquad +6$

$y = 7$

2. Samwise Gamgee solved two different equations, shown below:

a) <u>Check</u> his answers to see if he answered the questions correctly.

Question #1

$5x + 4 = 12 - 3x$
$2x + 4 = 12$
$2x = 8$
$x = 4$

Left Side	Right Side
$5x + 4$	$12 - 3x$
$= 5(4) + 4$	$= 12 - 3(4)$
$= 20 + 4$	$= 12 - 12$
$= 24$	$= 0$

$LS \neq RS$ ∴ WRONG

Question #2

$\dfrac{x}{3} + 6 = 9$
$\dfrac{x}{3} = 3$
$x = 9$

Left Side	Right Side
$\dfrac{x}{3} + 6$	9
$= \dfrac{9}{3} + 6$	
$= 3 + 6$	
$= 9$	

$LS = RS$ ∴ RIGHT

b) If either of his answers is incorrect, look at his work and circle where he made his error.
Explain, **in words,** what he did incorrectly.

$5x + 4 = 12 - 3x$
$2x + 4 = 12$
$2x = 8$
$x = 4$

He made a mistake with the elimination of $-3x$ from right side. He <u>subtracted</u> $3x$ from both sides instead of <u>adding</u> $3x$ to both sides.

3. Solve the following equation. Describe, **in words**, each step you used to solve the equation.

$7b + 2b = -5 - 4$

1) collect like terms and simplify on each side

2) divide both sides by 9 to eliminate 9 from left side.

$$\frac{9b}{9} = \frac{-9}{9}$$

$$\boxed{b = -1}$$

4. Determine the value of **A** in the equation $5x + 7 + 2x + A = 100$, such that the solution to the equation is $x = 11$.

If x is 11, let's sub in 11 for x in the equation

$5x + 7 + 2x + A = 100$

$5(11) + 7 + 2(11) + A = 100$

$55 + 7 + 22 + A = 100$ • simplify

$84 + A = 100$ • solve for A

$A = 16$

5. The cost of renting a bike at Centre Island in Toronto is represented by the equation $C = 2n + 10$, where C is the cost of renting a bike, and n is the number of hours of bike rental.

a) How much does it cost to rent a bike for **2 hours?**	b) How long can you rent the bike for if it costs $30?
$C = 2n + 10$ 1) sub in 2 for n $C = 2(2) + 10$ 2) solve for C $C = 4 + 10$ $C = 14$ ∴ It'll cost $14 to rent for 2h.	$C = 2n + 10$ (alternatively you can rearrange to make n the subject) $\dfrac{30}{-10} = 2n + 10 \atop -10$ 1) sub in 30 for C $\dfrac{20}{2} = \dfrac{2n}{2}$ $10 = n$ ∴ You can rent it for 10 hours. $n = 10$

c) Write a simplified equation to show the cost of renting 2 bikes.
 	
 $C = 2(2n + 10)$ $C = 2n + 10 + 2n + 10$
 $C = 4n + 20$ or $C = 4n + 20$
	d) You and a friend want to spend the day at Centre Island. Together, you have a total of $50 to spend for the day. If you each have to pay $8 for the ferry ride (round trip), how long can you afford to rent bikes for?
	 1) $ left after the ferry ride
	    $= 50 - 2 \times 8$ 2) $C = 4n + 20$ sub in 34 for
	    $= 50 - 16$ $34 = 4n + 20$ C in the equation
	    $= 34$ you created in c)
	               $14 = 4n$
	               $3.5 = n$
	 ∴ You can rent for $3\frac{1}{2}$ hours.

6. The total cost (T) for a group to go to an amusement park and buy and all-inclusive ticket for all the rides is given by $T = 25A + 15C + 10(A + C)$, where A is the number of adults, and C is the number of children.

a) What is the cost for a family with one adult and three children to go to the park?	b) If a family with two adults goes to the park and pays $195, how many children are there?
$T = 25A + 15C + 10(A+C)$ A=1 C=3 $T = 25(1) + 15(3) + 10(1+3)$ $T = 25 + 45 + 40$ $T = 110$ ∴ It will cost $110.	$T = 25A + 15C + 10(A+C)$ T=195 A=2 C=? $195 = 25(2) + 15C + 10(2+C)$ $195 = 50 + 15C + 20 + 10C$ $195 = 25C + 70$ $125 = 25C$ $5 = C$ ∴ There're 5 children.

c) A teacher plans to take his class of 25 students to the amusement park on a field trip. He is hoping to get some parent volunteers to come with them on the trip. If the bus they are taking seats 32 people, what is the maximum and minimum cost of the trip?

SCENARIO MIN

no volunteer parents; 1 teach and 25 children
$T = 25A + 15C + 10(A+C)$ A=1 C=25
$T = 25(1) + 15(25) + 10(1+25)$
$T = 25 + 375 + 260$
$T = 660$

SCENARIO MAX

max 6 parents can volunteer because there are 6 empty seats available on the bus
$T = 25A + 15C + 10(A+C)$ A=7 C=25
$T = 25(7) + 15(25) + 10(7+25)$
$T = 175 + 375 + 320$
$T = 870$

∴ The min cost is $660 and the max cost is $870.

7. The perimeter of the garden in the diagram is 170 m. Determine the value of **w** and the length of each side.

Sum of exterior all sides $=$ Perimeter
$5(2w+4) = 170$
$10w + 20 = 170$
$ -20 -20$
$\dfrac{10w}{10} = \dfrac{150}{10}$
$w = 15$

∴ w is 15
One side $2w + 4$
$2(15) + 4$
$= 30 + 4$
$= 34$
$34\,m$

2w + 4