

5.1 Solving Simple Equations

Warm-up:

Solve the following by inspection.

1. $x + 5 = 13$

2. $-3x = -4x - 5$

3. $0.8n + 18.3 = 3.9$

Solving Equations by: "Isolating the Variable through Inverse Operations"

Ex. 1. Solve each equation using inverse operations.

a) $x + 5 = 13$

$x + 5 - \underline{\quad} = 13 - \underline{\quad}$

b) $-3x = -4x - 5$

$-3x + \underline{\quad} = -4x - 5 + \underline{\quad}$

Shortcut: "Transposing terms using inverse operations"

Variable terms go on the left side of the equation and constants go on the right side.

If you switch sides, you switch operations.

Ex. 2. Solve each equation by transposing terms through inverse operations first.

a) $x + 5 = 13$

b) $-3x = -4x - 5$

c) $10 + 2y = 30$

d) $2y - 8 = 3y$

e) $3x - 1 = 14$

f) $5y - 6 = -6$

g) $5 - 5x = x - 15$

h) $2y = 8 + 2y$

i) $1.2n + 18.3 = 0.4n + 3.9$

Ex. 3. Solve and do a **formal check** using a “**L.S. = R.S.=** format” for the following equation:

$$-6x + 7 = -15 - 4x$$

Check

Ex. 4. For the following word problems write an equation that models the situation, and then solve. Remember to define the variable with a “Let” statement first.

a) Colin ordered 3 pizzas. If he paid \$27.00 for the order including a delivery cost \$1.50, how much was each pizza?

b) A number decreased by one is equal to three more than seven times the number. Determine the number.

5.1 Solving Simple Equations Worksheet

1. Solve each equation by transposing terms through inverse operations first.

a) $3n - 1 = 11$

b) $2x + 5 = 21$

c) $-3 - h = -2$

d) $6a + 12 = -18$

e) $10 = 4m + 2$

f) $3x - 5 = 10$

g) $2x - 8 = -9$

h) $7 = 16 + 3x$

i) $2.75x + 3.8 = 3.8$

j) $2.5c + 1.0 = 1.5$

k) $4f - 4 = -10$

l) $6 - 2e = -2e$

2. Solve and do a formal check using a "L.S. = R.S.= format" for the following equation:

$$6b - 10 = -2$$

Check

3. Solve each equation by transposing terms through inverse operations first.

a) $2c - 7 = 1 + 3c$

b) $-4 - z = 3z - 6$

c) $23 + 6a = -2a - 9$

d) $15 - b = 3b + 3$

e) $2x + 12 = 17 - 3x$

f) $7 + 2z = 4z - 9$

g) $5 + 10w = 2 - 2w$

h) $0.7 - 2.1y = 0.6y - 4.7$

i) $2.21 + 3.1x = 1.9x + 0.89$

4. Solve and do a formal check using a "L.S. = R.S." format for the following equation:

$$9 - 4k = 2k + 27$$

Check

5. For the following word problems write an equation that models the situation, and then solve. Remember to define the variable with a "Let" statement first.

a) Twenty-four more than a number is equal to eight less than five times the number. Find the number.

b) Bill's age 3 years ago was 18. How old is he now?

c) Nazir has \$14.50 in her pocket. Of this amount, \$10 is in bills and the rest is quarters. How many quarters are in her pocket?

d) Bart rented a truck for the day. His bill was \$177. The rental company charged him a flat fee of \$45 and a fee of \$0.55/km for the distance he drove. How many kilometres did he drive?

Answers

1. a) $n=4$ b) $x=8$ c) $h=-1$ d) $a=-5$ e) $m=2$ f) $x=5$ g) $x=-\frac{1}{2}$ h) $x=-3$ i) $x=0$ j) $c=\frac{1}{5}$ k) $-\frac{3}{2}$ or $-1\frac{1}{2}$ l) no solution

2. $b=\frac{4}{3}$ or $1\frac{1}{3}$ 3. a) $c=-8$ b) $z=\frac{1}{2}$ c) $a=-4$ d) $b=3$ e) $x=1$ f) $z=8$ g) $w=-\frac{1}{4}$ h) $y=2$ i) $x=-1.1$ 4. $k=-3$

5. a) 8 b) 21 c) 18 quarters d) 240 km

5.2 Solving Multi-Step Equations

Ex. 1. Solve and formally check the following equation.

Remember to transpose terms so that variable terms are on one side of the equation and constants are on the other.

$$5x - 6 = 2x + 8$$

Check

Ex. 2. Solve each equation.

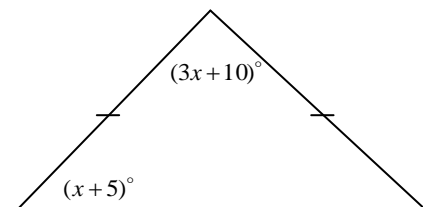
Make sure each side is simplified before transposing terms.

a) $\frac{-24 + 6x}{-3} = 3x - 17$ **b)** $2x - 5 - 3x + 1 = 7x - 8 - 2x$ **c)** $14 - 3(5t - 12) = 1 - (20t + 1)$

d) $-\frac{1}{2}(6x - 14) - 8x = 4 - 2(x + 3)$

e) $(2k - 5)(3k + 1) = 3k(2k - 1)$

Ex. 3. Use an **equation** to determine the value of x and **state any angle properties** used in your solution.



What Do You Call Someone Who Can't Turn Pancakes?

Cross out the letter pair next to each correct solution.
For each letter pair you DON'T cross out, write the upper case letter in the box containing the lower case letter.

a	b	c	d	e	f	g	h	i	j	k	l	m
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1 $9y + 4 = 2y + 25$

2 $5n - 2 = n + 18$

3 $11 + 8q = 3q - 19$

4 $-3 - 10x = 25 + 4x$

5 $15a = 6a - 90$

6 $24 - 5d = d$

7 Xavier is thinking of a number. Nine more than four times the number is the same as fifteen less than twice the number. What is Xavier's number?

- e · N** 4
- a · P** -6
- f · I** -1
- d · R** -12
- l · F** 3
- b · A** 7
- i · E** -10
- g · S** 5
- j · L** -9
- k · U** -2

8 $2 + 11b = 8b + 15$

9 $7m + 32 = 12 - m$

10 $16 - 5y = 1 - 4y$

11 $2x - 8x + 1 = 9 - 10x$

12 $-3t - 8 + 7t = 34 + 9t - 2$ **13** $2a + 3a + 4a = 5a - 18$

14 Yvonne is thinking of a number. Fifty, decreased by three times the number, is the same as seven times the number, increased by 80. What is Yvonne's number?

- c · N** 15
- k · O** -6
- e · H** $-2\frac{1}{2}$
- m · T** -3
- g · P** $-3\frac{3}{4}$
- a · R** -8
- l · S** $4\frac{1}{3}$
- h · D** 2
- d · F** 11
- i · L** $-4\frac{1}{2}$

15 $5(x + 4) = 7x - 26$

16 $20 - 9w = 4(15 - w)$

17 $2(11 + 3n) = 12n$

18 $10 - 4(p + 7) = 2(1 - p)$

19 $11x = 8x - 3(5 - 2x)$

20 $9 - 6(4u - 1) = u + 15$

21 Zabato is thinking of a number. Three times the sum of the number and ten is the same as eight times the number. What is Zabato's number?

- e · T** -8
- l · V** 6
- h · S** -10
- l · P** 18
- m · E** $3\frac{2}{3}$
- e · L** -9
- c · N** 0
- i · G** 23
- a · P** 5
- i · F** $6\frac{1}{3}$

5.2 Worksheet B**1. Solve each equation.****Make sure each side is simplified before transposing terms.**

a) $6(3p + 4) - 2(4p - 5) = -6$

b) $2 - 3(4y - 6) = 4(6y + 1) - 20$

c) $2(5x - 6) - (-3x) = 4 - 3(x - 2)$

d) $7(3a - 4) - 3(4a + 5) - (6a + 2) = a + 8(4a - 9) + 17$

e) $\frac{6 - 4x}{2} + \frac{1}{3}(3x - 21) = 0$

f) $-\frac{2}{3}(3x - 15) = 2x + 2(x - 4)$

g) $(x + 2)(x - 6) = x^2 - 4^2$

h) $2x(2x - 3) + 3(4x + 1) = (2x - 1)^2$

2. Solve and formally check the following equation.

$$1 + 2(0.3m - 1.5) = m + 4$$

Check

3. If the three interior angles of a triangle measure $(3x + 20)^\circ$, $(2x - 3)^\circ$ and $(x - 5)^\circ$, find x and the exact measure of the largest angle.

4. A rectangle has a length of $(3x + 5)$ cm and a width of $(2x - 1)$ cm. If the perimeter is $(7x + 17)$ cm, find x and the exact area.

Answers

1. a) $p = -4$ b) $y = 1$ c) $x = \frac{11}{8}$ or $1\frac{3}{8}$ d) $a = \frac{1}{3}$ e) $x = -4$ f) $x = 3$ g) $x = 1$ h) $x = -\frac{1}{5}$

2. $m = -15$

3. $x = 28$; 104°

4. $x = 3$; $A = 70 \text{ cm}^2$

5.3 Solving Multi-Step Equations Continued

Ex. 1. Solve and formally check the following equation.

$$-(2x+1) = -7 - 7(x+2)$$

Check

Ex. 2. Write an equation in terms of one variable to model each situation below and solve.

- a)** Liam sells sandwiches at an arena. He earns \$10.50 per hour plus \$0.40 for each sandwich he sells. How many sandwiches does he need to sell during a 6-hour shift to earn \$125?

Let _____ represent how many sandwiches Liam needs to sell during a 6-hour shift to earn \$125.

- b)** A submarine is currently submerged at a depth of 600 m below sea level. If it rises at a rate of 4 m/s, how long will it take for the submarine to reach a depth of 486 m below sea level?

Let _____ represent how long it will take to reach a depth of 486 m below sea level, in seconds.

- c) The perimeter of a rectangle is 58 cm. If the length is 5 cm longer than the width, find the rectangle's dimensions.



Let _____ represent the width of the rectangle in _____ .

Let _____ represent the length of the rectangle in _____ .

- d) The Sun Spa charges annual dues of \$125 plus \$10 per hour to use the facilities. The Moon Spa charges annual dues of \$230 plus \$7 per hour to use the facilities. For what number of hours would the two spas charge the same total amount?

Let _____ represent the number of hours for which the two spas charge the same total amount.

- e) Simon says: "Five times my age 4 years ago is the same as 3 times my age in 2 years."
How old is Simon now?

Let _____ represent Simon's age now in years.

$$5 \times \text{Simon's age}_{4 \text{ yrs ago}} = 3 \times \text{Simon's age}_{in 2 \text{ yrs}}$$

5.3 Worksheet**1. Solve each equation.****Make sure each side is simplified before transposing terms.**

a) $8x + 15 = 3x - 20$

b) $-7a + (-10) = -3a - (-20)$

c) $11d = (-3)^4 - 4^2 d$

d) $-21 - x = 5 + 6x + 9$

e) $3(2p + 7) = 15(p - 4)$

f) $3(11w + 5) = 3w - w + 4w$

g) $18 - 5y = \frac{1}{2}(2y + 8)$

h) $\frac{6 - 27n}{-3} = \frac{50 - 15n}{5}$

i) $\frac{32x - 40}{8} - \frac{18x - 15}{3} = 0$

j) $16 - 5(3t - 4) = 8(8 - 2t)$

k) $3q - 16q = 7 - 2(8q + 3)$

l) $14 - 3(5t - 12) = 2^0 - (20t + 1)$

m) $4.6(2 - 0.5x) = -0.8x + 12.65$

n) $6 - \frac{2}{5}(25 + 10a) = \frac{3}{7}(14a - 21)$

o) $(2x + 3)(2x - 3) = 4x(x + 3) + 3(3 - x)$

p) $4 - 2[1 - 3(x + 4)] = x + 1$

2. Solve and formally check the following equation.

$$(x + 4)(3 - x) = -x^2 + 8$$

Check

3. Write an equation in terms of one variable to model each situation below and solve.

- a) A basketball player scores 28 points in a game. She scores 35% of the total team points. How many points does her team score in total?
- b) A hot-air balloon is at a height of 500 m. It develops a steady leak and begins to descend at a rate of 60 m/min. How long does it take for the balloon to reach a height of 20 m?
- c) An author is paid \$5000 plus a royalty of \$1.25 for every book sold. How many books have to be sold for the author to earn \$10 000?
- d) The perimeter of a rectangle is 41 cm. If the width is 11 cm less than twice the length, determine the exact dimensions of the rectangle.
- e) George is three times as old as Sam. Five years from now, the sum of their ages will be 46. How old are they now?

Answers

1. a) $x = -7$ b) $a = -\frac{15}{2}$ or $-7\frac{1}{2}$ c) $d = 3$ d) $x = -5$ e) $p = 9$ f) $w = -\frac{5}{9}$ g) $y = \frac{7}{3}$ or $2\frac{1}{3}$ h) $n = 1$ i) $x = 0$ j) $t = 28$ k) $q = \frac{1}{3}$
l) $t = -10$ m) $x = -2.3$ n) $a = \frac{1}{2}$ o) $x = -2$ p) $x = -5$
2. $x = 4$ 3. a) 80 points b) 8 minutes c) 4000 books d) 10.5 m by 10m e) George is 27 years old; Sam is 9 years old

5.4 Solving Equations Involving Fractions

Rule:

Clear all fractions by multiplying **all terms** on **both sides** of the equation by the **lowest common denominator**.

Ex. 1. Solve each equation.

a) $\frac{x}{4} = -10$

b) $\frac{x}{10} = \frac{3}{5}$

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

d) $\frac{4y}{3} - \frac{1}{2} = 4$

Ex. 2. Solve and check.

$$\frac{2n}{3} - \frac{1}{2}n = 7 + \frac{3}{4}n$$

Check

5.4 Equations Involving Fractions Worksheet

Clear all fractions by multiplying **all terms** on **both sides** of the equation by the **lowest common denominator**.

1. Solve each equation.

a) $\frac{y}{5} = 7$

b) $-3 = \frac{a}{2}$

c) $\frac{4}{3}p = 8$

d) $\frac{-6k}{11} = 3$

e) $-\frac{4x}{21} = -\frac{8}{7}$

f) $\frac{9}{5}x = -\frac{3}{2}$

2. Solve.

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

b) $\frac{1}{3}w + 5 = 1$

c) $3 - \frac{d}{6} = -1$

d) $\frac{1}{2}x - \frac{5}{2} = 0$

e) $\frac{6}{7} = -3 + \frac{9a}{7}$

f) $-8 - \frac{3}{5}k = \frac{11}{5}$

3. Solve.

a) $3 - \frac{3}{2}x = \frac{9}{4}$

b) $\frac{2r}{3} + \frac{7}{5} = 1$

c) $\frac{7}{9} - \frac{5}{6}y = -\frac{1}{3}$

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

e) $\frac{1}{4}c - \frac{1}{3}c = \frac{1}{6}$

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

g) $\frac{3x}{4} - 5 = 2x + \frac{15}{4}$

h) $\frac{3k}{5} - 2 = \frac{k}{3}$

i) $\frac{5}{12} - \frac{7}{9}k = 2k - \frac{5}{9}$

4. Solve and check.

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

Check

5. For the following word problems write an equation that models the situation, and then solve. Remember to define the variable with a "Let" statement first.
- a) Thirty-one decreased by four times a number is the same as five more than the number divided by three. Find the number.
- b) One third of a number is 15 less than five sixths of the number. Find the number.
- c) Lauren spends one fourth of her money on food, three tenths of her money on make-up and two fifths of her money on clothes. If she spent \$95 on these three items all together, how much money did she have to begin with?

Answers

1. a) $y=35$ b) $a=-6$ c) $p=6$ d) $k=-\frac{11}{2}$ or $-5\frac{1}{2}$ e) $x=6$ f) $x=-\frac{5}{6}$
2. a) $x=8$ b) $w=-12$ c) $d=24$ d) $x=5$ e) $a=3$ f) $k=-17$
3. a) $x=\frac{1}{2}$ b) $r=-\frac{3}{5}$ c) $y=\frac{4}{3}$ or $1\frac{1}{3}$ d) $x=6$ e) $c=-2$ f) $x=-\frac{1}{3}$ g) $x=-7$ h) $k=\frac{15}{2}$ or $k=7\frac{1}{2}$ i) $k=\frac{7}{20}$
4. $x=-3$
5. a) 6 b) 30 c) \$100

5.5 Solving Equations Involving Fractions Continued

Recall:

Clear all fractions by multiplying **everything** on **both sides** of the equation by the **lowest common denominator**.

Ex. 1. Solve each equation.

a) $\frac{3x}{4} - 7 = 2\frac{1}{2}x$

b) $\frac{y-5}{4} = \frac{2y+7}{3}$

c) $\frac{x+3}{3} - \frac{2-x}{7} = 1$

d) $\frac{2}{3}(x+2) - \frac{5}{6}(x-2) = 3$

Ex. 2. Solve and check.

$$\frac{m+3}{2} - 4 = \frac{4-m}{3} + 7$$

Check

Ex. 3. Given the formula to convert Fahrenheit temperatures to Celsius is $C = \frac{5}{9}(F - 32)$, convert:

a) $5^\circ F$ to $^\circ C$

b) $20^\circ C$ to $^\circ F$

Ex. 4. A square has sides of length $2k - 1$ units. An equilateral triangle has sides of length $\frac{3k + 2}{2}$ units.

The square and the triangle have the same perimeter.

a) Find the value of k .

b) Find the perimeter.

5.5 Worksheet A

DOUBLE CROSS

1. What do you get when you cross an absent-minded elephant with a small flea?

Answer:

$$\frac{1}{2} \quad -4 \quad \frac{9}{4} \quad -\frac{17}{15} \quad \frac{30}{7} \quad -2 \quad 1 \quad 23 \quad -2 \quad \frac{30}{7} \quad 5 \quad \frac{1}{2} \quad 1$$

2. What do you get when you cross a shark with a snowball?

Answer:

$$-4 \quad -\frac{17}{15} \quad \frac{9}{4} \quad \frac{11}{2} \quad 1 \quad -\frac{5}{4} \quad 20 \quad 1 \quad -2$$

Solve each equation below and find the solution in the code. Each time the solution appears, write the letter of that exercise above it.

(G) $\frac{x}{2} + \frac{2x}{3} = 5$

(I) $\frac{9x}{5} - \frac{3x}{2} = 6$

(O) $\frac{2n-3}{2} = \frac{3}{4}$

(S) $\frac{1}{3}(a+5) = \frac{7}{2}$

(A) $\frac{3x-1}{4} + \frac{x}{2} = \frac{3}{8}$

(E) $\frac{2t+2}{3} - \frac{5t}{4} = \frac{11}{6}$

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

(B) $\frac{3k-8}{14} + \frac{5}{7} = \frac{k+1}{2}$

(R) $\frac{x+3}{4} - 2 = \frac{5x-2}{5}$

(N) $\frac{4x}{3} - \frac{2x+3}{6} = \frac{9}{2}$

(F) $\frac{1}{10}(m+8) - \frac{1}{15}(m-5) = 1$

(T) $\frac{5x}{6} - \frac{3-x}{8} = \frac{4x+3}{12}$

5.5 Worksheet B

1. Solve.

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

b) $\frac{4-2y}{5} + 6y = 0$

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

d) $\frac{2}{3}(3n-1) = -\frac{3}{2}(n+2)$

e) $\frac{2c+4}{5} - \frac{7c-6}{15} = 2$

2. Solve and check.

$$7 + \frac{1}{3}(4w-5) = \frac{4}{7}(4w+1)$$

Check

Answers1. a) $a=9$ b) $y=-\frac{1}{7}$ c) $x=-3$ d) $n=-\frac{2}{3}$ e) $c=-12$ 2. $w=5$

5.6 Word Problems

- Ex. 1.** One train leaves Boston for Chicago travelling at 80 km/h and a second train leaves Chicago for Boston travelling at 60 km/h. The distance from Boston to Chicago is 1540 km.
- How many hours after they left each station will the two trains meet?
 - How far will the train bound for Boston have travelled?

- Ex. 2.** One half of a certain even integer plus one fifth of the next consecutive even integer equals 48. Find the two integers.

Why Didn't the Astronauts Land on the Moon?

Solve each problem, then cross out the letter next to the correct answer. When you're finished, the answer to the title question will remain.

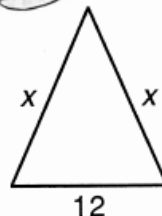
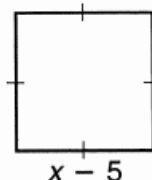


D	1075 ft
L	5°F
O	600
H	$-13\frac{1}{3}$
L	6 h
P	7.5 min
N	144 ft
U	\$8400
O	44
F	7 s
O	4 h
S	156 ft
D	\$7200
A	\$760
M	5 h
H	3°F
W	1250 ft
T	6.4 min
S	9 s
H	16
I	540
T	\$640

1 Solve. $4(x - 9) = 7x + 4$

2 The square and the triangle have equal perimeters.

- A. Find the value of x .
- B. Find the perimeter.



3 Omega just got her pilot's license and wants to rent a plane. The Platinum Plane Company charges \$180 plus \$92 per hour to rent a plane. The Plastic Plane Company charges \$250 plus \$78 per hour.

- A. For what number of hours would the companies charge the same amount?
- B. What would the charge be for that number of hours?

4 The launch site for Trigon Balloon Co. is 250 ft above sea level. A hot-air balloon is launched from the site and begins to rise at a rate of 110 ft/min. At the same time, another balloon 2200 ft above sea level begins to descend at a rate of 150 ft/min.

- A. How long will it be until the balloons are at the same elevation?
- B. What will their elevation be then?

5 The temperature in Coldspot is -7°F and increasing 2.5° per hour. The temperature in Frostberg is 19°F and decreasing 4° per hour.

- A. How long will it be until the temperatures are the same?
- B. What will the temperature be then?

6 Trendy T-Shirts has decided to manufacture a new design. It will cost \$400 plus \$3 per shirt to produce them, and Trendy plans to spend \$5000 on advertising. The shirts will sell for \$12 each.

- A. How many shirts must be sold to break even (total cost equals income from sales)?
- B. What is Trendy's income (or total cost) for that many shirts?

7 Romeo and Juliet first saw each other when they were 270 feet apart. Romeo began running toward Juliet at a rate of 16 ft/s. At the same moment, Juliet began running toward Romeo at a rate of 14 ft/s.

- A. How many seconds after they started running will they meet?
- B. How far will Romeo have run then?

What Did Gyro Exclaim When Dr. Freud Said: "You Have a Split Personality"?

Solve the problem, then cross out the letter pair next to your solution. For each letter pair that you DON'T cross out, write the uppercase letter in the box containing the lowercase letter.

- 1 Jack is thinking of a number. One half of the number added to two fifths of the number is 27. What is Jack's number?
- 2 Jill is thinking of a number. Three fourths of the number plus one third of the number is 52. Find Jill's number.
- 3 Two thirds of a number is $3\frac{1}{2}$ more than three eighths of the number. Find the number.
- 4 One half of a certain even integer plus one ninth of the next consecutive even integer equals 21. Find the first integer.
- 5 Mr. Enigma said: "One fourth of my age 3 years ago is the same as one fifth of my age in 8 years." How old is Mr. Enigma now?
- 6 Ms. Enigma said: "One third of my age plus four fifths of my age is the same as my age in 6 years." How old is Ms. Enigma now?
- 7 A science test has two parts. Part B has 4 more questions than Part A. Rimshot missed one fifth of the questions in Part A and one eighth of the questions in Part B. If he missed 7 questions altogether, how many questions were on the test?
- 8 Omega did a survey to see what kind of music the students like best. One sixth of the students chose pop, three tenths chose rap, and two fifths chose rock. If the combined total of these three groups was 78 students, how many students did Omega survey altogether?

Answers 1-4

- h • D** 40
- b • H** 12
- c • O** 36
- k • R** 30
- a • T** 34
- f • E** 24
- i • U** 48
- j • N** 38

Answers 5-8

- b • N** 39
- i • A** 47
- e • G** 90
- l • E** 45
- e • W** 60
- k • T** 52
- i • O** 120
- g • T** 44



a	b	c	d	e	f	g	h	i	j	k	l
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Review for Unit 5 Test

PART A – Circle the best answer for each question.

1. **Without** solving, identify which of the following equations does **not** have $k = 2$ as a solution.

- a. $\frac{2}{3}(5 - k) = 2$ b. $4k - 5 = 3$ c. $-3 = \frac{k - 17}{5}$ d. $3k - 8 = 4k - 6$

2. The value you should multiply both sides of the equation $-\frac{4}{5}x + \frac{2}{3} = 1\frac{3}{4}x + 2$ by to eliminate all fractions is:

- a. 15 b. 12 c. 60 d. 30

3. Anthony is 4 years older than his brother Felix. The sum of their ages is 42. Which equation can you use to find their ages?

- a. $4f = 42$ b. $4f + f = 42$ c. $f + (f + 4) = 42$ d. $4f + (f + 4) = 42$

4. The equation to convert between temperatures in degrees Celsius, C , and degrees Fahrenheit, F , is $\frac{C}{5} = \frac{F - 32}{9}$. If the temperature in degrees Celsius is 15, the temperature in degrees Fahrenheit is:

- a. between 40 and 60 b. less than 0 c. between 20 and 40 d. greater than 60

5. If $x = -4$ and $y = 3$ satisfy the equation $3x^2 + ky^2 = 24$, then which is the value of k ?

- a. $k = 8$ b. $k = -2\frac{2}{3}$ c. $k = 2\frac{2}{3}$ d. $k = -4$

6. Alex's distance from home is represented by the equation $D = -0.5t + 300$, where D represents his distance from home, in kilometres, and t represents time, in minutes. How long will it take Alex to reach a distance of 182 kilometres from home?

- a. 236 minutes b. 209 minutes c. 64 minutes d. 59 minutes

PART B – Do all questions in the space provided.

1. Solve and formally check the following equation.

$$3(2k - 5) - k = 8 - (3k + 7)$$

Check

2. Solve each equation.

a) $5 - x = 2x + 23$

b) $0.16 + 2.4x = 2.36x - 0.12$

c) $7 = \frac{5q + 8}{4}$

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

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

f) $-1\frac{2}{3}g + \frac{5}{9} = 0$

g) $4(x - 8) = -2(x - 5)$

h) $-\frac{1}{2}(10 - 2x) = \frac{6x - 9}{3}$

i) $\frac{1}{2}(1 - 5u) = \frac{4 + 5u}{3}$

3. Solve each equation. Make sure each side is simplified before transposing terms.

a) $6 - 2(4x + 1) = 3x - 2(x + 1)$

b) $(6z - 1)(2z + 3) = 4z(3z + 1)$

c) $11 - 3[2 + (x - 3)] = 2(x - 3)$

d) $\frac{c - 5}{6} - \frac{c + 3}{4} = -1$

e) $\frac{2}{3}(x - 3) - \frac{5}{6}(x - 2) = \frac{1}{9}$

f) $\frac{3}{5}(10 + 15y) + 7 = -\frac{2}{3}(12 - 24y)$

4. The sponsors of a new MTV reality show use a weighted rating system that factors in the audience demographic (who watches the show). Their research suggest that the viewing audience is made up of 50% girls, 30% boys, and 20% adult viewers. The formula for the show's weighted rating score, R , is $R = \frac{5g + 3b + 2a}{10}$ where:
- g represents the girls' average rating of the show, out of 10,
 - b represents the boys' average rating of the show, out of 10,
 - a represents the adults' average rating of the show, out of 10,
- The sponsors agree to pick up the show for a second season if the first season earns a weighted rating of 8 or better. If the average ratings for the boys and adults are 7.4 and 8.1 respectively, what exact minimum girls' rating is necessary to ensure a second season?

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5. For the following word problems write an equation that models the situation, and then solve. Remember to define the variable with a "Let" statement first.
- Murray works at a cell phone service kiosk in a shopping mall. He earns \$8.50/h, plus a \$15 commission for each 1-year service contract he sells. How many service contracts does Murray need to sell to earn \$790 in a 40-h work week?
 - Becky works part-time at a clothing store. She earns \$80 per week plus 6% of the value of her weekly sales. This week she earns \$119. What is the total value of her weekly sales?
 - The two equal sides of an isosceles triangle are 2 *cm* shorter than the longest side. If the perimeter of the triangle is 83 *cm*, find the three side lengths of the triangle.
 - Tyler is half Jessica's age. Five years ago their combined ages totalled 60 years. Determine how old each is currently.
 - Three more than two thirds of a certain even integer is the same as five less than one quarter of the next consecutive even integer. Find the two integers.

Answers

PART A

1. d 2. c 3. c 4. a 5. b 6. a

PART B

1. $k=2$ 2. a) $x=-6$ b) $x=-7$ c) $q=4$ d) $x=-1$ e) $x=0$ f) $g=\frac{1}{3}$ g) $x=7$ h) $x=-2$ i) $u=-\frac{1}{5}$

3. a) $x=\frac{2}{3}$ b) $z=\frac{1}{4}$ c) $x=4$ d) $c=-7$ e) $x=-\frac{8}{3}$ or $-2\frac{2}{3}$ f) $y=3$ 4. 8.32

5. a) $8.5(40) + 15n = 790$; 30 contracts b) $80 + 0.06s = 119$; \$650 d) $l + 2(l - 2) = 83$; 29 *cm*, 27 *cm*, 27 *cm*

e) $(j - 5) + \left(\frac{j}{2} - 5\right) = 60$; Jessica is 40 years old; Tyler is 20 years old f) $\frac{2}{3}x + 3 = \frac{1}{4}(x + 2) - 5$; -18 and -16