

Unit 1 - Algebra

Chapter 4 - Equations **WORKBOOK**

MPM1D

School Cartoon #6446

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"You knew X was 7 the whole time
and you never said anything?!"

Chapter 4 Worksheet Checklist

Worksheet	Check ✓
4.1 – Solving Simple Equations	
4.1 – Solving Simple Equations Worksheet #2	
4.2 – Solving Multi-Step Equations Worksheet #1	
4.2 Practice: Solve Multi-Step Equations	
Kuta – Multi-Step Equations (optional)	
4.3 – Solve Equations Involving Fractions #1	
4.3 – Solve Equations Involving Fractions #2	
4.4 – Modeling With Formulas Worksheet	
4.5 – Modeling With Algebra Worksheet #1	
4.5 Modeling With Algebra Practice	
Chapter 4 Review	
Chapter 4 Practice Test	

Mark /10	0-2	3-5	6-8	9-10
Work completion for chapter 4	Little to know homework done throughout chapter.	Some homework completed. Unorganized.	Most homework completed. Work clear and organized.	All homework completed accurately. Great organization of work.

Mark /4	1	2	3	4
In Class Work for Chapter 4	Class time not used well for work completion. Inattentive during lessons. Need to improve at limiting distractions.	Some work completed during class. Sometimes distracted during lessons.	Works well during class. Minimal distractions. Good attention during lessons.	Always uses class time efficiently. Pays attention and contributes to lessons.

Comments:

14

4.1 Solving Simple Equations

MPM1D

1. Solve the following equations:

a) $x + 3 = 12$

b) $a + 4 = 7$

c) $y + 9 = 11$

d) $b + 5 = 14$

e) $m + 6 = 7$

f) $p - 4 = 2$

g) $h + 1 = 7$

h) $x + 8 = 12$

i) $m + 7 = 10$

j) $p + 5 = 6$

e) $r - 9 = 2$

f) $t - 3 = 5$

2. Solve the following equations:

a) $6w = 32$

b) $5y = 35$

c) $-2x = 18$

d) $\frac{k}{4} = 3$

b) $\frac{u}{2} = 8$

c) $\frac{r}{-5} = -2$

3. Solve each two-step equation

a) $7x - 4 = 10$

b) $-12x - 36 = 0$

c) $-3x - 1 = 14$

d) $\frac{x}{-3} + 5 = 10$

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

f) $-3 + 8x = 1$

4. A hockey team has \$700 to buy new jerseys. Ice-wear, a jersey supplier, charges \$50 per jersey. How many new jerseys can the team buy?

a) Write an equation that models the number of jerseys the team can afford.

b) Solve the equation. Write a conclusion to the problem.

4.1 – Solve Simple Equations Worksheet #2

MPM1D

1. Solve

a) $x - 5 = 4$ b) $m + 8 = 11$ c) $y - 3 = 0$ d) $h + 2 = 6$

2. Solve

a) $x + 5 = 12$ b) $x - 6 = 7$ c) $y + 3 = 10$ d) $y - 4 = 2$

3. Solve

a) $x + 7 = 12$ b) $n - 8 = 11$ c) $-5 + y = -2$ d) $-9 + h = -6$

4. Solve

a) $3x = 12$ b) $5y = 20$ c) $\frac{n}{3} = 8$ d) $-2k = 16$

5. Solve

a) $4z = -24$ b) $\frac{h}{-5} = -6$ c) $-6c = -42$ d) $-9u = 45$

6. Find the root of each equation

a) $7x - 4 = 10$ b) $7k + 2 = 16$ c) $-p + 7 = 0$ d) $-12g - 33 = 0$

7. Solve

a) $k - 4 = -9$ b) $6x = -30$ c) $\frac{q}{7} = 2$

d) $2y - 7 = 9$ e) $-3w - 1 = 14$ f) $2q - 9 = -13$

8. Solve

a) $p + 9 = -2$ b) $-5x = 35$ c) $\frac{u}{4} = -8$

d) $6r + 3 = 33$ e) $10c - 6 = -16$ f) $-3v + 6 = -9$

9. At a bake sale, pies cost \$7 each. One customer buys \$84 worth of pies

a) Write an equation to model the number of pies the customer bought.

b) Solve the equation.

12. Solve each equation. Express fraction answers in lowest terms.

a) $2k - 7 = -8$

b) $3x + 8 = 2$

c) $4m - 6 = 12$

d) $-9u + 8 = 23$

13. Solve each equation. Express fraction answers in lowest terms.

a) $8r - \frac{3}{2} = -15$

b) $-10h - 6 = -\frac{2}{5}$

4.2 – Solve Multi-Step Equations Worksheet #1

MPM1D

1. Solve

a) $3 + 4m + 5m = 21$

b) $16y - 8 - 9y = 27$

c) $46 = 2 - 8w - 3w$

d) $3d + 4 - 9d + 12 = 0$

2. Solve

a) $5x + 9 = 3x + 7$

b) $-2u - 8 = 5u - 1$

c) $4y - 13 = -6y + 7$

d) $7 - 5m = -2 - 2m$

3. Solve

a) $0 = 14 - x + 6x - 9$

b) $11 - n + 3 = 3n + 3n$

c) $4t - 5 = 2t + 5$

d) $6k - 3 - 2k = k - 3$

4. Find the root of each equation

a) $2(x - 2) = 4x - 2$

b) $4c + 3 = 3(c - 4)$

c) $6p + 4(8 - p) = 22$

d) $k = 2(11 - k) + 14$

5. Find the root of each equation

a) $2(x - 3) + 3(x - 2) = 18$

b) $4(y - 1) - (y - 5) = 10$

$$c) 2(c + 2) = 5(c + 1) - 7$$

$$d) 3(t - 4) = -2(t + 3) + 14$$

9. Solve each equation. Express fraction answers in lowest terms.

$$a) 3x - 8 = 7x + 10$$

$$b) 3 + 10i = 4i - 18$$

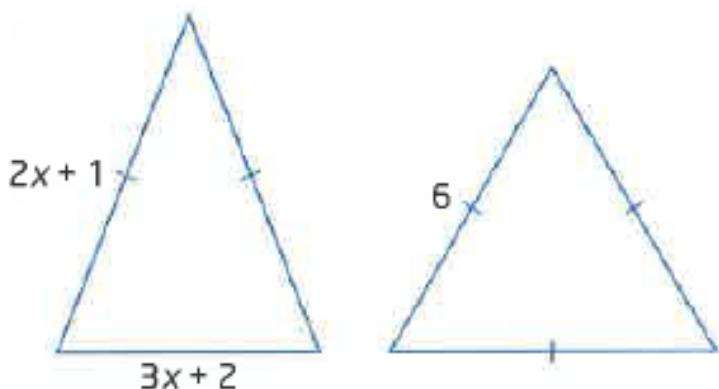
$$c) -4(u + 6) = 2(3u - 4)$$

$$d) 4(k - 3) = 2 - (2k - 6)$$

$$e) 3(p + 7) - (4p - 1) = -5(2p - 3) + 1$$

$$f) 8 - (3w - 2) = -5(w - 3) - (4w - 3)$$

13. An isosceles triangle and an equilateral triangle have the same perimeter. Find the side lengths of each triangle.



Get Ready for Tomorrow:

17. Solve each equation

a) $\frac{1}{2}(x + 6) = 4(x - 2)$

b) $\frac{1}{3}k + \frac{1}{2} = \frac{1}{4}k$

4.2 – Solve Multi-Step Equations Worksheet #2

MPM1D

1. Solve.

a) $6x + 3 + 2x = 19$

g) $9q + 2 - 8q - 13 = 0$

b) $10m - 3m + 8 = 43$

h) $8 - 3k + 5k = 0$

c) $4a + a + 9 = 44$

2. Find each root.

a) $3b + 4 = 2b + 6$

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

b) $7p - 18 = 3p - 2$

e) $2y + 4 + 3y = 9$

c) $2x + 4 = 5x - 5$

f) $7f - 12 + f = 20$

d) $8g + 3 = g + 10$

e) $6h - 5 = 2h + 3$

b) $2(a - 8) + 3(a + 6) = 17$

f) $4m - 9 = m + 7$

c) $3(2p + 1) = 5(p + 1)$

g) $5r - 6 = 2r + 3$

d) $5d = 4(d + 2)$

h) $-3y + 15 = y - 13$

e) $2(3t + 5) - 4(2t - 1) = 6$

3. Solve.

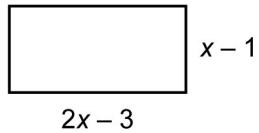
a) $4(x - 3) = 3x - 7$

f) $5(k + 3) = 2(4k + 7) - 5$

4. Solve, then check.

a) $2m + 1 - m = 4$

5. A square and a rectangle have the same perimeter. Find the side lengths of each figure.



b) $q + 4 + 2q - 19 = 0$

c) $g - 3 + 4g = 2g - 6$

d) $2(2b + 7) = 3(b + 3) + 3$

6. In a triangle, the measure of the middle angle is triple the measure of the smallest angle, and the measure of the largest angle is 55° greater than the measure of the smallest angle. Find the measures of the angles.

Two-Step Equations

Solve each equation.

1) $6 = \frac{a}{4} + 2$

2) $-6 + \frac{x}{4} = -5$

3) $9x - 7 = -7$

4) $0 = 4 + \frac{n}{5}$

5) $-4 = \frac{r}{20} - 5$

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

7) $\frac{v+9}{3} = 8$

8) $2(n+5) = -2$

9) $-9x + 1 = -80$

10) $-6 = \frac{n}{2} - 10$

11) $-2 = 2 + \frac{v}{4}$

12) $144 = -12(x+5)$

$$13) -15 = -4m + 5$$

$$14) 10 - 6v = -104$$

$$15) 8n + 7 = 31$$

$$16) -9x - 13 = -103$$

$$17) \frac{n+5}{-16} = -1$$

$$18) -10 = -10 + 7m$$

$$19) -10 = 10(k - 9)$$

$$20) \frac{m}{9} - 1 = -2$$

$$21) 9 + 9n = 9$$

$$22) 7(9 + k) = 84$$

$$23) 8 + \frac{b}{-4} = 5$$

$$24) -243 = -9(10 + x)$$

4.3 – Solve Equations Involving Fractions Worksheet #1

MPM1D

1. Solve

$$\text{a) } \frac{1}{3}(x - 2) = 5$$

$$\text{b) } 4 = \frac{-2}{3}(p - 2)$$

$$\text{c) } \frac{m+4}{3} = 7$$

$$\text{d) } -14 = \frac{2(h-3)}{5}$$

2. Solve

$$\text{a) } \frac{y-4}{5} = -6$$

$$\text{b) } \frac{1}{4}(u - 5) = -2$$

$$\text{c) } 3 = \frac{2}{5}(n + 7)$$

$$\text{d) } 16 = \frac{3(v+7)}{2}$$

3. Find the root of each equation

$$\text{a) } \frac{m-3}{4} = \frac{m+1}{3}$$

$$\text{b) } \frac{w-1}{4} = \frac{w+2}{3}$$

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

$$\text{d) } \frac{1}{5}(y-3) = \frac{1}{6}(y+4)$$

4. Find the root of each equation.

$$\text{a) } \frac{2}{3}(5n-1) = -\frac{3}{5}(n+2)$$

$$\text{b) } -\frac{3}{4}(d+3) = \frac{4}{5}(3d-2)$$

$$\text{c) } \frac{3c-2}{5} = \frac{2c-1}{3}$$

$$\text{d) } \frac{5-2a}{4} = \frac{6-a}{5}$$

5. Each of the following solutions contains an error. Identify the error and describe how to correct it.

a)
$$\frac{x - 3}{5} = \frac{x + 1}{4}$$
$$5(x - 3) = 4(x + 1)$$
$$5x - 15 = 4x + 4$$
$$5x - 15 - 4x + 15 = 4x + 4 - 4x + 15$$
$$x = 19$$

b)
$$\frac{1}{3}(3y - 2) = \frac{1}{4}(y + 3)$$
$$12 \times \frac{1}{3}(3y - 2) = 12 \times \frac{1}{4}(y + 3)$$
$$3y - 2 = y + 3$$
$$3y - 2 - y + 2 = y + 3 - y + 2$$
$$2y = 5$$
$$\frac{2y}{2} = \frac{5}{2}$$
$$y = \frac{5}{2}$$

6. Find the height of a triangle with base 10 cm and area 50 cm².

7. Solve

a) $\frac{3p}{4} + \frac{p-5}{3} = \frac{1}{2}$

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

4.3 – Solve Equations Involving Fractions Worksheet #2

MPM1D

1. Solve.

$$\text{a)} \quad \frac{c}{2} = 7$$

$$\text{b)} \quad \frac{n}{-3} = 4$$

$$\text{c)} \quad \frac{w}{-3} = -5$$

$$\text{d)} \quad \frac{h}{6} = -3$$

2. Find each root.

$$\text{a)} \quad 2 = \frac{1}{8}(s + 7)$$

$$\text{b)} \quad \frac{v + 8}{5} = 4$$

$$\text{c)} \quad \frac{3}{4}(r - 1) = 6$$

$$\text{d)} \quad \frac{u - 8}{2} = -1$$

e) $-\frac{1}{4}(z - 5) = -1$

d) $\frac{x + 4}{3} = \frac{x + 6}{5}$

f) $\frac{2(e + 5)}{3} = -2$

e) $\frac{3n + 2}{8} = \frac{3n - 2}{4}$

3. Find each root.

a) $\frac{b + 3}{4} = \frac{b - 1}{2}$

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

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

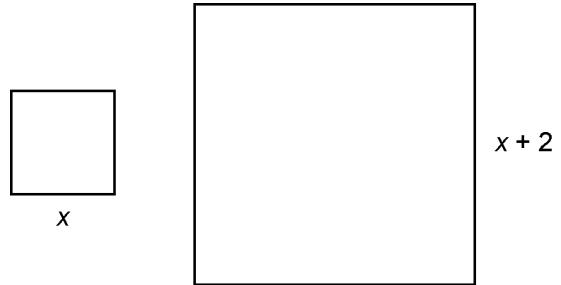
4. Solve and check.

a) $k - 3 = \frac{k + 3}{-5}$

c) $\frac{1}{6}(z - 4) = \frac{1}{2}(z - 2)$

b) $\frac{2z - 3}{5} = 3$

5. The perimeter of the small square is one-third the perimeter of the large square. What are the side lengths of the squares?



c) $\frac{1}{3}(9 + g) = g + 1$

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

6. The height of a triangle is 2 cm less than its width. The area of the triangle is 24 cm^2 . What are the measures of the base and height?

4.4 – Modeling With Formulas Worksheet

MPM1D

1. Rearrange each formula to isolate the variable indicated.

a) $P = 4s$ for s

b) $A = P + I$ for P

c) $C = 2\pi r$ for r

c) $y = mx + b$ for b

2. Rearrange each formula to isolate the variable indicated.

a) $d = mt + b$ for m

b) $P = 2l + 2w$ for w

c) $a = \frac{v}{t}$ for v

d) $v = \frac{d}{t}$ for t

e) $A = \pi r^2$ for r

f) $P = I^2R$ for I

3. You can use the formula $C = 2.5I$ to obtain an approximate value for converting a length, I , in inches to a length, C , in centimetres.

a) Use the formula to find the number of centimetres in

i) 6 inches

ii) 3 feet (1 foot = 12 inches)

b) Rearrange the formula to express I in terms of C .

c) How many inches are in

i) 75 cm

ii) 1 m

4. Kwok is a hotel manager. His responsibilities include renting rooms for conferences. The hotel charges \$250 per day plus \$15 per person for the grand ballroom.

a) Create a formula that relates the cost, C , in dollars, of renting the ballroom to the number of people, n .

b) How much should Kwok charge to rent the hall for:

i) 50 people

ii) 100 people

c) Rearrange your formula to express n in terms of C .

d) How many people could attend a wedding reception if the wedding planners have a budget of:

i) \$4000

ii) \$2000

5. The area, A , of a square is related to its perimeter, P , by the formula $A = \frac{P^2}{16}$

a) Rearrange this formula to express P in terms of A .

b) Find the perimeter of a square with area:

i) 25 cm^2

ii) 50 cm^2

6. Sometimes the same formula can have many different forms. $PV = nRT$ is a useful formula in chemistry. It relates the characteristics of a gas:

Variable	Characteristic
P	pressure
V	volume
R	universal gas constant
n	number of moles, or how much gas there is
T	temperature

Rearrange this formula to isolate each variable:

7. The distance an accelerating object travels is related to its initial speed, v , its rate of acceleration, a , and time, t :

$$d = vt + \frac{1}{2}at^2$$

a) Rearrange this formula to isolate v .

b) An object travels 30 m while accelerating at a rate of 6 m/s^2 for 3 seconds. What was its initial speed?

4.5 Modeling With Algebra Worksheet #1

MPM1D

1. Write an algebraic expression to represent each description.

a) triple a number _____

b) four more than a number _____

c) half a number _____

d) five less than double a number _____

2. Write an equation to represent each sentence.

a) four times a number is 112 _____

b) a perimeter increased by 12 is 56 _____

c) five more than triple a number is 29 _____

d) the sum of two consecutive integers is 63 _____

3. Solve each equation in question 2.

a) _____ b) _____

c) _____ d) _____

4. Estaban is 6 years older than his brother Raoul. The sum of their ages is 38. How old are the brothers?

5. Two friends enter a trivia challenge as a team. Fayth scored 200 more points than Jamal. As a team, they collected a total of 2250 points. How many points did each friend earn?

6. Natalie, Chantal, and Samara play together as a forward line on a hockey team. At the end of the season, Chantal had scored eight more goals than Natalie while Samara had scored twice as many goals as Natalie. The three girls scored a total of 52 goals. How many goals did each girl score?

7. The sum of three consecutive integers is 54. Find the numbers.

8. Paloma works part-time, 4 hours per day, selling fitness club memberships. She is paid \$9/h, plus a \$12 commission for each 1-year membership she sells.

a) Write an algebraic expression that describes Paloma's total earnings.

b) Find the amount Paloma makes in 8 hours when she sells 7 memberships.

c) How many memberships does Paloma need to sell to earn \$600 in a 24 hour work week?

9. The mass of a banana plus its peel is 360g. The mass of the banana is four times the mass of the peel. What is the mass of the peel?

4.5 Modeling With Algebra Practice

Instructions: Find an equation to represent each problem and then solve!

1. A box of fruit has four more apples than oranges. Together there are 52 pieces of fruit. How many of each type of fruit are there?
2. Thu and Cleo are sharing the driving on a 520 mile trip. If Thu drives 60 miles more than Cleo, how far did each of them drive?
3. Aimee cut a string that was originally 126 centimeters long in to two pieces so that one piece is twice as long as the other. How long is each piece?
4. A full bucket of water weighs eight kilograms. If the water weighs five times as much as the empty bucket, how much does the water weigh?
5. The perimeter of a rectangle is 100 feet. If the length is five feet more than twice the width, find the length and width.
6. The perimeter of a rectangular city is 94 miles. If the length is one mile less than three times the width, find the length and width of the city.
7. Find three consecutive numbers whose sum is 138.
8. Find three consecutive even numbers whose sum is 468.
9. The perimeter of a triangle is 57. The first side is twice the length of the second side. The third side is seven more than the second side. What is the length of each side?
10. The perimeter of a triangle is 86 inches. The largest side is four inches less than twice the smallest side. The third side is 10 inches longer than the smallest side. What is the length of each side?

11. Thirty more student tickets than adult tickets were sold for the game. Student tickets cost \$2, adult tickets cost \$5, and \$1460 was collected. How many of each kind of ticket were sold?
12. Fifty more “couples” tickets than “singles” tickets were sold for the dance. “Singles” tickets cost \$10 and “couples” tickets cost \$15. If \$4000 was collected, how many of each kind of ticket was sold?
13. Helen has twice as many dimes as nickels and five more quarters than nickels. The value of her coins is \$4.75. How many dimes does she have?
14. Ly has three more dimes than nickels and twice as many quarters as dimes. The value of his coins is \$9.60. How many of each kind of coin does he have?
15. Enrique put his money in the credit union for one year. His money earned 8% simple interest and at the end of the year his account was worth \$1350. How much was originally invested?
16. Juli's bank pays 7.5% simple interest. At the end of the year, her college fund was worth \$10,965. How much was it worth at the start of the year?

Bonus: Sidney is directly in front of Marc-Andre, who is playing goalie, as shown. Sidney is 2.8 m from both goal posts. He is also three times as far from Marc-Andre as Marc-Andre is from either post. How wide is the net?



SOLUTIONS: