

Title: Interesting Integers and Exciting Equations

Brief Overview:

The lessons in this unit are designed to address content standards for integers and solving one and two-step equations. Each lesson is based on the student learning outcomes prescribed for sixth grade. The one-day lesson on integers is designed as a review, as this concept has been previously taught. The three remaining lessons address the basics of evaluating expressions and solving simple equations using the balance method.

NCTM Content Standard/National Science Education Standard:

NCTM Content Standards for Grades 6-8: Algebra

- Represent and analyze mathematical situations and structures using algebraic symbols;
- Use mathematical models to represent and understand quantitative relationships;
- Apply and adapt a variety of appropriate strategies to solve problems.

Grade/Level:

Grade 6

Duration/Length:

Four 85 – 90 minute Periods

Student Outcomes:

Students will:

Lesson One

- Apply their knowledge of rational numbers and place value in order to review how to read, write, and represent integers.
- Use their knowledge of number relationships and computation in order to solve integer problems using all four operations.

Lesson Two

- Use their knowledge of expressions and equations in order to identify, write, and solve one-step equations.
- Determine the unknown in a linear equation using one operation (+, -, x, ÷) and positive and negative coefficients.

Lesson Three

- Use their knowledge of expressions and equations in order to identify, write, and solve two-step equations.

- Determine the unknown in a linear equation using one operation (+, -, \times , \div) and positive and negative coefficients.

Lesson 4

- Use their knowledge of number relationships and computation in order to review solving integer problems using all four operations.
- Use their knowledge of expressions and equations in order to review identifying, writing, and solving one-step equations and two-step equations.

Materials and Resources:

Lesson 1

- Glue Sticks
- Scissors
- Integer Vocabulary Packet for students
- Integer Vocabulary Magnet Templates
- “Sink or Sun” Packet (You will need 6 blank dice labeled as indicated in the packet)
- Operations with Integers Worksheet
- Magic Square Challenge
- Integer Homework (Worksheet)

Lesson 2

- Warm up Worksheet
- Integer chip templates (one positive, which should be printed on yellow paper, and one negative, which should be printed on red paper, for each student)
- One envelope or zip lock bag per student to store integer chips
- Styrofoam cups, one for each student
- Coach/Player Worksheets
- Solving Equations Worksheet
- Equation Concentration Packet
- Solving Equations Homework

Lesson 3

- How Am I Ever Going to Use This? Overhead
- Balance, blocks, bags (or small opaque containers)
- Pass the Problem Worksheet
- BCR
- Equation Concentration Cards from Lesson 2
- Homework Practice from math book

Lesson 4

- Two-step Equation Launch Cards
- Jeopardy Power Point Game
- Integer-Solving Equations Study Guide

Development/Procedures:

Lesson 1

Preassessment & Launch – Read the lesson objective to the students. Give each student one Integer Vocabulary Packet. Tell students they have 10 minutes to cut out the vocabulary terms and paste them in front of the appropriate definition. Circulate to assess prior knowledge and help students as needed. After 10 minutes, ask for student volunteers to come to the board and place magnetized vocabulary terms next to the appropriate definition. (See template)

Teacher Facilitation – Have the students Think/Pair/Share about integers. During the share stage, guide students in a discussion of the definition of an integer and how to write and graph integers. Remind students that we can compare integers by using a number line.

Student Application – All students may not have the same prior knowledge of integers. In order to facilitate student comprehension have students play “Sink or Sun”. See the attached “Sink or Sun” packet for directions and materials. Limit the actual game time to around 10 minutes. After completing the “Sink or Sun” game have students volunteer their observations about adding and subtracting integers. Follow up with a review of the rules for all four operations with integers.

Embedded Assessment – Students will complete the attached Operations with Integers Worksheet.

Reteaching/Extension –

- For those who have not completely understood the lesson, review the rules for operations with integers.
- For those who have understood the lesson, have them make up a word problem that requires the use of an operation and numbers that are between -20 and 20 . When students finish writing their problem have them trade with a partner to solve. Upon completion of this activity students should work on the Magic Square Challenge.
- All students should complete the Integer Homework Sheet attached.

Lesson 2

Preassessment & Launch – Distribute the Warm Up Your Engines sheet. Students work independently, then work with a partner to check for accuracy of answers. Then review the concept of a variable and checking work by using opposite operations.

Teacher Facilitation – Distribute one red and one yellow Integer Chip template and one Styrofoam cup to each student. Students cut out Integer Chips, and draw an X on the side of the cup. Model using the cup as a variable and the chips as numbers to represent one-step equations. After modeling solving the equation, the equation should be written on the board or overhead for students to see. Then model solving the equations algebraically without using the Integer Chips, using teacher-made examples.

Student Application – Distribute Coach and Player sheets. In this activity, partners take turns being the coach and player. Students work in pairs. The coach gives the player step-by-step instructions to solve an equation. The player records the solution step-by-step in writing. If the coach is correct, the player praises the coach. Otherwise, the player coaches the coach, then praises. Students switch roles for the next problem. While students are working, circulate to informally assess understanding and clear up misconceptions.

Embedded Assessment – Students should complete the Solving Equations Worksheet. Tell students they may use their Integer Chips to help them solve the problems.

Reteaching/Extension –

- For those who have not completely understood the lesson, review the steps for solving equations. If necessary use the Integer Chips as models.
- For those who have understood the lesson complete Equation Concentration Packet.
- All students should complete the Solving Equations Homework Sheet.

Lesson 3

Preassessment and Launch – Using the “How Am I Ever Going to Use This?” overhead, review to assess student understanding of the parts of an equation and to model the steps for solving a multi-step equation. Have students turn to a partner and explain how the equations change when the components of the equation change.

Teacher Facilitation – Using a balance, small opaque containers, (small bags, or small cups work) and rainbow cubes, model solving two-step equations using the balance method. Each time you do a step, write it on the overhead or board, modeling the correct way to solve the equation algebraically. Have students copy the examples in their notebooks as you go. Next, have students come up and model solving the equation using the balance, as you write the steps on the board. Finally, have students generate equations to model on the balance, and have student volunteers write the steps on the board.

Student Application – Have students work in groups of three to complete “Pass a Problem” sheets (see resources). Circulate to assess understanding, and to correct misconceptions.

Embedded Assessment – Have students complete a BCR on two-step equations. (See “Let’s Go Snowboarding!”).

Reteaching/Extension –

- For students needing re-teaching, work with them individually or in small groups.
- Those understanding the concept can play the Equation Concentration game they made yesterday, or a commercial game such as Integer 24.
- For homework, give students a practice page from the text.

Lesson 4

Preassessment and Launch – Distribute a two-step equation card to each student. Students solve the equations at their seats, showing all work. When they are finished, students will line up in front of the room with their answers in numerical order from least to greatest. Students must remain silent when arranging themselves in numerical order. The teacher can quickly assess understanding and correct misconceptions about integers and solving equations.

Teacher Facilitation, Student Application and Embedded Assessment – Students will be divided into two teams to play a Jeopardy game to review integer operations and how to solve one- and two-step equations.

Reteaching/Extension –

- Distribute the study guide and have students work in pairs to begin problems in class.
- Circulate to help students who need assistance.
- The study guide will be completed for homework, and will help students prepare for the next day's assessment.

Summative Assessment:

Students may take the Integer-Solving Equations Test provided in order to practice skills that will be on the MSA.

Authors:

Phyllis Crabbe
Severna Park Middle School
Anne Arundel County Public Schools

Dawn Pegg
Oaklands Elementary School
Prince George's County Public
Schools

Integer Vocabulary Matching Sheet 1

Directions:

Cut out the following words, and paste them next to the correct definition on the next page.

Additive Inverse

Algebraic Expression

Equation

Inequality

Integer

Inverse Operation

Manipulatives

Model

Multiplicative Inverse

Variable

Whole Numbers

Integer Vocabulary Matching Sheet 2

Directions: *Glue the vocabulary word in front of the correct definition.*

Tools, models, blocks, tiles, and other objects which are used to explore mathematical ideas and solve mathematical problems.

The numbers in the set $\{0,1,2,3,\dots\}$.

A set of whole numbers and its opposites (i.e. $\dots-3, -2, -1, 0,1,2,3, \dots$).

A mathematical sentence of equality between two expressions.

To represent or show mathematical ideas and relationships and real-world situations using objects, pictures, graphs, tables, functions, and other methods.

Two numbers whose sum is 0.

Numeral and/or variable joined by any combination of the four basic operations and involving any power(s) of numeral and/or variable.

Two numbers whose product is 1.

A letter or symbol which represents one or more numbers.

Two operations that "undo" each other, such as addition and subtraction.

A mathematical sentence in which the values of the expressions on either side of the relation symbol are unequal.

**Additive
Inverse**

**Algebraic
Expression
Equation**

Inequality

Integer

Inverse Operation

Manipulatives

Model

Multiplicative

Inverse

Variable

Whole Numbers

Tools, models, blocks, tiles,
and other objects which
are used to explore
mathematical ideas and
solve mathematical
problems.

The numbers in the set
 $\{0, 1, 2, 3, \dots\}$.

A set of whole numbers
and its opposites (i.e. ...-3,
-2, -1, 0, 1, 2, 3, ...).

A mathematical sentence
of equality between two
expressions.

To represent or show mathematical ideas and relationships and real-world situations using objects, pictures, graphs, tables, functions, and other methods.

Two numbers whose sum is
zero.

Numeral and/or variable
joined by any combination
of the four basic
operations and involving
any power(s) of numeral
and/or variable.

Two numbers whose
product is 1.

A letter or symbol which represents one or more numbers.

Two operations that "undo"
each other, such as
addition and subtraction.

A mathematical sentence in which the values of the expressions on either side of the relation symbol are unequal.

Teacher Instructions for Sink or Sun

Materials:

- Numbers for the floor
- "Sink" and "Sun" pictures
- A direction cube with 3 faces labeled "beach" and 3 labeled "water"
- A walking cube with faces labeled F1, F2, F3 and B1, B2, B3.

Directions:

- Lay out the numbers on the floor, in ascending order from left to right. Put the "sink" picture on the left, and the "sun" picture on the right.
- Have a student stand at the edge of the water (on the 0). To decide where the student should move, student volunteers roll 2 cubes, a direction cube and a walking cube.
- If the "beach" is rolled, the student faces the sun picture. If "water" is rolled, the student faces the sink picture.
- If F1, F2, or F3 are rolled, the student walks forward 1, 2, or 3 steps. If B1, B2, or B3 are rolled, the student walks backward 1, 2, or 3 steps.
- Play continues until the student "sinks" in the water or reaches the comfort of the beach blanket.
- After playing several times, have students relate the game to a number line, which can be drawn on the chalkboard behind where the game is being played.

1

2

3

4

O

1

1

1

2

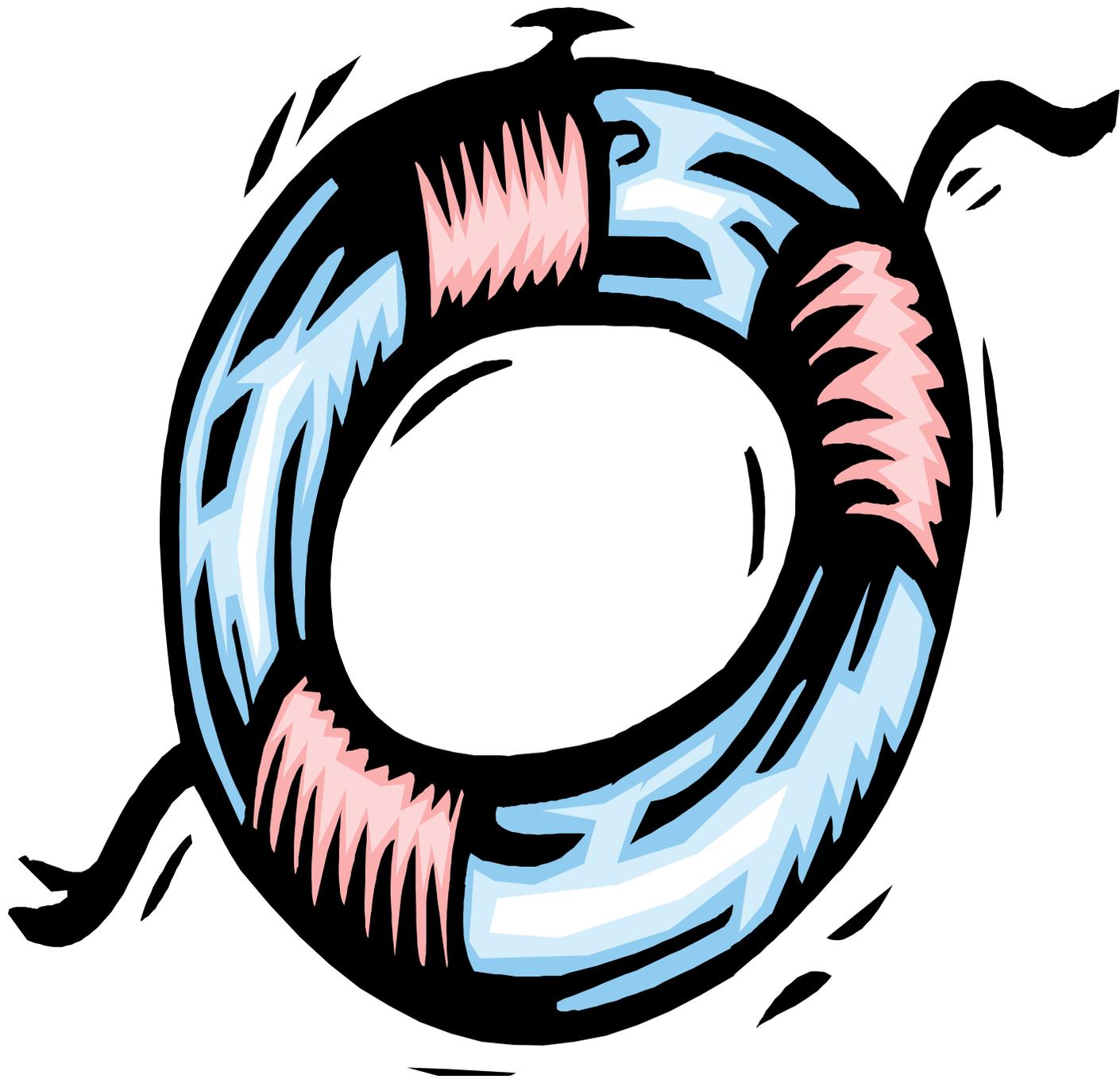
1

3

-4



Sun



Sink

Name _____ Date _____
Math _____ Period _____

Operations With Integers Worksheet

Directions: Solve each problem below using the appropriate operation.

1. $-8 + 16$

11. $8 \times (-4)$

2. $-4 + (-3)$

12. $-3(7)$

3. $-2 + (-2)$

13. $-3(-3)$

4. What is 2 plus -4 plus -3?

14. What is the product of -8 and -2?

5. Find the sum of -14 and 22.

15. Find the product of 7 and -10.

6. $4 - 7$

16. $8 \div 2$

7. $4 - (-5)$

17. $6 \div (-3)$

8. $-10 - 5$

18. $-25 \div (-5)$

9. What is 7 minus -2 plus -12?

19. What is the quotient of 72 and -8?

10. Find the difference of $-15 - (-5)$.

20. Find the value of $-32 \div -16$.

BONUS: The Smith's kitchen faucet has a leak. It drips 4 quarts of water every day. How many quarts of water does it drip in one week?

Name _____

Date _____

Math

Period _____

Operations With Integers Worksheet

ANSWER KEY

Directions: Solve each problem below using the appropriate operation.

11. $-8 + 16$

8

11. $8 \times (-4)$

-32

12. $-4 + (-3)$

-7

12. $-3(7)$

-21

13. $-2 + (-2)$

-4

13. $-3(-3)$

9

14. What is 2 plus -4 plus -3?

-5

14. What is the product of -8 and -2?

16

15. Find the sum of -14 and 22.

8

15. Find the product of 7 and -10.

-70

16. $4 - 7$

-3

16. $8 \div 2$

4

17. $4 - (-5)$

9

17. $6 \div (-3)$

-2

18. $-10 - 5$

-15

18. $-25 \div (-5)$

5

19. What is 7 minus -2 plus -12?

-3

19. What is the quotient of 72 and -8?

-920. Find the difference of $-15 - (-5)$.**-10**20. Find the value of $-32 \div -16$.**2**

BONUS: The Smith's kitchen faucet has a leak. It drips 4 quarts of water every day. How many quarts of water does it drip in one week? **28**

Name _____ Date _____

Math _____ Period _____

Magic Square Challenge

Directions: Your challenge is to place the integers listed above each Magic Square in one the boxes. Your goal is to arrange the integers so the sum of each vertical, horizontal, and diagonal row is the same. You may only use each integer one time.

3, 2, 1, 0, -1, -2, -3, -4, -5

-1, -2, -3, -4, -5, -6, -7, -8, -9

Name _____ Date _____

Math _____ Period _____

Magic Square Challenge

ANSWER KEY

Directions: Your challenge is to place the integers listed above each Magic Square in one the boxes. Your goal is to arrange the integers so the sum of each vertical, horizontal, and diagonal row is the same. You may only use each integer one time.

3, 2, 1, 0, -1, -2, -3, -4, -5

-4	1	0
3	-1	-5
-2	-3	2

-1, -2, -3, -4, -5, -6, -7, -8, -9

-8	-1	-6
-3	-5	-7
-4	-9	-2

Name _____ Date _____

Math _____ Period _____

Integer Homework

- Write the integer that describes 7 miles below sea level. _____
- $8 + (-3)$
- $-6 + 2$
- $-4 + (-7)$
- $-12 + 22$
- $9 - (-3)$
- $-3 - 5$
- $8 - (-2)$
- $-4 - (-7)$
- Find the value of f that makes $f - (-5) = 17$ a true sentence.
a) 22 b) -12 c) 12 d) -22
- -3×5
- $6(-4)$
- $-2 \times (-8)$
- $-8(8)$
- Write the integer that represents the amount lost if you lost \$3 each month for 4 months.
- $8 \div (-2)$
- $-56 \div (-8)$
- $-81 \div 9$
- $-36 \div (-3)$
- What is the value of $m \div q$ if $m = -28$ and $q = 7$?

CHALLENGE QUESTION: If it takes Susan 5 minutes to walk around her neighborhood block, then $5t$ gives the total time where t is the number of times around the block. Write the ordered pairs (the number of times around the block, time) for 1, 3, and 5 times.

Name _____ Date _____
Math _____ Period _____

Integer Homework ANSWER KEY

3. Write the integer that describes 7 miles below sea level. **-7**

4. $8 + (-3)$

5

3. $-6 + 2$

-4

4. $-4 + (-7)$

-11

5. $-12 + 22$

10

6. $9 - (-3)$

12

7. $-3 - 5$

-8

8. $8 - (-2)$

10

9. $-4 - (-7)$

3

10. Find the value of f that makes $f - (-5) = 17$ a true sentence. **C**

a) 22 b) -12 c) 12 d) -22

11. -3×5

-15

12. $6(-4)$

-24

13. $-2 \times (-8)$

16

14. $-8(8)$

-64

15. Write the integer that represents the amount lost, if you lost \$3 each month for 4 months. **\$-12**

-4

17. $-56 \div (-8)$

7

18. $-81 \div 9$

-9

19. $-36 \div (-3)$

12

20. What is the value of $m \div q$ if $m = -28$ and $q = 7$? **-4**

CHALLENGE QUESTION: If it takes Susan 5 minutes to walk around her neighborhood block, then $5t$ gives the total time where t is the number of times around the block. Write the ordered pairs (the number of times around the block, time) for 1, 3, and 5 times. **(1,5), (3,15), (5,25)**



Warm Up Your Engines!

Fill in the blanks with integers to make true statements.

Start...

$$67 - 39 = \underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}} - -85 = \underline{\hspace{2cm}}$$

$$-34 - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}} + 14 = \underline{\hspace{2cm}}$$

$$-98 - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}} + -27 = \underline{\hspace{2cm}}$$

$$-27 - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}} + 99 = \underline{\hspace{2cm}}$$

finished!

Coach & Player

Name _____

Name _____

$$X - 17 = 24$$

$$Y + 16 = 50$$

$$M - (-20) = 34$$

$$Q + (-5) = 17$$

$$P + 5 = -11$$

$$-14 + A = -20$$

Coach & Player **ANSWER KEY**

Name _____

Name _____

$\begin{array}{r} X - 17 = 24 \\ \underline{+17 \ +17} \\ X = 41 \end{array}$	$\begin{array}{r} Y + 16 = 50 \\ \underline{-16 \ -16} \\ X = 34 \end{array}$
$\begin{array}{r} M - (-20) = 34 \\ \underline{+(-20) \ +(-20)} \\ M = 14 \end{array}$	$\begin{array}{r} Q + (-5) = 17 \\ \underline{-(-5) \ -(-5)} \\ Q = 22 \end{array}$
$\begin{array}{r} P + 5 = -11 \\ \underline{-5 \ -5} \\ P = -16 \end{array}$	$\begin{array}{r} -14 + A = -20 \\ \underline{+14 \ +14} \\ A = -6 \end{array}$

Name _____
Math _____

Date _____
Period _____

Solving Equations Worksheet

Directions: Solve each equation below. You may use models if necessary. You must show your steps for solving the equations.

1. $-5 = x + 11$

2. $w + 17 = 29$

3. $m - 9 = 3$

4. $p - 5 = -1$

5. $-6d = 42$

6. $12 = c + (-2)$

7. $2b = -8$

8. $15 = 3n$

9. $g - 4 = -3$

10. $6x = 12$

11. Jane and her dog weigh 108 pounds. Jane weighs 87 pounds. Write and solve an addition equation to find the dog's weight.

12. If $d - 1.2 = 6$, what is the value of d ?

Name _____
Math _____

Date _____
Period _____

Solving Equations Worksheet ANSWER KEY

Directions: Solve each equation below. Use may use models if necessary. You must show your steps for solving the equations.

$$\begin{array}{r} 1. \ -5 = x + 11 \\ \underline{-11 \quad -11} \\ -16 = x \end{array}$$

$$\begin{array}{r} 2. \ w + 17 = 29 \\ \underline{-17 \quad -17} \\ w = 12 \end{array}$$

$$\begin{array}{r} 3. \ m - 9 = 3 \\ \underline{+9 \quad +9} \\ m = 12 \end{array}$$

$$\begin{array}{r} 4. \ p - 5 = -1 \\ \underline{+5 \quad +5} \\ p = 6 \end{array}$$

$$\begin{array}{r} 5. \ -6d = 42 \\ \underline{-6 \quad -6} \\ d = -7 \end{array}$$

$$\begin{array}{r} 6. \ 12 = c + (-2) \\ \underline{-(-2) \quad -(-2)} \\ 14 = c \end{array}$$

$$\begin{array}{r} 7. \ 2b = -8 \\ \underline{2 \quad 2} \\ b = -4 \end{array}$$

$$\begin{array}{r} 8. \ 15 = 3n \\ \underline{3 \quad 3} \\ 5 = n \end{array}$$

$$\begin{array}{r} 9. \ g - 4 = -3 \\ \underline{+4 \quad +4} \\ g = 1 \end{array}$$

$$\begin{array}{r} 10. \ 6x = 12 \\ \underline{6 \quad 6} \\ x = 2 \end{array}$$

11. Jane and her dog weigh 108 pounds. Jane weighs 87 pounds. Write and solve an addition equation to find the dog's weight.

$$\begin{array}{r} 108 = x + 87 \\ \underline{-87 \quad -87} \\ 21 = x \end{array}$$

12. If $d - 1.2 = 6$, what is the value of d ?

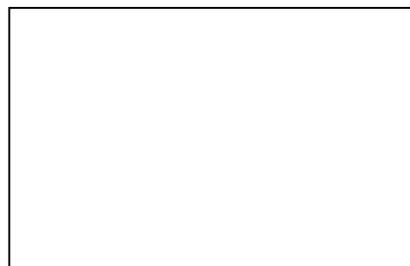
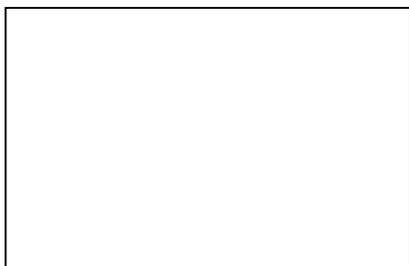
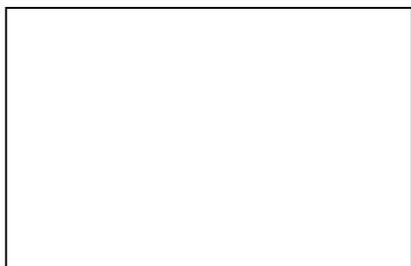
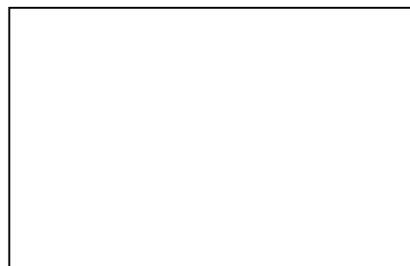
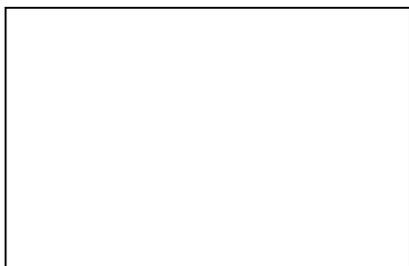
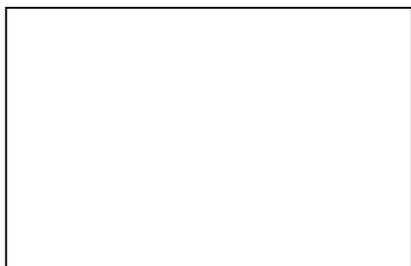
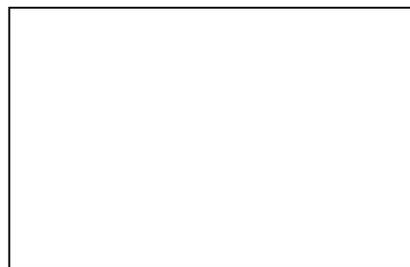
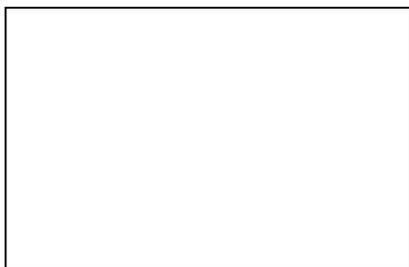
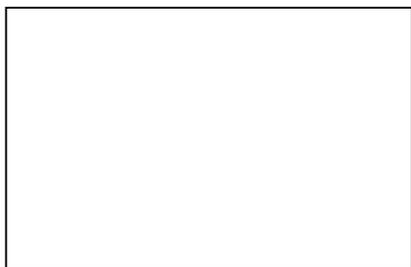
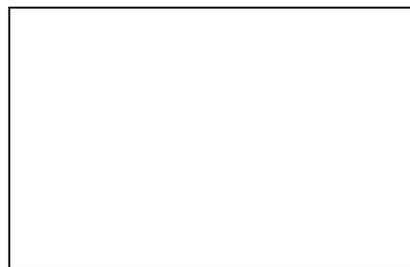
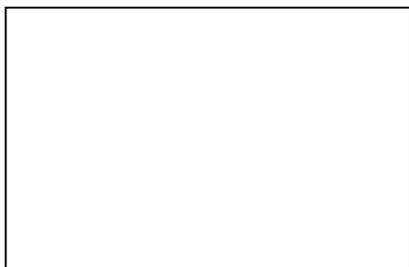
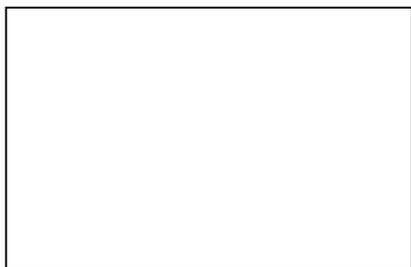
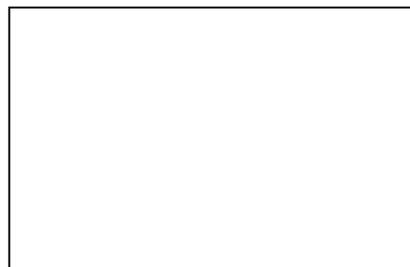
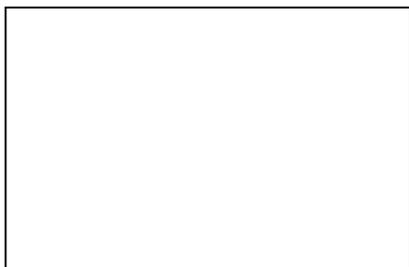
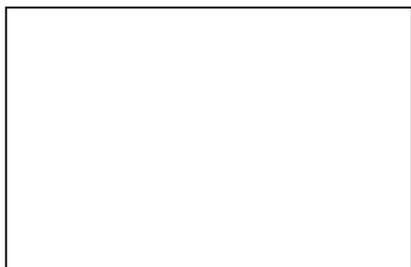
$$\begin{array}{r} \underline{+1.2 \quad +1.2} \\ d = 7.2 \end{array}$$

Equation Concentration

Directions: In each of the boxes below write a one-step equation. Next cut out your boxes.

Equation Concentration

Directions: In each of the boxes below write the answer to your one-step equations. Next cut out your boxes. When you have cut out all the boxes play concentration alone or with a partner to find the matches.



Name _____ Date _____

Math _____ Period _____

Solving Equations Homework

Directions: Solve each equation below. You may use models if necessary. You must show your steps for solving the equations.

1. $c + 8 = 11$

2. $x + 15 = 14$

3. $54 = m - 9$

4. $-5 = -2 + x$

5. $w + 13 = -25$

6. $17 + d = -2$

7. $23 = h + 11$

8. $19 + r = 11$

9. $z - 7 = 11$

10. $s - 9 = -12$

11. $14 = m - 5$

12. $-4 = y - 9$

13. $h - 2 = -9$

14. $-6 = g - 4$

15. $p - 22 = -7$

16. $d - 3 = -14$

17. $4b = 32$

18. $5y = 60$

19. $-3m = 21$

20. $-18 = -6c$

21. $7a = -35$

22. $28 = -2d$

23. $-4x = 10$

24. $-6y = -9$

25. Last week, Timothy spent 3 times as much on lunch as he spent on snacks. If he spent \$12 on lunch, how much did he spend on snacks? Explain your answer.

26. An object on Earth weighs six times what it would weigh on the moon. If an object weighs 78 pounds on Earth, what is its weight on the moon?

27. Margie is four times as old as her brother. If Maggie is 16, how old is her brother?

28. Lisa bought a backpack for \$28. This was \$8 less than the regular price. Write and solve a subtraction equation to find the regular price.

29. Jason and Carlos have a total of 20 tadpoles and frogs. Of these, 12 are tadpoles and the rest are frogs. Write and solve an addition equation to find the number of frogs.

30. A hot air balloon is 200 feet in the air. A few minutes later it ascends to 450 feet. Write and solve an addition equation to find the change of altitude of the hot air balloon.

Name _____ Date _____
Math _____ Period _____

Solving Equations Homework ANSWER KEY

Directions: Solve each equation below. Use may use models if necessary. You must show your steps for solving the equations.

$$\begin{array}{r} 1. \quad c + 8 = 11 \\ \quad - 8 \quad - 8 \\ \hline \quad \quad c = 3 \end{array}$$

$$\begin{array}{r} 2. \quad x + 15 = 14 \\ \quad - 15 \quad - 15 \\ \hline \quad \quad x = -1 \end{array}$$

$$\begin{array}{r} 3. \quad 54 = m - 9 \\ \quad + 9 \quad + 9 \\ \hline \quad 63 = m \end{array}$$

$$\begin{array}{r} 4. \quad -5 = -2 + x \\ \quad + 2 \quad + 2 \\ \hline \quad -3 = x \end{array}$$

$$\begin{array}{r} 5. \quad w + 13 = -25 \\ \quad - 13 \quad - 13 \\ \hline \quad \quad w = -38 \end{array}$$

$$\begin{array}{r} 6. \quad 17 + d = -2 \\ \quad - 17 \quad - 17 \\ \hline \quad \quad d = -19 \end{array}$$

$$\begin{array}{r} 7. \quad 23 = h + 11 \\ \quad - 11 \quad - 11 \\ \hline \quad 12 = h \end{array}$$

$$\begin{array}{r} 8. \quad 19 + r = 11 \\ \quad - 19 \quad - 19 \\ \hline \quad \quad r = -8 \end{array}$$

$$\begin{array}{r} 9. \quad z - 7 = 11 \\ \quad + 7 \quad + 7 \\ \hline \quad \quad z = 18 \end{array}$$

$$\begin{array}{r} 10. \quad s - 9 = -12 \\ \quad + 9 \quad + 9 \\ \hline \quad \quad s = -3 \end{array}$$

$$\begin{array}{r} 11. \quad 14 = m - 5 \\ \quad + 5 \quad + 5 \\ \hline \quad 19 = m \end{array}$$

$$\begin{array}{r} 12. \quad -4 = y - 9 \\ \quad + 9 \quad + 9 \\ \hline \quad \quad 5 = y \end{array}$$

$$\begin{array}{r} 13. \quad h - 2 = -9 \\ \quad + 2 \quad + 2 \\ \hline \quad \quad h = -7 \end{array}$$

$$\begin{array}{r} 14. \quad -6 = g - 4 \\ \quad + 4 \quad + 4 \\ \hline \quad \quad -2 = g \end{array}$$

$$\begin{array}{r} 15. \quad p - 22 = -7 \\ \quad + 22 \quad + 22 \\ \hline \quad \quad p = 15 \end{array}$$

$$\begin{array}{r} 16. \quad d - 3 = -14 \\ \quad + 3 \quad + 3 \\ \hline \quad \quad d = -11 \end{array}$$

$$\begin{array}{r} 17. \quad 4b = 32 \\ \quad \quad 4 \quad 4 \\ \hline \quad \quad b = 8 \end{array}$$

$$\begin{array}{r} 18. \quad 5y = 60 \\ \quad \quad 5 \quad 5 \\ \hline \quad \quad y = 12 \end{array}$$

$$19. \frac{-3m}{-3} = \frac{21}{-3}$$

$$m = -7$$

$$20. \frac{-18}{-6} = \frac{-6c}{-6}$$

$$3 = c$$

$$21. \frac{7a}{7} = \frac{-35}{7}$$

$$a = -5$$

$$22. \frac{28}{-2} = \frac{-2d}{-2}$$

$$-14 = d$$

$$23. \frac{-4x}{-4} = \frac{10}{-4}$$

$$x = -2.5$$

$$24. \frac{-6y}{-6} = \frac{-9}{-6}$$

$$y = 1.5$$

25. Last week, Timothy spent 3 times as much on lunch as he spent on snacks. If he spent \$12 on lunch, how much did he spend on snacks? Explain your answer.

$$\frac{3x}{3} = \frac{\$12}{3}$$

$$x = \$4$$

26. An object on Earth weighs six times what it would weigh on the moon. If an object weighs 78 pounds on Earth, what is its weight on the moon?

$$\frac{6x}{6} = \frac{78}{6}$$

$$x = 13$$

27. Margie is four times as old as her brother. If Maggie is 16, how old is her brother?

$$\frac{4x}{4} = \frac{16}{4}$$

$$x = 4$$

28. Lisa bought a backpack for \$28. This was \$8 less than the regular price. Write and solve a subtraction equation to find the regular price.

$$x - \$28 = \$8$$

$$\begin{array}{r} x - \$28 = \$8 \\ +28 \quad +28 \\ \hline x = \$36 \end{array}$$

29. Jason and Carlos have a total of 20 tadpoles and frogs. Of these, 12 are tadpoles and the rest are frogs. Write and solve an addition equation to find the number of frogs.

$$12 + x = 20$$

$$\begin{array}{r} 12 + x = 20 \\ -12 \quad -12 \\ \hline x = 8 \end{array}$$

30. A hot air balloon is 200 feet in the air. A few minutes later it ascends to 450 feet. Write and solve an addition equation to find the change of altitude of the hot air balloon.

$$200 + x = 450$$

$$\begin{array}{r} 200 + x = 450 \\ -200 \quad -200 \\ \hline x = 250 \end{array}$$

How am I Ever Going to Use This?

Suppose you buy two CDs online for a total price of \$31 including shipping and handling charges of \$4. The CDs are the same price.

1. Let C = the cost of one CD. How does the equation $2C+4 = 31$ represent this situation?
2. Subtract 4 from each side of the equation. Write the equation that results.
3. Divide each side of the equation you wrote by 2. Write the result. What is the cost of each CD?
4. Suppose you buy 3 CDs. How would this affect the equation?
5. Suppose each CD costs \$12. How would this affect the original equation?
6. Suppose the shipping and handling charge is \$5. How would this change the original equation? Rewrite the equation to represent this situation.

How am I Ever Going to Use This?

Answer Key

Suppose you buy two CDs online for a total price of \$31 including shipping and handling charges of \$4. The CDs are the same price.

1. Let C = the cost of one CD. How does the equation $2C+4 = 31$ represent this situation?

Two times the cost of the CD plus \$4 for shipping and handling.

2. Subtract 4 from each side of the equation. Write the equation that results.

$$2c=27$$

3. Divide each side of the equation you wrote by 2. Write the result. What is the cost of each CD?

$$\$13.50$$

4. Suppose you buy 3 CDs. How would this affect the equation? **The total cost would increase.**

5. Suppose each CD costs \$12. How would this affect the original equation? **The total cost would decrease.**

6. Suppose the shipping and handling charge is \$5. How would this change the original equation? Rewrite the equation to represent this situation.

$$2c + 5 = 31$$

The cost of the CDs would be less than in the original equation.

Pass the Problem

$$3a + 4 = 7$$

Pass the Problem

$$-8 = 6y - 2$$

Pass the Problem

$$2x + 3 = 9$$

Pass the Problem

$$-7 = 4s + 1$$

Pass the Problem

$$10 = 2r - 8$$

Pass the Problem

Answer Key

$$3a + 4 = 7$$

$$\begin{array}{r} -4 \quad -4 \\ \hline \end{array}$$

$$\underline{3a} = \underline{3}$$

$$\underline{3} \quad \underline{3}$$

$$a = 1$$

Pass the Problem

Answer Key

$$-8 = 6y - 2$$

$$\begin{array}{r} +2 \qquad \qquad \qquad +2 \\ \hline \end{array}$$

$$\underline{-6} = \underline{6y}$$

$$6 \qquad \qquad 6$$

$$-1 = y$$

Pass the Problem

Answer Key

$$2x + 3 = 9$$

$$-3 \quad -3$$

$$\underline{2x} = \underline{6}$$

$$2 \quad 2$$

$$x = 3$$

Pass the Problem

Answer Key

$$-7 = 4s + 1$$

$$\begin{array}{r} -1 \qquad \qquad -1 \\ \hline \end{array}$$

$$\underline{-8} = \underline{4s}$$

$$4 \qquad \qquad 4$$

$$-2 = s$$

Pass the Problem

Answer Key

$$10 = 2r - 8$$

$$\begin{array}{r} +8 \qquad \qquad \qquad +8 \\ \hline \end{array}$$

$$\underline{18} = \underline{2r}$$

$$2 \qquad \qquad \qquad 2$$

$$9 = r$$

Let's Go Snowboarding!

You and two of your friends decide to go snowboarding next weekend. The admission to the slopes is \$20 each. Your friend Pat brought her own snowboard, but you and your friend Chris had to rent boards. You all figured out that you needed a total of \$86 to hit the slopes. How much does it cost to rent one snowboard?

- Write an equation to represent the problem presented above.
-
- Solve the equation. Use what you know about solving equations to show how you got your answer. Be sure to show all work!

Let's Go Snowboarding!

Answer Key

You and two of your friends decide to go snowboarding next weekend. The admission to the slopes is \$20 each. Your friend Pat brought her own snowboard, but you and your friend Chris had to rent boards. You all figured out that you needed a total of \$86 to hit the slopes. How much does it cost to rent one snowboard?

- Write an equation to represent the problem presented above.

$$3(20) + 2x = 86$$

- Solve the equation. Use what you know about solving equations to show how you got your answer. Be sure to show all work!

$$\begin{array}{r} 3(20) + 2x = 86 \\ 60 + 2x = 86 \\ \underline{- 60 \quad - 60} \\ 2x = 26 \\ \underline{\quad 2 \quad 2} \\ x = 13 \end{array}$$

Two-Step Equation Launch for Lesson 4

Cut and distribute one card to each student. Refer to Lesson 4 for specific instructions.

$$3x - 7 = 13$$

$$2h - 5 = 7$$

$$-2 - 3y = -11$$

$$-6 + 2m = 8$$

$$7y - 3 = 4$$

$$-5 = 4t - 13$$

$$-4y + 9 = 17$$

$$-5 = -2g + 3$$

$$2x + 16 = 26$$

$$-4y + 16 = 64$$

$$5p + 3 = 23$$

$$4 = 8w + 20$$

$$7a - 6 = 15$$

$$6 = 2w + 2$$

$$7 + 3a = 25$$

Two-Step Equation Launch for Lesson 4

Cut and distribute one card to each student. Refer to Lesson 4 for specific instructions.

$$8m + 7 = -9$$

$$2x + 4 = 8$$

$$6t - 9 = 9$$

$$15 = -3p + 9$$

$$10y + 5 = 45$$

$$5m + 10 = 70$$

$$14 = -5q - 1$$

$$4z + 2 = 14$$

$$8s - 4 = 28$$

$$9h - 5 = 40$$

$$26 = 3j + 2$$

$$40 = 2d + 20$$

$$4 - 5p = 14$$

$$3x - 17 = -5$$

$$7 = 3y + 1$$

Name _____ Date _____
Math _____ Period _____

Integer & Solving Equations Study Guide

Solve the problems below. Make sure you show all of your work including all necessary steps.

1. $12 + -7 =$

2. $4 - (-7) =$

3. $-4x = 32$

4. $-3z - 7 = 29$

5. $-16 = -5y - 1$

6. $-5 + (-10)$

7. $4 + (-4)$

8. $-6 + 3$

9. $-15 - (-5)$

10. $-7 - (-2)$

11. $3(-7)$

12. $-6 \div (-3)$

13. $14 + w = -2$

14. $n - (-3) = 12$

$$15. 2g = -20$$

$$16. 2g + 5 = -30$$

$$17. 23 = -3z + 2$$

$$18. -15 = -3p + 9$$

$$19. -6q - 10 = 38$$

20. Tyler spent \$44 at the music store. He bought two CDs for the same price each and a case for \$14. How much did each CD cost? Write an equation to find your answer.

Name _____ Date _____
Math _____ Period _____

Integer & Solving Equations Study Guide **Answer Key**

Solve the problems below. Make sure you show all of your work including all necessary steps.

1. $12 + -7 =$
5

2. $4 - (-7) =$
11

4. $-4x = 32$
 $x = -8$

4. $-3z - 7 = 29$
 $z = -12$

6. $-16 = -5y - 1$
 $3 = y$

6. $-5 + (-10)$
-15

7. $4 + (-4)$
0

8. $-6 + 3$
-3

9. $-15 - (-5)$
-10

10. $-7 - (-2)$
-5

11. $3(-7)$
-21

12. $-6 \div (-3)$
2

13. $14 + w = -2$
 $w = -16$

14. $n - (-3) = 12$
 $n = 9$

$$15. 2g = -20$$
$$g = -10$$

$$16. 2g + 5 = -30$$
$$g = -17.5$$

$$17. 23 = -3z + 2$$
$$-7 = z$$

$$18. -15 = -3p + 9$$
$$8 = p$$

$$19. -6q - 10 = 38$$
$$q = -8$$

20. Tyler spent \$44 at the music store. He bought two CDs for the same price each and a case for \$14. How much did each CD cost? Write an equation to find your answer. $2c + 14 = 44$ Each CD costs \$15.

Name _____ Date _____
Math _____ Period _____

Integer & Solving Equations Test

Selected Response

1. $-12 + 7 =$

a) 19

b) -19

c) -5

d) 5

2. $-4 - (-7) =$

a) 3

b) -11

c) 11

d) -3

3. $4x = -32$

a) 8

b) -8

c) 9

d) -9

4. $3z - 7 = 29$

a) -12

b) 12

c) 7.3

d) -7.3

5. $-16 = 5y - 1$

a) 3

b) 33

c) -33

d) -3

Solve the problems below. Make sure you show all of your work including all necessary steps

6. $5 + (-10)$

7. $-4 + (-4)$

8. $-6 - 3$

9. $15 - (-5)$

$$10. 7 - (-2)$$

$$11. -3(-7)$$

$$12. 6 \div (-3)$$

$$13. 12 + w = -2$$

$$14. n - (-6) = 12$$

$$15. 2g = -10$$

$$16. 2g + 5 = -10$$

$$17. -22 = -3z + 2$$

$$18. 15 = -3p + 9$$

$$19. -6q - 10 = 38$$

20. Tyler spent \$34 at the music store. He bought two CDs for the same price each and a case for \$10. How much did each CD cost? Write an equation to find your answer.

Kelly earns \$5.00 per hour babysitting. She wants to buy a CD player that costs \$350.00.

Part A: How many hours Kelly needs to work in order to earn enough money to purchase the CD player.

Part B: Use what you know about solving two-step equations to explain how you determined your answer. Use words, numbers and/or symbols in your explanation,

Name _____ Date _____
Math _____ Period _____

Integer & Solving Equations Test **Answer Key**

Selected Response

7. $-12 + 7 =$

a) 19

b) -19

c) -5

d) 5

8. $-4 - (-7) =$

a) 3

b) -11

c) 11

d) -3

9. $4x = -32$

a) 8

b) -8

c) 9

d) -9

10. $3z - 7 = 29$

a) -12

b) 12

c) 7.3

d) -7.3

11. $-16 = 5y - 1$

a) 3

b) 33

c) -33

d) -3

Solve the problems below. Make sure you show all of your work including all necessary steps.

12. $5 + (-10)$

-5

7. $-4 + (-4)$

-8

9. $-6 - 3$

-9

9. $15 - (-5)$

20

$$10. 7 - (-2)$$
$$9$$

$$11. -3(-7)$$
$$21$$

$$12. 6 \div (-3)$$
$$-2$$

$$13. 12 + w = -2$$
$$w = -14$$

$$15. n - (-6) = 12$$
$$n = 6$$

$$15. 2g = -10$$
$$g = -5$$

$$16. 2g + 5 = -10$$
$$g = -7.5$$

$$17. -22 = -3z + 2$$
$$8 = z$$

$$19. 15 = -3p + 9$$
$$-2 = p$$

$$19. -6q - 10 = 38$$
$$q = -8$$

20. Tyler spent \$34 at the music store. He bought two CDs for the same price each and a case for \$10. How much did each CD cost? Write an equation to find your answer. $2c + 10 = 34$ Each CD costs \$12.

Kelly earns \$5.00 per hour babysitting. She wants to buy a CD player that costs \$350.00.

Part A: How many hours Kelly needs to work in order to earn enough money to purchase the CD player.

70 hours

Part B: Use what you know about solving two-step equations to explain how you determined your answer. Use words, numbers and/or symbols in your explanation,

$$\frac{5x}{5} = \frac{350}{5}$$

$$x = 70$$

$$x = 70$$
