Work At Home Directions - 7A

1. Read and complete the "Reteach Lesson Examples" for each lesson provided - 1 lesson per day
2. Watch the my.hrw.com video lesson pertaining to the lesson if possible
3. Read and complete the "Reading Strategies" worksheet
4. Read and complete the "Success for English Learners" worksheet
5. Complete Worksheet A/B that applies to the reteach lesson
6. Complete Worksheet C that goes along with the reteach lesson
7. Complete one lesson per day - ex. 6.1 on one day, 6.2 on the 2nd day, 6.3 on the 3rd day, etc.
8. You may utilize "my.hrw.com" - "Interactive Student Edition" for video presentations of the lessons you are assigned if internet access is available
9. You may also work on "IXL" - highlighted sections if internet access is available
10. "Khan Academy" is another resource if internet access is available
11. Please email me with any questions at ekaminski@apsedu.org

Please check your math class on Google Classroom daily if available for possible updates

Schedule

3/30/2020 - Lesson 5.1
3/31/2020 - Lesson 5.2
4/01/2020 - Lesson 5.3 & Module 5 Challenge
4/02/2020 - Lesson 6.1
4/03/2020 - Lesson 6.2
4/06/2020 - Lesson 6.3
4/07/2020 - Lesson 6.4 & Module 6 Challenge
4/08/2020 - Lesson 7.1
4/14/2020 - Lesson 7.2
4/15/2020 - Lesson 7.3 & Module 7 Challenge

Name _____ Date _____ Class _____

LESSON 5-1

Percent Increase and Decrease

Reteach

A change in a quantity is often described as a percent increase or percent decrease. To calculate a percent increase or decrease, use this equation.

$$\text{percent of change} = \frac{\text{amount of increase or decrease}}{\text{original amount}} \cdot 100$$

Find the percent of change from 28 to 42.

- First, find the amount of the change. $42 - 28 = 14$
- What is the original amount? 28
- Use the equation. $\frac{14}{28} \cdot 100 = 50\%$

An increase from 28 to 42 represents a 50% increase.

Find each percent of change.

1. 8 is increased to 22

   amount of change: 22 – 8 = _____

   original amount: _____

   _____ • 100 = _____%

2. 90 is decreased to 81

   amount of change: 90 – 81 = _____

   original amount: _____

   _____ • 100 = _____%

3. 125 is increased to 200

   amount of change: 200 – 125 = _____

   original amount: _____

   _____ • 100 = _____%

4. 400 is decreased to 60

   amount of change: 400 – 60 = _____

   original amount: _____

   _____ • 100 = _____%

5. 64 is decreased to 48

   _____

6. 140 is increased to 273

   _____

7. 30 is decreased to 6

   _____

8. 15 is increased to 21

   _____

9. 7 is increased to 21

   _____

10. 320 is decreased to 304

    _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 5-1

Percent Increase and Decrease

Reading Strategies: Analyze Information

Percent can be used to describe change. It is shown as a ratio.

$$\text{Percent of change} = \frac{\text{amount of change}}{\text{original amount}}$$

The following steps describe how the percent of change is figured on a savings account that starts with $50.

Original amount in the account: $50
Current amount in the account: $30
Amount the account decreased by: $20

$$\text{Percent of change} = \frac{\text{amount of change}}{\text{original amount}} = \frac{\$20}{\$50}$$

Savings went down, so this ratio is a **percent of decrease** in savings.

1. How much money was placed into the savings account when it opened? _____

2. Did the number of dollars in the account increase or decrease?

   _____

3. When you are finding the percent of change, where do you place the original number in the fraction?

   _____

Use the information below to solve 4–6.

A clothing salesman sold 25 shirts his first day on the job and 45 shirts the second day.

4. What is the original number of shirts he sold?

   _____

5. How many more shirts did he sell the second day than the first day?

   _____

6. Write the fraction that shows the amount of change over the original amount. What is the percent of change? Is it a percent increase or percent decrease?

   _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 5-1

Percent Increase and Decrease

Success for English Learners

Problem 1

$$\text{percent of change} = \frac{\text{amount of change}}{\text{original amount}}$$

27 is **DECREASED** to 20

The new amount is less than the original amount, so SUBTRACT to find the amount of change

$$\text{percent decrease} = \frac{\text{original amount} - \text{new amount}}{\text{original amount}}$$

$$= \frac{27 - 20}{27}$$

$$= \frac{7}{27}$$

$$= 27\overline{)7}$$

$$= 27\overline{)7.000}\ \ (0.259)$$

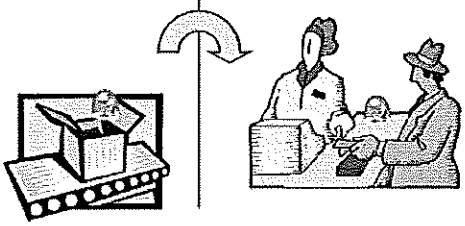
$$\approx 25.9\%$$

Problem 2

How do you find the retail price?

Buys snow globes for $9.20.

Sells snow globes at a 95% increase.



Step 1

Find 95% of $9.20 → $9.20 × 0.95 = $8.74

Step 2

To get the retail price, add the amount from Step 1 to the original price, $9.20.

$9.20 + $8.74 = $17.94

1. Explain the difference between a percent increase and a percent decrease.

_____

_____

2. Give a real-life example of a percent increase.

_____

3. Explain the difference between retail and wholesale.

_____

_____

4. Fill in the blank: retail = _____ + amount of increase

5. Write your own problem using percent of change.

_____

_____

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 5-1

Percent Increase and Decrease

Practice and Problem Solving: A/B

Find each percent increase. Round to the nearest percent.

1. From 24 teachers to 30 teachers _____
2. From $18 to $45 _____
3. From 75 pencils to 225 pencils _____
4. From $65 to $144 _____
5. From 42 acres to 72 acres _____
6. From 95 trees to 145 trees _____

Find each percent decrease. Round to the nearest percent.

7. From 20 miles to 11 miles _____
8. From $16 to $4 _____
9. From 126 ounces to 48 ounces _____
10. From 84 seconds to 8 seconds _____
11. From 90 apples to 75 apples _____
12. From 248 workers to 200 workers _____

Given the original amount and the percent of change, find the new amount.

13. $25; 300% increase _____
14. 160 bananas; 20% decrease _____
15. 56 books; 75% decrease _____
16. 52 companies; 25% increase _____
17. 12,000 miles; 5% increase _____
18. 710 points; 10% decrease _____

Solve.

19. Last year, there were 380 students at Woodland Middle School. This year, the student population will increase by 5%. What will be the school's increased student population?

_____

20. A backpack that normally sells for $39 is on sale for 33% off. Find the amount of the discount and the sale price.

_____

21. In August, the Simons' water bill was $48. In September, it was 15% lower. What was the Simons' water bill in September?

_____

22. A gallery owner purchased a very old painting for $3,000. The painting sells at a 325% increase in price. What is the retail price of the painting?

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 5-1

Percent Increase and Decrease

Practice and Problem Solving: C

Solve.

1. Enrollment in the school orchestra was 340 last year. This year, it dropped 15%.
   a. What is the enrollment this year? _____
   b. If enrollment increases 15% next year, what will the enrollment be?

      Round to the nearest whole number. _____

2. Rodrigo and Samantha work part-time selling magazine subscriptions. Their boss said that he wanted them to increase sales by 15% each week. As an incentive, whoever increases their sales by the higher percentage each week would get a bonus. The table below shows subscription sales for four weeks in a row.

Number of Subscriptions Sold

Worker	Week 1	Week 2	Week 3	Week 4
Rodrigo	17	25	18	27
Samantha	15	18	21	23

   a. Find Rodrigo's percent increase or decrease in sales each week.

      _____

   b. Find Samantha's percent increase or decrease in sales each week.

      _____

   c. Who received a bonus in weeks 2, 3, and 4?

      _____

   d. After four weeks, did Rodrigo or Samantha meet their boss's goal? Explain.

      _____

3. The Kelvin scale is an absolute temperature scale that can be used to calculate percent change in temperatures. The formula to convert Celsius to Kelvin is $K = C + 273.15$. What is the percent change if the temperature rises from 21°C to 29°C? Round to the nearest tenth.

   _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 5-2

Rewriting Percent Expressions

Reteach

A **markup** is an example of a percent increase.

To calculate a markup, write the markup percentage as a decimal and add 1. Multiply by the original cost.

A store buys soccer balls from a supplier for $5. The store's markup is 45%. Find the retail price.

Write the markup as a decimal and add 1.

$0.45 + 1 = 1.45$

Multiply by the original cost.

Retail price $= \$5 \times 1.45 = \$7.25$

A **markdown,** or discount, is an example of a percent decrease.

To calculate a markdown, write the markdown percentage as a decimal and subtract from 1. Multiply by the original price.

A store marks down sweaters by 20%. Find the sale price of a sweater originally priced at $60.

Write the markup as a decimal and subtract it from 1.

$1 - 0.2 = 0.8$

Multiply by the original cost.

Sale price $= \$60 \times 0.8 = \$48$

Apply the markup for each item. Then, find the retail price. Round to two decimal places when necessary.

1. Original cost: $45; Markup %: 20%

   _____

2. Original cost: $7.50; Markup %: 50%

   _____

3. Original cost: $1.25; Markup %: 80%

   _____

4. Original cost: $62; Markup %: 35%

   _____

Apply the markdown for each item. Then, find the sale price. Round to two decimal places when necessary.

5. Original price: $150; Markdown %: 40%

   _____

6. Original price: $18.99; Markdown: 25%

   _____

7. Original price: $95; Markdown: 10%

   _____

8. Original price: $75; Markdown: 15%

   _____

9. A clothing store bought packages of three pairs of socks for $1.75. The store owner marked up the price by 80%.
   a. What is the retail price? _____
   b. After a month, the store owner marks down the retail price by 20%. What is the sales price? _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 5-2

Rewriting Percent Expressions

Reading Strategies: Use a Model

A toy store buys kites from a supplier for k dollars. The store owner decides to mark up the price of each kite by 30%. What is the retail price of a kite that the supplier sells for $60?

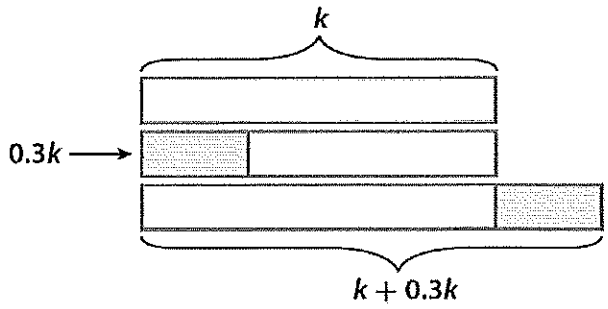
You can use a bar model to help you solve this problem.

Step 1: Draw a bar to show the cost of the kite, k.

Step 2: Draw a bar that shows the markup: 30% of k, or $0.3k$.

Step 3: These bars together represent the original cost plus the markup, $k + 0.3k$.

Step 4: Use the expression to find the retail price of a kite.



Retail price = Original cost + Markup

$= k + 0.3k$

$= 1.3k = 1.3(\$60) = \$78$

The retail price of each kite is $78.

Answer each question. As you do, draw each step of the bar model in the space at the right.

A store buys cameras from a supplier for c dollars. The store owner decides on a markup of 70%. What is the retail price of a camera that the supplier sells for $80?

1. When you use a bar model to solve the problem, which bar should you draw first?

   _____

2. Which bar should you draw next?

   _____

3. What do these bars together represent?

   _____

4. What is the retail price of the camera?

   _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 5-2

Rewriting Percent Expressions

Success for English Learners

A **markup** is a percent *increase*. With a markup, the price goes **UP.** ↑

A **markdown** is a percent *decrease*. With a markdown, the price goes **DOWN.** ↓

Problem 1

Find the retail price.

Retail price = Original cost + Markup

A store buys soccer balls for $5.
The store's markup is 45%.

Step 1

Find the markup.

$\$5 \times 0.45 = \$2.25$

Step 2

ADD the markup to the original cost.

$\$5 + \$2.25 = \$7.25$

The retail price of a soccer ball is $7.25.

Problem 2

Find the sale price.

Sale price = Original price – Markdown

The original price of a sweater is $60.
On sale, the markdown is 20%.
Find the sale price.

Step 1

Find the markdown.

$\$60 \times 0.20 = \$12$

Step 2

SUBTRACT the markdown from the original price.

$\$60 - \$12 = \$48$

The sale price of the sweater is $48.

1. Explain the difference between a markup and a markdown.

_____

_____

2. Explain the difference between a retail price and a sale price.

_____

_____

3. Write your own word problem using a markup or a markdown.

_____

_____

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 5-2

Rewriting Percent Expressions

Practice and Problem Solving: A/B

Use the situation below to complete Exercises 1–6 in the table below.

Discounts R Us buys items at wholesale, then marks them up to set a retail sale price. Some of the items the store sells are shown in the table below.

Item	Wholesale Price	% Markup	$ Markup	Retail Sale Price
1. Notebook	$1.50	20%		
2. Scissors	$3.25	40%		
3. Calculator	$9.60	25%		
4. Sunglasses	$12.50	78%		
5. Bicycle	$78.00	55%		
6. Picture frame	$2.99	150%		

Find the retail sale price of each item below. Round to two decimal places when necessary.

7. Original price: $65.00; Markdown: 12%

_____

8. Original price: $29.99; Markdown: $33\frac{1}{3}$%

_____

9. Original price: $119.00; Markdown: 70%

_____

10. Original price: $325.50; Markdown: 15%

_____

Use the information to complete 11–14.

A jewelry supply shop buys silver chains from a manufacturer for *c* dollars each, and then sells the chains at a 57% markup.

11. Write the markup as a decimal. _____

12. Write an expression for the retail price of a silver chain.

_____

13. What is the retail price of a silver chain purchased for $45.00?

_____

14. How much was added to the original price of the chain? _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 5-2

Rewriting Percent Expressions

Practice and Problem Solving: C

Answer the questions about each situation.

A clothing store offers various promotions to attract customers but wants to maintain the same amount of profit. To do this, the store marks up prices above retail and then advertises a deal that results in a markdown equivalent to the retail price. The retail price of a necktie is $59.99. The store offers a "buy 2, get one free" deal on neckties.

1. What is the new retail price during this promotion? _____
2. What is the markup? _____
3. What is the markup percent on a tie during the promotion? _____

A sporting goods store sells jerseys with the name of the local football team. The store owner buys 80 jerseys at a wholesale price of $55 each and applies his standard retail markup of 65%. When the local team made it to the playoffs, the store owner marked up the retail price by 25%. After the local team lost the championship, the store owner marked down that price by 33%.

4. What was the standard retail price of each jersey? _____
5. What was the price when the team was in the playoffs? _____
6. What was the price after the team lost the championship? _____

Two jewelry stores buy silver chains from a manufacturer for c dollars each, and then sell the chains at a 57% markup. Store A has a sale and marks down all chains by 20% off retail. In addition, customers can use a coupon worth 15% off the price of any item, including sale items. Store B offers a coupon worth 35% off any one item.

7. At Store A, Aurelie used a 15%-off coupon to buy a chain already marked down by 20%. Write an expression for the price of this chain.

   _____

8. At Store B, Tucker used a 35%-off coupon to buy a chain. Write an expression for the price of this chain.

   _____

9. Which store offers a better price on chains?

   _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 5-3

Applications of Percent

Reteach

For any problem involving percent, you can use a simple formula to calculate the percent.

amount = percent × total

The amount will be the amount of tax, tip, discount, or whatever you are calculating. Use the formula that has your unknown information before the equal sign.

For simple-interest problems, time is one factor. So, you must also include time in your formula.

amount (interest) = total (principal) × percent (rate) × time

A. Find the sale price after the discount.

Regular price = $899

Discount rate = 20%

You know the total and the percentage. You don't know the discount amount. Your formula is:

amount = % × total

= 0.20 × $899

= $179.80

The amount of discount is $179.80.
The sale price is the original price minus the discount.
$899 − $179.80 = $719.20

The sale price is $719.20

B. A bank offers simple interest on a certificate of deposit. Jamie invests $500 and after one year earns $40 in interest. What was the interest rate on his deposit?

You know the total deposited—the principal. You know the amount earned in interest. You don't know the percentage rate of interest. Since the time is 1 year, your formula is:

% = *amount* ÷ total

= $40 ÷ $500

= 0.08

= 8%

The interest rate is 8%.

Johanna purchases a book for $14.95. There is a sales tax of 6.5%. How much is the final price with tax?

1. What is the total in this problem? _____

2. What is the percent? _____

3. Use the formula *amount* = total × percent to find the amount of the sales tax.

   _____

4. To find the final price, add the cost of the book to the amount of tax.

   _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 5-3

Applications of Percent

Reading Strategies: Build Vocabulary

Sales tax is added to the price of an item or service. Sales tax is a percent of the purchase price. A sales tax of 6.5% means that all taxable items will have an additional 6.5% added to the total cost.

sales tax rate × sale price = sales tax

The **total sale price** is computed by adding the sales tax to the cost of all the items purchased.

sale price + sales tax = total sale price

Find the amount of sales tax for each purchase to the nearest whole cent.

1. sale price $9,450

   sales tax rate: 8%

   _____

2. sale price $1,089

   sales tax rate: 6.25%

   _____

3. sale price $21,097

   sales tax rate: 5.5%

   _____

Interest is the amount of money the bank pays to use your money, or the amount of money you pay the bank to borrow its money.

Principal is the amount of money you save or borrow from the bank.

Rate of interest is the percent rate on money you save or borrow.

Time is the number of years the money is saved or borrowed.

Answer each question.

4. You put $800 in a savings account at 4% annual interest and leave it there for five years.

   a. What is the principal? _____

   b. What is the interest rate? _____

   c. What is the amount of time the money will stay in the account?

   _____

Find out how much interest you would earn by using this formula:

Interest	=	**Principal**	×	**Rate**	×	**Time**	←	words
i	=	*p*	×	*r*	×	*t*	←	symbols
		$800	×	4%	×	5		
		$800	×	0.04	×	5	←	Change % to decimal.
		$160					←	Multiply to solve.

5. To find out how much interest you will earn by keeping your money in a bank, what three things do you need to know?

   _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 5-3

Applications of Percent

Success for English Learners

Problem 1

Find the tax on the sale.

HH Mart Welcome!	
DVD Player	$148.50
DVD	$15.99
CD	$15.99
Subtotal	$180.48
Tax (7.75%)	$13.99

Add the cost of total purchases to get a subtotal.

Multiply the subtotal by the tax rate.

$t = 7.75\% \times \$180.48$

$t = 0.0775 \times 180.78$

$t = \$13.99$

So, the sales tax is $13.99 on purchases.

Problem 2

Use this diagram to help you set up an equation for simple interest.

Simple interest $= P \times r \times t$

Principal	Rate	Time
Amount of money borrowed or invested	Interest rate written as a percent	Number of years money is borrowed or invested

Interest	=	$14,500	×	7%	×	5 years

$I = 14{,}500 \times 0.07 \times 5$

$I = 5{,}075$

Write 7% as $\frac{7}{100}$ and change to a decimal, 0.07.

The simple interest on $14,500 invested or loaned for 5 years at 7% is $5,075.

1. Jon invested $6,200 for 6 years at 3%. Calculate the simple interest.

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 5-3

Applications of Percent

Practice and Problem Solving: A/B

1. Complete the table.

Sale Amount	5% Sales Tax	Total Amount Paid
$67.50		
$98.75		
$399.79		
$1,250.00		
$12,500.00		

2. Complete the table.

Principal	Rate	Time	Interest Earned	New Balance
$300	3%	4 years		
$450		3 years	$67.50	
$500	4.5%		$112.50	
	8%	2 years	$108.00	

Solve.

3. Joanna wants to buy a car. Her parents loan her $5,000 for 5 years at 5% simple interest. How much will Joanna pay in interest?

_____

4. This month Salesperson A made 11% of $67,530. Salesperson B made 8% of $85,740. Who made more commission this month? How much did that salesperson make?

_____

5. Jon earned $38,000 last year. He paid $6,840 for entertainment. What percent of his earnings did Jon pay in entertainment expenses?

_____

6. Nora makes $3,000 a month. The circle graph shows how she spends her money. How much money does Nora spend on each category?

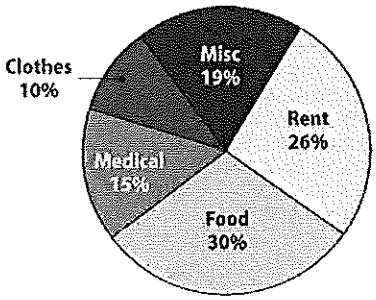
   a. rent _____

   b. food _____

   c. medical _____

   d. clothes_____

   e. miscellaneous _____



Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 5-3

Applications of Percent

Practice and Problem Solving: C

1. Complete the table.

Sale Amount	Tax	Amount of Tax	Total Cost
$49.95		$4.00	$53.95
	5%	$6.43	
$499.99	7.5%		
		$103.96	$2,702.96
$12,499.00	7%		

2. Complete the table.

Principal	Annual Rate	Time	Interest Earned	New Balance
$2,400		6 months		$2,442.00
	4.9%	2 years	$4.41	
$9,460.12		5 years		$12,061.65
$3,923.87	2.2%		$64.74	

Solve.

3. Jorge earns a 9% commission on all of his sales. He had sales of $89,400 for the month. Harris works for a different company, and also sold $89,400 for the month but made $447 more than Jorge. What is Harris' commission rate?

_____

4. Danielle wants to buy a video game. At the local Big Box store, it costs $49.95. Danielle has a coupon for 10% off at the store, and she will pay a 6.5% sales tax. At an online store, the game is $44.95, with $4.00 shipping charge and no sales tax. Which purchase would be cheaper?

_____

5. A clothing store ran advertisements for a special sale. The store's ads read "Buy one at regular price, get a second one for half price." Explain how the terms of the clothing store's sale are different from offering a 50% discount. Use $100 as the regular price for the item to write your explanation.

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

MODULE 5

Proportions and Percents

Challenge

Multi-Step Unit Conversion

Length (customary)	Length (metric)	Time	Metric-Customary
1 ft = 12 in. 1 yd = 3 ft 1 mi = 5,280 ft	1 cm = 10 mm 1 m = 100 cm 1 km = 1,000 m	1 h = 60 m 1 m = 60 s 1 y = 365 d	1 in. = 2.54 cm 1 m = 39.37 in.

Using a method called "dimensional analysis," you can convert any units for length, time, or speed using just the information in the chart.

This example shows converting 30 miles per hour (mi/h) to meters per second (m/s). Notice how the units cancel out.

$$\frac{30\,\cancel{\text{mi}}}{1\,\cancel{\text{h}}} \times \overbrace{\frac{5{,}280\,\cancel{\text{ft}}}{1\,\cancel{\text{mi}}} \times \frac{12\,\cancel{\text{in}}}{1\,\cancel{\text{ft}}} \times \frac{1\text{ m}}{39.37\,\cancel{\text{in}}}}^{\text{length}} \times \overbrace{\frac{1\,\cancel{\text{h}}}{60\,\cancel{\text{min}}} \times \frac{1\,\cancel{\text{min}}}{60\text{ sec}}}^{\text{time}}$$

Convert these units. Show your steps.

1. Complete the calculation above to change 30 mi/h to meters per second.

   _____

2. Change 2.3 km to inches.

   _____

3. Change 67.3 ft/s to kilometers per hour.

   _____

Try these area and volume conversions. (Hint: Square factors for area; cube factors for volume.)

4. A water tower is filled at 750 cubic feet per minute. Find the rate in gallons per hour. (1 gallon is about 0.134 cubic feet)

   _____

5. A field is 130 ft by 274 ft. Find the area in square meters.

   _____

6. A basement measures 9.6 m wide, 4.2 m tall, and 15.6 m long. Find the volume of space in the basement in cubic yards.

   _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-1

Algebraic Expressions

Reteach

Algebraic expressions can be written from verbal descriptions. Likewise, verbal descriptions can be written from algebraic expressions. In both cases, it is important to look for word and number clues.

Algebra from words

"One third of the participants increased by 25."

Clues

Look for "number words," like

- "One third."
- "Of" means multiplied by.
- "Increased by" means add to.

Combine the clues to produce the expression.

- "One third of the participants." $\frac{1}{3}p$ or $\frac{p}{3}$.
- "Increased by 25." $+25$

"One third of the participants increased by 25."

$\frac{1}{3}p + 25$ or $\frac{p}{3} + 25$

Words from algebra

"Write $0.75n - \frac{1}{2}m$ with words."

Clues

Identify the number of parts of the problem.

- "$0.75n$" means "three fourths of n" or 75 hundredths of n. The exact meaning will depend on the problem.
- "$-$" means "minus," "decreased by," "less than," etc., depending on the context.
- "$\frac{1}{2}m$" is "one half of m" or "m over 2."

Combine the clues to produce a description.

"75 hundredths of the population minus half the men."

Write a verbal description for each algebraic expression.

1. $100 - 5n$

_____

_____

2. $0.25r + 0.6s$

_____

_____

3. $\frac{3m - 8n}{13}$

_____

_____

Write an algebraic expression for each verbal description.

4. Half of the seventh graders and one third of the eighth graders were divided into ten teams.

_____

5. Thirty percent of the green house flowers are added to 25 ferns for the school garden.

_____

6. Four less than three times the number of egg orders and six more than two times the number of waffle orders.

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-1

Algebraic Expressions

Reading Strategies: Compare and Contrast

This lesson shows how the **Distributive Property** is used with expressions. It also presents the idea of **factoring**, which is related to the Distributive Property in some types of problems. Knowing how the two concepts are alike and how they are different can help you solve problems. The problems illustrate the two concepts.

Problem 1

Thirty-five percent of the revenue produced at the auction will go to the charity. The morning participants spent an average of $50 each. The afternoon attendees spent an average of $75 each.

a. Write an algebraic expression for the amount contributed to the charity by all participants. Use *m* for morning participants and *a* for afternoon participants.

_____

b. Use the Distributive Property to simplify the expression in part **a**.

_____

c. How do these expressions differ in the information they convey?

_____

Problem 2

Twenty customers bought the portable drill when it was on sale. Twelve of the customers also bought the charger that goes with it.

a. Write an algebraic expression for how much money was spent on the drills and chargers.

_____

b. Factor the expression in part **a**. What does the factored expression represent?

_____

c. How do these expressions differ in the information they convey?

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-1

Algebraic Expressions

Success for English Learners

Problem 1a

Write the expression:

"Three times the number of chairs increased by 10."

"Three times the number..." = **3*n***

"...increased by 10" = + **10.**
So, **3*n*** and + **10** give
3*n* + 10

Problem 1b

Write the words: "$\frac{2}{3}x - 12$"

"$\frac{2}{3}$" ⟶ "Two thirds"

"$\frac{2}{3}x$" ⟶ "Two thirds **of *x*.**"

"– 12" ⟶ "less 12," "reduced by 12," "minus 12," etc.

Combine:
"Two thirds of *x* minus 12"

Problem 2

Distributive Property or Factoring?

⟶ $5(2a + 3b) = 5(2a) + 5(3b) = 10a + 15b$

⟶ $100x - 300y = 100(x - 3y)$

⟶ "Three times the price of a pizza and six times the price of a drink."

⟶ "Three times the price of a pizza and two drinks."

Distributive: Multiply and...
Factor: Divide and...
Which is which?

1. In Problem 1a, what is another way to write the expression?

_____

2. In Problem 2, write expressions for the two word problems.

_____

3. Write the expressions from Exercise 2 in an equation to show the Distributive Property.

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-1

Algebraic Expressions

Practice and Problem Solving: A/B

Write an algebraic expression for each phrase.

1. Four more than the price, p

_____

2. Five less than three times the length, L

_____

Write a word phrase for each algebraic expression.

3. $25 - 0.6x$

_____

4. $\frac{2}{3}y + 4$

_____

Simplify each expression.

5. $(100 + 4z)20$

_____

6. $0.75(3.5a - 6b)$

_____

Factor each expression.

7. $45c + 10d$

_____

8. $27 - 9x + 15y$

_____

Solve. Show each step.

9. A construction worker bought several bottles of juice for \$3 at the convenience store. She paid for them with a \$20 bill. If j represents the number of bottles of juice, write an expression for the change she should receive.

_____

10. A giant bamboo plant grew an average of 18 centimeters per year. The botanist started measuring the plant when it was 5 centimeters tall. If y represents the number of years the botanist has measured the plant, what expression represents its height?

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-1

Algebraic Expressions

Practice and Problem Solving: C

An electrician has $120 to spend on interior light fixtures. The wholesale price for a 13-watt low-energy lamp is $4. The price for a high-energy lamp is $5.

1. Write the algebraic expression for how much the electrician spends for *a* units of the low-energy lamp and *b* units of the high-energy lamp.

_____

2. Write an *equation* that relates your answer to Exercise 1 to the amount of money the electrician has to spend.

_____

3. Complete the table for the electrician's purchase. Assume that all of the $120 is spent.

Number of low-energy lamps	Total Cost of low-energy lamps	Number of high-energy lamps	Total Cost of high-energy lamps	Total
5	a. $_____	b. _____	c. $ _____	$120
d. _____	e. $_____	16	f. $_____	$120
15	g. $_____	h. _____	i. $_____	$120
j. _____	k. $_____	l. _____	m. $_____	$120

4. How does the *total* price for the high-energy lamps relate to the total price of the low-energy lamps? How does the *total* price for the low-energy lamps relate to the total price of the high-energy lamps?

_____

5. The electrician wants to spend all of the $120 and buy some of both types of lamps. If he wants to buy as many high-energy lamps as possible, how many of each type of lamp should he buy?

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-2

One-Step Equations with Rational Coefficients

Reteach

Using Addition to Undo Subtraction

Addition "undoes" subtraction. Adding the same number to both sides of an equation keeps the equation balanced.

$$x - 5 = -6.3$$
$$x - 5 + \mathbf{5} = -6.3 + \mathbf{5}$$
$$x = -1.3$$

Using Subtraction to Undo Addition

Subtraction "undoes" addition. Subtracting a number from both sides of an equation keeps the equation balanced.

$$n + \frac{3}{4} = -15$$
$$n + \frac{3}{4} - \frac{3}{4} = -15 - \frac{3}{4}$$
$$n = -15\frac{3}{4}$$

Be careful to identify the correct number that is to be added or subtracted from both sides of an equation. The numbers and variables can move around, as the problems show.

Solve using addition or subtraction.

1. $6 = m - \frac{7}{8}$ _____

2. $3.9 + t = 4.5$ _____

3. $10 = -3.1 + j$ _____

Multiplication Undoes Division

To "undo" division, multiply both sides of an equation by the number in the denominator of a problem like this one.

$$\frac{m}{3} = 6$$
$$3 \times \frac{m}{3} = 3 \times 6$$
$$m = 18$$

Division Undoes Multiplication

To "undo" multiplication, divide both sides of an equation by the number that is multiplied by the variable as shown in this problem.

$$4.5p = 18$$
$$\frac{4.5p}{4.5} = \frac{18}{4.5} = 4$$

Notice that decimals and fractions can be handled this way, too.

Solve using division or multiplication.

4. $\frac{y}{2.4} = 5$ _____

5. $0.35w = -7$ _____

6. $-\frac{a}{6} = 1$ _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-2

One-Step Equations with Rational Coefficients

Reading Strategies: Use a Table

The procedure for solving a one-step equation can be shown in a table. As the lesson title suggests, there is ***one step*** to do before you write the answer. That step is the middle row below.

Problem	**Problem**	**Problem**	**Problem**
$a - 8 = -5.3$	$6 = b + 11.2$	$0.4c = 220$	$10.4 = \frac{d}{2}$
One Step Add 8: $a - 8 + \mathbf{8} = -5.3 + \mathbf{8}$	**One Step** Subtract 11.2: $6 - \mathbf{11.2} =$ $b + 11.2 - \mathbf{11.2}$	**One Step** Divide by 0.4: $\frac{0.4c}{\underline{0.4}} = \frac{220}{\underline{0.4}}$	**One Step** Multiply by 2: $\mathbf{2} \times 10.4 = \underline{2} \times \frac{d}{2}$
Answer $a = 2.7$	**Answer** $-5.2 = b$ or $b = -5.2$	**Answer** $c = 550$	**Answer** $20.4 = d$ or $d = 20.4$

Use the table to solve each equation.

1. **Problem:** $\frac{p}{8} = -2$

   One Step: _____

   Answer: $p =$ _____

2. **Problem:** $1.5 + q = -0.6$

   One Step: _____

   Answer: $q =$ _____

3. **Problem:** $-9.5a = -38$

   One Step: _____

   Answer: $a =$ _____

Write the equation for "Problem." Then, fill in the blanks.

4. A cat owner paid the vet a fee of $269.50 for a year's worth of visits. He made 14 visits that year. What was the average cost per visit?

   Problem: _____

   One Step: _____

   Answer: _____

5. A soccer team won three fourths of its games. The team won 18 games. How many games did the team play?

   Problem: _____

   One Step: _____

   Answer: _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

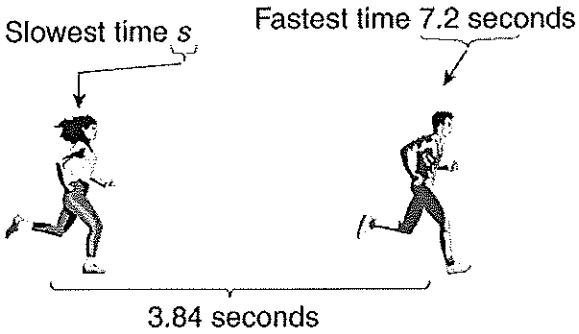
LESSON 6-2

One-Step Equations with Rational Coefficients

Success for English Learners

Problem 1

What is the slowest time s?



The difference between the fastest and slowest time is 3.84 seconds.

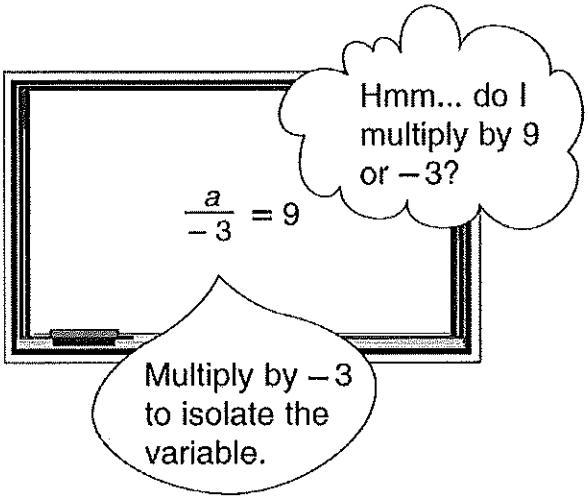
The slowest time is s.

The fastest time is 7.2 seconds.

$$\begin{array}{r} s - 3.84 = 7.2 \\ +3.84 \quad +3.84 \\ \hline s \qquad = 11.04 \end{array}$$

Problem 2

Sometimes you need to multiply both sides by a number in order to isolate the variable.



The solution to the equation is $a = -27$.

Problem 3

A fraction-and-a-whole-number problem: $\frac{1}{4}x = 9 \longrightarrow 4\left(\frac{1}{4}\right)x = 4(9) = 36$

How is this problem like Problem 2? How is it different from Problem 2? Both deal with rational numbers. One is written with the variable divided by a number, and the other shows the variable multiplied by a fraction.

1. In Problem 1, how do you get the result "11.04" by adding "7.2" and "3.84" since they have different numbers of decimal places?

   _____

2. In Problem 2, what rational number is a coefficient of a?

   _____

3. What is another way to write $\frac{1}{4}x$ in Problem 3? _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-2

One-Step Equations with Rational Coefficients

Practice and Problem Solving: A/B

Solve.

1. $\frac{1}{3}n = 4$

   _____

   $n =$ _____

2. $y + 0.4 = 2$

   _____

   $y =$ _____

3. $12 = 0.5a$

   _____

   $a =$ _____

4. $-1 = \frac{1}{3}v$

   _____

   $v =$ _____

5. $15.5z = -77.5$

   _____

   $z =$ _____

6. $\frac{t}{-11} = 11$

   _____

   $t =$ _____

7. $0.5m = 0.75$

   _____

   $m =$ _____

8. $\frac{r}{4} = 250$

   _____

   $r =$ _____

Write each sentence as an equation.

9. Eight less than $\frac{1}{3}$ a number n is -13.

   _____

10. A number f multiplied by -12.3 is -73.8.

   _____

Write an equation. Then, solve.

11. During unusually cold weather, the temperature in Miami Beach was 10°C. This was 12 degrees more than in Tallahassee. What is the temperature in Tallahassee?

   _____

12. A swimmer swam 48 kilometers in d days. What is the value of d if the swimmer swam an average of 3.2 kilometers daily?

   _____

13. Fifteen tickets cost $193.75. What is the average cost of each ticket?

   _____

14. A student walks $\frac{1}{4}$ mile from her home to the store on her way to a friend's house. If the store is $\frac{1}{3}$ of the way to her friend's house, how far is her friend's house from her home?

   _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-2

One-Step Equations with Rational Coefficients

Practice and Problem Solving: C

Solve using addition, subtraction, multiplication, or division.

1. $0.6x = 3.2$ _____

2. $m + 2.3 = 9.4$ _____

3. $\frac{y}{0.23} = 12$ _____

4. $z - 2.3 = 0.46$ _____

5. $s + \frac{3}{7} = 6$ _____

6. $\frac{5}{6}r = 4\frac{3}{5}$ _____

7. $f - \frac{3}{4} = 1\frac{1}{2}$ _____

8. $\frac{3m}{\frac{2}{3}} = 7$ _____

Answer the questions.

9. a. A painter works 37.5 hours one week. If she worked 5 days, how many hours did she work on average per day?

_____

b. At $15.75 per hour, how much did she make per day?

_____

10. A recipe calls for $3\frac{2}{3}$ cups of flour. Earl used $7\frac{1}{3}$ cups. By how much did he increase the recipe?

_____

11. Explain how you could use either of two operations to solve Exercise 10.

_____

_____

12. A bottle of fruit juice holds 1.89L. If Shakira bought almost 6L of fruit juice, how many bottles did she buy?

_____

13. Eric had 15.3 feet of fishing line. He cut off a piece and had 38.4 inches left. How long was the piece he cut?

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-3

Writing Two-Step Equations

Reteach

Many real-world problems look like this:

one-time amount + number × variable = total amount

You can use this pattern to write an equation.

Example:

At the start of a month a customer spends \$3 for a reusable coffee cup. She pays \$2 each time she has the cup filled with coffee. At the end of the month she has paid \$53. How many cups of coffee did she get?

one-time amount:	\$3
number × variable:	$2 \times c$ or $2c$, where c is the number of cups of coffee
total amount:	\$53
The equation is:	$3 + 2c = 53$.

Write an equation to represent each situation.
Each problem can be represented using the form:
one-time amount + number × variable = total amount

1. The sum of twenty-one and five times a number f is 61.

_____		_____		_____
one-time amount	+	number × variable	=	total amount

2. Seventeen more than seven times a number j is 87.

_____

3. A customer's total cell phone bill this month is \$50.50. The company charges a monthly fee of \$18 plus five cents for each call. Use n to represent the number of calls.

_____

4. A tutor works with a group of students. The tutor charges \$40 plus \$30 for each student in the group. Today the tutor has s students and charges a total of \$220.

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-3

Writing Two-Step Equations

Reading Strategies: Analyze Information

It is important to know whether an equation is a one-step equation or a two-step equation. It is also important to know whether each step is addition, subtraction, multiplication, or division.

Equation	Number of Steps and Description
$2x = 7$	One step: Multiply x by 2.
$y + 5 = 11$	One step: Add 5 to y.
$3z - 1 = 11$	Two steps: Multiply z by 3, then subtract 1.
$\frac{w+3}{2} = 4$	Two steps: Add 3 to w, then divide the result by 2.

Knowing the steps helps you write a two-step equation. Knowing the steps is even more important in the next lesson on *solving* two-step equations.

Write an equation for each problem. State whether the problem should be written as a one-step equation or a two-step equation. Then describe the step or steps.

1. Five times a number subtracted from 50 is 15. What is the number?

   Equation: _____

   Number of steps and description:

   _____

2. Eight more than a number is twenty-seven. What is the number?

   Equation: _____

   Number of steps and description:

   _____

3. At a bookstore, you buy a calendar for $3 and some books for $4 each. You spend a total of $23. How many books do you buy?

   Equation: _____

   Number of steps and description:

   _____

4. You are giving away equal groups of paper clips to some number of friends. Each friend receives 15 paper clips and you started with 90 paper clips. How many friends receive paper clips?

   Equation: _____

   Number of steps and description:

   _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-3

Writing Two-Step Equations

Success for English Learners

Problem 1

To write an equation from the words, remember clues:

"Six times a number" ⟶ $6n$

"Two less than a number" ⟶ $n - 2$

"Eight more than a number" ⟶ $n + 8$

"The opposite of 7" ⟶ -7

Combine the clues to write an equation with numbers:

"Four less than two times a number is equal to the opposite of nine."

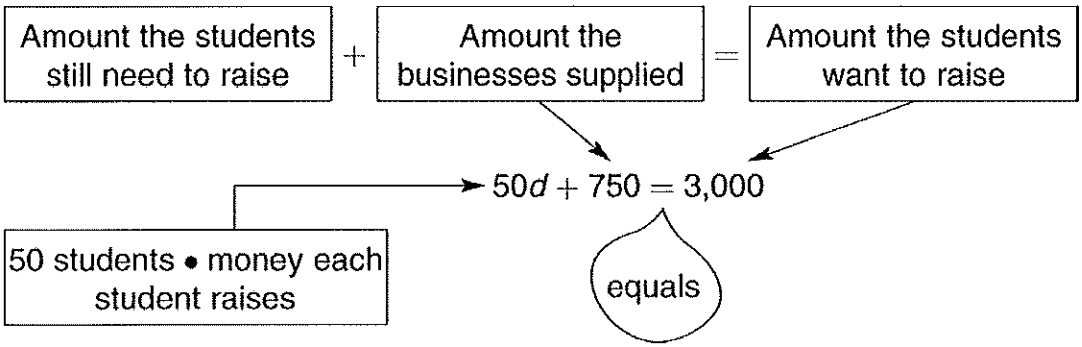
$2x - 4 = -9$

Problem 2

Look at the boldfaced numbers and words in the problem.

A group of students want to raise **$3,000** for hurricane victims. They were **given $750** by local businesses, but they have to raise the rest. If there are **50 students**, how much does each student need to raise?

Put the information in a chart like this:



1. Write the words for the numbers and symbols: $18 - 3x = 3$

_____

_____

2. Write the numbers and symbols for this problem: "Five times a number minus seven is equal to the opposite of eleven."

_____

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-3

Writing Two-Step Equations

Practice and Problem Solving: A/B

Model each two-step operation by drawing algebra tiles.

1. $3m + 5 = 8$

_____

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

_____

Write an equation to represent each problem.

3. The sum of fifteen and six times a number t is eighty-one. What is the number?

_____

4. An electrician charges \$40 to come to your house. She also charges \$55 for each hour that she works. The electrician charges you a total of \$190. How many hours does the electrician work at your house? Use h for the number of hours.

_____

5. A taxi charges \$1.75 plus a fee of \$0.75 for each mile traveled. The total cost of a ride, without a tip, is \$4.75. How many miles is the trip? Use m for the number of miles traveled.

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-3

Writing Two-Step Equations

Practice and Problem Solving: C

Write a two-step equation for each word problem.

1. The sum of a number p and seven is divided by twelve. The result is three. What is the number?

   _____

2. Sixteen is divided by the sum of a number q and 1. The result is four. What is the number?

   _____

3. A number s is subtracted from seven. When the result is divided by three, the quotient is two. What is the number?

   _____

Write a two-step equation to represent each problem.

4. Twelve and three tenths more than five and thirteen thousandths of a number d is equal to fifteen and three hundred two thousandths. What is the value of d?

   _____

5. When the sum of an unknown number z and twenty-two is divided by the same unknown number, the quotient is twelve. What is the unknown number?

   _____

6. A home repair crew charges seventy-five dollars per day plus two hundred fifty-five dollars for each hour the crew works. One day the crew works c hours and charges a total amount of one thousand, six hundred five dollars. How many hours does the crew work?

   _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-4

Solving Two-Step Equations

Reteach

Here is a key to solving an equation.

Example: Solve $3x - 7 = 8$.

Step 1:
- Describe how to form the expression $3x - 7$ from the variable x:
- Multiply by 3. Then subtract 7.

Step 2:
- Write the parts of Step 1 in the reverse order and use inverse operations:
- Add 7. Then divide by 3.

Step 3:
- Apply Step 2 to *both sides* of the original equation.
- Start with the original equation. $3x - 7 = 8$
- Add 7 to both sides. $3x = 15$
- Divide both sides by 3. $x = 5$

Describe the steps to solve each equation. Then solve the equation.

1. $4x + 11 = 19$

_____

2. $-3y + 10 = -14$

_____

3. $\frac{r - 11}{3} = -7$

_____

4. $5 - 2p = 11$

_____

5. $\frac{2}{3}z + 1 = 13$

_____

6. $\frac{w - 17}{9} = 2$

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-4

Solving Two-Step Equations

Reading Strategies: Analyze Information

An equation such as $-3x + 7 = -5$ is called a *two-step equation* because:

It takes two steps to form *the expression* $-3x + 7$.

It also takes two steps to solve *the equation* $-3x + 7 = -5$.

To form the expression $-3x + 7$ from x: Step 1. Multiply x by -3.
Step 2. Add 7.

To solve the equation $-3x + 7 = -5$: Step A. Subtract 7 from both sides.
Step B. Divide both sides by -3.

Look at the two pairs of steps. To find Step A and Step B, reverse the order of Step 1 and Step 2 and use inverse operations.

Before you solve each the equation, list each pair of steps.

1. to form $-2x - 3$ from x: _____

   to solve $-2x - 3 = -25$: _____

   The solution to the equation $-2x - 3 = -25$ is: _____

2. to form $\frac{x+1}{3}$ from x: _____

   to solve $\frac{x+1}{3} = -5$: _____

   The solution to the equation $\frac{x+1}{3} = -5$ is: _____

3. to form $5 - 4x$ from x: _____

   to solve $5 - 4x = 17$: _____

   The solution to the equation $5 - 4x = 17$ is: _____

4. to form $\frac{1}{3}(x - 7)$ from x: _____

   to solve $\frac{1}{3}(x - 7) = 1$: _____

   The solution to the equation $\frac{1}{3}(x - 7) = 1$ is: _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-4

Solving Two-Step Equations

Success for English Learners

$$\underbrace{\overbrace{5x-3}^{\text{Expression}} = 32}_{\text{Equation}}$$

$$\underbrace{\overbrace{\frac{x+12}{4}}^{\text{Expression}} = -3}_{\text{Equation}}$$

Problem 1

Steps to form the expression $5x - 3$:

1. Multiply a variable by 5.
2. Subtract 3.

Steps to solve the equation $5x - 3 = 32$:

A. Add 3 to both sides: $5x = 35$

B. Divide both sides by 5. $x = 7$

Problem 2

Steps to form the expression $\frac{x+12}{4}$:

1. Add 12 to a variable.
2. Divide by 4.

Steps to solve the equation $\frac{x+12}{4} = -3$:

A. Multiply both sides by 4: $x + 12 = -12$

B. Subtract 12 from both sides: $x = -24$

Here is the pattern:

Steps to form an expression	Reverse the steps and use inverse operations. →	Steps to solve the equation

Answer part a and part b for each equation.

1. $13x + 2 = 41$

   a. List the steps to form $13x + 2$.

   _____

   _____

   b. List the steps to solve $13x + 2 = 41$. Solve.

   _____

   _____

2. $\frac{x-3}{5} = -1$

   a. List the steps to form $\frac{x-3}{5}$.

   _____

   _____

   b. List the steps to solve $\frac{x-3}{5} = -1$. Solve.

   _____

   _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-4

Solving Two-Step Equations

Practice and Problem Solving: A/B

Solve each equation. Cross out each number in the box that matches a solution.

–18	–8	–6	–4	–3	–2	2	3	4	6	8	18

1. $5x + 8 = 23$ _____

2. $-2p - 4 = 2$ _____

3. $6a - 11 = 13$ _____

4. $4n + 12 = 4$ _____

5. $9g + 2 = 20$ _____

6. $\frac{k}{6} + 8 = 5$ _____

7. $\frac{s}{3} - 4 = 2$ _____

8. $\frac{c}{2} + 5 = 1$ _____

9. $9 + \frac{a}{6} = 8$ _____

Solve. Check each answer.

10. $3v - 12 = 15$ _____

11. $8 + 5x = -2$ _____

12. $\frac{d}{4} - 9 = -3$ _____

Write an equation to represent the problem. Then solve the equation.

13. Two years of local Internet service costs $685, including the installation fee of $85. What is the monthly fee?

_____

14. The sum of two consecutive numbers is 73. What are the numbers?

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 6-4

Solving Two-Step Equations

Practice and Problem Solving: C

Rewrite each equation so it is in the form $ax + b = c$ or $\frac{x + d}{e} = f$, where x is a variable. Then solve the equation.

1. $3x - 17 = x + 3$

_____

_____

2. $6 + \frac{5x - 1}{3} = 10$

_____

_____

3. $7 + \frac{3 - 4x}{5} = 0$

_____

_____

4. $8 + 5x - 2 = -14$

_____

_____

5. $x + 7 = 5x - 9$

_____

_____

6. $\frac{x + 11}{3} - 5 = 1$

_____

_____

In each equation, one of the letters represents a variable and the other letters represent constants. Solve for the indicated variable and describe what operations you performed to solve for the variable.

7. Solve $rs + t = u$ for the variable s.

_____

_____

8. Solve $r(s + t) = u$ for the variable t.

_____

_____

9. Solve $\frac{n + m}{p} = q$ for the variable n.

_____

_____

10. Solve $\frac{m + n}{p} = q$ for the variable p.

_____

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

MODULE 6

Expressions and Equations

Challenge

Five brothers hired a builder to build fence around their house. Each brother has a different requirement for the length of the fence. The requirements are shown in the table below.

Name	Requirement
Adam	"The sum of twice the length of the fence and 250 feet must be less than 2,000 feet"
Benny	"100 feet more than three times the length of the fence must be greater than 2,200 feet."
Christopher	"500 feet more than one-fourth the length of the fence must be between 700 and 725 feet."
Desmond	"35% of the length of the fence plus 1,000 feet is greater than 1,275 feet."
Eddie	"1,000 feet less than 3 times the length of the fence is greater than 1,550 feet"

1. Write a single inequality that represents the possible values for the length of the fence that meet the requirements of all five brothers.

_____

_____

_____

_____

_____

_____

2. The builder looked at the requirements and laughed. She said, "You didn't need to give me all of these requirements. I only needed requirements from two of you!" Which brother's requirements does the builder need and which ones are unnecessary? Why are some of the requirements unnecessary?

_____

_____

_____

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 7-1

Writing and Solving One-Step Inequalities

Reteach

When solving an inequality, solve it as if it is an equation. Then decide on the correct inequality sign to put in the answer.

When adding or subtracting a number from each side of an inequality, the sign stays the same. When multiplying or dividing by a positive number, the sign stays the same. When multiplying or dividing by a negative number, the sign changes.

$x + 5 > -5$ $x + 5 - 5 > -5 - 5$ $x > -10$ Check: Think: 0 is a solution because $0 > -10$. Substitute 0 for x to see if your answer checks. $x + 5 > -5$ $0 + 5 \ ? \ -5$ $5 > -5$ ✓	$x - 3 \le 8$ $x - 3 + 3 \le 8 + 3$ $x \le 11$ Check: Think: 0 is a solution because $0 \le 11$. Substitute 0 for x to see if your answer checks. $x - 3 \le 8$ $0 - 5 \ ? \ 8$ $-5 \le 8$ ✓	$-2x \ge 8$ $\frac{-2x}{-2} \le \frac{8}{-2}$ $x \le -4$ Dividing by a negative, so reverse the inequality sign. Check: Think: -6 is a solution because $-6 \le -4$. Substitute -6 for x to see if your answer checks. $-2x \ge 8$ $-2 \bullet -6 \ ? \ 8$ $12 \ge 8$ ✓	$\frac{x}{3} < -6$ $\frac{x}{(3)}(3) < (-6)(3)$ $x < -18$ Check: Think: -21 is a solution because $-21 < -18$. Substitute -21 for x to see if your answer checks. $\frac{x}{3} < -6$ $\frac{-21}{3} \ ? \ -6$ $-7 < -6$ ✓

Solve each inequality. Check your work.

1. $n + 6 \ge -3$

_____

2. $-2n < -12$

_____

3. $\frac{n}{3} \le -21$

_____

4. $n - (-3) \ge 7$

_____

5. $-15 + n < -8$

_____

6. $6n > -12$

_____

7. $-6 + n < -9$

_____

8. $\frac{n}{-6} > -2$

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 7-1

Writing and Solving One-Step Inequalities

Reading Strategies: Use a Graphic Organizer

When solving an inequality, solve it as if it is an equation. Then decide on the correct inequality sign to put in the answer.

Solving an inequality when you add or subtract $x + 3 > -4$ Think: To solve $x + 3 = -4$, subtract 3. The inequality sign does not change. $x + 3 - 3 > -4 - 3$ $x > -7$	Solving an inequality when you divide by a negative number $-2x \geq -6$ Think: To solve $-2x = -6$, divide by -2. The inequality sign reverses. $\frac{-2x}{-2} \leq \frac{-6}{-2}$ $x \leq 3$
The inequality signs stay the same.	**The inequality signs are reversed.**
Solving an inequality when you multiply or divide by a positive number $2x \leq -4$ Think: To solve $2x = -4$, divide by positive 2. The inequality sign does not change. $\frac{2x}{2} \leq \frac{-4}{2}$ $x \leq -2$	Solving an inequality when you multiply by a negative number $\frac{x}{-3} < 3$ Think: To solve $\frac{x}{-3} = 3$, multiply by -3. The inequality sign reverses. $\left(\frac{x}{-3}\right)(-3) > (3)(-3)$ $x > -9$

Tell what operation and number you use to solve each inequality. Tell whether the inequality sign reverses. Do not solve the inequalities.

1. To solve $n - 5 > 0$, you _____

   Does the sign of the inequality reverse? _____

2. To solve $\frac{n}{-6} \leq -2$, you _____

   Does the sign of the inequality reverse? _____

3. To solve $3n > -9$, you _____

   Does the sign of the inequality reverse? _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 7-1

Writing and Solving One-Step Inequalities

Success for English Learners

When adding or subtracting a number from each side of an inequality, the sign stays the same. When multiplying or dividing, sometimes you need to reverse the inequality.

Problem 1

Multiply or divide by a positive number.

The sign stays the same.

$6x > -54$

$\frac{6x}{6} > \frac{-54}{6}$

$x > -9$

Check:

$0 > -9$; $6 \bullet 0 \ ? \ -54$

$0 > -54$ ✓

The sign does not change.

$\frac{x}{4} \le 8$

$\left(\frac{x}{4}\right)4 \le (8)(4)$

$x \le 32$

Check:

$28 \le 32$; $\frac{28}{4} \ ? \ 8$

$7 \le 8$ ✓

Problem 2

Multiply or divide by a negative number.

The sign is reversed.

$-2x \ge 6$

$\frac{-2x}{-2} \le \frac{6}{-2}$

$x \le -3$

Check:

$-5 \le -3$; $-2 \bullet -5 \ ? \ 6$

$10 \ge 6$ ✓

The sign changes.

$\frac{x}{-3} \le 9$

$\left(\frac{x}{-3}\right)(-3) \ge (9)(-3)$

$x \ge -27$

Check:

$0 \ge -27$; $\frac{0}{-3} \ ? \ 9$

$0 \le 9$✓

Circle the symbol that will be in the answer to each inequality. Do not solve.

1. $n + -6 \ge 3$ $\quad < \quad \le \quad > \quad \ge$
2. $-6n < -12$ $\quad < \quad \le \quad > \quad \ge$
3. $6n \le 12$ $\quad < \quad \le \quad > \quad \ge$
4. $n - (-6) \ge 3$ $\quad < \quad \le \quad > \quad \ge$
5. $-6 + n < -3$ $\quad < \quad \le \quad > \quad \ge$
6. $6n > -12$ $\quad < \quad \le \quad > \quad \ge$

Complete.

7. Explain how you know when to reverse the inequality sign when solving inequalities.

_____

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

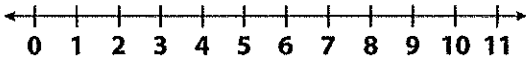
Name _____ Date _____ Class _____

LESSON 7-1

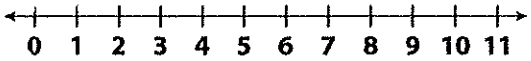
Writing and Solving One-Step Inequalities

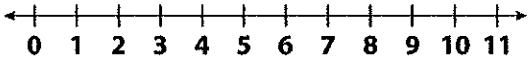
Practice and Problem Solving: A/B

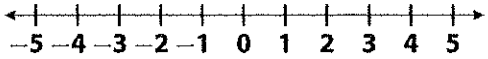
Solve each inequality. Graph and check the solution.

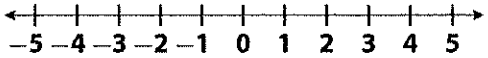
1. $\frac{e}{2} < 3$ _____ 

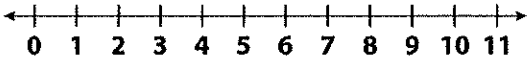
2. $n - 1 > 3$ _____

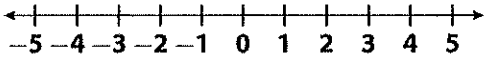
3. $5 < 3 + w$ _____ 

4. $8 \le 2m$ _____ 

5. $r - 4 < 1$ _____ 

6. $2 \le -1t$ _____ 

7. $2 \ge s - 2$ _____ 

8. $2 \ge 5 + p$ _____ 

Solve each inequality.

9. $\frac{1}{5} \le \frac{x}{15}$ _____

10. $9 > -r$ _____

11. $-2 + b < 3$ _____

12. $70 - a \ge 25$ _____

Write an inequality for each problem. Then solve.

13. Arthur earned $136 in three weeks. He goes back to school in one more week. He needs at least $189 to buy the new coat that he wants for school. How much must Arthur earn in the next week?

_____

14. Marna is playing a game where you score –5 points each time you guess the correct answer. The goal is to get the lowest score. To win the game, Marna must have a score less than –80 points. How many correct answers does Marna need to win the game?

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 7-1

Writing and Solving One-Step Inequalities

Practice and Problem Solving: C

Solve each inequality. Graph and check the solution.

1. $-3.2a \leq 8$ _____

2. $2 > n + 0.8$ _____

3. $b - 4.2 \geq -5$ _____

4. $\frac{e}{2} < -0.5$ _____

5. $5.1 - r \geq 5$ _____

6. $-1.44 \leq -1.8y$ _____

Write an inequality for each problem. Solve the inequality. Then solve the problem.

7. Ashley took $20 out of her savings account each week on Friday. How many weeks ago did she have at least $250 in her account?

_____

8. A cube has a volume of greater than 125 cm^3. What are the possible lengths of the side of that cube?

_____

9. A treasure chest sinks at a rate no less than 20 feet per second. The floor of the ocean is at most at –4,200 feet. Will the treasure chest reach the ocean floor in less than 3 minutes? Explain.

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 7-2

Writing Two-Step Inequalities

Reteach

Two-step inequalities involve
- a division or multiplication
- an addition or subtraction.

Step 1
The description indicates whether division or multiplication is involved:

"One half of a number..."

"$\frac{1}{2}n$ or $\frac{n}{2}$"

Step 2
The description indicates whether addition or subtraction is involved:

"...less 25..." or "...decreased by 25..."

" -25"

Step 3
Combine the two to give two steps:

"One half of a number less 25..."

$\frac{1}{2}n - 25$

Step 4
Use an inequality symbol:

"...is more than 15." means ">."

$\frac{1}{2}n - 25 > 15$

Fill in the steps as shown above.

1. Five less than 3 times a number is greater than the opposite of 8.

   Step 1: _____

   Step 2: _____

   Step 3: _____

   Step 4: _____

2. Thirteen plus 5 times a number is no more than 30.

   Step 1: _____

   Step 2: _____

   Step 3: _____

   Step 4: _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 7-2

Writing Two-Step Inequalities

Reading Strategies: Recognize Words and Phrases

Words and phrases in two-step inequality problems can be replaced with numbers, symbols, and the operations of addition, subtraction, multiplication, and division.

As you read inequality problems, watch for these "special" words.

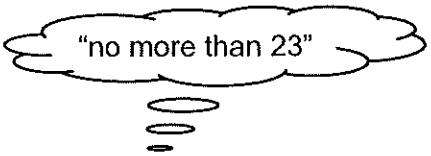
"one half of", "one third of" $\longrightarrow$ $\frac{1}{2}a, \frac{1}{3}b, \frac{c}{2}, \frac{d}{3}$

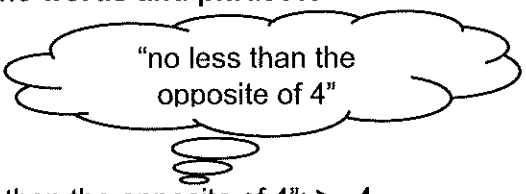
"four times", "double", "triple" $\longrightarrow$ $4x, 2y, 3z$

"five more than", "11 less than 1" $\longrightarrow$ $a + 5, b - 11$

"the opposite of" $\longrightarrow$ $-6, -\frac{1}{4}, -2.5$

Inequalities are also described by specific words and phrases.





"no more than 23": $\leq$ **23**

"no less than the opposite of 4": $\geq$ **–4**

Two-step inequality problems may combine all of these word clues.

Example Five less than 7 times a number is greater than the opposite of 3.

"...7 times a number..." $\longrightarrow$ $7n$

"Five less than..." $\longrightarrow$ -5

"...greater than the opposite of three." $\longrightarrow$ > -3

"Five less than 7 times a number..." $\longrightarrow$ $7n - 5$

"Five less than 7 times a number is greater than the opposite of 3."

$7n - 5 > -3$

Write an inequality for each description.

1. Half of the sum of a number and 6 is no less than 20.

   _____

2. Twelve more than 3 times a number is no more than the opposite of 11.

   _____

3. Two times a number minus 8 is less than 5.

   _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 7-2

Writing Two-Step Inequalities

Success for English Learners

Problem 1

To write an inequality from the words, remember clues:

"Four times a number" → $4n$

"Five less than a number" → $n - 5$

"Six more than a number" → $n + 6$

"The opposite of 3" → -3

"No more than a number" *or*

"Less than or equal to a number" → $\leq n$

"No less than a number" *or*

"Greater than or equal to a number" → $\geq n$

Combine the clues to write an inequality with numbers:

"Five more than three times a number is no greater than the opposite of 6."

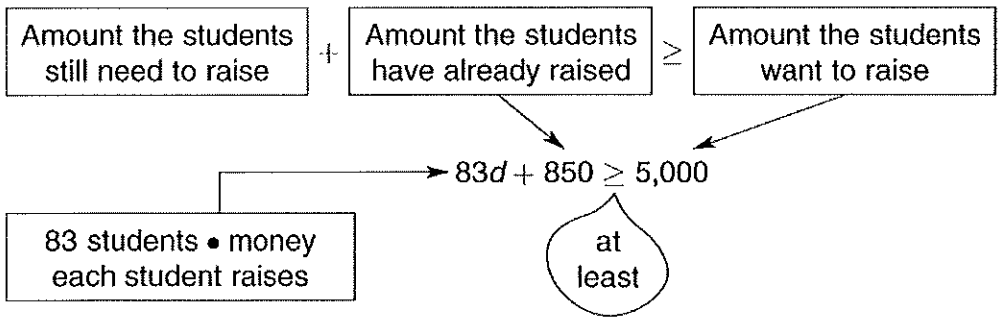
$$5 + 3n \leq -6$$

Problem 2

Look at the highlighted parts of the problem.

The seventh students need to raise **at least $5,000** for their class trip. They were **given $850** by local businesses for the trip, but they have to raise the rest. If there are **83 students**, how much does each student need to raise?

Put the information in a chart like this:



Write the words or the numbers and symbols.

1. Write the words for the numbers and symbols: $5 - 2x > -4$

_____

2. Write the numbers and symbols for this problem: "Three times a number minus 7 is less than or equal to the opposite of 10."

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 7-2

Writing Two-Step Inequalities

Practice and Problem Solving: A/B

Write an inequality for each description.

1. Ten times a number increased by four is no more than twenty-five.

   _____

2. Thirty subtracted from four times a number is greater than the opposite of ten.

   _____

3. One fourth of the opposite of the difference of five and a number is less than twenty.

   _____

Write a description of each inequality.

4. $-5a + 3 > 1$

   _____

5. $27 - 2b \leq -6$

   _____

6. $\frac{1}{2}(c + 1) \geq 5$

   _____

Use the following situation to complete Exercise 7.

7. The school photography club charges $10 for each photo in its annual pet photo contest. The club wants to save $75 of its earnings for a pizza party. The club members also want to have at least $50 left over after the pizza party to pay for other club expenses. Write an expression for:

   a. how much money the club earns by taking p pet photos

   _____

   b. the difference between the amount the club earns and the amount for the pizza party

   _____

   c. Now write a two-step inequality for finding the smallest number of photographs that need to be made to pay for the club's pizza party and have at least $50 left over to pay club expenses.

   _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 7-2

Writing Two-Step Inequalities

Practice and Problem Solving: C

Write an inequality for each situation. Then, combine the inequalities into a *compound inequality*.

1. A barge can safely haul no more than 400 tons across the river. The barge has an empty weight of 24 tons. The average weight of the railroad cars is 4 tons each. How many railroad cars can the barge haul?

_____

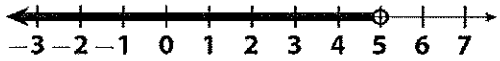
2. In order for the barge operator to meet his expenses, he has to haul at least 120 tons of freight. How many railroad cars must the barge operator haul on each trip to at least break even?

_____

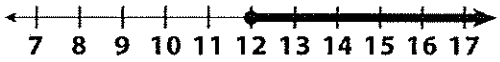
3. Write a compound inequality that gives the range of the number of railroad cars that the barge can haul which will allow the barge operator to at least break even.

_____

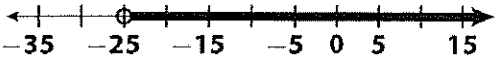
Write a two-step inequality for the graph on each number line. Include addition, subtraction, multiplication or division.

4. 

_____

5. 

_____

6. 

_____

7. Explain why the compound inequality, $-5 < 3x < 10$, is not considered a two-step inequality in the sense in which it is used in this lesson.

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 7-3

Solving Two-Step Inequalities

Reteach

When you solve a real-world two-step inequality, you have to
- be sure to solve the inequality correctly, and
- interpret the answer correctly in the context of the problem.

Example

The catfish pond contains 2,500 gallons of water. The pond can hold no more than 3,000 gallons. It is being filled at a rate of 110 gallons per hour. How many whole hours will it take to fill but not overfill the pond?

Step 1: Solve the inequality.

- The pond already contains 2,500 gallons.
- The pond can be filled at a rate of 110 gallons per hour, or $110h$ for the number of gallons added in h hours.
- The pond can hold no more than 3,000 gallons, so $2{,}500 + 110h \leq 3{,}000$.
- Solve the inequality:
  $2{,}500 - 2{,}500 + 110h \leq 3{,}000 - 2{,}500$
  $110h \leq 500$, or $h \leq 4.5$ hours.

Step 2: Interpret the results.

The problem asks for how many *whole* hours would be needed to fill the pond with not more than 3,000 gallons. Since $h \leq 4.5$ hours, 5 hours would fill the pool to overflowing. So, the nearest number of *whole* hours to fill it but not to overfill it would be 4 hours.

1. A cross-country racer travels 20 kilometers before she realizes that she has to cover at least 75 kilometers in order to qualify for the next race. If the racer travels at a rate of 10 kilometers per hour, how many whole hours will it take her to reach the 75-kilometer mark?

_____

With inequality problems, many solutions are possible. In real-world problems, these have to be interpreted in the context of the problem and its information.

Example

An animal shelter has \$2,500 in its reserve fund. The shelter charges \$40 per animal placement and would like to have at least \$4,000 in its reserve fund. If the shelter places 30 cats and 10 dogs, will that be enough to meet its goal?

Step 1

Write and solve the inequality:
$2{,}500 + 40a \geq 4{,}000$, or $40a \geq 1{,}500$
$a \geq 37.5$

Step 2

If the shelter places 30 cats and 10 dogs, or 40 animals, that will be enough to meet its goal, because $a = 40$ is a solution to the inequality $a \geq 37.5$.

2. Alissa has \$75 worth of bird seed, which she will put into small bags. She will sell each bag for \$7. What is the greatest number of bags she must sell in order to have no less than \$10 worth of bird seed left over?

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 7-3

Solving Two-Step Inequalities

Reading Strategies: Analyzing and Interpreting Information

Real-world, two-step inequalities involve data that has to be analyzed and interpreted.

Example

An orchard has 300 fruit trees, but only 250 bore fruit this year. How many days will it take to pick the fruit if pickers pick at most 30 trees per day?

Solution

Step 1 List and analyze the information that is given.

- 250 trees in all to pick
- The pickers pick at most 30 trees per day.

Step 2 Write and solve the inequality.

$30d \leq 250$

$d \leq 8\frac{1}{3}$ days

Step 3 Interpret the answer.

The answer will be either 8 or 9 days. However, notice that the inequality is "less than or equal to."

The pickers will pick at most 240 trees in 8 days. They will not be able to pick all 250 trees in 8 days, and will need to work for 9 days.

List and analyze the information in each problem. Then, write an inequality, and solve and interpret the answer.

1. The community food bank has 750 meals to distribute over a 12-hour period. They need to save at least 50 of the meals for the volunteers. How many people can be served by the food bank in 10 hours, not including the volunteers?

   _____

   _____

2. A vegetable-oil recovery plant has already recycled 1,400 liters out of 2,500 liters of used oil. If the plant can recycle 24 liters of used oil per hour, about how many hours will it take to recycle what is left?

   _____

   _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 7-3

Solving Two-Step Inequalities

Success for English Learners

Problem 1

Solve this the same way you would if it was an = sign.

$$\frac{x}{5} - \cancel{15} < 10$$

Add 15 to both sides. →

$$\underline{\quad +\cancel{15}} < \underline{+15}$$

$$\frac{x}{5} < 25$$

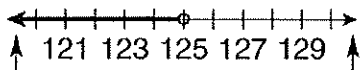
Multiply both sides by 5. →

$$(\cancel{5})\frac{x}{\cancel{5}} < 25(5)$$

$$x < 125$$

Graph your answer on a number line

means any number → $x < 125$ ← means less than



less than

Open circle, so do not include 125.

greater than

1. In Problem 1, is 125 a solution to the inequality? Explain.

_____

2. In Problem 1, why do you *not* reverse the inequality symbol?

_____

Problem 2

Think of Problem 1 as a real-world problem.

"One fifth of the students less 15 is less than 10. Could there be 120 students or 50 students or 25 students? Why?"

Do 120, 50, and 25 all make the inequality true?

Yes, all make true statements: $120 < 125$, $50 < 125$, and $25 < 125$.

Give three solutions to the inequalities.

3. $100 - 2x > 20$

_____

_____

4. $4y + 3 \leq -13$

_____

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 7-3

Solving Two-Step Inequalities

Practice and Problem Solving: A/B

Fill in the blanks to show the steps in solving the inequality.

1. $3x - 5 < 19$

   $3x - 5 +$ _____ $< 19 +$ _____

   $3x <$ _____

   $3x \div$ _____ $<$ _____ $\div$ _____

   $x <$ _____

2. $-2x + 12 < -4$

   $-2x + 12 -$ _____ $< -4 -$ _____

   $-2x <$ _____

   $-2x \div$ _____ $>$ _____ $\div$ _____

   $x >$ _____

3. Why do the inequality signs stay the same in the last two steps of Exercise 1?

   _____

4. Why is the inequality sign reversed in the last two steps of Exercise 2?

   _____

Solve the inequalities. Show your work.

5. $-7d + 8 > 29$

   _____

   _____

   _____

6. $12 - 3b < 9$

   _____

   _____

   _____

7. $\frac{z}{7} - 6 \geq -5$

   _____

   _____

   _____

8. Fifty students are trying to raise at least $12,500 for a class trip. They have already raised $1,250. How much should each student raise, on average, in order to meet the goal? Write and solve the two-step inequality for this problem.

   _____

   _____

9. At the end of the day, vegetables at Farm Market sell for $2.00 a pound, and a basket costs $3.50. If Charlene wants to buy a basket and spend no more than $10.00 total, how many pounds of vegetables can she buy? Write and solve the inequality.

   _____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

LESSON 7-3

Solving Two-Step Inequalities

Practice and Problem Solving: C

Provide the missing steps needed to arrive at the two-step inequality. Work backwards.

1. $a < -3$

_____

_____

$-5a + 2 > 17$

2. $b \geq 1$

_____

_____

$3b + 4 \geq 7$

Use the description below for Exercises 3–5.

In Euclidean geometry, the sum of the lengths of 2 sides of a triangle is greater than the length of the third side. The lengths of 3 sides of a triangle are $3x$, 7, and 12.

3. Write three inequalities that apply for this triangle.

_____

_____

_____

4. Find the value of x for each of the three inequalities.

_____

_____

_____

5. What range of values of x satisfies all three inequalities? Explain your answer.

_____

Write a description of each inequality listed below. Then, solve it.

6. $-3 \geq \frac{1}{3}(6 - x)$

_____

_____

7. $4(2x + 1) < -\frac{1}{2}$

_____

_____

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.

Name _____ Date _____ Class _____

MODULE 7

Inequalities

Challenge

The Schultz family is planning a garden for part of their back yard. The width of the garden will be 20 feet. Each family member has different requirements. The requirements are shown in the table below.

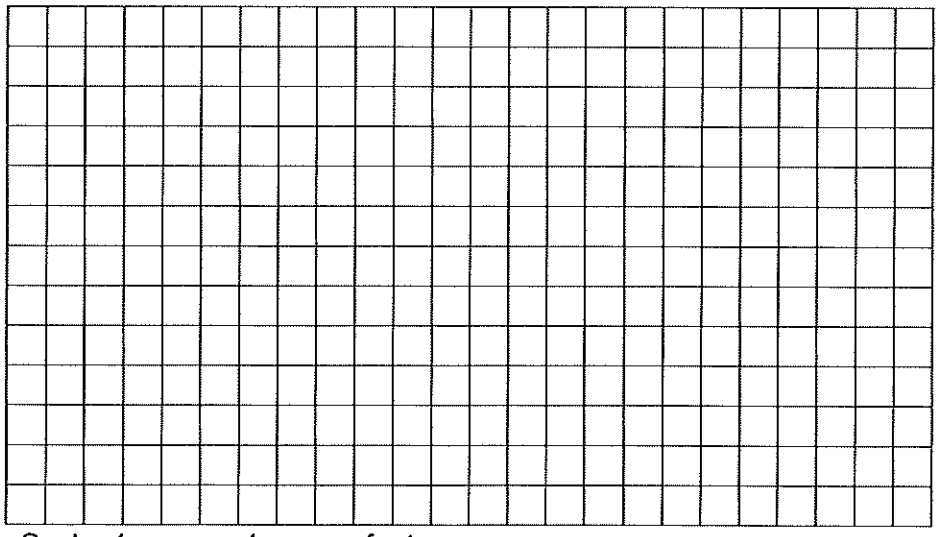
Name	Requirement
Mr. Schultz	The maximum length of fencing around the garden is 100 feet.
Mrs. Schultz	The area of the garden must be greater than 400 square feet.
Angelica	One-half of the garden will be flowers. At most there will be 350 square feet for flowers.
Robert	At least 15% percent of the garden will be used to grow carrots and lettuce. At least there will be 45 square feet for carrots and lettuce.

Write and solve an inequality that represents the possible values for the lengths of the garden for each family member.

1. Mr. Schultz: _____ _____
2. Mrs. Schultz: _____ _____
3. Angelica: _____ _____
4. Robert: _____ _____

Use the information to decide on the length for the garden. Then make and label a scale drawing of the garden, being sure each family member's requirements are met.

5.



Scale: 1 square: 4 square feet

Original content Copyright © by Houghton Mifflin Harcourt. Additions and changes to the original content are the responsibility of the instructor.