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Proportional Relationships [7th grade]

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UNDERSTANDING BY DESIGN

Unit Cover Page

Unit Title: Proportional Relationships

Grade Level: 7th Grade/7th Grade Pre AP/GT

Subject/Topic Area(s): Ratios, Rates, Unit Rates, Proportions, Percent Proportion, Scale Factor, Discounts, Sales Tax, Tip, Commission, Simple Interest, Proportional vs. Non-Proportional Relationships, Problem Solving.

Designed By: Sabrina Bennett and Courtney Bryand

Time Frame: 16 days

School District: East Central ISD

School: East Central Heritage Middle School

School Address and Phone: 8004 New Sulphur Springs Road
San Antonio, TX 78263
(210) 648-4546

Brief Summary of Unit

In this unit students will discover how everyday situations can be represented mathematically through proportional relationships. They will explore the use of ratios, rates and proportions as a problem solving tools. Students will examine proportional relationships in a variety of situations including percents, scaling, and purchasing situation (tax, tip, discount, best value etc).

This unit provides two levels of learning activities. The seventh grade activities incorporate the seventh grade standards, and seventh grade pre-AP/GT activities compacts the seventh grade curriculum to incorporate both seventh and eighth grade standards. Pre-AP/GT activities can also be used as extension to the 7th grade curriculum.

The unit culminates in a final performance assessment that challenges students to redesign a room. Students make decisions about paint and flooring options, and discover their costs as a designer on a RE-Design TV show. In the assessments students will demonstrate their understanding of scaling, unit rates, discounts, and sales tax.

Unit: Proportional Relationships
Grade: 7th Grade/7th Grade Pre-AP

Stage 1: Desired Results

Understandings

Students will understand that...

- Proportions can be used as a problem solving tool to represent real world situations
 - Ratios and Rates can be used to describe proportional relationships.
 - Proportions can be used to create mathematical equations for problem solving

Essential Questions

How can real life situations be described mathematically?

Knowledge

Students will know...

- The difference between rates and ratios in different forms (ie: part to whole (fractions), part to part)
- How to use ratios and rates to set up proportions with appropriate units
- Proportional Vocabulary: Ratios, Rates, Unit Rates, Sales Tax, Scale Factor, Percents, Discounts, Proportion. Pre-AP will also know the terms Principle, Simple Interest, Rate (in terms of simple interest), Commission

Skills

Students will be able to...

- Solve problems involving direct proportional relationships
- Identify proportional and non-proportional linear relationships
- Estimate and find solutions to application problems involving
 - Percents
 - Scaling
 - Measurement
 - Similarity *
 - Unit Rates

*Similarity is discussed in the TEKS, but it is not covered in this unit. It should be addressed during a geometry unit.

Stage 2: Assessment Evidence

Performance Task: *Design on a Dime*

Students will be remodeling a room on a budget. They will be given a scale drawing of the room and must calculate the actual dimensions using their knowledge of proportions and scaling. They will also have to select the “best deal” for supplies by calculating unit costs of various supplies and considering discounts when they are available. Students will discover the total costs including sales tax for redesigning the room.

*The performance task is designed to walk students through the many steps required to complete this complex problem solving task. To adapt the performance assessment to a higher level group, students can be given only the prompt, the dimensions of the model, and the price of the items. The performance assessment can also be extended by giving students a budget for the room and allowing them freedom in selecting items or allowing them to select room décor from catalogs to further decorate the room.

Other evidence:

Classwork, Homework, Exit Slips, Quizzes, Unit Exam

Stage 3: Learning Activities

Regular Math

Day 1: Proportional / Non-Proportional Relationships

As students enter the classroom, the question “**How can real life situations be described mathematically?**” will be on the overhead as a warm up. Students will have 3 minutes to think about the question on their own and write down ideas on their warm up page. Then the class will have a “chalk talk” to share some of their ideas with the class. The class will discuss some of the ideas and

Pre-AP/Pre-Algebra

Day 1: Proportional / Non-Proportional Relationships and Cross Multiplication

As students enter the classroom, the question “**How can real life situations be described mathematically?**” will be on the overhead as a warm up. Students will have 3 minutes to think about the question on their own and write down ideas on their warm up page. Then the class will have a “chalk talk” to share some of their ideas with the class. The class will discuss some of the ideas and

the teacher will explain that they are beginning a new unit called “Proportional Reasoning” to explore this question, but that there is some background information that they will need to discuss first.

To introduce students to the concept of proportional relationships the class will play a short game called “Example/Non-Example” in which the students will discover for themselves what proportional relationships look like.

First, The teacher will give several examples and non-examples of proportions.

Next the students will give examples and non-examples as they discover what the relationship is.

Once it appears that the majority of the class understands the concept, one student will explain the “rule.”

The class will likely identify the rule as “equivalent fractions”. At this point the teacher will remind students that a fraction is actually a ratio, or a comparison of two numbers by division that compares a part to a whole.

The teacher will explain that some ratios compare parts to parts as well. The teacher will demonstrate the relationship between equivalent ratios and will introduce the concept of proportionality. The class will practice determining whether or not relationships are proportional through cross multiplication

Day 2: Solving Proportions with Cross Multiplication

Warm Up: Baking Cookies*

After discussing the warm up, the teacher will redirect the class to the Essential Questions: “How can real life situations be described mathematically?” The teacher will remind students that proportional relationships are used to solve real world problems such as in baking. The teacher will show students how part two of the problem can be solved using a proportion rather than the scale factor which most of them probably used.

The teacher will demonstrate how to set up and solve problems and will emphasize the importance of showing work and keeping work organized.

Students will practice solving cross multiplication problems on their own or in pairs using the rally-coach cooperative learning strategy. (Glencoe Course 2 Resources: Skills Practice 7-4)

Day 3: Vocabulary and Unit Rates

Mini-Quiz- Instead of a warm up the class will take a brief mini-quiz over cross multiplication and determining proportionality. (Proportionality and Cross Multiplication*)

After going over the quiz, the class will begin a discussion of vocabulary terms using the vocabulary boxes* to guide the discussion. After Discussing the vocabulary, including unit rates, students will be asked to determine the unit rates for a set of items found in the grocery store (7th Grade C Scope: Unit 8, Lesson 1, page 39 #5-7). They will also have some mixed practice with cross multiplication and identifying proportional and non proportional relationships. What is not finished in

the teacher will explain that they are beginning a new unit called “Proportional Reasoning” to explore this question, but that there is some background information that they will need to discuss first.

To introduce students to the concept of proportional relationships the class will play a short game called “Example/Non-Example” in which the students will discover for themselves what proportional relationships look like.

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The class will likely identify the rule as “equivalent fractions”. At this point the teacher will remind students that a fraction is actually a ratio, or a comparison of two numbers by division that compares a part to a whole.

The teacher will explain that some ratios compare parts to parts as well. The teacher will demonstrate the relationship between equivalent ratios and will introduce the concept of proportionality. The class will practice determining whether or not relationships are proportional, *and will practice using cross multiplication to solve problems.* (Proportionality and Cross-Multiplication*)

Day 2: Vocabulary and Unit Rates

Warm Up: Baking Cookies*

After discussing the warm up the class will begin a discussion of vocabulary terms using the vocabulary boxes* to guide the discussion. The teacher can refer back to the warm up for examples of terms. When introducing scale factor the tie should be made to part two of the warm up.

After Discussing the vocabulary, including unit rates, students will be asked to determine the best value for a set of items found in the grocery store (7th Grade C Scope: Unit 8, Lesson 1, page 39 #5-7; or Glencoe Course 2 Resources: Study Guide and intervention 7-2).

They will also have some mixed practice with cross multiplication and identifying proportional and non proportional relationships. . (Glencoe Course 2 Resources: Study Guide and Intervention 7-4)

What is not finished in class must be completed for homework.

Day 3: Using Proportions for Problem Solving

Warm Up: Proportions*

Students will review using cross multiplication to solve proportions through the warm up: The teacher will introduce the steps for using proportions to create an equation in problem solving:

- 1- Set the *standard* (units over units)
- 2- Set up the proportion
- 3- Cross multiply
- 4- Solve

class must be completed for homework (Glencoe Course 2 Resources: Study Guide and Intervention 7-4).

Day 4: Unit Rates and Best Value

Warm Up: The Shoe Shop*

Use the warm up to demonstrate how unit rates can be used to make buying decisions. Discuss other real life examples that the kids have seen, especially at the grocery store. Allow student to practice finding unit rates and applying this concept to best value. Students should work independently. (Glencoe Course 2 Resources: Study Guide and intervention 7-2)

Day 5: Using Proportions for Problem Solving

Students will review using cross multiplication to solve proportions through the warm up: Proportions Warm Up*.

The teacher will introduce the steps for using proportions to create an equation in problem solving:

- 1- Set the *standard* (units over units)
- 2- Set up the proportion
- 3- Cross multiply
- 4- Solve

The teacher will demonstrate how to set up and solve problems using proportions while the students follow along. Then students will pair up. As a class they will use the Proportions Game Board to practice setting up and solving problems. Then the pairs will work together to set up the rest of the problems. When they think they have the problems set up correctly the teacher will check them off. They will record their proportions in the answer sheet and will solve the proportions on their own. (Problems Found in Glencoe Course 2 Resources: Word Problems 7-4) At the end of the period the class will discuss their set up and solutions and will examine how different proportions can produce the same result.

Day 6: Using Proportions for Problem Solving cont.

Students will have a day to practice using proportions to solve word problems. ("Pre-Algebra Pizzaz" Proportions Problems)

Students who finish early will be placed in groups and will write their own word problems to demonstrate proportional and non-proportional situations. This will allow time for the teacher to give extra assistance to students that are still struggling. At the closing of class students that created word problems will present their work to the class and the class will determine which situations represent proportional or non-proportional situations.

Day 7: Scale Drawings

Warm up: Model Car*: Students will use the same steps that they have been using for proportion problem solving to solve the warm up on their own. While discussing the warm up the teacher will coach the students into identifying the scale factor. The class will discuss how scale factor could be used to solve the problem. They will then discuss how they could use scale factor if the

The teacher will demonstrate how to set up and solve problems using proportions while the students follow along. Then students will pair up. As a class they will use the Proportions Game Board to practice setting up and solving problems. Then the pairs will work together to set up the rest of the problems. (Problems Found in Glencoe Course 2 Resources: Word Problems 7-4) When they think they have the problems set up correctly the teacher will check them off. They will record their proportions in the answer sheet and will solve the proportions on their own. At the end of the period the class will discuss their set up and solutions and will examine how different proportions can produce the same result.

Extension: Scaled Drawings

After everyone has finished students will discuss the model car* transparency and discuss solutions with their partners. The teacher will point out that a special kind of Proportion problem is the scale drawing problem. The class will discuss multiple ways of solving scale drawing problems including the use of proportions and the use of the scale factor. The class will examine some examples together and then will begin working independently on the *mixed practice*. What is not finished in class will be homework. (Mixed Practice taken from 6-3 and 6-4 in Glencoe Pre-Algebra text book resources)

Day 4: Using Proportions for Unit Conversion and Graphing Proportional Relationships

Warm Up: How could you set up a proportion to prove that 3 feet equals 36 inches? What would be the scale factor? Where on your formula charts do you find scale factors?

Students will discuss how proportions can be used to convert between units. They will explore how proportional reasoning and the concept of scale factor can be used to convert between units, write an equation, and graph a relationship. Students will complete the Unit Conversion and Graphing* activity.

Homework: Graphing Proportional Relationships*

Day 5: Mid Chapter Quiz (Glencoe Pre-Algebra Book Page 319)

Day 6: Percent Proportions

Warm Up: Students will answer the following questions:

- What are the two kinds of ratios? (part to part and part to whole)
- How is a fraction a ratio? (it is a part out of a whole)
- What is the first step in writing a percent as a fraction? Put the percent over 100)

The class will discuss the warm up questions to discover the set up for a percent proportion: percent over 100 equals part over whole. The teacher will also introduce the key words: is and of- is goes with the part, of goes with the whole. The class will practice setting up problems together in which they are using the percent

dimensions were different.

Next the teacher will introduce the day's activity: determining the actual dimensions at Hogwarts given a scaled drawing. The class will find some of the actual measurements together. They will then try one problem on their own, will check it with their partner, then will check their solution with the class. Finally the students will find the remainder of the measurements independently. Activity: ("Punchline Bridge to Algebra 2nd Edition," page 7.2)

Day 8: Percent Proportion- Finding Percentage

Warm Up: Students will answer the following questions:

- What are the two kinds of ratios? (part to part and part to whole)
- How is a fraction a ratio? (it is a part out of a whole)
- What is the first step in writing a percent as a fraction? Put the percent over 100)

The class will discuss the warm up questions to discover the set up for a percent proportion: percent over 100 equals part over whole. The teacher will also introduce the key words: is and of- is goes with the part, of goes with the whole. The class will practice setting up problems together in which they are discovering the percentage of the ratio using the percent proportion. (Glencoe Course 2, Section 8-1)

Day 9: Percent Proportion- Finding Parts or Wholes

Warm Up: Percent of a Number

Students will examine how the same proportion can be used to discover any missing part of the equation. After reviewing the warm up the teacher will ask what they would do if a different part of the proportion was missing. They class will discover that the problem is solved exactly the same way. The class will practice setting up problems together, and solving for missing numbers, then students will work independently as the teacher circulates and assists struggling students. (Glencoe Course 2, Section 8-2)

Day 10: Percent Proportion- Mixed Practice and Word Problems

As students enter instructions will be posted for them to get into their groups. Students will work in their cooperative learning groups on a "**group quiz**" that includes mixed practice and TAKS style questions. (Page 410 in Glencoe 7th Grade Text Book: Mid Chapter Quiz) At the end of the period groups will trade and grade and any questions that the class has will be addressed.

Day 11 and 12: Sales Tax, Tip and Discounts

Mini-Quiz- an independently taken quiz over the mixed practice to be averaged with the group quiz grade (Glencoe Course 2 Resources: Section 8-2 Quiz). As students finish their quiz they will begin working on the Tax and Discounts Introductory Worksheet*. This

proportion to find unknown percentages, parts or wholes.(Glencoe Pre-Algebra Section 6-6)

Day 7: Percent Change and Proportions

Mini- Quiz: Glencoe Course 2 Resources: Section 8-2 Quiz

Students will take notes on percent change and will practice working problems on their own. (Problems taken from the Glencoe Pre-Algebra Resources section 6-9).

Day 8: Sales Tax, Tip, and Discounts

As students enter they will pair up and begin working on the Tax, Tip and Discounts Introductory Worksheet*.

This worksheet will guide them through the steps and reasoning of calculating prices with taxes and discounts. Once pairs begin to finish, the class will discuss each of the steps and how to calculate discounts and tip amounts using proportions. Students will then work independently to complete the Calculating Prices Activity (From Curriculum Book).

Homework: Students will answer the following question for homework:

The state of Texas offers a Tax-Free weekend each year right before school starts. Susan went shopping during tax free weekend to pick out an outfit for the first day of school. She used a coupon and paid the cashier a total of \$72.25. If she didn't have the coupon, the outfit would have cost her \$85.00. For what percent off was Susan's coupon?

Day 9: Percent Equations

Warm Up: Percent Change

After the warm up students will trade homework assignments with their partner. Students will have 5 minutes to examine their partner's work and rank it as a 1-4 on the problem solving rubric (a tool that students should already have- Exemplars). Then students will discuss the question and solution with their partner. The class will debrief and discuss the homework question as a percent change question.

Then the class will derive the percent equation beginning with the percent proportion, using variables and whole number examples.

Students will practice solving percent problems using the percent equation rather than proportions. ("Punchline Bridge to Algebra 2nd Edition," page 7.13)

Day 10: Interest Rates and Commissions

Warm up: The Traveling Sales Man*

Use the warm up to introduce the concept of commissions and tie it to the concept of tax and tip. Discuss similarities (both calculate percentages and add) and differences (you are adding the percentage to a fixed amount rather than to a changing amount) Allow students to work a few examples on a scratch sheet of paper. Once students seem to understand the concept of

worksheet will guide them through the steps and reasoning of calculating prices with taxes, tips and discounts. Once all students have completed their quiz, the class will begin discussing each of the steps and how to calculate discount, tax and tip amounts using proportions. Students will then work in their pairs to complete the Calculating Prices Activity

Days 13-15: Design on a Dime

Warm Up: Re-present the question, “**How can real life situations be described mathematically?**” and discuss the differences in answers from the beginning of the unit compared to now. Then introduce the Design on a Dime Project explaining that students are going to be using all the skills that they have learned to re-design a room.

Day 16: Unit Test (Unit 3 Exam from 7th Grade Glencoe Text Book Resources)

commission and how both the proportion and the equation can be used to calculate commission, it will be time to begin the discussion of simple interest. Have the students describe what they are doing in the percent equation using complete sentences. (First you change the percent to a decimal, and then you multiply it with the whole to get the part.) If students seem “stuck” they can collaborate with a partner, then partners can pair into groups of four to create the best sentence or sentences. Different groups will share their responses, then the class will decide upon one sentence to describe the process. That sentence will be used as the framework for introducing the interest formula.

The teacher will explain that most people keep their money in a checking or savings account. She/he will ask if anyone knows why people choose to leave their money in banks and will explain that banks pay interest when money is left with them. The teacher will explain what the principle is (P), and what an interest rate is (r) and how they can be used to find the amount of interest earned (I). Throughout this discussion these variables will be placed into a formula using the sentence the class constructed. Finally the concept of time will be introduced into the formula so that students see that $I = Prt$. The class will work some examples together and then students will work independently from the (“Punchline Bridge to Algebra 2nd Edition,” worksheet 7.19).

Exit Slip*: Students will solve one simple interest and one Commission question and will rank their understanding on a scale of one through five.

Day 11: Percents and Mental Math

Mini-Quiz: Discounts, Tax, Tip, Interests, and Commissions* with vocabulary matching.

Trade and Grade the quiz in class. Discuss the different ways for solving the problem, including using proportions or the percent equation. Then explain that sometimes you just don’t want to do all that work! Some percentages are easy to find using mental math. Go through the Percents and Mental Math notes and activity (from Curriculum Notebook).

Day 12: Proportions, Predictions, and Review

Warm Up: Percent Mental Math

Students will have 5 minutes to calculate the percentages of a set of several numbers using the mental math shortcuts learned the day before. Then students will break into groups of four and will begin rotating through four stations where they will perform tasks and make predictions given specific situations. Students will spend 7 minutes at each station.

Station One- Flipping Out: in sets of two, students will flip color counters 20 times and will record all results (red and red, red and yellow, yellow and yellow) Students will create ratios and proportions comparing outcomes and will make predictions about the outcomes had they flipped more times.

Station two- Reading Graphs: Students will examine circle graphs and make predictions about the actual number of people who are represented in the survey using proportions. They will also examine a line graphs and tables to determine missing pieces of information

Station three- Word Problems: Students will answer a set of word problems and check their work/ explain their solutions with their group members. Word problems will deal with tax, tip, discounts, interests, and commission. (Glencoe Pre-Algebra Chapter 6 review)

Station Four- Room Dimensions: Students will measure unknown room dimensions on a blue print and use scale factor and proportions to determine the actual dimensions, (“Punchline Bridge to Algebra 2nd Edition,” page 7.2)

Days 13-15: Design on a Dime

Day 16: Unit Test (Chapter 6 Exam from Glencoe Pre-Algebra Text Book)

Warm Up: Re-present the question, “**How can real life situations be described mathematically?**” and discuss the differences in answers from the beginning of the unit compared to now.

Give the Unit Exam

Proportionality and Cross Multiplication

Identify each relationship as proportional or non-proportional.

1.

x	2	4	6	8	10
y	6	12	24	48	96

2.

A	3	6	9	12	15	18
B	4	8	12	16	20	24

3. $\frac{15}{50} = \frac{12}{20}$

Find the Missing Value

4. $\frac{18}{27} = \frac{12}{n}$

5. $\frac{2.2}{4} = \frac{n}{10}$

Warm Up: Baking Cookies

Mr. Townsend, Ms. Bennett, Mr. Krahn and Mrs. Bryand are planning a huge party for all the teachers at Heritage. They are planning to bake cookies for the party, but they need to make sure they have enough cookies, so they will have to increase the recipe proportionally. Ms. Bennett created table one to determine the right amount of each ingredient. Mrs. Bryand created table two.

Which table shows a proportional relationship and the correct amount of each ingredient?

Table 1:

	Butter	Sugar	Brown Sugar	Chocolate Chips
Original Recipe	2 sticks	1 cup	$\frac{1}{4}$ cups	8 ounces
Teacher Recipe	6 sticks	3 cups	$\frac{3}{4}$ cups	24 ounces

Table 2:

	Butter	Sugar	Brown Sugar	Chocolate Chips
Original Recipe	2 sticks	1 cup	$\frac{1}{4}$ cups	8 ounces
Teacher Recipe	5 sticks	4 cups	1 cup	11 ounces

Suppose the recipe also called for $\frac{1}{2}$ teaspoon of vanilla. How much vanilla will your teachers need to use?

Name: _____ Date: _____ Class Period: _____

Proportional Reasoning Vocabulary Boxes

<i>Ratio</i>	First Kind:	
Definition	Second Kind:	My Understanding: 1 2 3 4
	Your Own Definition	
Your Own Definition		Example/Picture

<i>Rate</i>	Example	
Definition	Non-example	My Understanding: 1 2 3 4
	Your Own Definition	
Your Own Definition		How it is different from a ratio?

<i>Unit Rate</i>	Example	
Definition	Non-example	My Understanding: 1 2 3 4
	Your Own Definition	
Your Own Definition		How to find it:

<i>Proportion</i>	Example	
Definition	Non-example	My Understanding: 1 2 3 4
	Your Own Definition	
Your Own Definition		How is it different from a ratio?

<i>Proportional Relationship</i>	Example	
Definition	Non-Example	My Understanding: 1 2 3 4
	Your Own Definition	
Your Own Definition		What is it called if a relationship is not proportional ?

<i>Scale Factor</i>	Example	
Definition	Non-example	My Understanding: 1 2 3 4
	Your Own Definition	
Your Own Definition		How to find it:

The Shoe Shop

Coach Bennett wants to buy new shoes for all the volleyball players before the next season. She found out that there are special prices for buying in bulk. Nikes shoes cost \$650 for twenty pairs of shoes, and New Balance shoes cost \$335 for ten pairs of shoes.

Find the cost per pair of shoes for Nikes and New Balance.

Which is the better deal?

Proportions Warm Up

Solve each proportion to the nearest tenths digit as needed.

$$1. \frac{34}{50} = \frac{x}{75}$$

$$2. \frac{15}{27} = \frac{25}{n}$$

$$3. \frac{m}{5} = \frac{3}{2}$$

$$4. \frac{12}{n} = \frac{5}{18}$$

Model Car

Bobby builds model cars as a hobby. He is very careful to make all his cars to scale. That means that every part of the model is proportional to the real thing. Bobby is building a model of a sports car that is 8 feet long and 4 feet high. If he builds the care to be 4 inches long, what will be the height of the model?

If the diameter of the wheel on the model car is 1 inch, what is the diameter of the actual wheel on the real car?

Unit Conversions and Graphing

Fill in the tables based on each situation. Then identify the scale factor and write an equation or proportion that describes the situation mathematically. Use your table to graph the ordered pairs on the separate sheet of graph paper and connect your points to form a line.

Situation 1: Converting from Feet to Inches

Feet (x)	1	2	3	4	5
Inches (y)					

Scale Factor:

Equation:

Situation 2: Converting from Inches to Feet

Inches (x)	0	6	12	18	24
Feet (y)					

Scale Factor:

Equation:

Situation 3: Converting from Gallons to Quarts

Gallons (x)	1	2	3	4	5
Quarts (y)					

Scale Factor:

Equation:

Situation 4: Converting from Quarts to Gallons

Quarts(x)	1	2	3	4	5
Gallons (y)					

Scale Factor:

Equation:

Situation 5: Converting from meters to centimeters

meters (x)	0	1	2	3	4
centimeters(y)					

Scale Factor:

Equation:

Situation 7: Converting from centimeters to millimeters

centimeters(x)	1	2	3	4	5
millimeters(y)					

Scale Factor:

Equation:

Situation 8: Converting from meters to kilometers

meters (x)	2000	1750	1500	1250	1000
kilometers(y)					

Scale Factor:

Equation:

Situation 9: Converting from pounds to ounces

pounds(x)	0	1	2	3	4
ounces(y)					

Scale Factor:

Equation:

Situation 10: ounces from centimeters to cups

ounces(x)	0	2	4	6	8
cups(y)					

Scale Factor:

Equation:

Graphing Proportional Relationships

For each set of numbers, determine if the relationship is proportional or non-proportional. Then graph each set of numbers on a coordinate grid.

Set 1:

x	-1	0	1	2	3
y	-2	0	2	4	6

Set 2:

x	2	4	6	3	5
y	4	8	12	6	10

Set 3:

x	0	1	2	3	4
y	1	2	3	4	5

Set 4:

x	1	2	3	4	5
y	3	5	7	9	11

Set 5:

x	-2	-3	-4	-5	-6
y	2	3	4	5	6

What do you notice about the graphs of the proportional relationships compared to the non-proportional relationships?

The Traveling Salesman

A traveling salesman is paid \$125 a month. He also earns 15% of his sales (15% commission). If he sells \$720 worth of widgets in the month of January, how much money will he take home for that month?

What if he sells \$1000 worth of widgets?

Discount, Tax, Tip, Interest, and Commission Quiz

Match each word with its definition.

- | | |
|--------------------------|---|
| _____ 1. Principle | A. One form of a rational number in which the part is out of 100. |
| _____ 2. Rate | B. An amount in relation to another amount of a different unit of measure. |
| _____ 3. Interest | C. An amount or percentage deducted from the usual list price |
| _____ 4. Commission | D. To increase the selling price of an item |
| _____ 5. Discount | E. A percent derived by examining the amount changed and the original amount. |
| _____ 6. Tax Rate | F. A percent paid based on sales that have been made |
| _____ 7. Proportion | G. The amount of money put in to a bank account |
| _____ 8. Percent | H. The percentage of an item or property to be paid to the government. |
| _____ 9. Mark Up | I. A comparative relation between things or parts. Two ratios set equal to one another. |
| _____ 10. Percent Change | |

Mrs. Bryand went shopping at Bealls and found a shirt on sale for 30% off. The sale price was not posted but the original price was \$32.99.

11. What is the sale price of the shirt?
12. If there is an 8% sales tax on the item, how much can Mrs. Bryand expect to pay at checkout?
13. If the sales lady at Bealls makes \$7.50 an hour plus 12% commission, and she works a seven hour day, how much can she expect to take home if she sells \$250 worth of clothing?
14. After shopping, Mrs. Bryand meets up with Ms. Bennett, Mr. Townsend, and Mr. Krahn at Big Jou's Pizza joint. After they finish their pizza, the check comes and it totals \$32.60 including tax. The teachers want to leave a 15% tip. How much will the tip be and how much will their total cost be?
15. When Mrs. Bryand gets home from shopping she feels a little guilty about the money that she has spent, so she decides to open a savings account to save the rest of her money. Mrs. Bryand opens the account with \$400. The account earns 3% interest each month. If Mrs. Bryand leaves her money in the account for a year, how much interest will she earn and how much will be in the account at the end of the year?

Percent Mental Math

Use your mental math strategies to find the missing percentages.

- 1) **20% of 40**
- 2) **75 % of 12**
- 3) **18% of 50**
- 4) **12.5% of 64**
- 5) **25% of 120**
- 6) **26% of 100**
- 7) **50% of 28**
- 8) **20% of 5**
- 9) **10% of 20**
- 10) **1% of 127**

Proportions, Predictions, and Review

Flipping Out:

With a partner, flip two color counters a total of 20 times and record the outcomes in your table. Then answer the questions to make predictions.

Possible Outcomes	Number of Times (Tallies)	Number of Times (numbers)
Red and Red		
Red and Yellow		
Yellow and Yellow		
Totals:	20	20

Write a ratio comparing the number of times you got all reds to the number of times you got all yellows.

Write a ratio comparing the number of times you got all reds compared to the number of times you flipped the counters.

Based on this information, if you were to flip the counter 100 times, how many times would you expect both counters to come up red? Show your work and explain your reasoning.

How many times would you expect to get both counters showing the same color if you flipped them 100 times? Show your work and explain your reasoning.

What percent of the time are the color counters different? Show your work and explain your reasoning.

Reading Graphs:

Use the provided graphs to answer the questions below. Use your knowledge of proportions and percents.

The circle graphs show the results of a survey in Mrs. Jones and Mrs. Green's fifth grade classes. Percentages have been rounded to the nearest whole number

If there are 26 people in Mrs. Green's fifth grade class, about how many people like dogs best?

How many like rabbits best?

How many like cats best?

If there are 20 people in Mrs. Jones's class, about how many people like hamsters best?

How many like cats best?

If both classes show that 31% like cats best, why is it that there are different numbers of students who like rabbits the best in Mrs. Jones and Mrs. Green's Classes?

Based on the information, how many fifth graders would you expect to like rabbits best if about 75 people were surveyed?

Create a table to show the ordered pairs from the line graph.

x						
y						

What would you expect y to be when x is 10?

What unit conversion could the graph represent? Use your formula chart if you need to.

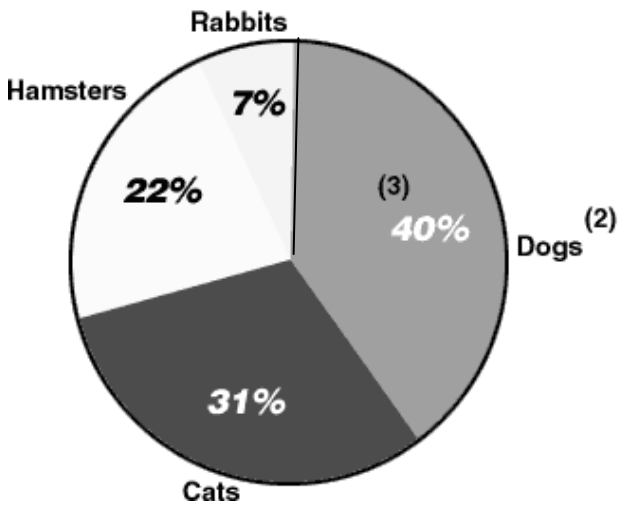
Word Problems:

Complete the word problems from your book in the space provided. Show all work.

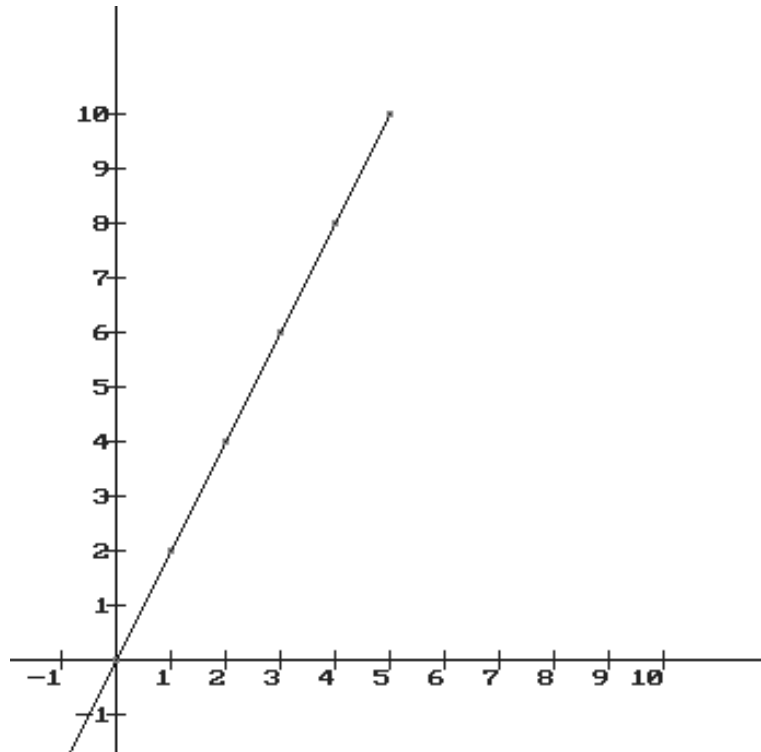
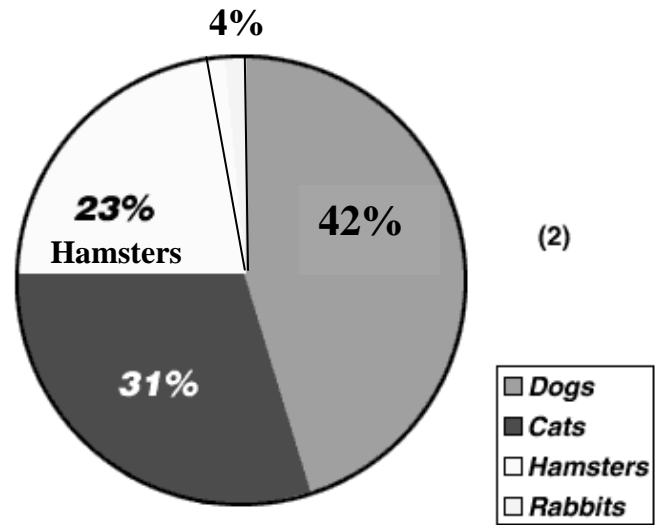
Room Dimensions

Measure the dimensions of rooms on the scaled drawing of Hogwarts Castle. Then use your knowledge of proportional reasoning and scale factor to find the actual dimensions.

(1) **Four Most Popular Pets Among Students in Ms. Green's Fifth Grade Class**



(1) **Four Most Popular Pets Among Students in Mr. Jones's Fifth Grade Class**



DESIGN ON A DIME

Congratulations! You and your design team have been selected to make a guest appearance on the hit TV show *Design on a Dime*. On this show your job is to redesign a room at the lowest cost possible. You will be replacing the flooring and repainting the walls to give your room a fresh new look.

Before the filming of the show, you will need to determine how much of each supply you need, and which supplies offer the best value. You will also need to submit your total cost to the producers of the show so all your items can be purchased.

The producers have put together a model of the room you will be redesigning and a list of possible supplies for you to choose from. Take a look at each item and follow all steps to determine which items you will use and how much you will spend in your redesign.

After you have determined the amount of money you will be spending, the producers are going to be reviewing your selections. They expect you to show all steps and to demonstrate an understanding of proportional reasoning. They will be scoring your work in the following way:

Part One: *The Model* (18 points total)

- You will need to determine *all three* dimensions* (6 points each)

Part Two: *Flooring Options* (26 points total)

- You will need to determine the area of the floor (2 points)
- You will need to determine a discounted price* (6 points).
- You will need to determine the unit rates on *all three* items* (6 points each)

Part Three: *The Walls* (29 points total)

- You will need to determine the total area of all the walls (5 points)
- You will need to determine a discounted price* (6 points).
- You will need to determine the unit rates on *all three* items* (6 points each)

Part Three: *Purchasing Items* (27 points total)

- Identifying best value for paint and flooring (1 point each)
- Calculating subtotal costs and total costs* (four problems in all). (6 points each)
- Identifying other things people may consider when making purchasing decisions (1 point)

**Most of the items will be scored on the following 6-point scale:*

6 points- I used my knowledge of proportional reasoning showed all work in a neat and organized way to obtain my solution. Anyone could look at my work and know exactly what I did. I demonstrate my understanding of proportional reasoning in my work.

5 points- I used a proportional relationships to obtain my solution, but my work was not neat and organized. My work can be followed, but it isn't as neat and organized as it could be.

4 points- I used proportional reasoning to find my solution, but my work was not neat and organized.

3 points- I found my solution. I showed all my work in a neat and organized way, but I did not use proportional reasoning to find my solution.

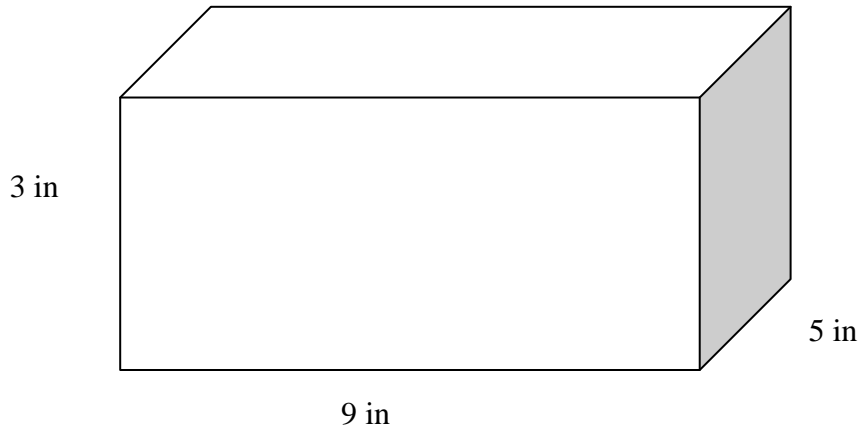
2 points- I was able to find the dimensions, but I required assistance or I did not show my work.

1 point- I tried to find the dimensions but was not successful.

0 points- I did not attempt to find the dimensions of the room.

Part I: The Model

Below you will find the scaled model of the room. In the model, the scale factor is, 1 in = 3 ft.



Determine the actual measurements of the room by setting up and solving a proportion:

Actual Length: _____

Actual Width: _____

Actual Height: _____

Part II: Flooring Options

In order to determine the amount of supplies you will need to purchase, you will first have to find the square footage of the floor in the room. Because the floor is a rectangle, you will use the formula for area of a rectangle ($A=lw$)

$$\frac{\text{ft}}{\text{Actual Length}} \times \frac{\text{ft}}{\text{Actual Width}} = \frac{\text{ft}^2}{\text{Area of the Floor}}$$

The area of the floor in square feet tells you the amount of supplies in square feet that you will need to purchase. Below are your flooring options. Find the unit rate for each to determine the best value.

Pergo Casual Living Oak Laminate Flooring

Price: \$52.24 for enough to cover 18 square feet



Use your knowledge of unit rates to determine the price per square foot of the Pergo. Round to the nearest cent (hundredth).

Price per square foot of
Pergo Flooring:

\$

Armstrong Marino Ceramic Tile

Price: \$32.48 for enough to cover 14 square feet



Use your knowledge of unit rates to determine the price per square foot of the tile. Round to the nearest cent (hundredth).

Price per square foot of
Tile Flooring:

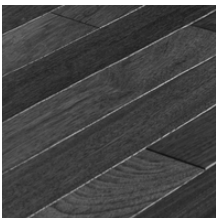
\$ _____

Solid Cherry Hardwood Flooring

Price: \$95.68 for enough to cover 22 square feet

**** You have a coupon for 30% off!!!!*

First find the discounted price: _____



Now Use your knowledge of unit rates to determine the price per square foot of the hard wood flooring using the discounted price. Round to the nearest cent (hundredth).

Price per square foot of
Hardwood Flooring:

\$ _____

Part III: Walls

In order to determine the amount of supplies you will need to purchase, you will first have to find the square footage of all the walls in the room. To do this you will need to find the area of each wall, and then add all the area of the walls together to find the total square footage.

Lets take a look at each of the walls:

Left Wall:

Right Wall:

Front Wall:

Back Wall:

Scaled Dimensions: 5 inches by 3 inches Actual Dimensions: _____ ft by _____ ft
--

Scaled Dimensions: 5 inches by 3 inches Actual Dimensions: _____ ft by _____ ft
--

Scaled Dimensions: 9 inches by 5 inches Actual Dimensions: _____ ft by _____ ft
--

Scaled Dimensions: 9 inches by 3 inches Actual Dimensions: _____ ft by _____ ft
--

Use the actual dimensions to calculate the areas of each wall ($A=lw$). Then add up all the areas to find the total area.

$$\begin{array}{r} \text{Left Wall Area:} \quad \underline{\hspace{2cm}} \text{ ft}^2 \\ \text{Right Wall Area:} \quad \underline{\hspace{2cm}} \text{ ft}^2 \\ \text{Front Wall Area:} \quad \underline{\hspace{2cm}} \text{ ft}^2 \\ \text{Back Wall Area:} \quad + \underline{\hspace{2cm}} \text{ ft}^2 \\ \hline \text{Total Area of Walls:} \quad \underline{\hspace{2cm}} \text{ ft}^2 \end{array}$$

Now that you know the area in square feet of wall space that you will need to cover, you are ready to look at the wall options.

5 gallon Olympic Premium Gloss Paint
Price: \$115 for enough to cover 2000 square feet



Use your knowledge of unit rates to determine the price per square foot of the premium gloss paint.

Price per square foot of Premium Gloss Paint: \$ _____
--

1 Gallon Olympic Satin Finish Paint
Price: \$16.32 for enough to cover 400 square feet



Use your knowledge of unit rates to determine the price per square foot of the satin finish paint.

Price per square foot of
Satin Finish Paint:

\$ _____

1 Quart Olympic Latex Paint
Price: \$8.80 for enough to cover 100 square feet
**** You have a 15% off Coupon*

First find the discounted price: _____



Now use your knowledge of unit rates to determine the price per square foot of the latex paint with your discounted price.

Price per square foot of
Latex Paint:

\$ _____

Part IV: Purchasing Items

Now that you have found the unit rates you are ready to select your best value items. Circle the item you choose and fill in the unit rate.

Best Value Flooring:

- A. Pergo
- B. Tile
- C. Hard Wood

Unit Price: _____

Best Value Wall Paint:

- A. Gloss Paint
- B. Satin Finish Paint
- C. Latex Paint

Unit Price: _____

