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| **Math 6 Unit 2: Rate, Ratio & Proportional Reasoning Using Equivalent Fractions****4 weeks (Math 67: 4 weeks)**  |
| **In this unit students will:** * Understand the concept of a ratio
* Understand the concept of a unit rate
* Solve real-world problems using tables, tape diagrams, double number line and/or equations.
* Interpret and compute quotients of fractions
* Make tables of equivalent ratios & plot on a coordinate plane
* Solve unit rate problems including unit pricing and constant speed
* Find a percent of a quantity; find the whole given the part/percent; and find the part given the whole/percent.

**Unit Resources:** [Unit 2 Overview Video](http://streamingcobb.cobbk12.org/Panopto/Pages/Viewer.aspx?id=b00b0468-48e8-4743-94c1-d66dc588f9ac)  Student Friendly Standards Parent Letter Vocabulary Cards Sample Concept Map Prerequisite Skills Assessment Sample Post Assessment Pick a Number Culminating Task  |
| **Topic 1: Ratio & Rate****Big Ideas/Enduring Understandings:*** A ratio is a number that relates two quantities or measures within a given situation in a multiplicative relationship (in contrast to a difference or additive relationship).The relationships and rules that govern whole numbers, govern all rational numbers.
* Making explicit the type of relationships that exist between two values will minimize confusion between multiplicative and additive situations.
* Ratios can express comparisons of a part to whole, (a/b with b ≠ 0), for example, the ratio of the number of boys in a class to the number of students in the class.
* The ratio of the length to the width of a rectangle is a part-to-part relationship.
* A rate is a comparison of the measures of two different things or quantities; the measuring unit is different for each value. For example if 4 similar vans carry 36 passengers, then the comparison of 4 vans to 36 passengers is a ratio.
* All rates of speed are ratios that compare distance to time, such as driving at 45 miles per hour or jogging at 7 minutes per mile.
* Ratios use division to represent relations between two quantities.

**Essential Questions:** * What kinds of problems can I solve by using ratios?
* What are unit ratios (unit rates)? What are some examples of unit ratios (unit rates)?
* How are ratios and rates similar and different? Can I give examples?
* What information do I get when I compare two numbers using a ratio?

**Student Relevance:*** Unit rates for shopping
* Mixtures using ratios
* Statistics-comparing such as commercials (4/5 dentists…)
* Scale models
* Cooking
* Driving/riding
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| **Content Standards***Content standards are interwoven and should be addressed throughout the year in as many different units and activities as possible in order to emphasize the natural connections that exist among mathematical topics*.**MGSE6.RP.1 (390Q)** Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.**MGSE6.RP.2 (390Q)** Understand the concept of a unit rate a/b associated with a ratio **a:b** with b ≠ 0 (b not equal to zero), and use rate language in the context of a ratio relationship.**MGSE6.RP.3b (830Q)** Solve unit rate problems including those involving unit pricing and constant speed. |
| ***Vertical Alignment*** |
| **Elementary** **MGSE5.NF.3** interpret a fraction as division of the numerator by the denominator | **7th Grade** **MGSE7.RP.1** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction (1/2)/(1/4) miles per hour, equivalently 2 miles per hour. |
| **Instructional Strategies**It is expected that students will have prior knowledge/experience related to multiples and factors, divisibility rules, relationships and rules for multiplication and division of whole numbers as they apply to decimal fractions, and understanding of common fractions. It may be necessary to pre-assess in order to determine if time needs to be spent on conceptual activities that help students develop a deeper understanding of these ideas.**6.RP.1** A ratio is the comparison of two quantities or measures. The comparison can be part-to-whole (ratio of guppies to all fish in an aquarium) or part-to-part (ratio of guppies to goldfish). Students need to understand each of these ratios when expressed in the following forms: 6/15 , 6 to 15 or 6:15. These values can be *simplified to 2/5, 2 to 5 or 2:5; however, students would need to understand how the simplified valu*es relate to the original numbers. A rate is a ratio where two measurements are related to each other. When discussing measurement of different units, the word rate is used rather than ratio. Understanding rate, however, is complicated and there is no universally accepted definition. When using the term rate, contextual understanding is critical. Students need many opportunities to use models to demonstrate the relationships between quantities before they are expected to work with rates numerically.A comparison of 8 black circles to 4 white circles can be written as the ratio of 8:4 and can be regrouped into 4 black circles to 2 white circles (4:2) and 2 black circles to 1 white circle (2:1).  Students should be able to identify all these ratios and describe them using “For every…., there are …”Students develop the understanding that ratio is a comparison of two numbers or quantities. Ratios that are written as part-to-whole are comparing a specific part to the whole. Part-to-part ratios are used to compare two parts. For example, the number of girls in the class (12) compared to the number of boys in the class (16) is the ratio the ratio 12 to 16. This form of ratios is often used to compare the event that can happen to the event that cannot happen. Other ways to illustrate ratios that will help students see the relationships follow. Begin written representation of ratios with the words “out of” or “to” before using the symbolic notation of the colon and then the fraction bar; for example, 3 out of 7, 3 to 5, 6:7 and then 4/5. Using hue/color intensity is a visual way to examine ratios of part-to-part. Students can compare the intensity of the color green and relate that to the ratio of colors used. For example, have students mix green paint into white paint in the following ratios: 1 part green to 5 parts white, 2 parts green to 3 parts white, and 3 parts green to 7 parts white. Compare the green color intensity with their ratios.**6.RP.2**Understand the concept of a unit rate *a*/*b* associated with a ratio *a*:*b* with b ≠ 0, and use rate language in the context of a ratio relationship. *For example, “This recipe has a ratio of 3 cups of* *flour to 4 cups of sugar, so there is ¾ cup of flour for each cup of sugar.” “We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger.”*A rate is a ratio where two measurements are related to each other. When discussing measurement of different units, the word rate is used rather than ratio. Understanding rate, however, is complicated and there is no universally accepted definition. When using the term rate, contextual understanding is critical. Students need many opportunities to use models to demonstrate the relationships between quantities before they are expected to work with rates numerically. A unit rate expresses a ratio as part-to-one or one unit of another quantity. Students understand the unit rate from various contextual situations. For example, if there are 2 cookies for 3 students, each student receives 2/3 of a cookie, so the unit rate is 2:1. If a car travels 240 miles in 4 hours, the car travels 60 miles per hour (60:1). Students will often use unit rates to solve missing value problems. Cost per item or distance per time unit are common unit rates, however, students should be able to flexibly use unit rates to name the amount of either quantity in terms of the other quantity. Students will begin to notice that related unit rates are reciprocals as in the first example. It is not intended that this be taught as an algorithm or rule because at this level, students should primarily use reasoning to find these unit rates.Rates, a relationship between two units of measure, can be written as ratios, such as miles per hour, ounces per gallon and students per bus. For example, 3 cans of pudding cost $2.48 at Store A and 6 cans of the same pudding costs $4.50 at Store B. Which store has the better buy on these cans of pudding? Various strategies could be used to solve this problem: * A student can determine the unit cost of 1 can of pudding at each store and compare.
* A student can determine the cost of 6 cans of pudding at Store A by doubling $2.48.
* A student can determine the cost of 3 cans of pudding at Store B by taking ½ of $4.50.

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| Store A  |
| 3 cans  | 6 cans  |
| $2.48  | $4.96  |

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| --- | --- |
| Store B  |  |
| 6 cans  | 3 cans  |
| $4.50  | $2.50  |

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On a bicycle you can travel 20 miles in 4 hours. What are the unit rates in this situation, (the distance you can travel in 1 hour and the amount of time required to travel 1 mile)? Sample solution: You can travel 5 miles in 1 hour written as 5 mi/1 hr and it takes 1/5 of an hour to travel each mile. Students can represent the relationship between 20 miles and 4 hours.**6.RP.3b**Students recognize the use of ratios, unit rate and multiplication in solving problems, which could allow for the use of fractions and decimals. The ratio tables above use unit rate by determining the cost of one book. However, ratio tables can be used to solve problems without the use of a unit rate. For example, in trail mix, the ratio of cups of peanuts to cups of chocolate candies is 3 to 2. How many cups of chocolate candies would be needed for 9 cups of peanuts?One possible way to solve this problem is to recognize that 3 cups of peanuts times 3 will give 9 cups. The amount of chocolate will also increase at the same rate (3 times) to give 6 cups of chocolate. Students could also find the number of cups of 2 chocolate candies for 1 cup of peanuts by dividing both sides of the table by 3, giving 3 cups of chocolate for each cup of peanuts. To find the amount of chocolate needed for 9 cups of peanuts, students multiply the unit rate by nine giving 6 cups of chocolate.**Opening*** A **ratio** is a number that relates two quantities or measures within a given situation in a multiplicative relationship (in contrast to a difference or additive relationship). The relationships and rules that govern whole numbers, govern all rational numbers.
* A **rate** is a comparison of the measures of two different things or quantities; the measuring unit is different for each value. For example if 4 similar vans carry 36 passengers, then the comparison of 4 vans to 36 passengers is a ratio.
* **Vocabulary Organizers –**
	+ [Ratio and Proportion Vocabulary Organizer](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L1ratioproportionorganizer.doc) (top part only in this lesson)
	+ [Rate Frayer Diagram](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L1frayerdiagramrate.doc) (Similar to four square model)
* **Study Jams** – [Ratios](http://studyjams.scholastic.com/studyjams/jams/math/algebra/ratio.htm), [Rates](http://studyjams.scholastic.com/studyjams/jams/math/algebra/rate.htm)
* [Real-World Application Ratio Video](http://www.bbc.co.uk/skillswise/topic/ratio-and-proportion)
* [Writing Ratios Presentation](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L1writingratios.pptx) – Students could use response boards (miniature white boards) to share their answers or complete the activity in collaborative pairs using the Rally Coach method. Students take turns writing ratios while the other student coaches as necessary.

**Work Session*** [Rate and Rates Presentation](http://picasso.cobbk12.org/Repository/Math0506/ccm6u2L1ratioratespresnetation.ppt)
* A ratio can be expressed three ways:
	+ Using the fraction bar as in $\frac{2}{3}$
	+ Using a colon symbol as in 2:3
	+ Using the word “to” as in 2 to 3.
* [Types of Ratios](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L1typesofratios.pdf) Handout (Answers on p. 2)
* [Writing Ratios](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L1writingratios.pptx) (Answers on p. 2)
* A rate is a ratio where two measurements are related to each other. When discussing measurement of different units, the word rate is used rather than ratio. When using the term rate, contextual understanding is critical. All rates of speed are ratios that compare distance to time, such as driving at 45 miles per hour or jogging at 7 minutes per mile.
* When the denominator of a rate is 1, it is called a unit ratio (unit rate). Typically, students will use the key word per or the division symbol / to indicate a unit rate. **For example:** If a student earns $7.65 per hour, it is the same as $7.65/hour, and means $7.65 for every hour of work.
* A unit rate compares a quantity in terms of one unit of another quantity. Students will use unit rates to solve missing value problems (cost per item or distance per time).
* [Comparing Ratios and Rates "Fruit Juices"](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L1comparingratiosandratesfruitjuices.pdf)
* The following can be used as station activities or can be assigned as needed.
	+ [Games at Recess](http://picasso.cobbk12.org/Repository/Math0506/ccm6u2L1gamesatreccess.pdf) (Using ratio language to describe ratios)
	+ [Mangos for Sale](http://picasso.cobbk12.org/Repository/Math0506/ccm6u2L1mangosforsale.pdf) (Unit Rate using unit pricing)
	+ [Ratio of boys to girls](http://picasso.cobbk12.org/Repository/Math0506/ccm6u2L1ratioofboystogirls.pdf) (Ratio reasoning to solve problems – **USE equivalent Ratios**)
	+ [Running at a constant speed](http://picasso.cobbk12.org/Repository/Math0506/ccm6u2L1runningataconstantspeed.pdf) (Unit Rate using constant speed)
* **Performance Task**: [Unit Rate Best Buy Activity](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L1unitratebestbuy.doc) or [Which is the Better Buy](http://picasso.cobbk12.org/Repository/Math0506/ccm6u2L1unitratepicsfromgrocerystore.ppt)?- Students can find unit rates and determine prices for different measurements. You could cut the activity apart to allow for pairs or small groups to complete sections of the task.
* **Performance Task**: [Ratios and Rates](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6U2L1ratiosrates.docx)

**Closing*** [Ratio Exit Ticket](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U1L1ratiosexitticket.doc) (Requires students to explain answer using mathematical terminology)
* [Rate Last Word](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6u2l1ratelastword.docx) (HOTS)
* [Unit Rate Error Analysis](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U1L1unitrateerroranalysis.doc) (HOTS)

**Sample Lesson Plans*** [Ratio and Rates Lesson Plan](http://picasso.cobbk12.org/Repository/Math0506/ccm6u2L1ratioratelessonplan.doc)
* [Unit Rate Lesson Plan](http://picasso.cobbk12.org/Repository/Math0506/ccm6u2L1unitratelessonplan.doc)

**Exemplars for Constructed Response Prompts:**RP.1,2,3b Charmin (R) ChoicesRP.1 Dear BettyRP.1 RaisinsRP.1 'Average' AmericanRP.1 Great Kayak ExpeditionRP.1 Height DilemmaRP.1 Let's Celebrate the Millennium!RP.1 Help with Our Next School Store OrderRP.2,3b Dripping FaucetRP.2,3b Greener GrassRP.2,3b LA to NYRP.2,3b Turkey Day**Engage NY Lessons:**Grade 6 Module 1: Ratios and Unit RatesTopic A: Representing and Reasoning About Ratios* Lessons 1–2: Ratios
* Lessons 3–4: Equivalent Ratios
* Lessons 5–6: Solving Problems by Finding Equivalent Ratios
* Lesson 7: Associated Ratios and the Value of a Ratio
* Lesson 8: Equivalent Ratios Defined Through the Value of a Ratio

Topic C: Unit Rates* Lesson 16: From Ratios to Rates
* Lesson 17: From Rates to Ratios
* Lesson 18: Finding a Rate by Dividing Two Quantities
* Lessons 19–20: Comparison Shopping—Unit Price and Related Measurement Conversions
* Lessons 21–22: Getting the Job Done—Speed, Work, and Measurement Units
* Lesson 23: Problem-Solving Using Rates, Unit Rates, and Conversions
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| **Differentiation Examples** |
| **Common Misconceptions**Fractions and ratios may represent different comparisons. Fractions can express a part-to- whole comparison, but ratios can express a part-to-whole comparison or a part-to-part comparison which can be written as: *a* to *b*, , or *a*:*b*. Even though ratios and fractions express a part-to-whole comparison, the addition of ratios and the addition of fractions are *distinctly different procedures*. When adding ratios, the parts are added, the wholes are added and then the total part is compared to the total whole. For example, (2 out of 3 parts) + (4 out of 5 parts) is equal to 6 parts out of 8 total parts (6 out of 8) if the parts are equal. When dealing with fractions, the procedure for addition is based on a common denominator: ) which is equal to  Therefore, the addition process for ratios and for fractions is distinctly different. |
| **Evidence of Learning**By completion of this lesson, students should be able to:* Write ratios and rates
* Determine unit rates from ratios
* Solve problems involving ratios and rates using equivalent ratios

**Additional Assessments:****Constructed response:** * [Ratio Exit Ticket](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U1L1ratiosexitticket.doc) (Requires students to explain answer using mathematical terminology)
* [Unit Rate Error Analysis](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U1L1unitrateerroranalysis.doc) (HOTS)

**Informal assessment:** [Writing Ratios Presentation](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L1writingratios.pptx) (Writing ratios and identify type of ratio)**Selected response:** [Ratio and Rates Quiz](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L1ratiosandratesquiz.docx) (2 per page)**Performance Tasks:*** [Unit Rate Best Buy Activity](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L1unitratebestbuy.doc) (Unit Rate using unit pricing)
* [Explore Golden Ratio](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6U2L1ExploreGoldenRatio.doc) (Exploration activity)
* [Which is the Better Buy](http://picasso.cobbk12.org/Repository/Math0506/ccm6u2L1unitratepicsfromgrocerystore.ppt)? (Similar to [Unit Rate Best Buy Activity](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L1unitratebestbuy.doc))
* [Games at Recess](http://picasso.cobbk12.org/Repository/Math0506/ccm6u2L1gamesatreccess.pdf) (Using ratio language to describe ratios)
* [Mangos for Sale](http://picasso.cobbk12.org/Repository/Math0506/ccm6u2L1mangosforsale.pdf) (Unit Rate using unit pricing)
* [Ratio of boys to girls](http://picasso.cobbk12.org/Repository/Math0506/ccm6u2L1ratioofboystogirls.pdf) (Ratio reasoning to solve problems – **USE equivalent Ratios**)
* [Running at a constant speed](http://picasso.cobbk12.org/Repository/Math0506/ccm6u2L1runningataconstantspeed.pdf) (Unit Rate using constant speed)
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| **Purchased Resources****McGraw Hill Grade 6:** *Chapter 3 Lessons 2,3,5,6***McGraw Hill Grade 6 Plus:** *Chapter 2 Lessons 2,3,6,7***Holt Mathematics Course 1** **(old):** *Chapter 7, Lesson 1***Holt Mathematics Course 2** **(old):** *Chapter 5, Lessons 1-2***Holt Mathematics in Context:** *Number: Models You Can Count On:* Section A-The Ratio Table, Section B-The Bar Model Lesson Add **Holt Mathematics in Context**: *Number: Fraction Times:* Section E-Fractional Parts**Hands-on Standards Grades 5-6:** Lesson 18 to introduce ratios by using Cuisenaire rods, 2-color counters, or centimeter cubes**Hands-on Standards Grades 7-8:** Numbers and Operations, Lessons 5-6**Hands-on Standards Grade 6:** Lesson 1 Ratios pg.8 | **Purchased Online Resources**<http://connected.mcgraw-hill.com/connected/login.do>**Teacher User ID**: ccsde0(enumber)**Password**: cobbmath1**Student User ID**: ccsd(student ID)**Password**: cobbmath1**General Login**:User: georgiamath1PW: demo123 | **Suggested Manipulatives**Cuisenaire rods2-color countersCentimeter cubes2 different objects & amountsNewspaper ads |
| **Web Resources** [“Constant Dimensions” NCTM Illuminations.](http://illuminations.nctm.org/LessonDetail.aspx?id=L572) Students measure length and width of rectangle and work to discover the ratio of length to width regardless of the use of non-standard or standard units.* [Fun Helpful Websites](https://cobbk12org-my.sharepoint.com/personal/ashley_clody_cobbk12_org/_layouts/15/guestaccess.aspx?docid=0874dbc57fb7f4a338963f34ff937c978&authkey=AY9IorP_E-LKY5UceIO2ptA)
* <http://www.virtualnerd.com/middle-math/ratios-proportions-percent/ratios-rates>
* <https://www.khanacademy.org/math/pre-algebra/rates-and-ratios>
* <http://www.teachertube.com/video/ratios-rates-and-unit-rates-217369>
* http://www.livebinders.com/play/play?id=1292996
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| **Vocabulary*** Rate
* Ratio
* Quantity
* Rational number
* Unit rate
 |
| **Videos**SEDL [RP.2](http://streamingcobb.cobbk12.org/Panopto/Pages/Viewer.aspx?id=d4acd4d8-814f-4b9f-a2fc-c10197276fb2) |
| **Task Descriptions**

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| Scaffolding Task | Task that build up to the learning task. |
| Constructing Task | Task in which students are constructing understanding through deep/rich contextualized problem solving  |
| Practice Task | Task that provide students opportunities to practice skills and concepts. |
| Culminating Task | Task designed to require students to use several concepts learned during the unit to answer a new or unique situation.  |
| Formative Assessment Lesson (FAL) | Lessons that support teachers in formative assessment which both reveal and develop students’ understanding of key mathematical ideas and applications. |
| 3-Act Task | Whole-group mathematical task consisting of 3 distinct parts: an engaging and perplexing Act One, an information and solution seeking Act Two, and a solution discussion and solution revealing Act Three.  |

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**State Tasks**

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| **Task Name** | **Task Type/****Grouping** | **Content Addressed** | **Standards** |
| **\***[**Arcade Basketball Insanity**](#Arcade_Basketball) | Constructing Task  *Partner/Small Group Task* | Ratios, Rates, and Unit Rates | MGSE6.RP.1MGSE6.RP.2MGSE6.RP.3MGSE6.RP.3b |
| [**Rope Jumper**](#Rope_Jumper)**(Spotlight Task)** | Constructing Task  *Partner/Small Group Task* | Ratios, Rates, and Unit Rates | MGSE6.RP.1MGSE6.RP.2MGSE6.RP.3MGSE6.RP.3b |
| [**Snack Mix**](#Snack_Mix)**(Spotlight Task)** | Constructing Task  *Partner/Small Group Task* | Ratios, Rates, and Unit Rates | MGSE6.RP.1MGSE6.RP.2MGSE6.RP.3MGSE6.RP.3b |
| [**Real??? World Ratios**](#Real_World_Ratios)**(Spotlight Task)** | Constructing Task  *Partner/Small Group Task* | Ratios, Rates, and Unit Rates | MGSE6.RP.1MGSE6.RP.2MGSE6.RP.3MGSE6.RP.3b |
| [**Ratios and Rates**](#Ratios_Rates) | Learning Task*Partner/Small Group Task* | Ratios, Rates, and Unit Rates | MGSE6.RP.1MGSE6.RP.2MGSE6.RP.3MGSE6.RP.3b |

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| **Topic 2: Proportions****Big Ideas/Enduring Understandings:*** Much of the math today is relational in nature, such as price per gallon, speed in miles per hour, pay per hour, students per teacher etc…
* Relational numbers could result in amounts that are not exact.
* Proportional relationships are equivalent ratios.
* Finding percents uses the same processes for solving rates and proportions.
* Percentages are ratios and are sometimes used to express ratios.

**Essential Questions:** * How would I solve real-world problems can I solve by using ratio and rate reasoning?
* How would I make tables of equivalent ratios and use them to compare ratios?
* How do I solve for a percent or find a percent of a number?

**Student Relevance:*** Cooking
* Mixtures-creating larger or smaller
* Decorating & design
* Catering
* Sales, commission, tax
* Surveys
* Measurement conversions & scale models
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| **Content Standards***Content standards are interwoven and should be addressed throughout the year in as many different units and activities as possible in order to emphasize the natural connections that exist among mathematical topics*.**MGSE6.RP.3 (830Q)** Use ratio and rate reasoning to solve real-world and mathematical problems utilizing strategies such as tables of equivalent ratios, tape diagrams (bar models), double number line diagrams, and/or equations.**MGSE6.RP.3a (930Q)** Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.**MGSE6.RP.3c (820Q)** Find a percent of a quantity as a rate per 100 (e.g. 30% of a quantity means 30/100 times the quantity); given a percent, solve problems involving finding the whole given a part and the part given the whole. |
| ***Vertical Alignment*** |
| **Elementary** **MGSE4.NF.1** Explain why two or more fractions are equivalent by using visual fraction models. Focus attention on how the number and size of the parts differ even though the fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. **MGSE5.NBT.3b** Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. | **Math 7** **MGSE7.RP.2** Recognize and represent proportional relationships between quantities.**MGSE7.RP.2a** Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.**MGSE7.RP.2b** Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.**MGSE7.RP.2c** Represent proportional relationships by equations. For example, if total cost *t* is proportional to the number *n* of items purchased at a constant price *p*, the relationship between the total cost and the number of items can be expressed as *t = pn*.**MGSE7.RP.2d** Explain what a point (*x, y*) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (*1,r*) where r is the unit rate.**MGSE7.RP.3** Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, and fees.**MGSE7.G.1** Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. |
|  **Instructional Strategies**Grade 6 is the first of several years in which students develop this multiplicative/proportional thinking. Examples with ratio and proportion should involve measurements, prices and geometric contexts. Miles per hour, constant speed, and portions per person within contexts that are relevant to sixth graders should be used for rates. Experience with proportional and non-proportional relationships, comparing and predicting ratios, and relating unit rates to previously learned unit fractions will facilitate the development of proportional reasoning. **Although algorithms provide efficient means for finding solutions, the cross-product algorithm commonly used for solving proportions will not aid in the development of proportional reasoning. Delaying the introduction of rules and algorithms will encourage thinking about multiplicative situations instead of indiscriminately applying rules. Students will use the cross-product algorithm in unit 4 after solving one-step equations.** Students develop the understanding that ratio is a comparison of two numbers or quantities. Ratios that are written as part-to-whole are comparing a specific part to the whole. Fractions and percent are examples of part-to-whole ratios. Fractions are written as the part being identified compared to the whole amount. A percent is the part identified compared to the whole (100). Provide students with multiple examples of ratios, fractions and percent of this type. For example, the number of girls in the class (12) to the number of students in the class (28) is the ratio 12 to 28. Percents are often taught in relationship to learning fractions and decimals. This cluster indicates that percents are to be taught as a special type of rate. Provide students with opportunities to find percents in the same ways they would solve rates and proportions.Using ratio tables develops the concept of proportion. By comparing equivalent ratios, the concept of proportional thinking is developed and many problems can be easily solved.Multiplicative reasoning is used when finding the missing element in a proportion. For example, use 2 cups of syrup to 5 cups of water to make fruit punch. If 6 cups of syrup are used to make punch, how many cups of water are needed? Recognize that the relationship between 2 and 6 is 3 times. (2)(3) = 6 To find x, the relationship between 5 and x must also be 3 times. (3)(5) = x  the final proportion**Other ways to illustrate ratios that will help students see the relationships follow. Begin written representation of ratios with the words “out of” or “to” before using the symbolic notation of the colon and then the fraction bar; for example, 3 out of 7, 3 to 7, 3:7 and then 3/7.** Use skip counting as a technique to determine if ratios are equal. Labeling units helps students organize the quantities when writing proportions.Using hue/color intensity is a visual way to examine ratios of part-to-part. Students can compare the intensity of the color green and relate that to the ratio of colors used. For example, have students mix green paint into white paint in the following ratios: 1 part green to 5 parts white, 2 parts green to 3 parts white, and 3 parts green to 7 parts white. Compare the green color intensity with their ratios.Students will often use unit rates to solve missing value problems. Cost per item or distance per time unit are common unit rates, however, students should be able to flexibly use unit rates to name the amount of either quantity in terms of the other quantity. Students will begin to notice that related unit rates are reciprocals as in the first example. It is not intended that this be taught as an algorithm or rule because at this level, students should primarily use reasoning to find these unit rates. *In Grade 6, students are not expected to work with unit rates expressed as complex fractions. Both the numerator and denominator of the original ratio will be whole numbers.* **Examples**: On a bicycle you can travel 20 miles in 4 hours. What are the unit rates in this situation, (the distance you can travel in 1 hour and the amount of time required to travel 1 mile)? 1 *hr* represent the relationship between 20 miles and 4 hours. *Sample Solution*: You can travel 5 miles in 1 hour written as *mi* 5and it takes 5 1of an hour to travel each mile. Students can  This is the students’ first introduction to percents. Percentages are a rate per 100. Models, such as percent bars or 10 × 10 grids should be used to model percents. Students use percentages to find the part when given the percent, by recognizing that the whole is being divided into 100 parts and then taking a part of them (the percent). For example, to find 40% of 30, students could use a 10 × 10 grid to represent the whole (or 30). If the 30 is divided into 100 parts, the rate for one block is 0**.**3. Forty percent would be 40 of the blocks, or 40 × .0.3, which equals 12.Students also find the whole, given a part and the percent. For example, if 25% of the students in Mrs. Rumford’s class like chocolate ice cream, then how many students are in Mrs. Rumford’s class if 6 like chocolate ice cream? Students can reason that if 25% is 6 and 100% is 4 times the 25%, then 6 times 4 would give 24 students in Mrs. Rumford’s class.**Opening*** Use [Equivalent Ratios](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L2equivalentratios.pdf) as an Anticipation Guide to begin the lesson (left side only). Students could hold up 2 fingers for true and a fist for false. At the conclusion of the lesson, students could complete the Equivalent Ratios activity and write their explanations.
* **Study Jams** – [Proportions](http://studyjams.scholastic.com/studyjams/jams/math/algebra/proportion.htm), [Percents](http://studyjams.scholastic.com/studyjams/jams/math/decimals-percents/percents.htm)

**Work Session*** **Tape Diagrams** - Drawings that look like a segment of tape, used to illustrate number relationships. Also known as strip diagrams, bar models or graphs, fraction strips, or length models. ([Tape Diagrams Example](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L2tapediagramsexample.docx))

* **Double Number Line Diagrams –** They are used for understanding the equivalence of two related numbers. It’s called “double” because each mark on the line has two sets of numbers matched to it. The top row of numbers describes the whole represented by the line in one way and the bottom row describes the whole in another way. Because the whole line is the same, it’s possible to see the equivalences between the rows of numbers at any point on the line.

 NL2P9A* **Tables of Equivalent Ratios**

* **Solving Percent Problems**Use the percent proportion () for solving percent problems. Students should be solving for the “is”, the “of”, and the %. Unit 4 will look at using equations for solving percent problems.

* [Unit Rates Problem Solving](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L2examplesproblemsforsolvingunitrates.pdf) - Students could choose five problems to solve by drawing a tape diagram or a double number line diagram to prove answers.
* [Find the Whole, Given a Part and a Percent](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L2findthewholegivenapartandapercent.pdf)
* [Snail's Pace](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L2snailspace.pdf) (p. 1)
* **Performance Tasks**: [What's Your Rate](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L2what%27syourrate.pdf), [Constant Dimensions](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6U2L2ConstantDimensions.docx), [How Many Noses](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6U2L2HowManyNoses.docx), [Reaching the Goal](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6U2L2ReachingtheGoal.docx), [Free Throws](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6U2L2FreeThrows.docx), [Ice Cream or Cake?](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6U2L2IceCreamorCake.docx)

**Closing:*** **Grab Bag –** The teacher cuts [Percent Problems](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L2percentproblems.docx) apart and places them in a bag. Students choose 1 problem or partners choose 2 problems to solve. The students must create a model to explain their answer.

**Exemplars Constructed Response Prompts:**RP.3a Dripping FaucetRP.3c Ski PassRP.3c ''3.14159....We Think Math Is Really Fine!''**Engage NY Lessons:**Grade 6 Module 1: Ratios and Unit RatesTopic B: Collections of Equivalent Ratios* Lesson 9: Tables of Equivalent Ratios
* Lesson 10: The Structure of Ratio Tables—Additive and Multiplicative
* Lesson 11: Comparing Ratios Using Ratio Tables
* Lesson 12: From Ratio Tables to Double Number Line Diagrams
* Lesson 13: From Ratio Tables to Equations Using the Value of a Ratio
* Lesson 14: From Ratio Tables, Equations, and Double Number Line Diagrams to Plots on the Coordinate Plane
* Lesson 15: A Synthesis of Representations of Equivalent Ratio Collections

Topic D: Percent* Lesson 24: Percent and Rates per 100
* Lesson 25: A Fraction as a Percent
* Lesson 26: Percent of a Quantity
* Lessons 27–29: Solving Percent Problems
 |
| **Differentiation** * Voting for 2 Tasks
* Voting for 3 Tasks
 |
| **Common Misconceptions**Regarding proportional reasoning, the most common misconception that students have about proportional relationships is that they are additive rather than multiplicative. For example, if a particular shade of orange paint uses 3 quarts of red paint for every 2 quarts of yellow paint, a student using additive reasoning might incorrectly reason that 9 quarts of red paint should be mixed with 8 quarts of yellow paint to maintain the same shade of orange because “the amount of red paint should be 1 more quart than the amount of yellow paint.”Regarding percents, often there is a misunderstanding that a percent is always a natural number less than or equal to 100. Provide examples of percent amounts that are greater than 100%, and percent amounts that are less 1%.Students may confuse mathematical terms such as ratio, rate, unit rate and percent. Students may not understand the difference between an additive relationship and a multiplicative relationship.  |
| **Evidence of Learning**By completion of this lesson, students should be able to:* Students are able to recognize & solve for equivalent ratios
* Students should be able to view percentages as a special rate out of 100
* Students should be able to calculate percentages

**Additional Assessments****Constructed response:** [Percent Problems](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L2percentproblems.docx)**Selected response:** [Unit 2 Lesson 2 Quiz](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L2quiz.docx) |
| **Purchased Resources****McGraw-Hill Georgia Math Grade 6**Chapter 3, Lessons 3-6Chapter 4, Lessons 1-4, 6-8**McGraw-Hill Georgia Math Grade 6 Plus**Chapter 2, Lessons 4-10**Holt Mathematics Course 1 Text (old)**Chapter 6, Lessons 6-7Chapter 7, Lessons 2-3 & 7-10**Math in Context:***Number: Models You Can Count On:* Section E-Choose Your Model*Number: Fraction Times:* Section D- Ratios, Fractions, Decimals, & Percents**Hands-on Standards** **Grades 5-6:** Ratio and Proportion: Finding the Ratio; Ratio and Proportion: Solving the Equation**Hands-on Standards Grade 6:** Lesson 2-3 Proportions and Finding the Ratio pgs. 12-16**Graphing Calculator Strategies Middle School Math:** Lesson 2 Making Sense of Percents and Lesson 3 Solving Ratios and Proportions | **Purchased Online Resources**<http://connected.mcgraw-hill.com/connected/login.do>**Teacher User ID**: ccsde0(enumber)**Password**: cobbmath1**Student User ID**: ccsd(student ID)**Password**: cobbmath1**General Login**:User: georgiamath1PW: demo123 | **Suggested Manipulatives*** 100 grids
* Centimeter Cubes
* Cuisenaire Rods
* Linking Cubes
* Tape Diagrams
 |
| **Web Resources**http://www.purplemath.com/modules/ratio4.htmhttp://www.cehd.umn.edu/ci/rationalnumberproject/93\_4.html<http://www.eduplace.com/math/mathsteps/6/a/6.proportions.ask.html>[https://www.khanacademy.org/math/algebra-basics/core-algebra-linear-equations-inequalities/ratios-core-algebra/v/find-an-unknown-in-a-proportion#](https://www.khanacademy.org/math/algebra-basics/core-algebra-linear-equations-inequalities/ratios-core-algebra/v/find-an-unknown-in-a-proportion)! <http://www.purplemath.com/modules/percntof.htm><https://www.khanacademy.org/math/pre-algebra/decimals-pre-alg/percent-intro-pre-alg/v/finding-percentages-example> <http://www.themathpage.com/ARITH/percent-of-a-number.htm>[“Constant Dimensions” NCTM Illuminations.](http://illuminations.nctm.org/LessonDetail.aspx?id=L572) Students measure length and width of rectangle and work to discover the ratio of length to width regardless of the use of non-standard or standard units.[6.RP, 7.RP.3 Climbing the steps of El Castillo](https://www.illustrativemathematics.org/illustrations/1564)  [6.RP Games at Recess](https://www.illustrativemathematics.org/illustrations/76) [6.RP Mangos for Sale](https://www.illustrativemathematics.org/illustrations/77)  [6.RP Price per pound and pounds per dollar](https://www.illustrativemathematics.org/illustrations/549)  [6.RP Riding at a Constant Speed, Assessment Variation](https://www.illustrativemathematics.org/illustrations/1175)  [6.RP The Escalator, Assessment Variation](https://www.illustrativemathematics.org/illustrations/1181)  [6.RP Hippos Love Pumpkins](https://www.illustrativemathematics.org/illustrations/1611)   [“Finding Our Top Speed”, NCTM Illuminations.](http://illuminations.nctm.org/LessonDetail.aspx?id=L254) The discussions sets the stage for travel in the solar system. Students work with time and distance and plot data.  NCTM Illuminations Lesson: [What’s Your Rate](http://illuminations.nctm.org/Lesson.aspx?id=1660)UEN Lesson: [Trundle Wheel](http://www.uen.org/Lessonplan/preview?LPid=6396)  [6.RP The Escalator, Assessment Variation](https://www.illustrativemathematics.org/illustrations/1181)   |
| **Vocabulary*** Proportion
* Percent
 |
| **Task Descriptions**

|  |  |
| --- | --- |
| Scaffolding Task | Task that build up to the learning task. |
| Constructing Task | Task in which students are constructing understanding through deep/rich contextualized problem solving  |
| Practice Task | Task that provide students opportunities to practice skills and concepts. |
| Culminating Task | Task designed to require students to use several concepts learned during the unit to answer a new or unique situation.  |
| Formative Assessment Lesson (FAL) | Lessons that support teachers in formative assessment which both reveal and develop students’ understanding of key mathematical ideas and applications. |
| 3-Act Task | Whole-group mathematical task consisting of 3 distinct parts: an engaging and perplexing Act One, an information and solution seeking Act Two, and a solution discussion and solution revealing Act Three.  |

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**State Tasks**

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| --- | --- | --- | --- |
| **Task Name** | **Task Type/****Grouping** | **Content Addressed** | **Standards** |
| **\*\***[**How Many Noses Are In Your Arms?**](#Noses_In_Arms) | Performance Task*Partner/Partner Group* | Ratios and Proportions | MGSE6.RP.1MGSE6.RP.3MGSE6.RP.3d |
| [**Reaching the Goal**](#Reaching_Goal) | Performance Task*Individual/Partner Task* | Fraction, Percent | MGSE6.RP.3MGSE6.RP.3c |
| **\***[**Free Throw Warm-up**](#FreeThrowWarmup) | Learning Task*Partner/Small Group Task* | Fractions, Decimals, Percents, Ratios, Rates | MGSE6.RP.3MGSE6.RP.3c |
| [**Free Throws**](#Free_Throws) | Performance Task*Individual/Partner Task*  | Multiplying, Percentages, and Ratios | MGSE6.RP.3MGSE6.RP.3c |
| **\***[**Comparing Rates**](#Comparing_Rates) | Learning Task*Partner/Small Group Task* | Comparing Ratios and Rates | MGSE6.RP.1MGSE6.RP.3MGSE6.RP.3a |
| [**Ice Cream or Cake?**](#IceCream_Cake) | Performance Task*Individual/Partner Task* | Percentages and Ratios | MGSE6.RP.3MGSE6.RP.3c |

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| **Topic 3: Conversions****Big Ideas/Enduring Understandings:*** Solving real-life problems involving measurement units typically need converting.

**Essential Questions:** * How are unit rates helpful in solving real-world problems?

**Student Relevance:*** Measuring for constructing
* Comparing distances, lengths and amounts
 |
| **Content Standards***Content standards are interwoven and should be addressed throughout the year in as many different units and activities as possible in order to emphasize the natural connections that exist among mathematical topics*.**MGSE6.RP.3d (820Q)** Given a conversion factor, use ratio reasoning to convert measurement units within one system of measurement and between two systems of measurements (customary and metric); manipulate and transform units appropriately when multiplying or dividing quantities. *For example, given 1 in. = 2.54 cm, how many centimeters are in 6 inches?* |
| ***Vertical Alignment*** |
| **Elementary Standards** **MGSE4.MD.1** Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. 1. Understand the relationship between gallons, cups, quarts, and pints.
2. Express larger units in terms of smaller units within the same measurement system.
3. Record measurement equivalents in a two column table.

**MGSE5.MD.1** Convert among different-sized standard measurement units (mass, weight, length, time, etc.) within a given measurement system (customary and metric) (e.g., convert 5cm to 0.05m), and use these conversions in solving multi-step, real world problems. | **Math 7 Standards****MGSE7.G.1** Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. |
|  **Instructional Strategies**Students should also solve real-life problems involving measurement units that need to be converted. **Representing these measurement conversions with models such as ratio tables, t-charts or double number line diagrams will help students internalize the size relationships between same system measurements and relate the process of converting to the solution of a ratio.**Using the information in the table, find the number of yards in 24 feet.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  Feet  | 3  | 6  | 9  | 15  | 24  |
| Yards  | 1  | 2  | 3  | 5  |  ?  |

There are several strategies that students could use to determine the solution to this problem. * Add quantities from the table to total 24 feet (9 feet and 15 feet); therefore the number of yards must be 8 yards (3 yards and 5 yards).
* Use multiplication to find 24 feet:

1) 3 𝑓𝑒𝑒𝑡 × 8 = 24 𝑓𝑒𝑒𝑡; therefore 1 𝑦𝑎𝑟𝑑 × 8 = 8 𝑦𝑎𝑟𝑑𝑠, or 2) 6 𝑓𝑒𝑒𝑡 × 4 = 24 𝑓𝑒𝑒𝑡; therefore 2 𝑦𝑎𝑟𝑑𝑠 × 4 = 8 𝑦𝑎𝑟𝑑𝑠.  Compare the number of black to white circles. If the ratio remains the same, how many black circles will you have if you have 60 white circles?

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|   |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Black  | 4  | 40  | 20  | 60  | ?  |
| White  | 3  | 30  | 15  | 45  | 60  |

 |

 If 6 is 30% of a value, what is that value?  A ratio can be used to compare measures of two different types, such as inches per foot, milliliters per liter and centimeters per inch. Students recognize that a conversion factor is a fraction equal to 1 since the quantity described in the numerator and denominator is the same. For example 12 inches is a conversion 1 foot factor since the numerator and denominator name the same amount. Since the ratio is equivalent to 1, the identity property of multiplication allows an amount to be multiplied by the ratio. Students use ratios as conversion factors and the identity property for multiplication to convert ratio units. For example, how many centimeters are in 7 feet, given that 1 𝑖𝑛𝑐ℎ = 2.54𝑐𝑚?   **Note:** Conversion factors will be given. Conversions can occur both between and across the metric and English system. Estimates are not expected.**Opening*** Use different **liquid measurement containers** for **hands on** experience for understanding of conversions. Add food color to water or rice to enhance viewing.
* View **Study Jams** interactive lesson onunits of measure – <http://studyjams.scholastic.com/studyjams/jams/math/measurement/units-of-measurement.htm>
* [**Guided notes**](file:///C%3A%5CUsers%5Cca114420%5CDesktop%5CCCMath%206%5CCCM6U2%5CCCM6U2Lesson3MeasurementConversions%5CCCM6U2L3MeasurementHints.doc) for measurement conversions. Use the “[Metric Measure Madness](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6U2L3MetricMeasureMadness.docx)” guide when working only with metric units of measure.
* Review the Gallon conversion [**graphic organizer**](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6u2L3MeasuringUp-AS-GallonsCups.pdf)
* Students need to review **units required** for length (unit), perimeter (unit), area (unit²) and volume (unit³). Students have worked with all of these measurements in elementary school; volume with rectangular prisms only. Give students examples of objects (Kleenex box, fencing, string etc…) where they would determine what units to use for all of the different measurements.
* Proportions and Customary Measurement [Overview](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6u2L3proportion_customaryconv.pdf)
* Understanding Metric Units of Measure [PowerPoint](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6u2L3UnderstandMetric.pptx)
* Converting Metric Units [PowerPoint](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6u2L3MetricConversions.pptx)

**Work Session*** After showing students how to set up the proportion, students will use this information to write proportions to convert customary units of measure.
* ***Hands On Standards*** *Grades 5-6 Resource:* Lesson Ratio & Proportion: Finding the Ratio & Ratio & Proportion: Solving the Equation
* [Measurement Conversions Placemat Activity](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6U2L3MeasurementConversionsPlacematActivity.doc)
* [**Station Rotation Review**](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6U2L3ConvertingCustomaryUnitsStationRotation.doc)**:** Rotations from training with hint cards as needed; Set up 6 stations for students to rotate around to solve. At the “Conference with Teacher” station, teacher will have the flexibility to address a variety of issues (strengths, obstacles, next steps, missing assignments, etc.)
* **Performance Tasks**:
	+ [How Many Noses are in Your Arms](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6U2L3HowManyNoses.docx)
	+ [Die Hard Activity](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6u2L3diehardactivity.pdf)

**Closing*** [Customary Conversions Exit Ticket](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L3CustomaryConversionsExitTicket.doc)
* [One Sentence Summary](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6U2L3OneSentenceSummary.doc)
* **Would You Rather?** – Have students to choose one scenario and explain why they would rather do one more than the other. Examples: Run 1 mile or 1 kilometer; Eat 1 pound of candy or 1 gram, 12 oz drink or 1 liter etc.
* [Two Truths and a Lie](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6U2L3TwoTruthsandaLie.docx)

**Exemplars for Constructed Response Prompts:**RP.3d ABC QuiltsRP.3d Cavity-Less CaperRP.3d Ottawa Architecture |
| **Differentiation** |
| **Common Misconceptions**Students confuse measuring with rulers if there are different “tick” marks representing different units of measure. |
| **Evidence of Learning**By completion of this lesson, students should be able to:Students should be able to write and solve proportions to convert units of measure within the same and different measurement systems.**Additional Assessments****Constructed response:** * [Customary Conversions Exit Ticket](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L3CustomaryConversionsExitTicket.doc)
* [One Sentence Summary](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6U2L3OneSentenceSummary.doc)
* [Two Truths and a Lie](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6U2L3TwoTruthsandaLie.docx)
* [Student Unit Reflection](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCM6U2L3UnitReflection.doc) (complete after post-test)

**Informal assessment:** [Measurement Conversions Placemat Activity](http://picasso.cobbk12.org/cobbcurriculum/Curriculum/Math0506/CCm6U2L3MeasurementConversionsPlacematActivity.doc) (Make sense of problems and perseveres in solving them) |
| **Purchased Resources****McGraw-Hill Georgia Math Grade 6**Chapter 2, Lesson 5**McGraw-Hill Georgia Math Grade 6 Plus**Chapter 2, Lesson 1**Holt Mathematics Course 1 (old)**Chapter 9, Lessons 1-4**Graphing Calculator Strategies Middle School Math:** Lesson 20 Developing a Sense of Customary and Metric Units | **Purchased Online Resources**<http://connected.mcgraw-hill.com/connected/login.do>**Teacher User ID**: ccsde0(enumber)**Password**: cobbmath1**Student User ID**: ccsd(student ID)**Password**: cobbmath1**General Login**:User: georgiamath1PW: demo123 | **Suggested Manipulatives**Objects to measureDaily containers with different measurement systemsMetric/customary rulers |
| **Web Resources**<http://www.ixl.com/math/grade-5/compare-and-convert-customary-units>[“Bagel Algebra”, NCTM Illuminations.](http://illuminations.nctm.org/LessonDetail.aspx?id=L662) Students get to think about solving real-world problems symbolically as they interpret results to understand the bagel shop owner’s point.NCTM Illuminations Lesson: [Shopping Mall Math](http://illuminations.nctm.org/LessonDetail.aspx?ID=L266)  [Big Math and Fries](http://illuminations.nctm.org/LessonDetail.aspx?ID=L849) [6.RP Walk-a-thon 1](https://www.illustrativemathematics.org/illustrations/711)<http://www.dummies.com/how-to/content/how-to-convert-metric-units-of-measurement.html> <http://www.brighthubeducation.com/lesson-plans-grades-3-5/91710-teaching-about-metric-conversions/> <http://atlantis.coe.uh.edu/archive/math/math_lessons/mathles4/activities/activities/activiti.htm> <http://literacy.kent.edu/eureka/EDR/10/Converting%20Units%20of%20Measure.pdf>  |
| **Vocabulary*** quantity
 |
| **Task Descriptions**

|  |  |
| --- | --- |
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| Constructing Task | Task in which students are constructing understanding through deep/rich contextualized problem solving  |
| Practice Task | Task that provide students opportunities to practice skills and concepts. |
| Culminating Task | Task designed to require students to use several concepts learned during the unit to answer a new or unique situation.  |
| Formative Assessment Lesson (FAL) | Lessons that support teachers in formative assessment which both reveal and develop students’ understanding of key mathematical ideas and applications. |
| 3-Act Task | Whole-group mathematical task consisting of 3 distinct parts: an engaging and perplexing Act One, an information and solution seeking Act Two, and a solution discussion and solution revealing Act Three.  |

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**State Tasks**

|  |  |  |  |
| --- | --- | --- | --- |
| **Task Name** | **Task Type/****Grouping** | **Content Addressed** | **Standards** |
| [**Traveling to School**](#FAL) | Formative Assessment Lesson | Fractions, ratios, and proportions | MGSE6.RP.1-3MGSE6.RP.3a-d |
| [**Optimizing Security Cameras**](#FAL2_Cameras) | Formative Assessment Lesson | Percentages | MGSE6.RP.1-3MGSE6.RP.3a-d |
| **[Culminating Task:](#Culminating_Task)****[The Rocky Mountain Vacation Trip Problem](#Culminating_Task)** | Performance Task*Individual* | Ratio and Proportions | MGSE6.RP.1-3MGSE6.RP.3a-d |