Unit Abstract: Students will use proportions and scale factors to identify a unit rate. They will be able to identify scale factors in a variety of ways including in talbes, graphs, and equations. Students will perform operations with percents including finding taxes, tips, discounts, and percent change. Students will explore proportionality in scale drawings.

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| **Overarching Question:**  How can we compare numbers to find relationships to make it easier to solve problems? | | | | | | |
|  | | **This Unit: ratios, unit rates, rate of change, proportionalality, percent change, scale drawings** | | | |  |
| **Questions to Focus Assessment and Instruction:**  How can you use proportions to solve for unit rates?  How can you identify proportional relationships?  How can you identify the constant of proportionality in tables, graphs, proportions, and equations?  How are coordinate points, equations, and graphs related? | | | | **Standards for Mathematical Practice**  1.Make sense of problems and persevere in solving them.  **2.Reason abstractly and quantitatively.**  3.Construct viable arguments and critique the reasoning of others.  **4.Model with mathematics.**  5.Use appropriate tools strategically.  6.Attend to precision.  **7.Look for and make use of structure.**  8.Look for and express regularity in repeated reasoning. | | |
| **Academic Vocabulary**  *(5-8 most important content specific vocabulary words)* | Ratio  Rate  Proportional relationship  Constant of proportionality  Scale factor | |  | |  | |

| **Standards** | **Learning Targets** *(including relevant practice standards)* | **Explanations and Examples\*** | **Assured Experiences**  *(common assessments and learning activities)* |
| --- | --- | --- | --- |
| List number and text of the content standard; priority standards are bold-faced   * 7.RP.1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. * **7.RP.2 Recognize and represent proportional relationships between quantities.**  1. **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.** 2. **Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.** 3. **Represent proportional relationships by equations.** 4. **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.** | Students will….  Compute unit rates using ratios of fractions in various units of measurement.  Be able to identify proportional relationships from graphs and tables  Explain what a proportional relationship means  Calculate a constant of proportionality  Write an equation that represents a proportional relationship  Identify the constant of proportionality (scale factor) from an equation or when given coordinate points. | From state document  For example, if a person walks ½ mile in each ¼ hour, compute the unit rate as the complex fraction ½ to ¼ miles per hour, equivalently 2 miles per hour.  **7.RP.2.** Students may use a content web site and/or interactive white board to create tables and graphs of proportional or non-proportional relationships. Graphing proportional relationships represented in a table helps students recognize that the graph is a line through the origin (0,0) with a constant of proportionality equal to the slope of the line.  Examples:  • A student is making trail mix. Create a graph to determine if the quantities of nuts and fruit are proportional for each serving size listed in the table. If the quantities are proportional, what is the constant of proportionality or unit rate that defines the relationship? Explain how you determined the constant of proportionality and how it relates to both the table and graph.    The relationship is proportional. For each of the other serving sizes there are 2 cups of fruit for every 1 cup of nuts (2:1). The constant of proportionality is shown in the first column of the table and by the slope of the line on the graph.  • The graph below represents the cost of gum packs as a unit rate of $2 dollars for every pack of gum. The unit rate is represented as $2/pack. Represent the relationship using a table and an equation.      Equation: *d* = 2*g*, where d is the cost in dollars and g is the packs of gum  A common error is to reverse the position of the variables when writing equations. Students may find it useful to use variables specifically related to the quantities rather than using x and y. Constructing verbal models can also be helpful. A student might describe the situation as “the number of packs of gum times the cost for each pack is the total cost in dollars”. They can use this verbal model to construct the equation. Students can check their equation by substituting values and comparing their results to the table. The checking process helps student revise and recheck their model as n | * [engage ny proportional relationships.pdf](engage%20ny%20proportional%20relationships.pdf)   15. I want to make a mixture of red paint and orange paint at a 5 part to 3 part ratio. If I want to make a mixture of 20 ounces, how many ounces ***of each*** color do I need to add?   * Unit 4 common summative assessment * Learning activity: * Teach comparisons of unit rates using different measurements   [NYC grade 7 assessment 1 proporitonal reasoning](Proportional%20Reasoning%20Gr%20%207%20NYC%20assured%20experince%20rp123.pdf) or website at  http://rda.aps.edu/RDA/Performance\_Task\_Bank/Documents/7th\_Grade/Proportional%20Reasoning%20Gr.%207%20NYC.pdf |
| * **7.RP.3 Use proportional relationships to solve multistep ratio and percent problems.***.* * 7.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 | Calculate tax, tip, and discounts.  Calculate percent increase/decrease.  Use percent increase/decrease to solve problems.  Identify the proportional relationship in percent problems.  Compute lengths and areas of a scale drawing given a scale factor.  Construct a scale drawing given a scale factor. | *Examples: simple interest, tax, markups/markdowns, gratuities and commissions, fees, percent increase/decrease, percent error*  • Gas prices are projected to increase 124% by April 2015. A gallon of gas currently costs $4.17. What is the projected cost of a gallon of gas for April 2015?  A student might say: “The original cost of a gallon of gas is $4.17. An increase of 100% means that the cost will double. I will also need to add another 24% to figure out the final projected cost of a gallon of gas. Since 25% of $4.17 is about $1.04, the projected cost of a gallon of gas should be around $9.40.”  $4.17 + 4.17 + (0.24 • 4.17) = 2.24 x 4.17   |  |  |  | | --- | --- | --- | | 100% | 100% | 24% | | $4.17 | $4.17 | ? |   • A sweater is marked down 33%. Its original price was $37.50. What is the price of the sweater before sales tax?   |  |  | | --- | --- | | $37.50  Original Price of Sweater | | | 33% of $37.50 | 67% of $37.50 |   The discount is 33% times 37.50. The sale price of the sweater is the original price minus the discount or 67% of the original price of the sweater, or Sale Price = 0.67 x Original Price.  A shirt is on sale for 40% off. The sale price is $12. What was the original price? What was the amount of the discount?   |  |  | | --- | --- | | Discount  40% of original price | Sale Price - $12  0.60p = 12  60% of original price | | Original Price (p) | |   • At a certain store, 48 television sets were sold in April. The manager at the store wants to encourage the sales team to sell more TVs and is going to give all the sales team members a bonus if the number of TVs sold increases by 30% in May. How many TVs must the sales team sell in May to receive the bonus? Justify your solution.  • A salesperson set a goal to earn $2,000 in May. He receives a base salary of $500 as well as a 10% commission for all sales. How much merchandise will he have to sell to meet his goal?  After eating at a restaurant, your bill before tax is $52.60 The sales tax rate is 8%. You decide to leave a 20% tip for the waiter based on the pre-tax amount. How much is the tip you leave for the waiter? How much will the total bill be, including tax and tip? Express your solution as a multiple of the bill. The amount paid = 0.20 x $52.50 + 0.08 x $52.50 = 0.28 x $52.50  7.G.1. Example:   |  |  | | --- | --- | | • Julie showed you the scale drawing of her room. If each 2 cm on the scale drawing equals 5 ft, what are the actual dimensions of Julie’s room? Reproduce the drawing at 3 times its current size.    Inline image 1 |  | | [Cereal - Task rp3.pdf](Cereal%20-%20Task%20rp3.pdf)  Or weblink  http://rda.aps.edu/RDA/Performance\_Task\_Bank/Documents/7th\_Grade/Cereal%20-%20Task.pdf  17. A business office is short on its paper supply. In a budget proposal, it was announced that the money spent on paper this year has already been reduced by 25% from last year. If the office spent $927 on paper this year, how much money did they spend on paper last year?  Weblink to fences task  http://rda.aps.edu/RDA/Performance\_Task\_Bank/Documents/7th\_Grade/Fences.pdf  [Fences PDF](Fences%20-%20g1.pdf)  Lesson 19 from Engage NY Ratios and Proportional Realationships [www.engageny.org/sites/default/files/resource/attachments/g7-m1-teacher-materials.pdf](http://www.engageny.org/sites/default/files/resource/attachments/g7-m1-teacher-materials.pdf)  Lesson 19 specific web address:  [www.engageny.org/resource/grade-7-mathematics-module-1-topic-d-lesson-19](http://www.engageny.org/resource/grade-7-mathematics-module-1-topic-d-lesson-19)  Computing Actual Areas from a ScaleDrawing (look left, third column)  Inline image 1 |

| **Standards** | **Learning Targets** *(including relevant practice standards)* | **Explanations and Examples\*** | **Assured Experiences**  *(common assessments and learning activities)* |
| --- | --- | --- | --- |
| List number and text of the content standard; priority standards are bold-faced | Students will…. | From state document | * Unit # common summative assessment * Learning activity: |

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**Instructional resources** (including manipulatives, literature connections, professional resources)

Standard #1

Standard #2

Standard #3

Standard #4

Standard #5