# Unit 1: Ratios and Proportional Reasoning

Content Area: **Mathematics**
Course(s): **Math - Grade 7**
Time Period: **January**
Length: **9 Weeks**
Status: **Published**

## Unit Overview

Analyze proportional relationships and use them to solve real-world and mathematical problems.

Proportional relationships can be used to solve real-world problems. Determine whether the relationship between two quantities is proportional. Use proportions to solve multi-step problems.

Proportional relationships can be used to solve percent problems. Find the percent of increase and decrease and use percents to solve problems involving sales tax, tips, markups and discounts, and simple interest.

*By the end of January, administer the Link It! NJSLS Form B.*

*Benchmark Assessment 2 will be given after chapter 4 at the end of this unit.*

## Transfer

Students will be able to independently use their learning to...

apply rates, ratios, percentages and proportional relationships to problem solving situations such as interest, tax, discount, etc.
apply rates, ratios, percentages and proportional relationships to solve multi-step ratio and percent problems.
apply scale drawings to problem solving situations involving geometric figures.

identify slope as a proportional relationship.

use mathematical expressions, equations, inequalities and graphs to represent and solve real-world and mathematical problems.

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For more information, read the following article by Grant Wiggins.

http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60

## Meaning

## Understandings

Students will understand that...

- Fractions, decimals, and percents can be used interchangeably.
- Ratios use division to represent relationships between two quantities.
- The constant of proportionality is also considered to be the unit rate.

## Essential Questions

Students will keep considering...

- Unit: How can you use mathematics to describe change and model real-world situations?
- Chapter 3: How can you show that two objects are proportional?
- Chapter 4: How can percent help you understand situations involving money?

## Application of Knowledge and Skill

## Students will know...

Students will know...

how to compute unit rates associated with fractions, including ratios of lengths, areas, and other quantities measured in like or different units. (7.RP.1)
how to recognize and represent proportional relationships between quantities (7.RP.2)

how to solve real-world and mathematical problems involving the four operations with rational numbers (7.NS.3)

## Students will be skilled at...

Students will be skilled at...

Solving multi-step ratio and percent problems. (7.RP.3)
• Solving problems involving simple interest and tax. (7.RP.3)
• Solving problems involving markups and markdowns, gratuities and commissions, and fees. (7.RP.3)
• Solving problems involving percent increase, percent decrease, and percent (margin of) error. (7.RP.3)

ex) Wilson baught a painting for x dollars. After 1 year the paining increased 5%. write an expression best repreents the value of the painting.

• Converting between rational number forms (whole numbers, fractions and decimals) to solve problems as appropriate. (7.EE.3)
• Solve multi-step mathematical problems posed with positive and negative rationingl numbers in any form (whole numbers, fractions, and decimals), using tools strategically. (7.EE.3)
• Solving multi-step real-life problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. (7.EE.3)
• Using mental computation and estimation strategies to assess the reasonableness of the answer. (7.EE.3)

## Academic Vocabulary

Chapter 3

Complex fraction, constant of proportionality, constant rate of change, constant of variation, coordinate plane, cross products, dimensional analysis, direct variation, equivalent ratios, nonproportional, proportion, proportional, ordered pair, origin, quadrants, rate, rate of change, slope, unit rate, unit ratio, x-axis, x-coordinate, y-axis, y-coordinate

Chapter 4

Discount, gratuity, markdown, markup, percent equation, percent error, percent of change, percent of decrease, percent of increase, percent proportion, principal, sales tax, selling price, simple interest, tip

## Learning Goal

Analyze proportional relationships and use them to solve real-world and mathematical problems.

Compute unit rates associated with ratios of fractions measured in like or unlike units. (7.RP.A.1)

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. (7.RP.A.2d)

Use proportional relationships to solve multistep ratio and percent problems (for example, simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error)

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| CRP.K-12.CRP2.1 | Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation. |
| CRP.K-12.CRP11 | Use technology to enhance productivity. |
| CAEP.9.2.8.B.5 | Analyze labor market trends using state and federal labor market information and other resources available online. |
| TECH.8.1.8.A.3 | Use and/or develop a simulation that provides an environment to solve a real world problem or theory. |

## Target #1.1.1 (Level of Difficulty: Comprehension(integrating), DOK: 3 - strategic thinking)

SWBAT describe some characteristics of a scaled copy.

SWBAT tell whether or not a figure is a scaled copy of another figure.

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.7.RP.A.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. |
| MA.K-12.4 | Model with mathematics. |
| MA.K-12.5 | Use appropriate tools strategically. |

## Target #1.1.2 (Level of Difficulty: Comprehension(integrating), DOK: 3 - strategic thinking)

SWBAT describe what the scale factor has to do with a figure and its scaled copy.

SWBAT identify corresponding points, corresponding segments, and corresponding angles within a pair of figures.

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.7.RP.A.2a | Decide whether two quantities are in a proportional relationship, e.g., by testing for |

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| | equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. |
| MA.K-12.4 | Model with mathematics. |

## Target #1.1.3 (Level of Difficulty: comprehension, DOK: 2-skill/concept)

SWBAT draw a scaled copy of a figure using a given scale factor.

SWBAT know what operation to use on the side lengths of a figure to produce a scaled copy.

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.7.RP.A.1 | Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.7.RP.A.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. |
| MA.7.RP.A.2b | Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. |
| MA.K-12.4 | Model with mathematics. |
| MA.K-12.5 | Use appropriate tools strategically. |

## Target #1.1.4 (Level of Difficulty: Comprehension(integrating), DOK: 3 - strategic thinking)

SWBAT use corresponding distances and corresponding angles to tell whether one figure is a scaled copy of another.

SWBAT see a figure and its scaled copy, then explain what is true about corresponding angles.

SWBAT see a figure and its scaled copy, then explain what is true about corresponding distances.

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.7.RP.A | Analyze proportional relationships and use them to solve real-world and mathematical problems. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.7.RP.A.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. |
| MA.7.RP.A.2b | Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. |

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| MA.K-12.4 | Model with mathematics. |

## Target #1.1.5 (Level of Difficulty: Comprehension(integrating), DOK: 3 - strategic thinking)

SWBAT explain how the scale factor that takes Figure A to its copy Figure B is related to the scale factor that takes Figure B to Figure A.

SWBAT describe the effect on a scaled copy when I use a scale factor that is greater than 1, less than 1, or equal to 1.

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.7.RP.A | Analyze proportional relationships and use them to solve real-world and mathematical problems. |
| MA.K-12.2 | Reason abstractly and quantitatively. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.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. |
| MA.K-12.4 | Model with mathematics. |
| MA.7.RP.A.2b | Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. |

## Target #1.1.6 (Level of Difficulty: Comprehension(integrating), DOK: 3 - strategic thinking)

SWBAT describe how the area of a scaled copy is related to the area of the original figure and the scale factor that was used.

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.K-12.2 | Reason abstractly and quantitatively. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.7.RP.A.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. |
| MA.7.RP.A.2b | Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. |
| MA.K-12.4 | Model with mathematics. |
| MA.7.RP.A.2c | Represent proportional relationships by equations. |
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |

## Target #1.1.7 (Level of Difficulty: Comprehension(symbolizing), DOK: 2 - skill/concept)

SWBAT explain what a scale drawing is, and I can explain what its scale means.

SWBAT use a scale drawing and its scale to find actual distances.

SWBAT use actual distances and a scale to find scaled distances.

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.7.RP.A.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. |
| MA.7.RP.A.2b | Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. |
| MA.K-12.4 | Model with mathematics. |
| MA.7.RP.A.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. |

## Target #1.1.8 (Level of Difficulty: Retrieval(recognizing), DOK: 2 - skill/concept)

SWBAT use a map and its scale to solve problems about traveling.

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.7.RP.A | Analyze proportional relationships and use them to solve real-world and mathematical problems. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.K-12.4 | Model with mathematics. |
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |

## Target #1.1.9 (Level of Difficulty: Retrieval(recognizing), DOK: 2 - skill/concept)

SWBAT determine the scale of a scale drawing when I know lengths on the drawing and corresponding actual lengths.

SWBAT compare different scales affect the lengths in the scale drawing.

SWBAT create a scale drawing at a given scale when measurements are known.

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.7.RP.A | Analyze proportional relationships and use them to solve real-world and mathematical problems. |
| MA.K-12.2 | Reason abstractly and quantitatively. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |

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| MA.K-12.4 | Model with mathematics. |
| MA.7.G.A | Draw, construct, and describe geometrical figures and describe the relationships between them. |

## Target #1.1.10 (Level of Difficulty: Retrieval(recognizing), DOK: 2 - skill/concept)

SWBAT create another scale drawing that shows the same thing at a different scale.

SWBAT use a scale drawing to find actual areas.

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.7.RP.A | Analyze proportional relationships and use them to solve real-world and mathematical problems. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.K-12.4 | Model with mathematics. |
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |

## Target #1.1.11 (Level of Difficulty: Comprehension, DOK: 3 - strategic thinking)

SWBAT explain the meaning of scales expressed without units.

SWBAT use scales without units to find scaled distances or actual distances.

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.7.RP.A | Analyze proportional relationships and use them to solve real-world and mathematical problems. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.K-12.4 | Model with mathematics. |
| MA.K-12.5 | Use appropriate tools strategically. |
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |

## Target # 1.1.12 (Level of Difficulty: Comprehension, DOK: 3 - strategic thinking)

SWBAT tell whether two scales are equivalent and describe why.

SWBAT write scales with units as scales without units.

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.7.RP.A | Analyze proportional relationships and use them to solve real-world and mathematical problems. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |

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| MA.K-12.4 | Model with mathematics. |
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |

## Target #1.2.1 (Level of Difficulty: Comprehension, DOK: 3 - strategic thinking)

SWBAT use equivalent ratios to describe scaled copies of shapes.

SWBAT know that two recipes will taste the same if the ingredients are in equivalent ratios.

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.7.RP.A | Analyze proportional relationships and use them to solve real-world and mathematical problems. |
| MA.K-12.2 | Reason abstractly and quantitatively. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.K-12.4 | Model with mathematics. |
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |

## Target #1.2.2 (Level of Difficulty: Retrieval (executing), DOK: 2 - skill/concept)

SWBAT use a table to reason about two quantities that are in a proportional relationship.

SWBAT understand the terms proportional relationship and constant of proportionality.

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.7.RP.A | Analyze proportional relationships and use them to solve real-world and mathematical problems. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.K-12.4 | Model with mathematics. |
| MA.K-12.5 | Use appropriate tools strategically. |
| MA.K-12.6 | Attend to precision. |
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |
| MA.7.EE.B | Solve real-life and mathematical problems using numerical and algebraic expressions and equations. |

## Target #1.2.3 (Level of Difficulty: Comprehension, DOK: 3 - strategic thinking)

SWBAT find missing information in a proportional relationship using a table and decribe what it means.

SWBAT find the constant of proportionality from information given in a table and decribe what it means..

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.7.RP.A | Analyze proportional relationships and use them to solve real-world and mathematical problems. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.K-12.4 | Model with mathematics. |
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |
| MA.7.NS.A.1c | Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. |

## Target #1.2.4 (Level of Difficulty: Comprehension, DOK: 3 - strategic thinking)

SWBAT write an equation of the form y=kx to represent a proportional relationship described by a table or a story.

SWBAT write an equation of the form  to represent a proportional relationship described by a table or a story.

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|---|---|
| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.7.RP.A | Analyze proportional relationships and use them to solve real-world and mathematical problems. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.K-12.4 | Model with mathematics. |
| MA.K-12.5 | Use appropriate tools strategically. |
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |

## Target#1.2.5 (Level of Difficulty: Knowledge Utilization, DOK: 4 - Extended Thinking)

SWBAT find two constants of proportionality for a proportional relationship.

SWBAT write two equations justifying a proportional relationship described by a table or story.

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.7.RP.A | Analyze proportional relationships and use them to solve real-world and mathematical problems. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.K-12.4 | Model with mathematics. |
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |
| MA.7.EE.B.3 | Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. |

## Target #1.2.6 (Level of Difficulty: Knowledge Utilization, DOK: 4 - Extended Thinking)

SWBAT: find missing information in a proportional relationship using the constant of proportionality.

SWBAT relate all parts of an equation like y=kx to Justify the situation it represents.

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.7.RP.A | Analyze proportional relationships and use them to solve real-world and mathematical problems. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.K-12.4 | Model with mathematics. |
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |
| MA.7.EE.B.3 | Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. |

## Target #1.2.7 (Level of Difficulty: Knowledge Utilization, DOK: 4 - Extended Thinking)

SWBAT: Justify if a relationship represented by a table could be proportional and when it is definitely not proportional.

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.7.RP.A | Analyze proportional relationships and use them to solve real-world and mathematical problems. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.K-12.4 | Model with mathematics. |
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |
| MA.7.G.A.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. |

## Target #1.2.8 (Level of Difficulty: Knowledge Utilization, DOK: 4 - Extended Thinking)

SWBAT Justify if a relationship represented by an equation is proportional or not.

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| MA.7.RP.A.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. |

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| MA.7.RP.A.2b | Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. |
| MA.7.RP.A.2c | Represent proportional relationships by equations. |
| MA.7.RP.A.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. |
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |

## Target #1.2.9 (Level of Difficulty: Knowledge Utilization, DOK: 4 - extended thinking)

SWBAT ask questions about a situation to determine whether two quantities are in a proportional relationship.

SWBAT solve all kinds of problems involving proportional relationships.

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| MA.7.RP.A.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. |
| MA.7.RP.A.2b | Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. |
| MA.7.RP.A.2c | Represent proportional relationships by equations. |
| MA.7.RP.A.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. |
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |

## Target 1.2.10 (Level of Difficulty: Retrieval (executing), DOK: 2 - skill/concept)

SWBAT know that the graph of a proportional relationship lies on a line through (0,0).

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| MA.7.RP.A.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. |
| MA.7.RP.A.2b | Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. |
| MA.7.RP.A.2c | Represent proportional relationships by equations. |
| MA.7.RP.A.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. |

## Target # 1.2.11 (Level of Difficulty: Comprehension, DOK: 3 - strategic thinking)

SWBAT draw the graph of a proportional relationship given a single point on the graph (other than the origin).

SWBAT find the constant of proportionality from a graph.

SWBAT decsribe the information given by graphs of proportional relationships that are made of up of points or a line.

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| MA.7.RP.A.2a | Decide whether two quantities are in a proportional relationship, e.g., by testing for |

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| | equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. |
| MA.7.RP.A.2b | Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. |
| MA.7.RP.A.2c | Represent proportional relationships by equations. |
| MA.7.RP.A.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. |
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |

## Target #1.2.12 (Level of Difficulty: Comprehension, DOK: 3 - strategic thinking)

SWBAT compare two related proportional relationships based on their graphs.

SWBAT comare two graphs and understand that the steeper graph of two proportional relationships has a larger constant of proportionality.

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| MA.7.RP.A.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. |
| MA.7.RP.A.2b | Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. |
| MA.7.RP.A.2c | Represent proportional relationships by equations. |
| MA.7.RP.A.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. |
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |

## Target #1.4.1 (Level of Difficulty: Recall, DOK:1 - Recall/Reproduction)

SWBAT find dimensions on scaled copies of a rectangle.

SWBAT remember how to compute percentages.

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| MA.7.RP.A | Analyze proportional relationships and use them to solve real-world and mathematical problems. |
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |
| MA.6.RP.A.3c | Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. |

## Target #1.4.2 (Level of Difficulty: Retrieval (executing), DOK: 2 - skill/concept)

SWBAT solve problems about ratios of fractions and decimals.

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| MA.6.RP.A | Understand ratio concepts and use ratio reasoning to solve problems. |
| MA.6.RP.A.1 | Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. |

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| MA.6.RP.A.2 | Understand the concept of a unit rate $a/b$ associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. |
| MA.6.RP.A.3 | Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. |
| MA.6.RP.A.3c | Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. |

## Target #1.4.3 (Level of Difficulty: Retrieval (executing), DOK: 2 - skill/concept)

SWBAT use a table with 2 rows and 2 columns to find an unknown value in a proportional relationship.

SWBAT identify the two quantities that are in a proportional relationship when there is a constant rate.

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| MA.7.RP.A.1 | Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. |
| MA.7.RP.A.2 | Recognize and represent proportional relationships between quantities. |
| MA.7.RP.A.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. |
| MA.7.RP.A.2b | Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. |
| MA.7.RP.A.2c | Represent proportional relationships by equations. |

## Target #1.4.4 (Level of Difficulty: Retrieval (executing), DOK: 2 - skill/concept)

SWBAT use the distributive property to rewrite an expression

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|---|---|
| MA.7.RP.A.2c | Represent proportional relationships by equations. |
| MA.7.EE.B.3 | Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. |
| MA.7.EE.B.4 | Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. |
| MA.7.EE.B.4a | Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where $p$, $q$, and $r$ are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. |

## Target #1.4.5 (Level of Difficulty: Retrieval (executing), DOK: 2 - skill/concept)

SWBAT write fractions as decimals.

SWBAT use the distributive property to rewrite an equation.

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|---|---|
| MA.7.RP.A.2c | Represent proportional relationships by equations. |
| MA.7.EE.A | Use properties of operations to generate equivalent expressions. |
| MA.7.EE.B.4 | Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. |
| MA.7.EE.B.4a | Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where $p$, $q$, and $r$ are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. |

## Target #1.4.6 (Level of Difficulty: Retrieval (executing), DOK: 2 - skill/concept)

SWBAT draw a tape diagram that represents a percent increase or decrease.

SWBAT find the new amount when they know a starting amount and the percent increase or decrease

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|---|---|
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |
| MA.6.RP.A.3c | Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. |
| PFL.9.1.8.E.3 | Compare and contrast product facts versus advertising claims. |
| PFL.9.1.8.E.4 | Prioritize personal wants and needs when making purchases. |
| PFL.9.1.8.E.5 | Analyze interest rates and fees associated with financial services, credit cards, debit cards, and gift cards. |

## Target #1.4.7 (Level of Difficulty: Comprehension, DOK: 3 - strategic thinking)

SWBAT use a double number line diagram to help me solve percent increase and decrease problems.

SWBAT understand that if I know how much a quantity has grown, then the original amount represents 100%.

SWBAT know the new amount and the percentage of increase or decrease, I can find the original amount.

| | |
|---|---|
| MA.7.RP.A.2c | Represent proportional relationships by equations. |
| MA.6.RP.A.3c | Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. |
| MA.6.RP.A.3d | Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. |

## Target #1.4.8 (Level of Difficulty: Comprehension, DOK: 3 - strategic thinking)

SWBAT solve percent increase and decrease problems by writing an equation to represent the situation and solving it.

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| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |
| MA.6.RP.A.3c | Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. |
| MA.6.RP.A.3d | Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. |
| MA.7.EE.A.1 | Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. |

## Target # 1.4.9 (Level of Difficulty: Comprehension, DOK: 3 - strategic thinking)

SWBAT find percentages of quantities like 12.5% and 0.4%.

SWBAT understand that to find 0.1% of an amount I have to multiply by 0.001.

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| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |
| MA.6.RP.A.3c | Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. |
| MA.6.EE.A.3 | Apply the properties of operations to generate equivalent expressions. |
| MA.6.EE.B.6 | Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. |

## Target #1.4.10 (Level of Difficulty: Comprehension, DOK: 3 - strategic thinking)

SWBAT understand and can solve problems about sales tax and tips.

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| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |
| MA.6.RP.A.3c | Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. |
| MA.7.EE.A | Use properties of operations to generate equivalent expressions. |
| MA.7.EE.A.2 | Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. |
| MA.7.EE.B.3 | Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. |

## Target #1.4.12 (Level of Difficulty: Knowledge Utilization, DOK: 4 - extended thinking)

SWBAT find the percentage increase or decrease when I know the original amount and the new amount.

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|---|---|
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |
| MA.7.EE.A | Use properties of operations to generate equivalent expressions. |
| MA.7.EE.A.1 | Apply properties of operations as strategies to add, subtract, factor, and expand linear |

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| | expressions with rational coefficients. |
| MA.7.EE.A.2 | Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. |
| MA.7.EE.B | Solve real-life and mathematical problems using numerical and algebraic expressions and equations. |

## Target #1.4.13 (Level of Difficulty: Knowledge Utilization, DOK: 4 - extended thinking)

SWBAT represent measurement error as a percentage of the correct measurement.

SWBAT understand that all measurements include some error.

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| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |
| MA.6.RP.A.3c | Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. |
| MA.7.EE.A | Use properties of operations to generate equivalent expressions. |
| MA.7.EE.A.1 | Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. |
| MA.7.EE.A.2 | Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. |
| MA.7.EE.B | Solve real-life and mathematical problems using numerical and algebraic expressions and equations. |

## Target # 1.4.14 (Level of Difficulty: Knowledge Utilization, DOK: 4 - extended thinking)

SWBAT solve problems that involve percent error.

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|---|---|
| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |
| MA.6.RP.A.3c | Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. |
| MA.7.EE.A | Use properties of operations to generate equivalent expressions. |
| MA.7.EE.A.1 | Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. |
| MA.7.EE.A.2 | Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. |
| MA.7.EE.B | Solve real-life and mathematical problems using numerical and algebraic expressions and equations. |

## Target #1.4.15 (Level of Difficulty: Knowledge Utilization, DOK: 4 - extended thinking)

SWBAT find a range of possible values for a quantity if I know the maximum percent error and the correct value.

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| MA.7.RP.A.3 | Use proportional relationships to solve multistep ratio and percent problems. |
| MA.6.RP.A.3c | Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. |
| MA.7.EE.A | Use properties of operations to generate equivalent expressions. |
| MA.7.EE.A.1 | Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. |
| MA.7.EE.A.2 | Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. |
| MA.7.EE.B | Solve real-life and mathematical problems using numerical and algebraic expressions and equations. |

## Formative Assessment and Performance Opportunities

- ALEKS
- Exit Ticket
- Interactive Notes
- Kahoot
- Quizizz
- Quizlett
- Status Check (Thumbs Up/Down...)
- Student Persentation
- Student-Teacher Conferences
- White Boards

## Summative Assessment

- ALEKS
- Bench Mark
- Linkit
- Project
- Quiz
- Test

## 21st Century Life and Careers

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|---|---|
| CAEP.9.2.8.B.2 | Develop a Personalized Student Learning Plan with the assistance of an adult mentor that includes information about career areas of interest, goals and an educational plan. |
| CAEP.9.2.8.B.3 | Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career. |
| CAEP.9.2.8.B.4 | Evaluate how traditional and nontraditional careers have evolved regionally, nationally, and globally. |

## Accommodations / Modifications

- calculators
- Colored Tiles
- Cross Products Notes
- Desmos/Online Graphing Calculaor
- leveled centers
- modifications as per IEP/504
- Proportion Set Up Sheet
- Real World Recipe Examples
- review and practice
- small group instruction
- ST Math
- teacher conferences
- Word bank

## Unit Resources

- ALEKS
- CK12 online resources
- http://achievethecore.org/page/1118/coherence-map

## Interdisciplinary Connections

- history: find the total distance native History: trace the migration patterns of native Americans to find the total distance and how long it took them to walk that far to get the average walking speed. use that walking speed to find out how long it would take to walk to other parts of the country
- science: create an experiment converting different weights, volumes, electrical outputs.

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| 6-8.MS-PS2-3 | Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. |
| 6-8.MS-PS2-3.1 | Asking questions and defining problems in grades 6–8 builds from grades K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models. |
| SOC.6.1.8.B.1.a | Describe migration and settlement patterns of Native American groups, and explain how these patterns affected interactions in different regions of the Western Hemisphere. |