# Unit 3: Rates and Percentages

Content Area: **Mathematics**
Course(s): **Math - Grade 6**
Time Period: **November**
Length: **18-19 days**
Status: **Published**

## Unit Overview

In this unit, students examine how the relative sizes of numerator and denominator affect the size of their quotient when numerator or denominator (or both) is a fraction. They acquire the understanding that dividing by a/b has the same outcome as multiplying by b, then by 1/a. They compute quotients of fractions.

## Transfer

Students will be able to independently use their learning to solve real world situations such as:.

- calculating miles per gallon, mile per hour etc.
- calculating unit conversions.
- finding parts to whole/ parts to part.
- finding unit pricing.
- finding the best deal.

## Meaning

## Understandings

Students will understand:

- how to use tables and graphs to find and solve for equivalent rates, including unit rates.

## Essential Questions

How can you use mathematics to describe change and model real-world situations?

How do you use equivalent rates in real-world situations?

## Application of Knowledge and Skill

## Students will know...

- the vocbulary accompanying the unit.
- multiple ways to represent rates.

## Students will be skilled at...

- solving for equivalent rates.
- comparing and ordering rates.
- solving for unit rates.
- solving real world problems dealing with rates, and proportions, including percents.

## Learning Goal

Understand ratio concepts and use ratio reasoning to solve problems.

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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.K-12.6 | Attend to precision. |

## Vocabulary

order, best deal, rate per 1, unit rate, result, pace, percentage (_% of), _% as much, _% of, regular price, sale price

## Daily Target- Lesson 1

- Evaluate (orally) the usefulness of calculating a rate per 1 when solving problems involving unfamiliar rates.
- Explain (orally, in writing, and through other representations) how to solve a problem involving rates in a less familiar context, e.g., minutes per window.

Desmos Match the Appropriate

Measurement https://teacher.desmos.com/activitybuilder/custom/5f05fd9878a6df5bc0a74823

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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. |

## Daily Target- Lesson 2

- Compare (orally) the relative size of different units of measure for one attribute, i.e., length, volume, weight or mass.
- Comprehend the approximate size of 1 "inch", "foot", "yard", "mile", "millimeter", "centimeter", "meter", "kilometer", "ounce", "pound", "ton", "gram", "kilogram", "cup", "quart", "gallon", "milliliter", and "liter".
- Identify which unit is closest to the length, volume, weight, or mass of a given object, and explain (orally) the reasoning.

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| MA.6.RP.A.3d | Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. |

## Daily Target- Lesson 3

- Generalize (orally and in writing) that it takes more of a smaller unit or fewer of a larger unit to measure the same quantity.
- Given a measurement in one unit, estimate what would be the same amount expressed in a different unit, and explain (orally) the reasoning.

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| MA.6.RP.A.3d | Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. |

## Daily Target- Lesson 4

- Choose and create a double number line diagram or table to solve problems involving unit conversion.
- Explain (orally) how to use a “rate per 1” to solve problems involving unit conversion.
- Recognize that when we measure things in two different units, the pairs of measurements are equivalent ratios.

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| MA.6.RP.A.3d | Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. |

## Daily Target- Lesson 5

- Explain (orally and in writing) that if two ratios have the same rate per 1, they are equivalent ratios.
- Justify (orally and in writing) comparisons of speeds or prices.
- Recognize that calculating how much for 1 of the same unit is a useful strategy for comparing rates. Express these rates (in spoken and written language) using the word “per” and specifying the unit.

Desmos The Better Deal https://teacher.desmos.com/activitybuilder/custom/59c49e2be0086960d15f914f

Desmos Better Buy https://teacher.desmos.com/activitybuilder/custom/5de51c8c593c9f0c2346e544

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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.3b | Solve unit rate problems including those involving unit pricing and constant speed. |

## Daily Target- Lesson 6

- Calculate and interpret the two unit rates associated with a ratio, i.e., a/b and b/a for the ratio a:b.
- Choose which unit rate to use to solve a given problem and explain the choice (orally and in writing).
- Comprehend the term "unit rate" (in spoken and written language) refers to a rate per 1.

Desmos Recipe Rescue https://teacher.desmos.com/activitybuilder/custom/5e3a2da1cea9a5677611ecdf

Desmos How Much https://teacher.desmos.com/activitybuilder/custom/5de5149875af6d0c0ef5e50d

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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.3b | Solve unit rate problems including those involving unit pricing and constant speed. |

## Daily Target- Lesson 7

- Apply reasoning about unit rates to complete a table of equivalent ratios, and explain (orally and in writing) the solution method.
- Explain (orally) that if two ratios are equivalent, they have the same rate per 1.
- Generalize that the unit rate is the factor that takes you from one column to the other column in a table of equivalent ratios.

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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.3b | Solve unit rate problems including those involving unit pricing and constant speed. |

## Daily Target- Lesson 8

- Calculate unit rates that represent speed or pace, use them to determine unknown distances or elapsed times, and explain (orally) the solution method.
- Interpret a verbal (written) description of a situation involving two objects moving at constant speeds, and create a diagram or table to represent the situation.

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| 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.3b | Solve unit rate problems including those involving unit pricing and constant speed. |

## Daily Target- Lesson 9

- Apply reasoning about ratios and rates to convert and compare (in writing) distances expressed in different units.
- Apply reasoning about ratios and rates to justify (orally) whether a given price is a good deal.
- Practice grade 5 arithmetic with fractions and decimals.

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| 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.3b | Solve unit rate problems including those involving unit pricing and constant speed. |
| MA.6.RP.A.3d | Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. |

## Daily Target- Lesson 10

- Comprehend the word "percentage" (in written and spoken language) and the symbol "%" (in written language) to mean a rate per 100.
- Draw and label a double number line diagram to represent percentages of a dollar and to find corresponding monetary values or percentages.

Desmos Percent Bar Modeling https://teacher.desmos.com/activitybuilder/custom/5804fdb5a1e415d2079c3319

Desmos Battery Percents Decimals and Fractions https://teacher.desmos.com/activitybuilder/custom/5a21b4c53909e70d138d2bc5

Desmos Pondering Percents https://teacher.desmos.com/activitybuilder/custom/57d44f57265aed741c0b2d57

Desmos Percent Charge https://teacher.desmos.com/activitybuilder/custom/563a59893f80f2fd0b7c77f0

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| 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. |

## Daily Target- Lesson 11

- Comprehend a phrase like "A% of B" (in written and spoken language) to refer to the value that makes a ratio with B that is equivalent to A : 100.
- Explain (orally) how to use a double number line diagram or table to solve problems such as A% of B is ? and A% of ? is C.
- State explicitly what one is finding the percentage of.

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| 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. |

## Daily Target- Lesson 12

- Choose and create diagrams to solve problems such as A% of B is ? and A% of ? is C.
- Draw and label a tape diagram to represent a situation involving percentages.
- Interpret tape diagrams that represent multiplicative comparisons and express such comparisons using fractions and percentages.

Desmos Percent Model https://teacher.desmos.com/activitybuilder/custom/5d4c8d0f4f07f04acd613868

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| 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. |

## Daily Target- Lesson 13

- Explain (orally and in writing) how to solve problems involving the percentages 10%, 25%, 50%, and 75% by reasoning about the fractions 1/10, 1/4 , 1/2, and 3/4.
- Generalize (orally) processes for calculating 10%, 25%, 50%, and 75% of a quantity.

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| 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. |

## Daily Target- Lesson 14

- Choose and create a tape diagram, double number line diagram, or table to solve problems involving percentages and explain (orally) the solution method.
- Determine what information is needed to solve a problem involving percentages. Ask questions to elicit that information.

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| 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. |

## Daily Target- Lesson 15

- Choose and create diagrams to calculate A% of B, and explain (orally) the solution method.
- Generalize a process for finding A% of B and justify (orally) why this can be abstracted as A/100 * B.
- Identify equivalent expressions that could be used to find A% of B and justify (orally) that they are equivalent.

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| 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. |

## Daily Target- Lesson 16

- Critique or justify (orally) statements about percentages and equivalent numerical expressions.
- Generalize a process for finding the percentage that C is of B and justify (orally) why this can be abstracted as C/B * 100.

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| 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. |

## Daily Target- Lesson 17

- Apply rates and percentages to calculate how long it will take and how much it will cost to complete a painting project, and explain (orally) the reasoning.
- Make simplifying assumptions and determine what information is needed to solve a problem about painting a room.

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| MA.6.RP.A | Understand ratio concepts and use ratio reasoning to solve problems. |
| MA.6.G.A | Solve real-world and mathematical problems involving area, surface area, and volume. |

## Formative Assessment and Performance Opportunities

- Academic Game
- BrainPop
- Centers
- Class Discussions
- Clickers
- Do Now
- Exit Ticket
- Graphic Organizer
- LinkIT
- Project
- Quiz
- Self-Assessment
- Student Teacher
- Teacher Interview
- Teacher Observation
- Think, Pair, Share

## Summative Assessment

Group Presentation

End of Unit Assessment (located in shared google drive)

Chapter Project

## 21st Century Life and Careers

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| CRP.K-12.CRP1 | Act as a responsible and contributing citizen and employee. |
| CRP.K-12.CRP1.1 | Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good. |
| CRP.K-12.CRP2 | Apply appropriate academic and technical skills. |
| 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.CRP4 | Communicate clearly and effectively and with reason. |
| CRP.K-12.CRP4.1 | Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome. |
| CRP.K-12.CRP6 | Demonstrate creativity and innovation. |
| CRP.K-12.CRP6.1 | Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization. |
| CRP.K-12.CRP8 | Utilize critical thinking to make sense of problems and persevere in solving them. |
| CRP.K-12.CRP8.1 | Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others. |

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| 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.6 | Demonstrate understanding of the necessary preparation and legal requirements to enter the workforce. |
| TECH.8.1.8.B | Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology. |
| TECH.8.1.8.B.CS2 | Create original works as a means of personal or group expression. |
| TECH.8.1.8.D | Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. |
| TECH.8.1.8.D.CS1 | Advocate and practice safe, legal, and responsible use of information and technology. |

## Accommodations and Modifications

- *Fine Motor Skills: Peer Tutors.* Pair students with their previously identified peer tutors and allow students who struggle with fine motor skills to dictate where to cut the string as needed.
- *Conceptual Processing: Processing Time.* Check in with individual students as needed to assess for comprehension during each step of the activity.
- *Memory: Processing Time.* Provide sticky notes or mini whiteboards to aid students with working memory challenges.
- *Receptive/Expressive Language: Peer Tutors.* Pair students with their previously identified peer tutors to aid in comprehension and expression of understanding.
- Teacher provides notes for student(s)
- *Conceptual Processing: Eliminate Barriers.* Allow students to use calculators to ensure inclusive participation in the activity. Also, assist students in seeing the connections between new problems and prior work. Students may benefit from a review of different representations to activate prior knowledge.
- Teacher will modify test for student(s)
- Students may use graph paper to help organize data
- A word bank can be provided
- Leveled centers can be used
- Small group instruction can be utilized
- Calculators may be used
- Extra Practice Board can be utilized to review pre-requisite skills
- Interactive games/websites may be used to practice skills
- Uitilize items in the room to demonstrate skills as they relate to their life (eg: price per gallon for gas)

- Calculators
- Compass Learning
- Extra Practice Board
- Interactive Games/Websites
- Leveled Centers
- Manipulatives
- Modify Assessments
- Provide Notes
- Teacher Conferences

- Word Bank

## Unit Resources

Mr. Morgan's Math Help https://sites.google.com/view/mrmorgansmathhelp/illustrative-mathematics/math-6/unit-1-area-and-surface-area

Kahoot Unit 3 Review https://create.kahoot.it/share/unit-3-review-illustrative-math/84d1572e-e257-40ec-91e7-34129ef99606?fbclid=IwAR2cd1Vf5yLvNegT7ag6xLCs9AnPBseFxvWaTb8ayqpnaZi0JJRo51T8_iE

Kahoot Review Lesson 1-9 https://create.kahoot.it/share/unit-3-lessons-1-9-quiz-review-illustrative-math/e9692cc1-05a0-42dc-b7f8-98841f7545fc?fbclid=IwAR01TulTt8_LFEma43T-_G27E-KzJkXz8oZC3RnQnWiYH1_ieSScGsRM6HU

SUGGESTION: I saw a suggestion in this facebook group to use the Pre-Assessments as a group task with students as a pre-unit review rather than an assessment. I created a 6th Grade Unit 3 Pre-Assessment Kahoot for students to play after having time to work together in partners/small groups on paper first. They then use their papers to do a team Kahoot to check answers and discuss misconceptions whole class as needed. https://create.kahoot.it/share/9b9579ab-64a7-4bca-9ba3-77b90dad3c1d

Illustrative Math YouTube Channel https://www.youtube.com/c/ChannelGRated/videos

Unit 3 Shared Google Drive

## Interdisciplinary Connections