Unit 4: Dividing Fractions

Content Area: **Mathematics**
Course(s): **Math - Grade 6**
Time Period: **December**
Length: **20 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 including:

- estimation.
- multiplying and dividing fractions, whole numbers, and mixed numbers.

Meaning

Understandings

Students will understand that:

- which operation to use in real-world fraction problems.
- an estimation can be used to see if an answer to a problem "makes sense."

Essential Questions

How can mathematical ideas be represented?

What does it mean to multiply and divide fractions?

How can estimating be helpful?

Application of Knowledge and Skill

Students will know...

- the vocbulary that goes along with the unit.
- multiply and divide fractions, whole numbers and mixed numbers.

Students will be skilled at...

- multiplying and dividing fractions, mixed numbers, and whole numbers.

Learning Goal

Apply and extend previous understandings of multiplication and division to divide fractions by fractions

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.7	Look for and make use of structure.

Vocabulary

divisor, dividend, equation, interpretation, unknown, equal-sized, relationship, times as _, fraction as _, container, reciprocal

Daily Target- Lesson 1

- Comprehend the terms "dividend" and "divisor" (in spoken language) to refer to the numbers in a division problem.
- Explain (orally) how to estimate quotients, by comparing the size of the dividend and divisor.
- Generalize about the size of a quotient, i.e., predicting whether it is a very large number, a very small number, or close to 1.

Desmos Division https://teacher.desmos.com/activitybuilder/custom/5ae330b2f430d44aab791bec

MA.6.NS.A	Apply and extend previous understandings of multiplication and division to divide fractions by fractions.

Daily Target- Lesson 2

- Identify or generate a multiplication equation that represents the same relationship as a division expression, and explain (orally) the reasoning.
- Interpret and create tape diagrams that represent situations involving equal-sized groups.
- Recognize there are two different ways to interpret a division expression, i.e., asking "how many groups?" or "how many in each group?"

MA.6.NS.A	Apply and extend previous understandings of multiplication and division to divide fractions by fractions.

Daily Target- Lesson 3

- Create an equation and a diagram to represent a multiplication or division situation involving fractions, and coordinate these representations (orally).
- Explain (using words and other representations) how to find the unknown quantity in a multiplication or division situation involving fractions.
- Interpret a verbal description of a multiplication situation (in spoken or written language), and identify which quantity is unknown, i.e., the number of groups, the amount in one group, or the total amount.

MA.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

Daily Target- Lesson 4

- Coordinate multiplication equations and pattern block diagrams in which the yellow hexagon represents one whole.
- Create a diagram to represent and solve a problem asking "How many groups?" in which the divisor is a unit fraction, and explain (orally) the solution method.

MA.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

Daily Target- Lesson 5

- Coordinate multiplication and division equations and pattern block diagrams in which the red trapezoid represents one whole.
- Create a diagram to represent and solve a problem asking "How many groups?" in which the divisor is a non-unit fraction, and explain (orally) the solution method.
- Identify or generate a multiplication or division equation that represents a given situation involving a fractional divisor.

MA.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

Daily Target- Lesson 6

- Explain (orally) how to create a tape diagram to represent and solve a problem asking "How many groups?"
- Justify (orally and using other representations) the answer to a problem asking "How many groups?" in which the divisor is a non-unit fraction and the quotient is a fraction greater than 1.

MA.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

Daily Target- Lesson 7

- Comprehend the phrase "What fraction of a group?" (in spoken and written language) as a variation of the question "How many groups?" that is used when the quotient is less than 1.
- Create a tape diagram to represent and solve a problem asking "How many groups?" in which the quotient is a fraction less than 1.
- Write multiplication and division equations to represent a problem asking "How many times as long?"

MA.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

Daily Target- Lesson 8

- Compare and contrast (orally) strategies for solving problems about "how many groups?" and "how much in 1 group?"
- Create a tape diagram to represent and solve a problem asking "How much in 1 group?" where the dividend, divisor, and quotient may be fractions, and explain (orally) the solution method.
- Write multiplication and division equations to represent a problem asking "How much in 1 group?"

Desmos Fraction Sense https://teacher.desmos.com/activitybuilder/custom/566c961e5b1b9f5818e3fa72

MA.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent

the problem.

Daily Target- Lesson 9

- Interpret a situation (presented in written language or using other representations) involving equal-sized groups, and generate mathematical questions that could be asked about it.
- Solve a problem involving division of fractions, and present the solution method (orally, in writing, and using other representations).

Desmos Dividing Fractions https://teacher.desmos.com/activitybuilder/custom/5e38e05b7681060c27990051

MA.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

Daily Target- Lesson 10

- Interpret and critique explanations (in spoken and written language, as well as in other representations) of how to divide by a fraction.
- Use a tape diagram to represent dividing by a non-unit fraction a/b and explain (orally) why this produces the same result as multiplying the number by b and dividing by a.
- Use a tape diagram to represent dividing by a unit fraction 1/b and explain (orally and in writing) why this is the same as multiplying by b.

Desmos Dividing Fractions using Visual
Model https://teacher.desmos.com/activitybuilder/custom/572bacb6494adaa7073d6257

MA.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

Daily Target- Lesson 11

- Coordinate (orally) different strategies for dividing by a fraction.
- Find the quotient of two fractions, and explain (orally, in writing, and using other representations) the solution method.
- Generalize a process for dividing a number by a fraction, and justify (orally) why this can be abstracted as n* b/a.

Desmos Dividing Fractions https://teacher.desmos.com/activitybuilder/custom/5f06194fee734d738398d8da

MA.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

Daily Target- Lesson 12

- Apply dividing by fractions to solve a problem about comparing lengths or measuring with non-

standard units, and explain (orally and in writing) the solution method.
- Interpret a question (in written language) about multiplicative comparison, e.g., "How many times as long?" and write a division equation to represent it.

Desmos Divide Fractions https://teacher.desmos.com/activitybuilder/custom/5c8ea44e309dd82445a4de8b

MA.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

Daily Target- Lesson 13

- Apply dividing by fractions to calculate the side length of a rectangle, given its area and the other side length.
- Coordinate (orally) diagrams and equations that represent the area of a rectangle with fractional side lengths.
- Draw and label a diagram to justify the area of a rectangle with fractional side lengths.

MA.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

Daily Target- Lesson 14

- Apply dividing by fractions to calculate the base or height of a triangle, given its area and the other measurement.
- Determine the volume of a rectangular prism by counting how many 1/2-inch or 1/3-inch cubes it takes to build, and explain (orally and in writing) the solution method.
- Generalize that the volume of a rectangular prism with fractional edge lengths can be found by multiplying the edge lengths.

MA.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.
MA.6.G.A.1	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
MA.6.G.A.2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = Bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

Daily Target- Lesson 15

- Apply dividing by fractions to calculate one edge length of a rectangular prism, given its volume and the other two edge lengths.
- Explain (orally, in writing, and using other representations) how to solve a problem involving the

volume of a rectangular prism with fractional edge lengths.
- Generalize that it takes more smaller cubes or fewer larger cubes to fill the same volume.

MA.6.G.A.2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = Bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

Daily Target- Lesson 16
- Apply operations with fractions to solve problems in a variety of situations, and explain (orally and in writing) the reasoning.
- Generate an equation to represent a situation involving fractions, and justify (orally) the operation chosen.

MA.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

Daily Target- Lesson 17
- Compare and contrast (orally and using other representations) different ways jewelry boxes could be packed inside larger shipping boxes.
- Determine which size shipping box is least expensive, and present (orally and in writing) a justification.
- Make simplifying assumptions and determine what information is needed to solve a problem about shipping costs.

MA.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.
MA.6.G.A.2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = Bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

Formative Assessment and Performance Opportunities

- Academic Game
- BrainPop
- Centers
- Class Discussions

- Clickers

- Desmos

- 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

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.
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

- *Memory:*
  - *Processing Time.* Provide sticky notes or mini whiteboards to aid students with working memory challenges.
  - *Processing Time.* This instructional routine can be very taxing to student's working memory. For students with challenges in this area, show the image for a longer period of time or repeat the image flash as needed. Students also benefit from being explicitly told not to count the dots, but instead to look for helpful structure within the image.
- *Conceptual Processing:*
  - *Manipulatives.* Begin with realia (i.e., real cardboard boxes, real notebooks, real coins, etc.), which will provide access for students who benefit from concrete contexts.
  - *Processing Time.* Check in with individual students as needed to assess for comprehension during each step of the activity.
  - *Peer Tutors.* Allow students who benefit from extra processing time and interpersonal work to develop the scenarios with their previously identified peer tutor, and then switch scenarios with another pair of students.
  - *Processing Time.* Begin with a physical demonstration of the actual cups of flour and batches of cookies, which will provide access for students who benefit from concrete contexts.
- *Receptive/Expressive Language:*

- ○ *Processing Time.* Students who benefit from extra processing time would also be aided by MLR 3.
- ○ *Peer Tutors.* Pair students with their previously identified peer tutors to aid in comprehension and expression of understanding.
- ○ *Processing Time.* Read all statements aloud. Students who both listen to and read the information will benefit from extra processing time.
- *Executive Functioning: Graphic Organizers.* Provide a Venn diagram with which to compare the similarities and differences between pattern blocks and tape diagrams.
- *Fine Motor Skills: Peer Tutors.* Pair students with their previously identified peer tutors and allow students who struggle with fine motor skills to dictate how to draw the diagrams, as needed.
- Teacher provides notes for student(s)
- Teacher will modify test for student(s)
- 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

- 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

 Unit 4 Shared Google Drive

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

Interdisciplinary Connections

Unit 4 Lesson 12

Science & Engineering - Discuss and explore the use of rulers.

Engineering - tiling a floor

Science - Discussion of height of humans and animals