

Unit 7

Fractions and Decimals

Grade 7

Lesson Outline

Big Picture

Students will:

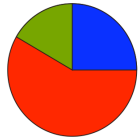
- explore fraction relationships;
- develop an understanding of strategies related to addition and subtraction of fractions (proper, improper, and mixed);
- explore multiplication of fractions through repeated addition;
- explore division of whole numbers by simple fractions;
- understand the percent/decimal/fraction relationship;
- solve problems involving whole number percents, fractions, and decimals;
- add, subtract, multiply, and divide decimals;
- investigate experimental probabilities and compare to theoretical probabilities and independent events.

Day	Lesson Title	Math Learning Goals	Expectations
1	Fraction Puzzles	<ul style="list-style-type: none"> • Explore/review fractional parts of geometric shapes. • Order fractions. 	7m11, 7m15 CGE 3c, 5a, 5e
2	Adding Fractions	<ul style="list-style-type: none"> • Investigate adding fractions using manipulatives. 	7m11 CGE 3b, 3c, 5a
3	Adding Fractions with Different Denominators	<ul style="list-style-type: none"> • Add fractions by connecting concrete to symbolic. • Recognize the need for and find equivalent fractions with common denominators. 	7m11, 7m12 CGE 4b, 5e
4	Exploring Fractions Using Relational Rods	<ul style="list-style-type: none"> • Explore fractions using relational rods. 	7m24 CGE 3c, 4a
5	Adding and Subtracting Fractions Using Relational Rods	<ul style="list-style-type: none"> • Add and subtract fractions using relational rods. 	7m24 CGE 2c, 3b, 3c, 5e
6	Subtracting Fractions Using Equivalent Fractions	<ul style="list-style-type: none"> • Develop strategies for subtracting fractions using equivalent fractions with common denominators. • Add and subtract fractions. 	7m24 CGE 4e, 5g
7	Adding and Subtracting Fractions	<ul style="list-style-type: none"> • Demonstrate understanding and skills while performing operations with fractions. 	7m24 CGE 2b, 3c
8	Exploring Fractions Further	<ul style="list-style-type: none"> • Explore repeated addition of fractions and addition and subtraction of mixed numbers. 	7m24, 7m25 CGE 3b, 4f, 5a
9	Dividing Whole Numbers by Fractions Using Concrete Materials	<ul style="list-style-type: none"> • Divide whole numbers by simple fractions using concrete materials, e.g., divide 3 by $\frac{1}{2}$, using fraction strips. 	7m18
10	Summative Assessment	<ul style="list-style-type: none"> • Demonstrate understanding of fractions and operations with fractions on an open-ended, problem-solving task. 	7m11, 7m19, 7m24, 7m25 CGE 2b, 3c, 4f

Day	Lesson Title	Math Learning Goals	Expectations
11	Fractions and Decimals	<ul style="list-style-type: none"> Explore the relationships between fractions and decimals. 	7m15, 7m27 CGE 2c, 3c
12	Decimals	<ul style="list-style-type: none"> Compare and order decimals to hundredths, using a variety of tools, e.g., number lines, relational rods, base-ten materials, calculators. Determine whether a fraction or a decimal is the most appropriate way to represent a given quantity, e.g., I would use a fraction to express part of an hour, saying “quarter hour” instead of “.25 of an hour.” Add and subtract decimals. 	7m11, 7m15, 7m23 CGE 2c, 3e
13	Mental Math and Decimals	<ul style="list-style-type: none"> Use a variety of mental strategies to add and subtract decimals, e.g., use the distributive property. Divide whole numbers by decimal numbers to hundredths using concrete materials. 	7m19, 7m23 CGE 3c, 4b
14	Multiplying Decimals	<ul style="list-style-type: none"> Multiply decimal numbers to thousandths by one-digit whole numbers, using concrete materials, calculators, estimation, and algorithms. Solve problems involving the multiplication of decimal numbers. 	7m18, 7m20 CGE 3e, 4b
15	Dividing Decimals	<ul style="list-style-type: none"> Divide whole numbers by decimal numbers to hundredths, using concrete materials, e.g., base-ten materials to divide 4 by 0.8. Divide decimal numbers to thousandths by one-digit whole numbers, using concrete materials, estimation, and algorithms, e.g., estimate $16.75 \div 3$ as $18 \div 3 \approx 6$, then calculate, predicting an answer slightly less than 6. Solve everyday problems involving division with decimals. 	7m18, 7m20 CGE 3a, 3c
16	Solving Multi-Step Problems Involving Decimals	<ul style="list-style-type: none"> Solve multi-step problems involving whole numbers and decimals. Justify solutions using concrete materials, calculators, estimation, and algorithms. Use estimation when solving problems involving decimals to judge the reasonableness of a solution, e.g., A book costs \$18.49. The salesperson tells you that the total price, including taxes, is \$22.37. How can you tell if the total price is reasonable without using a calculator? 	7m21, 7m22 CGE 2b, 3c
17	Summative Assessment of Decimals	<ul style="list-style-type: none"> Demonstrate an understanding of decimals and operations with decimals. 	
18	Percent	<ul style="list-style-type: none"> Investigate and represent the relationships among fractions, decimals, and percents. Identify common uses of percents, fractions, and decimals. Estimate percents visually, e.g., shade 60% of a rectangle, and mentally, e.g., 3 out of 11 hockey players missed practice means approximately 25% were absent. 	7m15, 7m22, 7m27 CGE 2b, 2c, 3e
19	Solving Percent Problems with Concrete Materials	<ul style="list-style-type: none"> Solve problems that involve determining whole-number percents, using concrete materials, e.g., base-ten materials, 10×10 square. 	7m28 CGE 2b, 2c, 3e

Day	Lesson Title	Math Learning Goals	Expectations
20	Finding the Percent of a Number	<ul style="list-style-type: none"> Solve problems that involve determining the percent of a number, e.g., CDs are on sale for 50% of the regular price. What is the sale price of a \$14.98 CD? Relate the percent to fraction and decimal versions, e.g., The CD is half price. Estimate to judge the reasonableness of the answer. Solve problems that involve determining whole-number percents with and without calculators. 	7m22, 7m28 CGE 3c, 3e
21	Connecting Fractions to Percent	<ul style="list-style-type: none"> Determine what percent one number is of another, e.g., 4 out of 16 shapes are hearts. What percent are hearts? Connect this type of problem to converting a fraction to a percent, e.g., 4 out of 16 = $\frac{4}{16}$ = 25%. 	7m15, 7m28 CGE 3c, 3e
22	Using Percent to Make Comparisons	<ul style="list-style-type: none"> Use percent to make comparisons, e.g., $\frac{23}{31}$ students won ribbons in one class and $\frac{20}{29}$ won in the other class. Which had the better performance? Pose and solve comparison problems using a calculator. 	7m28 CGE 3e
23	Using Percent to Find the Whole	<ul style="list-style-type: none"> Calculate the size of the whole when a percentage of the whole is known, e.g., 6 students in a class have juice for snack. If that is 20% of the class, how large is the class? Relate to probability e.g., if 20% of the students have juice, what is the probability that a student chosen at random will have juice? 	7m27, 7m28, 7m84 CGE 2b, 2c
Term 3			
24	Using Tables and Lists to Determine Outcomes	<ul style="list-style-type: none"> Determine all possible outcomes of an event using a chart, table, or systematic list, e.g., If you threw three coins simultaneously, what are all the possible combinations of heads and tails? Determine all possible sums when rolling two number cubes. 	7m85 CGE 2c, 3e
25	Probability	<ul style="list-style-type: none"> Distinguish between theoretical probability and experimental probability. Express probability as a fraction, decimal, and percent. Calculate probability of specific outcomes using Day 24 charts and tables, e.g., what is the probability of three coin flips being HHH? 	7m27, 7m85, 7m86 CGE 3c, 3e
26	Designing Games and Experiments	<ul style="list-style-type: none"> Understand the connections between percent and probability by: <ul style="list-style-type: none"> designing a fair game (each player has a 50% chance of winning), e.g., Two players take turns rolling one numbered cube. If the number is odd, player A scores a point. If the number is even, player B scores a point. designing an experiment where the chance of a particular outcome is 1 in 3, e.g., use a bag of 2 red and 4 green balls. 	7m84 CGE 2c, 3c, 4b, 4c
27	Making Predictions Based on Probability	<ul style="list-style-type: none"> Make predictions about a population given a probability, e.g., if the probability of catching a fish at the conservation is 30%, how many students in our class of 28 will catch a fish, if we all go to the conservation to fish? 	7m84 CGE 3c, 3e
28	Tree Diagrams	<ul style="list-style-type: none"> Understand that two events are independent when one does not affect the probability of the other, e.g., rolling a number cube, then flipping a coin. Determine all possible outcomes for two independent events by completing tree diagrams, e.g., spinning a three-section spinner two consecutive times; rolling a number cube, then spinning a four-section spinner. 	7m85 CGE 3c

Day	Lesson Title	Math Learning Goals	Expectations
29	Probability of a Specific Event	<ul style="list-style-type: none"> Determine the probability of a specific outcome from two independent events using tree diagrams, e.g., when flipping a coin and then rolling a number cube, what is the probability of getting a head and an even number? 	7m85 CGE 3a
30	Comparing Theoretical and Experimental Probability	<ul style="list-style-type: none"> Perform a simple probability experiment. Compare theoretical probability with the results of the experiment using both a small sample (individual student results) and a large sample (the combined results from all students in the class). Understand that probability results can be misleading if an experiment has too few trials. 	7m86 CGE 2e, 3c
31	Applications of Probability in the World	<ul style="list-style-type: none"> Examine everyday applications of probability, e.g., batting averages, goalie statistics, weather forecasts, opinion polls. Research and report on probabilities expressed in fraction, decimal, and percent form. 	7m27, 7m83 CGE 3c, 4c, 4e, 4f



Math Learning Goals

- Explore/review fractional parts of geometric shapes.
- Order fractions.

Materials

- pattern blocks
- overhead pattern blocks
- BLM 7.1.1, 7.1.2, 7.1.3, 7.1.4
- 2 or 3 large imperial socket wrench sets in cases

Assessment Opportunities

Minds On...

Whole Class → Solving a Problem

Students solve an area fraction puzzle:

- With your pattern blocks build two different triangles each with an area that is one-half green and one-half blue.

Students share their solutions, using the overhead pattern blocks.

Discuss whether rearranging the blocks makes the solution “different.”

See Continuum and Connections Fractions in LMS library.

Virtual pattern blocks are available at:
http://arcytech.org/java/patterns/patterns_j.shtml

Action!

Pairs → Problem Solving

Students complete questions 1 to 5 on BLM 7.1.1, using pattern blocks. They show the graphic solution, labelling each colour with the appropriate fraction of the whole triangle (BLM 7.1.2).

Students complete questions 1 to 5 (BLM 7.1.3) individually. Pairs of students take turns, completing question 6, using an imperial set of socket wrenches.

Curriculum Expectations/Demonstration/Marking Scheme: Assess students’ understanding of equivalent fractions and ordering fractions.

Briefly review the meaning of *parallelogram* (blue or beige block) and *trapezoid* (red block). Some methods students may use include physical size of each socket, ordering of the sockets could also be accomplished using equivalent fractions, converting to decimals, or measuring in millimetres.

Consolidate Debrief

Whole Class → Sharing/Discussion

Pairs of students share their solutions to an area puzzle using the overhead pattern blocks and explain how they know their solution is correct.

Discuss possible answers to question 5 on the student worksheet (BLM 7.1.1).

Several different pairs of students share their solutions, even if the solution is merely another arrangement of the same pattern blocks. This allows more students to be recognized and reinforces multiple solutions and explanations.

Discuss the various methods students used to solve the socket set problem.

Students explain why they placed a certain socket between two others.

Home Activity or Further Classroom Consolidation

Concept Practice

Complete worksheet 7.1.4.

Provide a tangram pattern.

7.1.1: Pattern Block Area Fraction Puzzles

Name:

Date:

Use pattern blocks to solve each of the area fraction puzzles below. Draw each solution on pattern block paper. Label each colour with its fraction of the whole shape.

1. Build a parallelogram with an area that is $\frac{1}{3}$ green, $\frac{1}{3}$ blue, and $\frac{1}{3}$ red.
2. Build a parallelogram with an area that is $\frac{1}{8}$ green, $\frac{1}{2}$ yellow, $\frac{1}{8}$ red, and $\frac{1}{4}$ blue.
3. Build a trapezoid with an area that is $\frac{1}{10}$ green and $\frac{9}{10}$ red.
4. Rebuild each of the puzzles above in a different way.
5. Explain why it is not possible to build a parallelogram with an area that is one-half yellow, one-third green, and one-quarter blue.



Pattern Block Area Fraction Puzzles

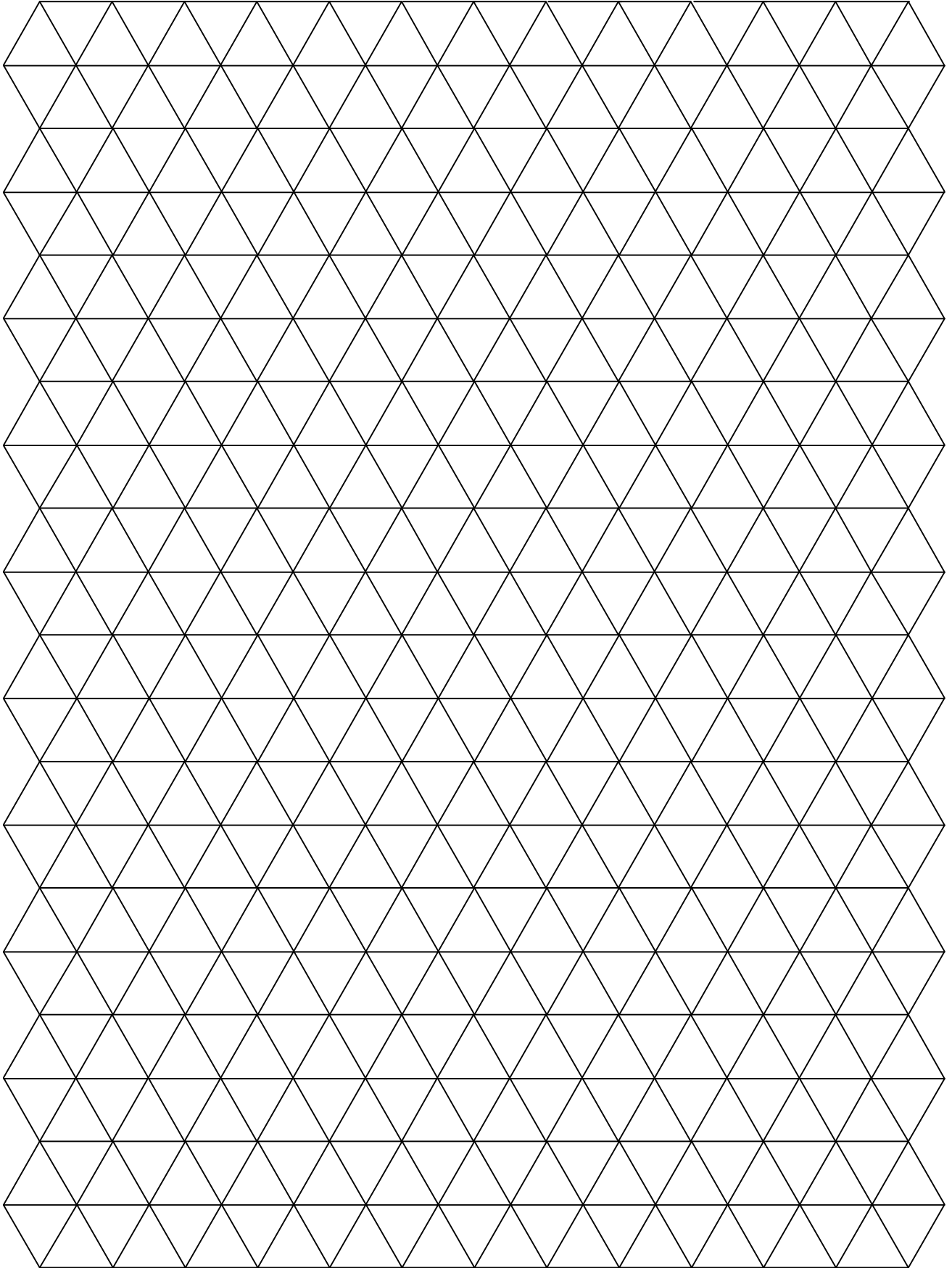
Name:

Date:

Use pattern blocks to solve each of the area fraction puzzles below. Draw each solution on pattern block paper. Label each colour with its fraction of the whole shape.

1. Build a parallelogram with an area that is $\frac{1}{3}$ green, $\frac{1}{3}$ blue, and $\frac{1}{3}$ red
2. Build a parallelogram with an area that is $\frac{1}{8}$ green, $\frac{1}{2}$ yellow, $\frac{1}{8}$ red, and $\frac{1}{4}$ blue.
3. Build a trapezoid with an area that is $\frac{1}{10}$ green and $\frac{9}{10}$ red.
4. Rebuild each of the puzzles above in a different way.
5. Explain why it is not possible to build a parallelogram with an area that is one-half yellow, one-third green, and one-quarter blue.

7.1.2: Pattern Block Paper



7.1.3: Socket to You!

Name:

Date:

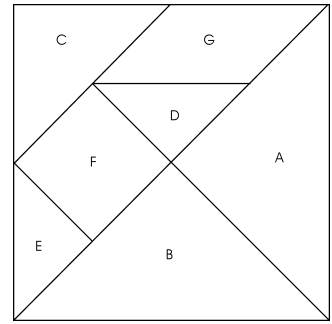
- $\frac{20}{32}$ is an equivalent fraction for $\frac{5}{8}$. Write two more equivalent fractions for $\frac{5}{8}$.
- Write two equivalent fractions for $\frac{3}{4}$.
- Circle which is larger: $\frac{3}{8}$ or $\frac{3}{16}$. Explain how you know.
- Circle which is smaller: $\frac{7}{16}$ or $\frac{9}{16}$. Explain how you know.
- Circle the fraction that fits between $\frac{7}{16}$ and $\frac{9}{16}$. Verify your answer using a method of your choice.
 $\frac{13}{32}$ $\frac{1}{4}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{5}{8}$ $\frac{3}{4}$ $\frac{19}{32}$
- Often mechanics use socket wrench sets with openings measured in fractions of an inch. These fractions are stamped on the fronts of the sockets.
Arrange the sockets from smallest to largest.
Explain how you decided on the order you chose.
Check by placing the sockets in the case.

7.1.4: Area with Tangrams

Name:

Date:

- Use your tangram pieces to complete the table. Consider the area of D to be one square unit.



Tangram Piece	Calculated Area of Tangram Piece	Fraction of the Entire Set (by Area)
A		
B		
C		
D	1 unit ²	
E		
F		
G		

- What fraction of part D is E?
- What fraction of part A is C?
- What fraction of part B is C?
- If the area of C is 4 cm², find the area of each of the other parts.
- If the area of F is 3 cm², find the area of each of the other parts.

	Calculated Area	Calculated Area
A		
B		
C	4 cm ²	
D		
E		
F		3 cm ²
G		



Math Learning Goals

- Investigate combinations of fractions using manipulatives.

Materials

- pattern blocks
- overhead pattern blocks
- BLM 7.2.1

Assessment Opportunities

Minds On...

Whole Class → Introducing Problems

Using pattern blocks, students show that $\frac{1}{6} + \frac{1}{2} = \frac{2}{3}$. Several students share their methods.

Students show that $\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$ and share which pattern block they chose to represent one whole.

Demonstrate the use of different pattern blocks to represent one whole.

One way: Using the hexagon as one whole, the triangle can be one-sixth, three triangles (or the trapezoid) can be one-half, and together they form four-sixths (two-thirds).

Action!

Pairs → Exploration

Students answer several questions involving combining fractions that can be modelled with pattern blocks. For example, $\frac{1}{2} + \frac{5}{6}$; $\frac{1}{3} + \frac{1}{6}$; $\frac{1}{3} + \frac{5}{6} + \frac{4}{3}$.

Students explain each solution, and identify which pattern block they used to represent the whole.

Fractions, both proper and improper, that have denominators of 2, 3, or 6 work well with pattern blocks.

Consolidate Debrief

Whole Class → Sharing/Discussion

Students demonstrate their strategies to add fractions using overhead pattern blocks.

Discuss the idea of equivalent fractions with common denominators as it relates to the pattern blocks, e.g., using smaller blocks helps to combine fractions with different denominators.

For example, to add $\frac{1}{2} + \frac{5}{6}$, students may choose to use the hexagon as the one whole. They would use the trapezoid to represent $\frac{1}{2}$ and five triangles to represent $\frac{5}{6}$. To combine the fractions, students need to express the answer in triangles (one whole and two triangles, or one- and two-sixths, which can be simplified to one and one-third using the blue rhombi).

Students should use a variety of methods to determine the common denominator.

As students explore and discuss they gain a deeper understanding of equivalent fractions and of the algorithm for determining a common denominator.

Curriculum Expectations/Demonstration/Checklist: Assess students' ability to add fractions using manipulatives.

Home Activity or Further Classroom Consolidation

Complete the worksheet, Combining Fractions (7.2.1).

For virtual pattern blocks and related activities see: <http://math.rice.edu/~lanius/Patterns/>

Concept Practice

7.2.1: Combining Fractions

Name:

Date:

Use pattern blocks to solve each problem. Record your solutions on the pattern block paper. Include the symbolic fractions as well as the drawings.

1. Show that:

a) $\frac{1}{6} + \frac{1}{6} = \frac{1}{3}$

b) $\frac{1}{6} + \frac{2}{3} = \frac{5}{6}$

c) $\frac{1}{6} + \frac{1}{3} + \frac{1}{2} = 1$

2. Add $\frac{1}{6}$ and $\frac{1}{3}$.

3. Add $\frac{1}{2} + \frac{2}{3}$.

4. Show three different ways of adding three fractions to get two wholes.

5. Show that $\frac{2}{3} + \frac{1}{6}$ is less than 1. How much less than 1 is this sum?



Combining Fractions

Name:

Date:

Use pattern blocks to solve each problem. Record your solutions on the pattern block paper. Include the symbolic fractions as well as the drawings.

1. Show that:

a) $\frac{1}{6} + \frac{1}{6} = \frac{1}{3}$

b) $\frac{1}{6} + \frac{2}{3} = \frac{5}{6}$

c) $\frac{1}{6} + \frac{1}{3} + \frac{1}{2} = 1$

2. Add $\frac{1}{6}$ and $\frac{1}{3}$.

3. Add $\frac{1}{2} + \frac{2}{3}$.

4. Show three different ways of adding three fractions to get two wholes.

5. Show that $\frac{2}{3} + \frac{1}{6}$ is less than 1. How much less than 1 is this sum?



Math Learning Goals

- Add fractions by connecting concrete to symbolic.
- Recognize the need for and find equivalent fractions with common denominators.

Materials

- BLM 7.3.1, 7.3.2
- pattern blocks

Minds On...

Whole Class → Teacher Directed Instruction

Some students share their solutions to question 3 from the previous day’s Home Activity ($\frac{1}{2} + \frac{2}{3}$) using overhead pattern blocks.

Record the symbolic form of each solution, i.e., the fractions. Discuss how to get the solution without using pattern blocks.

Through questioning, students consider the use of equivalent fractions with a common denominator, in this case, 6. They may determine the common denominator in different ways.

Action!

Pairs → Think/Pair/Share

Students think individually about solving each of the questions from the Home Activity, Day 2, using equivalent fractions with a common denominator. Then with a partner, they discuss their strategies for finding equivalent fractions with a common denominator. Pairs share their strategies with a small group and/or the whole class.

Curriculum Expectations/Observation/Checklist: Assess students’ understanding of addition of fractions with common denominators.

Consolidate Debrief

Whole Class → Note Making

Create a note together that outlines the process for adding fractions using equivalent fractions with a common denominator. Include the multiples method of finding common denominators.

Students determine the steps to follow in the process.

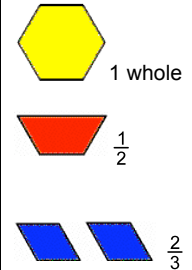
Students work independently on differentiated practice, based on the teacher’s observations in Action (see BLM 7.3.1, 7.3.2).

Differentiated Concept Practice

Home Activity or Further Classroom Consolidation

Complete the worksheet, Adding Fractions with Different Denominators, and the practice questions.

Assessment Opportunities



BLM 7.3.2 shows scaffolding.

Provide student with appropriate practice questions.

7.3.1: Adding Fractions with Different Denominators

Name:

Date:

1. Use multiples to find three common denominators for the following pair of fractions:

$$\frac{1}{2}, \frac{5}{8}$$

Multiples of 2:

Multiples of 8:

My three common denominators are _____, _____, and _____.

2. Find a common denominator for the following fraction pairs:

a) $\frac{1}{4}, \frac{2}{3}$

b) $\frac{3}{5}, \frac{3}{8}$

Common denominator: _____

Common denominator: _____

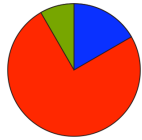
Rewrite each pair with a common denominator using equivalent fractions.

3. Rewrite each of the following expressions using equivalent fractions with a common denominator. Add the fractions.

a) $\frac{1}{3} + \frac{1}{5}$

b) $\frac{5}{6} + \frac{1}{4}$

c) $\frac{3}{5} + \frac{1}{8}$



Math Learning Goals

- Explore fractions using relational rods.

Materials

- overhead relational rods
- sets of relational rods
- BLM 7.4.1, 7.4.2, 7.4.3

Assessment Opportunities

Minds On...

Whole Class → Introducing the Problem

As pairs of students follow along with their own sets of relational rods, place the blue and black overhead relational rods together to form one whole (BLM 7.4.2). Students decide how they would determine the value of a particular coloured rod in relation to this blue-black whole.

Invite a student to demonstrate that the brown rod (8 units) is one-half of the blue-black whole (16 units).

Repeat with the dark green rod. Students determine the fractional value of the dark green rod in relation to the blue-black whole. Write this relation as a fraction ($\frac{6}{16} = \frac{3}{8}$).

Guide their thinking with questions:

- What rod(s) may represent one unit for this whole?
- How many units is the dark green rod? Students use other rods to determine equivalent fractions in lowest terms.

If students have not worked with relational rods before, some time should be allocated to exploration. They may benefit from some discussion of “unit” in the rods.

If sets of relational rods are not readily available, use BLM 7.4.1.

Action!

Pairs → Exploration

Students explore the fractional value of each of the relational rods relative to the blue-black whole.

Students organize their work in a table to clearly show how they have determined the fractional value of all of the coloured rods in relation to the blue-black whole and their relationships to each other (fractions less than one only). See BLM 7.4.3.

Curriculum Expectations/Observation/Mental Note: Assess students’ understanding of equivalent fractions.

Consolidate Debrief

Whole Class → Sharing/Discussion

Students share the reasoning they used to determine the fractional value for each coloured rod in relation to the blue-black whole and to each other. Several different pairs share their strategies.

Pairs share their methods for organizing the information to show the relationships among the rods.

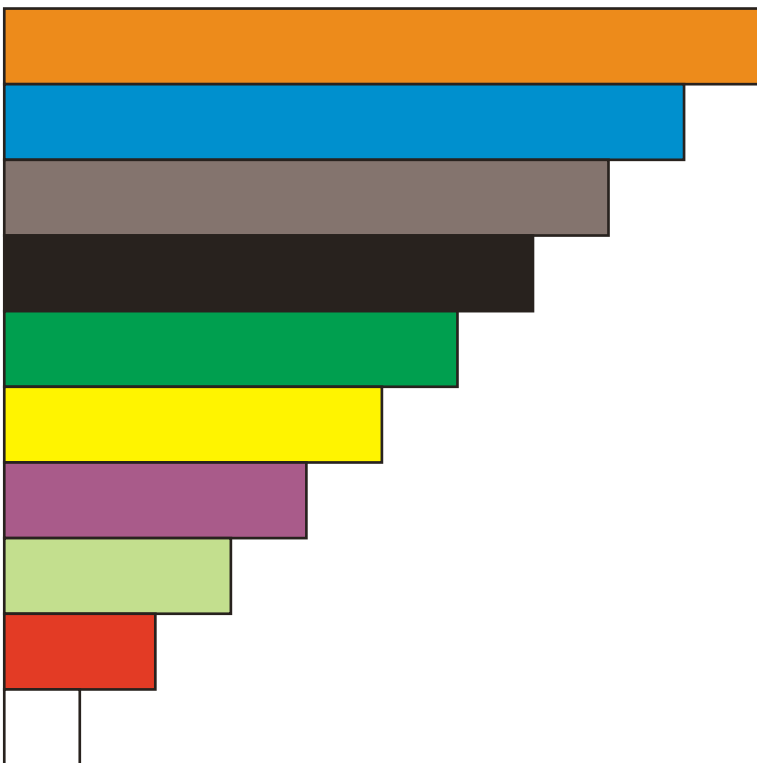
Home Activity or Further Classroom Consolidation

Complete practice questions.

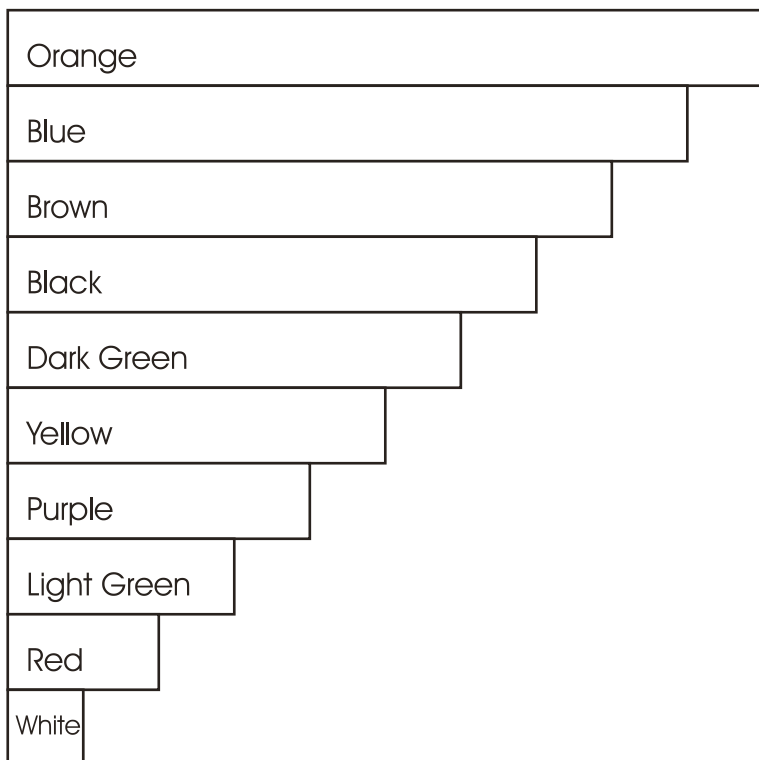
Provide students with appropriate practice questions.

Concept Practice

7.4.1: Template for Relational Rods



Teachers may want to print the coloured rods on acetate and cut them apart to use on the overhead transparency.

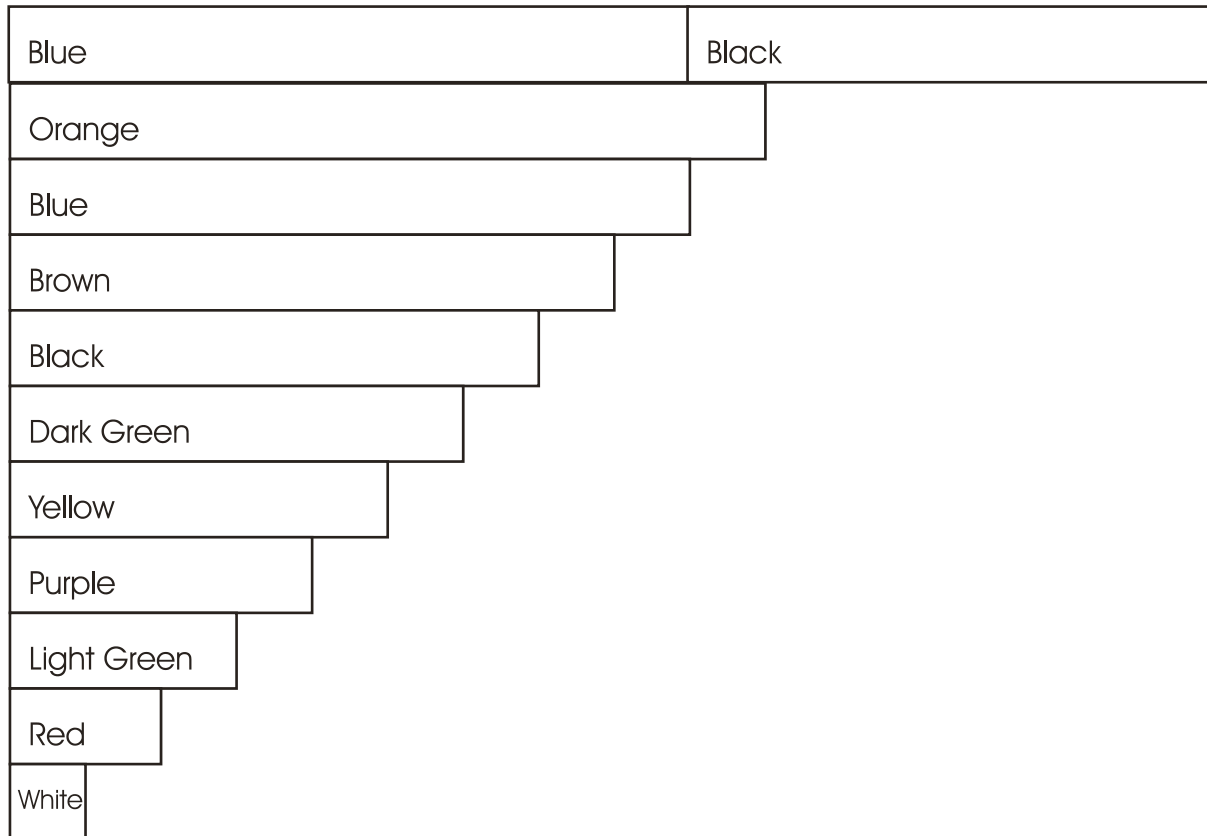


Students can colour the rods as indicated and cut them apart to make their own set of relational rods.

7.4.2: Relational Rods as a Fraction of One Blue-Black Whole

Name:

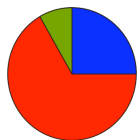
Date:



Write the value of each coloured rod as a fraction of the blue-black rod. Simplify any fraction that is not in lowest terms.

7.4.3: Fractions Using Relational Rods

	White	Red	Light Green	Purple	Yellow	Dark Green	Black	Brown	Blue	Orange
White										
Red										
Light Green										
Purple			$\frac{3}{4}$							
Yellow										
Dark Green										
Black										
Brown	$\frac{1}{8}$									
Blue										
Orange								$\frac{4}{5}$		
Blue/Black	$\frac{1}{16}$									



Math Learning Goals

- Add and subtract fractions using relational rods.

Materials

- sets of relational rods
- BLM 7.5.1

Assessment Opportunities

Minds On...

Whole Class → Review

Discuss strategies that different students used for expressing one rod as a fraction of another.

Action!

Pairs → Game

Play one game as a whole class.

Students work with the relational rods to create and complete addition and subtraction problems (BLM 7.5.1).

They use various strategies to prove that their statement is correct – modelling with the rods, using symbolic manipulation and equivalent fractions, using a calculator.

Curriculum Expectations/Demonstration/Anecdotal Note: Assess students’ ability to add and subtract fractions, using relational rods and equivalent fractions.

This would allow for some reinforcement of appropriate language and problem-solving skills.

Consolidate Debrief

Whole Class → Discussion

Each pair of students shares one addition or subtraction expression they created for the class to solve.

Discuss students’ strategies for solving, e.g., using rods, mentally, finding equivalent fractions with a common denominator.

Home Activity or Further Classroom Consolidation

- Create a new game that would require the use of relational rods to add or subtract fractions, e.g., purple-brown whole.

OR

- Create a new whole based on two or more rods combined (not blue-black). Find the fractional value that each rod is of the whole.

OR

- Complete the practice questions about determining equivalent fractions.

Assign these tasks to specific groups of students based on their skill levels.

Provide students with appropriate practice questions involving equivalent fractions.

*Application
Reflection
Exploration*

7.5.1: Fraction Game with Relational Rods

Name:

Date:

Work with a partner.

Use the worksheet 7.4.2: Relational Rods as a Fraction of One Blue-Black Whole to help you with the fractional value of each rod.

1. One partner randomly selects 5 rods from the set and lays them out on the table. The other partner chooses from these, 2 rods to add and subtract.
2. Individually, create two addition-of-fractions equations and two subtraction-of-fractions equations using the rods. Record your equations using the colours as well as the fractional values in terms of the blue-black rod.

For example,

Addition

$$\begin{array}{rccccccc} \text{dark green} & & + & & \text{purple} & & = & & \text{orange} \\ \frac{6}{16} \text{ blue-black} & & + & & \frac{4}{16} \text{ blue-black} & & = & & \frac{10}{16} \text{ blue-black} \end{array}$$

Use equivalent fractions to reduce to:

$$\frac{3}{8} \text{ blue-black} + \frac{1}{4} \text{ blue-black} = \frac{5}{8} \text{ blue-black}$$

Subtraction

$$\begin{array}{rccccccc} \text{orange} & & - & & \text{purple} & & = & & \text{dark green} \\ \frac{10}{16} \text{ blue-black} & & - & & \frac{4}{16} \text{ blue-black} & & = & & \frac{6}{16} \text{ blue-black,} \end{array}$$

Use equivalent fractions to reduce to:

$$\frac{5}{8} \text{ blue-black} - \frac{1}{4} \text{ blue-black} = \frac{3}{8} \text{ blue-black}$$

3. Compare your two sets of equations.
 - For each equation that is common, check the answer using another method. If it is correct award your team 2 points.
 - For each equation that is different, explain your solution to your partner. When you agree on the correct equation, check the answer. If it is correct, award your team 1 point.
 - No points are awarded for incorrect equations.
4. Record each person's score for that round.
5. For each round, take turns, randomly selecting 5 rods from the set.
6. Play continues until one person reaches 20 points.



Math Learning Goals

- Develop rules for subtracting fractions using equivalent fractions with common denominators.
- Add and subtract fractions.

Materials

- BLM 7.6.1, 7.6.2
- relational rods
- pattern blocks

Minds On...

Whole Class → Game

Play the concentration game with the class (BLM 7.6.1, 7.6.2).

Action!

Whole Class → Note making

Students summarize their understanding of subtracting fractions using equivalent fractions with a common denominator.

Work together to pose questions, create examples related to the questions, and work the examples. Students add to their notes. Highlight different methods that students have developed for determining equivalent fractions and for subtracting fractions.

Students develop the steps in the process, including as much detail as they require.

Consolidate Debrief

Individual → Practice

Students work independently to add and subtract fractions by completing assigned questions. Make manipulatives available.

Curriculum Expectations/Quiz/Marking Scheme: Assess students' ability to add and subtract fractions, using a variety of tools.

Home Activity or Further Classroom Consolidation

- Complete the practice questions.
- OR
- Create a card game based on fractions.

*Application
Concept Practice
Reflection
Skill Drill*

Assessment Opportunities

Consider including visual representations of the fractions on the game board, e.g., coloured rods, pattern blocks.

Alternatives to this whole-class activity include working in pairs or small groups or creating poster notes. Make manipulatives available.

Provide students with appropriate practice questions.

7.6.1: A Concentration Game (Teacher)

--	--	--	--

A

B

C

D

--	--	--	--

E

F

G

H

--	--	--	--

I

J

K

L

--	--	--	--

M

N

O

P

7.6.2: Instructions for the Concentration Game (Teacher)

This game can be used to introduce a topic or to help students consolidate a concept. Choose only one concept for each game.

For example:

- equivalent fractions
- fractions in simplest form
- converting between fractions and decimals, decimals and percent, or fractions and percent
- converting between mixed numbers and improper fractions

To prepare the game:

Randomly write eight fractions in different boxes on an acetate copy of the game board. In the remaining eight boxes, write the match to the original eight. Cut out and number 16 paper squares to hide the contents of each box as the game is projected on the overhead screen. Label the blank squares that you use to cover the boxes.

To play the game:

The class forms two teams. A student from the starting team requests that two boxes be uncovered. The student tells if there is a match. If the two items revealed match, the team gets a point. If not, the boxes are covered again and a student from the next team gets a turn. Play continues until all matches have been found.

Note: Students can work in pairs to quietly discuss the correctness of the match. This may also reduce self-consciousness for some students.

Alternate playing suggestions:

- If a team makes a match, they get another turn.
- All students must have at least one turn before anyone can take a second turn.
- To prevent students from automatically saying that everything revealed is matching, the team loses a point if a student declares an incorrect match.



Math Learning Skills

- Demonstrate understanding and skills while performing operations with fractions.

Materials

- BLM 7.7.1, 7.7.2

Assessment Opportunities

Minds On...

Whole Class → Review/Four Corners

Students go to the corner where the question they are most interested in discussing is posted, e.g., adding fractions, subtracting fractions, equivalent fractions, using manipulatives to understand fractions. In this corner students discuss their understanding. Visit each corner and ask relevant questions and redirect the discussion, as needed.

Refer to *Think Literacy: Mathematics, Grades 7–9*, pp. 106–109.

Action!

Individual → Applying Understanding

Students work independently to complete the Fraction Flag task (BLM 7.7.1). Students may measure using a ruler or use manipulatives to cover the area. They may use any of the manipulative materials they have been using to add and subtract fractions, if they choose.

For some students, the flag could be superimposed on grid paper (or grid paper on acetate could be used) to provide an additional option for counting squares to determine area.

Curriculum Expectations/Application/Checkbric: Assess students' ability to apply their understanding of fractions.



Consolidate Debrief

Whole Class → Sharing

Students share their strategies for completing the task.

Exploration Reflection

Home Activity or Further Classroom Consolidation

Create your own flag using fractional sections. Include solutions.

See BLM 7.7.2. Post flags in the classroom.

7.7.1: Fraction Flag

Name:

Date:

The flag to the right was designed with four colours.

1. Determine the fraction of the flag that is:

a. Orange



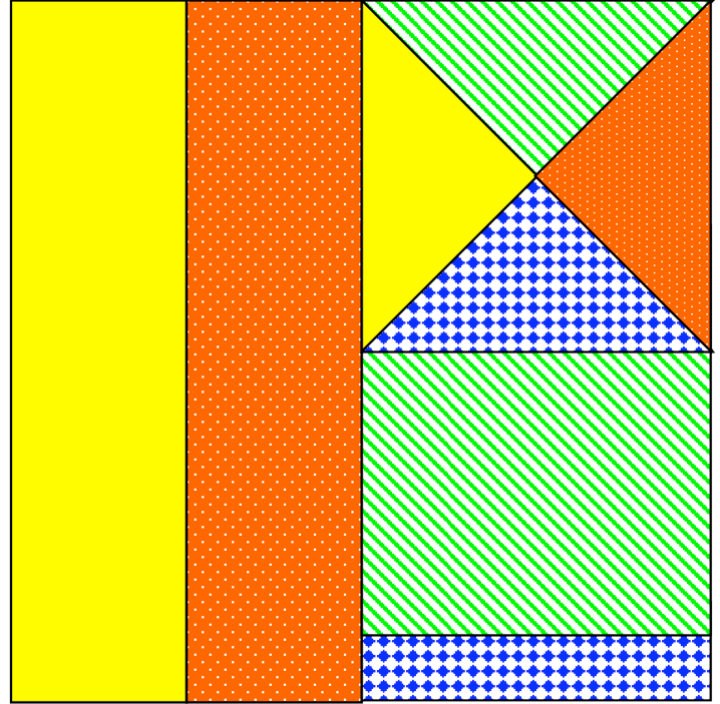
b. Blue



c. Yellow



d. Green



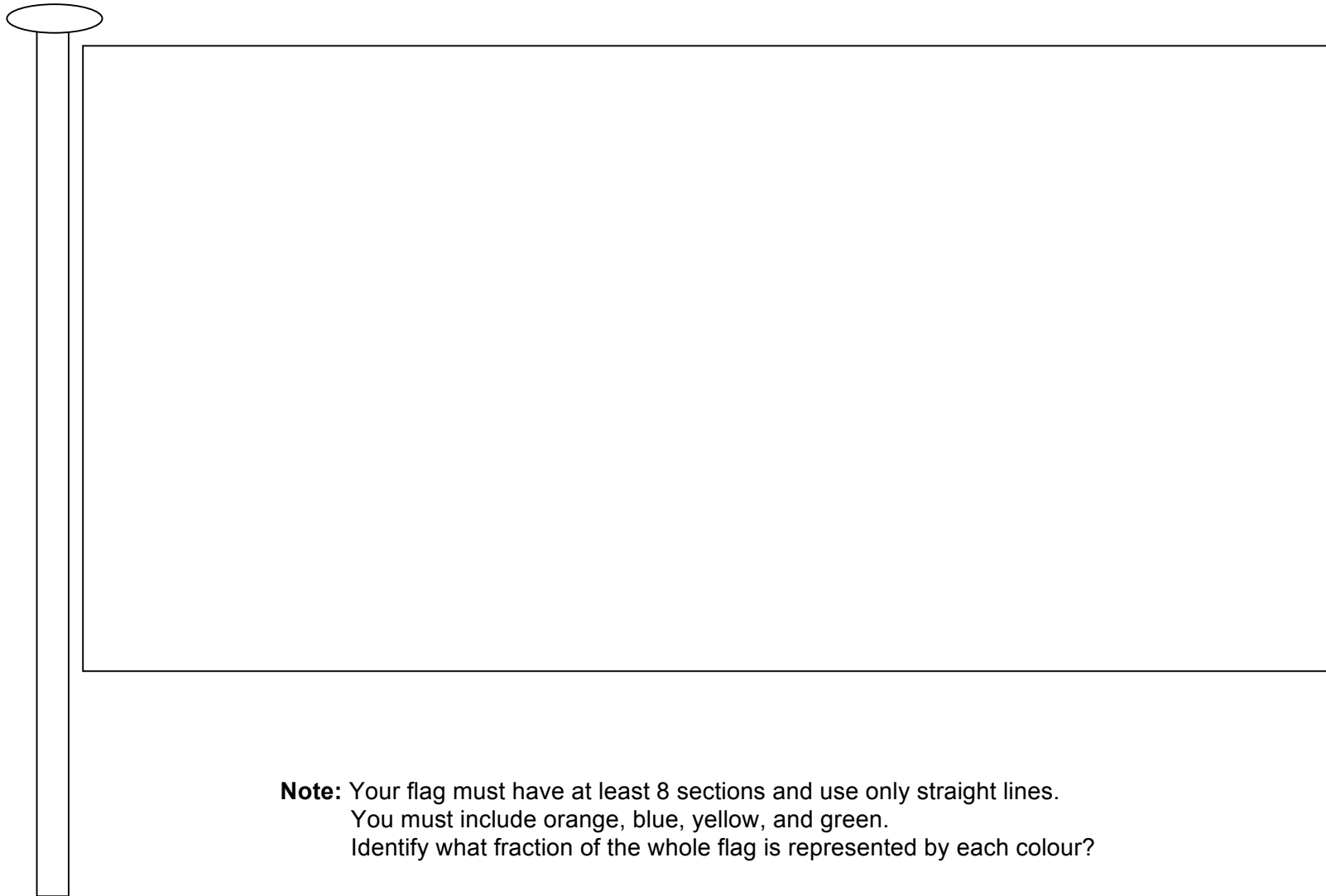
2. What fraction of the flag is not green?
Explain your reasoning.

3. How much more of the flag is orange than blue? Show all of your work.

7.7.2: Create Your Own Fraction Flag

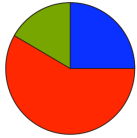
_____’s Fraction Flag

Date: _____



Note: Your flag must have at least 8 sections and use only straight lines.
You must include orange, blue, yellow, and green.
Identify what fraction of the whole flag is represented by each colour?

orange = _____ blue = _____ yellow = _____ green = _____



Math Learning Goals

- Explore repeated addition of fractions and addition and subtraction of mixed numbers.

Materials

- BLM 7.8.1, 7.8.2
- overhead manipulatives

Assessment Opportunities

Minds On...

Whole Class → Introducing the Problems

Identify and describe types of fractions and operations with fractions that have not been addressed (mixed numbers, multiplication and division of fractions, etc.). Focus on mixed fractions. Students can build the fractions with manipulatives, as well as represent them symbolically.

Have manipulatives available for students to use to add and subtract mixed fractions.

Action!

Pairs → Exploration

Students develop solutions for the various fraction problems (BLM 7.8.1). Students can use manipulatives of their choice.

Problem Solving/Application/Checklist: Assess students' ability to solve problems involving the addition and subtraction of fractions.

Students should consult with their partner before they ask for assistance.

Consolidate Debrief

Whole Class → Sharing

Students share the strategies they used to solve the problems, providing a complete explanation of how they attempted the solution and how they can prove their solution is correct.

Record the different methods students used and lead them to see that there is more than one valid strategy, e.g., $\frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3}$ is the same as $6 \times \frac{2}{3}$.

Have overhead manipulatives available.

*Application
Concept Practice*

Home Activity or Further Classroom Consolidation

Complete worksheet 7.8.2, Food Fractions.

7.8.1: Fraction Party Problems

Solve the following problems involving fractions. Show or explain your strategies.

1. A recipe for Pink Party Punch calls for $4\frac{2}{3}$ cups of raspberry juice, $3\frac{1}{4}$ cups of ginger ale, and $2\frac{1}{2}$ cups of raspberry sherbet. How many cups of punch will the recipe make?

2. Sam filled 6 glasses with $\frac{2}{3}$ L of juice in each glass. How many litres of juice did he use?

3. Xia has 16 metres of rope. She cuts off $\frac{1}{6}$ of the rope to use as a skipping rope for a party activity. How long is Xia's skipping rope?

4. Tyson cut some bagels in half and some apples into eighths. At the end of the party, there were 5 pieces of bagel and 11 slices of apple left. How many bagels and how many apples were not eaten?

7.8.2: Food Fractions

Solve the following problems involving food and fractions. Show and/or explain the strategies you used.

- Three people shared a mega nutrition bar.
Which of the following statements are possible? Explain your reasoning.
 - Greg ate $\frac{3}{8}$ of the bar, Gursharan ate, $\frac{1}{4}$ and Mo ate $\frac{1}{2}$.
 - Greg ate $\frac{1}{5}$ of the bar, Gursharan ate $\frac{3}{10}$, and Mo ate $\frac{1}{2}$.
 - Greg ate $\frac{1}{3}$ of the bar, Gursharan ate $\frac{1}{2}$, and Mo ate $\frac{1}{6}$.
 - Greg ate $\frac{1}{6}$ of the bar, Gursharan ate $\frac{1}{4}$, and Mo ate $\frac{1}{3}$.
- Ms. Legume wants to use $\frac{1}{3}$ of her garden for lettuce and $\frac{1}{2}$ for beans.
What fraction of the garden does she have left for each of her carrots and her peas if they both are to get the same amount of space?

Unit 7: Day 9: Dividing Whole Numbers by Fractions Using Concrete Materials

Grade 7



Math Learning Goals

- Divide whole numbers by simple fractions using concrete materials, e.g., divide 3 by $\frac{1}{2}$, using fraction strips.

Materials

- Fraction strips
- Linking cubes
- Relational Rods
- Ruler
- Graph paper
- BLM 7.9.1
- BLM 7.9.2

Assessment (A) and DI (D) Opportunities

Minds On...

Whole Class & Pairs → Solving a Problem

Pose the following questions related to division and have students solve questions in pairs using manipulatives.

$$4 \div 2 = \quad 4 \div \frac{1}{2} = \quad 6 \div 3 = \quad 6 \div \frac{1}{3} = \quad 6 \div \frac{2}{3} =$$

Encourage students to solve questions in a variety of ways and be prepared to explain their thinking / reasoning.

Students share their solutions, using the blackboard or overhead.

Discuss the different representations (numerical, graphical, concrete materials) of student solutions.

Typical student misconception:

$$4 \div \frac{1}{2} = 2$$

Suggest translating this into words: How many halves are there in four

OR
show 4 circles each cut in half. Count the halves to show the answer of 8.

Action!

Whole Class & Pairs → Create a Problem & Gallery Walk

As a class – discuss and list the various real-life examples and applications of dividing whole numbers by fractions.

In pairs, students will use BLM 7.9.1 to create and solve a realistic problem (division of whole numbers by fractions) and represent their solution in 2 ways (manipulatives, pictures, numbers, etc.)

Students do a gallery walk (walk around and observe various questions and solutions).

Students complete the reflection part of BLM 7.9.1.

Curriculum Expectations/Demonstration/Marking Scheme: Assess students' understanding of dividing whole numbers by simple fractions.

When dividing whole numbers by whole numbers the answer gets smaller BUT when dividing whole numbers by fractions (smaller than 1) the answer gets larger.

Consolidate Debrief


Whole Class → Sharing/Discussion

Briefly discuss the observations of the students during the gallery walk (context of questions, representations used, any number solutions, etc.).

Have several different students share their problems and solutions.

Discuss and list the various representations students used to solve their problems.

All activities are assessment for learning through discussion and student work.

 Use various representations

*Application
Concept Practice*

Home Activity or Further Classroom Consolidation

Complete worksheet 7.9.2.

Watch a 4 minute video on dividing fractions for a step-by-step how-to using algorithms:
http://www.mathplayground.com/howto_divide_fractions.html

7.9.1: Dividing Whole Numbers by Fractions

Grade 7

Problem:

Representation 1:

Representation 2:

What did you learn or notice during your gallery walk?

7.9.2: Dividing Whole Numbers by Fractions

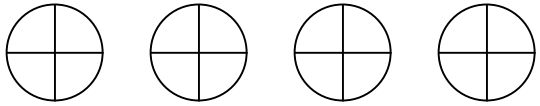
Grade 7

Name: _____

Date: _____

Solve the following problems involving fractions. Show or explain your strategies.

1. How many quarters are in a roll of quarters (\$10.00)? Explain.
2. For a class party, the teacher buys 3 bottles of 2 L pop. Each cup holds $\frac{1}{5}$ L. Will the teacher have enough pop to fill 33 cups full?
3. It takes Mason $\frac{2}{3}$ of an hour to walk 4.6 km. How far can he walk in 1 hour?
4. Complete the chart below showing division of whole numbers by fractions.

Whole	Fraction	Quotient	Diagram
3	$\frac{1}{2}$		
			
	$\frac{2}{5}$	10	

7.9.2: Dividing Whole Numbers by Fractions Solutions

Grade 7

Solve the following problems involving fractions. Show or explain your strategies.

1. How many quarters are in a roll of quarters (\$10.00)?

$\$10 \div \frac{1}{4} = 40$ OR $\$1 \div \frac{1}{4} = 4$ and $4 \times 10 = 40$ OR Draw 40 quarters OR

2. For a class party, the teacher buys 3 bottles of 2 L pop. Each cup holds $\frac{1}{5}$ L. Will the teacher have enough pop to fill 33 cups full?

With 3 bottles, there are 6 L total. $6 \div \frac{1}{5} = 30$. Each $1 \div \frac{1}{5} = 5$. (Each whole can be partitioned into 5 fifths.) Therefore 6 wholes can be partitioned into 30 fifths. Therefore, the teacher will not have enough pop to fill 33 cups full.


3. It takes Mason $\frac{2}{3}$ of an hour to walk 4.6 km. How far can he walk in 1 hour?

In $\frac{1}{3}$ hour, Mason walks 2.3 km ($\frac{2}{3} \div 2 = \frac{1}{3}$ and $4.6 \text{ km} \div 2 = 2.3 \text{ km}$.) Therefore in $\frac{3}{3}$ of an hour (or 1 whole hour), Mason can walk 6.9 km ($\frac{3}{3} \times 2.3 = 6.9$ and $2.3 \text{ km} \times 3 = 6.9 \text{ km}$.)
***Note* This calculation is really “inverting and multiplying” but by first finding the unit part ($\frac{1}{3}$) and then the whole, the student is able to see why this works.**



4. Complete the chart below showing division of whole numbers by fractions.

Whole	Fraction	Answer	Diagram
3	$\frac{1}{2}$	6	
4	$\frac{1}{4}$	16	
4	$\frac{2}{5}$	10	

Unit 7: Day 10: Summative Assessment		Grade 7
	Math Learning Goals <ul style="list-style-type: none"> Demonstrate an understanding of fractions and operations with fractions on an open-ended, problem-solving task 	Materials <ul style="list-style-type: none"> BLM 7.10.1
Assessment (A) and DI (D) Opportunities		
Minds On...	Small Group → Placemat Activity Have small groups of students use a Placemat organizer to solve one of the sample problems below. Prompt students to write their full solution to the problem, including an explanation of their thinking and strategy used In the centre of the placemat, each group writes a “model” solution to their problem <u>Sample Problems</u> <ul style="list-style-type: none"> divide 10 chocolate bars into quarters add $1 \frac{1}{4}$ cup + $\frac{1}{3}$ cup pour $\frac{1}{4}$ out of a pail of water that is only $\frac{2}{3}$ full a student has already run $\frac{5}{8}$ of a lap in a $3 \frac{1}{2}$ lap race – how many laps remain? $\frac{1}{2}$ hour on computer, $\frac{3}{4}$ hour watching TV, $\frac{1}{3}$ hour playing video games – what is total screen time? As a whole class, discuss similarities, common misconceptions and possible strategies to solve problems with fractions.	Refer to Think Literacy: Mathematics, Gr. 7-9, pp. 102-104 <div style="background-color: black; width: 15px; height: 15px; margin-bottom: 5px;"></div> Consider making homogeneous student groupings for the Placemat activity <div style="background-color: black; width: 15px; height: 15px; margin-bottom: 5px;"></div> Consider having different groups solve different problems
Action!	Individual → Assessment Task Students work independently to complete BLM 7.10.1	
Consolidate Debrief	Whole Class → Discussion Discuss any questions that arise during the independent work period. <i>Curriculum Expectations/Quiz/Marking Scheme: Assess students’ ability to solve problems involving operations with fractions, using a variety of tools.</i>	
<i>Differentiated Exploration Reflection</i>	Home Activity or Further Classroom Consolidation After individual work has been assessed, teacher should select a variety of solutions to highlight a range of solutions to share through congress or Bansho. Students look for similarities in solutions, reflect on their solution and identify strategies to improve/clarify.	

7.10.1: Operations with Fractions Summative Assessment

Grade 7

You have been asked by your principal to help re-design a new eco yard at your school. The yard will have to include the following sections:

$\frac{1}{6}$ of the yard will be a flower and vegetable garden

$\frac{1}{4}$ of the yard will be used for a creative play space with trees and shrubbery

$\frac{1}{3}$ of the yard will be used for open field space for soccer, football, etc.

The remainder of the yard will be used for basketball nets and 4-square.


1. Determine the **total** fraction of the yard used for garden, creative play and open field. Explain your thinking.

Show your work and explain your thinking.

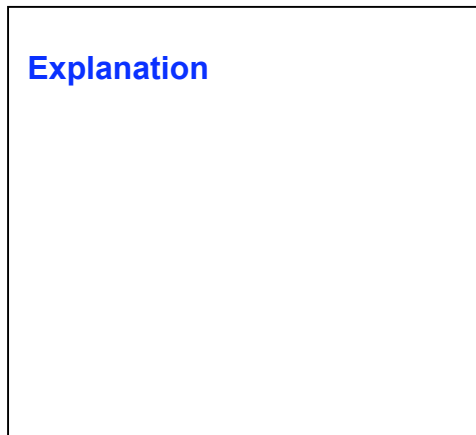
Final Answer:

2. The principal wants to know if there will be $\frac{1}{3}$ of the yard left over for basketball and 4-square. Show your calculations and draw a diagram that explains your answer to the principal.

SCHOOL YARD



Explanation



7.10.1: Operations with Fractions

Summative Assessment (Continued)

Grade 7

3. In the part of the yard used for basketball and 4-square, the area of each basketball court is twice as big as each 4-square court.
- a) The principal wants two basketball courts and four 4-square courts in this part of the yard. What fraction of **this part of the yard** would be taken up by **one** 4-square court?

Show your work and explain your thinking.

Final Answer:

- b) What fraction of the **entire yard** would each 4-square court be? Explain the strategy you used to calculate the answer.

Explain your thinking.

Final Answer:

4. The area of the creative play space will only be used by the primary students. The total area of the yard is 800 m^2 . Calculate the area of the yard that will be used by junior and intermediate students.

Show your work and explain your thinking.

Final Answer:

7.10.1: Operations with Fractions

Summative Assessment Solutions

Grade 7

You have been asked by your principal to help re-design a new eco yard at your school. The yard will have to include the following sections:

$\frac{1}{6}$ of the yard will be a flower and vegetable garden

$\frac{1}{4}$ of the yard will be used for a creative play space with trees and shrubbery

$\frac{1}{3}$ of the yard will be used for open field space for soccer, football, etc.

The remainder of the yard will be used for basketball nets and 4-square.

1. Calculate the total fraction of the yard used for garden, creative play and open field. Explain your thinking.

Show your work and explain your thinking.

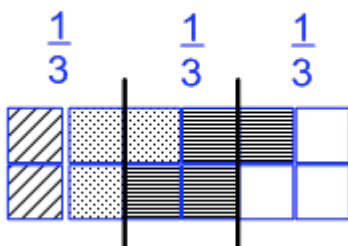
$$\frac{1}{6} + \frac{1}{4} + \frac{1}{3} = \frac{2}{12} + \frac{3}{12} + \frac{4}{12} = \frac{9}{12} = \frac{3}{4}$$

Students could also draw a diagram.

Final Answer:

The total fraction of the yard used for garden, creative play & open field is $\frac{3}{4}$.

2. The principal wants to know if there will be $\frac{1}{3}$ of the yard left over for basketball and 4-square. Show your calculations and draw a diagram that explains your answer to the principal.



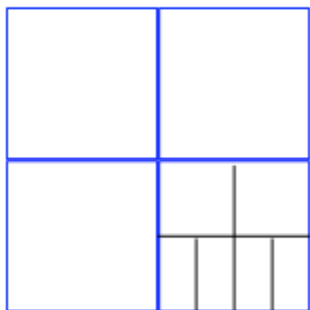
This diagram represents the schoolyard divided into 12ths:

$$\frac{2}{12} + \frac{3}{12} + \frac{4}{12}$$

Because $\frac{1}{3}$ of the yard would be $\frac{4}{12}$, and only $\frac{3}{12}$ is left over, there is only $\frac{1}{4}$ of the yard left for basketball and 4-square.

Summative Assessment Solutions

3. In the part of the yard used for basketball and 4-square, the area of each basketball court is twice as big as each 4-square court.
- c) The principal wants two basketball courts and four 4-square courts in this part of the yard. What fraction of **this part of the yard** would be taken up by **one** 4-square court?



Each basketball court takes up $\frac{1}{4}$ of the space. Because the basketball courts are twice as big as the 4-square court, each 4-square court would represent $\frac{1}{8}$ of this part of the yard.

- d) What fraction of the **entire yard** would each 4-square court be? Explain the strategy you used to calculate the answer.

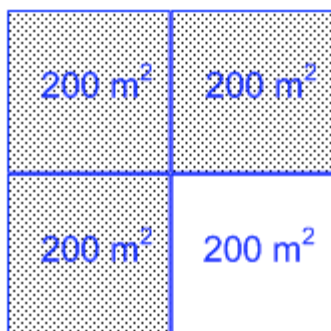
Explain your thinking

Each 4-square court is $\frac{1}{8}$ of $\frac{1}{4}$ of the entire yard. This means that there are

$8 \times 4 = 32$ areas the same size as one 4-square court. Therefore each 4-square court represents $\frac{1}{32}$ of the entire yard.

Final Answer: $\frac{1}{32}$ of the entire yard

4. The area of the creative play space will only be used by the primary students. The total area of the yard is 800 m^2 . Calculate the area of the yard that will be used by junior and intermediate students.



The primary students will use $\frac{1}{4}$ of the yard. This leaves $\frac{3}{4}$ for the junior and intermediate students.

Each quarter represents 200 m^2 of the yard. Three of these sections would be 600 m^2 .



Math Learning Goals

- Explore the relationship between fractions and decimals.

Materials

- BLM 7.11.1, 7.11.2

Assessment Opportunities

Minds On...

Whole Class → Review and Introduce New Problem

Ask students to think of any two fractions that are “really close.” Record a few of their suggestions on the board.

Challenge them to choose one pair of fractions from the board and to find two numbers that are between the two listed. Ask what types of numbers they might use to solve this problem. Identify that they could use fractions or decimals.

Action!

Pairs → Problem Solving

Students find two numbers between one pair of fractions listed on the board. Pairs develop their own strategies and methods independently, share their solutions to the problem, and their reasoning in finding the two numbers. If they use decimals, they should make the connection to fractions.

Communicating/Observation/Anecdotal Note: Assess students’ ability to communicate their thinking using correct mathematical language.

Consolidate Debrief

Whole Class → Sharing

Some discussion around the connection between fractions and decimals and how to use a calculator to convert fractions to decimals would be useful. Include number systems, common relationships that students are familiar with, and applications/appropriateness of each in daily contexts.

Pairs → Practice

Reinforce understanding of the fraction-decimal relationship (BLM 7.11.1).

Home Activity or Further Classroom Consolidation

Create three determine-the-decimal questions. Each one should have either two or three clues and all the clues should be needed to determine the decimal.

Complete the practice questions.

Two methods to change a fraction to a decimal on a calculator are:

- divide the numerator by the denominator
- enter the fraction using the fraction key ($a\frac{b}{c}$), press ENTER, then press the fraction key again

The definition of *multiple* may need to be reviewed with students.

Provide students with appropriate practice questions for exploring the relationship of fractions to decimals.

*Concept Practice
Exploration
Reflection*

7.11.1: Determine the Decimal

Determine the mystery decimal number from the clues listed.

- The decimal is... Clue #1: greater than $\frac{1}{8}$

 Clue #2: less than $\frac{1}{5}$

 Clue #3: a multiple of $\frac{1}{20}$
- The decimal is... Clue #1: between $\frac{2}{5}$ and $\frac{3}{5}$

 Clue #2: greater than $\frac{1}{2}$

 Clue #3: a multiple of 0.11
- The decimal is... Clue #1: a multiple of $\frac{3}{4}$

 Clue #2: between 2 and 3
- The decimal is... Clue #1: less than $\frac{7}{8}$

 Clue #2: greater than $\frac{3}{4}$

 Clue #3: a multiple of 0.17
- The decimal is... Clue #1: greater than $\frac{4}{5}$

 Clue #2: a multiple of 0.22

 Clue #3: less than 1
- The decimal is... Clue #1: between $\frac{1}{5}$ and $\frac{6}{10}$

 Clue #2: closer to $\frac{1}{4}$ than to one-half

 Clue #3: a multiple of $\frac{1}{10}$
- The decimal is... Clue #1: multiple of $\frac{1}{2}$

 Clue #2: closer to 6 than to 3.5

 Clue #3: not a whole number

7.11.2: Determine the Decimal Answers (Teacher)

Determine the mystery decimal number from the clues listed.

- The decimal is... **(0.15)**

Clue #1: greater than $\frac{1}{8}$

Clue #2: less than $\frac{1}{5}$

Clue #3: a multiple of $\frac{1}{20}$
- The decimal is... **(0.55)**

Clue #1: between $\frac{2}{5}$ and $\frac{3}{5}$

Clue #2: greater than $\frac{1}{2}$

Clue #3: a multiple of 0.11
- The decimal is... **(2.25)**

Clue #1: a multiple of $\frac{3}{4}$

Clue #2: between 2 and 3
- The decimal is... **(0.85)**

Clue #1: less than $\frac{7}{8}$

Clue #2: greater than $\frac{3}{4}$

Clue #3: a multiple of 0.17
- The decimal is... **(0.88)**

Clue #1: greater than $\frac{4}{5}$

Clue #2: a multiple of 0.22

Clue #3: less than 1
- The decimal is... **(0.3)**

Clue #1: between $\frac{1}{5}$ and $\frac{6}{10}$



Clue #2: closer to $\frac{1}{4}$ than to one-half

Clue #3: a multiple of $\frac{1}{10}$
- The decimal is... **(5.5)**

Clue #1: multiple of $\frac{1}{2}$

Clue #2: closer to 6 than to 3.5

Clue #3: not a whole number

Unit 7: Day 12: Decimals		Grade 7
	Math Learning Goals <ul style="list-style-type: none"> Compare and order decimals to hundredths, using a variety of tools, e.g., number lines, base-ten materials, calculators. Determine whether a fraction or a decimal is the most appropriate way to represent a given quantity, e.g., I would use a fraction to express part of an hour, saying “quarter hour” instead of “.25 of an hour.” Add and subtract decimals. 	Materials <ul style="list-style-type: none"> BLM 7.12.1 BLM 7.12.2 Number lines Base-ten blocks Calculators 10 x 10 grid
Assessment (A) and DI (D) Opportunities		
Minds On...	Whole Class → Discussion Discuss and identify the connection between fractions and decimals from Lesson 11 and have students individually list real-life examples that use fractions and decimals. Discuss whether the fraction or decimal notation is the most appropriate way to represent a given quantity depending on the situation. i.e., a measuring cup is in fractions but monetary value is usually in decimals Have students label their list (F for fraction or D for decimal). As a class, quickly discuss any problems that students faced (i.e., a quarter is the same as \$.25 and both are used in different scenarios). Write 3 decimals on the board between 0 and 2 – using tenths and hundredths (e.g., 0.4, 0.35 and 1.25). Have pairs of students represent one of these numbers using various manipulatives (number line, base-ten blocks, 10x10 grid). Order these decimals on the board (possibly reviewing place value up to hundredths if needed).	This lesson reinforces students’ experience from the junior grades with decimals.  Encourage use of manipulatives (base-ten blocks and 10 x 10 grids) or use Gizmos: Ordering Fractions and Decimals Choice of decimal in activity allows for students to choose decimals that are appropriate for them (e.g., 0.5 or 1.31). <i>Teacher Note:</i> You may choose to do the same ordering activity including a choice of fractions or decimals to extend and connect these concepts further.
Action!	Whole Class → Activity Have students make up a decimal between 0 and 2 and write it on a small piece of scrap paper. Students will stand up and place themselves in order around the outside of the room. Once they are in order, have students call out their numbers. Decide as a class whether everybody is in the correct order. Discuss a few examples on the board and/or using manipulatives to clarify any difficulties or misconceptions. Complete BLM 7.12.1 in pairs to consolidate these concepts. To clarify “hard” and “easy”, the teacher could provide some criteria. E.g., “easy” means comparing up to 3 decimals, or the decimals are all written with the same place value i.e. hundredths. “Hard” could mean that at least 4 decimals are compared and/or decimals are written using different place values. Curriculum Expectations/Demonstration/Marking scheme: Assess students’ understanding of comparing and ordering decimals as well as adding and subtracting decimals.	
Consolidate Debrief	Whole Class → Sharing/Discussion Have students share strategies to represent, compare and order decimals as well as add and subtract decimals. Take up activity BLM 7.12.1 as a class and discuss any difficulties with the activity – have pairs of students explain their reasoning. Share part E from handout where students created their own problems.	
<i>Concept Practice</i>	Home Activity or Further Classroom Consolidation Complete BLM 7.12.2	

7.12.1: Decimals

Grade 7

Name: _____

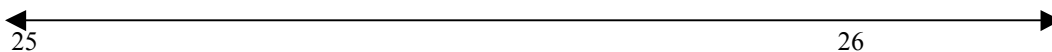
Date: _____

1. Four students ran a 200m race. They each ran in a heat and in the finals. The times for the two races were as follows:

Student	Heat Time	Final Time
A	25.34 s	25.29 s
B	26.12 s	25.13 s
C	25.89 s	25.45 s
D	25.45 s	25.01 s

- A. In the Final race what place did each runner finish in?

- B. Place the final running times for each runner on the number line below.



- C. If the winner was decided by adding the heat time to the final time, which student would win the race? Did they finish in the same order compared to the final? Show your work.

7.12.1: Decimals (Continued)

Grade 7

D. Which student showed the most improvement in their times from the heat to the final race?
Show your work.

E. Make up two problems using decimals. One problem has to be easy and the other problem must be difficult. Solve each of your problems.

<u>Problem One</u>	<u>Problem Two</u>
<u>Solution One</u>	<u>Solution Two</u>

7.12.1: Decimals Solutions

Grade 7

Name: _____

Date: _____

1. Four students ran a 200m race. They each ran in a heat and in the finals. The times for the two races were as follows:

Student	Heat Time	Final Time
A	25.34 s	25.29 s
B	26.12 s	25.13 s
C	25.83 s	25.45 s
D	25.45 s	25.01 s

- A. What place did each runner finish in the final race?

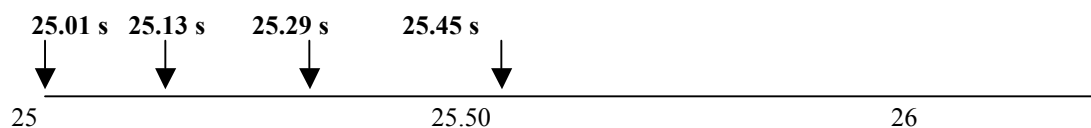
Student A - first

Student B - fourth

Student C - third

Student D - second

- B. Order the final running times from least to greatest on a number line.



- C. If the winner was decided by adding the heat time to the final time which student would win the race? Did they finish in the same order compared to the final? Show your work.

Student A

$$\begin{array}{r} 25.34 \text{ s} \\ + \underline{25.29 \text{ s}} \\ \hline 50.63 \text{ s} \end{array}$$

Student B

$$\begin{array}{r} 26.12 \text{ s} \\ + \underline{25.13 \text{ s}} \\ \hline 51.25 \text{ s} \end{array}$$

Student C

$$\begin{array}{r} 25.83 \text{ s} \\ + \underline{25.45 \text{ s}} \\ \hline 51.28 \text{ s} \end{array}$$

Student D

$$\begin{array}{r} 25.45 \text{ s} \\ + \underline{25.01 \text{ s}} \\ \hline 51.46 \text{ s} \end{array}$$

Student A still came first, but Student B came second instead of fourth.

7.12.1: Decimals Solutions (Continued)

Grade 7

- D. Which student showed the most improvement in their times from the heat to the final race? Show your work.

Student A

$$\begin{array}{r} 25.34 \text{ s} \\ -25.29 \text{ s} \\ \hline 0.05 \text{ s} \end{array}$$

Student B

$$\begin{array}{r} 26.12 \text{ s} \\ - 25.13 \\ \hline 0.99 \text{ s} \end{array}$$

Student C

$$\begin{array}{r} 25.83 \text{ s} \\ - 25.45 \text{ s} \\ \hline 0.38 \text{ s} \end{array}$$

Student D

$$\begin{array}{r} 25.45 \text{ s} \\ - 25.01 \text{ s} \\ \hline 0.44 \text{ s} \end{array}$$

Student B showed the greatest improvement from the heat to the final race.

- E. Make up two problems using decimals. One problem has to be easy and the other problem must be difficult. Solve each of your problems.

<u>Problem One</u>	<u>Problem Two</u>
<u>Solution One</u> <i>Answers will vary.</i>	<u>Solution Two</u> <i>Answers will vary.</i>

7.12.2: Decimals

Grade 7

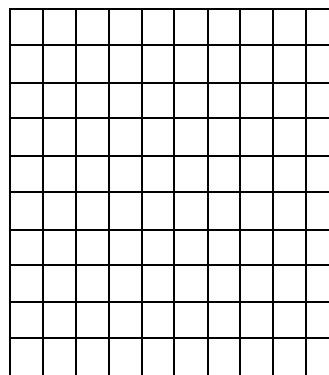
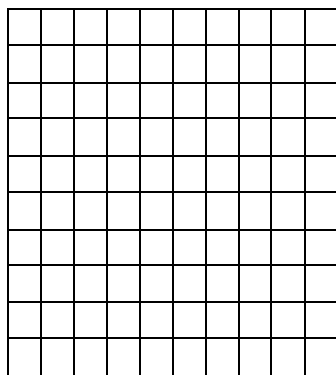
Name: _____

Date: _____

1. Represent the following decimals using these 10x10 grids provided.

a. 0.4

b. 0.17

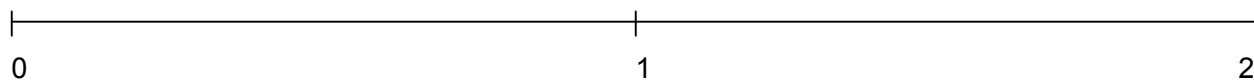


2. Compare the following decimals (<, > or =)

- a. 0.8 0.65
b. 14.5 14.50
c. 1.68 1.61

3. Place the following decimals in order on the number line below.

0.5, 1.37, 0.73, 0.7, 1.32



4. Add and subtract the following decimals.

$$\begin{array}{r} 34.51 \\ +5.39 \\ \hline \end{array}$$

$$\begin{array}{r} 17.82 \\ +18.27 \\ \hline \end{array}$$

$$\begin{array}{r} 524.79 \\ - 32.85 \\ \hline \end{array}$$

$$9 - 3.25 =$$

$$780.05 + 17.9 =$$

7.12.2: Decimals Solutions

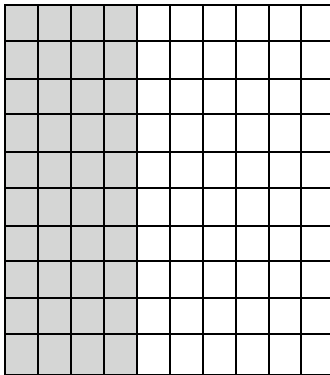
Grade 7

Name: _____

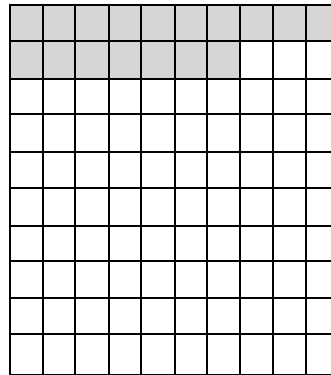
Date: _____

1. Represent the following numbers using these 10x10 grids.

a. 0.4



b. 0.17

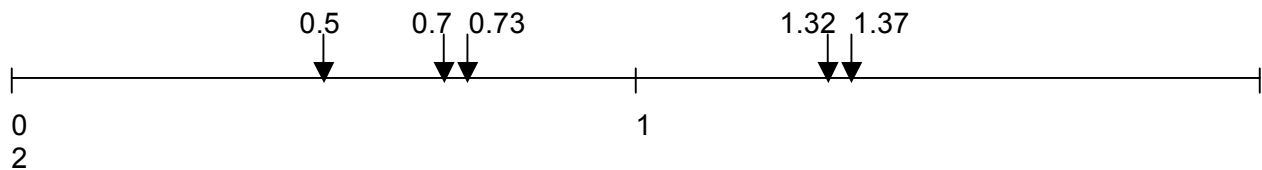


2. Compare the following decimals (<, > or =)

- a. $0.8 > 0.65$
b. $14.5 = 14.50$
c. $1.68 > 1.61$

3. Place the following decimals in order on the number line below.

0.5, 1.37, 0.73, 0.7, 1.32



4. Add and subtract the following decimals.


$$\begin{array}{r} 34.51 \\ +5.39 \\ \hline 39.90 \end{array}$$

$$\begin{array}{r} 17.82 \\ +18.27 \\ \hline 36.09 \end{array}$$

$$\begin{array}{r} 524.79 \\ - 32.85 \\ \hline 491.94 \end{array}$$

$$9 - 3.25 = 5.75$$

$$780.05 + 17.9 = 797.95$$

Unit 7: Day 13: Mental Math and Decimals		Grade 7
	Math Learning Goals <ul style="list-style-type: none"> Use a variety of mental strategies to add and subtract decimals, e.g., use the distributive property. Divide whole numbers by decimal numbers to hundredths using concrete materials. 	Materials <ul style="list-style-type: none"> 10x10 grid Money Number line BLM 7.13.1
Assessment (A) and DI (D) Opportunities		
Minds On...	Whole Class → Solving a Problem Present the problems below to the class in order to explore mental math strategies with decimals. <i>John went to the corner store to buy a big bag of chips that costs \$2.89 and a bottle of pop for \$1.49. How much did he spend? If he brought \$5, how much change did he get? Note: You may <u>not</u> use a pencil or calculator.</i> (Note: Ignore taxes for the purpose of today’s activities – focus on mental math aspect of the lesson.) Students share and discuss strategies they used to solve the problem. <i>Jenny had a \$5 bill and wanted to get quarters to play the video game at the store. How many quarters did the store owner give Jenny? Show this as a division question. (Answer: $5 \div 0.25 = 20$).</i> Be sure to discuss mental math strategies including: rounding, distributive property (e.g. $2.89 + 1.49 = 2 + 1 + 0.90 + 0.50$), number lines, adding whole numbers then decimals, etc.	When dividing whole numbers by whole numbers the answer gets smaller BUT when dividing whole numbers by decimals (smaller than 1) the answer gets larger. Distributive property – allows numbers to be decomposed using place value. E.g. 3.92 is $3 + 0.9 + 0.02$ ■ Instructions explicitly state not to use a calculator – some students may require a calculator or paper/pencil to complete these tasks. ■ Access Gizmo: Sums and differences with decimals
Action!	Groups → Solving a Problem Distribute chart paper and BLM 7.13.1 to students in same-ability groupings (2-4 students per group). Have students explain their solution to question #4 in detail on a piece of chart paper. Curriculum Expectations/Demonstration/Marking scheme: Assess students’ understanding of mental math strategies involved in addition and subtraction of decimals	
Consolidate Debrief	Whole Class → Presentation/Discussion/Sharing Strategies Teacher leads a discussion about the solutions to questions 1-3. Even though students may have the same final answers, their strategies may be quite different and these variations can be highlighted. Post chart papers showing solutions to question #4 on the blackboard. Have groups present their answers and have students share their mental math strategies. Encourage the class to question their peers to help them deepen their understanding of each other’s strategies. Practise some of the key mental math strategies that were used through a few new questions such as: How much would it cost for a package of bubble gum and a container of white milk? (Solve this using the idea of distributive property).	
<i>Application Concept Practice Differentiated</i>	Home Activity or Further Classroom Consolidation Have students take an advertisement from a local grocery store flyer and buy 3 different items for as close to \$10 as possible. Explain the mental math strategy that they used.	

7.13.1: Mental Math and Decimals

Grade 7

Names: _____

Date: _____

You are going to the corner store. The following items can be purchased:
(Remember you are not allowed to use a calculator and the strategies you use must be doable without a pencil)

Small bag of chips	\$1.29
Chocolate Bar	\$0.89
Package of Liquorice	\$3.43
Package of Bubble Gum	\$1.48

Chocolate Milk (500 mL)	\$1.15
White Milk (500 mL)	\$1.15
Bottle of Pop	\$1.49
Bottle of Water	\$2.41

Giant Freezie	\$0.87
Popsicle	\$0.50
Slushie	\$3.27

1. a) How much would it cost to buy a chocolate bar and a bottle of water? Show the mental math strategy you used.

b) How much change would you receive from a \$5.00 bill?

2. If you and your friends wanted to buy 3 chocolate milks, 3 bags of chips and a package of liquorice. If you had a \$10.00 bill, would you have enough money?

3. a) How much would it cost to buy a Slushie, a freezie and a package of gum? Show the mental math strategy that you used.
- b) You had a toonie, three loonies, 5 quarters, 8 dimes and 10 nickels. How much change would you receive from your purchase?
4. You have \$8.00 to spend. What would you buy? What is the total cost? How much change did you receive? (Whatever money you don't spend goes back to your parents so be sure to spend as close to \$8 as you can)
5. You have \$4.00, how many freezies can you buy? (Show a division equation in your answer).
6. You have \$10.00. Jasdeep thinks you can buy 7 bottles of pop. Is she right? Explain your thinking.

7.13.1: Mental Math and Decimals Solutions

Grade 7

Name: _____

Date: _____

You are going to the corner store. The following items can be purchased:
(Remember you are not allowed to use a calculator and the strategies you use must be able to have been done without a pencil)

Small bag of chips \$1.29
Chocolate Bar \$0.89
Package of Liquorice \$3.43
Package of Bubble Gum \$1.48

Chocolate Milk (500 mL) \$1.15
White Milk (500 mL) \$1.15
Bottle of Pop \$1.49
Bottle of Water \$2.41

Giant Freezie \$0.87
Popsicle \$0.50
Slushie \$3.27

1. a) How much would it cost to buy a chocolate bar and a bottle of water? Show the mental math strategy you used.

$$\mathbf{\$0.89 + \$2.41 = \$3.30}$$

(Students will use various strategies – we will provide a few examples but many others will arise)

$$\mathbf{\$1 - .11 + 2.41 = 3.41 - .11 = 3.30}$$

$$\mathbf{\$.90 - .01 + 2.41 = 3.31 - .01 = 3.30}$$

$$\mathbf{\$.90 + \$2.40 = \$3.30}$$

**Strategies: Number line
Money - change**

- b) How much change would you receive from a \$5.00 bill?

$$\mathbf{\$5 - \$3.30 = \$1.70}$$

Many strategies should be explored

2. If you and your friends wanted to buy 3 chocolate milks, 3 bags of chips and a package of liquorice. If you had a \$10.00 bill, would you have enough money?

$$\mathbf{3\ Chocolate\ Milks:\quad \$1.15 + \$1.15 + \$1.15 = \$3 + .45 \quad = \$3.45}$$

$$\mathbf{3\ Chips:\quad \$1.29 + \$1.29 + \$1.29 = \$1.30 \times 3 - .01 \times 3 = \$3.90 - .03 \quad = \$3.87}$$

$$\mathbf{Liquorice:\quad \$3.43 \quad = \$3.43}$$

$$\mathbf{\underline{\underline{\$10.75}}}$$

By inspection – you can see that with \$.87 and \$9, as well as \$.45 and \$.43 it is easily more than \$10.

7.13.1: Mental Math and Decimals Solutions Continued

Grade 7

3. a) How much would it cost to buy a Slushie, a freezie and a package of gum? Show the mental math strategy that you used.

Slushie	\$3.27	\$3 and \$1 = \$4	.48 and .27 = .75	and .87
Freezie	\$0.87	Many strategies should be explored		
Gum	<u>\$1.48</u>			
	\$5.62			

- b) You had a toonie, three loonies, 5 quarters, 8 dimes and 10 nickels. How much change would you receive from your purchase?

$$\$2 + \$3 + \$1.25 + \$0.80 + \$0.50 = \$6 + \$0.25 + \$1.30 = \$7.55$$

$$\$7.55 - \$5.62 = \text{almost } \$2 = \$2 - .07 = \$1.93$$

4. You have \$8.00 to spend. What would you buy? What is the total cost? How much change did you receive? (Whatever money you don't spend goes back to your parents so be sure to spend as close to \$8 as you can)

Answers will vary and mental math strategies should be explored in discussion!

5. You have \$4.00, how many freezies can you buy? (Show a division equation in your answer).

$$\$4 \div .50 = 8$$


6. You have \$10.00. Jasdeep thinks you can buy 7 bottles of pop. Is she right? Explain your thinking.

$$\$10 \div \$1.49 = ? \quad \$1.50 + 1.50 + 1.50 + 1.50 + 1.50 + 1.50 + 1.50 = \$10.50 - .07 = \$10.43$$

OR $\$10 \div \$1.50 = 7$ would be \$10.50 so not enough

$$\$10 \div \$1.50 = 6 \text{ would get you } \$1 \text{ left over}$$

Jasdeep was wrong – she doesn't quite have enough!

Unit 7: Day 14: Multiplying Decimals		Grade 7
	<p>Math Learning Goals</p> <ul style="list-style-type: none"> • Multiply decimal numbers to thousandths by one-digit whole numbers, using concrete materials, calculators, estimation, and algorithms • Solve problems involving the multiplication of decimal numbers 	<p>Materials</p> <ul style="list-style-type: none"> • BLM 7.14.1 • BLM 7.14.2 • BLM 7.14.3 • Bingo chips
Assessment (A) and DI (D) Opportunities		
Minds On...	<p>Whole Class → Discussion</p> <p>Pose this problem: <i>There were 3 mini-watermelons that weighed 2.132 kilograms each. How much was the total weight?</i></p> <p>As a class discuss an estimation for the following question: $2.132 \times 3 =$ (The answer will be more than 6 because $2 \times 3 = 6$)</p> <p>Students complete the following questions:</p> <p>$21 \times 3 = (63)$ $2.1 \times 3 = (6.3)$</p> <p>$213 \times 3 = (639)$ $2.13 \times 3 = (6.39)$</p> <p>$2132 \times 3 = (6396)$ $2.132 \times 3 = (6.396)$</p> <p>Students will check their answers with a calculator. Ask the following questions:</p> <ul style="list-style-type: none"> • What patterns do you notice? <i>The answers are the same without the decimal but the placement of the decimal is determined by looking at the question and figuring out where the decimal goes in the answer.</i> • What happens when you add $2.132 + 2.132 + 2.132 = ?$ • Can you represent 2.132×3 in a different way? (Distributive Property) $(2 \times 3) + (0.1 \times 3) + (0.03 \times 3) + (0.002 \times 3) =$ <p>Do another question with the class: $3175 \times 4 = (12700)$ or Can you have an answer of 127? $3.175 \times 4 = 12.700$ or 12.7</p> <p>Discuss the placement of the zeroes in the question without a decimal and with a decimal.</p>	<p>Encourage students to reason out the answer and placement of the decimal, rather than the need to count the decimal places when multiplying decimals.</p> <p>■ Using base-ten blocks and grids helps visual and tactile learners. Blackline masters for base-ten grids can found on eworkshop under printable documents.</p> <p>■ Use Gizmo: Multiplying with Decimals</p> <p>■ Students need to make sure that they have four answers for each column in the Math Bingo Game, therefore they only need to complete four questions. (Calculators may be used by students if needed.)</p> <p>For an expansion of the Distributive Model using area, see these two Gizmos from www.explorelarning.com: Multiplying with Decimals and Multiplying Decimals (Area Model). Watch the Demo movie for the latter Gizmo to see an excellent explanation of the model in action.</p>
Action!	<p>Individual and Whole Class → Math Bingo Game</p> <p>Students complete the questions on BLM 7.14.2 prior to playing the Math Bingo Game. They must also fill out their chart.</p> <p>Teacher plays Math Bingo Game with students.</p> <p>Curriculum Expectations/Observations/Anecdotal Notes: Assess students' ability to multiply decimals by whole numbers.</p>	<p>Identify ahead of time students who have interesting strategies to share with the class.</p>
Consolidate Debrief	<p>Whole Class → Sharing</p> <p>Have students come up with real-life examples of multiplication of decimals by whole numbers (money, gas, weight, distance, time, etc.). Identify any misconceptions (the placement of the decimal in the answer and the relationship to the question) that were observed when multiplying decimals by whole numbers and effective strategies that were used by students to find solutions.</p>	<p>Identify ahead of time students who have interesting strategies to share with the class.</p>
<i>Application Concept Practice</i>	<p>Home Activity or Further Classroom Consolidation</p> <p>Complete problems on BLM 7.14.3 that reinforce the multiplication of decimals.</p>	<p>If used for classroom consolidation, BLM 7.14.4 could be completed in pairs.</p>

7.14.1 Multiplying Decimals Overhead Transparency Grade 7

$21 \times 3 = \underline{\hspace{2cm}}$

$2.1 \times 3 = \underline{\hspace{2cm}}$

$213 \times 3 = \underline{\hspace{2cm}}$

$2.13 \times 3 = \underline{\hspace{2cm}}$

$2132 \times 3 = \underline{\hspace{2cm}}$

$2.132 \times 3 = \underline{\hspace{2cm}}$

Represent 2.132×3 as a sum:

Use the Distributive Property to represent this sum another way:

7.14.2: Multiplying Decimals

Grade 7

Name: _____

Date: _____

Complete the questions below. Place any 16 of the answers in the MATH Chart at the bottom for a quick game your teacher will lead when you are done. Your answers should be placed in the appropriate columns M (0-1), A (1-10), T (11-20), H (20+)

$$\begin{array}{r} 3.42 \times 2 = \\ 34.2 \times 2 = \\ 0.342 \times 2 = \end{array}$$

$$\begin{array}{r} 72 \\ \times 0.25 \end{array}$$

$$\begin{array}{r} 55 \\ \times 0.25 \end{array}$$

$$\begin{array}{r} 1.75 \times 5 = \\ .175 \times 5 = \end{array}$$

$$\begin{array}{r} 0.125 \\ \times 99 \end{array}$$

$$\begin{array}{r} 0.125 \\ \times 88 \end{array}$$

$$\begin{array}{r} 8 \times 1.23 = \\ 8 \times .123 = \end{array}$$

$$\begin{array}{r} 1 \times .333 = \\ 3 \times .333 = \\ 4 \times .333 = \end{array}$$

$$\begin{array}{r} 8.58 \\ \times 42 \end{array}$$

$$\begin{array}{r} 8.58 \\ \times 37 \end{array}$$

$$7 \times 2.25 =$$

$$\begin{array}{r} 2.651 \\ \times 3 \end{array}$$

$$\begin{array}{r} 2.651 \\ \times 23 \end{array}$$

$$\begin{array}{r} 2.651 \\ \times 78 \end{array}$$

M (0-1)	A (1-10)	T (11-20)	H (20+)

7.14.2: Multiplying Decimals (Teacher Copy)

Grade 7

Name: _____

Date: _____

When students have completed their work, read out questions from the worksheet below randomly (ensuring to choose questions with answers in each category). Students will circle their answers in their MATH Chart (if they got the right answer and placed it in their chart). The first student to get MATH in a row wins! Continue to correct the rest of the worksheet when finished the game.

$3.42 \times 2 = \mathbf{6.84 A}$

72

55

$34.2 \times 2 = \mathbf{68.4 H}$

$\begin{array}{r} 72 \\ \times 25 \\ \hline \end{array}$

$\begin{array}{r} 55 \\ \times 25 \\ \hline \end{array}$

$.342 \times 2 = \mathbf{.684 M}$

$\mathbf{18.00 T}$

$\mathbf{13.75 T}$

$1.75 \times 5 = \mathbf{8.75 A}$

$.175 \times 5 = \mathbf{.875 M}$

$\begin{array}{r} .125 \\ \times 99 \\ \hline \end{array}$

$\begin{array}{r} .125 \\ \times 88 \\ \hline \end{array}$

$8 \times 1.23 = \mathbf{.984 M}$

$8 \times .123 = \mathbf{9.84 A}$

$\mathbf{12.375 T}$

$\mathbf{11.000 T}$

$1 \times .333 = \mathbf{.333 M}$

$3 \times .333 = \mathbf{.999 M}$

$4 \times .333 = \mathbf{1.332 A}$

$\begin{array}{r} 8.58 \\ \times 42 \\ \hline \end{array}$

$\begin{array}{r} 8.58 \\ \times 37 \\ \hline \end{array}$

$7 \times 2.25 = \mathbf{15.75 T}$

$\mathbf{360.36 H}$

$\mathbf{317.46 H}$

$\begin{array}{r} 2.651 \\ \times 3 \\ \hline \end{array}$

$\mathbf{7.953 A}$

$\begin{array}{r} 2.651 \\ \times 23 \\ \hline \end{array}$

$\mathbf{60.973 H}$

$\begin{array}{r} 2.651 \\ \times 78 \\ \hline \end{array}$

$\mathbf{206.778 H}$

M (0-1)	A (1-10)	T (11-20)	H (20+)

Any of:

.684

6.84

15.75

68.4

.875

8.75

18.00

360.36

.984

9.84

13.75

317.46

.333

1.332

12.375

60.973

.999

7.953

11.000

206.778

7.14.3 Multiplying Decimals

Grade 7

Name: _____

Date: _____

1. Manuel went to the store to buy three pairs of jeans that cost \$ 29.89 per pair. What is the total cost of the purchase?

2. Ishmael's dad had to purchase gas for his car 5 times in one month. Gas costs 97.7 cents per litre and he purchased 65 L each time. How much would gas cost him for the one month?

3. Lisa lives 1.357 km from school and walks everyday.
How many kilometres does she walk in a week? (HINT: She also has to walk home.)

4. Chicken costs \$8.80 a kilogram. The recipe you are making for a party requires you to buy 6 kilograms of chicken. How much will the chicken cost you?

7.14.3 Multiplying Decimals Solutions

Grade 7

Name: _____

Date: _____

1. Manuel went to the store to buy three pairs of jeans. The jeans cost \$29.89, how much was the cost of the jeans?

$$\mathbf{\$29.89 \times 3 = \$89.67}$$

2. Ishmael's dad had to fill up his car 5 times in one month. Gas costs 97.7 cents per litre. If his car requires 65 L, how much would gas cost him for the one month?

$$\mathbf{97.7 \times 65 = 6350.5 \text{ cents}}$$

$$\mathbf{6350.5 \times 5 = 31752.5 \text{ cents}}$$

How many dollars is this? \$317.525 rounded to \$317.53

OR $\$0.977 \times 65 = \63.505

$$\mathbf{\$63.505 \times 5 = \$317.525 \text{ rounded to } \$317.53}$$

3. Lisa walks 1.357 km to school everyday. How many kilometres does she walk in a week? (HINT: She also has to walk home.)



$$\mathbf{1.357 \text{ km} \times 2 = 2.714 \text{ km}}$$

$$\mathbf{2.714 \text{ km} \times 5 \text{ (number of days in a normal school week)} = 13.57 \text{ km}}$$

OR $1.357 \text{ km} \times 10 = 13.57 \text{ km}$

4. Chicken costs \$8.80 a kilogram. The recipe you are making for a party requires you to buy 6 kilograms of chicken. How much will the chicken cost you?

$$\mathbf{\$8.80 \times 6 = \$52.80}$$

Unit 7: Day 15: Dividing Decimals		Grade 7
	<p>Math Learning Goals</p> <ul style="list-style-type: none"> Divide whole numbers by decimals to hundredths, using concrete materials, e.g. base-ten materials to divide 4 by 0.8 Divide decimal numbers to thousandths by one-digit whole numbers, using concrete materials, estimation, and algorithms, e.g., estimate $16.75 \div 3$ as $18 \div 3 \approx 6$, then calculate, predicting an answer slightly less than 6 Solve everyday problems involving division with decimals. 	<p>Materials</p> <ul style="list-style-type: none"> Hundredths Grids Play money Fraction strips BLM 7.15.1 BLM 7.15.2
Assessment (A) and DI (D) Opportunities		
Minds On...	<p>Whole Class→ Discussion</p> <p>Using hundredths grids or fraction strips have students complete the following: $4 \div 2 =$ (Answer: 2); $4 \div 0.2 =$ (Answer: 20); $4 \div 0.25 =$ (Answer: 16)</p> <ul style="list-style-type: none"> What did you notice about your solution when you divided a whole number by a whole number and a whole number by a decimal? (<i>The answer gets larger when dividing by decimals rather than a whole.</i>) Why did the answer get smaller when dividing by 0.25 compared to 0.2? <p>Use the fraction strips or hundreds chart to create two questions that show a whole number being divided by a decimal number and explain your thinking. (e.g. $3 \div 0.5$ or $4 \div 0.8$)</p> <p>Instead of dividing a whole by a decimal number, students will now solve a problem that involves dividing a decimal number by a whole number.</p> <p>$15 \div 3 = 5$ $1.5 \div 3 = 0.5$ $0.15 \div 3 = 0.05$ $0.015 \div 3 = 0.005$</p> <p>Use a drawing or number line to represent the solutions. Discuss with students the placement of the decimal in the answer and the size of the answer. Ask students if their answer seems reasonable.</p>	<p>Identify with the students that the whole is the one hundredths grid, or show them what the whole is with fraction strips.</p> <p> Students may need to use play money.</p>
Action!	<p>Pairs→ Problem Solving</p> <p>Pose the following question to students: <i>You and your two friends did some work around the house for your family. They emptied their penny jar and gave you and your friends \$22.86 to share evenly. How much did each of you make?</i></p> <p>Students are not allowed to use a calculator. Students in pairs solve the question on chart paper or on BLM 7.15.1. Encourage students to use manipulatives and different strategies to solve the problem.</p> <p>Scaffolding: Why can't the answer be \$8 or more? What if it was only you and ONE friend?</p> <p>Communicating/Observation/Anecdotal Note: Assess students' ability to communicate their thinking using correct mathematical language.</p>	<p>Math Congress is a format that allows for the sharing and discussing of various student solutions. During the congress various strategies and big ideas are highlighted.</p>
Consolidate Debrief	<p>Choose different students to share their answer (math congress), making sure that the answers displayed show different strategies.</p> <p>Identify the key ideas and different strategies that were used.</p>	
<i>Application Concept Practice Skill Drill</i>	<p>Home Activity or Further Classroom Consolidation</p> <p>Students will complete BLM 7.15.2.</p> <p>Discuss with students the answer to question 5 because the concepts of estimation and repeating decimals are encountered with these questions.</p>	<p>The concept of rounding repeating decimals needs to be discussed.</p>

7.15.1: Dividing Decimals

Grade 7

Name: _____

Date: _____

You and your two friends did some work around the house for your family. They emptied their penny jar and gave you and your friends \$22.86 to share evenly. How much did each of you make?

A. Estimate your answer and explain your reasoning.

B. Solve and show your thinking.

7.15.1: Dividing Decimals: Answers and Discussion Sheet

Grade 7

Name: _____

Date: _____

You and your two friends did some work around the house for your family. They emptied their penny jar and gave you and your friends \$21.86 to share evenly. How much did each of you make?

A. Estimate your answer and explain your reasoning.

As a class discuss an estimation for the following question:

$$21 \div 3 = 7$$

Talk about using “friendly numbers” - the closest number that can be divisible by 3 that is closest to \$22.86 is \$21.00 without going over the original amount. Each person will receive more than \$7. (Each person would not receive \$8.00 because $8 \times 3 = \$24.00$)

B. Solve and show your thinking.

Possible student solutions:

A. $\$22.86 \div 3 =$

$$22 \div 3 = 7 \text{ remainder } 1 \rightarrow 1.86 \div 3 = 0.62$$

\$7.62

B. Some students will have use the standard algorithm.

C. Some students might use a number line.

D. Some students are going to draw money or use play money if available. (DI)

7.15.2: Division with Decimals

Grade 7

Name: _____

Date: _____

Represent the following questions using diagrams.

1) $2 \div 0.5 =$

2) $5 \div 0.25 =$

3) $0.75 \div 3 =$

Solve the following problems.

- 4) You made \$90 at work in a week. Your hourly wage is \$7.50. How many hours did you work that week?

- 5) a) You bought \$8 worth of gas for your lawnmower. The cost of the gas was \$0.925 per litre. **Estimate** how many litres of gas you bought. Explain your thinking. Is your estimate higher or lower than you believe the final answer should be?



- b) Exactly how much did you buy (correct to thousandth decimal place)?

- 6) You and 3 friends bought 2.36 kg of candy. You need to share the candy equally. How much candy does each person get?



7.15.2: Division with Decimals Solutions

Grade 7

Name:

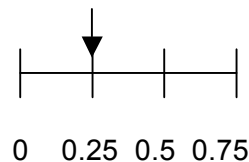
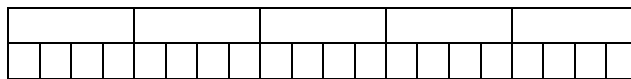
Date:

Represent the following questions using diagrams.

1) $2 \div 0.5 = 4$

2) $5 \div 0.25 = 20$

3) $0.75 \div 3 = 0.25$



Solve the following problems.

- 4) You made \$90 at work in a week. Your hourly wage is \$7.50. How many hours did you work that week?

$\$90 \text{ per hour} \div \$7.50 = 12 \text{ hours}$

- 5) a) You bought \$8 worth of gas for your lawnmower. The cost of the gas was \$0.925 per litre. **Estimate** how many litres of gas you bought. Explain your thinking. Is your estimate higher or lower than you believe the final answer to be?

$\$8 \div \$1 \text{ per litre} = 8 \text{ litres}$

Our estimate will be slightly too low because we divided by a whole dollar but the cost was less than a dollar.

OR **$\$8 \div \$0.90 \text{ per litre} = \text{almost } 9 \text{ litres}$**

Our estimate will be slightly too high because we divided by less than the cost of the gas.

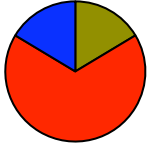
- b) Exactly how much did you buy (correct to thousandth decimal place)?

$\$8 \div \$0.925 \text{ per litre} = 8.648648648 \text{ litres}$
rounded to 8.649 litres

- 6) You and 3 friends bought 2.36 kg of candy. You need to share the candy equally. How much candy does each person get?

$2.36 \text{ kg} \div 4 = 0.59$

OR **$2 \div 4 = 0.5 \text{ and } .36 \div 4 = 0.09 \text{ so } 2.36 \div 4 = 0.50 + 0.09 = 0.59$**

Day 16: Solving Multi-Step Problems Involving Decimals		Grade 7				
	<p>Math Learning Goals</p> <ul style="list-style-type: none"> Solve multi-step problems involving whole numbers and decimals. Justify solutions using concrete materials, calculators, estimation, and algorithms. Use estimation when solving problems involving decimals to judge the reasonableness of a solution, e.g. A book costs \$18.49. The salesperson tells you that the total price, including taxes, is \$22.37. How can you tell if the total price is reasonable without using a calculator? 	<p>Materials</p> <ul style="list-style-type: none"> Calculators Various concrete materials to represent fractions and decimals BLM 7.16.1 BLM 7.16.2 				
Assessment (A) and DI (D) Opportunities						
Minds On...	<p>Whole Class → Small Group → Review Operations with Decimals</p> <p>Give each small group the following organizer:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;"><u>Addition with Decimals</u></td> <td style="padding: 5px;"><u>Subtraction with Decimals</u></td> </tr> <tr> <td style="padding: 5px;"><u>Multiplication with Decimals</u></td> <td style="padding: 5px;"><u>Division with Decimals</u></td> </tr> </table> <p>Groups then work together to fill in each section with important ideas, reminders and strategies when solving problems involving the particular operations and decimals. Each section must have at least one sample problem and solution.</p> <p>Time permitting – have groups conduct a gallery walk to see what other groups have written and then return to their original placemat and record/discuss their observations from other group’s organizer. Discuss as a class any “aha” moments.</p>	<u>Addition with Decimals</u>	<u>Subtraction with Decimals</u>	<u>Multiplication with Decimals</u>	<u>Division with Decimals</u>	<p>■ Students may need to use a calculator.</p>
<u>Addition with Decimals</u>	<u>Subtraction with Decimals</u>					
<u>Multiplication with Decimals</u>	<u>Division with Decimals</u>					
Action!	<p>Small Group → Whole Group → Problem Solving</p> <p>In small homogeneous groups, students complete BLM 7.16.1. Encourage students to use manipulatives and different strategies to solve the problems. Students are to put their solutions for question number 4 on a piece of chart paper.</p> <p>Choose different students to share their answer (math congress), making sure that the answers displayed show different strategies.</p> <p><i>Curriculum Expectations/Observations/Checklist: Assess students’ ability to solve multi-step problems involving whole numbers and decimals.</i></p>	<p>Math Congress is a format that allows for the sharing and discussing of various student solutions. During the congress various strategies and big ideas are highlighted.</p>				
Consolidate Debrief	<p>Whole Group → Group Discussion</p> <p>Discuss the student solutions, identifying big ideas involving the operations of decimals (estimation, arithmetic properties, thinking of decimals as parts).</p>					
<i>Differentiated Reflection</i>	<p>Home Activity or Further Classroom Consolidation</p> <p>Students can fill out an exit card that identifies questions they still have about the operation of decimals and anything they found interesting or an “aha” moment that they encountered when adding, subtracting, multiplying and dividing decimals. See sample on BLM 7.16.2.</p>	<p>An online game that requires students to multiply and divide decimals is “Midnight at the Super Big”.</p> <p>http://www.learningave.com/lwonline/decimal13/midnight_worki ng/midnight.html</p>				

7.16.1: Solving Multi-Step Problems Involving Decimals Grade 7

Continued

4. The stores are offering different discounts. Please figure out the best deal to buy one pair of jeans and 2 shirts from the same store.

Store A (10% off)

Store B (Buy one jeans, get one shirt at 50% off)

Store C (25% off jeans)

- a) Spend a few minutes discussing which you think will be the best deal.
- b) Determine the exact answer.

Store A

Store B

Store C

7.16.1: Solving Multi-Step Problems Involving Decimals (Teacher Answers)

Grade 7

Name: _____

Date: _____

Riley and Caileigh go shopping at a mall. They are each planning on buying 1 pair of jeans and 2 shirts. They each brought \$100. (No taxes on their purchases.)

<u>Store A</u>	<u>Store B</u>	<u>Store C</u>
Jeans A \$39.97	Jeans B \$44.99	Jeans C \$49.96
2 Shirts A for \$44.48	Shirt B \$22.48	Shirt C \$20.46

1. At what store should Riley and Caileigh shop to spend the least amount of money?

<u>Store A</u>	<u>Store B</u>	<u>Store C</u>
$\$39.97 + 44.48 = \84.45	$\$44.99 + 22.48 + 22.48 = \89.95	$\$49.96 + 20.46 + 20.46 = \90.88

2. Riley really likes the Jeans from Store C, a shirt from Store A and another shirt from Store B. Does she have enough money to buy these clothes? If so, how much money would she get back?

Jeans C	\$49.96	Cost:	$49.96 + 22.48 + 22.48 = \\94.68
Shirt A	$\\$44.48 \div 2 = \\22.24	Yes, she has enough money to buy them.	
Shirt B	\$22.48	Change:	$100 - 94.68 = \\$5.32$

3. Caileigh really wants to get 2 pairs of jeans and 1 shirt. Is it possible for her to do this if she shops at different stores? Explain.

Cheapest jeans are from Store A: $\$39.97 \times 2 = \79.94
Cheapest shirt is from Store C: \$20.46

$$79.94 + 20.46 = \$100.40$$

Caileigh does not have enough money to do this – she is short \$0.40.

4. The stores are offering different discounts. Please figure out the best deal to buy one pair of jeans and 2 shirts from the same store.

Store A (10% off)
 Store B (Buy one jeans, get one shirt at 50% off)
 Store C (25% off jeans)

- a) Estimate: **Answers will vary – discussion/reasoning in groups is important**
Many students will presume that Store B will have the best deal because it has 50% off.
Other students will estimate that Store A will have the best deal because Store A was the cheapest from question 1.
Other students will estimate that Store C will have the best deal because jeans are the most expensive.

b) Actual:

<u>Store A</u>	<u>Store B</u>	<u>Store C</u>
Cost at store A (from 1)	One shirt is 50% off	Jeans 25% off
\$84.46	$\\$22.48 \div 2 = \\11.24	$\\$49.96 \div 4 = \\12.49
10% off is \$8.45		Jeans cost:
$(84.46 \times .10)$		$\\$49.96 - 12.49$
		= \$37.47
Cost:	Cost:	Cost:
$84.46 - 8.45$	$44.99 + 11.24 + 22.48$	$37.47 + 20.46 + 20.46$
= \$76.01	= \$78.71	= \$78.39

7.16.2: Solving Multi-Step Problems Involving Decimals

Grade 7

EXIT CARD

NAME: _____ DATE: _____

1. Rate your confidence (1-5) when doing the following operations with decimals.
(1 is not confident and 5 is very confident)

Adding

Subtracting

Multiplying

Dividing

2. What questions do you still have about operations with decimals?

3. What did you learn about doing operations with decimals or what was an “aha” moment for you?

EXIT CARD

NAME: _____ DATE: _____

1. Rate your confidence (1-5) when doing the following operations with decimals.
(1 is not confident and 5 is very confident)

Adding


Subtracting

Multiplying

Dividing

2. What questions do you still have about operations with decimals?

3. What did you learn about doing operations with decimals or what was an “aha” moment for you?

Unit 7: Day 17: Summative Assessment of Decimals		Grade 7
	Math Learning Goals <ul style="list-style-type: none"> Demonstrate an understanding of decimals and operations with decimals 	Materials <ul style="list-style-type: none"> BLM 7.17.1 Calculators
Assessment (A) and DI (D) Opportunities		
Minds On...	Whole Class → Review and Discussion Ask the class to bring out their exit cards from the previous day and discuss answers. Or, if the students did not complete exit cards, ask and discuss the following questions: <ul style="list-style-type: none"> Are there any questions about the operation of decimals? Are there any ideas they found interesting or an “aha” moment that they encountered when adding, subtracting, multiplying and dividing decimals? Are there any big ideas or strategies to remember when working with decimals? 	<div style="background-color: black; width: 15px; height: 15px; display: inline-block; margin-bottom: 5px;"></div> Students may use calculators or work in pairs See online resource list for suggested online games and tools to support previous concepts. <div style="background-color: black; width: 15px; height: 15px; display: inline-block; margin-bottom: 5px;"></div> Have students work in groups for a few minutes to discuss their initial thoughts / strategies about the problems (but they are not allowed to write anything on their paper).
Action!	Individual → Summative Assessment Piece Students independently will complete BLM 7.17.1. <i>Curriculum Expectations/Quiz/Marking Scheme: Assess students’ ability to solve problems involving operations with decimals, using a variety of tools.</i>	
Consolidate Debrief	Whole Class → Discussion Collect papers and identify solutions that show different strategies. Ask students if there were any questions that they had difficulty with. Ask students to discuss and display the different ways that they solved the identified problem(s).	
<i>Reflection</i>	Follow up activity Identify a variety of solutions that effectively displayed the ability to clearly communicate a solution. Discuss the attributes that made the solution a clear example of effective communication.	Assessment as Learning opportunity as students reflect on their learning.

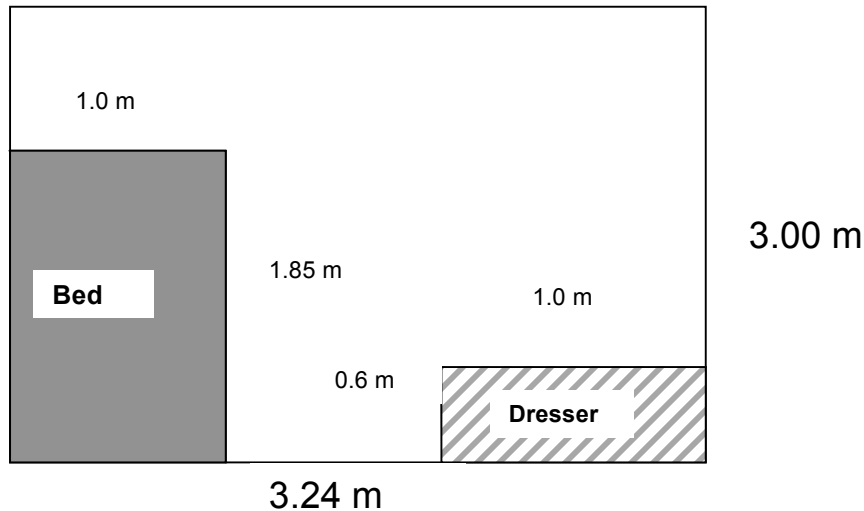
7.17.1: Summative Assessment

Grade 7

Name: _____

Date: _____

Below is a diagram of your new bedroom. (Note: The diagram is not exactly to scale.)



- a) You are going to get flooring for your new room. You need to know the area of the floor in order to determine how much it will cost to buy hardwood floors. What is the area of the room?
 - b) The total cost for the hardwood floor was \$425.00. How much did it cost per square metre?
- a) You are also putting baseboards around the room. Baseboards come in pieces that are 1.5 m long. How many pieces will you need?
 - b) The cost of baseboards is \$8.97 per piece from part a. Estimate, using whole numbers, how much it will cost you to put baseboards in your room. Make a second more accurate estimation that includes a decimal. Explain your thinking.

3. a) A cousin is coming to live with you and you need to share your room with him/her. You have been told that you have to give your cousin half of the room. How much floor space will your cousin get?

b) Your cousin is bringing a bed and a desk that are the same size as yours. How much floor space will be left in the room after your cousin moves in?

c) Your parents are bugging you to practice your math. They ask you if you can figure out about what fraction of the room is covered? Explain your thinking to them.

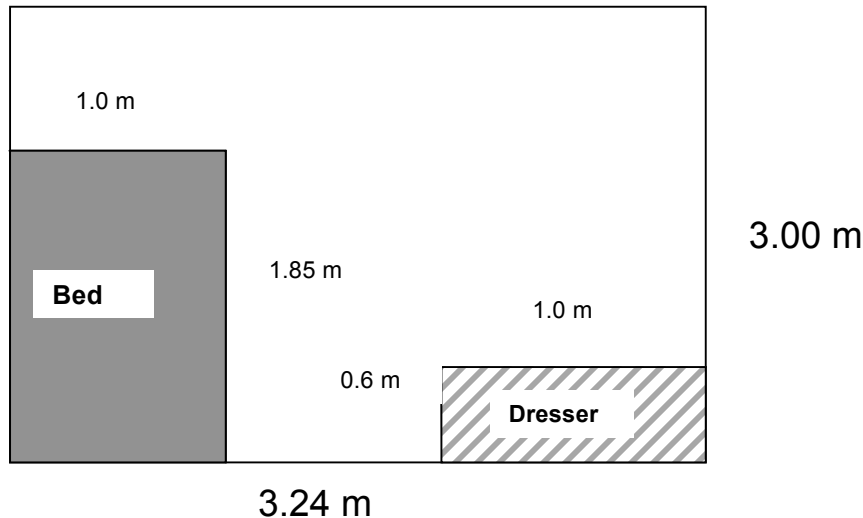
7.17.1 Summative Assessment Solutions

Grade 7

Name: _____

Date: _____

Below is a diagram of your new bedroom. (Note: The diagram is not exactly to scale)



1. a) You are going to get flooring for your new room. You need to know the area of the floor in order to determine how much it will cost to buy hardwood floors. What is the area of the room?

$$\begin{aligned}\text{Area} &= l \times w \\ &= 3.24 \text{ m} \times 3 \text{ m} \\ &= 9.72 \text{ m}^2\end{aligned}$$

- b) The total cost for the hardwood floor was \$425.00. How much did it cost per square metre?

$$\begin{aligned}\text{Solution: } & \$425 \div 9.72 \text{ m}^2 \\ & = \$ 43.7242798 \\ & \text{Rounded to } 43.72\end{aligned}$$

$$\text{Final Answer: } \quad \$43.72 \text{ per m}^2$$

2. a) You are also putting baseboards around the room. Baseboards come in pieces that are 1.5 m long. How many pieces will you need?

$$\begin{aligned}\text{Perimeter of the room} &= 3 + 3 + 3.24 + 3.24 \\ &= 12.48 \text{ m}\end{aligned}$$

One solution:

$$1.5 \times 8 \text{ pieces} = 12\text{m}$$

$$1.5 \times 9 \text{ pieces} = 13.5\text{m}$$

(9)

Another solution:

$$3.0 \text{ m side} \rightarrow 2 \text{ pieces } (3 \div 1.5 = 2)$$

$$3.24 \text{ m side} \rightarrow 2 \text{ and a bit pieces} \quad \text{Total of } 8+ \text{ pieces}$$

OR $12.48 \div 1.5 = 8.32$ (not an expected solution for grades 7)

So, you need 9 pieces.

b) The cost of baseboards is \$8.47 per piece from part a. Estimate how much it will cost you to put baseboards in your room. Make a second more accurate estimation that includes a decimal. Explain your thinking.

Possible Answers

Estimate 1: $\$10 \times 9 \text{ pieces} = \90

OR $\$9 \times 9 \text{ pieces} = \81

Estimate including a decimal: $\$8.5 \times 9 \text{ pieces} = \76.50

3. a) A cousin is coming to live with you and you need to share your room with them. You have been told that you have to give your cousin half of the room. How much floor space will they get?

Possible Solutions

Solution 1: $\text{Area} \div 2 = 9.72 \div 2 = 4.86 \text{ m}^2$

Solution 2: $\text{length} \div 2 \times \text{width} = 3.24 \div 2 \times 3 = 1.62 \times 3 = 4.86 \text{ m}^2$

Solution 3: $\text{length} \times \text{width} \div 2 = 3.24 \times 3 \div 2 = 3.24 \times 1.5 = 4.86 \text{ m}^2$

b) Your cousin is bringing a bed and a desk that are the same size as yours. How much floor space will be left in the room after your cousin moves in?

Solution: $\text{Area of desks} = 1.85 \times 1 \times 2 = 3.7 \text{ m}^2$
 $\text{Area of dressers} = 0.6 \times 1 \times 2 = 1.2 \text{ m}^2$

Answer: $\text{Area of Room} - \text{Area of Desks} - \text{Area of Dressers}$
 $= 9.72 - 3.7 - 1.2$
 $= 4.82 \text{ m}^2$

c) Your parents are bugging you to practice your math. They ask you if you can figure out about what fraction of the room is covered? Explain your thinking to them.

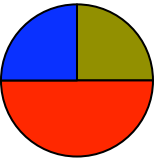
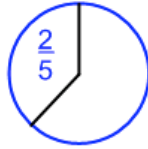
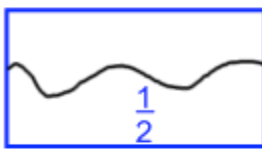
4.82 m² is covered

9.72 m² is the total area

4.82 is very close to 5

9.72 is very close to 10

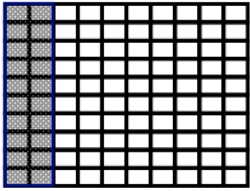
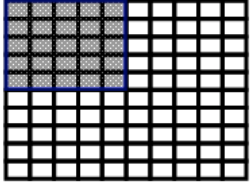
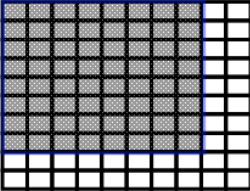
5 is half of 10. Therefore, $\frac{1}{2}$ of the room is covered with furniture.

Unit 7: Day 18: Percent		Grade 7
	<p>Math Learning Goals</p> <ul style="list-style-type: none"> Investigate and represent the relationships among fractions, decimals, and percents Identify common uses of percents, fractions and decimals Estimate percents visually, e.g., shade 60% of a rectangle, and mentally, e.g., 3 out of 11 hockey players missed practice means approximately 25% were absent 	<p>Materials</p> <ul style="list-style-type: none"> BLM 7.18.1 Van de Walle hundredths disk
Assessment (A) and DI (D) Opportunities		
<p>Minds On...</p>	<p>Small Group → Think Pair Share</p> <p>Students activate prior knowledge by discussing familiar uses of percents (e.g. discounts at stores, basketball statistics, 2% milk, etc.), fractions (e.g. baking) and decimals (e.g. batting averages, money).</p> <p>Whole Class → Discussion</p> <p>Teacher constructs a familiar shape (see samples below) and asks students what fraction each section represents. Students may use a variety of strategies but should recognize the relative fraction as part of the whole.</p> <p>Teacher prompts students: “If this shape was divided into 100 equal pieces, how many pieces would be shaded? (e.g. $\frac{2}{5}$ would be $\frac{40}{100}$; $\frac{1}{2}$ would be $\frac{50}{100}$) How would this be expressed as a fraction?”</p> <p>Teacher models relationship with Van de Walle hundredths disks. Make these disks available for student use as needed.</p> <p>Teacher discusses the meaning of “percent.” Teacher makes a connection between a fraction out of 100 and the equivalent decimal (e.g. $40\% = \frac{40}{100} = 0.4$). Students should make connection between place value of decimals and percent (e.g. $0.58 = 58$ hundredths → 58%).</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>	<p>Make connection to French: “per” = of; “cent” = 100. Percent means “out of 100” or “hundredth” and percent represents a fraction out of 100. (E.g. $\frac{40}{100} = 40\%$)</p> <p>See Teaching Student Centred Mathematics, Van de Walle page 108 or www.ablongman.com/van-dewalle-series</p> <p>Teacher can access Gizmos “Percents Fractions & Decimals” at www.explorelearning.com</p> <p>There is an attached assessment in this Gizmo that students can use to confirm their understanding</p>
<p>Action!</p>	<p>Individual or Pairs</p> <p>Complete BLM 7.18.1 or Gizmo “Percent, Fractions & Decimals”.</p> <p>Curriculum Expectations/Demonstration/Marking Scheme: assess students’ understanding of relationship between fractions, decimals and percent</p>	<div style="background-color: black; width: 20px; height: 20px; margin-bottom: 5px;"></div> <p>Consider photocopying BLM 7.18.2 (Teacher’s Answers) and having students cut and paste appropriate answers into template</p>
<p>Consolidate Debrief</p>	<p>Whole Class → Discussion</p> <p>Discuss answers to BLM 7.18.1, reinforcing the connection between fractions out of 100, decimals and percent.</p> <p>Students describe in their math journals the relationship between fractions, decimals and percent.</p>	
<p><i>Application</i></p>	<p>Home Activity or Further Classroom Consolidation</p> <p>Teacher gives the student a number and students judge which format (fraction, decimal or percent) is “best” to represent this statistic. Judging what representation is the best should involve students determining suitable criteria (i.e. $\frac{1}{10}$ on a test....the best representation would probably be 10%).</p>	

7.18.1: Fractions, Decimals & Percent

Grade 7

1. Use the shaded areas to complete the chart.

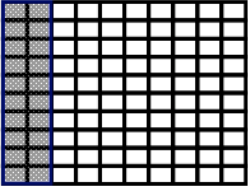
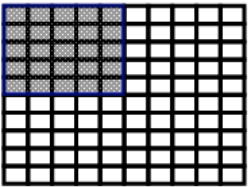
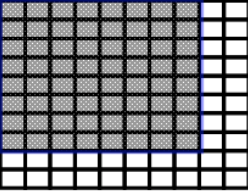
	Fraction out of 100	Decimal	Percent
			
			
			

2. Complete the following chart.

	Fraction out of 100	Decimal	Percent
$\frac{1}{4}$			
$\frac{4}{5}$			
$\frac{12}{50}$			

7.18.1: Fractions, Decimals & Percent Solutions Grade 7

1. Use the shaded areas to complete the chart.

	Fraction out of 100	Decimal	Percent
	$\frac{20}{100}$	0.2	20%
	$\frac{25}{100}$	0.25	25%
	$\frac{64}{100}$	0.64	64%

2. Complete the following chart

	Fraction out of 100	Decimal	Percent
$\frac{1}{4}$	$\frac{25}{100}$	0.25	25%
$\frac{4}{5}$	$\frac{80}{100}$	0.8	80%
$\frac{12}{50}$	$\frac{24}{100}$	0.24	24%

Unit 7: Day 19: Solving Percent Problems with Concrete Materials		Grade 7
	<p>Math Learning Goals</p> <ul style="list-style-type: none"> Solve problems that involve determining whole-number percents, using concrete materials, e.g., base-ten materials, 10 x 10 square. 	<p>Materials</p> <ul style="list-style-type: none"> BLM 7.19.1 BLM 7.19.2 BLM 7.19.3 Relational Rods 2 Colour Counters 30 cm Rulers Cube-a-links Newspapers
Assessment (A) and DI (D) Opportunities		
Minds On...	<p>Small Group → Investigation</p> <p>In small groups, students skim through newspapers for a few minutes and locate examples of each of the following: percents, fractions and decimals. Students record their examples on chart paper under the appropriate heading. Students then post and share their group’s media examples with the class. (Some examples may include: 30% chance of rain, 40% of the popular vote for an election, tax, sporting averages, product studies/improvements).</p> <p>After student groups have shared their examples with the class, the teacher asks:</p> <ul style="list-style-type: none"> Which representation is used most frequently? Which representation is the easiest to comprehend at a glance? <p>Students suggest possible reasons why a given number or statistic may be represented as a fraction/decimal/percent. (Possible answers: <i>Percents are easiest to read because “out of 100” is a friendly benchmark for comparison; they also may be most widely used. Fractions are perceived as difficult to understand so may not be as frequently used.</i>)</p>	<p>If sets of relational rods are not readily available, use BLM 7.4.1. (Template for relational rods)</p>
Action!	<p>Small Groups → Carousel Investigations</p> <p>In groups, students rotate through the stations described by BLM 7.19.1. They record their work on BLM 7.19.2.</p> <p>For Station 1, part c) provides an extension for students needing a further challenge.</p> <p>By completing the problems at each of the four stations, students will work with percentages using an area, linear and set model.</p> <p>Curriculum Expectations/Observation/Mental Note: Assess students’ understanding of representing percentages, with particular attention to effective use of each model.</p>	
Consolidate Debrief	<p>Whole Class → Sharing/Discussion</p> <p>Students share their findings and record any corrections on their worksheet. For Station 4, encourage students to take notice of the relationship between part b) and part c).</p>	
<i>Application Concept Practice Skill Drill</i>	<p>Home Activity or Further Classroom Consolidation</p> <p>Further practice can be given with each manipulative as needed.</p>	Provide students with appropriate practice questions.

Station 1: Relational Rods

If the yellow rod represents 100%:

- a) Which rod represents 20%?
- b) Which rod represents 60%?
- c) Which rod represents 200%?

Station 2: 2 Colour Counters

Using 2 colour counters:

Count out 8 red counters and 2 yellow counters:

- a) What percent are yellow?
- b) What percent are not yellow?
- c) If you take away 50% of the red counters, what percent of the counters are now yellow?

Station 3: 10 x 10 Grid

Shade in 50 squares on a 10 x 10 grid. This represents 100%.

- a) What percent is represented by 10 squares?
- b) What percent is represented by 45 squares?
- c) How many squares would represent 11%?

Station 4: Ruler or Cube-a-Links

Draw a 12 cm line segment labelled AB.

AB represents 75% of a longer line segment called AC:

- a) What is the length of AC? Draw AC.
- b) What is the length of 25% of AC?
- c) What is the length of 50% of 50% of AC?

7.19.2: Stations for Small Group Investigations **Grade 7**
– Percent with Concrete Materials Student Record Sheet

<p>Station 1: Relational Rods</p> <p>a)</p> <p>b)</p> <p>c)</p>	<p>Station 2: 2 Colour Counters</p> <p>a)</p> <p>b)</p> <p>c)</p>
<p>Station 3: 10 x 10 Grid</p> <p>a)</p> <p>b)</p> <p>c)</p>	<p>Station 4: Ruler or Cube-a-Links</p> <p>a)</p> <p>b)</p> <p>c)</p>

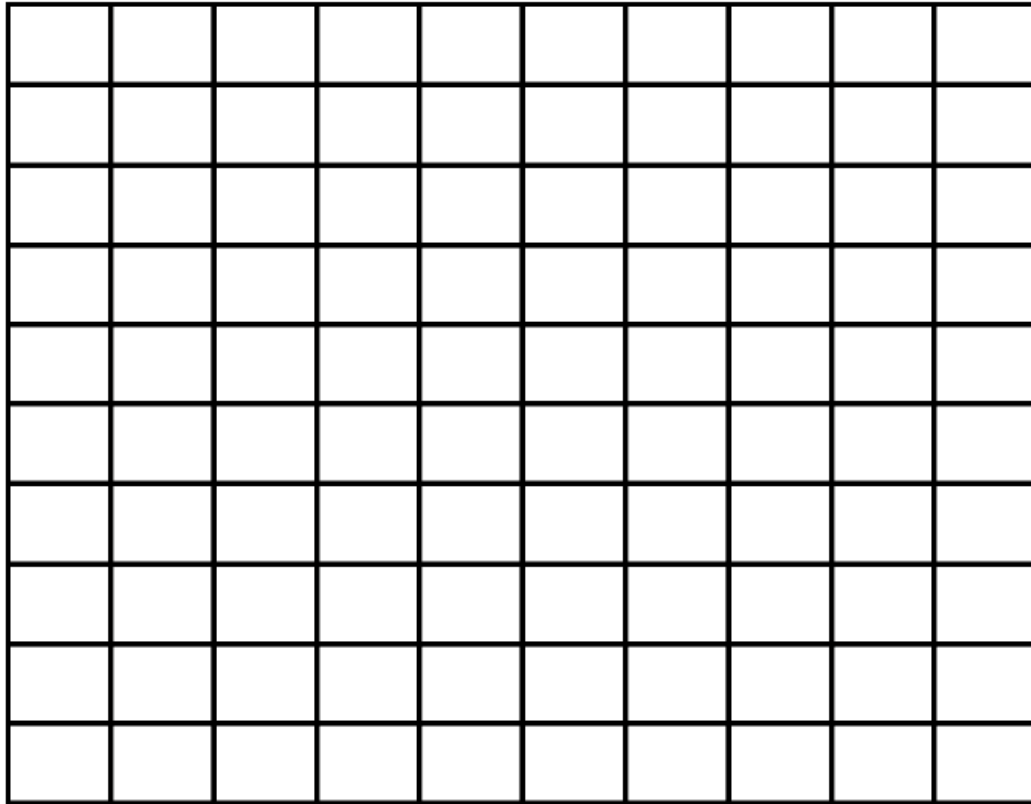
7.19.2: Stations for Small Group Investigations – Percent with Concrete Materials Solutions

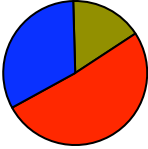
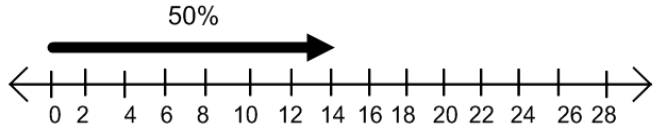
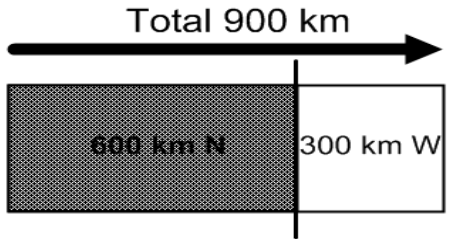
Grade 7

<p style="text-align: center;">Station 1: Relational Rods</p> <p><i>If the yellow rod represents 100%:</i></p> <ol style="list-style-type: none"> <i>What rod represents 20%? (white)</i> <i>What rod represents 60%? (green)</i> <i>What rod represents 200%? (orange)</i> 	<p style="text-align: center;">Station 2: 2 Colour Counters</p> <p><i>Using 2 colour counters:</i></p> <p><i>If you have 8 red counters and 2 yellow counters:</i></p> <ol style="list-style-type: none"> <i>What percent are yellow? (20%)</i> <i>What percent are not yellow? (80%)</i> <i>If you take away 50% of the red counters, now what percent of the counters are yellow? (33%)</i>
<p style="text-align: center;">Station 3: 10 x 10 Grid</p> <p><i>Shade in 50 squares on a 10 x 10 grid. This represents 100%.</i></p> <ol style="list-style-type: none"> <i>What percent is represented by 10 squares? (20%)</i> <i>What percent is represented by 45 squares? (90%)</i> <i>How many squares would represent 11%? (5.5 squares)</i> 	<p style="text-align: center;">Station 4: Ruler or Cube-a-Links</p> <p><i>If a 12 cm line segment AB represents 75% of a longer line segment AC:</i></p> <ol style="list-style-type: none"> <i>What is the length of AC? Draw AC. (16 cm)</i> <i>What is the length of 25% of AC? (4 cm)</i> <i>What is the length of 50% of 50% of AC? (4 cm)</i>

7.19.3: 10 x 10 Grid

Grade 7



Unit 7: Day 20: Finding the Percent of a Number		Grade 7
	<p>Math Learning Goals</p> <ul style="list-style-type: none"> Solve problems that involve determining the percent of a number, e.g. CDs are on sale for 50% off the regular price. What is the sale price of a \$14.98 CD? Relate the percent to fraction and decimal versions, e.g., the CD is half price. Estimate to judge the reasonableness of the answer Solve problems that involve determining whole-number percents with and without calculators 	<p>Materials</p> <ul style="list-style-type: none"> BLM 7.20.1 BLM 7.20.2 Fraction circles & rings
Assessment (A) and DI (D) Opportunities		
Minds On...	<p>Pairs → Think Pair Share Students share examples of real life situations in which they would need to calculate the percent of a number (e.g., finding the percent of a test score).</p> <p>Whole Class → Pair Problem Solving Teacher presents a sample problem involving finding percent of a number and students work in pairs to solve the problem and explain their solution.</p> <p>Sample Problem 1: In a class of 28 students, 50% are wearing jeans. How many students are wearing jeans?</p> <ul style="list-style-type: none"> Students should be able to represent 50% as $\frac{1}{2}$, and that $\frac{1}{2}$ of 28 is 14. Ask students to represent this problem using a number line. Discuss solution strategies as a class, reinforcing options to solve the problem (e.g. convert percent to a decimal and multiply by number). <div style="text-align: center;">  </div> <p>Sample Problem 2: On your vacation, you travel 600 km north and 300 km west. What percent of your trip did you travel north?</p> <ul style="list-style-type: none"> Students should calculate the total distance travelled as $600 + 300 = 900$; $\frac{600}{900}$ is the same as $\frac{6}{9} = \frac{2}{3} = 66.6\%$ <div style="text-align: center;">  </div>	<p>Students may use calculators if necessary; encourage students to round using mental math, but they may use the calculator for calculations</p> <p>$\frac{1}{3}$ and $\frac{2}{3}$ are common benchmark fractions/percents; students should think about $\frac{1}{3} = 33.3\%$ and $\frac{2}{3} = 66.6\%$</p> <p>Teacher can access Gizmos "Percent of Change" at www.explorellearning.com. This is a manipulative "percent ruler" tool.</p> <p>Gizmo – Percent of Change gives a good visual representation for the <i>Action!</i> and/or <i>Consolidate</i> sections</p>
Action!	<p>Small Group → Problem Solving Students work in groups to solve problems on BLM 7.20.1</p> <p><i>Curriculum Expectations/Demonstration/Marking Scheme: Assess students' understanding of calculating percent of a number</i></p>	<p>Select homogeneous or heterogeneous groupings</p> <p>Be aware of misconceptions in students' work and address as a class</p>
Consolidate Debrief	<p>Whole Class → Discussion Teacher prompts students to identify similarities and differences in solutions & addresses common misconceptions (e.g. identifying the "whole"). Students do a Gallery Walk in order to identify various methods of solving problems and graphic representations.</p>	
Application Concept Practice	<p>Home Activity or Further Classroom Consolidation Students work independently to complete the problem on BLM 7.20.2</p>	<p>This provides an opportunity for individual assessment</p>

7.20.1: Finding Percent of a Number Practice Problems

Grade 7

For each problem, first estimate your answer. Then use pictures, numbers and words to explain your answer.

1. Two different video game systems are on sale. The regular price of game system A is \$280 and it is on sale for 15% off. The regular price of game system B is \$360 and it is on sale for 25% off. Which game system costs less after the discount?



2. In a new marketing campaign to sell a new bag of chips, the manufacturer advertises “20% more for free!” If a standard bag of chips is 50g, what size is the new chip bag?



3. The average height of a grade 7 student in September is 120cm. In June, the average height is 150 cm. What is the percent growth in height over the year?



7.20.1: Finding Percent of a Number

Practice Problems Solutions

Grade 7

For each problem, first estimate your answer. Then use pictures, numbers and words to explain your answer.

1. Two different video games are on sale. The regular price of game system A is \$280 and it is on sale for 15% off. The regular price of game system B is \$360 is 25% off. Which game system costs less after the discount?

Answer: *System A costs 85% of the original price. $0.85 \times \$280 = \238 . System B is 75% of the original price. $0.75 \times \$360 = \270 . Therefore game system A costs less after the discount.*

2. In a new marketing campaign to sell a new bag of chips, the manufacturer advertises “20% more for free!” If a standard bag of chips is 50 g, what size is the new chip bag?

Answer: *20% of 50 g is 10 g. (Mental math: 10% is 5 g.) So the new chip bag is 20% more, or 10 g more. Its new size is 60 g.*

3. The average height of a grade 7 student in September is 120 cm. In June, the average height is 150 cm. What is the percent growth in height over the year?

Answer: *Growth is $150 \text{ cm} - 120 \text{ cm} = 30 \text{ cm}$. 30 cm compared to 120 cm (the original height) is $\frac{1}{4}$ or 25%. [Note: an incorrect answer may be obtained as follows. If you compare 120 cm to 150 cm, there is a 20% difference. This “difference” is not the same as “percent growth”. To look at growth, the “whole” is the original height.]*

7.20.2: Finding Percent of a Number Independent Practice

Grade 7

For this problem, first estimate your answer. Then use pictures, numbers and words to explain your answer.

A pair of jeans costs \$50. They are on sale for 20% off. You have to add PST and GST to the final cost of the jeans.

PST in Ontario = _____ %

GST = _____ %

Which method of calculating the final price results in a lower price?

- a) calculating the sales tax on the jeans BEFORE taking the 20% discount
- OR
- b) calculating the sales tax on the jeans AFTER taking the 20% discount

7.20.2: Finding Percent of a Number Independent Practice Solutions

Grade 7

For this problem, first estimate your answer. Then use pictures, numbers and words to explain your answer.

A pair of jeans costs \$50. They are on sale for 20% off. You have to add PST and GST to the final cost of the jeans.

PST in Ontario = _____%

GST = _____%

Which method of calculating the final price results in a lower price:

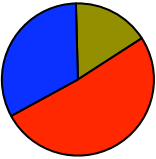
- a) calculating the sales tax on the jeans BEFORE taking the 20% discount,
or
- b) calculating the sales tax on the jeans AFTER taking the 20% discount

ANSWER:

Option a) If PST & GST is 13%, the sales tax on the jeans is $0.13 \times 50 = \$6.50$, so the total price is \$56.50. 20% of \$56.50 is \$11.30, for a final price of $\$56.50 - \$11.30 = \$45.20$.

Option b) Take the 20% discount first off \$50.00. 20% of \$50.00 is \$10.00 so the before-tax price is \$40.00. The sales tax on the jeans is $0.13 \times \$40 = \5.20 for a total price of \$45.20.

Therefore, both methods will give the same final price.

Unit 7: Day 21: Connecting Fractions to Percents		Grade 7
	<p>Math Learning Goals</p> <ul style="list-style-type: none"> Determine what percent one number is of another, e.g., 4 out of 16 shapes are hearts. What percent are hearts? Connect this type of problem to converting a fraction to a percent, e.g., 4 out of 16 = $\frac{4}{16} = 25\%$. 	<p>Materials</p> <ul style="list-style-type: none"> String Rulers Chart Paper Calculators Cube-a-links BLM 7.21.1 BLM 7.21.2 BLM 7.21.3
Assessment (A) and DI (D) Opportunities		
Minds On...	<p>Whole Class → Sharing Activity</p> <p>In order to calculate percents, students need to clearly understand that a fraction is really a division expression. $\frac{18}{5}$ is “18 fifths” or “$18 \div 5$”. So the following activity reinforces this concept.</p> <p>Discuss the question on BLM 7.21.1 with the class. Make an overhead of BLM 7.21.1. Provide students with 3m of string per group.</p>	<p>Students having difficulty may choose to use calculators or other manipulatives such as cube-a-links.</p> <p><i>Teaching Note:</i> A “quadrat” is a square or rectangular area of land marked off for the study of plants & animals</p>
Action!	<p>Pairs → Problem Solving</p> <p>Students complete BLM 7.21.2 (may be used as an overhead) and solution is discussed.</p> <p>Students then complete BLM 7.21.3. Introduce the problems and have students individually complete the first two steps:</p> <ol style="list-style-type: none"> Individual - estimate each answer and justify thinking. (e.g. relate to benchmarks) Individual – identify each number as a part, a whole or a fraction. Then in pairs, solve the problems using chart paper to display solutions. <p>Curriculum Expectations/Demonstration/Marking Scheme: Assess student’s understanding of connecting fractions and percents using the consolidation activity below.</p>	<p>Do not suggest procedures. Interchange the words “fraction” and “percent/hundredth” while speaking with students. Refer to the concepts of “whole”, “part” and “fraction/percent” Use both set and area models because it seems that most percent problems are sets but students are more familiar with areas. Students should use models or pictures to explain their answers; this will more fully develop the relationships. Encourage mental computation.</p> <p>Math Congress is the sharing of student answers. Teacher chooses a variety of problem solving approaches to highlight and validate various strategies.</p>
Consolidate Debrief	<p>Whole Class → Debrief and Consolidate</p> <p>Students participate in sharing of solutions (Math Congress). They explain their solutions and explain how they know their solution is correct. Several different pairs of students share their solutions. This allows more students to be recognized and reinforces multiple solutions and explanations.</p>	
<i>Application Concept Practice Exploration</i>	<p>Home Activity or Further Classroom Consolidation</p> <p>Students complete the same problems but substitute fractions for the percentages. Teacher Prompt: <i>How would the solutions be different?</i> -It would also be appropriate to use a Gizmo: Percents and Proportions</p>	

7.21.1: Connecting Fractions to Percents (Overhead) Grade 7

A student is making a quadrat for a field study in her Ecosystems unit. She has 3 m of string and uses $\frac{1}{4}$ of this to create the square quadrat. How much string did she use for this task?

Which of the following answers are correct? Which answer is “best”?

(A) Draw a sketch of a 3 m string split into fourths to show that $3\text{m} \div 4 = 0.75\text{ m}$

(B) This means $\frac{1}{4}$ of 3 m or 3 groups of $\frac{1}{4}$ or $3 \times \frac{1}{4}$

(C) This means $\frac{3}{4}$ m because you’re sharing the string into 4ths and taking 3 of them.

Four out of 16 shapes are hearts. What percent are hearts?



1. Estimate the answer.
2. Identify each number as the part, the whole or the fraction/percent.
3. Solve the problem.

Teacher Answers

1. Estimate:
4 out of 16 is the same as $\frac{1}{4}$ or 25% (a very easy estimation here!).
2. Identify each number as a part, a whole or a fraction / percent.
Part: 4 , Whole: 16, Fraction / percent: $\frac{4}{16}$ or 25%
i.e., the numerator counts and the denominator tells you what you're counting.
3. Solve the problem.
- $\frac{4}{16}$ is equivalent to $\frac{1}{4}$, which is equivalent to $\frac{25}{100}$ or 25%
- $\frac{4}{16}$ means $4 \div 16$ or 0.25. This is "twenty five hundredths" or "twenty five percent".

DI: An area model (simpler version) of this question is provided below:

A chocolate bar is split into 16 squares and you eat 4 of them. What percent of the chocolate bar did you eat? You have 4 parts (here a part is a " $\frac{1}{16}$ "), so again the numerator counts and the denominator tells you what you're counting.

7.21.3: Connecting Fractions to Percents

Student Practice

Grade 7

For each problem:

1. Estimate.

Hint: identify each number as a part, a whole or a fraction.

2. Solve the problem.

1. a) In a Grade 7 class, 18 out of 30 students play on extra-curricular sports teams. What percent of students play on a team?

- b) In the same class, 20% of students are on the Honour Roll. How many students are on the Honour Roll?

2. Bill buys a skateboard. The price tag shows an original price of \$120, but it has been marked down to \$90. What percentage did he save by buying this skateboard on sale?

7.21.3: Connecting Fractions to Percents Solutions Grade 7 Solutions

1. a) In a Grade 7 class, 18 out of 30 students play on extra-curricular sports teams. What percent of students play on a team?

Answer:

- $18 \div 30 = 0.6$ or “six tenths” or “sixty hundredths” or “sixty percent”
- $18 / 30 = 6 / 10 = 60 / 100 = 60\%$

- b) In the same class, 20% of students are on the Honour Roll. How many students is that?

Answer:

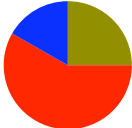
- 20% is $20/100$ or $2/10$ or $6/30$
- If 60% was 18 students, then 30% is 9 students and 10% is 3 students, so 20% is 6 students
- 20% is 0.20 and $0.20 \times 30 = 6$

2. Bill buys a skateboard. The price tag shows an original price of \$120, but it has been marked down to \$90.

What percentage did he save by buying this skateboard on sale?

Answer:

- Saved \$30
- $30/120 = \frac{1}{4} = 0.25 = 25\%$
- Therefore Bill saved 25% on his purchase

Unit 7: Day 22: Using Percent to Make Comparisons		Grade 7
	<p>Math Learning Goals</p> <ul style="list-style-type: none"> Use percent to make comparisons, e.g., $\frac{23}{31}$ students won ribbons in one class and $\frac{20}{29}$ won in the other class. Which had the better performance? Pose and solve comparison problems using a calculator. 	<p>Materials</p> <ul style="list-style-type: none"> BLM 7.22.1 BLM 7.22.2
Assessment (A) and DI (D) Opportunities		
Minds On...	<p>Pairs → Activity</p> <p>Use BLM 7.22.1 – photocopy one copy for each pair of students. Students cut out all questions and match equivalent fractions, decimals and percents. Once they have matched equivalent fraction/decimal/percent, students need to arrange the items from smallest to largest on a number line; students decide what is the “best” label for the number line (e.g. 0% - 100%, decimal or fraction).</p> <p>Whole Class → Discussion</p> <p>Teacher asks students how they compared the fractions $\frac{8}{9}$ and $\frac{9}{10}$</p> <p>E.g. 1: Both fractions are 1 piece less than a whole; $\frac{1}{9}$ is a larger fraction than $\frac{1}{10}$ so therefore taking away a larger fraction would give a smaller “left over” which means that $\frac{9}{10}$ would be the larger fraction</p> <p>E.g. 2: Calculate / compare percent for each fraction: $\frac{8}{9} = 88\%$ and $\frac{9}{10} = 90\%$</p>	<p>Smartboard Activity: Comparing Percents available: U7L22_notebook1</p> <p>A variety of fractions have been included to give students the opportunity to see “friendly” numbers as well as less familiar fractions.</p> <p>BLM 7.22.1: The decimals have been rounded to the nearest 100th, and the percents have been rounded to the nearest whole number.</p> <p>Gizmo: Ordering Percents, Fractions, and Decimals gives a visual representation for the ‘Minds On...’ section.</p>
Action!	<p>Whole Class → Discussion</p> <p>Students should discuss which form is “easiest” to compare – fraction vs. fraction, or percent vs. percent. Teacher reviews idea from Lesson 21 – a fraction is a division expression. In order to calculate the equivalent percent of a given fraction, divide the numerator by the denominator to get a decimal with 2 decimal places and convert to percent.</p> <p>e.g. $\frac{5}{7} \rightarrow 5 \div 7 = 0.71 \rightarrow 71\%$ (numerator \div denominator x 100 = %)</p> <p>Pair Activity → Practice Solving Percent Comparison Problems</p> <p>Students work in pairs to complete BLM 7.22.2</p> <p>Curriculum Expectations/Demonstration/Marking Scheme: Assess students’ understanding of comparing percents/fractions/decimals</p>	
Consolidate Debrief	<p>Whole Class → Discussion</p> <p>Discuss answers to problems on BLM 7.22.2</p>	
<i>Application Concept Practice Exploration</i>	<p>Home Activity or Further Classroom Consolidation</p> <p>Students complete the “Independent Practice” activity from BLM 7.22.2. Students can share their problems with other students in a follow-up class (see Unit 7 Lesson 23).</p>	

7.22.1: Matching Fractions, Decimals and Percents Grade 7

1. Cut out the cards.
2. Match cards (fraction, decimal and percent) that represent the same quantity
3. Order the fractions/decimals/percents from smallest to largest.

$\frac{2}{3}$	$\frac{23}{31}$	$\frac{9}{10}$
$\frac{10}{50}$	$\frac{2}{13}$	$\frac{8}{9}$
$\frac{14}{30}$	$\frac{9}{27}$	0.20
0.67	0.15	90%
74%	0.47	67%
20%	0.33	15%
0.89	33%	0.90
0.74	89%	47%

**7.22.1: Matching Fractions, Decimals and Percents Grade 7
Solutions**

2/13	0.15	15%
10/50	0.20	20%
9/27	0.33	33%
14/30	0.47	47%
2/3	0.67	67%
23/31	0.74	74%
8/9	0.89	89%
9/10	0.90	90%

1. During a hockey season, Terry scored 9 goals in 14 games. Cory scored 10 goals in 17 games. Casey scored 8 goals in 13 games. Represent each player's statistics as a fraction, decimal and percent. (Round each decimal to the nearest 100th)

2. If the coach wants to pick the player who is best at scoring for the All-Star team, what player should she pick?

3. The coach is able to pick 2 players for the All-Star team and selects Casey and Terry. In the All-Star game, Terry scores 1 goal and Casey scores 2 goals. Which player is now the best / highest scoring player?

Independent Practice

You are the coach of this hockey team. Create a problem that compares percents using statistics that YOU invent about the team (E.g. penalties, assists, wins/losses, ice time, etc.). Write the problem on one side of a page and solve the problem on the reverse of the same page.

7.22.2: Problem Solving – Comparing Percents Solutions

Grade 7

1. During a hockey season, Terry scored 9 goals in 14 games. Cory scored 10 goals in 17 games. Casey scored 8 goals in 13 games. Represent each player's statistic as a fraction, decimal and percent.

Answer:



	Fraction	Decimal	Percent
Terry	$\frac{9}{14}$	0.64	64%
Cory	$\frac{10}{17}$	0.59	59%
Casey	$\frac{8}{13}$	0.62	62%

2. If the coach wants to pick the highest scoring player for the All-Star team, what player should she pick?

Answer: The coach should pick Terry (64%).

3. The coach is able to pick 2 players for the All-Star team and selects Casey and Terry. In the All-Star game, Terry scores 1 goal and Casey scores 2 goals. Which player is now the best / highest scoring player?

Answer: Now, Casey has now scored a total of 10/14 games or 71%. Terry has now scored in 10/15 games or 67%. Casey is now the highest scoring player.

Unit 7: Day 23: Using Percent to Find the Whole		Grade 7
	<p>Learning Goals</p> <p>Calculate the size of the whole when a percentage of the whole is known, e.g. 6 students in a class have juice for snack. If that is 20% of the class, how large is the class?</p> <p>Relate to probability; e.g. if 20% of the students have juice, what is the probability that a student chosen at random will have juice?</p>	<p>Materials</p> <ul style="list-style-type: none"> • BLM 7.23.1 • BLM 7.23.2 • BLM 7.23.3 • BLM 7.23.4 • Manipulatives (relational rods) • Post-it notes
Assessment (A) and DI (D) Opportunities		
Minds On...	<p>Whole Class → Modified Four Corners</p> <p>Pose questions to the class from BLM 7.23.1. For each question, ask students to write their answer on a page and get up and go make a group with students around the room with whom they can share their answers. After all students have grouped, discuss each answer as a class to determine correct answers. If all students correctly identify the questions but without enough information, then give them a second prompt: What information is missing?</p> <p>Answers:</p> <ol style="list-style-type: none"> 1. Not enough information; we don't know the area of the walls. 2. 25% of a 1 m rope is 0.25 m and 50% of a 2 m rope is 1 m. 3. Not enough information; we don't know the heights of either grade ten student. 4. Not enough information; we don't know. 	<p>If relational rods are not available, use BLM 7.4.1 – Relational Rods Template</p>
Action!	<p>Whole Class → Exploration (Representing)</p> <p>Give students the problem from BLM 7.23.2. The teacher should focus on the <i>representation</i> of the answer and encourage students to connect to previous understanding.</p> <p>After students have produced solutions, have them do a gallery walk and jot down on a post-it note one more representation of a solution that they find effective.</p> <p>Possible student answers are on BLM 7.23.3.</p> <p>Whole Class → Sharing</p> <p>Consolidate ideas through discussion. Pointing out working through decimals and fractions is effective. Ask the class, “What is the probability that a student selected at random will have a litterless lunch?” Answer: 1/5</p>	<p>Make manipulatives from previous lessons available, especially relational rods.</p> <p> Use Gizmo: Percents and Proportions for a visual representation</p>
Consolidate Debrief	<p>Individual → Practice</p> <p>Students work on BLM 7.23.4 individually.</p> <p>Curriculum Expectations/Recorded Solutions/Rubric: Assess students' solutions using a rubric based on the mathematical process of representing.</p>	
<i>Application Reflection</i>	<p>Home Activity or Further Classroom Consolidation</p> <p>When taking up students' independent practice, students record the probability of each event for each question.</p> <p>Answers:</p> <ol style="list-style-type: none"> 1. What is probability that a team won the next game played? Answer: 40/100 or 2/5 2. What is the probability that a randomly selected student has already paid? Answer: 2/3 3. What is the probability that a randomly selected seat is taken? Answer: 95/100 or 19/20 	

**7.23.1: Using Percent to Find the Whole
(Overhead)**

Grade 7

1. If I paint 25% of one wall in my house green and $\frac{1}{3}$ of another wall white, which wall used more paint?
2. Which is longer: 25% of a 1 m rope or 50% of a 2 m rope?
3. A grade ten male is 15% taller than a grade eight male. A grade ten female is 10% taller than a grade eight female. Which of these students is the tallest?
4. In 2007, 17% of Canada's population was under the age of 15. In 1971, 29% of Canada's population was the same age. In which year were there more children in Canada?

7.23.2: Using Percent to Find the Whole
(Gallery Walk Problem)

Grade 7

Six (6) students in a class have litterless lunches. If that is 20% of the class, how large is the class?
Clearly explain your thinking.

7.23.3: Using Percent to Find the Whole (Teacher Answers)

Grade 7

Six (6) students in a class have litterless lunches. If that is 20% of the class, how large is the class?

Sample Answers:

1. $20\% = \frac{20}{100} = \frac{1}{5}$ Using equivalent fractions, $\frac{1}{5} = \frac{6}{30} \rightarrow 30$ students in class

2. $20\% + 20\% + 20\% + 20\% + 20\% = 100\%$ Therefore,

$$6 + 6 + 6 + 6 + 6 = 30 \rightarrow 30 \text{ students in the class}$$

3. $20\% = 0.2 \rightarrow$ Let y represent the number of students in the class

$$\begin{aligned} 0.2 \times y &= 6 \\ y &= 30 \end{aligned}$$

4.  = 30

$$\frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} = \frac{5}{5}$$

$$20\% + 20\% + 20\% + 20\% + 20\% = 100\%$$

5. Using relational rods as a model: The red rod is $\frac{1}{5}$ or 20 % of the orange rod

$$6 + 6 + 6 + 6 + 6 + 6$$



Total Class = 30

7.23.4: Using Percent to Find the Whole
Student Practice

Grade 7

1. If a baseball team won 8 games and this represented a 0.4 winning percentage, how many games did they play?

2. The Grade 7 class had collected 67% ($\frac{2}{3}$) of their class trip money. The amount collected was \$210. How much money will be collected in total?

3. The movie theatre was 95% full for the opening show. If there are 250 people seated, how many more can fit?

7.23.4: Using Percent to Find the Whole

Student Practice Solutions

Grade 7

1. If a baseball team won 8 games and this represented a 0.4 winning percentage, how many games did they play?

8 games represents winning 40% of their games

If 8 games is 40%, 4 games is 20% and 2 games represents 10%,

Then 2 games multiplied by 10 equals 20 games.

Answer : 20 games

2. The Grade 7 class had collected 67% ($\frac{2}{3}$) of their class trip money. The amount collected was \$210. How much money will be collected in total?

67% or $\frac{2}{3}$ divided by 2 is equal to $\frac{1}{3}$.

If $\frac{1}{3}$ is \$105 ($\$210/2$) then $\frac{3}{3}$ is $\$105 \times 3 = \315

$\frac{1}{3} = \$105$	$\frac{1}{3} = \$105$	$\frac{1}{3} = \$105$
-----------------------	-----------------------	-----------------------

OR

$\frac{1}{3}$ is 105/? (Solve for the equivalent fraction)

Answer: \$315 will be collected in total

3. The movie theatre was 95% full for the opening show. If there are 250 people seated, how many more can fit?

$$.95x = 250$$


$$.95/.95x = 250/.95$$

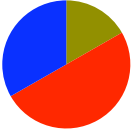
$$x = 263 \text{ (rounded to the nearest whole number)}$$

To find how many more people can fit:

$$263 - 250 = 13$$

Answer: 13 more people can fit in the theatre

Unit 7: Day 24: Using Tables and Lists to Determine Outcomes		Grade 7
	<p>Math Learning Goals</p> <ul style="list-style-type: none"> Determine all possible outcomes of an event using a chart, table, or systematic list, e.g., if you threw 3 coins simultaneously, what are all the possible combinations of heads and tails? Determine all possible sums when rolling 2 number cubes 	<p>Materials</p> <ul style="list-style-type: none"> BLM 7.24.1 Coins Number cubes Counters
Assessment (A) and DI (D) Opportunities		
Minds On...	<p>Whole Class Activity → Introduce Vocabulary</p> <p>Write vocabulary words on board (see below) so that students can begin to use the terms during the demonstration.</p> <p>Teacher demonstrates flipping a coin at least 8 times and recording outcomes. Either use coins, or National Library of Virtual Manipulatives → grade 6-8 → data analysis & probability → coin toss. http://nlvm.usu.edu/en/nav/frames_asid_305_g_3_t_5.html?from=category_g_3_t_5.html or the Probability Simulations gizmo from www.explorelearning.com.</p> <p>Ask students what they think the next outcome will be. Reinforce with students that both H or T are equally likely because these are independent events.</p> <p>Discuss and define “outcome”, “likely”, “impossible”, “most likely”, “certain”.</p>	<p>This activity addresses a possible misconception that successive events depend on the previous event</p>
Action!	<p>Small Group Activity → Number Cube Race Game</p> <p>Each group of students plays the game on BLM 7.24.1.</p> <p><u>Instructions for Game:</u></p> <p>In each small group, students pick numbers (like a draft) until all numbers between 1 and 12 are taken. Roll 2 number cubes and calculate the sum. Each time a sum is rolled, students move a marker up the game board for that sum. The first sum to reach the top of the game board “wins”.</p> <p>At the end of the game, students record all possible outcomes of calculating the sum of 2 number cubes.</p> <p>Curriculum Expectations/Demonstration/Marking Scheme: Assess students’ understanding of determining outcomes and possible outcomes.</p>	
Consolidate Debrief	<p>Whole Class Activity</p> <p>Teacher explains that an outcome is a possible event of a probability experiment. Teacher prompts: <i>“What were possible/impossible/likely/unlikely/most likely outcomes of the number cube game?”</i></p> <p>After discussing the game, students should identify that the sum of 7 is the most likely outcome.</p> <p>Teacher asks students to reflect on other methods of recording the results of this game (e.g. tally chart, table).</p>	
<i>Reflection</i>	<p>Home Activity or Further Classroom Consolidation</p> <p>Students write a reflection (e.g. rap) using probability vocabulary (likely, most likely, impossible, certain, etc.) to reflect the number cube race game outcomes.</p>	

Unit 7: Lesson 25: Probability		Grade 7
	Math Learning Goals <ul style="list-style-type: none"> Distinguish between theoretical probability and experimental probability Express probability as a fraction, decimal and percent Calculate probability of specific outcomes using Lesson 24 charts and tables, e.g., what is the probability of 3 coin flips being HHH? 	Materials <ul style="list-style-type: none"> BLM 7.25.1 BLM 7.25.2 BLM 7.25.3 Number cubes, coins
Assessment (A) and DI (D) Opportunities		
Minds On...	Pair Activity → Exploring Give pairs of students a coin; one student will pick heads (H) and the other student will pick tails (T). Students predict the number of heads/tails for a total of 50 flips. Students perform 50 coin flips and record their results in a tally chart. Students also write the actual number of heads/tails as a fraction out of 50.	Theoretical probability: the chance that something should happen based on calculating: $\frac{\# \text{ favourable outcomes}}{\text{total } \# \text{ outcomes}}$ Experimental probability: the chance that something will happen based on results from an experiment Teacher can access Gizmos "Theoretical and Experimental Probability" at www.explorellearning.com Here the teacher can design a spinner (and use multiple spinners) and select the favourable outcome and tally the results.
Action!	Whole Class → Discussion Teacher prompts: <ul style="list-style-type: none"> "What are the possible outcomes of flipping a coin?" An outcome that you "want" to happen is called a "favourable outcome" "What is the total number of outcomes when flipping a coin?" Show how to calculate theoretical probability = $\frac{\# \text{ favourable outcomes}}{\text{total } \# \text{ outcomes}}$ Teacher prompt: "What is the theoretical probability of flipping a head?" Students compare theoretical probability to the results of their experiments (record results from various pairs' experiments on board). Students should recognize that experimental probability and theoretical probability are often not the same. Pair Activity Students complete BLM 7.25.1 using previous day's results from Number Cube Race on their charts. Curriculum Expectations/Demonstration/Marking Scheme: Assess students' understanding of the difference between theoretical and experimental probability.	
Consolidate Debrief	Whole Class → Discussion Compare pairs' results as a class; what different experimental probabilities were observed? Whole Class → Probability Game "SKUNK" Students use BLM 7.25.2 to play SKUNK (instructions for playing the game are included on BLM). Teacher prompts: "How did you know when to sit down?" Students use BLM 7.25.3 to record all possible outcomes for sums of number cubes.	
<i>Application Concept Practice Exploration Reflection</i>	Home Activity or Further Classroom Consolidation Take the SKUNK game home to teach someone else the game and play it, discussing their strategies for winning. Teachers may copy the game board to send home.	

7.25.1: Probability – Number Cube Game Probabilities

Grade 7



1. Using the data from the Number Cube Game, complete the chart.

Probability of the actual event (P) = $\frac{\text{frequency of the outcome}}{\text{Total \# of trials}}$

	Frequency of Outcome (From Number Cube Race)	Total # of Trials	Probability as a Fraction	Probability as a Decimal (round to nearest hundredth)	Probability as a Percent (%)
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

7.25.2: “SKUNK” Probability Game Board

Grade 7

Game Instructions:

- Teacher rolls 2 number cubes
- Players record the sum of the numbers in the appropriate column (i.e. sums for round 1 are recorded under "S", sums for round 2 are recorded under the first "K", etc.)
- Players must now individually choose to either remain standing or to sit down (if a student sits down, this ends the round for them)
- Players still standing continue to record the sums of future rolls (and must decide to remain standing or sit down after each roll)
- The round ends when a double is rolled.
- Players who are standing when a double is rolled get 0 points for that round.
- For players who are sitting when a double is rolled, their score for that round is the sum of all the numbers they recorded while standing.
- There are 5 rounds: "S", "K", "U", "N", "K" and the final score is sum of all 5 rounds

Roll	S	K	U	N	K
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
Score for Round					

Total Final Score: _____.

7.25.3: Probability of a Double Roll with 2 Number Cubes

Grade 7


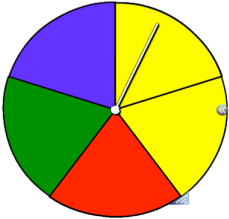

	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

Total number of outcomes: _____

Circle all the outcomes that result in a double roll ("favourable" outcomes)

Theoretical Probability = $\frac{\# \text{ favourable outcomes}}{\text{total \# of outcomes}}$ = _____



Unit 7: Lesson 26: Designing Games and Experiments		Grade 7
	<p>Math Learning Goals</p> <ul style="list-style-type: none"> Understand the connections between percent and probability by: <ul style="list-style-type: none"> Designing a fair game (each player has a 50% chance of winning) e.g., two players take turns rolling one numbered cube. If the number is odd, player A scores a point. If the number is even, player B scores a point. Designing an experiment where the chance of a particular outcome is 1 in 3, e.g., use a bag of red and green balls 	<p>Materials</p> <ul style="list-style-type: none"> Number cubes Spinners Playing cards Coins, Marbles, Modifiable spinner BLM 7.26.1
Assessment (A) and DI (D) Opportunities		
Minds On...	<p>Whole Class → Spinner Game</p> <p>Demonstrate a fair game using a regular spinner or the default fair spinner (with equivalent sections) from the National Library of Virtual Manipulatives → data analysis & probability → spinners. Students get a point for each time the arrow lands on the colour they selected. http://nlvm.usu.edu/en/nav/frames_asid_186_g_3_t_5.html?open=activities&from=topic_t_5.html</p> <p>Discuss and record the theoretical probability of getting each of the colours to prove that this is a fair game (e.g., equal chance of each outcome). Modify the spinner to increase the size of one section to make one outcome more likely than others (e.g., increase 1 region's value from 1 → 2). Discuss and record the theoretical probability of getting each of the colours to prove that this is an unfair game (unequal chance of each outcome). Discuss ways to make the modified spinner a fair game (see below).</p> <div style="display: flex; align-items: center; justify-content: center;">  <div style="border: 1px solid black; padding: 5px; margin-left: 20px;"> <p>To make this “unfair” spinner a fair game, award $\frac{1}{2}$ a point for landing on yellow and 1 point for landing on all others.</p> <p>Or, players could select yellow as their option, or 2 other colours.</p> </div> </div>	<p>Fair Game Design incorporates procedural writing (instructions for playing the game) that can be assessed separately for a writing mark</p> <p> Students may modify existing games</p>
Action!	<p>Pair Activity → Design a Fair Game</p> <p>Students use BLM 7.26.1 and play their own game Curriculum Expectations/Demonstration/Marking Scheme: Assess students' understanding of fair games using a rubric for problem solving.</p>	
Consolidate Debrief	<p>Whole Class</p> <p>Students play each other's games, identifying whether particular games are fair or not.</p> <p>Individual Practice</p> <p>Students complete a journal entry proving mathematically that their game is fair.</p>	
<i>Exploration</i>	<p>Home Activity or Further Classroom Consolidation</p> <p>Discuss / explore the fairness of other games at home (board games, card games, etc.).</p>	


7.26.1 BLM Designing Games and Experiments Grade 7



Task: Working with a partner, you must design a fair game that uses any of number cubes, coins, playing cards, marbles or spinners. (If you have another creative idea, consult with your teacher for approval.)

Game Criteria:

- Your game must result in a winner (should take 5-10 minutes to play).
- You must state the object of the game.
- Your game must include clearly written rules that are easy to follow
- Your game must be fair.
- Your game must be fun for other Grade 7 students.
- Your game may be a modification of an existing game.

Unit 7: Lesson 27: Making Predictions Based on Probability		Grade 7
	Math Learning Goals <ul style="list-style-type: none"> Make predictions about a population given a probability, e.g., if the probability of catching a fish is 30%, how many students in a class of 28 will catch a fish if they all go fishing together? 	Materials <ul style="list-style-type: none"> BLM 7.27.1
Assessment (A) and DI (D) Opportunities		
Minds On...	Whole Class → Discussion Discuss real life applications of probability in which you use “chance” to determine your willingness to participate (e.g., weather → 30% chance of rain; getting picked to be on a sports team; investment risk; lottery ticket, etc.). Discuss with students the lowest probability needed to motivate them to participate (personal risk factor) e.g., the chance of winning a national lottery prize might be very low vs. the chance of winning a prize in a school draw.	
Action!	Individual Practice Teacher reviews how to convert fractions to percent and how to calculate percent of a number. Students complete BLM 7.27.1. <i>Curriculum Expectations/Demonstrations/Marking Scheme: Assess students’ understanding of making predictions based on probability.</i>	
Consolidate Debrief	Small Group Sharing Students form small groups and share their solutions for BLM 7.27.1 #2 within their group. The teacher can group similar solutions together on the board to highlight particular strategies in a Bansho or Congress and discuss how fractions, decimals, and percents relate to probability.	
<i>Application Concept Practice</i>	Home Activity or Further Classroom Consolidation Select a variety of appropriate textbook problems.	

7.27.1: Making Predictions Based on Probability

Grade 7

Answer these questions individually and show your work clearly.

- If the chance of winning a prize on a coffee cup rim is 10%, and a class of 30 Grade 7 students each bought one cup, how many winners would you expect?

 - If the students who did *not* win a prize on their first cup each bought a second cup, how many winners would you expect on the second cups, if the probability of winning is still 10%?

- The school baseball team played 24 games. Sean scored 6 home runs, Carole hit home runs in 5% of her games and Mitch hit home runs $\frac{1}{8}$ of the time.
 - Based on these probabilities, who has best chance of hitting a home run in the next game?

 - If the probabilities stayed the same for the next season where 30 games are played, how many homeruns would you expect each player to hit?

- A multiple-choice test has four options for each question. If you randomly answered a test with 60 questions, how many questions would you expect to get correct?

7.27.1: Making Predictions Based on Probability Grade 7 Solutions

1. a) If the chance of winning a prize on a coffee cup rim is 10%, and a class of 30 Grade 7 students each bought one cup, how many winners would you expect?

Answer: $0.10 \times 30 = 3$, \therefore 3 winners would be expected

- b) If the students who did *not* win a prize on their first cups each bought a second cup, how many winners would you expect on the second cups, if the probability of winning is still 10%?

Answer: $0.10 \times 27 = 2.7$, \therefore 2 or 3 winners would be expected

2. The school baseball team played 24 games. Sean scored 6 homeruns, Carole hit homeruns in 5% of her games and Mitch hit homeruns $\frac{1}{8}$ of the time.

- a. Based on these probabilities, who has best chance of hitting a home run in the next game?

Answer: Sean $\rightarrow 6/24 = 0.25 = 25\%$
Carole $\rightarrow 5\%$
Mitch $\rightarrow 1/8 = 0.125 = 12.5\%$

Sean has the best chance.

- b. If the probabilities stayed the same for the next season where 30 games are played, how many homeruns would you expect each player to hit?

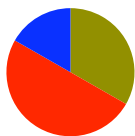
Answer: Sean $\rightarrow 0.25 \times 30 = 12.5$ or 13
Carole $\rightarrow 0.05 \times 30 = 1.5$ or 2
Mitch $\rightarrow 0.125 \times 30 = 3.75$ or 4

3. A multiple-choice test has four options for each question. If you randomly answered a test of 60 questions, how many questions would you expect to get correct?

Answer: *You have a $\frac{1}{4}$ chance of getting the question correct. So on a test with 60 questions, you would get $0.25 \times 60 = 15$ questions correct.*

Unit 7: Day 28: Tree Diagrams

Grade 7



Math Learning Goals

- Understand that two events are independent when one does not affect the probability of the other, e.g., rolling a number cube, then flipping a coin.
- Determine all possible outcomes for two independent events by completing tree diagrams, e.g., spinning a three-section spinner two consecutive times; rolling a number cube, then spinning a four-section spinner.

Materials

- BLM 7.28.1

Assessment (A) and DI (D) Opportunities

Minds On...

Pairs (Problem Solving) → Whole Class (Discussion)

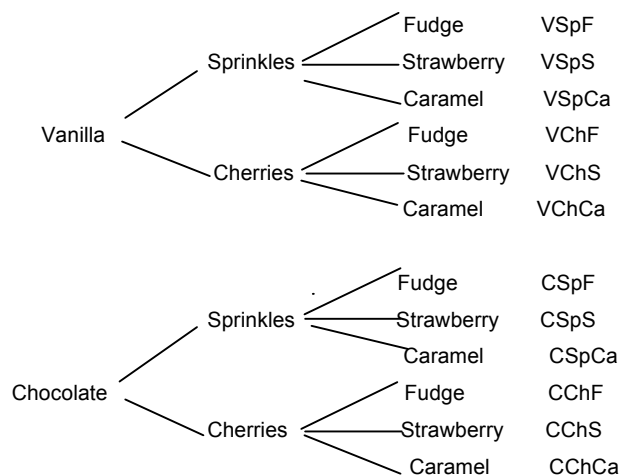
Pose the following problem to the class, and have them solve it in pairs.

- You are going to an ice-cream store to make your own sundae. You have to choose one type of ice-cream, one topping and a sauce.

The following options are on the menu:

Ice -Cream	Topping	Sauce
Vanilla (V)	Sprinkles (Sp)	Fudge (F)
Chocolate (C)	Cherries (Ch)	Strawberry (S)
		Caramel (Ca)

With your partner, display all of the different combinations of sundaes that could be made. Then discuss the number of the combinations. Have students display different ways they organized their work (e.g., lists, charts, random combinations, etc.). If a pair of students has done a tree diagram, have that group explain their solution. If no one used a tree diagram, model how to draw one.



There are 12 different combinations.
 (2 types of ice cream x 2 toppings x 3 sauces = 12)
 Ask students questions like the sample question below:

- How many combinations have strawberry sauce?

This example is to show how to do a tree diagram. The discussion during the consolidation and debrief section will expose students to understanding that when two events are independent of each other, one will not affect the probability of the other event.

Recall generating lists and tables from Lesson 24 and how tree diagrams organize outcomes in a logical sequence. Tree diagrams are more suitable when there are more events and combinations (hard to show 3 events on a table).

Students may need to use a coin or a spinner to understand how many outcomes there are for each. See Lesson 24 for online tools.

Independent Events- Two or more events where one does not affect the probability of another.

The Gizmo "Compound Independent and Dependent Events" could be used to model an independent and a dependent event. See www.explorelarning.com

Action!

Pairs → Exploration

Students complete questions on BLM 7.28.1 in pairs.

Consolidate Debrief

Whole Class → Discussions

Pairs of students share their solutions for question 1. Discuss question number 2 with students, identifying when events are dependent and independent and how that would affect the possible outcomes. Point out that we will always be working with independent events and that using dependent events becomes much more complex.

Curriculum Expectations/ Observation/Mental Note: Assess students' understanding of being able to identify possible outcomes for two or more independent events using tree diagrams.

Application Reflection

Home Activity

Write a reflection about the usefulness of organizing your possible outcomes using a tree diagram. Think of real-life scenarios where you would need to find all of the possible outcomes.

Provide scenarios so students can practice using tree diagrams.

7.28.1: Tree Diagrams

Grade 7

Name: _____

Date: _____

1. Create a tree diagram and list all of the outcomes for the following situations.

a) Rolling a 6-sided die and flipping a coin

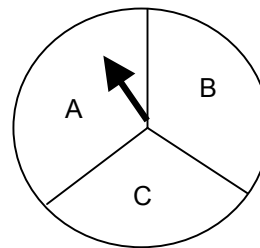


b) Flipping a coin 3 times



c) Spinning the spinner **twice** and then flipping a coin

Spinner



2. a) In the situations above, do any of those events depend on the results of another event? Explain why or why not.

b) Can you think of another situation where the outcome of one event depends on the outcome from a previous event?

7.28.1: Tree Diagrams Solutions

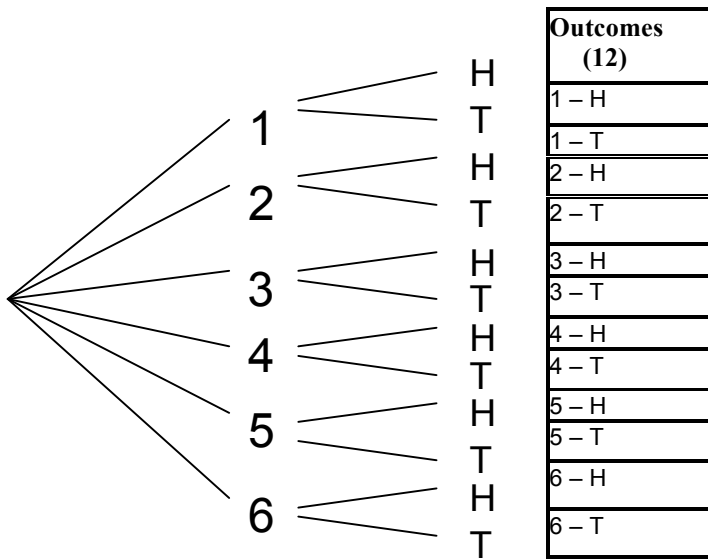
Grade 7

Name: _____

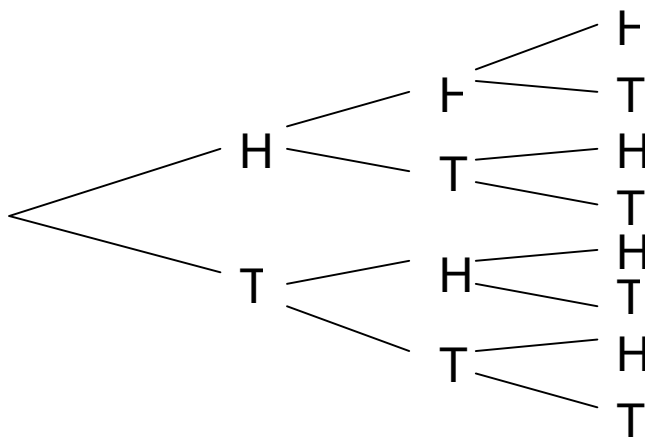
Date: _____

1. Complete a tree diagram and list all of the outcomes for the following situations.

a) Rolling a 6-sided die and flipping a coin



b) Flipping a coin 3 times

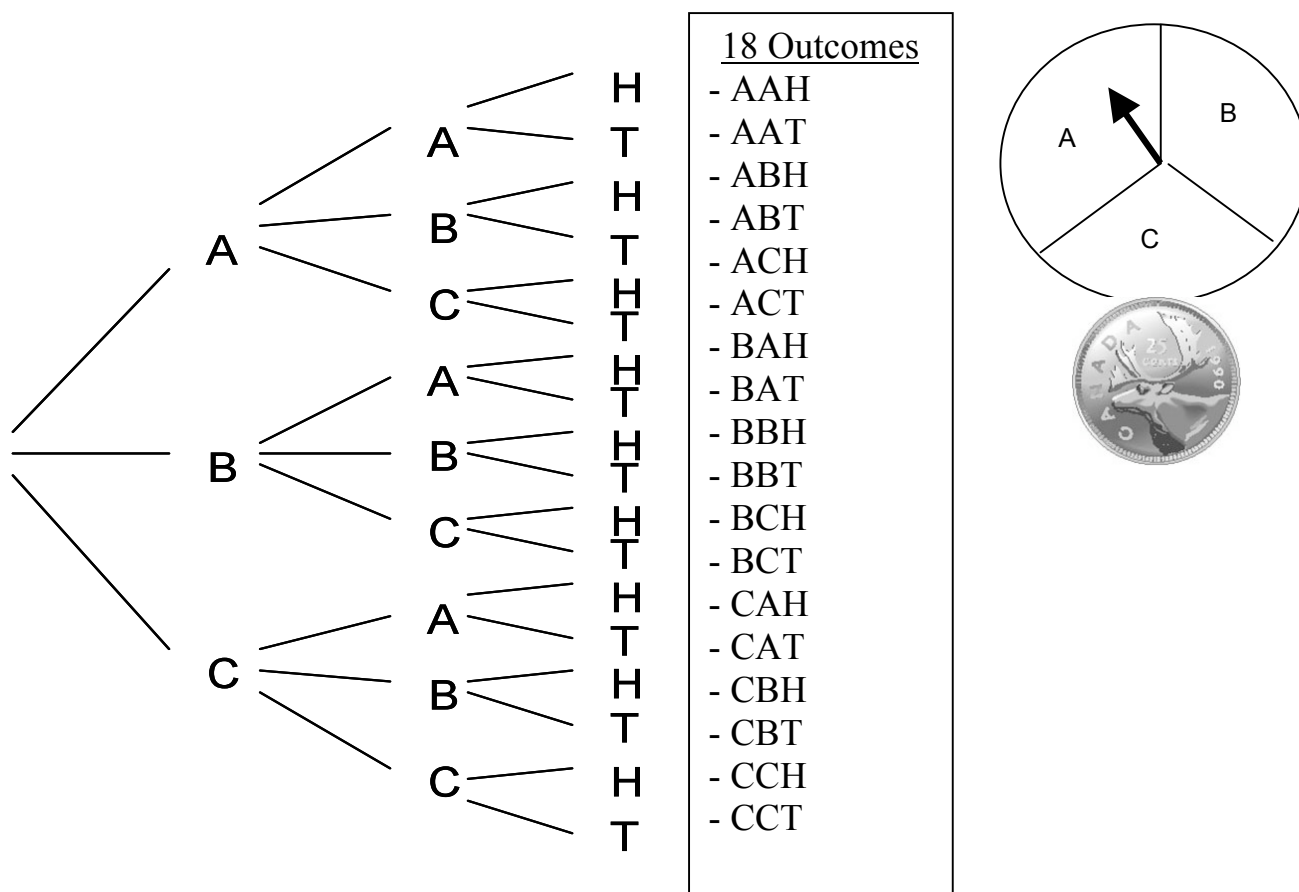


Possible Outcomes (8)	
-	HHH
-	HHT
-	HTH
-	HTT
-	THH
-	THT
-	TTH
-	TTT

7.28.1: Tree Diagrams Solutions Continued

Grade 7

c) Spinning the spinner below **twice** and flipping a coin




2. a) In the situations above, do any of those events depend on the results of another event? Explain why or why not.

None of them do. Whether you get a heads on a flip of a coin doesn't impact what you'll get the next time. All of these are "independent" of each other.

- b) Can you think of another situation where the outcome of one event depends on the outcome from a previous event?

If you drew a coloured marble from a bag and did not put the marble back, it would change the possible outcomes for the colour of the next marble you grab from the bag (and therefore it "depends" on the colour of the first marble).

Unit 7: Day 29: Probability of Specific Event		Grade 7
	<p>Math Learning Goals</p> <ul style="list-style-type: none"> Determine the probability of a specific outcome from two independent events using tree diagram, e.g., when flipping a coin and then rolling a number cube, what is the probability of getting a head and an even number? 	<p>Materials</p> <ul style="list-style-type: none"> BLM 7.29.1 BLM 7.29.2 Spinners
Assessment (A) and DI (D) Opportunities		
Minds On...	<p>Whole Class → Discussion</p> <p>Refer to the tree diagrams on BLM 7.28.1 from Day 28. Have students create 3 probability based questions that identify specific outcomes from the tree diagrams in question 1a), i.e., What is the probability of flipping heads and rolling a 3? What is the probability of rolling an even number and flipping tails?</p> <p>Ask students to solve their questions and then discuss how they represented their answers (fractions, words, percent, decimals, etc.).</p>	<p>■ Students can use calculators to help them determine the theoretical probability (in percent form).</p>
Action!	<p>Pairs → Exploration → Discussion</p> <p>In pairs students complete BLM 7.29.1.</p> <p>Discuss question number two from BLM 7.29.1. Ask students to explain their thinking and display different ways they represented their answer.</p> <p>Individual → Practice</p> <p>Individually complete BLM 7.29.2.</p> <p>Curriculum Expectations/ Observation/Mental Note: Assess students' understanding of using tree diagrams to determine the probability of a specific outcome from two independent events.</p>	<p>Virtual Spinners are available at: http://nlvm.usu.edu/en/nav/topic_t_5.html or the Gizmo "Probability Simulations" from www.explorelearnin.com</p>
Consolidate Debrief	<p>Whole Class → Discussion/Sharing</p> <p>Discuss how tree diagrams gives access to all possible outcomes for probability experiments, and how they are useful for determining / calculating theoretical probability.</p> <p>Discuss any difficulties or "aha" moments arising from BLM 7.29.2.</p>	
<i>Application Concept Practice Exploration</i>	<p>Further Consolidation or Home Activity</p> <p>Using BLM 7.29.1, have students consider changing the size of the second spinner to have 6 equally sized sections (by removing brown and purple). How would this change your answers on the BLM? What would the new answers be?</p>	

7.29.1: Probability of a Specific Event

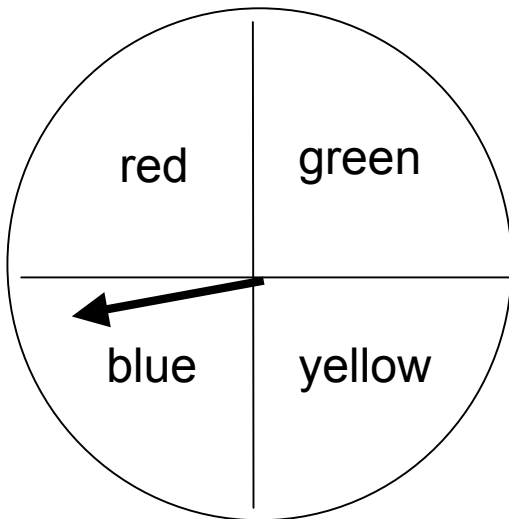
Grade 7

Name: _____

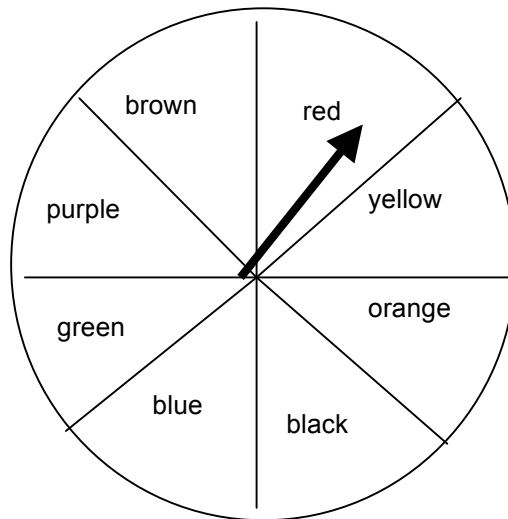
Date: _____

At the school fun fair there was a game with two spinners like the ones below. You must spin both spinners once; if they land on the same colour, you win a prize.

Spinner 1



Spinner 2



1. Draw a tree diagram and list all of the possible outcomes.

2. What is the theoretical probability that you will win a prize?

7.29.1: Probability of a Specific Event Solutions

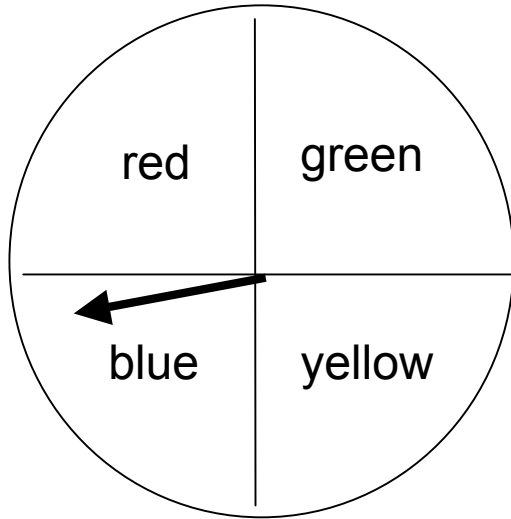
Grade 7

Name: _____

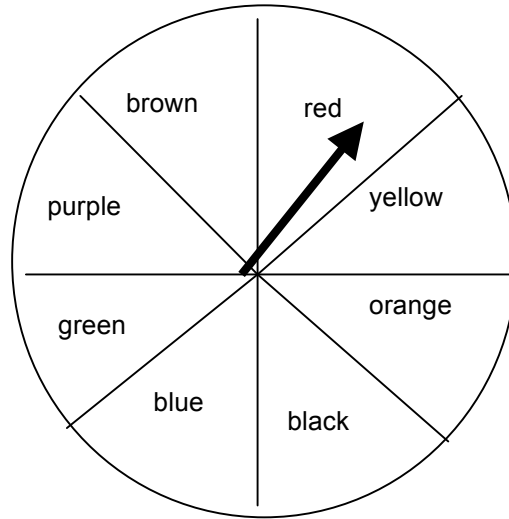
Date: _____

At the school fun fair there was a game with two spinners like the ones below. You must spin both spinners once; if they land on the same colour, you win a prize.

Spinner 1

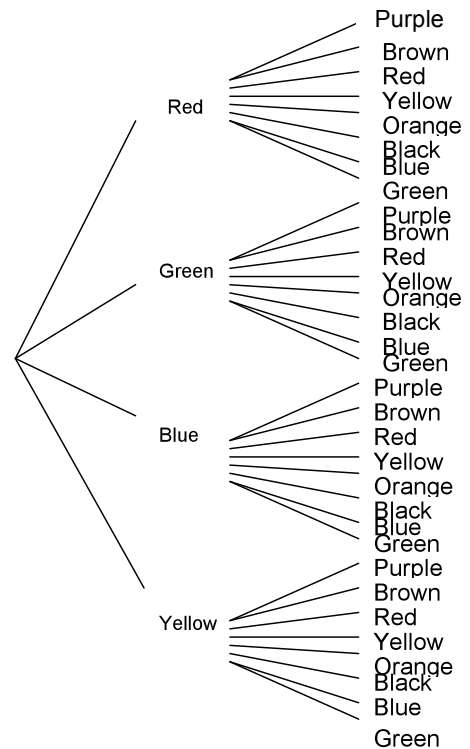


Spinner 2



1. Draw a tree diagram and list all of the possible outcomes.

Red – Purple	Green -Purple	Blue – Purple	Yellow – Purple
Red – Brown	Green – Brown	Blue – Brown	Yellow – Brown
Red – Red	Green – Red	Blue – Red	Yellow – Red
Red – Yellow	Green – Yellow	Blue – Yellow	Yellow – Yellow
Red – Orange	Green – Orange	Blue – Orange	Yellow – Orange
Red – Black	Green – Black	Blue – Black	Yellow – Black
Red – Blue	Green – Blue	Blue – Blue	Yellow – Blue
Red – Green	Green – Green	Blue – Green	Yellow - Green



2. What is the theoretical probability that you will win a prize?

$$\begin{aligned} \text{Theoretical Probability} &= \frac{\text{Favourable Outcomes}}{\text{Total Outcomes}} \\ &= \frac{4}{32} \text{ or } \frac{1}{8} \end{aligned}$$

7.29.2: Probability of a Specific Event

Grade 7

Name: _____

Date: _____

Complete the following questions determining the probability of the given events. You can use the tree diagrams from Lesson 28.

1. Rolling a 6-sided die and flipping a coin



a) $P(3, H) =$

b) $P(4 \text{ or } 5, T) =$

c) $P(<5, T) =$

d) $P(\text{Even number}, T) =$

e) $P(\text{Prime number}, H) =$

f) $P(\text{Odd number}, H \text{ or } T) =$

g) $P(\text{Any number}, H) =$

2. Flipping a coin 3 times



a) $P(3 \text{ Heads}) =$

b) $P(3 \text{ Tails}) =$

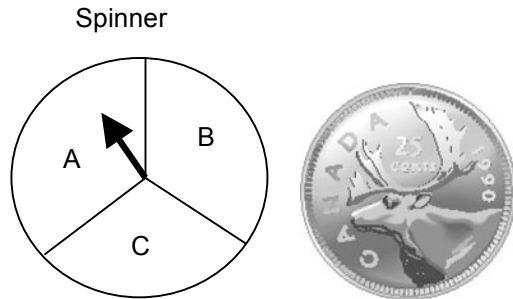
c) $P(2 \text{ Heads and } 1 \text{ Tails}) =$

d) $P(1 \text{ Heads and } 2 \text{ Tails}) =$

e) $P(\text{Heads first, then } 1 \text{ Heads and } 1 \text{ Tail in any order}) =$

7.29.2: Probability of a Specific Event Continued Grade 7

3. Spinning the spinner below **twice** and flipping a coin



- a) $P(\text{A and B and Heads}) =$
 - b) $P(\text{B and C and Tails}) =$
 - c) $P(\text{2 Cs and Tails}) =$
 - d) $P(\text{Both the same letter and Tails}) =$
 - e) $P(\text{Any letters and Heads}) =$
4. Make up your own situation with 3 events where there are 12 outcomes.
5. Create and answer three probability questions (similar to questions above) dealing with the situation you created in question 4.
- a)
 - b)
 - c)

Name: _____

Date: _____

Complete the following questions determining the probability of the given events. You can use the tree diagrams from Lesson 28.

1. Rolling a 6-sided die and flipping a coin



a) $P(3, H) = \frac{1}{12}$

b) $P(4 \text{ or } 5, T) = \frac{2}{12} \text{ or } \frac{1}{6}$

c) $P(<5, T) = \frac{4}{12} \text{ or } \frac{1}{3}$

d) $P(\text{Even number}, T) = \frac{3}{12} \text{ or } \frac{1}{4}$

e) $P(\text{Prime number}, H) = \frac{3}{12} \text{ or } \frac{1}{4}$

f) $P(\text{Odd number}, H \text{ or } T) = \frac{6}{12} \text{ or } \frac{1}{2}$

g) $P(\text{Any number}, H) = \frac{6}{12} \text{ or } \frac{1}{2}$

2. Flipping a coin 3 times



a) $P(3 \text{ Heads}) = \frac{1}{8}$

b) $P(3 \text{ Tails}) = \frac{1}{8}$

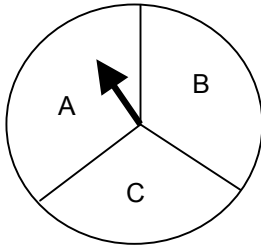
c) $P(2 \text{ Heads and } 1 \text{ Tails}) = \frac{3}{8}$

d) $P(1 \text{ Heads and } 2 \text{ Tails}) = \frac{3}{8}$

e) $P(\text{Heads first, then } 1 \text{ Heads and } 1 \text{ Tail in any order}) = \frac{2}{8} \text{ or } \frac{1}{4}$

3. Spinning the spinner below **twice** and flipping a coin

Spinner



- a) $P(\text{A and B and Heads}) = \frac{2}{18}$ or $\frac{1}{9}$
- b) $P(\text{B and C and Tails}) = \frac{2}{18}$ or $\frac{1}{9}$
- c) $P(\text{2 Cs and Tails}) = \frac{1}{18}$
- d) $P(\text{Both the same letter and Tails}) = \frac{3}{18}$ or $\frac{1}{6}$
- e) $P(\text{Any letters and Heads}) = \frac{9}{18}$ or $\frac{1}{2}$

4. Make up your own situation with 3 events where there are 12 outcomes.

Many options: Flipping 2 coins and spinning 1 three-section spinner

Rolling 2 dice (even numbers) and spinning 1 three-section spinner

Rolling 2 dice (odd numbers) and rolling another die (getting a 5 or 6)



Any situation with 2 outcomes, 2 outcomes, and 3 outcomes

5. Create and answer three probability questions (similar to questions above) dealing with the situation you created in question 4.

Answers will vary.

Sample from first option above (flipping 2 coins and three-section spinner)

- a) $P(\text{2 Heads and a B}) = \frac{1}{12}$
- b) $P(\text{Heads and Tails and a C}) = \frac{2}{12}$ or $\frac{1}{6}$
- c) $P(\text{2 Heads and any letter}) = \frac{3}{12}$ or $\frac{1}{4}$

Unit 7: Day 30: Comparing Theoretical to Experimental Probability		Grade 7
	<p>Math Learning Goals</p> <ul style="list-style-type: none"> Perform simple probability experiments. Compare theoretical probability with the results of the experiment using both a small sample (individual student results) and a large sample (the combined results from all students in the class). Understand that probability results can be misleading if an experiment has too few trials. 	<p>Materials</p> <ul style="list-style-type: none"> BLM 7.29.1 BLM 7.30.1 Paper clips Dice Coins
Assessment (A) and DI (D) Opportunities		
Minds On...	<p>Teacher Directed → Whole Class → Discussion</p> <p>Give students a paper clip to act as the pointer on a spinner. Have students do the game 8 times from BLM 7.29.1 from the previous lesson. Have the students keep track of their results. Remind them of the terms “theoretical probability” and “experimental probability”. Looking at the tree diagram from Day 29, compare the results of their spin (experimental probability) to the theoretical probability.</p> <p>On a chart, record the results of 4 students. Compare the results of the 4 students (experimental probability) to the theoretical probability.</p> <p>On a different chart, record the results of the whole class. Compare the results of the whole class to the theoretical probability.</p> <p>Depending on the results, discuss how the results on each chart can be misleading if an experiment has too few trials or the sample size is too small. (e.g. if nobody won the game based on the first sample size, someone might assume that if you played the game you would never win if they saw the first chart)</p> <p>Define the term “sample size” and discuss how the sample size is 32 for the first chart. Ask the question: Do the results from these 32 trials represent what should happen to other people who will play the game?</p> <p>For the chart showing the results from the whole class, ask the question: Does this sample size represent what will happen to people who will play this game?</p>	<p>Theoretical probability – A mathematical calculation of the chances that an event will happen in theory.</p> <p>Experimental Probability – The likelihood of an event occurring, determined from experimental results rather than from theoretical reasoning.</p> <p>Sample Size – A representative group chosen from a population and examined in order to make predictions about the populations.</p>
Action!	<p>Individual → Exploration → Apply Understanding</p> <p>Have students conduct a probability experiment, using BLM 7.30.1. Students are familiar with this question from Day 28 BLM 7.28.1 question 1. OR</p> <p>If you have access to Gizmos (and it has not already used), students can use the following probability experiments online from www.explorelarning.com :</p> <p>a) Compound Independent Events http://www.explorelarning.com/index.cfm?method=cResource.dspResourcesForCourse&CourseID=233</p> <p>b) Theoretical or Experimental Probability http://www.explorelarning.com/index.cfm?method=cResource.dspResourcesForCourse&CourseID=233</p> <p>Curriculum Expectations/ Application/Checklist: Assess students’ understanding of being able to conduct a probability experiment and being able to compare theoretically probability to experimental probability based on sample size.</p>	<p> Use the second Gizmo</p>
Consolidate Debrief	<p>Whole Class → Discussions</p> <p>Discuss how the sample size will reflect the accuracy of theoretical probability when compared to experimental probability. Also, discuss that probability games have an element of chance (somebody has to win the lottery).</p> <p>Discuss the importance of an appropriate sample size when comparing theoretical probability to experimental probability.</p> <p>Discuss real life examples where probability, percents, fractions and decimals could be misleading (e.g., advertisements’ claims based on percentages where sample sizes are not known, or the number of trials of a given event are not shared).</p>	
<i>Application Reflection</i>	<p>Home Activity</p> <p>To prepare for Lesson 31, think of everyday applications of probability and bring in samples from: magazines, the internet, books, newspapers etc.</p>	

7.30.1: Comparing Theoretical and Experimental Probability


Grade 7

Below is a tally chart for flipping a coin and rolling a 6-sided die. Conduct the experiment 24 times and complete the chart.

(All of the possible outcomes have been provided for you in the first column)

Outcome		Tally	Total	Experimental Probability (Fraction)	Experimental Probability (Percent)	Theoretical Probability (Fraction)	Theoretical Probability (Percent)	Experimental = Theoretical? (yes or no)
<i>Flip</i>	<i>Roll</i>							
H	1							
H	2							
H	3							
H	4							
H	5							
H	6							
T	1							
T	2							
T	3							
T	4							
T	5							
T	6							

- For how many of the outcomes were your experimental probabilities equal to the theoretical probability? How many were close? Which was the furthest away? Does that make sense?
- If we gathered the whole class' data, would you expect similar results to what you obtained individually?

Unit 7: Day 31: Application of Probability in the World		Grade 7
	Math Learning Goals <ul style="list-style-type: none"> Examine everyday applications of probability, e.g. batting averages, goalie statistics, weather forecasts, opinion polls, etc. Research and report on probabilities expressed in fraction, decimal, and percent form. 	Materials <ul style="list-style-type: none"> BLM 7.31.1 BLM 7.31.2 BLM 7.31.3
Assessment (A) and DI (D) Opportunities		
Minds On...	Whole Class → Discussion Display and discuss real life examples of probability that students brought in from the Day 30 'At Home Activity'. If students didn't bring any; brainstorm examples and discuss what each example means in terms of probability. How are these examples represented? (words, fractions, decimals and percents) <u>Possibilities</u> : weather results, lotteries or gaming, sports betting, "risks" in the financial world, demographic predictions based on population statistics, car insurance rates based on probabilities of certain ages/genders getting in accidents, etc. Discuss a few examples in sports where knowledge of probability can help provide information about more favourable outcomes. These outcomes can help predict who has a better chance of winning and aid in decision-making. Discuss a few examples where the outcomes are affected by chance even when the probability of an event has been given (e.g., weather, lotteries, scratch tickets, etc.). Also talk about statistics that apply to teenagers. What are your chances of becoming a smoker? What are the chances that someone in this class will smoke?	Statistics on smoking can be found at: http://www.familyfirstaid.org/teen-smoking.html .
Action!	Pairs or Individual → Research and Application Students will complete BLM 7.31.1 using BLM 7.31.2 (which is a collection of sample statistical data) or the Internet. Students could use the following sentence starter: What are the odds that ... <i>Examples: Someone will be struck by lightning once? Twice? Or win the Roll up the Rim to Win Contest at Tim Hortons?)</i> Use any website that gives statistics. Students could change the population or sample size to match their school size, class or town/city. (Comparing statistical data with different sample sizes) Possible Ideas/ Websites Statistics Canada (students can also look at census data for their city or town) http://www.statcan.gc.ca/ Tim Hortons Roll Up the Rim to Win Contest http://www.rolluptherimtown.com/en/rules.php Sports Statistics www.mlb.com , www.nhl.com , www.nba.com Weather http://www.theweathernetwork.com/ Lottery Statistics http://www.lotto649stats.com/lotto649.html http://www.cbc.ca/news/background/gambling/lotteries.html Curriculum Expectations/ Application/Rubric: Assess students' ability to research a real life example of probability and their ability to effectively communicate and apply their knowledge.	Remind students about equivalent fractions when trying to relate statistics to a different sample size. This would allow students to make connections to transfer and apply knowledge.
Consolidate Debrief	Gallery Walk → Whole Group Discussion Have students walk around the room and read other students' work. After students have completed a gallery walk discuss anything they found interesting or questions they still might have.	
<i>Application Exploration</i>	Home Activity or Further Consolidation Challenge the students to try to find an interesting or bizarre math fact that is a real life example of probability OR complete BLM 7.31.3.	<div style="background-color: black; width: 15px; height: 15px; display: inline-block; vertical-align: middle;"></div> Highlight the appropriate columns in the data table and/or discuss headings.

7.31.1 Applications of Probability in the World

Grade 7

Name: _____

Date: _____

Find out the probability (could be a decimal, percent or fraction) of something happening in the real world and fill out the following chart. Refer to BLM 7.31.2.

Math Fact(s) that is a Real Life Example of Probability:
Source:
Explain how the math fact you have chosen is a good real life example of probability.
How would people use your fact?
Who would use your math fact and why?
Can you apply your statistic to the population of your class? School? Town or city? Future events?

7.31.2: Applications of Probability in the World

Grade 7

Name: _____







Date: _____

Use any of the following real-life statistics to complete the worksheet 7.31.1.

<u>Roll Up the Rim to Win!!!</u> Total Cups: 281 686 000 Cars: 35 \$100 Gift Card: 25 000	<u>Lotto 649 Odds</u> Jackpot Winner: 1 in 13 983 816 5 out of 6 numbers: 1 in 55 491 4 out of 6 numbers: 1 in 1032 3 out of 6 numbers: 1 in 57
<u>Statistics from one study by CDC</u> (High school students smoking) 23% in 2005 22% in 2003 36% in 1997	<u>Hockey</u> Goalie Goals Against Average (GAA): 3.15 Goalie Save Percentage: .913
<u>Unemployment Rate</u> Overall: 8.6% Ages 15-24: 15.9%	<u>Total Sales at a Store</u> Year: Up 3.5% Month: Down 1.1%

Long Term Forecast Updated: Friday, July 10, 2009, 8:00 EDT

(from: theweathernetwork.com)

	Saturday Jul. 11	Sunday Jul. 12	Monday Jul. 13	Tuesday Jul. 14	Wednesday Jul. 15	Thursday Jul. 16
						
	Thunderstorms	Cloudy periods	Sunny	Sunny	Isolated showers	Variable cloudiness
<u>P.O.P.</u>	90%	0%	0%	0%	40%	20%
<u>High</u>	26°C	22°C	23°C	23°C	24°C	16°C
<u>Feels Like</u>	35	-	-	-	-	-
<u>Low</u>	15°C	15°C	15°C	15°C	13°C	13°C
<u>Wind</u>	SW 20 km/h	W 15 km/h	W 15 km/h	W 15 km/h	SE 10 km/h	W 20 km/h
<u>24-Hr Rain</u>	2-4 mm	-	-	-	less than 1 mm	-

(Note: P.O. P. is probability of precipitation)

7.31.3: Applications of Probability in the World

Grade 7

Name: _____

Date: _____

2007 Raptors Playoffs Statistics

PLAYER AVERAGES

Player	G	GS	MPG	FG%	3p%	FT%	REBOUNDS			APG	SPG	BPG	TO	PF	PPG
							OFF	DEF	TOT						
Chris Bosh	6	6	37.0	.396	.200	.842	1.20	7.80	9.00	2.5	.83	1.83	2.00	3.20	17.5
T.J. Ford	6	5	22.7	.487	.500	.810	.80	.80	1.70	4.0	1.17	.33	2.33	1.20	16.0
Anthony Parker	6	6	40.0	.419	.400	.795	.50	4.80	5.30	1.0	1.50	.33	1.17	3.00	15.2
Jose Calderon	6	1	24.3	.507	.250	.833	.30	1.30	1.70	5.3	.83	.00	2.50	2.00	13.0
Andrea Bargnani	6	3	30.2	.478	.412	.789	.50	3.50	4.00	1.0	.83	.50	1.17	2.70	11.0
Morris Peterson	6	2	30.5	.517	.500	.833	.80	3.70	4.50	.3	.33	.33	1.00	3.30	6.8
Rasho Nesterovic	5	4	14.2	.467	.000	1.000	2.00	2.60	4.60	.6	.00	.40	.80	.80	3.4
Juan Dixon	6	0	10.5	.381	.250	.000	.00	.70	.70	.5	1.17	.00	1.67	1.00	3.0
Joey Graham	6	3	18.2	.286	.000	.800	.20	3.20	3.30	.3	.67	.00	1.00	2.00	2.7
Luke Jackson	3	0	3.7	.000	.000	1.000	.30	1.30	1.70	.3	.33	.00	.33	1.00	2.0
Kris Humphries	6	0	11.5	.333	.000	.375	1.20	1.70	2.80	.2	.17	.33	.50	1.80	1.5
Darrick Martin	2	0	4.0	.000	.000	1.000	.00	.50	.50	1.0	.00	.00	.00	.00	1.0

- A. Using the table (Toronto Raptors 2007 Playoffs) complete the following questions.
- Which players made just less than half of their shots (FG%) during the playoffs?
 - If you were the coach who would you want shooting a foul shot (FT%) at the end of a game?
 - If Jose Calderon were to shoot 20 3-pointers (3p%), how many do you think he would make?
 - Would it be better for Morris Peterson to focus on the percentage statistics (FG%, 3p% and FT%) or the other ones (Rebounds, Assists-APG, Points-PPG, etc.) when discussing a new contract with the Raptors? Justify your answer.
- B. As a team, The Toronto Blue Jays were batting .275 at one point in the season.
- If they had 40 bats in a game, how many hits would you expect them to get?

7.31.3: Applications of Probability in the World Solutions

Grade 7

Name: _____

Date: _____

2007 Raptors Playoffs Statistics

PLAYER AVERAGES

Player	G	GS	MPG	FG%	3p%	FT%	REBOUNDS			APG	SPG	BPG	TO	PF	PPG
							OFF	DEF	TOT						
Chris Bosh	6	6	37.0	.396	.200	.842	1.20	7.80	9.00	2.5	.83	1.83	2.00	3.20	17.5
T.J. Ford	6	5	22.7	.487	.500	.810	.80	.80	1.70	4.0	1.17	.33	2.33	1.20	16.0
Anthony Parker	6	6	40.0	.419	.400	.795	.50	4.80	5.30	1.0	1.50	.33	1.17	3.00	15.2
Jose Calderon	6	1	24.3	.507	.250	.833	.30	1.30	1.70	5.3	.83	.00	2.50	2.00	13.0
Andrea Bargnani	6	3	30.2	.478	.412	.789	.50	3.50	4.00	1.0	.83	.50	1.17	2.70	11.0
Morris Peterson	6	2	30.5	.517	.500	.833	.80	3.70	4.50	.3	.33	.33	1.00	3.30	6.8
Rasho Nesterovic	5	4	14.2	.467	.000	1.000	2.00	2.60	4.60	.6	.00	.40	.80	.80	3.4
Juan Dixon	6	0	10.5	.381	.250	.000	.00	.70	.70	.5	1.17	.00	1.67	1.00	3.0
Joey Graham	6	3	18.2	.286	.000	.800	.20	3.20	3.30	.3	.67	.00	1.00	2.00	2.7
Luke Jackson	3	0	3.7	.000	.000	1.000	.30	1.30	1.70	.3	.33	.00	.33	1.00	2.0
Kris Humphries	6	0	11.5	.333	.000	.375	1.20	1.70	2.80	.2	.17	.33	.50	1.80	1.5
Darrick Martin	2	0	4.0	.000	.000	1.000	.00	.50	.50	1.0	.00	.00	.00	.00	1.0

A. Using the table (Toronto Raptors 2007 Playoffs), complete the following questions:

1. Which players made just less than half of their shots (FG%) during the playoffs?

T.J. Ford, Andrea Bargnani and Rasho Nesterovic

2. If you were the coach, who would you want shooting a foul shot (FT%) at the end of a game?

Rasho Nesterovic, Luke Jackson or Darrick Martin

3. If Jose Calderon were to shoot 20 3-pointers (3p%), how many do you think he would make?

.250% = .25 = 1/4 He would make a quarter of the 20 shots = 5

4. Would it be better for Morris Peterson to focus on the percentage statistics (FG%, 3p% and FT%) or the other ones (Rebounds, Assists-APG, Points-PPG, etc.) when discussing a new contract with the Raptors? Justify your answer.

He would be better to use the percentage statistics because he is the highest on the team in FG% and 3p% and very good at FT% (.833). However, using the other statistics he is not the highest (rebounds-4th, points-6th, assists-almost last)

B. As a team, The Toronto Blue Jays were batting .275 at one point in the season.

1. If they had 40 bats in a game, how many hits would you expect them to get?

Many solutions possible:

$$.275 = \frac{275}{1000} = \frac{11}{40} \quad \text{or} \quad .275 \times 40 = 11$$

Online Student-Friendly Resources for Decimals

Using Decimals

- tenths “Railroad Repair” <http://pbskids.org/cyberchase/games/decimals/decimals.html>
- estimating and reading tenths, hundredths and thousandths “Decimal Darts”
<http://www.decimalsquares.com/dsGames/games/darts.html>
- tenths, hundredths and thousandths using a grid “Beat the Clock”
<http://www.decimalsquares.com/dsGames/games/beatclock.html> and “Concentration”
<http://www.decimalsquares.com/dsGames/games/concentration.html>
- online number line for tenths, hundredths and thousandths
http://www.mathsonline.co.uk/freesite_tour/resource/whiteboard/decimals/dec_notes.html

Ordering Decimals

- online number line for tenths, hundredths and thousandths
http://www.mathsonline.co.uk/freesite_tour/resource/whiteboard/decimals/dec_notes.html
- ordering tenths and hundredths “Switch” <http://www.interactivestuff.org/sums4fun/switch.html>
- ordering tenths and hundredths “Builder Ted”
<http://www.bbc.co.uk/education/mathsfile/shockwave/games/laddergame.html>
- ordering tenths, hundredths and thousandths “Place Value”
<http://www.decimalsquares.com/dsGames/games/placevalue.html>
- ordering hundredths using Olympic scores “The Award Ceremony”
<http://www.mathsonline.co.uk/nonmembers/gamesroom/awards/awardc.html>
- ordering thousandths and ten thousandths (hard!) “Decimals in Space”
<http://themathtgames.com/arithmetic-games/place-value/decimal-place-value-math-game.php>

Adding Decimals

- adding tenths, hundredths or thousandths “Decimal Squares Blackjack”
<http://www.decimalsquares.com/dsGames/games/blackjack.html>

Subtracting Decimals

- subtracting tenths, hundredths or thousandths “Rope Tug”
<http://www.decimalsquares.com/dsGames/games/tugowar.html>

Multiplying Decimals

- estimating, multiplying decimals “Decimal Speedway”
<http://www.decimalsquares.com/dsGames/games/speedway.html>

Converting Fractions and Decimals

- online converter between fractions and decimals
<http://www.shodor.org/interactivate/activities/Converter/>