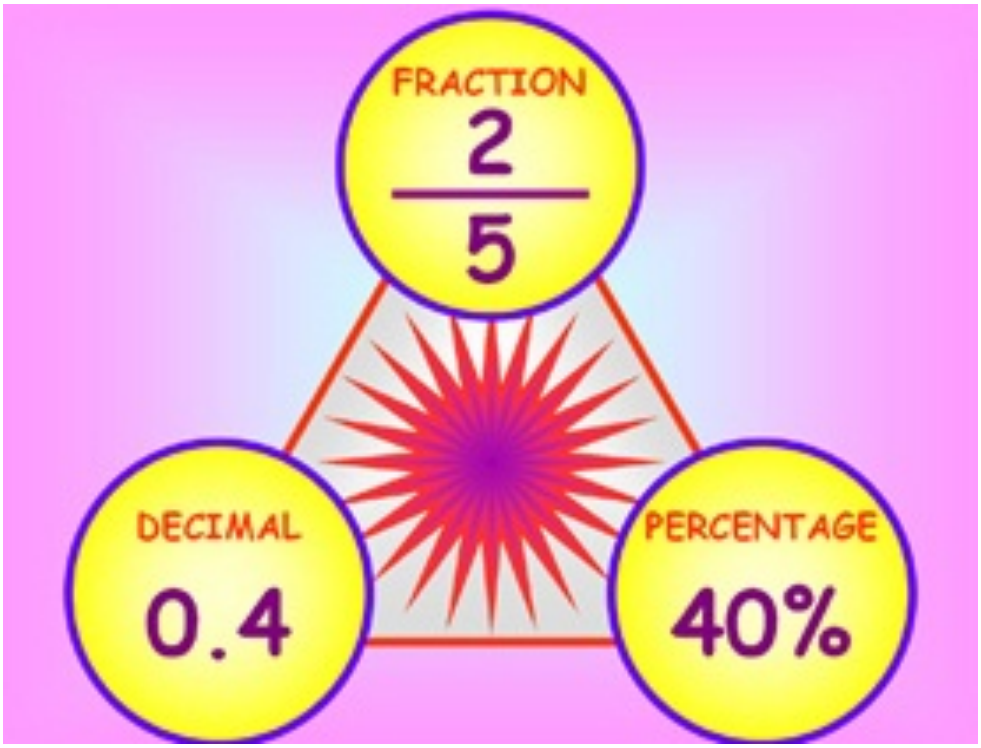
Part Numbers

Junior Mathematics
Study of Rounding, Place Value, Fractions and Decimals
(Grades 3,4 & 5)



http://www.mathx.net/image/convert_percent_decimals_fractions.jpg

LEARNING LOG

Name: _____

Junior Part Numbers Learning Log

First Edition, June 2016
3600 Yonge St.
Toronto, Ontario, Canada M4N3R8
Author: Barbara J. Smith

This document edition will be used as a pilot resource to support innovative schools. The intent of sharing this first version with students, staff and families, is so we can gather further input for future revisions of this living curriculum. All we ask is that if you use these materials that you give credit to the author(s) of this initial work, in your introduction.

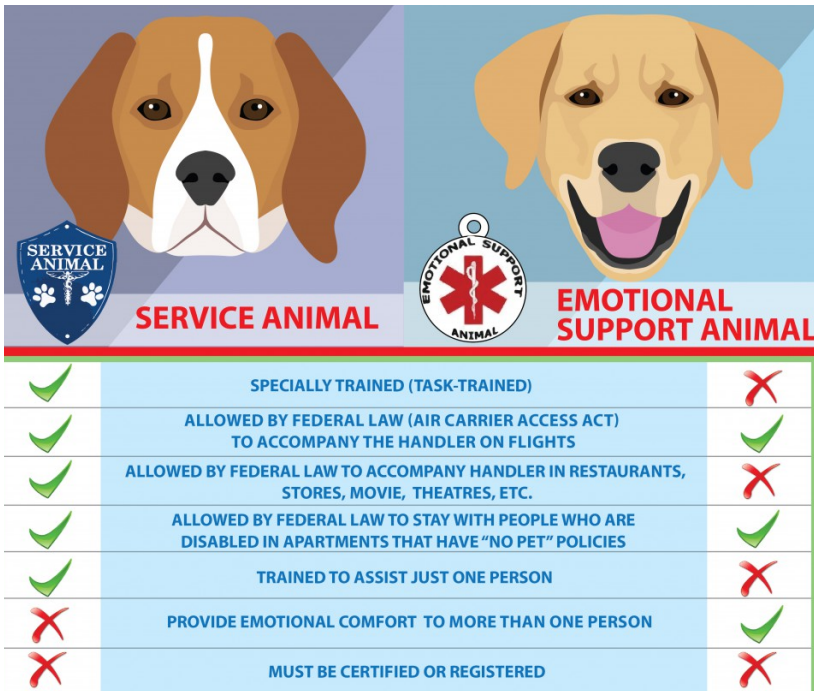
Acknowledgement: Many thanks to Mark Brown for providing some editorial support for this initial draft.

PURPOSE of LEARNING LOG RESOURCE:

1. To support the Ontario Mathematics Curriculum
2. To support independent and paired study during station work or during home study (holiday or at-home interest/extendedhomework activities)
3. To add support as an enrichment or remedial resource (students can work at their own pace)
4. To provide a learning log (evidence of learning) built in to student resources

What's in each lesson/unit?

- ***Check In*** – (diagnostic quiz – to reduce repeated teaching)
- ***Essential Targets (ET)*** – state or provincial expectations
- ***Examples*** (patterns for examining the math)
- ***TECH CHECK*** (more ways and examples for practicing the math)
- ***REAL WORLD Problems*** (context for math)
- ***Fun and Games*** (activities for making memories)
- ***Reciprocal Teaching*** (talking and demonstrating 'like a teacher')
- ***GOT IT*** (learning log/notebook evidence of learning)
- ***Habit Check*** (checking in on how students are doing the math)
- ***Extensions*** (students can extend where lesson leads next)
- ***Master Quiz*** (sample unit quiz)
- ***Math Project*** (culminating task revealing applied mastery of many ET's)



The MATH Challenge!

Trailblazer (Expert)	450 + points
Pathfinder (Apprentice)	400 - 449 points
Rookie (Novice)	< than 400 points

Challenge	Maximum Points
Rounding and Place Value Quiz	80
Decimals Quiz	100
Fraction Quiz	100
Percentage and Ratio Quiz	100
Comfort Dog Project	100
Learning Log Challenge (complete tasks in book)	10
Classroom Work	10
TOTAL	500

TABLE OF CONTENTS

- Read though the *Fractions and Decimals Glossary* on the next page with a partner and create 3 "What am I?" poems to share with your classmates.

Example: Choose the best answer from the list below:

I hover below a number on top
We are separated by a diving sign
What am I?

I think this might be a: _____.

Fractions and Decimals Glossary

Fraction - Any part of a whole. When you divide something into equal pieces, each piece is a fraction of the whole thing.

Numerator - The number on the top in a fraction. This number shows how many parts of the denominator are taken. For example, in 2/3, 2 parts of 3 are taken.

Denominator - The number on the bottom of a fraction. This number shows how many total parts there are.

Proper Fraction - A fraction that is less than one. Also called a common fraction.

Improper fraction - A fraction that is greater than one. They are also called **top heavy fractions**.

Mixed number - Mixed numbers are bigger than 1. A mixed number is a combination of a whole number and a common fraction. Example 2 ½.

Equivalent fraction Fractions that have the same value. You can make equivalent fractions by multiplying or dividing the top and bottom of a fraction by the same number.

Reducing, or simplifying fractions To simplify a fraction you divide the numerator and the denominator by the largest number that divides into both exactly. The value of the fraction stays the same.

Decimal number - A number with digits to the right of the decimal that signify fractional parts. These numbers have denominator of 10, 100, 1000 etc. They have a decimal point.

Decimal places - The numbers after the decimal point. It can be shortened to d.p. E.g. 10.948 has three decimal places after the point.

Compare - When you compare fractions, decimals or percentages, you have to work out the difference between the numbers.

- Create 3 of your own *Who Am I* poems:

Who am I?

Who am I?

Who am I?

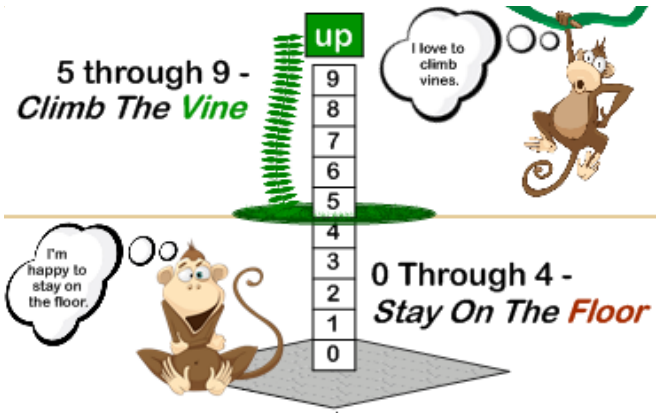
A. Rounding and Place Value

CHECK-IN: Maybe you already know all this? Show your teacher what you know!
*Go to Page 23 and Try the Decimals Test

1. Rounding Small Numbers

RULE: When rounding a number, you look to the right of the place value you're rounding, to decide what to do when rounding. If the number to the right is 5 or above you round the subject number up and replace the remaining numbers to the right with zeros. If it is below 5 you round down and replace with zeros.

EXAMPLES:



Rounding to the nearest 10:

54	1,379,377
Rounds down to 50	Rounds up to 1,379,380

Rounding to the nearest whole number (unit)

55.49	1,379,300.73
Rounds down to 55.00	Rounds up to 1,379,301.00

TECH CHECK:

- http://www.quiz-tree.com/Rounding-Numbers_decimal---round-off-to-the-nearest-hundredth-1_1imageXML.html
- http://www.softschools.com/quizzes/math/rounding/quiz837.html
- http://www.aplusmath.com/Flashcards/rounding.html

FUN & GAMES:

- What are the estimates to the nearest 10 for the following holes:

Hole	1	2	3	4	5	6	7	8	9	Out	10	11	12	13	14	15	16	17	18	In	Total
Blue	385	354	509	448	193	347	508	178	421	3,343	399	382	213	592	403	391	162	482	401	3,425	6,768
Blue Handicap	7	17	9	1	15	13	5	11	3		4	10	12	2	16	6	18	14	8		
White	364	326	491	425	168	330	484	157	399	3,144	386	354	190	565	378	363	150	457	368	3,211	6,355
White Handicap	7	17	11	1	15	13	5	9	3		4	10	12	2	16	6	18	14	8		
Men's Par	**4**	**4**	**5**	**4**	**3**	**4**	**5**	**3**	**4**	**36**	**4**	**4**	**3**	**5**	**4**	**4**	**3**	**5**	**4**	**36**	**72**
Women's Par										**0**										**0**	**0**

Hole Number	Actual Value (yards)	Rounded Value
1	364	360
5		
11		
16		

- Round each of the numbers to the nearest 1,000,000 (million); 100,000 (hundred thousand); 1000 (thousand); and 100 (hundred).

Round to	530,674	754,382	265,735
1000000			
100000			
1000			
100			

REAL WORLD PROBLEM:
Your school is ordering pencils that come in boxes of 100. If there are 3 classes and each class needs about 110 pencils, estimate how many boxes we should buy?

RECIPROCAL TEACHING:
- "Like a teacher" explain how to round whole numbers
- Share examples and teach rounding to a friend or family member.
- Use scrap paper or a notebook.
- Have your friend or family member change places and replay what you taught.

GOT IT!
- Round to the nearest hundred.

(a) 435,601 = _____

(b) 150 =_____

(c) 8,471,085 = _____

How well did I do on this task?	Guide ☺ (Expert)	Pathfinder (Apprentice)	Rookie (Training to be an expert!)

Essential Target (ET) - Use place value from 0.001 to 1 billion.

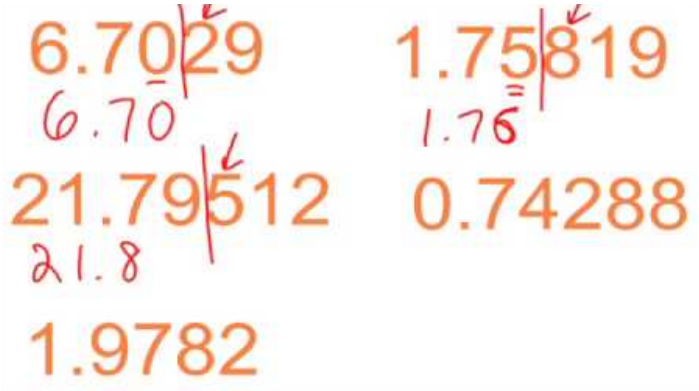
2. Rounding Large Numbers

RULE: The trick is to read the question CAREFULLY. If you are asked to round to something with a "th" on the end, then you are rounding to a decimal number. If you are rounding to the tenths – you must look at the number in the hundredths column. Always look to the right of your subject number for your clue! If it is 5 or more you ROUND UP!

EXAMPLES:

Round to the	**4,703,112.647**	**6,428,020.7008**
10^{th}	4,703,112.6	6,428,020.7
100^{th}	4,703,112.65	6,428,020.70
1000^{th}	4,703,112.647	6,428,020.701
1	4,703,113	6,428, 021
10	4,703,110	6,428,020
100	4,703,100	6,428,000
10,000	4,700,000	6,430,000
100,000	4,700,000	6,400,000
1,000,000	5,000,000	6,000,000

Rounding to the nearest hundredths:

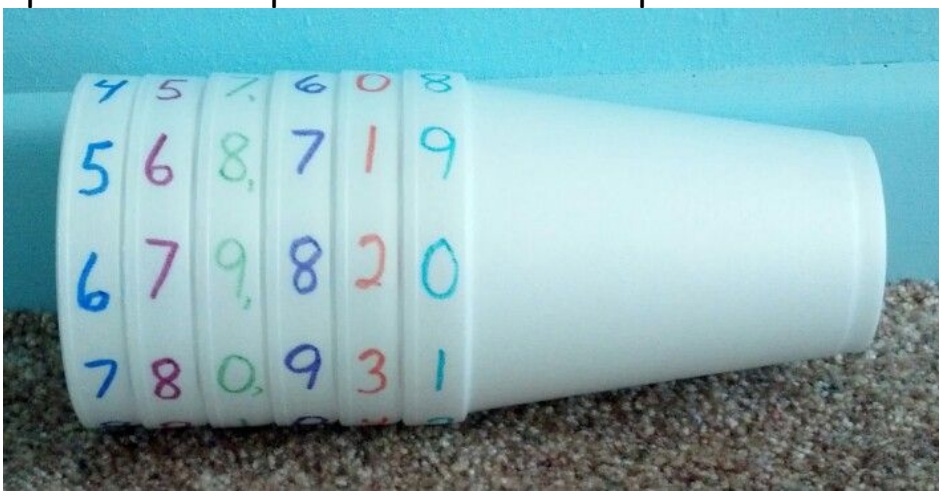


TECH CHECK:

- http://www.scienceacademy.com/BI/round.htm
- http://www.bbc.co.uk/scotland/learning/bitesize/standard/maths_i/numbers/rounding_rev1.shtml
- http://www.numbernut.com/advanced/activities/estimate_quiz_round100th.shtml
- http://www.bbc.co.uk/scotland/learning/bitesize/standard/maths_i/numbers/rounding_activity.shtml
- http://www.bbc.co.uk/education/mathsfile/shockwave/games/roundoff.html
- http://www.aaamath.com/B/g32_rox2.htm

FUN & GAMES

- Create a 'place value' cup with three decimal places.



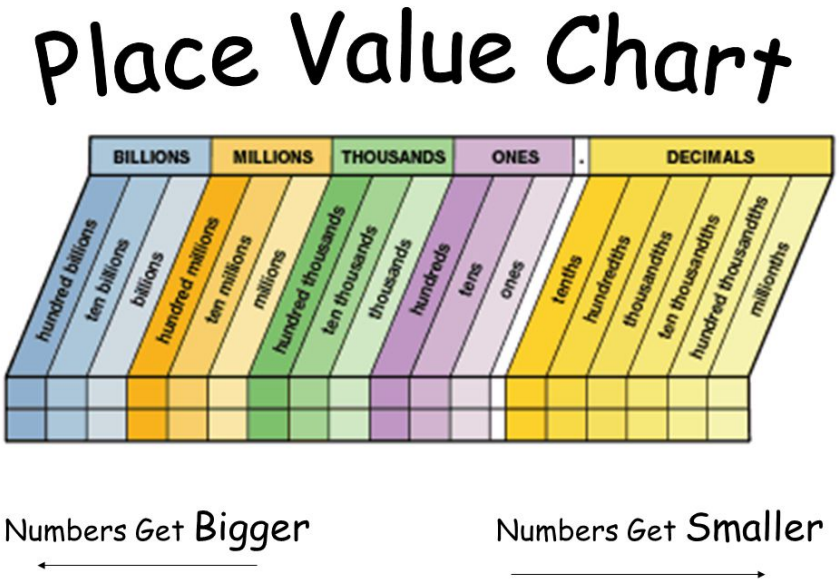
- Create a combination whole and part number Place Value Cup.

- Using place value cups count aloud from 3.7 forward to 4.7, using the fractional amount to describe part numbers. (i.e. "Three and seven tenths, three and eight tenths, three and nine tenths, four…)
- Then count forward from 2.96 to 3.23 by hundredths to two decimal places, using the place value cup fractional amount to describe the part numbers. (i.e. "*Two and ninety-six hundredths, two and ninety-seven hundredths, two and ninety-eight hundredths, two and ninety-nine hundredths, three, three and one hundredth*, …").

RULE: A digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.

FUN & GAMES:

- Create a giant classroom place value chart.
- Roll a die/box seven times to make a number.
- Roll a second die/box that has the words, "Tens", "Hundreds", "Thousands", "Ten Thousands", "Hundred Thousands" and "millions" on it.
- To score a point, a pair from two teams shouts out what numbers falls within the place value.



http://slideplayer.com/slide/5937775/20/images/9/Place+Value+Chart+Numbers+Get+Bigger+Numbers+Get+Smaller.jpg

RECIPROCAL TEACHING:

- "Like a teacher" explain how to round decimal numbers.
- Share examples and teach rounding decimals to a friend or family member.
- Use scrap paper or a notebook.
- Have your friend or family member change places and replay what you taught.

RULE: Sometimes you have to guess at the likelihood or probability of numbers.

- Circle the word you think makes most sense and then respond with your reason below:

1. What is the likelihood of kayaking in June?
    - impossible
    - possible
    - certain

    Why? _____

2. What is the likelihood of biking in January?
    - impossible
    - possible
    - certain

    Why? _____

3. What is the likelihood of going to the market in May?
    - impossible
    - possible
    - certain

    Why? _____

10,000 Steps

If you buy a smart pedometer or fitness tracker like a Fitbit, chances are the device will encourage you to take 10,000 steps a day. But do you really have to walk this much to be healthy? Experts say that while 10,000 steps a day is a good number to reach, any amount of activity beyond what you're currently doing will likely benefit your health. The origins of the 10,000-steps recommendation aren't exactly scientific. Pedometers sold in Japan in the 1960s were marketed under the name "manpo-kei," which translates to "10,000 steps meter," said Catrine Tudor-Locke, director of the Walking Behavior Laboratory at Pennington Biomedical Research Center in Baton Rouge, La. http://www.livescience.com/43956-walking-10000-steps-healthy.html#sthash.4EUongsY.dpuf

According to Kyle's Converter **10,000 steps = 7620 meters** which is approximately 7.6 km. *http://www.kylesconverter.com/length/steps-to-meters.*

Challenge **– How many times do you think you would have to walk around a golf course to get in 10,000 steps a day?**

I estimate that I would have to walk around a golf course _____ times to get in my 10,000 steps a day.

http://www.bluemountain.ca/golf.htm

- Let's check out the yardage on several golf courses to see if you need to walk around more than one course to get in 10,000 steps.

Golf Course	Total Yardage	Meters	Km
Atoka at Cranberry	6556	5994.806	
Batteaux Creek Golf Club	6768	6188.659	
Blue Mountain Golf & Country Club	6097	5575.097	
Cobble Beach	7134	6523.33	
Georgian Bay Club	7108	6499.555	
Monterra Golf Club	6581	6017.666	

- What is the likelihood of doing 10,000 steps if you climb up the Ridge Runner Mountain Coaster 7 times (note the coaster is 1km long).

  - impossible
  - possible
  - certain

Why? _____

Snowfall

- How much snow do you think has fallen at Blue Mountain Ski Resort between 2013 and 2016?

I estimate that _____ meters have fallen at Blue Mountain Ski Resort!

Let's check it out!

- Look up the historical snow thickness at Blue Mountain Ski Resort and add up total snowfall and the number of snowfall days from 2013 to 2016.
- Convert the data to meters from centimeters.
- Place the cm and converted meter readings in the table below.

Blue Mountain Ski Resort Snow History	**cm (from website)**	**M (conversion) /100**
2013 snowfall		
2013 snowfall days		
2014 snowfall		
2014 snowfall days		
2015 snowfall		
2015 snowfall days		
2016 snowfall		
2016 snowfall days		

- Place the sum totals on the place value chart below.

	100	10	1	.1	.01
Total Snowfall					
Total Snowfall Days					
Average Base					

http://www.onthesnow.ca/pennsylvania/blue-mountain-ski-area/historical-snowfall.html?&y=0&v=calendar

Approximately

- Research 4 nature facts about living things.
- List the ACTUAL figures below and then round each number to an APPROXIMATE VALUE for purposes of sharing information with people.
- You can search on-line and in classroom materials.
- Each classmate must have different facts – so check to make sure no one has listed your fact.

Nature Fact	Actual Value	Approximate Value
A honeybee hive cell is 5.08 mm wide in nature.	5.08mm	$\frac{1}{2}$ cm

GOT IT!

- Round each of the numbers to the nearest 100,000, 1000, 100, .1 (tenth) and .01 (hundredths).

Round to the nearest	530,674.346	754,382.154	265,735.458
(a) 100000			
(b) 1000			
(c) 100			
(d) .1			
(e) .01			

- Complete the rounding chart for each of the following:

Round to the nearest	44,328.9356	5,835,600.045
(f) 100000		
(g) 1000		
(h) 100		
(i) .1		
(j) .01		

- Round to the nearest tenth.

(k) 435,601.35 = _____

(l) 1.50 =_____

(m) 8,471,001.79 = _____

(n) What is the likelihood of skating in May?

- less likely
- equally likely
- more likely

Why? _____

How well did you use place value from .01 to 1 billion?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

3. Doing Operations with Rounding and Estimating

RULE: Estimation often uses rounding to make quick but accurate 'guesses' of total values.

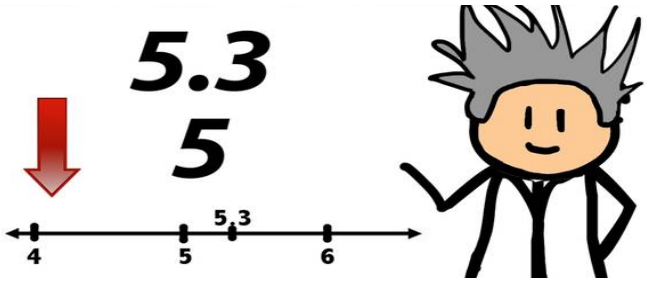
EXAMPLES:

Addition & Subtraction– front end estimation	Addition & Subtraction (with rounding)
4943 + 3755 4900 + 3700 = 8600 4943 – 3755 4900 – 3700 = 1200	4943 + 3755 4900 + 3800 = 8700; 4943 + 3755 4900 – 3800 = 1100
Actual: Addition = **8698; Subtraction = 1188**	

Multiplication (using rounding)	Division (using rounding)
496 x 43 500 x 40 =20,000	496: 43 500: 40 = 12.5
Actual: 496 x 43 = 21,328	Actual 496: 43 = 11.54

TECH CHECK:

- http://www.aaamath.com/B/g3_73ax2.htmhttp://www.bbc.co.uk/scotland/learning/bitesize/standard/maths_i/numbers/quiz/rounding/
- http://www.softschools.com/quizzes/math/estimation_multiplication/quiz691.html
- http://www.aaastudy.com/est-dec-sum.htm
- http://www.homeschoolmath.net/teaching/md/estimation.php



GOT IT!

- Complete and SHOW YOUR WORK!

(a) Estimate the sum of 5926 and 3633. Compare your estimate to the actual value.	Rough Work ☺
(b) Estimate 837 x 29. Compare your estimate to the actual value.	Rough Work ☺

(c) Use estimation to calculate 817/75. Compare your estimate to the actual value.	Rough Work ☺

How well did I do on this task?	Guide ☺ (Expert)	Pathfinder (Apprentice)	Rookie (Training to be an expert!)

Rounding and Place Value Quiz

1) Circle the place value of the 3 in each number:

(a) 200.3	tens	tenths	hundredths
(b) 161,304.775	thousands	hundreds	hundredths
(c) 7, 488, 228.435	tenths	thousands	hundredths

2) What place value is the "3" in each number?

(a) 200.4953 - _____
(b) 7,321,161,504.775 - _____
(c) 7, 488, 228.435 - _____

3) Round the following numbers to the nearest 10:

97 - _____ 13 - ____

4) Round the following numbers to the nearest tenth:

(a) 44.55 -_____ (b) 97.407 - _____

5) Round the following number to the nearest hundredth:
15,644.5574

When a quiz is created, you have a chance to submit possible problems that may be selected for the section quiz.

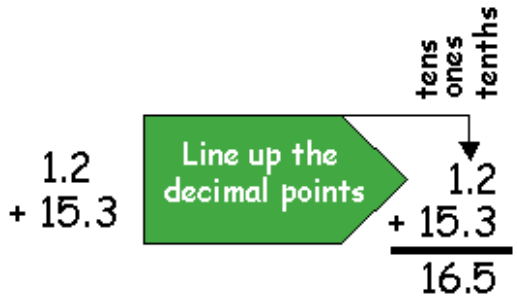
B. Decimals

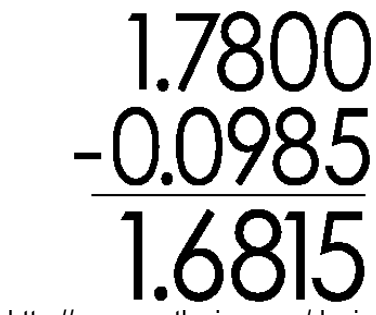
CHECK-IN:
Maybe you already know all this? Show your teacher what you know!
*Go to Page 35 and Try the Decimals Test

4. Adding and Subtracting Decimals

RULE: When adding or subtracting numbers with decimals the place values of the numbers must align vertically. In other words, line up the decimals!

EXAMPLE:





http://www.mathwizz.com/decimals/help/help3.gif

TECH CHECK:

- http://www.math.com/school/subject1/lessons/S1U1L4GL.htmlhttp://www.helpingwithmath.com/printables/worksheets/dec0601subtracting01.htm
- http://www.helpingwithmath.com/printables/worksheets/dec0601subtracting02.htm
- http://www.homeschoolmath.net/teaching/d/add-decimals.php
- http://www.youtube.com/watch?v=rO9Df3vEkN8
- http://www.aplusmath.com/cgi-bin/Worksheets/OnlineMoneyTest
- http://www.funbrain.com/cgi-bin/fb.cgi?A1=start2&A2=Hard&ALG=No&Submit=Let%27s+Pla

RECIPROCAL TEACHING:

- "Like a teacher" explain how to add and subtract decimal numbers.
- Share examples and teach how to add and subtract decimals to a friend or family member.
- Use scrap paper or a notebook.
- Have your friend or family member change places and replay what you taught.

REAL WORLD PROBLEM:

Albert used a calculator to add 7.45 and 2.39. The calculator display showed 31.35. Explain why this result does not make sense.

- Where do you think Albert went wrong?

I think…

STEP OUTSIDE:

- Using a measuring tape, measure in meters the distance of the main driveway. Then measure the distance from of the school driveway.
- Determine how much the one road is longer than the other by subtracting the two numbers. Place your calculations below:

	Rough Work ☺

How well did I do on this task?	Trailblazer ☺ (Expert)	Pathfinder (Apprentice)	Rookie (Training to be an expert!)

GOT IT! Complete and SHOW YOUR WORK!

(a) 104.743 + 7.09	Rough Work ☺
(b) 1,395,592.01 + 37,884. 887	Rough Work ☺
(c) 5,427,336.002 – 3,411.95	Rough Work ☺

How well did you add and subtract decimal numbers?	Trailblazer ☺ (Expert)	Pathfinder (Apprentice)	Rookie (Training to be an expert!)

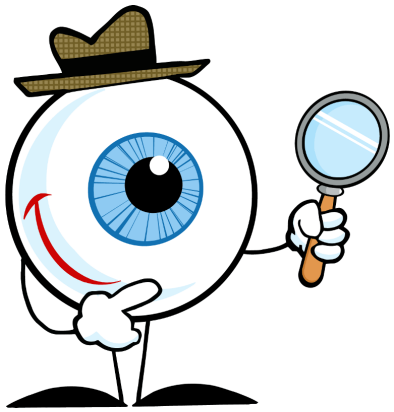
5. **Multiplying Decimals**

RULE: When you're finished multiplying, make sure to add up all the decimal numbers there are in the question and count from the right that many places to insert the decimal point accurately into the question. Does your placement make sense? (Use estimation to decide.)

- Multiply 5, 34, and 183 by 0.1, 0.01, and 0.0 01 using a calculator:

MULTIPLY	0.1	0.01	0.001
5			
34			
183			

- Do you see any patterns? List your own rule below for the pattern.



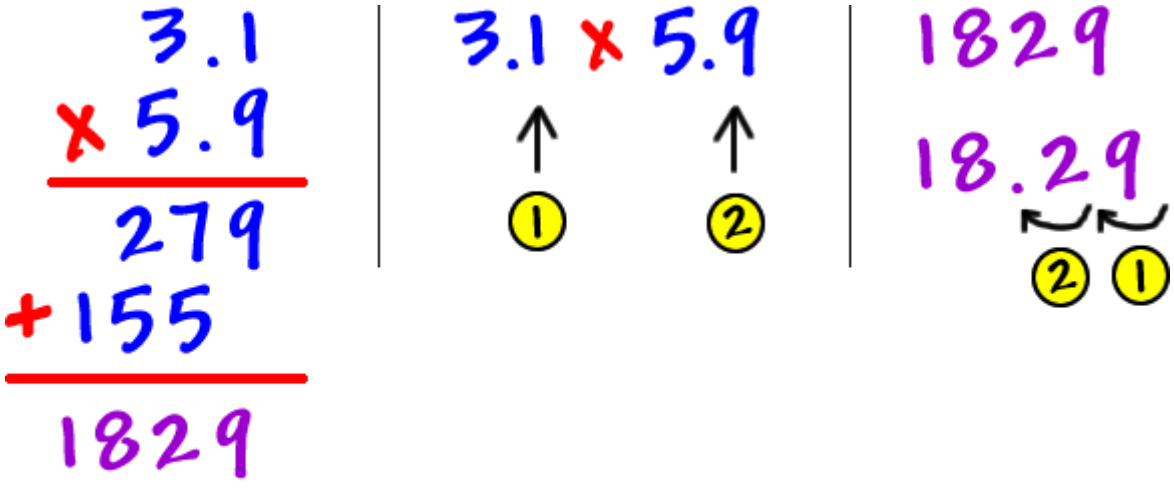
EXAMPLES:

$$\begin{array}{r} 3.5 \\ \times\ .3 \\ \hline 1.05 \end{array}$$

$$\begin{array}{r} .05 \\ \times\ .6 \\ \hline 0.030 \end{array}$$

$$\begin{array}{r} .52 \\ \times\ .24 \\ \hline 208 \\ 1040 \\ \hline 0.1248 \end{array}$$

http://www.mathsisfun.com/numbers/decimals-multiplying-animation.html



So, 3.1 x 5.9 = 18.29

https://cdn-media1.teachertube.com/static-pages/img/multiply-decimals.gif

TECH CHECK:

- http://www.math.com/school/subject1/lessons/S1U1L5GL.html
- http://www.mcwdn.org/Decimals/MultDecQuiz.html
- http://images.google.com/imgres?imgurl=http://www.onlinemathlearning.com/image-files/cliari53.jpg&imgrefurl=http://www.onlinemathlearning.com/multiply-fractions.html&usg=__pF4oStda87IPpQ9qc6ypDzjM804=&h=269&w=352&sz=11&hl=en&start=13&um=1&itbs=1&tbnid=kz5j9RxagyxuvM:&tbnh=92&tbnw=120&prev=/images%3Fq%3Dmultiplying%2Bfractions%26um%3D1%26hl%3Den%26sa%3DN%26tbs%3Disch:1
- http://www.aaamath.com/fra66m-multfract.html
- http://www.math.com/school/subject1/lessons/S1U4L4GL.html http://www.youtube.com/watch?v=FrJeBVK1EsQ
- http://www.youtube.com/watch?v=uiwN8Zj_0vs&NR=1

RECIPROCAL TEACHING:

- "Like a teacher" explain how to multiply decimal numbers.
- Share examples and teach how to multiply decimals to a friend or family member.
- Use scrap paper or a notebook.
- Have your friend or family member change places and replay what you taught.

Practice:

	.35 x .3 .105	3.5 x .03	.35 x .05 .0175
.8 x .6		.07 x .03 .0021	.82 x .9
.45 x .4	.63 x .5		.29 x .12 58 380 .0438

GOT IT!

- Complete the following questions:

.34	.008	.004	.035
x .52	x 5	x .6	x .04

How well did you multiply decimal numbers?	Trailblazer ☺ (Expert)	Pathfinder (Apprentice)	Rookie (Training to be an expert!)

6. Dividing Decimals

RULE: You may need to multiply both numbers you are dividing by 10 or more to make it possible to divide – if the divisor is a decimal number. It must be a whole number so the decimal point is placed in the quotient accurately!

EXAMPLES:

Some questions can be done without long division.

(a) 6.04 ÷ 2 = = 3.02

(b) 0.24 ÷ 4 ==.06

(c) 8.2 ÷ 10 = .82

(d) 7.2 ÷ 100 = .072

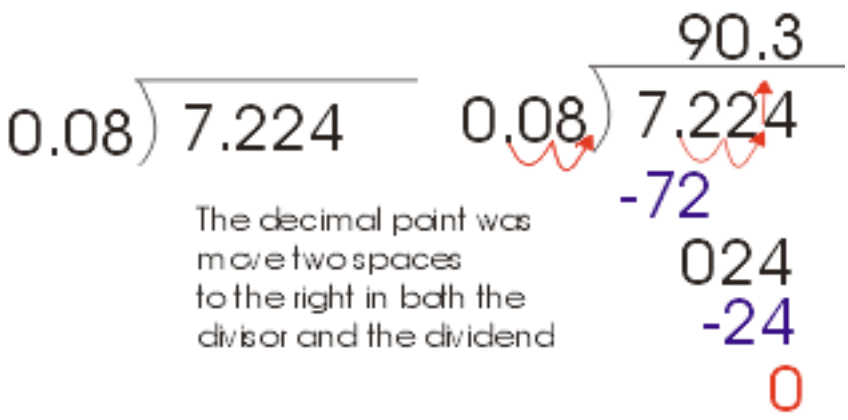
Talk about what happened

Dividend ÷ Divisor = Quotient

We are to name the number of times one number, called the *divisor*, is contained in another number, called the *dividend*.

That number of times it fits is called the *quotient*.

```
      0.31
8.4.)2.6.04
   -2 5 2
      84
     -84
       0
```



Find the quotient.

55.318 ÷ 3.4 → 3.4) 55.318 Write in standard form.

3.4) 55.318 Move decimal point in divisor and dividend.

16.27
3.4) 55.318 Keep dividing until quotient repeats or comes out evenly.
- 34
213
- 204
91 Add zeros on right of dividend as needed.
- 68
238
- 238
0

The quotient is 16.27.

TECH CHECK:

- http://www.coolmath.com/prealgebra/02-decimals/10-decimals-dividing-by-decimal-01
- https://www.mathsisfun.com/dividing-decimals.html
- http://www.math.com/school/subject1/lessons/S1U1L6DP.html
- https://www.khanacademy.org/math/arithmetic/arith-decimals/arith-review-dividing-decimals/v/long-division-with-decimals

Practice

- Look at the following answers and then match them up by doing <u>three questions</u> on the next page:

<u>186.25; 11.174; 500; 1645.6363; 3.506; 0.03823</u>

35.06 ÷ 10	**Rough Work ☺**
38.23 ÷ 1000	
22.35 ÷ 0.12	
25 ÷ 0.05	
10.057 ÷ 0.9	
18.102÷ 0.011	

RECIPROCAL TEACHING:

- "Like a teacher" explain how to divide decimal numbers.
- Share examples and teach how to divide decimals to a friend or family member.
- Use scrap paper or a notebook.
- Have your friend or family member change places and replay what you taught.

GOT IT!

(a) 336 divided by 64

(b) 1.20 divided by 25

(c) 4.16 divided by .8

Decimal Quiz

1. Adding and Subtracting Decimals

(a) 5.41 + 1.42	
(b) 1885.73 – 76.46	
(c) 2000.52 – 159. 31	

2. Multiplying Decimals

(a) .43 x .04	
(b) 2.95 x 3.2	
(c) 4.270 x 8.692	

3. Dividing Decimals

(a) 315.9 divided by 13	
(b) 6.85 divided by .5	
(c) 5.292 divided by .03	

How well did I do on this task?	Trailblazer ☺ (Expert)	Pathfinder (Apprentice)	Rookie (Training to be an expert!)

C. Fractions

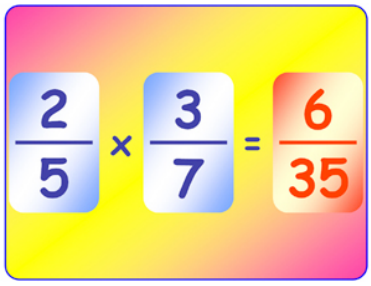
CHECK-IN:
Maybe you already know all this? Show your teacher what you know!
*Go to Page 107 and Try the Fractions Test

ET - Multiply, divide, reduce & convert between proper, mixed & improper fractions.

7. Multiplying Fractions

RULE: Simply multiple the numerators and denominators. It is more accurate if you can reduce them before so you are multiplying with smaller numbers.

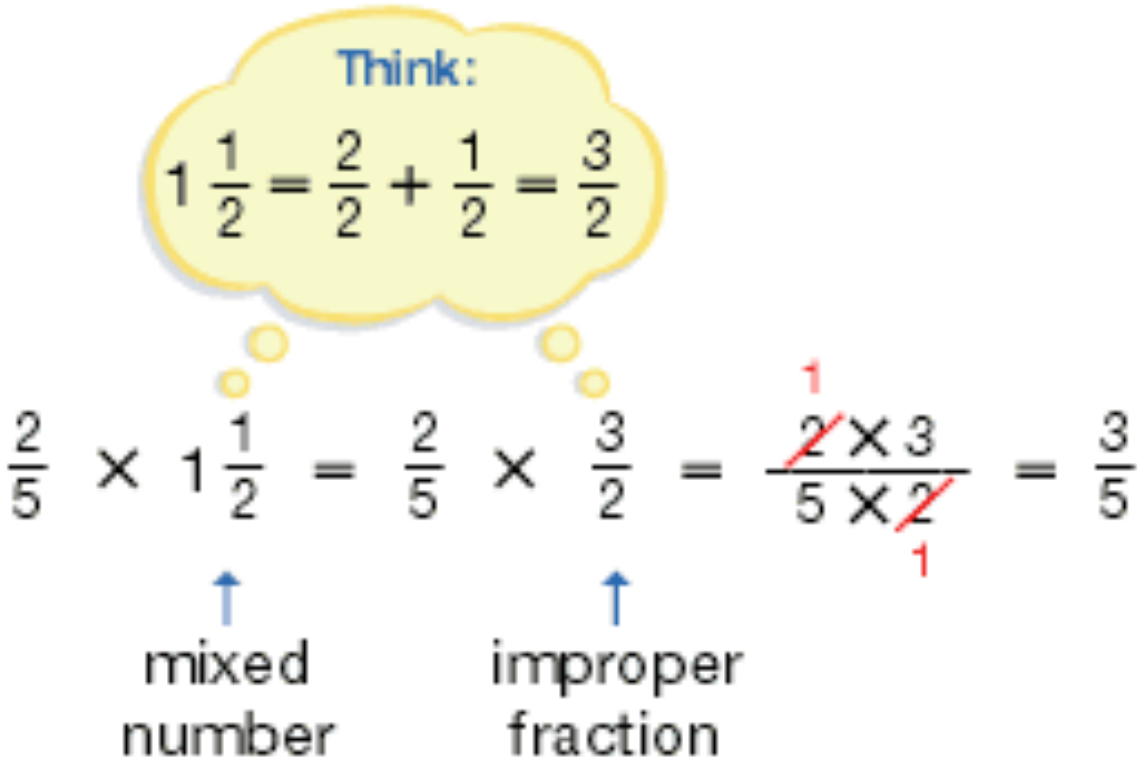
EXAMPLES:
1. Multiply the top numbers (the *numerators*).
2. Multiply the bottom numbers (the *denominators*).
3. Simplify the fraction if it not simplified.



http://www.mentalstarters.co.uk/Yr%209%20Screenshots/Multiplying%20Fractions.jpg

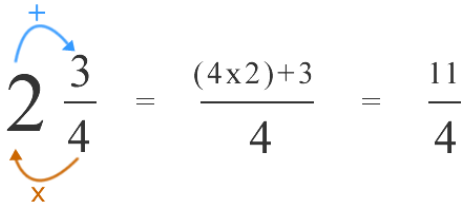
*When multiplying a fraction by a whole number – place the whole number in the numerator and a "1" in the denominator:

$$3 \times \frac{1}{5} = \frac{3 \times 1}{1\ 5} = \frac{3}{5}$$

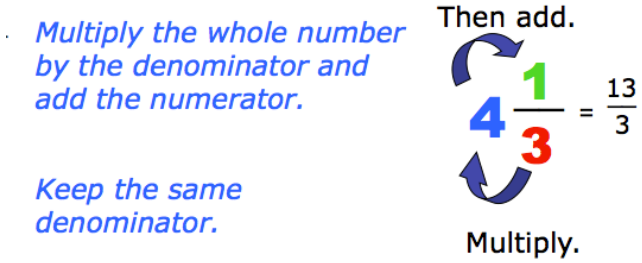


http://www.eduplace.com/math/mw/background/5/08/graphics/ts_5_8_wi-5.gif

- Take a look at the way to change mixed to improper fractions and put a check mark beside the example helped you the most!



http://4.bp.blogspot.com/-NfOZbygL_VA/VfnpmfPD6sI/AAAAAAAAAM0/R822Rp6wa-Q/s1600/full-fraction.gif



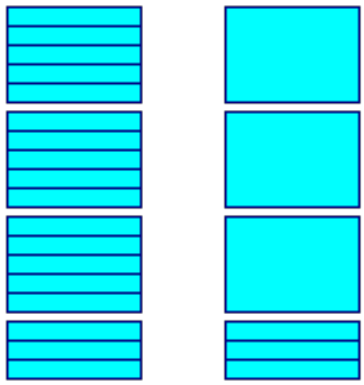
http://campbellcorner.weebly.com/uploads/9/8/6/6/9866336/64466_orig.png

Converting between Mixed Numbers and Improper Fractions

Improper Fraction → Mixed Number

Example : Convert $\frac{18}{5}$ to a mixed number

Graphical Method



eighteen fifths = three and three fifths

Numerical Method

$$\frac{18}{5} = \frac{15}{5} + \frac{3}{5}$$

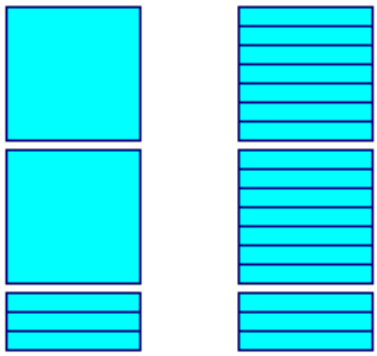
$$= 3 + \frac{3}{5}$$

$$= 3\frac{3}{5}$$

Mixed Number → Improper Fraction

Example : Convert $2\frac{3}{7}$ to an Improper fraction

Graphical Method



two and three sevenths = seventeen sevenths

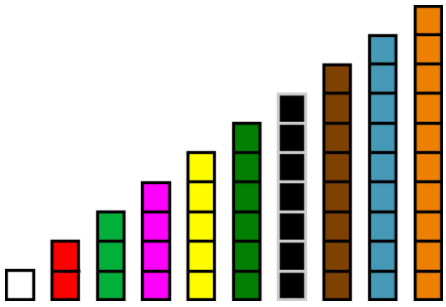
Numerical Method

$$2\frac{3}{7} = \frac{14}{7} + \frac{3}{7}$$

$$= \frac{17}{7}$$

http://www.cimt.plymouth.ac.uk/projects/mepres/book7/bk7i10/s4eg6.gif

- Now make your own Cuisenaire Rods and create your own mixed fractions.
- Invented by Belgium school teacher, Georges Cuisenaire
- 10 rods (1cm to 10cm units)



https://content.ncetm.org.uk/images/microsites/primary_magazine/issue_31/31_8.gif

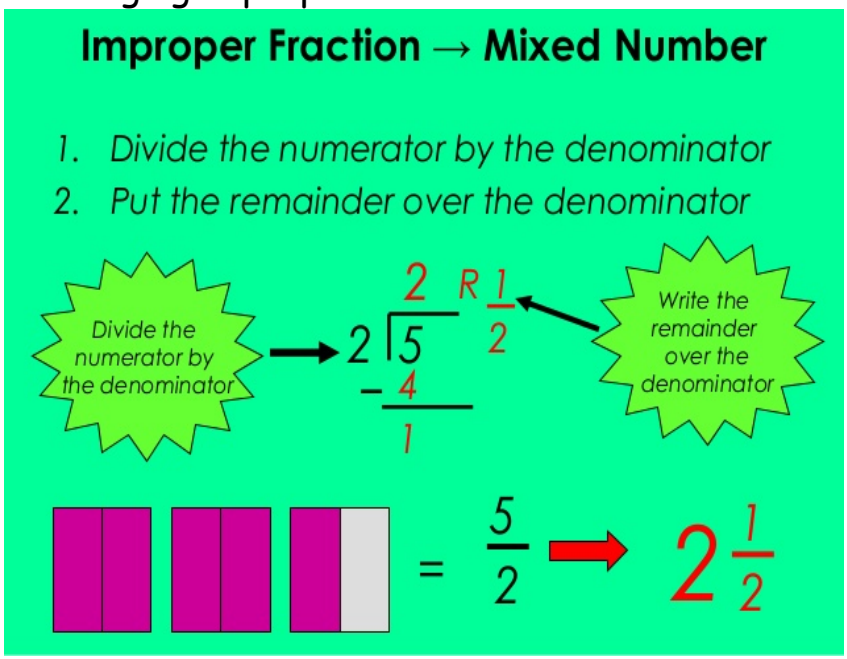
- Most Cuisenaire rods follow this system:
- White rod = 1 cm.
- Light green rod = 3 cm.
- Yellow rod = 5 cm.
- Black rod = 7 cm.
- Blue rod = 9 cm.
- Red rod = 2 cm.
- Lavender rod = 4 cm.
- Dark green rod = 6 cm.
- Brown rod = 8 cm.
- Orange rod = 10 c

http://image.slidesharecdn.com/swmethod-100105101537-phpapp01/95/silent-way-9-728.jpg?cb=1262698207

- Using the rods, explain how to change from mixed to improper fractions

Changing Improper to Mixed Fractions

- Look at the rule for changing improper to mixed numbers:



http://image.slidesharecdn.com/convertingmixednumbersandimproperfractionspptbykellykatz-140126084255-phpapp02/95/converting-mixed-numbers-and-improper-fractions-12-638.jpg?cb=1390725806

In your words, you need to: _____

_____.

TECH CHECK:

- http://www.mathsisfun.com/fractions_multiplication.html
- http://www.mathsisfun.com/mixed-fractions-multiply.html
- http://www.mathsisfun.com/improper-fractions.htm

RECIPROCAL TEACHING:

- "Like a teacher" explain how to multiple fractions, reduce fractions and change between mixed and improper fractions.
- Share examples and teach rounding decimals to a friend or family member.
- Use scrap paper or a notebook.
- Have your friend or family member change places and replay what you taught.

GOT IT!

Multiply the following fractions:

(a) 3/4 x 7/8

(b) 2 x 2/5

Change the following numbers from mixed to improper fractions.

(a) $7\frac{1}{2}$

(b) $4\frac{3}{4}$

Calculate and reduce to lowest terms:

(a) 5/12 x 2/3 =

(b) 3 x 6/9 =

(c) $1\ 2/3 \times 3\ 7/8 =$

How well did you multiply, reduce & convert between proper, mixed & improper fractions?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

8. Fractions as Remainders

It would be great of all numbers divided evenly into each other.
When there is a remainder, it can form a fraction with the number doing the dividing!

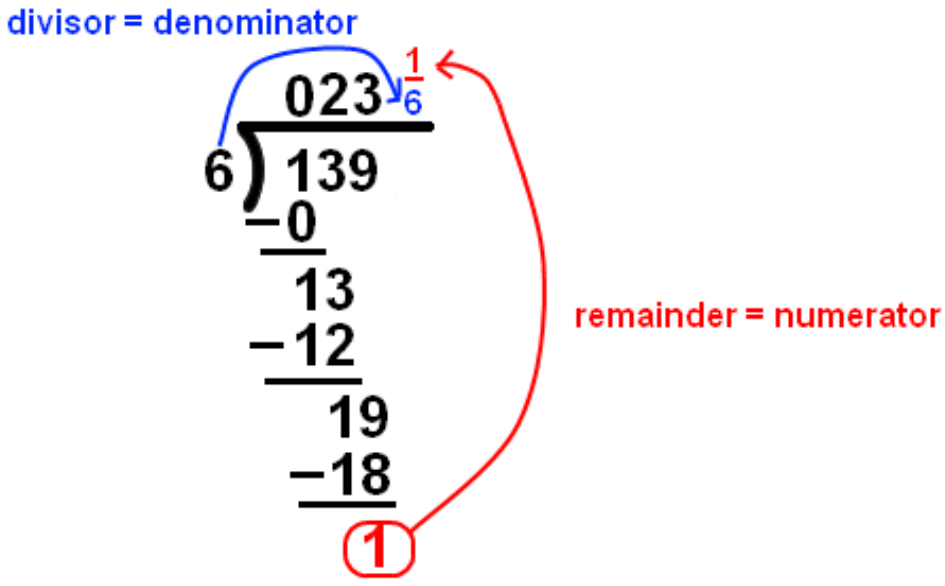
- Look at this example below to see how to record the answer as a fraction:

EXAMPLES:

$$5\overline{)123} = 24\ r\ 3 = 24\ \tfrac{3}{5}$$

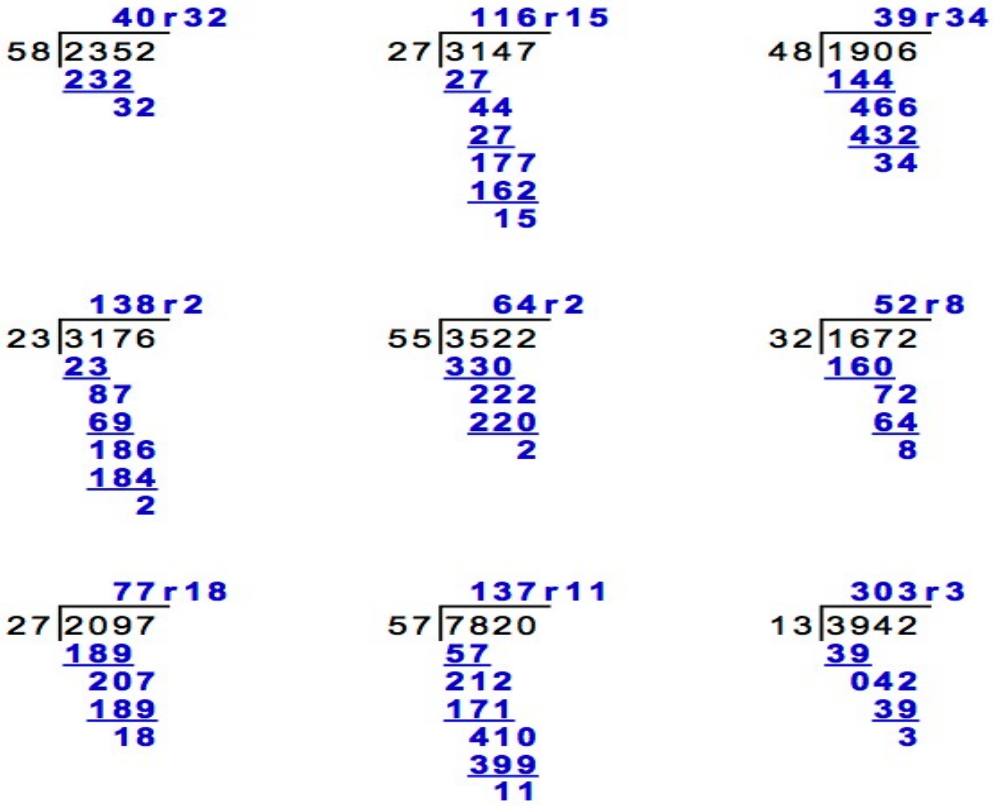
$$\begin{array}{r} 24 \\ -10 \\ \hline 23 \\ -20 \\ \hline 3 \end{array}$$

https://dj1hlxw0wr920.cloudfront.net/userfiles/wyzfiles/5559ec4d-e81d-4ad2-80fc-0913b5765c12.gif



https://dj1hlxw0wr920.cloudfront.net/userfiles/wyzfiles/120d91ed-722e-4a7d-a321-da5fb1b8373f.gif

- Look at these questions and answers, and try three of them to see if you get the same answers. Make sure you list the answer as a mixed fraction.



TECH CHECK:

- https://www.youtube.com/watch?v=sppoXVxGpKc
- https://www.mathsisfun.com/numbers/division-remainder.html

RECIPROCAL TEACHING:

- "Like a teacher" explain how to divide whole numbers with remainders that make fractions.
- Share examples and teach dividing with remainders to a friend or family member.
- Use scrap paper or a notebook.
- Have your friend or family member change places and replay what you taught.

GOT IT!

- Complete 2 of the following division questions on the next page.

Remainders as a fraction

Did you know that remainders can be written as fractions?

21 ÷ 5 = 4 remainder 1 or $\frac{1}{5}$

It's quite easy to work out – the remainder goes on the top line (numerator) and the bottom number (denominator) is the number you have divided by.

37 ÷ 5 = 7 remainder 2 or $\frac{2}{5}$

1. 22 ÷ 5 = 4 remainder ☐ or 4 $\frac{\square}{\square}$
2. 32 ÷ 10 = 3 remainder ☐ or 3 $\frac{\square}{\square}$
3. 27 ÷ 5 = 5 remainder ☐ or 5 $\frac{\square}{\square}$
4. 28 ÷ 3 = 9 remainder ☐ or 9 $\frac{\square}{\square}$
5. 26 ÷ 4 = 6 remainder ☐ or 6 $\frac{\square}{\square}$
6. 84 ÷ 9 = 9 remainder ☐ or 9 $\frac{\square}{\square}$

Question #_____

Question #_____

- Divide 743 by 15

- Divide 521 by 17

How well did you divide whole numbers with remainders?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

9. Dividing Fractions

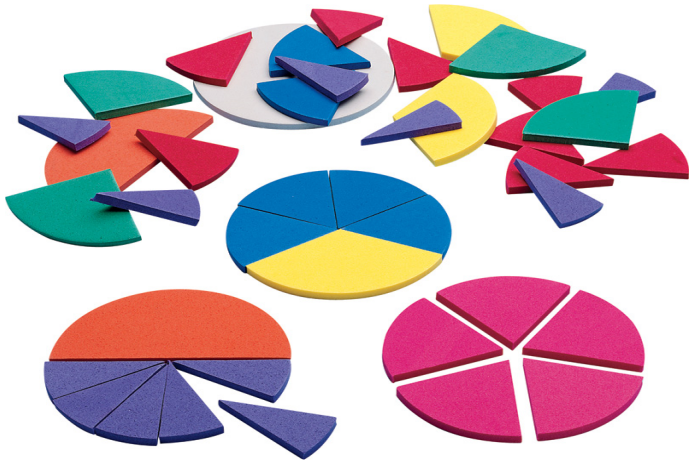
RULE: To divide fractions, you must invert the second fraction and change the operation to multiplication – and then multiply the top and bottom (after reducing). *Fractions themselves are, in fact, division expressions.*

EXAMPLES:

When you divide 1/1 (a whole pizza) into 2,3,4,5 equal parts, and you serve one piece to ___ people, how much of the pizza are they eating if they have equal amounts?

2 people will eat _____ of the pizza.
3 people will eat _____ of the pizza.
4 people will eat _____ of the pizza.
5 people will eat _____ of the pizza.
60 people will eat _____of the pizza. (a sliver!!!!)

- Divide fraction circles into 2, 3, 4, and five parts.
- Tell your partner each fractional name when you separate and combine them. (i.e. one half; three thirds; two fourths or two quarters).



http://www.didax.com/images/img_800/2-485.jpg

$$\frac{2}{3} \div \frac{4}{5} = \frac{2}{3} \times \frac{5}{4}$$

$$= \frac{2 \times 5}{3 \times 4}$$

$$= \frac{10}{12}$$

$$= \frac{5}{6}$$

$4\frac{1}{2} \cdot 2\frac{1}{3}$

Bowtie Method

$\frac{9}{2} \times \frac{7}{3} = \frac{21}{2} = 10\frac{1}{2}$

Example:

$3 \div \frac{3}{4} =$

Solution:

$3 \div \frac{3}{4} = \frac{\cancel{3}^{1}}{1} \times \frac{4}{\cancel{3}_{1}} = \frac{4}{1} = 4$

http://www.graspr.com/videos/Dividing-Fractions-and-Mixed-Numbers-1
http://www.webmath.com/_answer.php

TECH CHECK:

- http://www.gradeamathhelp.com/support-files/dividing-mixed-numbers-b.pdf
- http://www.gradeamathhelp.com/support-files/dividing-fractions-c.pdf
- http://www.gradeamathhelp.com/support-files/dividing-fractions-b.pdf
- https://www.youtube.com/watch?v=L_YkKNzUeoU
- http://www.321know.com/g5_66ox1.htm
- http://www.mathplayground.com/fractions_div.html
- http://www.math.com/school/subject1/lessons/S1U4L5GL.html
- http://amby.com/educate/math/frac-div.html

REAL WORLD PROBLEMS:

When 3 pizzas are divided equally among 4 people each person has a share of size $\frac{3}{4}$.

Using math – it would be 3/1 divided by 4/1

Inverse and multiply top and bottom to get answer:

$3/1 \times \frac{1}{4} = \frac{3}{4}$

Using fraction circles, figure out what happens if 4 people ate $\frac{3}{4}$ of a pizza – all you would need is _____ pizzas.

To figure it out with math:

$\frac{3}{4}$ X 4/1 = 12/4 = _____

RECIPROCAL TEACHING:

- "Like a teacher" explain how to divide fractions.
- Share examples and teach how to divide fractions to a friend or family member.
- Use scrap paper or a notebook.
- Have your friend or family member change places and replay what you taught.

GOT IT!

(a) 7/8 divided by 5/4

(b) $\frac{1}{4}$ divided by 2/3

(c) 5 divided by 2/3

- If 9 people want to share a 50-pound sack of grain from the Collingwood Terminals equally by weight, how many pounds of grain should each person get? Between what two whole numbers does your answer lie?

- How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins? (visual)

- Complete one of the problem sets on-line: https://www.saddleback.edu/faculty/lperez/algebra2go/prealgebra/fractions/fractionDiv.html

How well did you divide fractions?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

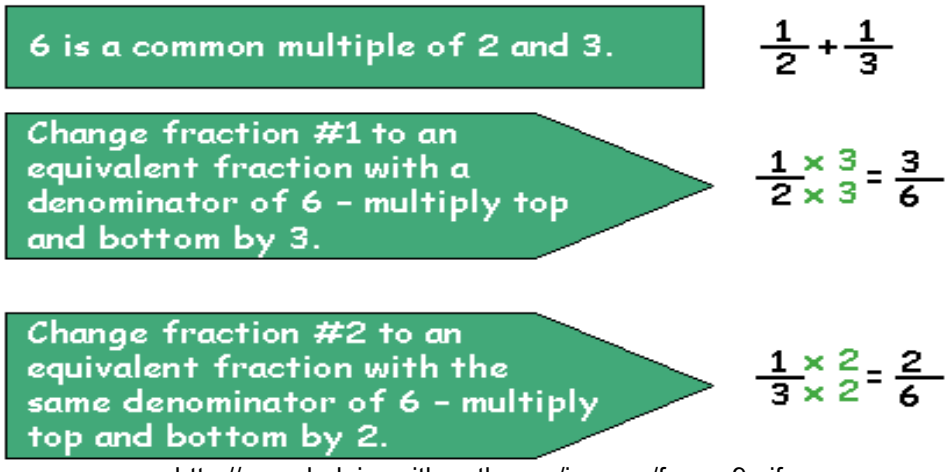
10. Addition of Fractions

RULE: To add fractions they must have like denominators. To make like denominators you find the *Lowest Common Multiple* and multiply the top and bottom by that number.

EXAMPLE: (adding same denominator)

2/7 + 3/7
= 5/7

$1\frac{3}{4} + 7\frac{3}{4}$ (same thing – a few more steps to be precise)
= 8 + $\frac{3}{4} + \frac{3}{4}$
= 8 + 6/4
= 8 + 4/4 + 2/4
= 8 + 1 + 2/4
= 9 + 2/4
= 9 + $\frac{1}{2}$
= $9\frac{1}{2}$



http://www.helpingwithmath.com/images/fra_ex9.gif

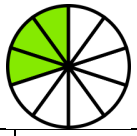
- Decompose fractions into a sum of fractions.

  Example (a) 3/8 = 1/8 + 1/8 + 1/8

  Example (b) 3/8 = 1/8 + 2/8

  Example (c) 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8

- Roll a die to find two numerators.
- Use 10 as the denominator to make two fractions.
- Draw fractions you make using fraction circles to show each fraction.



- Add the two base 10 fractions together.

$$\frac{17}{31} + \frac{12}{31} = \frac{29}{31}$$ So easy when the denominators are the same, right?

Now Add with UNLIKE denominators

$$\frac{9}{12} + \frac{1}{6} = \frac{9}{12} + \frac{2}{12} = \frac{11}{12}$$

Notice how the second fraction had to be changed to complete the addition with the same denominator.

Q: How did 1/6 become 2/12?
A: We multiplied the top and bottom by 2 to get 12 as the common denominator.

Look at this example where the top and bottom were multiplied by 3/3 to get a common denominator:

$$\frac{2}{15} + \frac{3}{5} = \frac{2}{15} + \frac{3}{5}\left(\frac{3}{3}\right)$$

$$= \frac{2}{15} + \frac{9}{15}$$ ← Same denominator

$$= \frac{11}{15}$$

NOTE: When you multiply a fraction by 2/2, 3/3 or 151/151 – you are simply multiplying by 1.

- When you have mixed numbers in addition, you can add the whole numbers first, and then be sure that the denominators are the same to find out the fraction.

$$\begin{array}{r} 4\frac{1}{3} = 4\frac{5}{15} \\ +\,3\frac{2}{5} = 3\frac{6}{15} \\ \hline 7\frac{11}{15} \end{array}$$

- When you have mixed numbers in addition, you can change the mixed number to an improper fraction first, and then be sure that the denominators are the same to find out the fraction.

$$9\frac{1}{2}+5\frac{3}{4}$$

$$=\frac{19}{2}+\frac{23}{4}$$ Change to improper fractions

$$=\frac{19}{2}\frac{\times 2}{\times 2}+\frac{23}{4}$$ Change to common denominators

$$=\frac{38}{4}+\frac{23}{4}$$

$$=\frac{61}{4}$$ Add the numerators

$$=15\frac{1}{4}$$ Change back to mixed number

TECH CHECK:

- http://aaamath.com/g66a_ax1.htm
- https://www.youtube.com/watch?v=gLWphGTjGHI
- http://webmath.com/addfract.html
- http://www.mathplayground.com/Fractions_Add.html
- http://www.mathsisfun.com/fractions_addition.html
- http://ca.dummies.com/how-to/content/how-to-add-and-subtract-fractions-in-algebra.html
- https://www.youtube.com/watch?v=pynfj2bYRms
- https://www.onlinemathlearning.com/adding-mixed-numbers.html

RECIPROCAL TEACHING:

- "Like a teacher" explain how to add mixed numbers.
- Share examples and teach how to add mixed numbers to a friend or family member.
- Use scrap paper or a notebook.
- Have your friend or family member change places and replay what you taught.

GOT IT!

Fraction Answer	Create an addition question
3/5	
2/4	
9/10	

Solve for:

1/8 + 5/8 =	
3/7 + 31/7 =	
$\frac{2}{3} + \frac{5}{11} =$	

$5\frac{1}{4} + 2\frac{1}{3} =$	
$2\frac{7}{16} + 1\frac{5}{20} =$	

How well did you add fractions and mixed numbers?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

Extension

- Solve equations with inequalities of the form $x>c$ or $x < c$.

11. Equivalent Fractions – or not?

RULE: You can use a number line and fraction circles to count forward by halves, thirds, fourths, and tenths to beyond one whole.

EXAMPLES:

- Can you see how $\frac{1}{2}$ is the same as 2/4 is the name as 4/8?

$$\frac{1}{2} = \frac{2}{4} = \frac{4}{8}$$

You can also make equivalent fractions by making the denominators smaller.

- Look at the examples below of equivalent fractions.

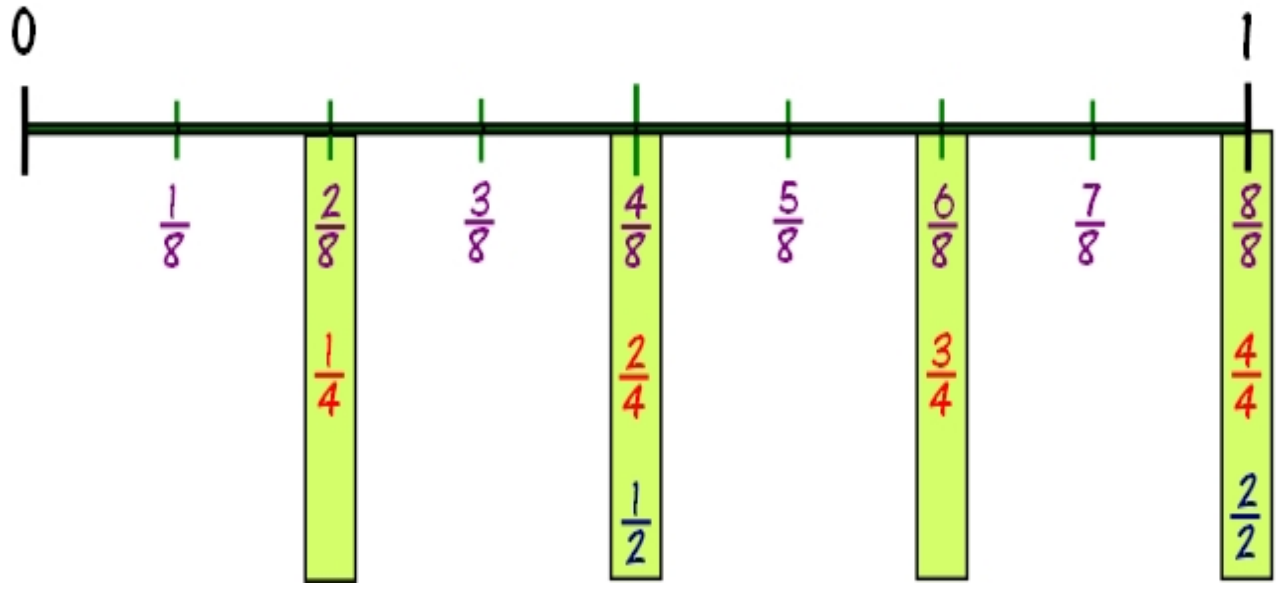
Fraction	Equivalent Fraction	What did we do to get the equivalent fraction?
2/10	1/5	Divided by 2
4/10	2/5	
5/10	$\frac{1}{2}$	

6/10	3/5	
8/10	4/5	
10/10	5/5	

- Now create equivalent fractions by making the following denominators larger and smaller.

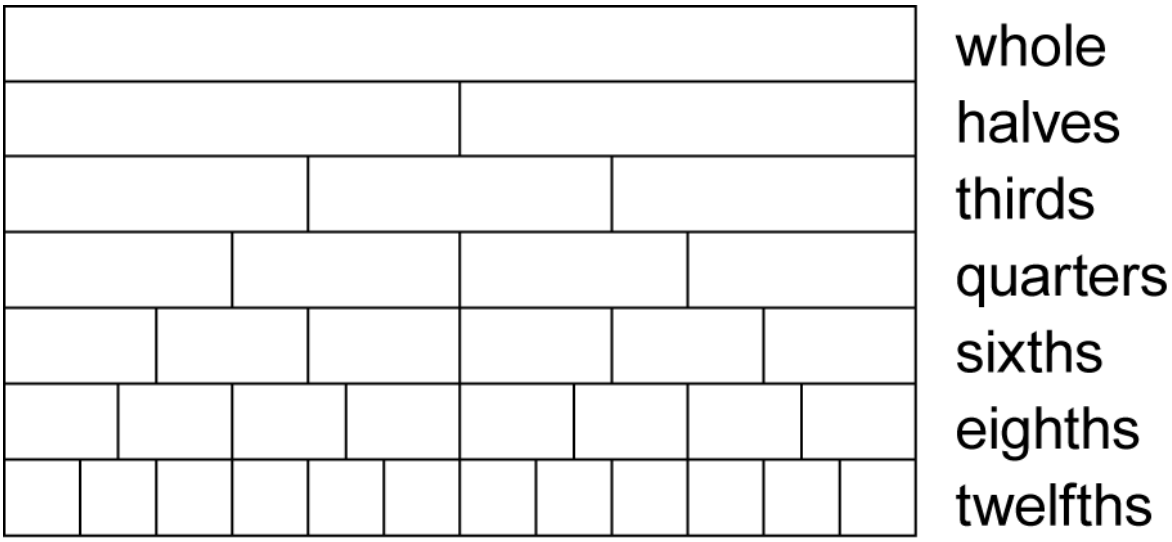
Equivalent Fraction – smaller denominator	**Fraction**	**Equivalent Fraction – larger denominator**
	2/4	
	3/6	
	5/10	
	8/12	
	6/8	

- Take a look at the following number line.
- Why are there no equivalent fractions listed for 1/8, 3/8, 5/8 and 7/8?



http://www.learn-with-math-games.com/images/fraction_number_line_picture.jpg

- Look at the following diagram and color in the following fractions:

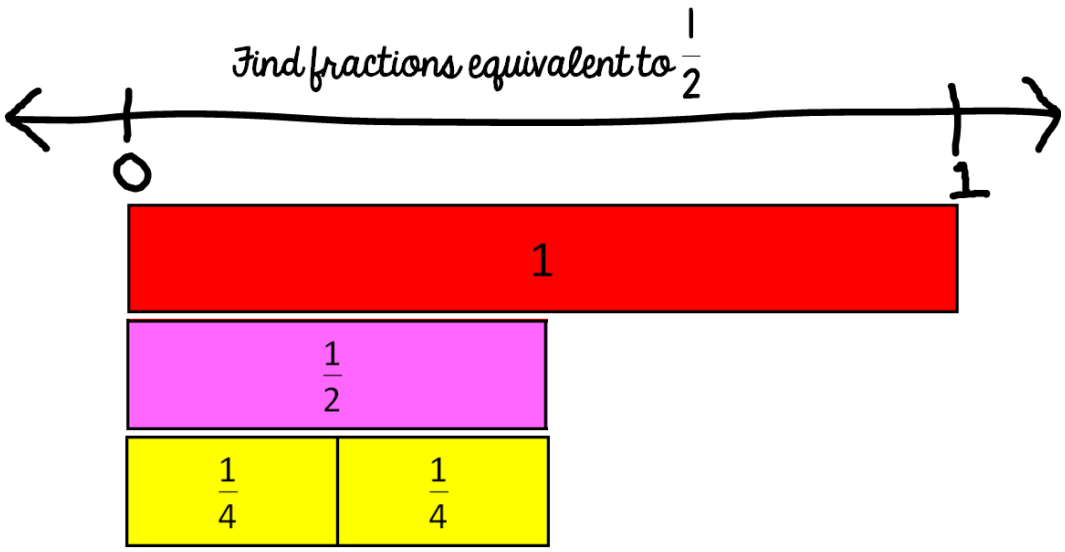


http://syllabus.bostes.nsw.edu.au/assets/mathematicsk10/images/s3na042.png

- Color in 1/3 and 2/6.
- By looking at this image, what are equivalent fractions for:

1 whole
2/4
3/6
4/6
2/8
6/8
2/12
6/12
8/12

- Look at the following fraction strips or fraction bars that shows how $\frac{1}{2}$ is equivalent to 2/4.

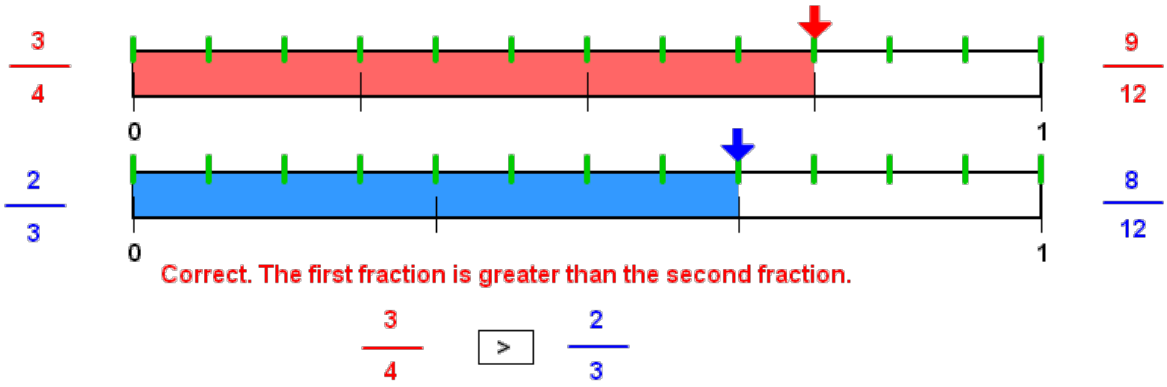


- Use fraction strips or fraction bars to show that 3/4 is equal to 9/12.
- Draw them here:

FUN & GAMES:

- Create an equivalent Fraction Wall using sticks!
- Find 10 similar sized sticks that you could break in half.
- Place them on the ground like a number line.
- Count each section as 1/10, 2/10, 3/10, 4/10, 5/10…
- Then break each stick in half to create 2/20, 4/20, 6/20, 8/20, 10/20.
- Talk about how 6/20 is the same as 3/10.

- Draw a number line and break it into 12 parts.
- Take a look at the number line examples below that show how one fraction is greater than another:



http://www.visualfractions.com/CompareL/complns.gif

- Create a different example using number lines of 2 fractions with the same denominator and compare with the equation showing which one is LESS than the other.

TECH CHECK:

https://www.youtube.com/watch?v=qcHHhd6HizI
https://www.youtube.com/watch?v=P056eG02WiM
https://www.khanacademy.org/math/arithmetic/fraction-arithmetic/arith-review-visualizing-equiv-frac/v/equivalent-amount-of-pizza
https://www.youtube.com/watch?v=mU5249bHGuc
https://www.youtube.com/watch?v=Uu5NxKHoSh8
https://www.mathcoachscorner.com/2015/06/comparing-fractions-using-a-benchmark-of-12/

RECIPROCAL TEACHING:

- "Like a teacher" explain how fractions can be equivalent.
- Share examples and teach about equivalent fractions to a friend or family member.
- Use scrap paper or a notebook.
- Have your friend or family member change places and replay what you taught.

GOT IT!

- Which of the following fractions are closest to 0, 1/2, and 1

	0	$\frac{1}{2}$	1
1/8			
4/7			
2/3			
3/6			

- Place a greater than or less than (<) sign between the following fractions:

	Greater than (>) or Less than (<)	
4/5		3/5
1/5		$\frac{1}{4}$
1/3		2/8

- Order the following fractions from smallest to largest in size:

2/3	11/12	$\frac{3}{4}$	1/6	4/5

How well did you find equivalent fractions?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

12. Subtraction of Fractions

RULE: Subtracting fractions requires common denominators as well.
Fast Fact: Whole Numbers are fractions, too! 3 = 3/1; 4 = 4/1; 142 = 142/1,

EXAMPLE 1:

$$\begin{array}{r} 2011.25 \\ -1996.75 \\ \hline 14.50 \end{array}$$

$\frac{17}{21} - \frac{12}{21} = \frac{5}{21}$ So easy when the denominators are the same, right?

Same rules apply as Addition of Subtraction with UNLIKE denominators

$\frac{9}{12} - \frac{2}{6} = \frac{9}{12} - \frac{4}{12} = \frac{5}{12}$

Notice how the second fraction had to be changed to complete the subtraction.

Now here is when things get tricky. **EXAMPLE 2:**

Subtract... $4\frac{2}{3} - 3\frac{1}{3}$

first convert $4\frac{2}{3}$ to $\frac{14}{3}$

next convert $3\frac{1}{3}$ to $\frac{10}{3}$

$\frac{14}{3} - \frac{10}{3} = \frac{4}{3}$

Simplified answer... $1\frac{1}{3}$

http://www.jolenemorris.com/mathematics/Math115/Wk2/2.3prob60/2.3prob60.html

EXAMPLE 3:

$$10\frac{7}{28} - 2\frac{12}{28} = 9\frac{7+28}{28} - 2\frac{12}{28} = 9\frac{35}{28} - 2\frac{12}{28}$$

http://www.ehow.co.uk/video_4990950_subtracting-mixed-numbers-regrouping.html

EXAMPLE 4: Careful Borrowing

$6\ \frac{1}{3} - 2\ \frac{7}{8}$

$= 6\ 8/24 - 2\ 21/24$

$= 5\ 32/24 - 2\ 21/24$

$= 5\ 11/24$

http://www.wisc-online.com/objects/ViewObject.aspx?ID=abm701

- Watch the following video on subtracting fractions and give it a 1,2, or 3 (awesome) star rating.

http://www.youtube.com/watch?v=sIPGOzyTpbY

1 star☹ 2 star 3 star ☺

TECH CHECK:

- https://www.youtube.com/watch?v=gDzUeyH8dgM
- http://www.helpingwithmath.com/printables/worksheets/fra0501fraction18.htm
- http://www.math-drills.com/fractions/fractions_subtract_mixed_hard_001.pdf
- http://www.jamit.com.au/htmlFolder/app1007.html
- http://www.free-ed.net/sweethaven/Math/fractions/fracs03.asp?iNum=34&dNum=1
- http://www.youtube.com/watch?v=52ZlXsFJULI

REAL WORLD PROBLEMS: Use diagrams, labels and fractions to figure these word problems out.

- Tucker tasted 2 4/5 cups of honey on Wednesday at Bernie's Bees and 1 1/2 cups of honey on Thursday. How much honey did she taste on those two days combined?

- Beverly has a tummy ache after eating 3 3/8 pounds of candy after Halloween. Gail ate 2 3/4 pounds of candy. How much more did Beverley eat than Gail?

- Chris loves granola. He stocked up with his favorite breakfast treat from the Georgian Granola Company. He planned to purchase 5 kilograms of granola, and gave 3 and 4/5 kilograms to his sister. How much did he have left over for himself?

Extension:

- Find out why can't zero be expressed as a fraction?

RECIPROCAL TEACHING:

- "Like a teacher" explain how to subtract fractions.
- Share examples and teach how to subtract fractions to a friend or family member.
- Use scrap paper or a notebook.
- Have your friend or family member change places and replay what you taught.

GOT IT!

$6\ \frac{5}{8} - 3\ \frac{6}{7} =$

$5\ \frac{5}{8} - 2\ \frac{14}{16} =$

$11\ \frac{3}{7} - 4\ \frac{3}{8} =$

- Try this quiz:

http://www.softschools.com/quizzes/math/add_and_subtract_mixed_numbers_word_problems/quiz5100.html

How well did you subtract fractions with unlike denominators?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

Extension:

- http://www.mathsisfun.com/least-common-multiple-tool.html (quick)
- http://www.metacafe.com/watch/339625/easy_graphical_fractions_addition_subtraction_trick

ET - Solve problems by converting between decimals & base ten fractions.

ET - Use expanded form with whole numbers and fractions to tenths.

13. Converting Between Fractions and Decimals

- Read each number aloud to your partner.
- Round each number to the nearest 100^{th}; 10^{th}; and 100,000's

	1000000	100000	10000	1000	100	10	1	.	.1	.01	.001
(a)	3	8	4	9	9	2	0	.	6	5	7
(b)			2	2	0	5	8	.	6	3	9
(c)		7	7	0	6	4	3	.	8	0	1

	100,000's	100th	10^{th}
3,849,920.657			
22,058.639			
770,643.801			

- Create a number line that goes from 2.50 to 3.50
- Add in 100 parts (as equal as possible) between these two numbers.

- Count forward by hundredths for your partner and your teacher.

EXAMPLE: from 2.97 to 3.07 -"*Two and ninety-six hundredths, two and ninety-seven hundredths, two and ninety-eight hundredths, two and ninety-nine hundredths, three, three and one hundredth*")

- Draw a partial number line that extends from 4.2 to 6.7, and mark the location of 5.6.

I think there are _____cm in a meter.

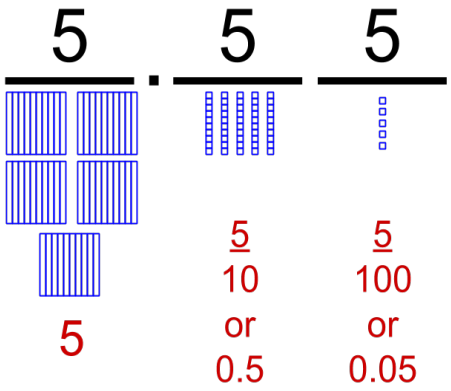
- Check out the following Fraction, Decimal and Measurement Units Table.

Fraction, Decimal and Measurement Units Table			
Cm	**meter**	**Fractional meters**	**Decimal Meters**
100	1	1/100	.01
200	2	2/100	.02
1000	10	10/100	.10

- Review using multiplication and addition to expand a decimal to the thousandths:

347.392 =
3 × 100 +
4 × 10 +
7 × 1 +
3 × (1/10) +
9 × (1/100) +
2 × (1/1000).

- Look at the following image and create two more examples to show how decimals relate to fractions.



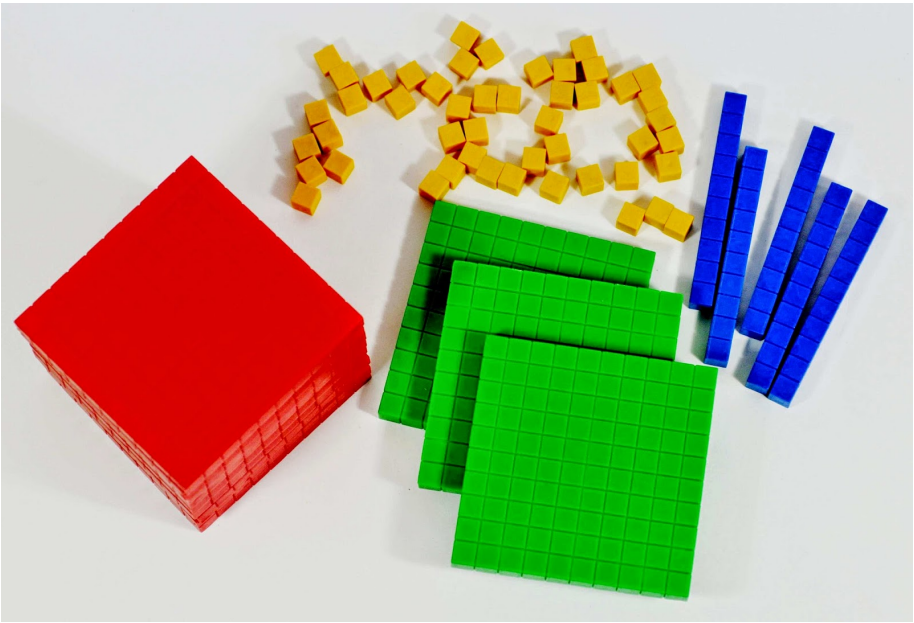
http://www.cpalms.org/Uploads/resources/28707/1/4/graphics/Base%20Ten%20System%20%281%29.png

- Use fraction circles or fraction strips to show that 1 ½ is greater than 5/4.
- Draw images below and put a greater than (>) sign between them.

- Change each decimal number to a fraction and then place a greater than (>) or less than (<) sign between them.

	Greater or Less Than	
0.032 = /1000		0.101 = /1000
0.705 = /1000		0.738 = /1000
1.035 = /1000		1.102 = /1000

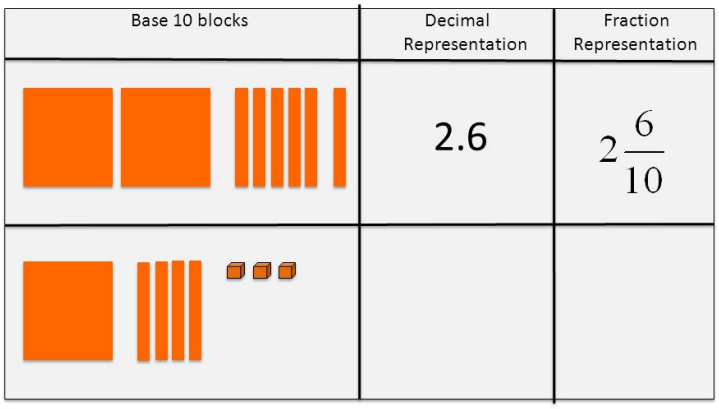
- Show your partner using Base Ten Blocks that 3/10 is .3 and is the same as 30/100 or 0.30.



http://4.bp.blogspot.com/-sjlPcKK56bE/VPbPLbU5bxI/AAAAAAAARQg/Ut42TTYIM28/s1600/Base%2BTen%2BBlocks.jpg

- Create a table to show how Base Ten, Decimal and Fractions are related with each other.
- Choose two mixed numbers and place them in the chart and then fill in the image and the decimal number that it converts to.

Representing Decimal Numbers



http://images.slideplayer.com/8/2464166/slides/slide_3.jpg

Mixed Number	Decimal Number	Base 10 Block Image

RECIPROCAL TEACHING:

- "Like a teacher" explain how fractions convert to decimals and how decimals convert to fractions.
- Share examples and teach how fractions relate to decimals to a friend or family member.
- Use scrap paper or a notebook.
- Have your friend or family member change places and replay what you taught.

GOT IT!

- Using base ten blocks, show how 2/5 is the same as 4/10 or 0.4.
- Draw the images below.

- Use fraction strips to show that 3/4 is equal to 9/12.
- Draw strips below.

- Expand the following decimals to make a fraction:

(a) ..75	
(b) .6	
(c) .085	

- Expand the following fractions to make a decimal:

$\frac{3674}{10000}$	
$\frac{5782}{1000}$	

- Write decimals to thousandths in expanded form.

475.921	3071.024

- Put the following decimal numbers in order from largest to smallest:

2.35	8.24	0.337	0.08	0.009

How well did you solve problems by converting between decimals & base ten fractions?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

How well did you use expanded form with whole numbers and fractions to tenths?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

14.Money Matters

RULE: Money can be represented as coins, bill, cheques, and money orders, A penny, nickel and quarter can be written in 2 ways: as cents and decimal parts of $.

Coins in 1 Dollar ($1.00/ 100 cents) *loonie	
Pennies	100 (100 x 0.01 = 1.00)
Nickels	20 (20 x 0.05 =1.00)
Dimes	10 (10 x 0.10 = 1.00)
Quarters	4 (4 x 0.25 = 1.00)
Loonies	1 (1 x 1.00 = 1.00)

- How many pennies, nickels and quarters are there in a toonie?
- Write the number sentences below:

Coins	**In a toonie (2 dollar Canadian coin)**
Pennies	
Nickels	
Quarters	

- Use the choices below to place them under the proper title in the table.

$0.25	1 cent	$0.05	25 cents	$0.01	5 cents

penny	Nickel	Quarter

- Figure out the best bill you need to buy the following (without having any bills in your change).
- Add in your own items in the blank. ☺

$100	$50	$10	$5

2 smoothies totaling $8.35	
1 pair of snowshoes at $79.95	
A day ski pass $75.00	
Bar of hand soap at $3.49	
One hour kayak rental $45.00	
60 sun block at $7.45	
3 pack of toothpaste at $12.49	

- Using the information above – calculate the exact change from the bill for the following items:

2 smoothies totaling $8.35	
1 pair of snowshoes at $79.95	
Bar of hand soap at $3.49	
60 sun block at $7.45	
3 pack of toothpaste at $12.49	

- Draw each of the Canadian bills and shade in the appropriate color.
- Copy "Canadian Bills" table here.

Bill	Image
$5.00	
$10.00	
$20.00	
$50.00	
$100.00	

- Did you know that Canada used to have a 2-dollar bill? It looked like this!

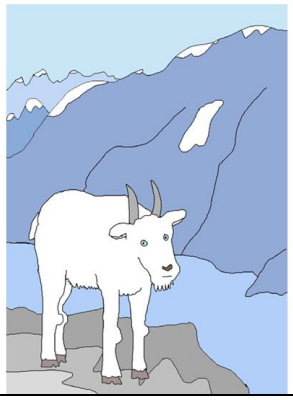
http://cdn.mtlblog.com/uploads/2014/06/canada-2-dollar-obverse.jpg

http://cdn.mtlblog.com/uploads/2014/06/canada-2-dollar-reverse.jpg

FUN & GAMES:

- Let's create our own Canadian 9-dollar bill.
- Draw it below:

- Complete the following word problem:

The Goat	
If you buy a goat for $20, sell it for $40, buy it back again for $60, and sell it again for $80, how much money have you gained or lost on the combined deals? 	

REAL WORLD PROBLEMS:

We often ring up several products at the same time when we are at the store. Think about the total cost as C and the number of products as 'n', so you can build a money equation.

- If each toilet paper roll cost $.50, what is the total cost if you bought 8?

Let C be the total cost.

$C = .50 \times n$

$C = .50 \times 8$

$C = 4.00$

Therefore, the total cost of the 8 toilet paper rolls in $4.00.

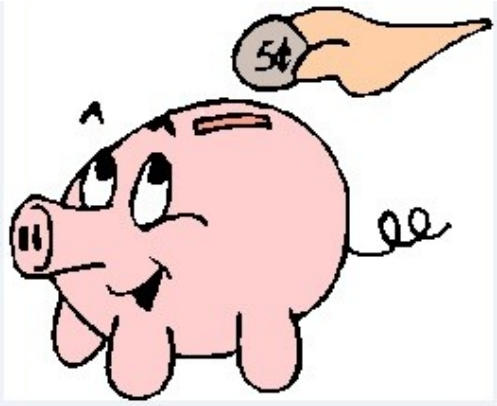
GOT IT!

(a) How do you write 1 cent (penny) as a decimal number? _____

(b) How do you write 50 cents as a decimal number? _____

(c) How much change do you get from a $20.00 bill when you purchase a $3.75 bus ticket?

(d) Create 2 money problems on index cards with the question on one side and the solution on the other.



How well did you calculate using coins and bills?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

15. Rounding with Money

RULE: Rounding a monetary amount to the nearest dollar means you need to round up if it is 50 cents or more, or round down if it is less than 50 cents.

EXAMPLE:

$ 55.49	$1,379,300.73
Rounds down to $55.00	Rounds up to $1,379,301.00

- Using the exact change from the bill for the following items – calculate the approximate change you would tell someone each item was.

	Actual Change	Approximate Change
2 smoothies totaling $8.35		
1 pair of snowshoes at $79.95		
Bar of hand soap at $3.49		
60 sun block at $7.45		
3 pack of toothpaste at $12.49		

TECH CHECK:

- http://www.beaconlearningcenter.com/weblessons/letsgoshopping/default.htm
- http://www.softschools.com/quizzes/math/money_word_problems/quiz1952.html

FUN & GAMES:

- **Bean and Penny Counting Contest** – Estimate the number of beans and pennies (in estimated dollar amount) in two jars.

	Beans	Pennies (in $amount)
Estimate		
Actual		

Bat House Build

- Could we build a bat house for $100?
- Search out the costs of materials for building a bat house.
- Put together a proposal featuring the costs and ways to fund the project, if you think it is a good idea.

GOT IT!

- Round to the nearest dollar and SHOW YOUR WORK!

(a) $435,601.35	Rough Work ☺
(b) $1.50 =	
(c)$8,471,001.79	

How well did you round the value of coins and bills?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

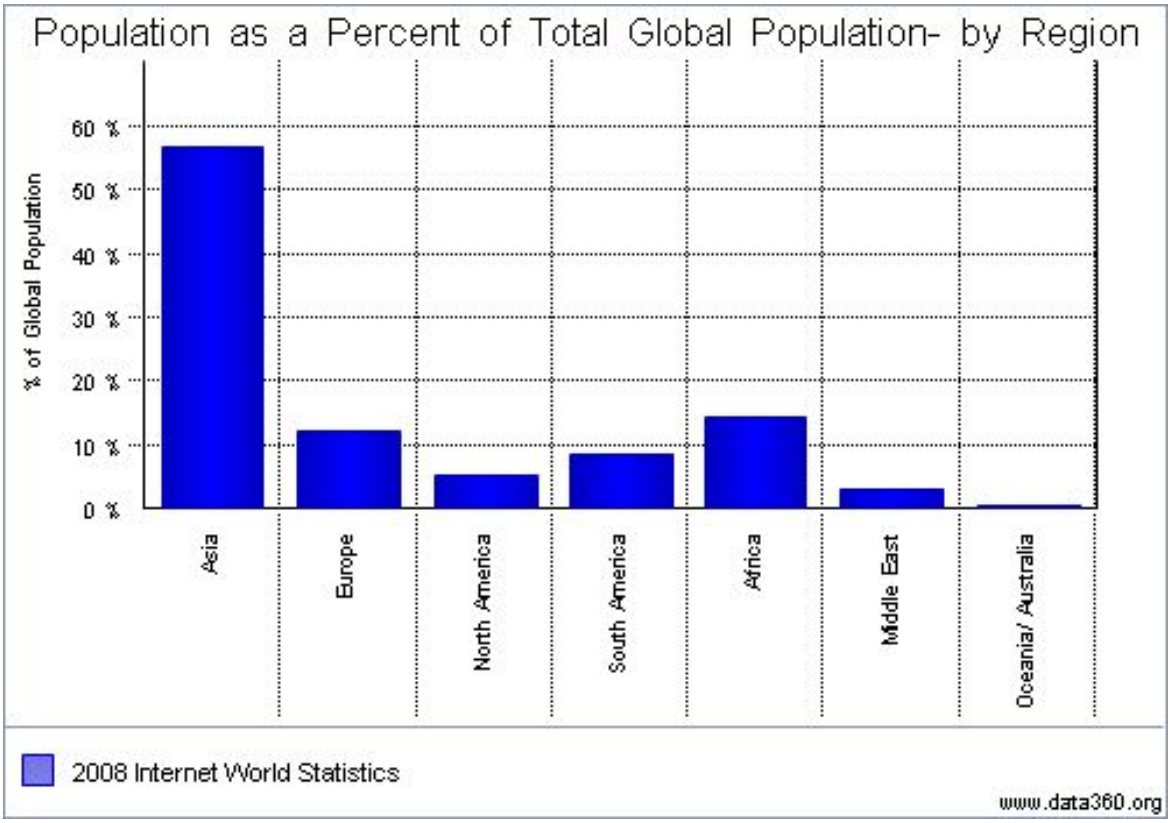
16. Percent, Tax and Discounts

RULE: Percent can be used to determine tax. In many problems it is important to READ the question. The percent is usually something used to find the answer – but it is not always the FINAL Step!

EXAMPLE:

Reading Percent Graphs

- Put in words under each graph at least one comparative statement.

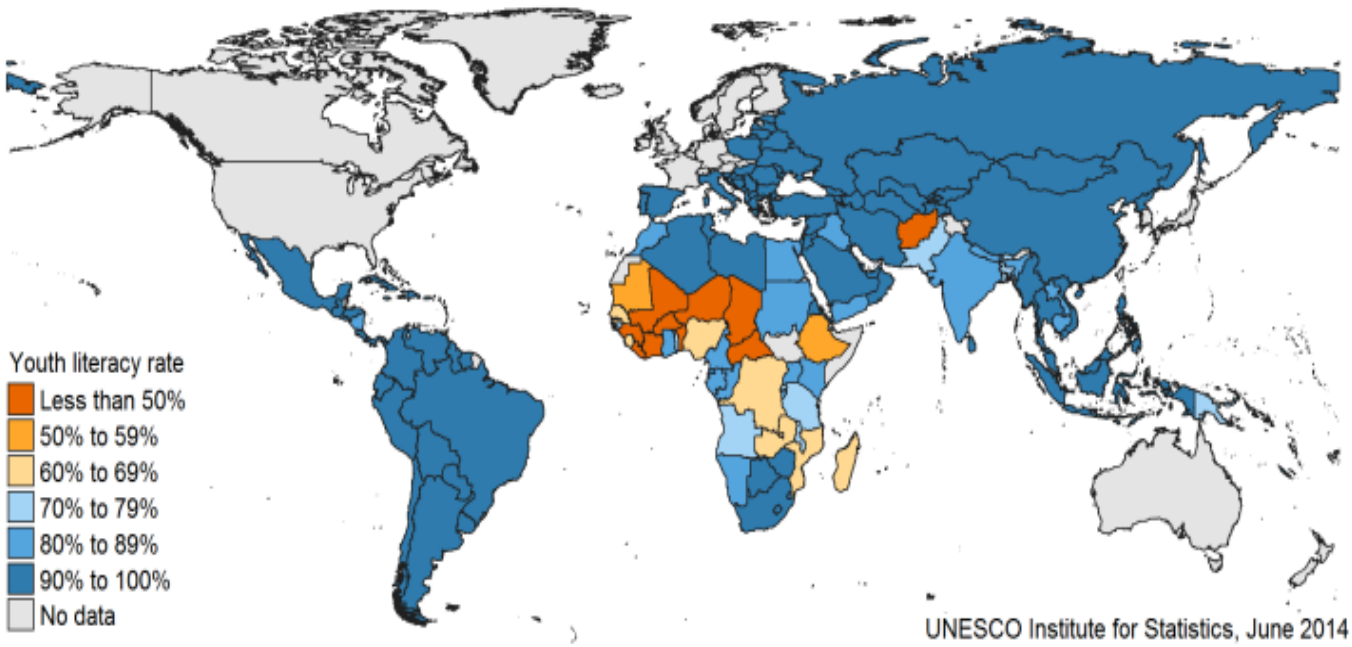


http://www.data360.org/temp/dsg644_500_350.jpg

This graph tells me that _____

_____

_____

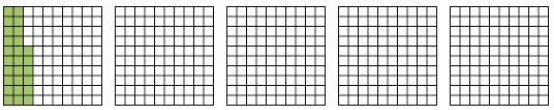


http://www.uis.unesco.org/Education/PublishingImages/Youth%20LR%202014.png

*This map tells me that*_____

_____.

- Look at how percentages link to fractions and decimals:



$$26\% = \frac{26}{100} = \frac{13}{50}$$

Fraction	Decimal	Percentage
$\frac{1}{2}$	0.5	50%
$\frac{1}{3}$	0.33	33.33%
$\frac{1}{4}$	0.25	25%
$\frac{1}{5}$	0.2	20%
$\frac{1}{10}$	0.1	10%
$\frac{1}{20}$	0.05	5%
$\frac{4}{10}$	0.4	40%
$\frac{6}{10}$	0.6	60%
$\frac{7}{10}$	0.7	70%
$\frac{8}{10}$	0.8	80%
$\frac{9}{10}$	0.9	90%

- Work with a partner on 3 questions.
- Figure out what the decimal was before the fraction.

1) 1/5 = 1/5 x 20/20 = 20/100 = .20 = 20%

1) $\frac{1}{5}$ = 20% 2) $\frac{3}{4}$ = 75% 3) $\frac{3}{8}$ = 37.5% 4) $\frac{4}{9}$ = 44.4%

5) $\frac{5}{8}$ = 62.5% 6) $\frac{7}{16}$ = 43.8% 7) $\frac{2}{10}$ = 20% 8) $\frac{11}{3}$ = 366.7%

9) $\frac{7}{8}$ = 87.5% 10) $\frac{8}{15}$ = 53.3% 11) $\frac{8}{3}$ = 266.7% 12) $\frac{14}{20}$ = 70%

13) $\frac{7}{12}$ = 58.3% 14) $\frac{14}{10}$ = 140% 15) $\frac{7}{9}$ = 77.8% 16) $\frac{7}{11}$ = 63.6%

17) $\frac{11}{25}$ = 44% 18) $\frac{12}{13}$ = 92.3% 19) $\frac{12}{9}$ = 133.3% 20) $\frac{9}{5}$ = 180%

21) $\frac{9}{20}$ = 45% 22) $\frac{9}{4}$ = 225% 23) $\frac{5}{12}$ = 41.7% 24) $\frac{4}{7}$ = 57.1%

25) $\frac{19}{22}$ = 86.4% 26) $\frac{13}{20}$ = 65% 27) $\frac{3}{11}$ = 27.3% 28) $\frac{6}{7}$ = 85.7%

TECH CHECK:

- http://www.learningwave.com/lwonline/percent/percent_num.html
- http://www.bbc.co.uk/schools/ks3bitesize/maths/number/fractions_decimals_percentages/revise1.shtml
- http://www.csgnetwork.com/csgpercent.html
- http://mindprod.com/image/screenshot/canadiantax.png
- http://www.raymondgeddes.com/sswebsite/images/_downloads/lp7-calculating-sales-tax.pdf

REAL WORLD PROBLEM:

Bob wishes to buy wood to build 4 bluebird boxes. The price of the wood is $48. However, in Ontario, there is a 13% HST (Harmonized Sales Tax). What is the total cost?

13% = 0.13 = 13/100

Thus, the tax is: $48 x 0.13 = $6.24

The total cost is: $48 + $6.24 = $54.24

Total cost can also be found in one step by multiplying the price by 1 plus the tax, thus 1.13 **$48 x 1.13 = $54.24**

How Right is Your Price?

***** Store catalogs; store receipts

***** A chart made out similar to a receipt: Title in one column; 'Items', and in the other column; 'Price'. At the bottom 'Price' column should be Subtotal, Tax and Total.

(d) You have been given $500.00 to spend and the one who comes closest to spending $500.00 will receive a prize.

(e) Write down items, the page you picked the item from and write down the price and tax. Be as specific as possible.

GOT IT!

Calculate:

Fractions	Decimals	Percentages
1/10		
	0.2	
1/4		
		30%
2/5		
1/2	0.5	50%
		60%
	0.7	
		75%
8/10		
	0.9	
1/1		

1) Of 136 people competing, 17 received awards. What percent of the competitors received awards?

	Rough Work ☺

2) Data: Participants in school soccer

2008 120 boys 30 girls

2010 100 boys 120 girls

In 2008, what percentage of the students were boys?

Find the percentage of increase in the number of girls from 2008 to 2010?

	Rough Work ☺

How well did you calculate percent to solve math problems?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

17. Banking and Budgeting

RULE: Never spend more money than you have in the bank.

Have you ever wanted a pet?
How much do you think a pet costs?

- Brainstorm the costs associated with owning a pet.

- Look up some of these costs on the web.
- Figure out the costs per week for owning a dog.

I believe it costs $ _____/week to own a pet dog.

- What are different ways you can solve the problem of paying for a pet dog?

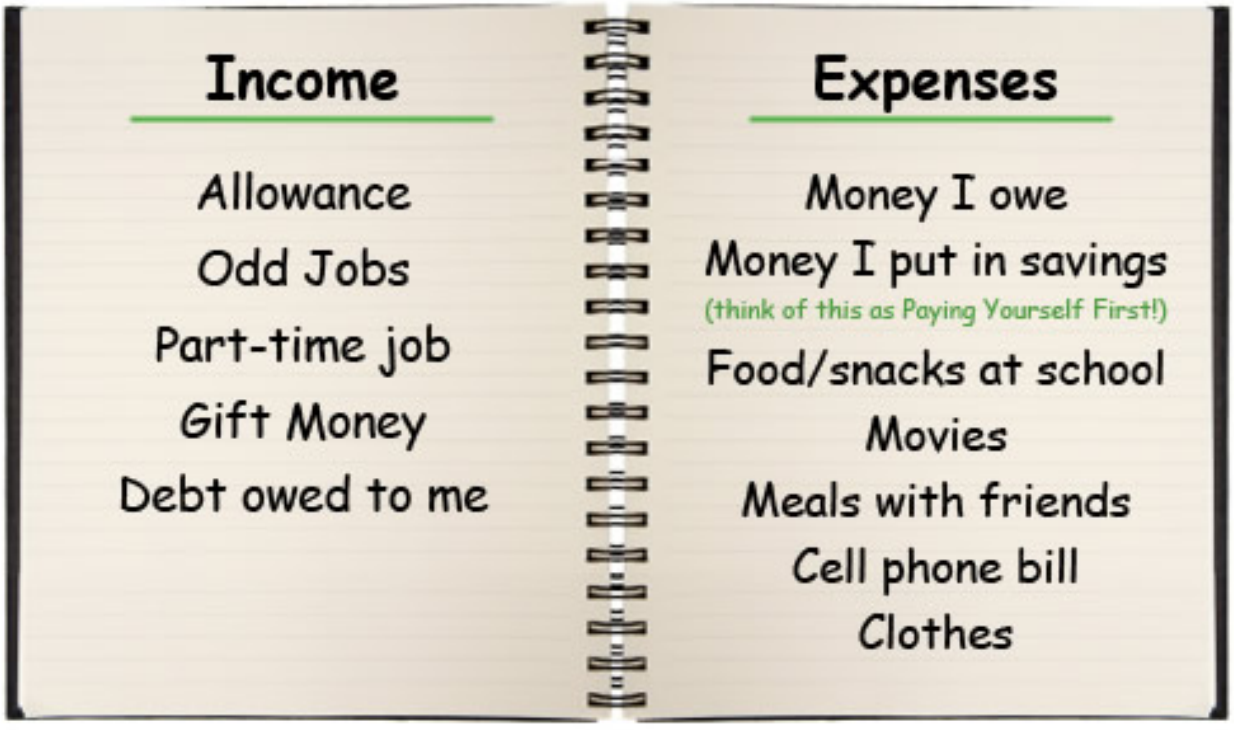
- If you receive $25 dollars a month for allowance, do you think you will have enough money to pay for your dog? Yes? No? (circle one).
- Why?

Personal Budgeting

You are ready to use your bank account when you can:

- Add and subtract earnings/income and expenses (what you spend)
- Understand the added charges for banking
- Calculate the percentage of savings and chequing interest rates
- You can write a cheque!
- You can deposit a cheque at the bank and in a bank machine!
- You can keep a debit card in a safe place and use it at a bank machine or at the bank (and remember your password).

(Note: Credit cards are different than a debit card – and generally not something that a minor possesses. They can be very costly as large interest payments are added for late payments.)



http://www.themint.org/kids/keeping-a-money-diary.html

You pay for things with:

(a) cash
(b) debit cards
(c) credit cards
(d) cheques
(e) other

Do you know how to fill in a cheque?

- Click out this 'how to write a cheque' animation to learn how to fill out a cheque:

https://www.moneyinstructor.com/app/checkwrite/checkwriteindex.asp

https://images.template.net/wp-content/uploads/2015/06/Sample-Amarican-Blank-Check-Design.jpg

Extension:

- Find out what 'other' ways of paying for things might be.

RULE: Now when it comes to budgeting, it's important to keep track of all expenses. The small ones do add up!

- Look at the budget for the PowerBarr company over two years. Highlight where you think this company saved money from 2014 to 2015.
- Choose three areas of the budget where the company could save money.

2014 PowerBarr Income	Total
Sales of units	16
Rental units (total available in quarter)	32
Rental forecast (days)	100
Sales of units	$ 120,000
Rental payments (2 units per day @ $700)	$ 140,000
Loan from Bank	$ 20,000
Equity Investment	$ 30,000
Total Income	**$ 310,000**
2014 PowerBarr Expense	**Total**
Sales & Marketing (Colin)	$ 24,000
Commission	$ 12,500
R&D	$ 20,000
COGS (sales units)	$ 64,000
COG (rental units)	$ 40,000
Office / workshop space / storage / charge	$ 30,000
Office equipment	$ 5,000
Operating costs (incorporation, bank, legal)	$ 20,000
Loan repayment (3 year, 3%)	$ 6,984
Repayment of loan to John Wilson	$ 14,000
Total Expense	**$ 236,484**
Income – Expense	**$ 73,516**
Cumulative Net Income (loss)	

2015 PowerBarr Income	Total
Sales of units	38
Rental units	100
Rental forecast (days)	250
Sales of units	$ 285,000
Rental payments (2 units per day @ $700)	$ 350,000
Cash from Operations in 2014	$ 73,516
Total Income	**$ 708,516**
2015 PowerBarr Expense	**Total**
Sales & Marketing (Colin & Elena)	$ 80,000
Commission	$ 29,750
R&D	$ 80,000
COGS (sales units)	$ 152,000
COG (rental units)	$ 80,000
Office / workshop space / storage / charge	$ 80,000
Office equipment	$ 10,000
Operating costs (incorporation, bank, legal)	$ 14,000
Loan repayment (3 year, 3%)	$ 6,984
Total Expense	**$ 532,734**
Income - Expense	**$ 175,782**
Cumulative Net Income (loss)	

- There are many new words in this budget.
- List them and discuss what you think they mean.

A personal budget is much simpler than a business budget.

- Create your own list of income/revenue and expenses below:

My Income	
My Expenses	

Comfort Dog Project:

*Rural schools might consider goats, chickens or other living things!

Step 1

- Research things we will need to look after a dog at our school

Things we probably need to do	**Points /2**
TOTAL POINTS	/10

Step 2:

- Research how much comfort dogs cost.

Decision-Making Chart

- Prepare your recommendation for purchasing a dog for your school.
- Use the chart below to organize your data.

Where to Purchase	**Cost and Advantage of Choice**
Points	/4 points

http://www.mitchellplainfarm.com/blog/wp-content/uploads/2011/10/heifer_facebook_graphic1d_as11.png

Step 3:

Create a list of expenses for a school comfort dog for one year.

Need to purchase	Source	Amount
Cost for a Comfort Dog		
Total Points		/66

Step 4:

- Present your budget to your classmates to help create a class budget plan for buying a comfort dog for our school.

Speaking	**Up to 2 points each**
spoke clearly	
spoke with enthusiasm	
spoke so everyone could hear message	
spoke at a good pace – not too fast – not too slow	
message shared strong points	
TOTAL POINTS	/10

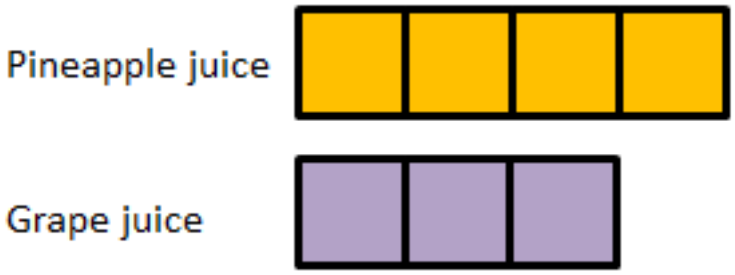
18. Ratios and Relationships (Extension)

RULE: A ratio describes the relationship between two quantities. For instance, the ratio of toes to ears is 10:2 or 5:1. For every 1 ear you have five toes. The ratio sign is also a fraction or division sign.

EXAMPLES:

- Look at the tape diagrams below and record what you think the ratio of pineapple juice to grape juice is:

_____: _____

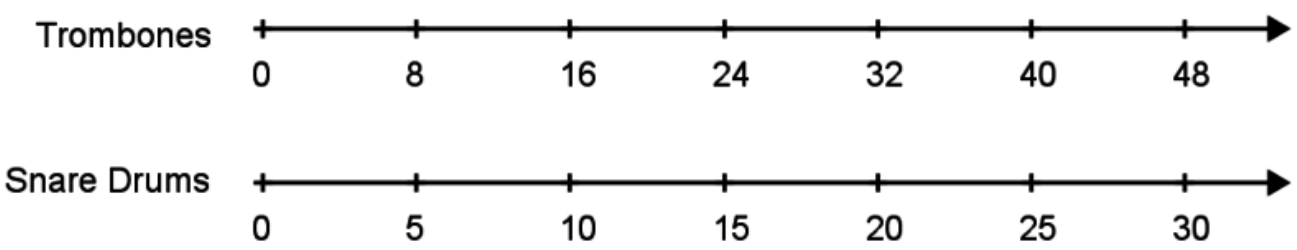


http://www.ccssmath.com/images/6/6_rp_1_19.png

- Draw the following images of ratios:

5:6
8:4
2:3
8:6

- Look at the number lines below and identify at least three equivalent ratios for the trombones: snare drums.



http://s3.amazonaws.com/illustrativemathematics/images/000/003/917/max/bandDNL_9624901176ba968c2c57f0a3de56f8d1.png?1447074611

The ratio of trombones to snare drums is:

(a) _____:_____ OR

(b) _____OR

(c) _____

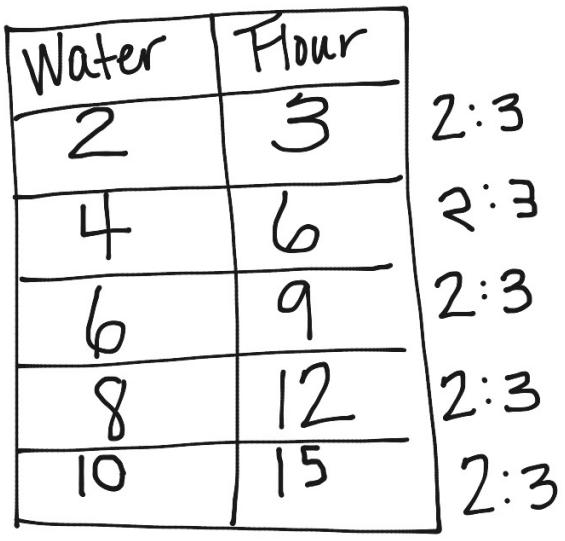
- Find the missing values in the table below:

Dogs	4		24
Cats	6	12	

http://2.bp.blogspot.com/-JTOzePSE8gw/Vl3_-MZ8AGI/AAAAAAAAA90/G0fWoACMXRo/s1600/Screenshot%2B2015-12-01%2Bat%2B2.15.27%2BPM.png

Look at the equivalent ratios below. What operation was used in order to see these were all the same ratios?

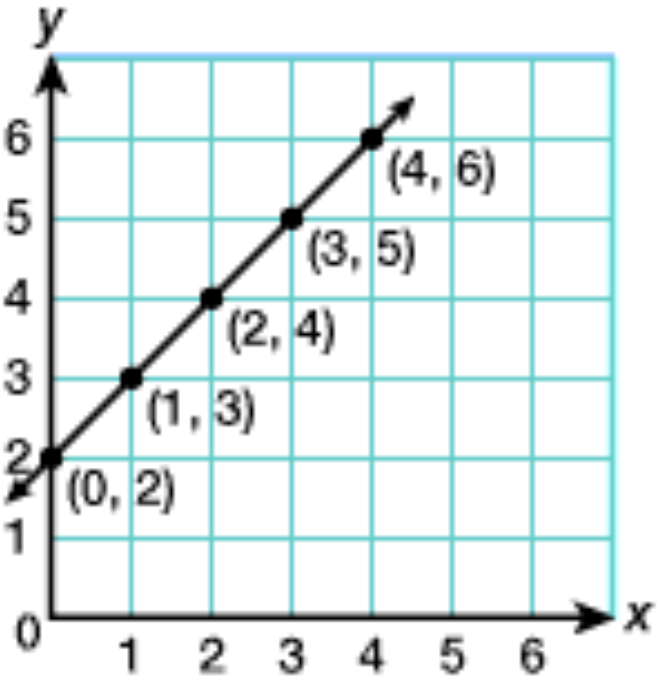
_____



http://media.showme.com/files/126031/pictures/thumbs/1164789/last_thumb1381841964.jpg

- Make your own ratio table with a different set of numbers other than 2:3.

- Look at the following graph with coordinates that represent ratios.



http://www.eduplace.com/math/mw/background/4/11/graphics/ts_4_11_wi5.gif

Let's say the above example reflects the ratio of boys to girls in a classroom. If boys are represented on the 'y' axis and girls on the 'x' axis, how many boys are in the class if there is a total of 12 girls? Create a table to show and extend the pattern to find your answer. **The pattern of coordinates gives you a clue!**

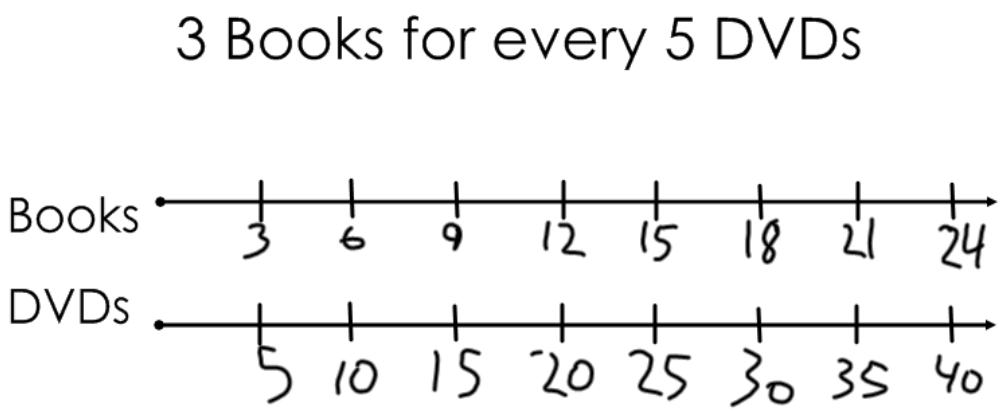
What is the ratio of boys to girls in your classroom?

_____: _____

- Review the following lesson on plotting coordinate pairs:

https://learnzillion.com/lesson_plans/5435-graph-ratios-using-a-table

- Look at the sample below that compares books to DVD ratios:



http://3.bp.blogspot.com/-amKJpWm7JOc/VA9Pc1-3n6I/AAAAAAAAAn4/950i2lQr8p0/s1600/double.png

- Now create your own double number line to show a ratio pattern of your choice!

Unit price

Investigate the unit cost of bird seed by reviewing different websites (Canadian Tire; Home Depot; Home Hardware…).
Using your 'know-how' of ratios and percentages, figure out the "unit prices", to find out what you think is the most affordable option!

Complete the following unit price word problems:

(a) If 5 batteries cost $4.75, what is the cost of 1 battery?

(b) A recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger.

- Convert & round percents, fractions, decimals & ratios.

ET- Solve elapsed time word problems, using time lines.

ET - Add & subtract simple elapse time (using seconds, minutes, & hours).

ET - Add & subtract complex elapsed time.

19. Measuring Time

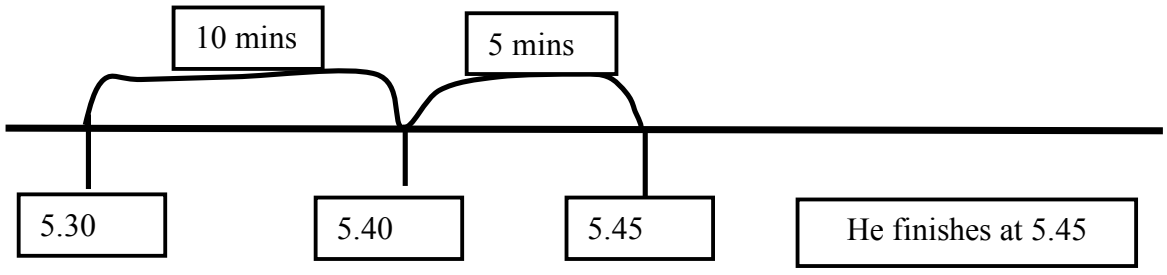
RULE: To figure out how to add or subtract time, you need to see 60 as the highest number, to add to or subtract from.

EXAMPLES:

Addition	Subtraction
4 hours and 54 minutes + 7 hours and 35 minutes = 11 hours + (54 + 35 minutes) = 11 hours + 89 minutes = 11 hours + 60 minutes + 29 minutes = 12 hours + 29 minutes	17 hours and 21 minutes - 5 hours and 47 minutes = 16 hours and (60 + 21 minutes) – 5 hours and 47 minutes = 16 hours and 81 minutes 5 hours and 47 minutes = 11 hours and (81-47 minutes) = 11 hours and 34 minutes

- You can use a number line to help you solve time problems.

A boy starts drinking his tea at 5.30. It takes 15 minutes.
What time does he finish?



Non-Standard Time Measures

"That will take me a song to complete."

- How long in standard measures do you think this means?

_____

- "That will be a meal's worth of time."

_____

- "It will take as long as it takes a tomato to grow!"

_____

- "I think the drive will be 3 suns and 2 moons worth of travel."

_____

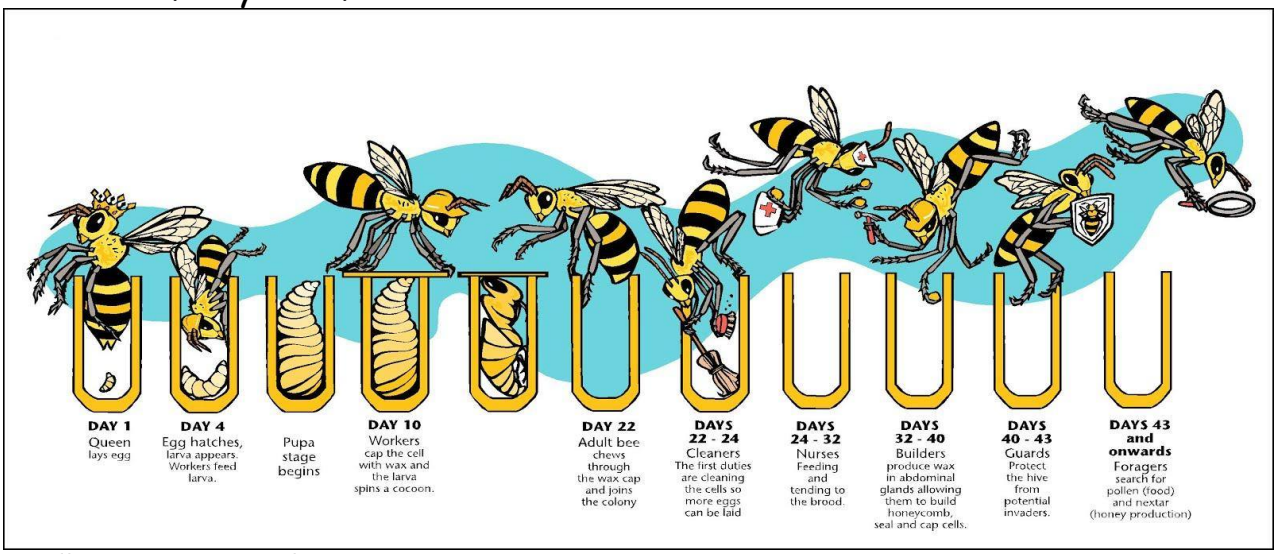
- Create your own non-standard unit of time.

"_____"

Time Trials:

- Divide the group into the AM team and the PM team.
- Representatives take turns calling out the time that the teacher (or a student) moves the hands to. First series refers to the 12-hour clock – and then play using the 24-hour clock!
- How much time does it take to do things I do every day?
- Create a chart to post your response!

- Look at the life cycle of a bee.



http://1.bp.blogspot.com/-OHJLfg4NLeI/Vw7R8TZDzDI/AAAAAAAAAI0/jU5U1BPKr9M96_9nbzuYRuCM4gOZepJywCK4B/s1600/bee-schedule.jpg

- What things do people do that may take up the length of a bee's life?

TECH CHECK:

- http://www.mathsisfun.com/time-add-subtract.html
- http://www.math-aids.com/cgi/time_adding.pl?hour_minute=0&range=0&inc=20&language=0&memo=&answer=1&x=86&y=22
- http://www.glencoe.com/sec/math/studytools/cgi-bin/msgQuiz.php4?isbn=0-02-833050-1&chapter=6&lesson=7

GOT IT!

Solve the following time challenges:

It is three o'clock. What time will it be in 3 hours-time?

I get home from school at 4 o'clock. I go to bed 4 hours later. What time will I go to bed?

On Thursday afternoon, we have register time at half past one. We start art one hour later. What time do we start art?

Playtime starts at 10.30. We play for 30 minutes. What time does playtime end?

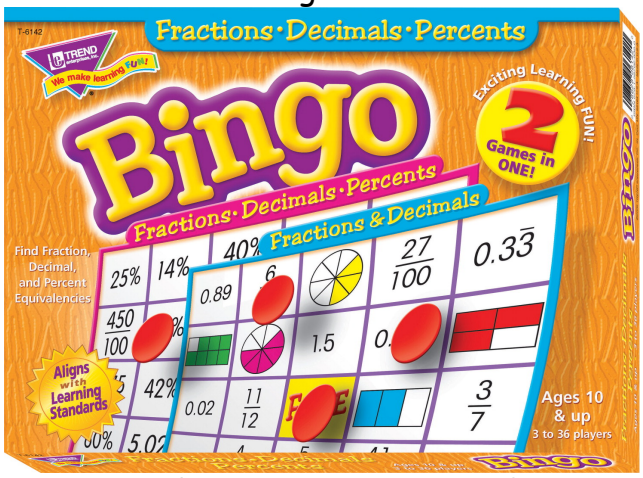
You are travelling from Toronto to Montreal by train. If the train departs Toronto at 11:30 a.m. and arrives in Montreal at 4:56 p.m., how long will you be on the train?

(a) 7 hours and 31 minutes + 6 hours and 49 minutes	Rough Work ☺
(b) 8 hours and 3 minutes – 5 hours and 54 minutes	Rough Work ☺
(c) 23 hours and 57 minutes + 4 hours and 29 minutes	Rough Work ☺

Extension:

- Calculate variable rates (percentage, speed) with time (dollars/hour).

Let's create our own Fraction – Decimal – Percentage and Ratio BINGO Game.



http://ep.yimg.com/ay/yhst-64576602297917/trend-enterprises-decimals-fractions-percentages-bingo-game-1-31-x-9-3-4-7-13-in-grade-9-1322090-math-4.gif

How well did you solve elapsed time in word problems, using time lines?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

How well did you add & subtract simple elapse time (using seconds, minutes, & hours)?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

How well did you add & subtract complex elapsed time.?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

Fraction Quiz

- Change the following fractions to decimals or decimals to fractions.

1) 0.1 = 2) 5/100 = 3) 3/10 =

4) Shade in 1/8 – to the right								

5) 49/100 + 23/100 = _____

- Solve the following:

6) $\frac{1}{2}$ + 4/5=	7) 1 and 2/3 - 7/8 =
8) 1 + 36/9 – 12/ 3	9) Reduce the following fractions to lowest terms: 36/8

- Change the following proper fractions to improper fractions or improper fractions to mixed fractions.

10) $1 + \frac{1}{2}$

11) 36/4

12) Donna's training trip costs $815. Her business pays 25% of the cost. How much does Donna need to pay?

	Rough Work ☺

13) Wayne's bill is $20.60 for dinner. He wants to add a 15% tip. How much will the final bill be?

	Rough Work ☺

14) 45 kids signed up for the track and field team. This was 150% of the number of kids who were on the team last year. How many kids were on last year's team?

	Rough Work ☺

15) The parking lot holds 14 trucks. On Monday the lot was almost full at the beginning of the day, but then 4 trucks left. On Tuesday the lot was $\frac{1}{4}$ full in the morning but by the end of the day, this number doubled. On Wednesday, the lot started out full but by mid-day there was only one car left. Write an equation and then solve to determine the daily average number of trucks in this lot.

	Rough Work ☺

16) Mr. Carter borrowed $2,500.00 at 14% interest. How much will be need to pay back for his loan?

	Rough Work ☺

17) Now the time is 6:45. What is 8 hours earlier?	

Checking Your Understanding

Date: _____

Dear _____(teacher name),

I have completed Junior Part Numbers.

Did I learn from making mistakes? _____

I am proudest about the work we did on page ___ because….

_____

We think the trickiest part of this Math was….

_____

because_____

I enjoyed working (with others or on my own) because….

_____

Sincerely,

_____

Appendix A:
Ontario Ministry of Education and Training Expectations

3A.1.5 round two-digit numbers to the nearest ten, in problems arising from real-life situations

3A.1.7 divide whole objects and sets of objects into equal parts, and identify the parts using fractional name without using numbers in standard fractional notation

3A.1.8 represent and describe the relationships between coins and bills up to $10

3A.1.9 estimate, count, and represent (using the $ symbol) the value of a collection of coins and bills with a maximum value of $10

3A.3.3 use estimation when solving problems involving addition and subtraction, to help judge the reasonableness of a solution

3A.3.4 add and subtract money amounts, using a variety of tools to make simulated purchases and change for amounts up to $10 (Sample problem: You spent 5 dollars and 75 cents on one item and 10 cents on another item. How much did you spend in total?)

3B.1.3 read time using analogue clocks, to the nearest five minutes, and using digital clocks, and represent time in 12-hour notation

4A.1.4 round four-digit whole numbers to the nearest ten, hundred, and thousand, in problems arising from real-life situations

4A.1.5 represent, compare, and order decimal numbers to tenths, using a variety of tools and using standard decimal notation (Sample problem: Draw a partial number line that extends from 4.2 to 6.7, and mark the location of 5.6.)

4A.1.6 represent fractions using concrete materials, words, and standard fractional notation, and explain the meaning of the denominator as the number of the fractional parts of a whole or a set, and the numerator as the number of fractional parts being considered

4A.1.7 compare and order fractions (i.e., halves, thirds, fourths, fifths, tenths) by considering the size and the number of fractional parts (e.g., 4/5 us greater than 3/5 because there are more parts in 4/5; 1/4 is greater than 1/5 because the size of the part is larger in 1/4)

4A.1.8 compare fractions to the benchmarks of 0, 1/2, and 1 (e.g., 1/8 is closer to 0 than 1/2; 3/5 more than 1/2)

4A.1.9 demonstrate and explain the relationship between equivalent fractions, using concrete materials and drawings

4A.1.10 read and represent money amounts to $100

4A.1.12 count forward by halves, thirds, fourths, and tenths to beyond one whole, using concrete materials and number lines

4A.1.13 count forward by tenths from any decimal number expressed to one decimal place, using concrete materials and number lines (Sample problem: What connections can you make between counting by tenths and measuring lengths in millimetres and in centimetres?).

4A.2.3 add and subtract decimal numbers to tenths, using concrete materials (e.g., paper strips divided into tenths, base ten materials) and student-generated algorithms.

4A.2.4 add and subtract money amounts by making simulated purchases and providing change for amounts up to $100, using a variety of tools (e.g., currency manipulatives, drawings.

4A.2.9 use estimation when solving problems involving the addition, subtraction, and multiplication of whole numbers, to help judge the reasonableness of a solution (Sample problem: A school is ordering pencils that come in boxes of 100. If there are 9 classes and each class needs about 110 pencils, estimate how many boxes the school should buy.).

4A.3.2 determine and explain, through investigation, the relationship between fractions (i.e., halves, fifths, tenths) and decimals to tenths, using a variety of tools and strategies

4B.1.2 estimate, measure and represent time intervals to the nearest minute.

4B.1.3 estimate and determine elapsed time, with and without using a time line, given the durations of events expressed in five-minute intervals, hours, days, weeks, months, or years (Sample problem: If you wake up at 7:30 a.m., and it takes you 10 minutes to eat your breakfast, 5 minutes to brush your teeth, 25 minutes to wash and get dressed, 5 minutes to get your backpack ready, and 20 minutes to get to school, will you be at school by 9:00 a.m.?).

5A.1.4 round decimal numbers to the nearest tenth, in problems arising from real-life situations

5A.1.5 represent, compare, and order fractional amounts with like denominators, including proper and improper fractions and mixed numbers, using a variety of tools and using standard fractional notation.

5A.1.6 demonstrate and explain the concept of equivalent fractions, using concrete materials

5A.1.7 demonstrate and explain equivalent representations of a decimal number, using concrete materials and drawings.

5A.1.8 read and write money amounts to $1000.

5A.2.1 count forward by hundredths from any decimal number expressed to two decimal places, using concrete materials and number lines (Sample problem: What connections can you make between counting by hundredths and measuring lengths in centimetres and metres?).

5A.3.2 add and subtract decimal numbers to hundredths, including money amounts, using concrete materials, estimation, and algorithms.

5A.3.3 multiply two-digit whole numbers by two-digit whole numbers, using estimation, student-generated algorithms, and standard algorithms.

5A.3.4 divide three-digit whole numbers by one-digit whole numbers, using concrete materials, estimation, student-generated algorithms, and standard algorithms.

5A.3.5 multiply decimal numbers by 10, 100, 1000, and 10 000, and divide decimal numbers by 10 and 100, using mental strategies.

5A.3.6 use estimation when solving problems involving the addition, subtraction, multiplication, and division of whole numbers, to help judge the reasonableness of a solution.

5A.4.1 describe multiplicative relationships between quantities by using simple fractions and decimals.

5B.1.1 estimate, measure, and represent time intervals to the nearest second.

5B.1.2 estimate and determine elapsed time, with and without using a time line, given the durations of events expressed in minutes, hours, days, weeks, months, or years (Sample problem: You are travelling from Toronto to Montreal by train. If the train departs Toronto at 11:30 a.m. and arrives in Montreal at 4:56 p.m., how long will you be on the train?).

5B.1.3 measure and record temperatures to determine and represent temperature changes over time (Sample problem: Investigate the relationship between weather, climate, and temperature changes over time in different locations.)

5D.2.1 demonstrate, through investigation, an understanding of variables as changing quantities, given equations with letters or other symbols that describe relationships involving simple rates.

EXTENSIONS:

6A.1.1 represent, compare, and order whole numbers and decimal numbers from 0.001 to 1 000 000, using a variety of tools.

6A.1.2 demonstrate an understanding of place value in whole numbers and decimal numbers from 0.001 to 1 000 000, using a variety of tools and strategies.

6A.1.3 read and print in words whole numbers to one hundred thousand, using meaningful contexts.

6A.1.4 represent, compare, and order fractional amounts with unlike denominators, including proper and improper fractions and mixed numbers, using a variety of tools and using standard fractional notation (Sample problem: Use fraction strips to show that 1 1/2 is greater than 5/4).

6A.1.5 estimate quantities using benchmarks of 10%, 25%, 50%, 75%, and 100%.

6A.2.3 Add and subtract decimal numbers to thousandths, using concrete materials, estimation, algorithms, and calculators.

6A.2.4 multiply and divide decimal numbers to tenths by whole numbers, using concrete materials, estimation, algorithms, and calculators.

6A.2.5 multiply whole numbers by 0.1, 0.01, and 0.0 01 using mental strategies.

6A.2.7 use estimation when solving problems involving the addition and subtraction of whole numbers and decimals, to help judge the reasonableness of a solution (Sample problem: Mori used a calculator to add 7.45 and 2.39 .The calculator dis play showed 31.35 .Explain why this result is not reasonable ,and suggest where you think Mori made his mistake.).

6A.3.1 represent ratios found in real-life contexts, using concrete materials, drawings, and standard fractional notation (Sample problem:

In a classroom of 28 students, 12 are female. What is the ratio of male students to female students?)

6A.3.2 determine and explain, through investigation using concrete materials, drawings, and calculators, the relationships among fractions, decimal numbers, and percents (e .g ., use a 10 x 10 grid to show that ¼.

6A.3.3 represent relationships using unit rates (Sample problem: If 5 batteries cost $4.75, what is the cost of 1 battery?).= 0.25 or 25%);grid to show that ¼ = 0.25 or 25%.

Appendix B: Headwater Mathematics & Alberta and Common Core State Standards (US)

Essential Understandings to Master	Alberta Education Standards	Common Core State Standards
Rounding Small Numbers	5A.2; 5D.3; 5D.4	3.NBT.A.1
Rounding Large Numbers	6A.1; 5A.2.	3.OA.D.8; 5.NBT.A.4; 5.NBT.A.1;
Doing Operations with Rounding and Front End Estimation	6A.1; 5A.2.	3.OA.D.8
Place Value with Whole and Part Numbers	5A.10; 6A.1	3.NBT.A.1; 5.NBT.A.1
Adding and Subtracting Decimals	4A.11; 5A.11; 3A.13.	5.NBT.B.7
Multiplying Decimals	6A.8	5.NBT.B.7
Dividing Decimals	6A.8; 4A.1.5	5.NBT.B.7
Multiplying Fractions	6A.8	4.NF.B.4; 4.NF.B.4a; 4.NF.B.4.c; 5.NF.B.4 3.NF.A.1; 4.NF.A.1
Dividing Fractions	4A.1.	5.NF.B.7.b; 5.NF.B.7.c 6.NS.A.1; 5.NF.B.3; 5.NF.B.7; 5.NF.B.7a; 5.NF.B.7b; 5.NF.B.7c 5.NF.B.3; 5.NF.B.7.c
Addition of Fractions	5.NF.A.1	4.NF.B.3.a; 4.NF.B.3.c ; 4.NF.B.3.d; 5.NF.A.1; 4.NF.B.3.b
Equivalent – or not?	5A.7; 5A.8; 5A.9; 5A.10	3.NF.A.1; 3.NF.A.2 ; 4.NF.C.5; 4.NF.B.4a; 4.NF.B.4; 5.NBT.A.1; 4.NF.A.1; 5.NF.A.1; 4.NF.C.5; 4.NF.C.6; 4.NF.C.7; 3.NF.A.3.b; 3.NF.A.3; 3.NF.A.3.a; 3.NF.A.3.b; 3.NF.A.3.d' 4.NF.A.2
Subtraction of Fractions	5.NF.A.1;	3.NF.A.3.d ; 3.NF.A.3.c; 4.NF.B.3.c ; 5.NF.B.2; 5.NF.B.3; 3.NF.A.3.c; 4.NF.B.3.d; 5.NF.A.2
Converting between Decimals and Fractions	4A.8.	4.NF.C.6; 4.NF.C.7; 5.NBT.A.3.a; 4.NF.C.6; 4.NF.C.7; 5.NBT.A.3; 4.NF.C.6; 5.NBT.A.3.b; 4.NF.C.7; 4.NF.C.6
Money Matters		6.NS.C.7.c; 6.NS.C.7.d
Rounding Change		3.NBT.A.1; 5.NBT.A.4;
Percent, Tax and Discount	6A.6	6.RP.A.3.c
Banking and Budgeting		
Ratios and Relationships	6A.5	6.RP.A.1; 6.RP.A.2; 6.RP.A.3; 6.RP.A.3a; 6.RP.A.3.b;
Measuring Time	3C.1; 4C.1;	3.MD.A.1

Appendix C:
Alberta Education Mathematics Expectations

3C.1. Relate the passage of time to common activities, using nonstandard and standard units (minutes, hours, days, weeks, months, years).

4C.1. Read and record time, using digital and analog clocks, including 24-hour clocks.

3A.13. Demonstrate an understanding of fractions by:
- explaining that a fraction represents a part of a whole
- describing situations in which fractions are used
- comparing fractions of the same whole that have like denominators

4A.8. Demonstrate an understanding of fractions less than or equal to one by using concrete, pictorial and symbolic representations to:
- name and record fractions for the parts of a whole or a set
- Compare and order fractions
- model and explain that for different wholes, two identical fractions may not represent the same quantity
- provide examples of where fractions are used.

4A.9. Represent and describe decimals (tenths and hundredths), concretely, pictorially and symbolically.

4A.10. Relate decimals to fractions and fractions to decimals (to hundredths).

4A.11.Demonstrate an understanding of addition and subtraction of decimals (limited to hundredths) by:
- using personal strategies to determine sums and differences
- estimating sums and differences
- using mental mathematics strategies to solve problems.

5A.2. Use estimation strategies, such as:
- front-end rounding
- compensation
- compatible numbers in problem-solving contexts.

5A.7. Demonstrate an understanding of fractions by using concrete, pictorial and symbolic representations to:
- create sets of equivalent fractions
- compare fractions with like and unlike denominators

5A.8. Describe and represent decimals (tenths, hundredths, thousandths), concretely, pictorially and symbolically.

5A.9. Relate decimals to fractions and fractions to decimals (to thousandths).

5A.10. Compare and order decimals (to thousandths) by using:
- benchmarks
- place value
- equivalent decimals.

5A.11. Demonstrate an understanding of addition and subtraction of decimals (limited to thousandths).

5B.1. Determine the pattern rule to make predictions about subsequent elements.

5D.3. Describe the likelihood of a single outcome occurring, using words such as:
- impossible
- possible
- certain.

5D.4. Compare the likelihood of two possible out comes occurring, using words such as:
- less likely
- equally likely
- more likely

6A.1. Demonstrate an understanding of place value, including numbers that are:
- _greater than one million
- _less than one thousandth.

6A.4. Relate improper fractions to mixed numbers and mixed numbers to improper fractions.

6A.5. Demonstrate an understanding of ratio, concretely, pictorially and symbolically.

6A.6. Demonstrate an understanding of percent (limited to whole numbers), concretely, pictorially and symbolically.

6A.8. Demonstrate an understanding of multiplication and division of decimals (1-digit whole number multipliers and 1-digit natural number divisors).

Appendix D:
Headwater Mathematics & Common Core State Standards (US)

CCSS.Math.Content.3.NF.A.1
Understand a fraction 1/*b* as the quantity formed by 1 part when a whole is partitioned into *b* equal parts; understand a fraction *a*/*b* as the quantity formed by *a* parts of size 1/*b*.

CCSS.Math.Content.3.NF.A.2
Understand a fraction as a number on the number line; represent fractions on a number line diagram.

CCSS.Math.Content.3.NF.A.2.a
Represent a fraction 1/*b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size 1/*b* and that the endpoint of the part based at 0 locates the number 1/*b* on the number line.

CCSS.Math.Content.3.NF.A.2.b
Represent a fraction *a*/*b* on a number line diagram by marking off a lengths 1/*b* from 0. Recognize that the resulting interval has size *a*/*b* and that its endpoint locates the number *a*/*b* on the number line.

CCSS.Math.Content.3.NF.A.3
Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

CCSS.Math.Content.3.NF.A.3.a
Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.

CCSS.Math.Content.3.NF.A.3.b
Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3. Explain why the fractions are equivalent, e.g., by using a visual fraction model.

CCSS.Math.Content.3.NF.A.3.c
Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.*

CCSS.Math.Content.3.NF.A.3.d
Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

CCSS.Math.Content.3.MD.A.1
Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.

CCSS Math Content 3.NBT.A.1
Use place value understanding to round whole numbers to the nearest 10 or 100.

CCSS Math Content 3.OA.D.8
Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

CCSS.Math.Content.4.NF.A.1
Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

CCSS.Math.Content.4.NF.A.2
Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

CCSS.Math.Content.4.NF.B.3
Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.

CCSS.Math.Content.4.NF.B.3.a
Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.

CCSS.Math.Content.4.NF.B.3.b
Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.*

CCSS.Math.Content.4.NF.B.3.c
Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.

CCSS.Math.Content.4.NF.B.3.d
Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.

CCSS.Math.Content.4.NF.B.4
Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

CCSS.Math.Content.4.NF.B.4.a
Understand a fraction a/b as a multiple of $1/b$. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).*

CCSS.Math.Content.4.NF.B.4.b
Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)*

CCSS.Math.Content.4.NF.B.4.c
Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*

CCSS.Math.Content.4.NF.C.5
Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.[2] *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.*

CCSS.Math.Content.4.NF.C.6
Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.*

CCSS.Math.Content.4.NF.C.7
Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.

CCSS.Math.Content.5.NBT.A.1
Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.

CCSS.Math.Content.5.NBT.A.2
Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

CCSS.Math.Content.5.NBT.A.3
Read, write, and compare decimals to thousandths.

CCSS.Math.Content.5.NBT.A.3.a
Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000).

CCSS.Math.Content.5.NBT.A.3.b
Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

CCSS.Math.Content.5.NBT.A.4
Use place value understanding to round decimals to any place.

CCSS.Math.Content.5.NBT.B.7
Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

CCSS.Math.Content.5.NF.A.1
Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)*

CCSS.Math.Content.5.NF.A.2
Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.*

CCSS.Math.Content.5.NF.B.3
Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*

CCSS.Math.Content.5.NF.B.4
Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

CCSS.Math.Content.5.NF.B.4.a
Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)*

CCSS.Math.Content.5.NF.B.5.b
Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.

CCSS.Math.Content.5.NF.B.6
Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

CCSS.Math.Content.5.NF.B.7
Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.[1]

CCSS.Math.Content.5.NF.B.7.a
Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.*

CCSS.Math.Content.5.NF.B.7.b
Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.*

CCSS.Math.Content.5.NF.B.7.c
Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*

Extensions:

CCSS.Math.Content.6.RP.A.1
Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*

CCSS.Math.Content.6.RP.A.2
Understand the concept of a unit rate a/b associated with a ratio a:b with $b \neq 0$, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*

CCSS.Math.Content.6.RP.A.3
Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

CCSS.Math.Content.6.RP.A.3.a
Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

CCSS.Math.Content.6.RP.A.3.b
Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*

CCSS.Math.Content.6.RP.A.3.c
Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

CCSS.Math.Content.6.NS.A.1
Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?*.

CCSS.Math.Content.6.NS.B.3
Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.