DRAFT

Unit of Study

Introduction to Fractions

Grade: 4	Topic: Numbers and Operations: Fractions	Length of Unit: 12-17 days

Focus of Learning

Common Core Standards:

Extend understanding of fraction equivalence and ordering.

4.NF.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.

4.NF.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.

Supporting Standards:

Gain familiarity with factors and multiples.

4.OA.4 Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a 1 multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Enduring Understanding(s): *Students will understand that…*

- two equivalent fractions are two ways of describing the same amount by using different-sized fractional parts.

Guiding Questions: *These questions will guide student inquiry.*

- How can I use what I know about whole numbers to help me better understand fractions?
- How are fractions related to whole numbers?
- How can I use different size pieces to create equivalent fractions?
- How can equivalent fractions be identified?
- Why are fractions important?
- How do we compare fractions?
- How are fractions used in real life?

Student Performance

Knowledge: *Students will understand/know…*

- When comparing fractions, the whole must be the same.
- Fractions can be represented as parts of a whole, parts of a set, parts of an area, as a measure, and as numbers on the number line.
- The size or the amount of the whole matters when expressing relationships with fractions.
- The more fractional parts used to make a whole, the smaller the parts. E.g. eighths are smaller than fifths.
- Fractions with like numerators can be compared.
- Fractions with like denominators can be compared.
- Fractional parts can be equivalent without necessarily being congruent
- Fractions with the same whole can be compared.
- Equivalent fractions can be used to generate equal sized parts of the whole, or common denominators
- For equivalence the ratio must be kept constant
- How many pieces it takes to make a whole and each piece is a unit fraction.
- A whole number is a 1 multiple of each of its factors.

Application: *Students will be able to…*

- Build and manipulate fractions
- Read, write, and label fractions
- Identify fractions
- Compare fractions
- Represent fractions as parts of a whole, parts of a set, on a number line, as an area…
- Generate equivalent fractions
- Use equivalent fractions and to compare fractions with unlike denominators and in relationship to benchmark fractions
- Use visual fraction models to justify conclusions
- Recognize equivalent fractions
- Identify unit fractions
- Generate area models
- Find factor pairs for whole numbers 1-100.
- Determine whether a number is a multiple of one-digit number.
- Determine if numbers are prime or composite.

Assessments *(Attached)*

Pre-Assessment:

- Ready for More with Fractions

Formative Interim Assessment

- Mid-Unit Check (Use after Lesson 4)

Suggested Formative Assessments:

- Illustrative Mathematics 4.NF Explaining Fraction Equivalence with Pictures (Use after lesson 1)
- Smarter Balanced Sample Task: MAT.04.ER.3.000NF.F.210 (Use after lesson 2)
- Illustrative Mathematics 4.NF Comparing Two Different Pizzas (Use after lesson 2)
- Illustrative Mathematics 4.NF Running Laps (Use after lesson 5)
- Illustrative Mathematics 4.NF Listing fractions in Increasing Size (Use after lesson 6)
- Illustrative Mathematics 4.NF Using Benchmarks to Compare Fractions (Use after lesson 6)

Post Assessment: (Culminating Tasks)

- Picking Fractions

Learning Experiences *(Lesson Plans Attached)*

Days	Lesson Sequence	Materials
	Pre-Assessment: Ready for More Fractions **Lesson 1: Explore Parts of Whole** *Students will know…* • the size whole matters when expressing relationships with fractions • the more fractional parts used to make a whole, the smaller the parts • how many pieces it takes to make a whole and each piece is a unit fraction. *Students will be able to…* identify, build, read, write, and label fractions	**Suggested Formative Assessment:** Illustrative Mathematics 4.NF Explaining Fraction Equivalence with Pictures
	Lesson 2: Sharing Equally *Students will know…* • the size or the amount of the whole matters when expressing relationships with fractions • the more fractional parts used to make a whole, the smaller the parts • fractional parts can be equivalent without necessarily being congruent *Students will be able to…* • identify, build, read, write, and label fractions	**Suggested Formative Assessment:** • Smarter Balanced Sample Task: MAT.04.ER.3.000NF.F.210 • Illustrative Mathematics 4.NF Comparing Two Different Pizzas
	Lesson 3: Benchmark Fractions *Students will know…* • the size of the whole matters and be able to compare known fractions to benchmark fractions (0, 1/2, 1) *Students will be able to…* • identify, build, read, write, label, and compare fractions	
	Lesson 4: Ordering Unit Fractions *Students will know…* • the size of the whole matters when expressing relationships with fractions *Students will be able to…* • identify, build, read, write, label, and compare fractions	
	Review and Assessment: Fraction Concepts Checkpoint *Students will…* • propose, justify and communicate solutions	**Formative Interim Assessment:** Mid-Unit Check
	Lesson 5: Comparing Fractions with Common Denominators *Students will know…* • when comparing fractions the whole must be the same, fractions can be represented as part of a whole, parts of a set, parts of an area, as a	**Suggested Formative Assessment:** • Illustrative Mathematics 4.NF Running Laps

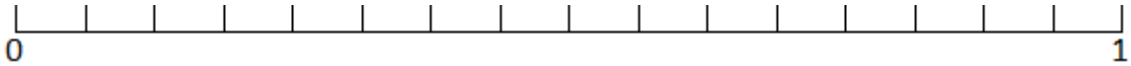
	measure, and as a number on the number line • fractions with like denominators can be compared. *Students will be able to…* • identify, build, read, write, label, compare, and represent (as part of a whole, parts of a set, parts of an area, as a measure, and as a number on the number line) fractions. • use visual fraction models to justify conclusions.	
	Lesson 6: Comparing Fractions with Common Numerators *Students will know…* • when comparing fractions the whole must be the same, fractions can be represented as part of a whole, parts of a set, parts of an area, as a measure, and as a number on the number line • fractions with like numerators can be compared. *Students will be able to…* • identify, build, read, write, label, compare, and represent (as part of a whole, parts of a set, parts of an area, as a measure, and as a number on the number line) fractions • use visual fraction models to justify conclusions.	**Suggested Formative Assessment:** • Illustrative Mathematics 4.NF Listing fractions in Increasing Size • Illustrative Mathematics 4.NF Using Benchmarks to Compare Fractions
	Lesson 7: Visual Representation of Equivalent Fractions *Students will know…* • the more fractional parts used to make a whole, the smaller the parts; equivalent fractions are ways of describing the same amount by using different-sized fractional parts • equivalence is preserved when equal-sized pieces are combined or broken into smaller equal-sized pieces. *Students will be able to…* • identify, compare, build, manipulate, generate equivalent fractions • use visual fraction models to justify conclusions • generate area models	
	Lesson 8: Making Equivalent Fractions *Students will know…* • the more fractional parts used to make a whole, the smaller the parts • equivalent fractions are ways of describing the same amount by using different-sized fractional parts; equivalence is preserved when equal-sized pieces are combined or broken into smaller equal-sized pieces. *(e.g. 1/3 x 2/2=4/6 and 1/3=4/6 because 2/2=1)* • a whole number is a 1 multiple of each of its factors *Students will be able to…* • identify, compare, build, manipulate, generate equivalent fractions use visual fraction models to justify conclusions • find factor pairs for whole numbers • determine whether a number is a multiple of a one-digit number • determine if numbers are prime or composite	
	Culminating Task: Picking Fractions	**Summative Assessment**: • Picking Fractions Assessment

Resources	
Online	**Text**
Georgia Department of Education https://www.georgiastandards.org/Common-Core/Pages/Math.aspx **Illustrative Mathematics** http://www.illustrativemathematics.org/ **Inside Mathematics** http://www.insidemathematics.org/	**McGraw-Hill. *California Mathematics: Concepts, Skills, and Problem Solving: Grade 4*. New York: McGraw-Hill Companies, Inc. 2009.** **Shoseki, Tokyo. *Mathematics International: Grade 4*. 2012 (Japanese Text)** **Van de Walle, John, and LouAnn Lovin. *Teaching***

MARS tasks http://map.mathshell.org/materials/index.php **Massachusetts Department of Elementary and Secondary Education** http://www.doe.mass.edu/candi/commoncore/ **National Library of Virtual Manipulatives** http://nlvm.usu.edu/en/nav/vlibrary.html **North Carolina Department of Public Instruction** http://www.dpi.state.nc.us/acre/standards/common-core-tools/#unmath **Progressions for the Common Core State Standards in Mathematics** http://ime.math.arizona.edu/progressions/ **Smarter Balanced Assessment Consortium** http://www.smarterbalanced.org/smarter-balanced-assessments/#item	***Student-Centered Mathematics: Grades 3-5.*** **Vol. 2. Boston: Pearson, 2006.**

Name_____ Date_____

4NF1 Mid-Unit Check



1. Label the following fractions on the number line above: $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$

2. Which of the above fraction is the smallest? Explain how you know.

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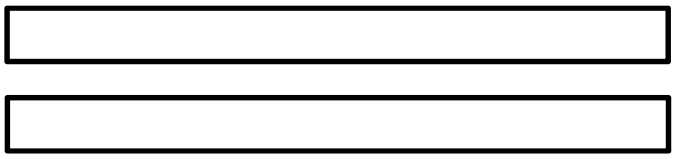
_____

_____

3. Which fraction is closest to $\frac{1}{2}$: $\frac{1}{6}$ or $\frac{3}{4}$? Use the rectangles below to justify your answer, be sure to label your work.



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4. Sam ate $\frac{1}{3}$ of a small candy bar and Tim ate $\frac{1}{3}$ of a king size candy bar. Tim said they ate the same amount. Do you agree? Explain.

_____

_____

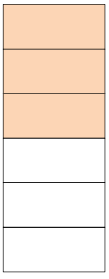
_____

5. Label the shaded fractional part of the tree diagrams below:

a)

_____

b)



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c)

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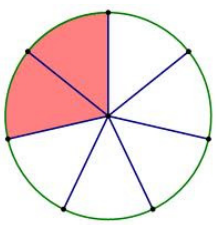


1

Answer Key

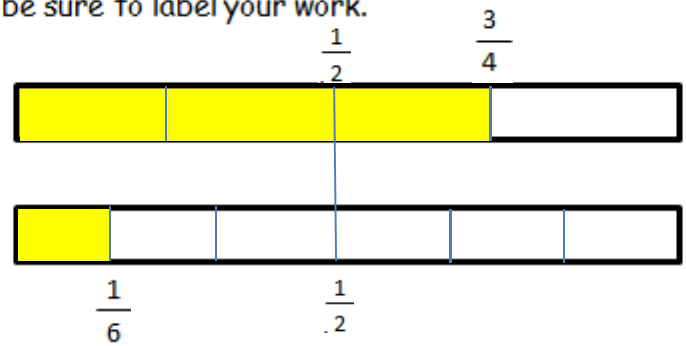
1. Label the following fractions on the number line above: $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$

2. Which of the above fraction is the smallest? Explain how you know.

Possible answers:

a) 1/16 is the smallest fractions because it is closest to zero.
b) 1/16 is the smallest because the whole was cut into more pieces, therefore each piece is smaller.

3. Which fraction is closest to $\frac{1}{2}$: $\frac{1}{6}$ or $\frac{3}{4}$? Use the rectangles below to justify your answer, be sure to label your work.



Possible answers:

a) 1/6 is 2/6 away from 1/2 and 3/4 is 1/4 away from 1/2. 1/4 is less than 2/6 so 3/4 is closer to 1/2 than 1/6.
b) 3/4 is closer to 1/2 because 2/6 is greater than 1/4.

4. Sam ate $\frac{1}{3}$ of a small candy bar and Tim ate $\frac{1}{3}$ of a king size candy bar. Tim said they ate the same amount. Do you agree? Explain.

Possible answers:

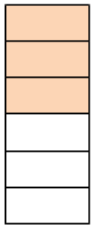
a) They are not the same size because the candy bars were not the same size.
b) 1/3 of a small candy bar is smaller than 1/3 of a king size candy bar.
c) The size of the original whole was not the same, so the 1/3rds are not the same.

5. Label the shaded fractional part of the tree diagrams below:

a)

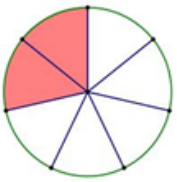
$\frac{1}{3}$

b)



$\frac{3}{6}$ or $\frac{1}{2}$

c)



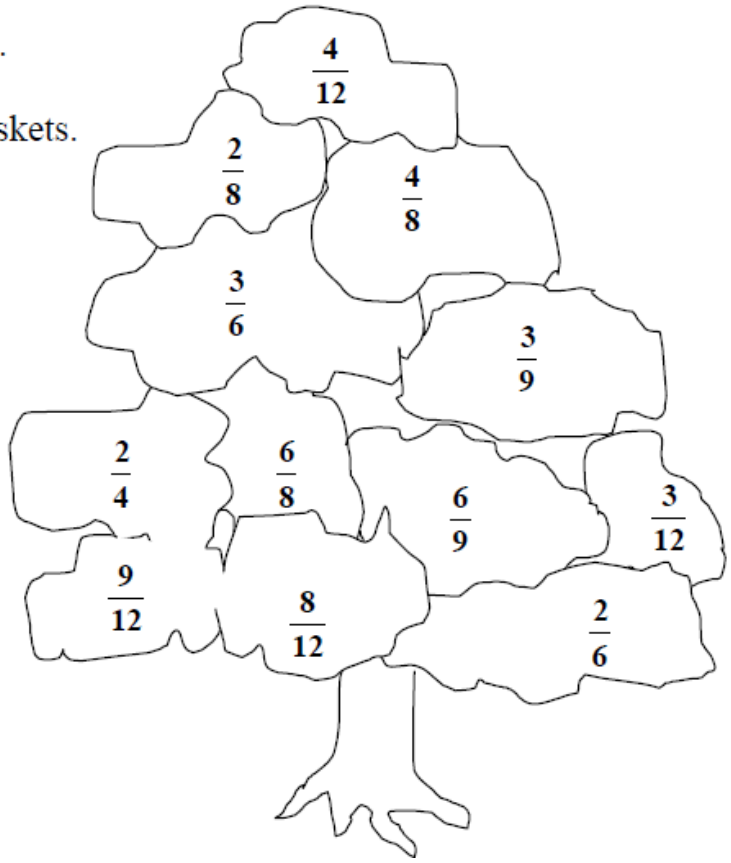
$\frac{2}{7}$

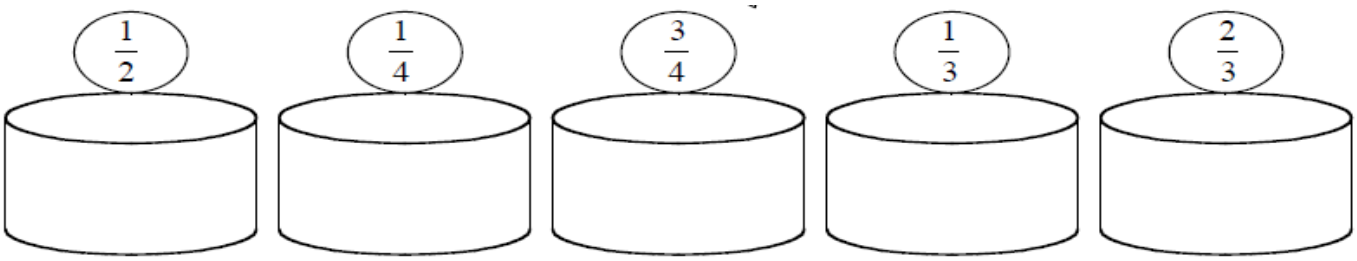
Name _____ Date _____

Picking Fractions

This is a fraction tree.

Under the tree are baskets.





_____ _____ _____ _____ _____

1. Equivalent fractions picked from the tree must be placed in the same basket. Put each fraction on the tree into the correct basket.

2. Find one **new** equivalent fraction for each basket and write it on the line that is in front of the basket.

3. Fill in the missing numerator and denominator to make this pair of fractions equivalent.

$$\frac{2}{} = \frac{}{10}$$

Explain how you figured it out.

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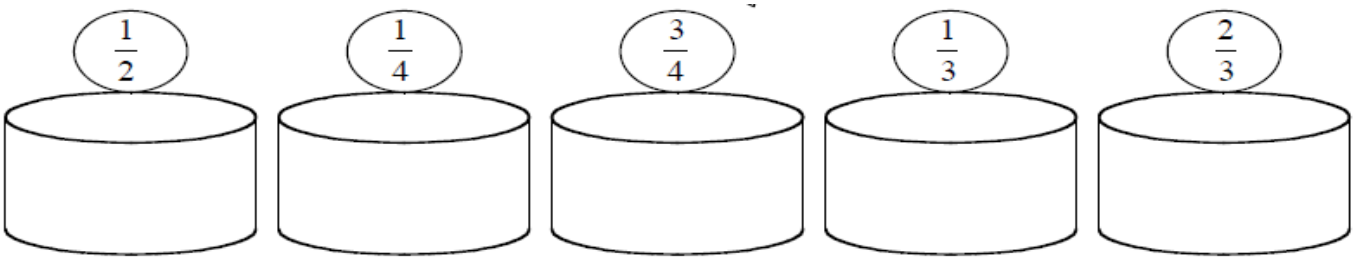
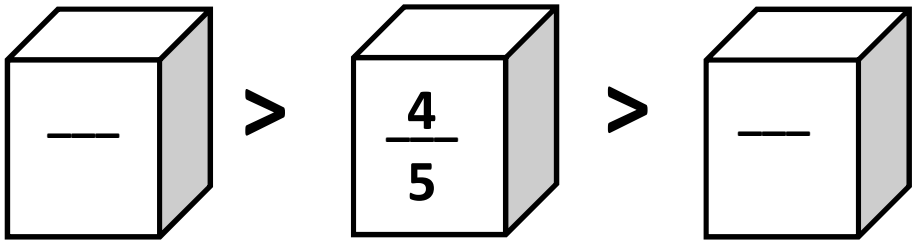
4. The farmer needs to organize the baskets from least to greatest. Put the basket fraction in order from least to greatest. Use the space below to show your work.

_____ _____ _____ _____ _____



5. Fill in the boxes below with fractions that make the statement true.



Explain how you know that your answer is correct.

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_____

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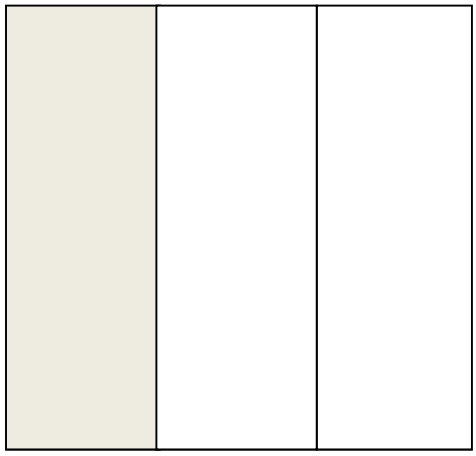
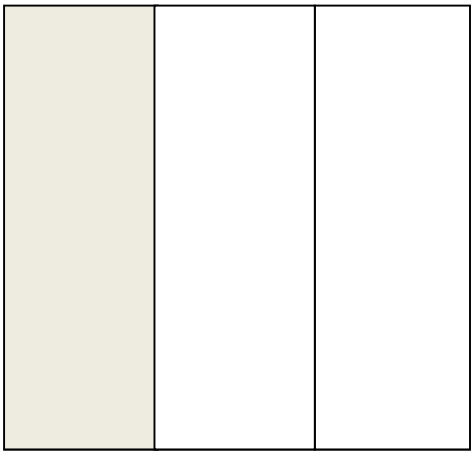
_____

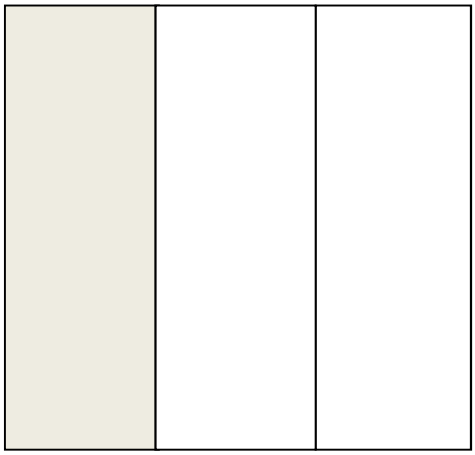
6. Find fractions that are equivalent to the fraction shown in each rectangle below. Slice the rectangles by drawing line segments in each rectangle to create a different but equivalent fraction.



$\frac{1}{3} =$ _____

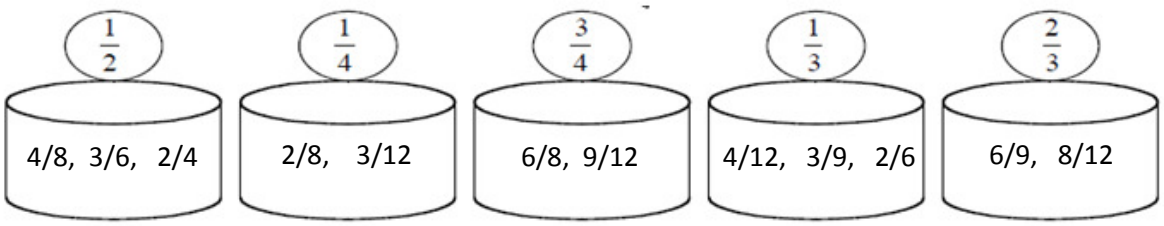


$\frac{1}{3} =$ _____



$\frac{1}{3} =$ _____

Assessment Key



possible answers: 5/10, 6/12, 50/100 4/16, 5/20, 25/100 12/16, 15/20 5/15, 6/18, 7/21 4/6, 10/15, 12/18

2 point each
(total 34 problem 1)

1. Equivalent fractions picked from the tree must be placed in the same basket. Put each fraction on the tree into the correct basket.

2. Find one **new** equivalent fraction for each basket and write it on the line that is in front of the basket.

2 point each
(total 10 problem 2)

3. Fill in the missing numerator and denominator to make this pair of fractions equivalent.

2 point each $\frac{2}{\quad} = \frac{\quad}{10}$ **Possible answers**: 2/1 = 20/10; 2/2=10/10; 2/5=4/10; 2/10=2/10; 2/20=1/10 …

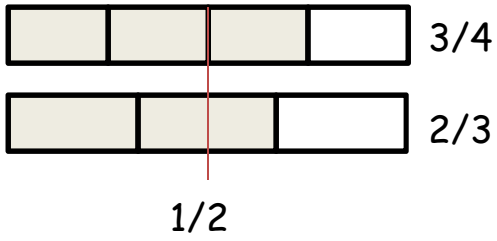
Explain how you figured it out. **10 points**
(total 14 problem 3)

Possible answers:

a) 2/1=20/10 because both fractions are equal to two wholes. If the whole is cut into 1 piece it takes two of those pieces to equal two wholes. If the whole is cut into 10 pieces it takes 20 of those pieces to equal two wholes.
b) 2/2=10/10 because both fractions are equal to one whole. No matter how many equal pieces you cut a whole into, if you take all the pieces you still have one whole.
c) 2/5=4/10 because if you have a whole cut into 5 equal pieces, then you equally divide each of those pieces once more, you will then have 10 equal pieces. The same is true for the two shaded pieces (numerator) of the 2/5 fraction, the 2 pieces become 4 pieces.
d) 2/10=2/10 because the wholes are equally cut into 10 pieces and 2 of those pieces are shaded.

4. The farmer needs to organize the baskets from least to greatest. Put the basket fraction in order from least to greatest. Use the space below to show your work.

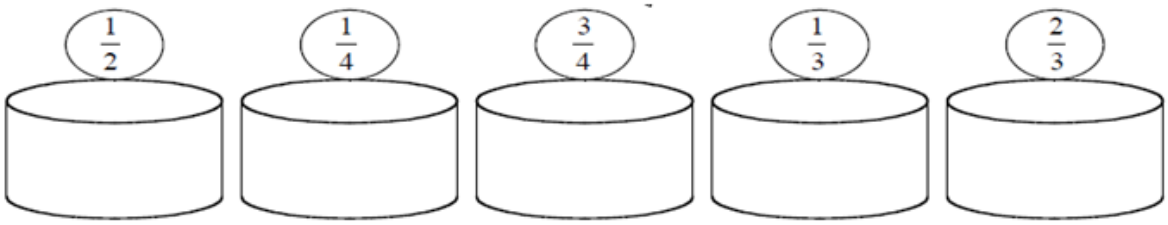
Possible work: 1/4<1/3<1/2



6 points work shown

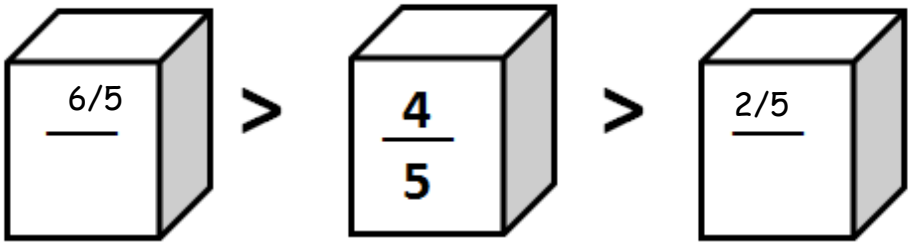
1/4 1/3 1/2 2/3 3/4

2 point each
(total 16 problem 4)



5. Fill in the boxes below with fractions that make the statement true.

Possible answer:



2 point each

Explain how you know that your answer is correct.

10 points explanation
(total 14 problem 5)

Possible answers:

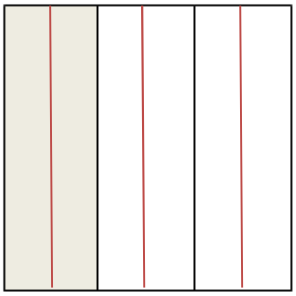
a) 2/5 is less than 4/5 and 6/5 is greater than 4/5 because the wholes are all cut into the same amount of equal pieces and the number of pieces represented by the numerator is the only thing changing. So the higher the numerator, the larger the fraction.

b) If your denominators are equal then the numerator tells you how many pieces you have; so the higher the numerator, the larger the fraction.

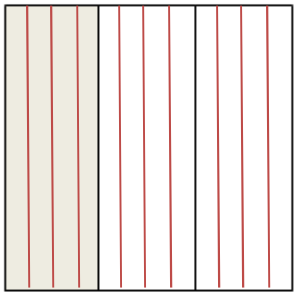
6. Find fractions that are equivalent to the fraction shown in each rectangle below. Slice the rectangles by drawing line segments in each rectangle to create a different but equivalent fraction.

4 points each
(total 12 problem 6)

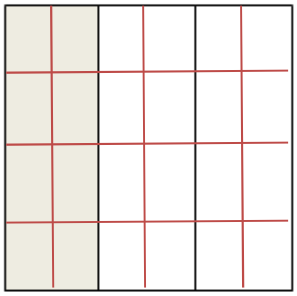
Possible answers:



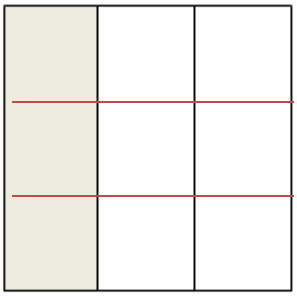
$\frac{1}{3} = 2/6$



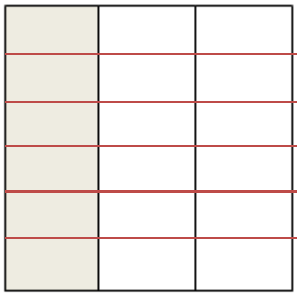
$\frac{1}{3} = 4/12$



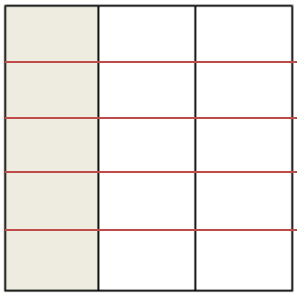
$\frac{1}{3} = 8/24$



$\frac{1}{3} = 3/9$



$\frac{1}{3} = 6/18$



$\frac{1}{3} = 5/15$

Test is a total of 100 possible points