Focus on Fractions: Fractions Foundations

May 4, 2020 (Updated 3/11/21)

https://www.kentuckymathematics.org/kcm_virtual.php

IES Practice Guide: Developing Effective Fractions Instructions for Kindergarten through 8th Grade

https://ies.ed.gov/ncee/wwc/Docs/PracticeGuide/fractions_pg_093010.pdf

First Grade Kate – Blog in which a first grade teacher discusses using play-doh to explore halves and fourths.

https://www.firstgradekate.com/2014/01/hands-on-fractions-using-playdough-to.html

KNP IG entry Fraction Squares: I can Share (F7701.1)

Teacher Guide, Instruction page and Black Line Masters:
http://knp.kentuckymathematics.org/knp/landings.php?act_id=7701.1&prefix=F

Interactive JamBoard: https://www.kentuckymathematics.org/vr_fractions.php#frac-7

KNP IG Entry Fraction Squares: Is it Fair (F7701.2)

Teacher Guide, Instruction page and Black Line Masters:
http://knp.kentuckymathematics.org/knp/landings.php?act_id=7701.2&prefix=F

Interactive JamBoard: https://www.kentuckymathematics.org/vr_fractions.php#frac-8

Is it Fourths? Jamboard:

https://jamboard.google.com/d/1pYgvwbyLhAhszfmPlpfAc05uSINpFvbT5ROxvPDlopw/copy

"What fractions do you see?" and other interesting visuals for exploring fractions

Interactive JamBoard: https://jamboard.google.com/d/1-Wy6iszuAjkTnsirnxuFS3_Bmztm_rvd79uXMQIDpKw/copy

3 Act Task. The image I shared is at the end: https://tapintoteenminds.com/3act-math/cover-it-up/

Fraction Talks – more fraction images: http://fractiontalks.com/

MathWalks: https://sites.google.com/powayusd.com/math-walks/home

Lesson Plan

Teacher:	**Class/Group:**	**Date:**
KNPIG ID #: F 7701.1 (Fraction Squares - I can share!)	**Task Group Name:** Fraction Squares	
AVMR Strand:	**AVMR Construct Level/Color:** Red	

Fluency Benchmark for RTI:
2.FFF Fluency with Fraction Foundations

KAS(s):	**KAS Domain and Cluster:**
1) 3.G.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape. **2)** 2.G.3 Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape. **3)** 1.G.3 Partition circles and rectangles into two and four equal shares, describe the shares using the words halves, fourths, and quarters, and use the phrases half of, fourth of, and quarter of. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.	Geometry **1)** Reason with shapes and their attributes.

Learning Target: I can partition rectangles to make two, three or four equal shares.

Setting/Materials:
Paper cut outs of rectangles (including squares), sorting mat (1 per group), recording sheet (at least 1 per person), people cube (showing 2 to 4 stick figures on each face of the cube), pencils, scissors, straight edge and/or popsicle sticks, tape or glue stick (optional).

Activity:
For one round, each student will need at least two paper cut-outs of a rectangle (including squares). All students should use cut-outs of the same size & shape within one round. A Black line master is included in the print link for different rectangles. (It is recommended that you also make your own of varying sizes and proportions using whatever resources are convenient. See the teacher note.) Explain that the shape is a "cake" (or brownie) that will be shared. Roll the number cube (or choose) a number of people to share the cake. Each student should cut, fold or draw on his or her shape to make equal shares, then place his or her work on the "fair" side the of the recording sheet. (If a student makes an error allow him/her to place his/her work on the "not fair" side. Each student should also cut, fold or draw at least one shape that is NOT fair, placing it on the not fair side of the recording sheet. Allow students to use popsicle sticks to plan cuts on the shape.
As students work, ask questions such as "Is that a fair way to share the cake? Do you have the right number of pieces? Does everyone get the same amount of cake? How can you verify that?" You may additionally ask students to color the share for one person and/or name the size of that piece (i.e. half, third, fourth or quarter). Highlight effective strategies. For example, when making fourths, students can halve and halve again.
Model appropriate language using vocabulary such as "halves, thirds, fourths, quarters" and "a half, a third", etc. Students should compare their work. Ask questions such as "Is there more than one way to share the cake fairly?", "How do you know that the shares are equal?", "Is a share in this cake equal to a share in that cake?" and "Would everyone get the same amount if we cut a cake this way as compared to that way?" Bring attention to explanations that emphasize the amount of cake (area of the piece) rather than the shape of the piece. Record the name of the share using the word and not the symbol (i.e. write "one third" and not "1/3"). When students seem comfortable, have students work individually on the recording sheet, specifying if they should show halves, thirds or fourths.

Evidence of Learning (Diagnostic Assessment of Progress):
Give student a paper rectangle and ask "Fold or draw on this paper to show me fourths." Similarly, give student a circle and ask for a thirds. (Note - thirds are more difficult then halves or fourths for most students).

Teacher Notes:
If targeting standard 1.G.3, the die should include faces with exactly 2 or 4 stick people (omit 3). As an enrichment, student might be asked to share cakes into 6 or 8 equal pieces. The rectangles may be much larger than those included on the master. For example, each student could be given a full or half sheet of paper. Consider having student place work on chart paper or a bulletin board (replicate the "T-chart" format of Sorting Mat).
The following suggestion comes from the IES Practice Guide "Developing Effective Fractions Instruction for Kindergarten through 8th Grade" on page 15: "Students may be tempted to use repeated halving for all sharing problems, but teachers should help students develop other strategies for partitioning an object. One approach is to have students place wooden sticks on concrete shapes, with the sticks representing the slices or cuts that a student would make to partition the object."

Printables Link:
http://knp.kentuckymathematics.org/knp/uploads/printables_7701.1F.pdf

Student Instructions Link:

Fraction Squares - I can share!

I can partition rectangles to make two, three or four equal shares.

KNP # F 7701.1 - Fraction Squares - I can share!, Red
Fluency Standard: 2.FFF
Standard: 3.G.2, 2.G.3, 1.G.3,

Materials: Paper cut outs of rectangles (including squares), sorting mat (1 per group), recording sheet (at least 1 per person), people cube (showing 2 to 4 stick figures on each face of the cube), pencils, scissors, straight edge and/or popsicle sticks, tape or glue stick (optional).

Directions:

1. Get a sorting mat and enough paper cut-outs of the same shape & size so that each player can have at least two. (You may need to cut them out.) Pretend each cut-out is a cake to be shared.

2. Player 1 rolls the people cube. This is how many people will share each cake.

3. Each player, using one pretend cake, will fold, cut or draw on the cake to show a way to share the entire cake fairly. Player may use popsicle sticks to plan outlines. Place the cake on the "Fair" side of the Sorting Mat. (If a player accidentally makes an unfair way to share the cake, he or she can place it on the "Not Fair" side.)

4. Each player, using another pretend cake, will fold, cut or draw it to show a way that ISN't fair. Place it on the Not Fair side of the Sorting Mat.

5. Take turns to explain WHY each cake is placed correctly on the Sorting Mat. Be sure ALL players agree.

6. Name the size of **one** person's share if the cake is shared fairly.

7. Repeat steps 1 through 6, with a new player rolling the cube. A rectangle of a different size MAY be used.

8. After 3 rounds, EACH player completes one recording sheet using the number of people rolled on the third round.

KCM - facilitating teacher growth for stateâ€ wide student success in mathematics: Professional Development/Research/Resources
Funded by the General Assembly; supported by the Kentucky Council on Postsecondary Education and the Kentucky Department of Education
<http://KENTUCKYMATHEMATICS.ORG> · Northern Kentucky University · 475 MEP Building · Highland Heights, KY 41076

Printables for
“Fraction Squares - I can Share!”

KNP # F 7701.1 – Red

This file contains printables for a small group of four students.

For each additional student, print 1 recording sheet.
Additional consumable rectangles may be required as well.

- 1 Reusable Sorting Board: 1 per small group
- 4 Consumable Recording sheets: 1 per student
- Consumable "Cake Shapes": 5 pages with 4 different size rectangles to be cut apart. Each student will use at least 2 rectangles per round. (Rectangles of other sizes may be cut from plain copy paper in addition to, or in place of, these consumables.)

Sorting Mat

The number of people sharing our cake:

Fair (or equal) ways ☺	NOT Fair ways ☹

One person's share is called a _____

Recording Sheet

Name:_____

Date:_____

The number of shares is _____

Draw a rectangle showing **Fair (Equal) Shares** ☺	I know this shape shows **fair** shares because….
Draw a rectangle showing **Unfair (not equal) Shares** ☹	I know this shape shows **unfair** shares because….

Recording Sheet

Name:_____

Date:_____

The number of shares is _____

Draw a rectangle showing **Fair (Equal) Shares** ☺	I know this shape shows **fair** shares because….
Draw a rectangle showing **Unfair (not equal) Shares** ☹	I know this shape shows **unfair** shares because….

Recording Sheet

Name:_____

Date:_____

The number of shares is _____

Draw a rectangle showing **Fair (Equal) Shares** ☺	I know this shape shows **fair** shares because….
Draw a rectangle showing **Unfair (not equal) Shares** ☹	I know this shape shows **unfair** shares because….

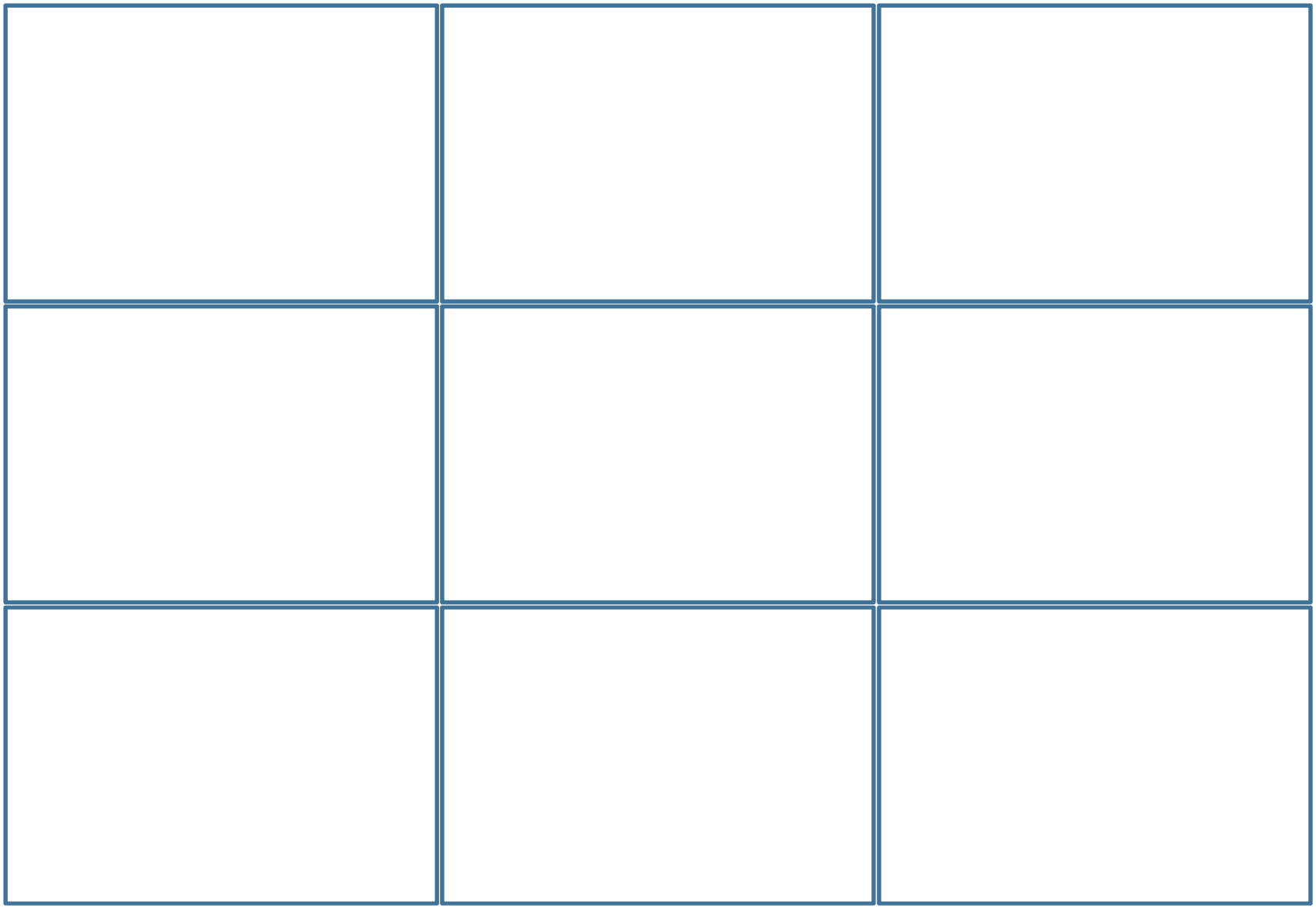
Recording Sheet

Name:_____

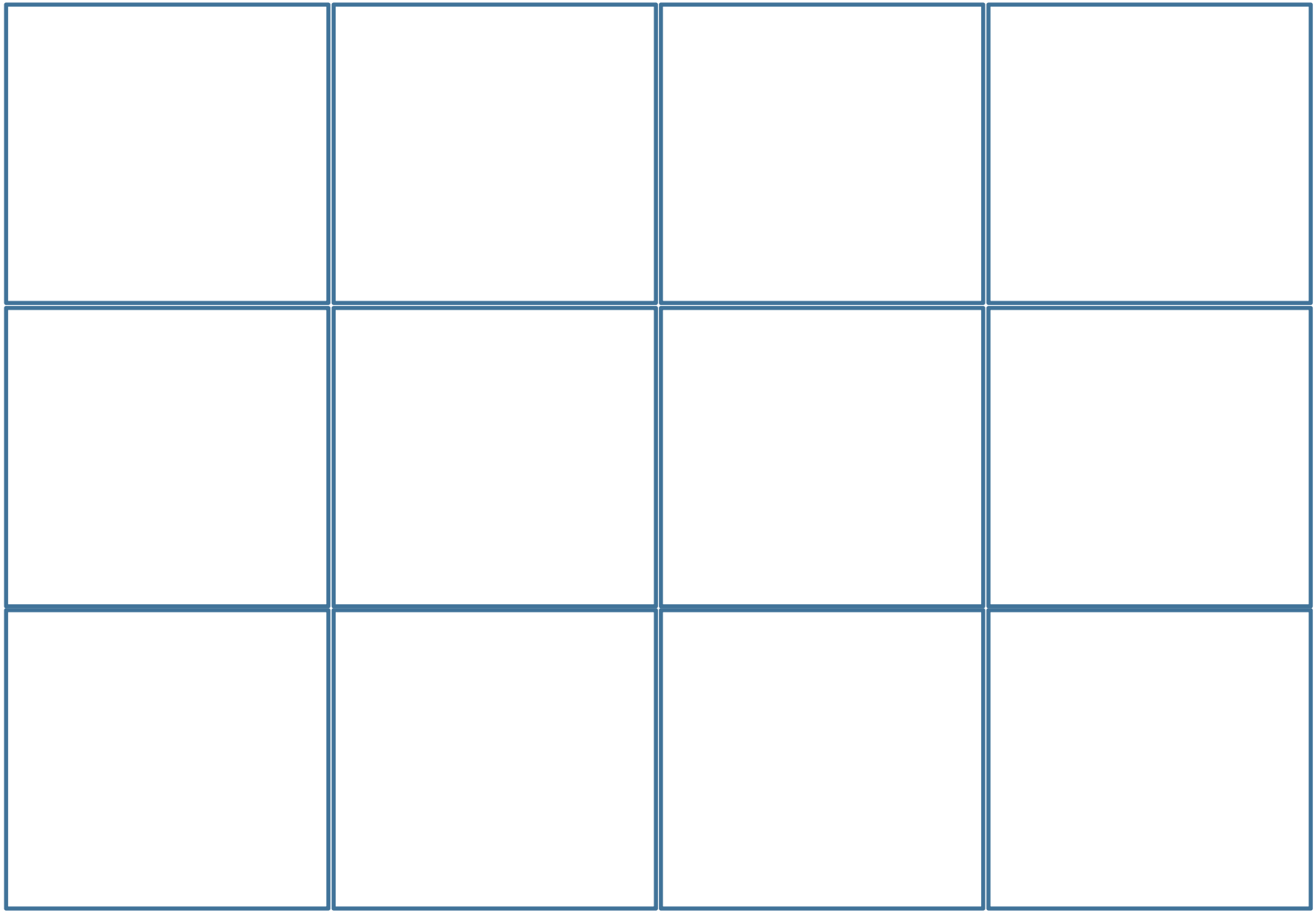
Date:_____

The number of shares is _____

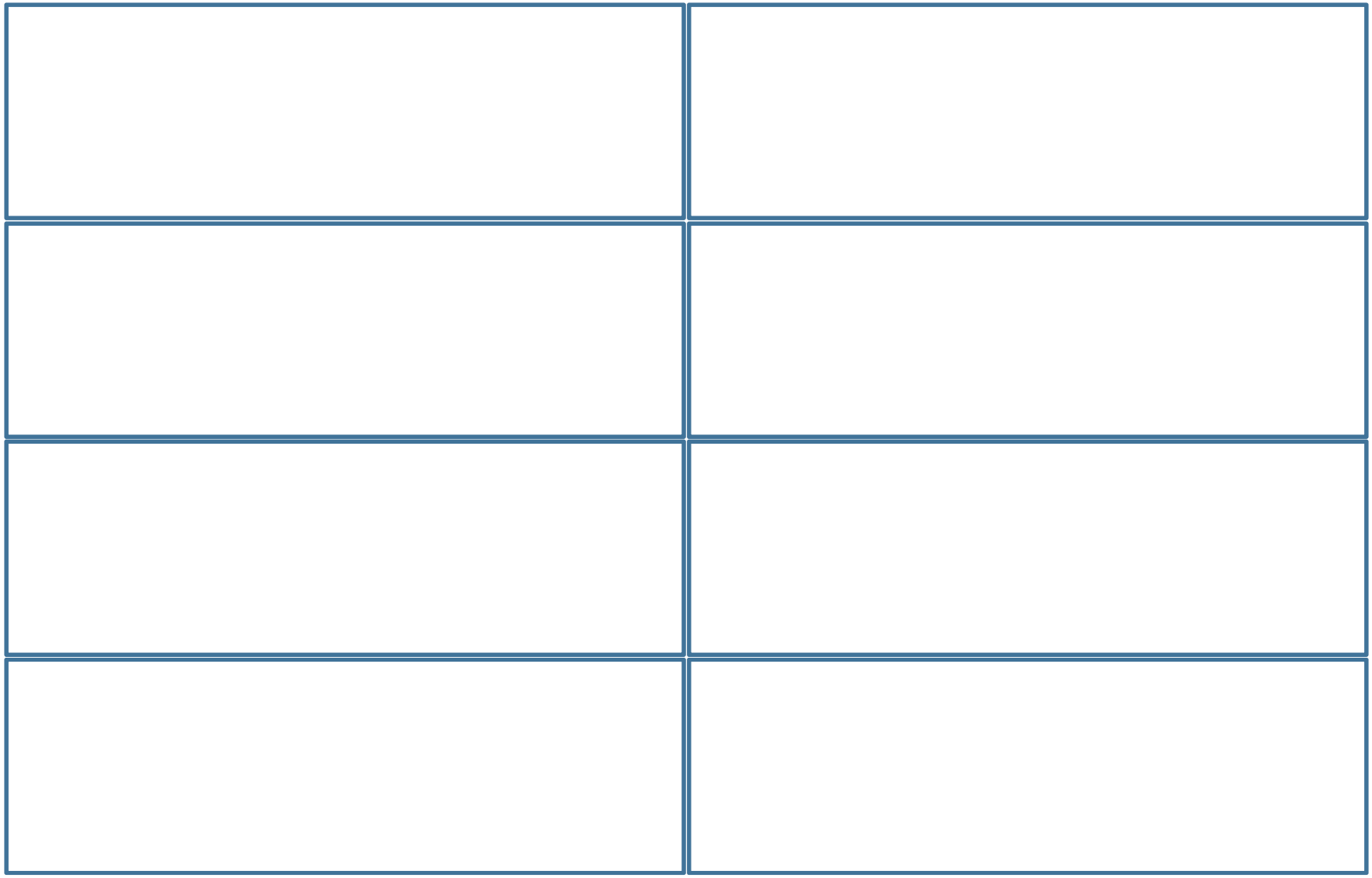
Draw a rectangle showing **Fair (Equal) Shares** ☺	I know this shape shows **fair** shares because….
Draw a rectangle showing **Unfair (not equal) Shares** ☹	I know this shape shows **unfair** shares because….



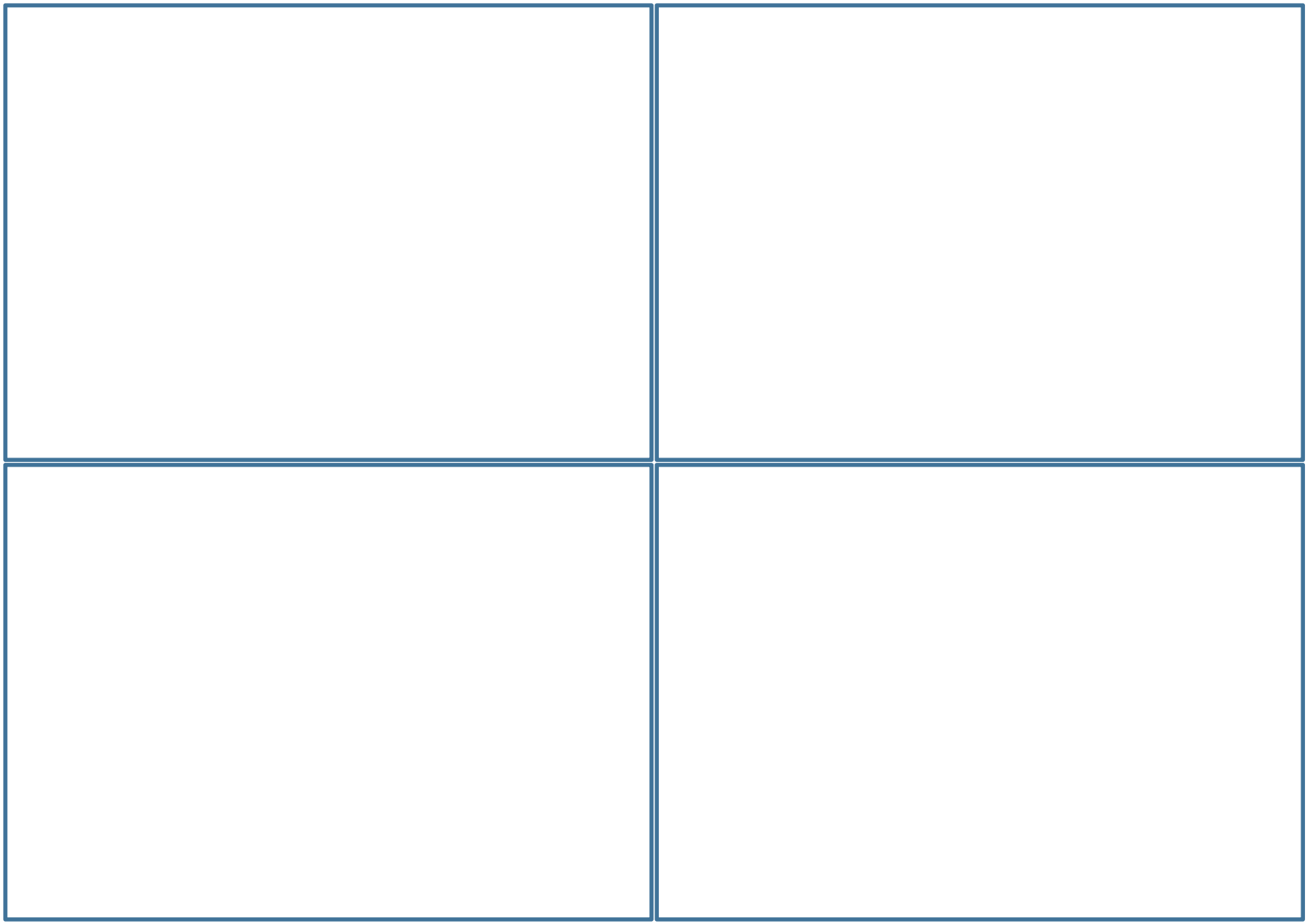
Cake Shapes



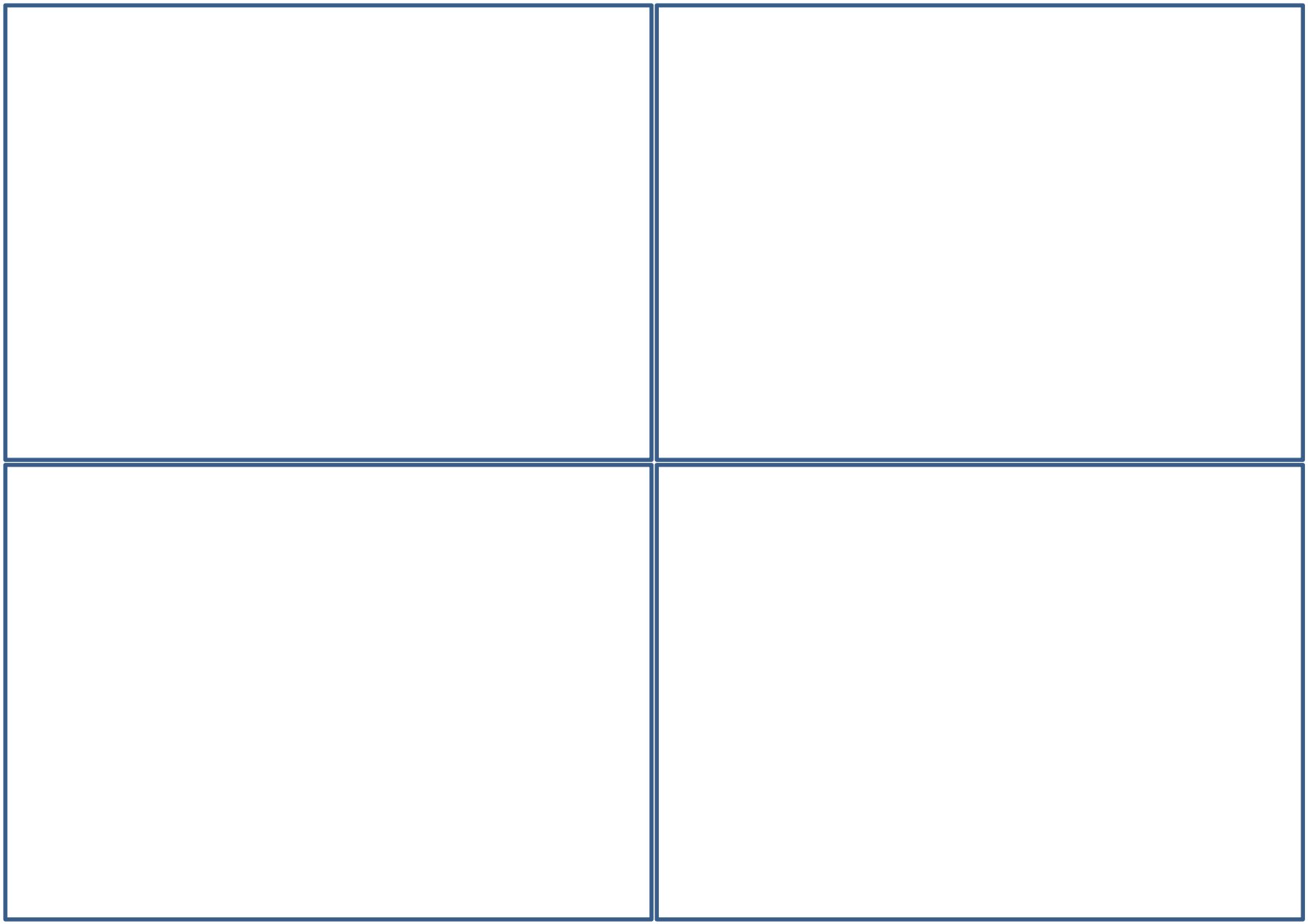
Cake Shapes



Cake Shapes



Cake Shapes



Cake Shapes

Lesson Plan

Teacher:	**Class/Group:**	**Date:**
KNPIG ID #: F 7701.2 (Fraction Squares - Is it Fair?)	**Task Group Name:** Fraction Squares	
AVMR Strand:	**AVMR Construct Level/Color:** Blue	

Fluency Benchmark for RTI:
2.FFF Fluency with Fraction Foundations

KAS(s):	**KAS Domain and Cluster:**
1) 3.G.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape. **2)** 2.G.3 Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.	Geometry **1)** Reason with shapes and their attributes.

Learning Target: I can determine if a rectangle has been partitioned fairly. I can determine whether or not a shaded portion of a rectangle is a stated amount.

Setting/Materials:
Fraction Sort Cards sets A through H, Sorting Board, Answer Cards

Activity:
Students work individually, in pairs or in a group to sort one set of cards at a time, starting with set A. Place the "rule" card for the set in use at the top of the sorting board. The rule card states the type of sorting that should happen for that set (e.g. "halves" and "not halves") Then students sort the remaining cards, either working collaboratively or taking turns choosing, then placing, a card. An answer card is available for students to check work independently if needed.
If a student is struggling to see if two regions on a card are equivalent, it may be helpful to cut the card apart and let student make direct comparisons between portions.
The card sets are labeled A through I and progress in difficulty.
As an extension, laminate the blank cards. A student (or the teacher) will use a dry erase marker to partition the shape on the card and/or shade in a region. The other students then decide on which side of the sorting mat the card belongs.
Level "I" is beyond the scope of the standards listed. It is included as an extension activity for kids that are ready.

Evidence of Learning (Diagnostic Assessment of Progress):
Ask student to sort card Set F and/or Set G independently.

Teacher Notes:
Students are implementing math practice 3 by critiquing the visuals created by another.

Printables Link: http://knp.kentuckymathematics.org/knp/uploads/printables_7701.2F.pdf
Student Instructions Link:

F7701.2

Fraction Squares - Is it Fair?

I can determine if a rectangle has been partitioned fairly. I can determine whether or not a shaded portion of a rectangle is a stated amount.

KNP # F 7701.2 - Fraction Squares - Is it Fair?, Blue
Fluency Standard: 2.FFF
Standard: 3.G.2, 2.G.3,

Materials: Fraction Sort Cards sets A through H, Sorting Board, Answer Cards

Directions:

1. Get Card Set A and the Sorting Board.

2. Place the Rule Card at the top of the Sorting Board.

3. Sort the cards according to the rule.

4. Check your answer.

5. Continue in order, sorting sets B through H, checking your work each time.

Extension 1:(Materials: laminated cards with non-partitioned shapes)

After sorting all the cards in a set, each student uses a dry erase marker to partition a blank shape.

The other student(s) determines where to place the card on the board.

Extension 2: (Materials: Card Sort I) Complete the activity sort "I".

KCM - facilitating teacher growth for stateâ€ wide student success in mathematics: Professional Development/Research/Resources
Funded by the General Assembly; supported by the Kentucky Council on Postsecondary Education and the Kentucky Department of Education
<http://KENTUCKYMATHEMATICS.ORG> · Northern Kentucky University · 475 MEP Building · Highland Heights, KY 41076

Printables for
“Fraction Squares - Is it Fair?”

KNP # F 7701.2 – Blue

This file contains printables for a small groups of students (approx 3 to 5).

- Reusable Sorting Board (2 copies)
- Reusable sorting cards: levels A through I (9 pages)
- Reusable Answer cards (2 pages)
- Reusable optional Blank Rectangles (1 page): recommend laminating before use

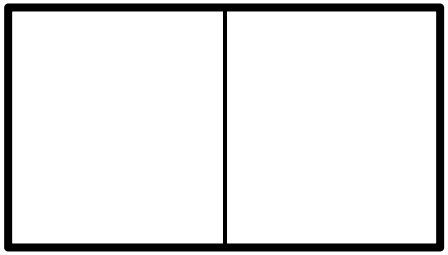
Place Rule Card HERE

Place Rule Card HERE

Cut on double lines only

Rule Card - Set A	
Cards that show halves	Cards that do NOT show halves

7701.2

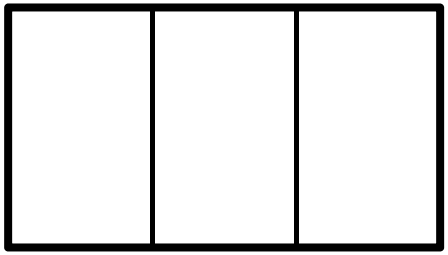


Card 1 Set A

7701.2

Card 2 Set A

7701.2

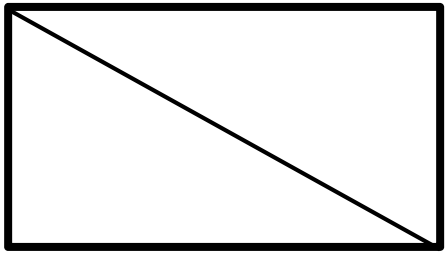


Card 3 Set A

7701.2

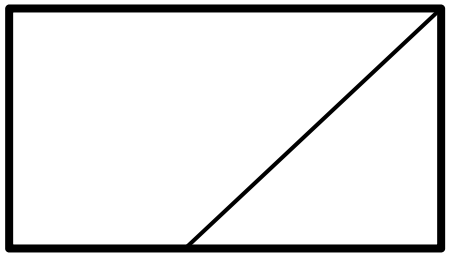
Card 4 Set A

7701.2



Card 5 Set A

7701.2

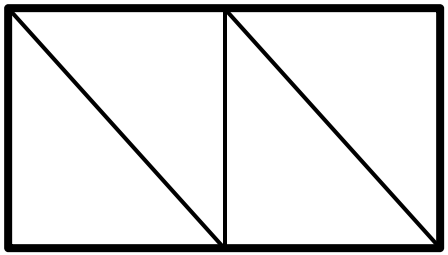


Card 6 Set A

Cut on double lines only

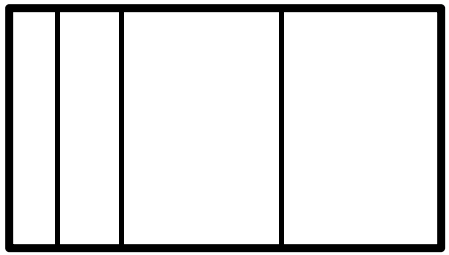
Rule Card - Set B	
Cards that show fourths	Cards that do NOT show fourths

7701.2



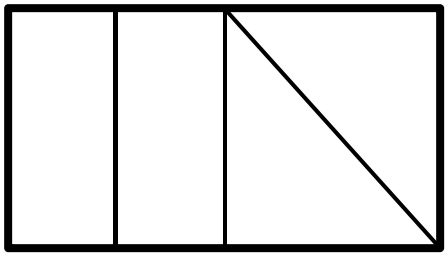
Card 1 Set B

7701.2



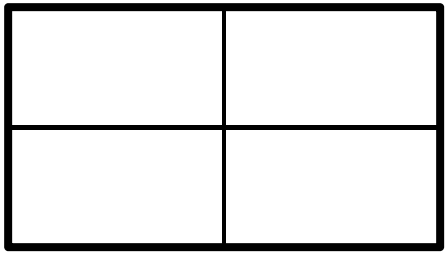
Card 2 Set B

7701.2



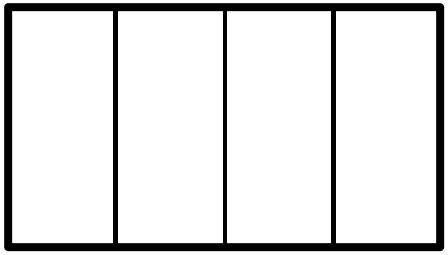
Card 3 Set B

7701.2



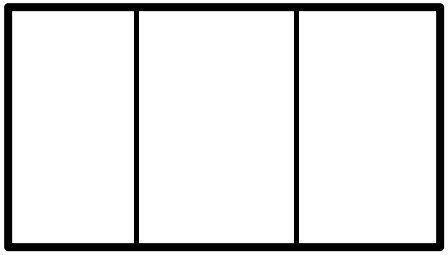
Card 4 Set B

7701.2



Card 5 Set B

7701.2

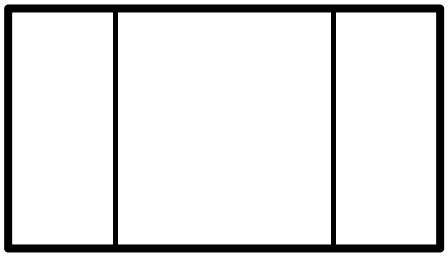


Card 6 Set B

Cut on double lines only

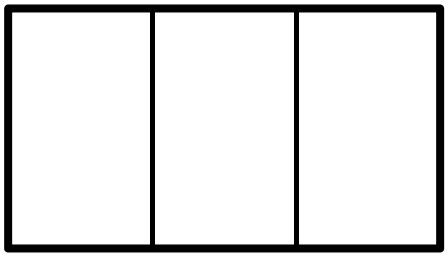
Rule Card - Set C	
Cards that show thirds	Cards that do NOT show thirds

7701.2



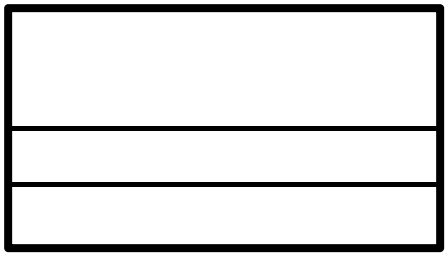
Card 1 Set C

7701.2



Card 2 Set C

7701.2

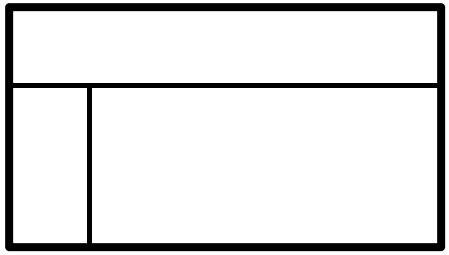


Card 3 Set C

7701.2

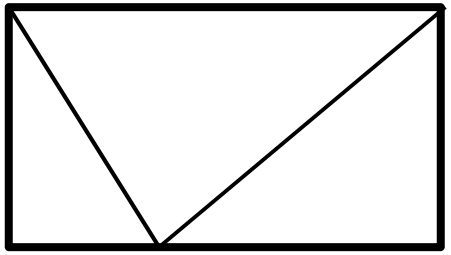
Card 4 Set C

7701.2



Card 5 Set C

7701.2

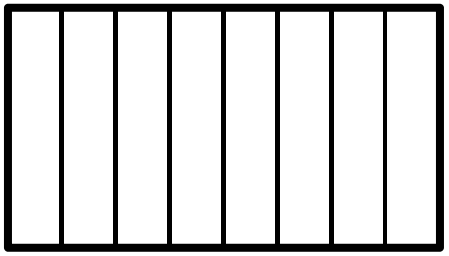


Card 6 Set C

Cut on double lines only

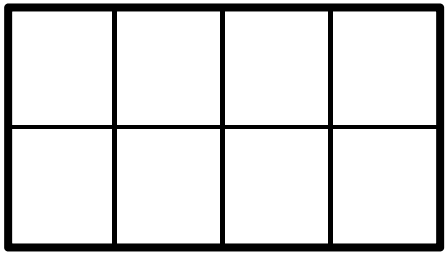
Rule Card - Set D	
Cards that show eighths	Cards that do NOT show eighths

7701.2



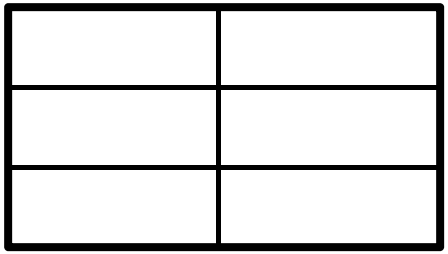
Card 1 Set D

7701.2



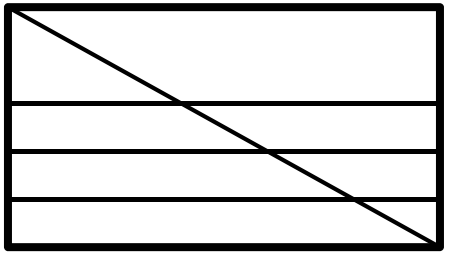
Card 2 Set D

7701.2



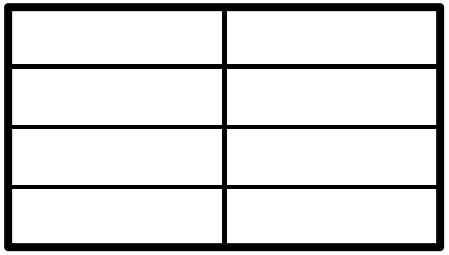
Card 3 Set D

7701.2



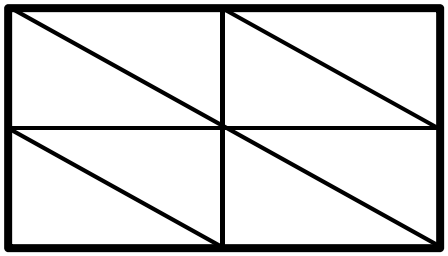
Card 4 Set D

7701.2



Card 5 Set D

7701.2



Card 6 Set D

Cut on double lines only

Rule Card - Set E	
The shaded area is one-half	The shaded area is NOT one-half

7701.2

Card 1 Set E

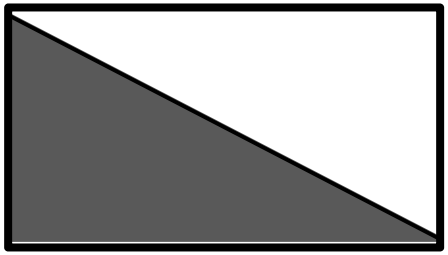
7701.2

Card 2 Set E

7701.2

Card 3 Set E

7701.2



Card 4 Set E

7701.2

Card 5 Set E

7701.2

Card 6 Set E

Cut on double lines only

Rule Card - Set F	
The shaded area is one-half	The shaded area is NOT one-half

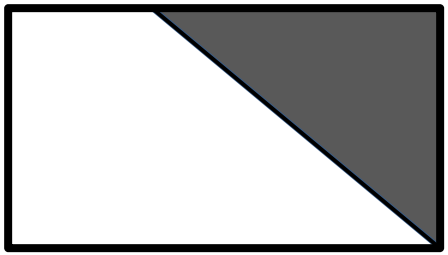
7701.2

Card 1 Set F

7701.2

Card 2 Set F

7701.2



Card 3 Set F

7701.2

Card 4 Set F

7701.2

Card 5 Set F

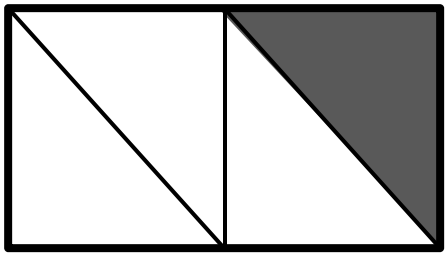
7701.2

Card 6 Set F

Cut on double lines only

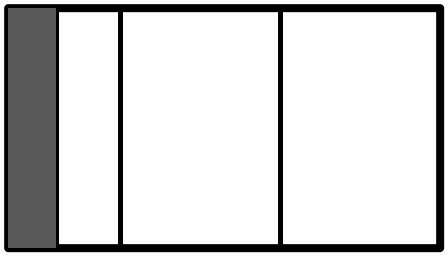
Rule Card - Set G	
The shaded area is one-fourth	The shaded area is NOT one-fourth

7701.2



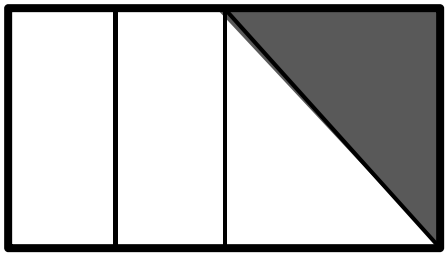
Card 1 Set G

7701.2



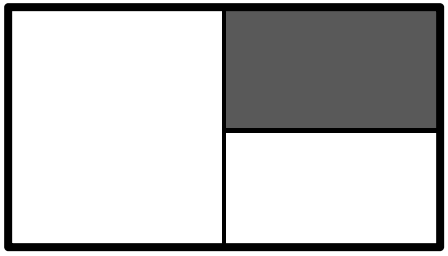
Card 2 Set G

7701.2



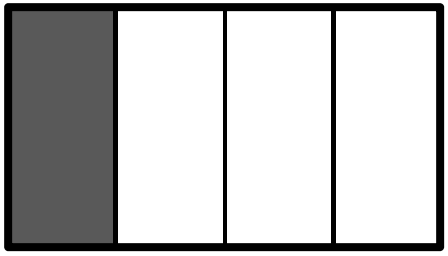
Card 3 Set G

7701.2



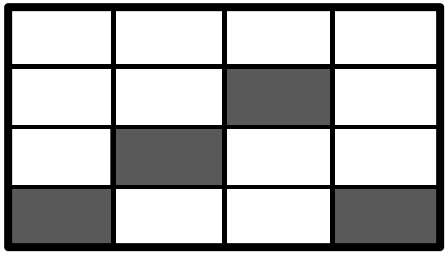
Card 4 Set G

7701.2



Card 5 Set G

7701.2

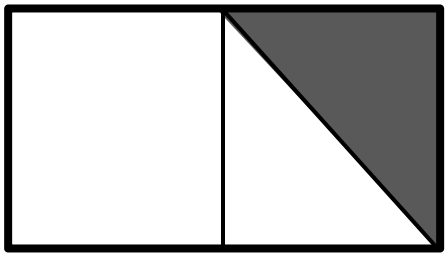


Card 6 Set G

Cut on double lines only

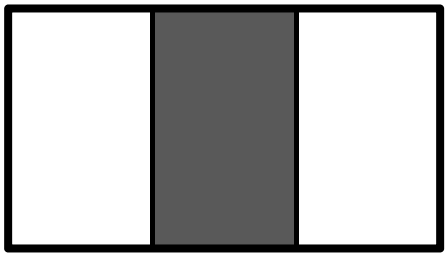
Rule Card - Set H	
The shaded area is one-third	The shaded area is NOT one-third

7701.2



Card 1 Set H

7701.2

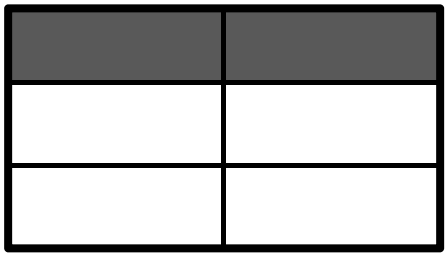


Card 2 Set H

7701.2

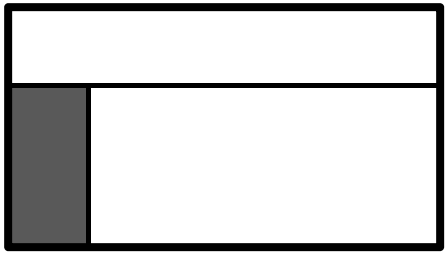
Card 3 Set H

7701.2



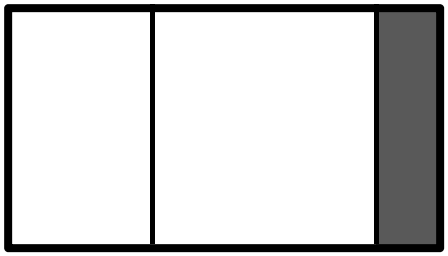
Card 4 Set H

7701.2



Card 5 Set H

7701.2

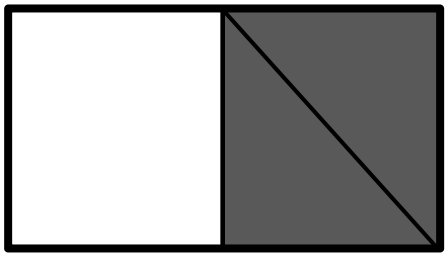


Card 6 Set H

Cut on double lines only

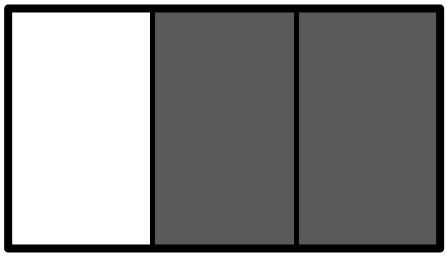
Rule Card - Set I	*Extension Activity*
The shaded area is two-thirds	The shaded area is NOT two-thirds

7701.2



Card 1 Set I

7701.2

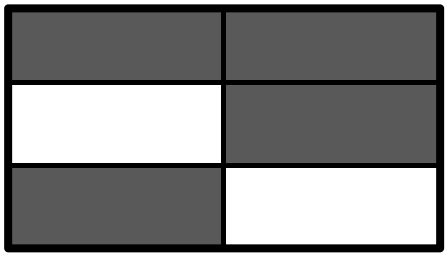


Card 2 Set I

7701.2

Card 3 Set I

7701.2

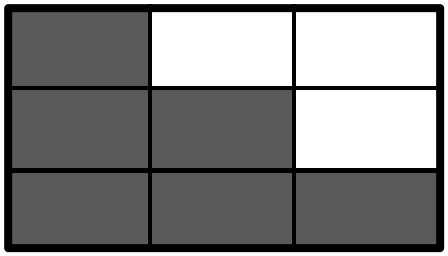


Card 4 Set I

7701.2

Card 5 Set I

7701.2



Card 6 Set I

Cut on double lines only

ANSWER CARDS

Answer Card: Set **A**	
Halves	NOT Halves
1 4 5	2 3 6
7701.2	

Answer Card: Set **B**	
Fourths	NOT Fourths
1 3 4 5	2 6
7701.2	

Answer Card: Set **C**	
Thirds	NOT Thirds
2 4	1 3 5 6
7701.2	

Answer Card: Set **D**	
Eighths	NOT Eighths
1 2 5 6	3 4
7701.2	

Answer Card: Set **E**	
One-half	NOT One-half
2 4	1 3 5 6
7701.2	

Answer Card: Set **F**	
One-half	NOT One-half
2 4 5 6	1 3
7701.2	

Cut on double lines only

ANSWER CARDS

Answer Card: Set **G**	
One-fourth	NOT One-fourth
1 3 4 5 6	2
7701.2	

Answer Card: Set **H**	
One-third	NOT One-third
2 3 4	1 5 6
7701.2	

Answer Card: Set **I**	
Two-thirds	NOT Two-thirds
2 3 4 6	1 5
7701.2	

7701.2

7701.2

7701.2

Cut on double lines only

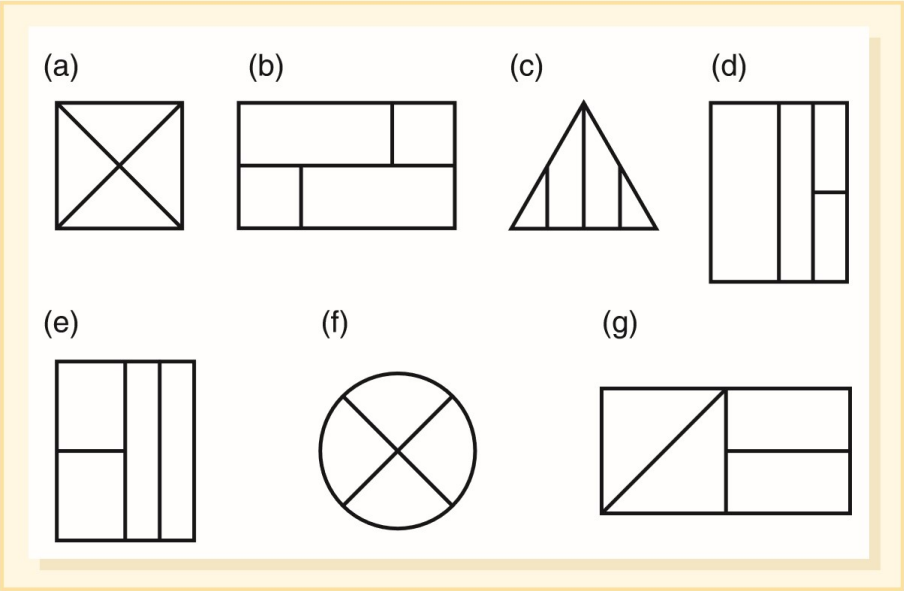
Blank rectangles

Students (or the teacher) may use these to make additional cards for sorting.

 7701.2	 7701.2	 7701.2
 7701.2	 7701.2	 7701.2

Which figures show fourths?

Explain why or why not for each figure.



a) ☐ yes ☐ no _____

b) ☐ yes ☐ no _____

c) ☐ yes ☐ no _____

d) ☐ yes ☐ no _____

e) ☐ yes ☐ no _____

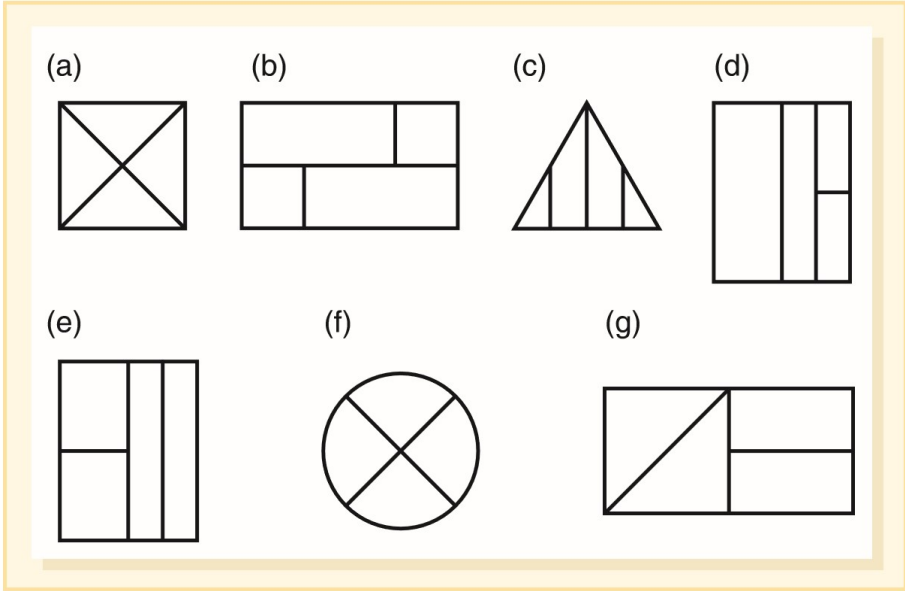
f) ☐ yes ☐ no _____

g) ☐ yes ☐ no _____

Teaching Student-Centered Mathematics Volume III, 2014 edition, page 110, Figure 8.1

Which figures show fourths?

Explain why or why not for each figure.



a) ☐ yes ☐ no _____

b) ☐ yes ☐ no _____

c) ☐ yes ☐ no _____

d) ☐ yes ☐ no _____

e) ☐ yes ☐ no _____

f) ☐ yes ☐ no _____

g) ☐ yes ☐ no _____

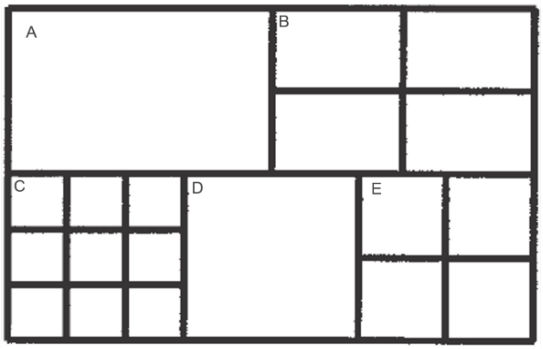
Teaching Student-Centered Mathematics Volume III, 2014 edition, page 110, Figure 8.1

The Unitizer

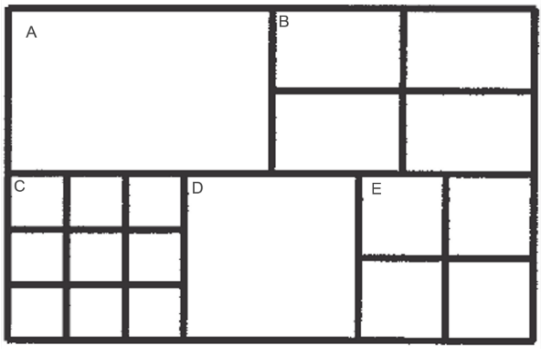
name:_____

In each of the following, the large rectangle comprises the total area (i.e. 1 unit) .
Shade the indicated fractional amount.

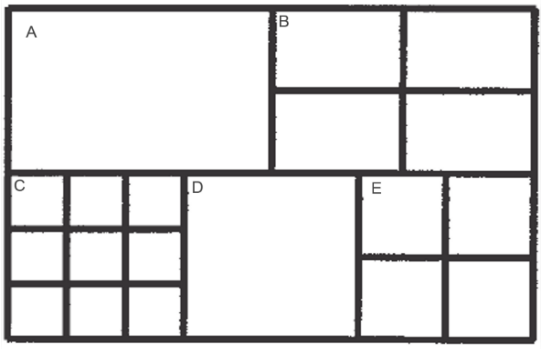
$\frac{1}{6}$



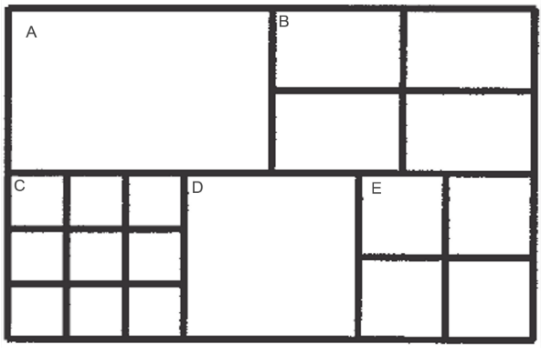
$\frac{1}{16}$



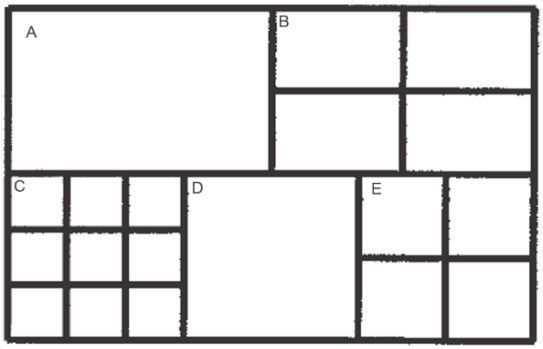
$\frac{1}{3}$



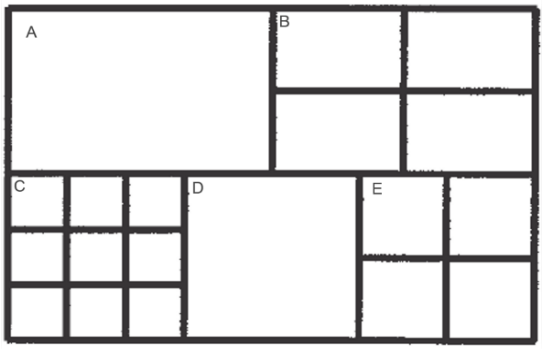
$\frac{1}{18}$



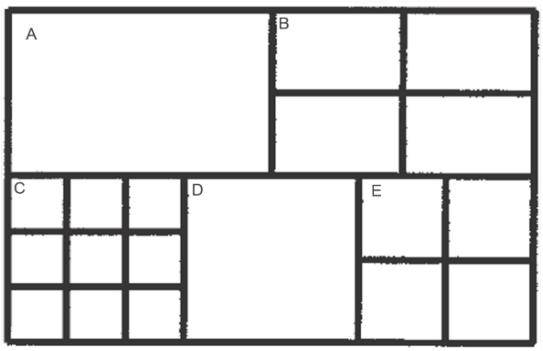
$\frac{1}{8}$



$\frac{2}{18}$

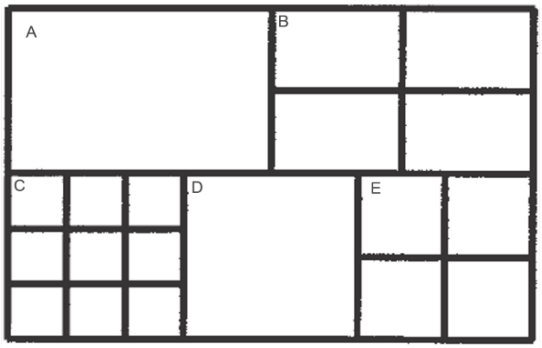


$\frac{1}{12}$



Bonus question

$\frac{7}{8}$

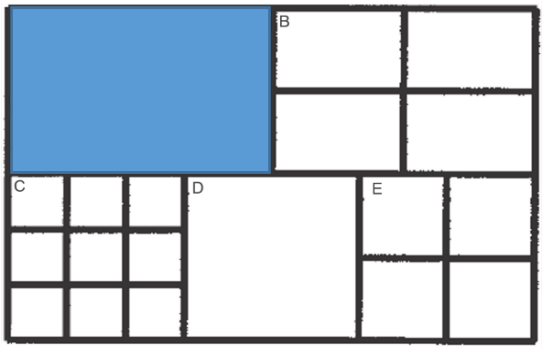


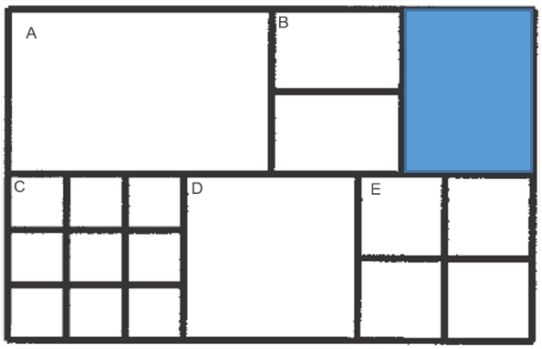
Lamon, Susan J. Teaching Fractions and Ratios for Understanding: Essential Content Knowledge and Instructional Strategies for Teachers. 3rd ed. New York: Routledge, 2012. Print.

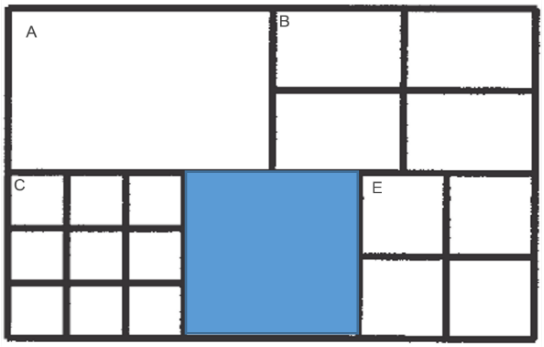
Name the Fractional Part

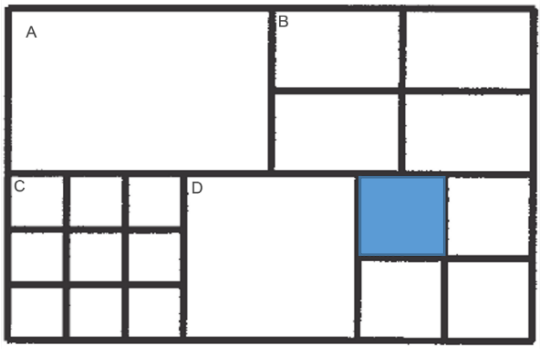
name:_____

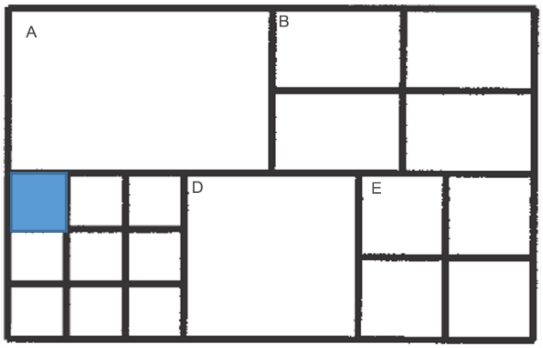
In each of the following, the large rectangle comprises the total area (i.e. 1 unit) .
Name the shaded amount.

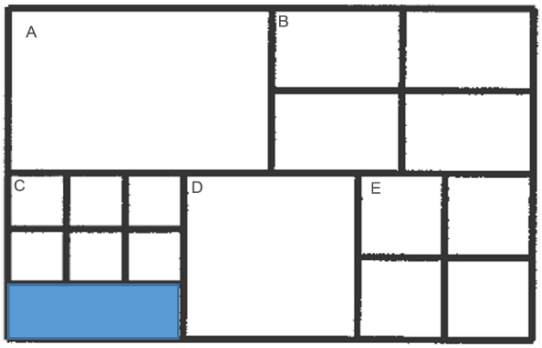


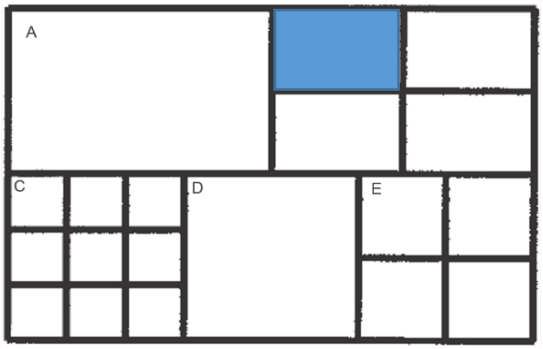


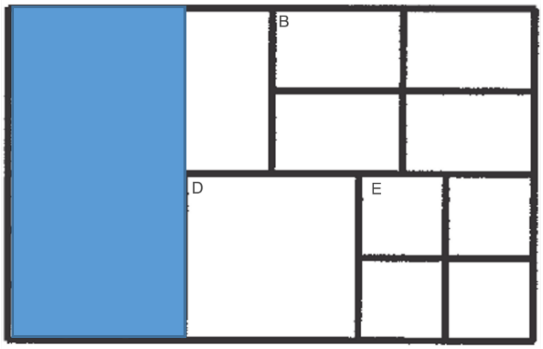




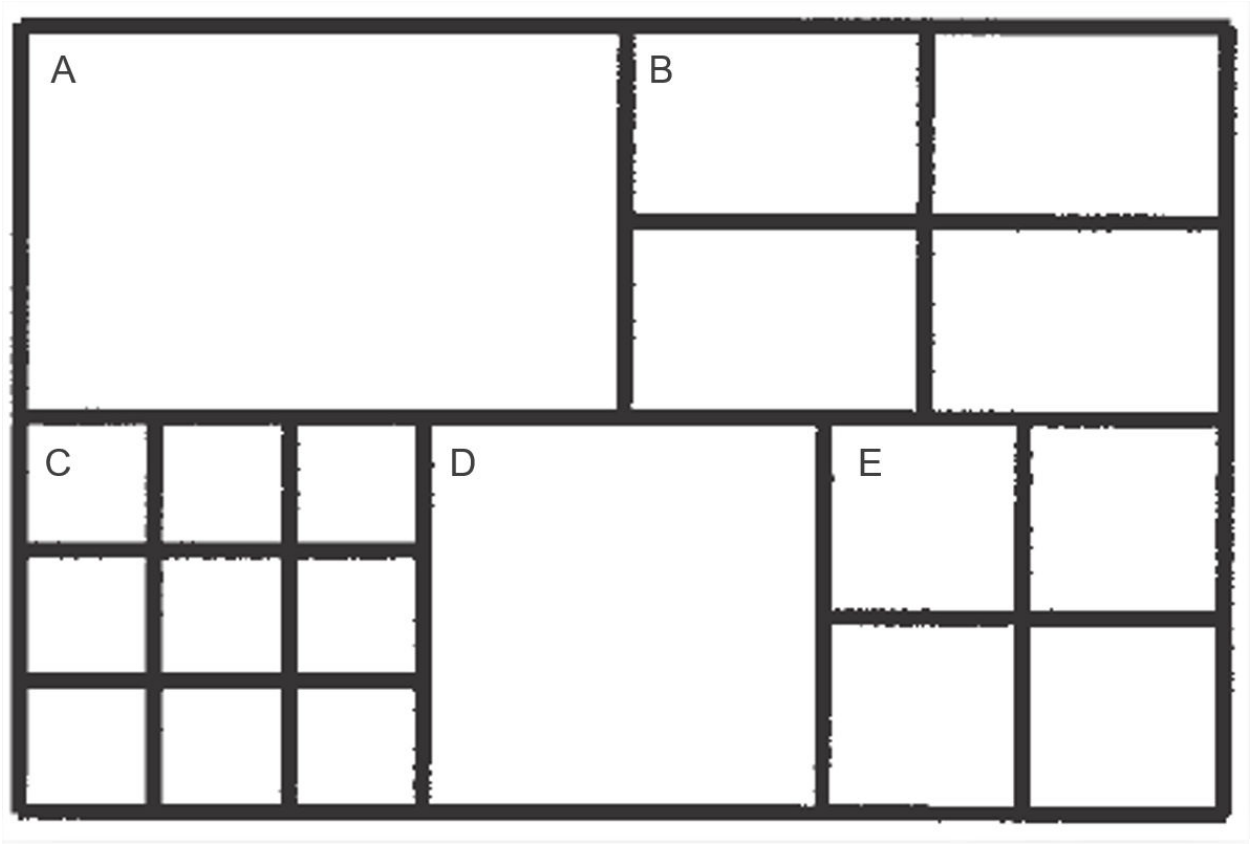


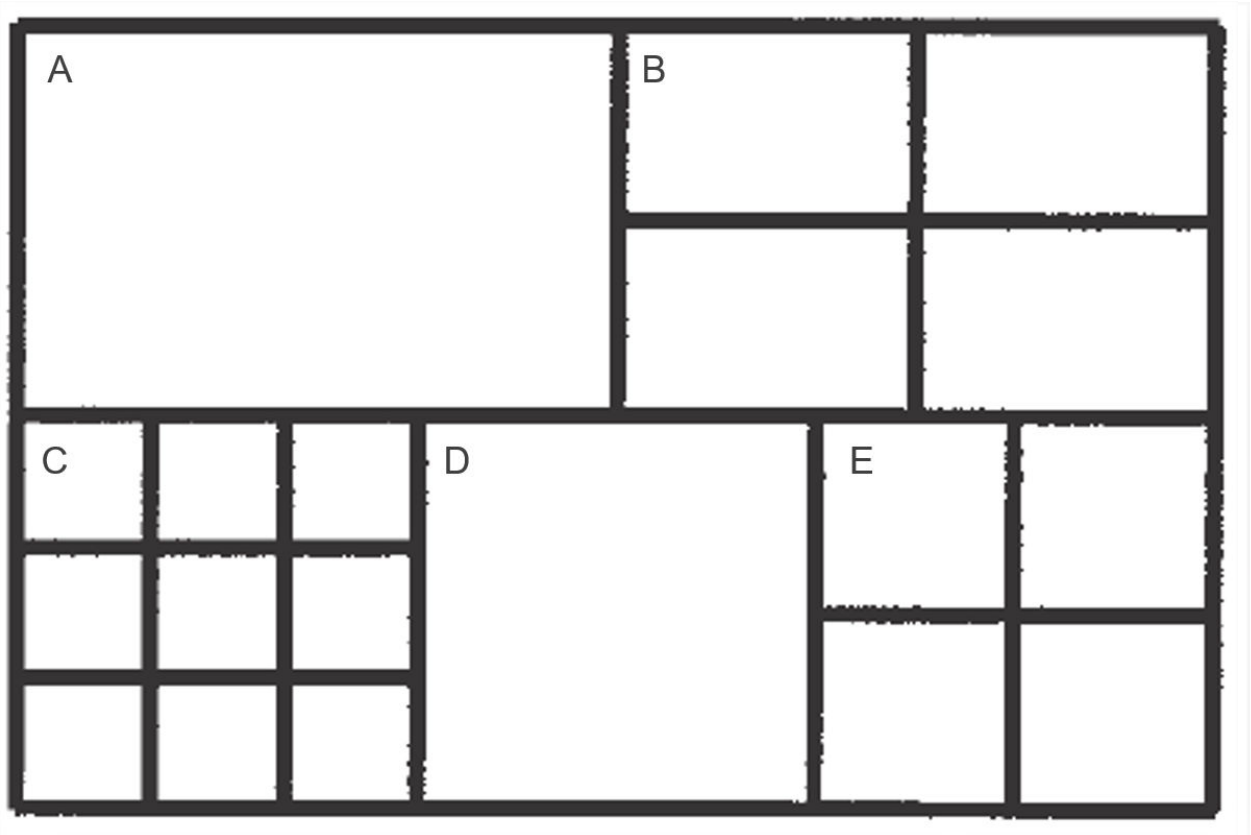




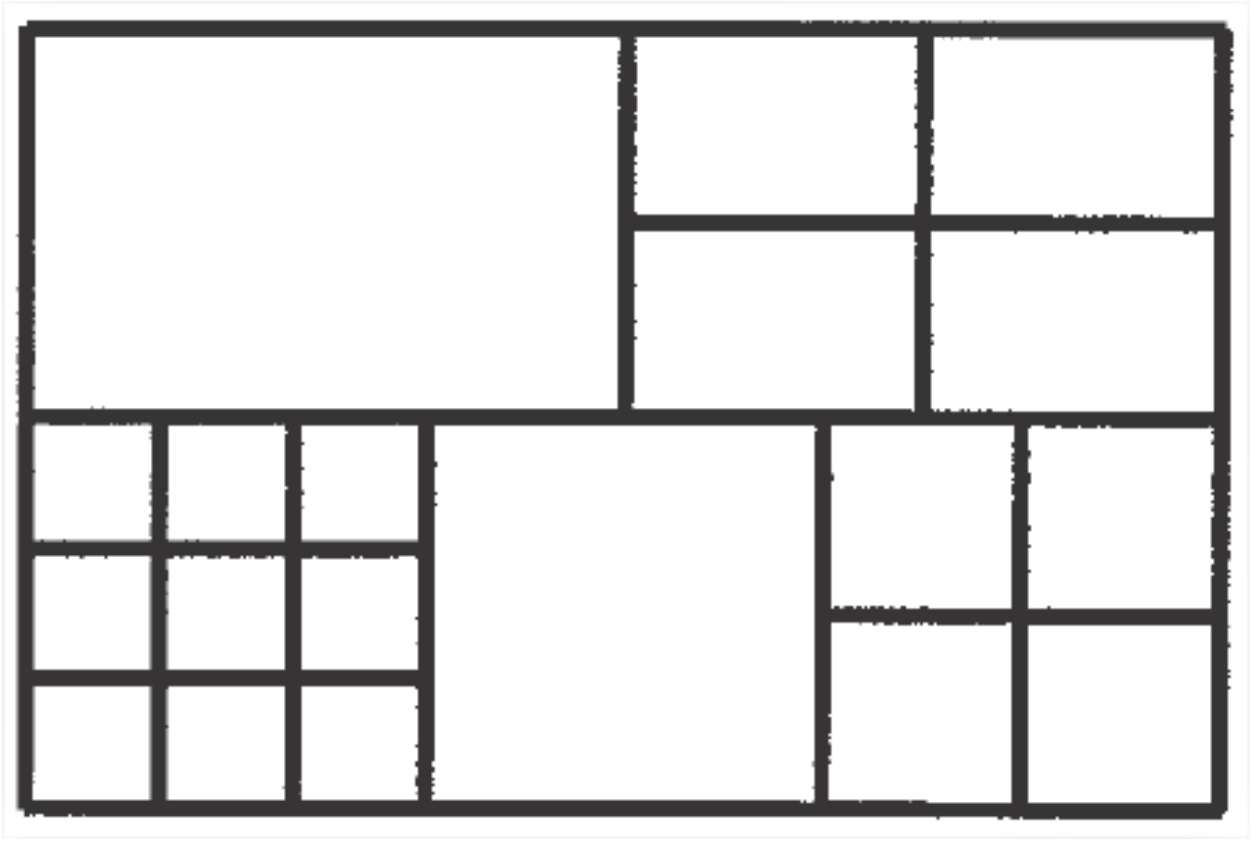


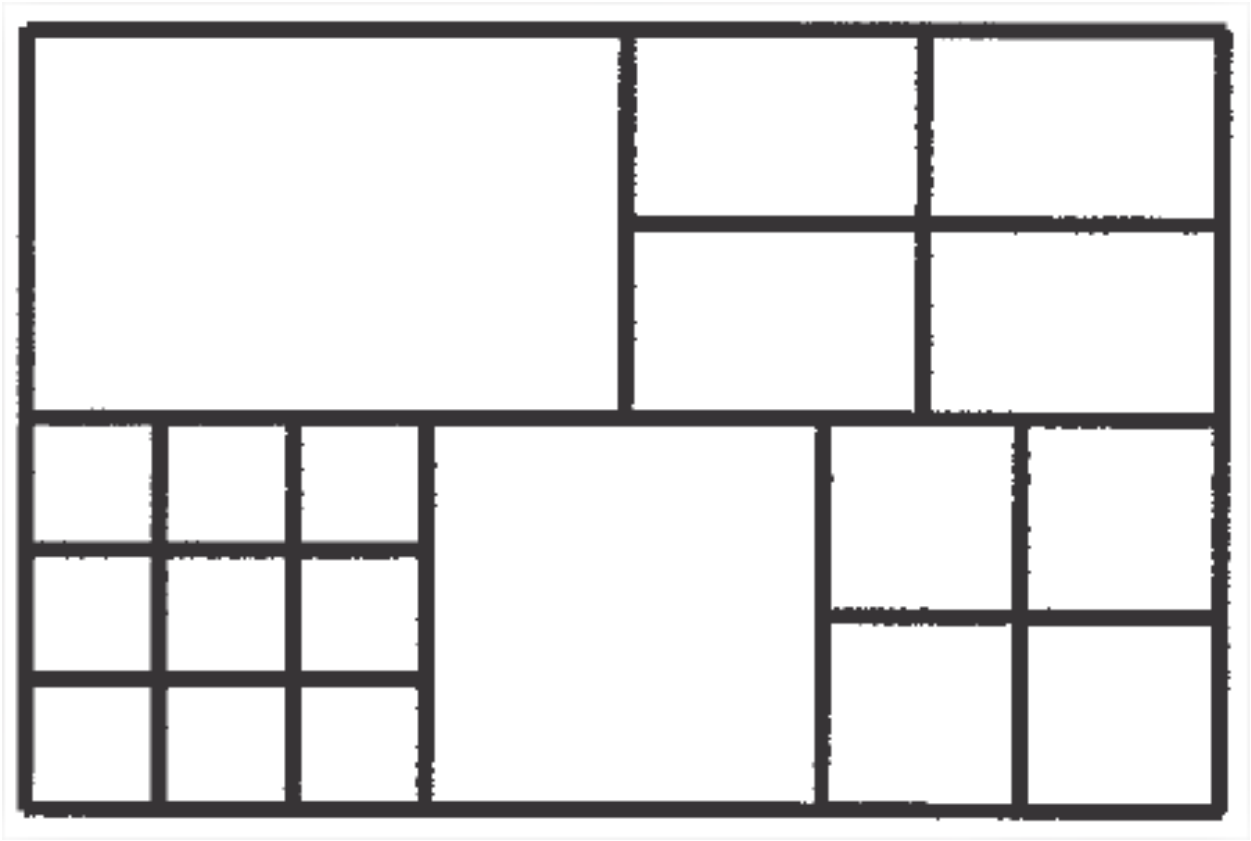
Lamon, Susan J. Teaching Fractions and Ratios for Understanding: Essential Content Knowledge and Instructional Strategies for Teachers. 3rd ed. New York: Routledge, 2012. Print.





Lamon, Susan J. Teaching Fractions and Ratios for Understanding: Essential Content Knowledge and Instructional Strategies for Teachers. 3rd ed. New York: Routledge, 2012. Print.





Lamon, Susan J. Teaching Fractions and Ratios for Understanding: Essential Content Knowledge and Instructional Strategies for Teachers. 3rd ed. New York: Routledge, 2012. Print.