Lesson/Activity Title: Fractangle Puzzles

Lesson/Activity Overview: Students will expand their understanding of equivalent fractions by solving fractangle puzzles.

Learning Objectives:

- Students will expand their understanding of equivalent fractions by solving fractangle puzzles.
- 5.NF.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.

Materials:

- Fractangle Puzzles (on cardstock, laminated)
- Expo Markers
- Color Tiles
- Graph Paper (1 inch x 1 inch, laminated)
- Markers, Colored Pencils or Crayons
- Fractangle Recording Sheet (optional)

Instructional Plan/What Will Happen:

Lesson:

- <u>Before:</u>
  - Human Fractional Demonstration – Select six students to come up to the front of the room. Ask the following questions: (*Encourage the students to simplify the fractions where needed. You can physically move the kids around to show how 4/6 is equivalent to 2/3.)*
    - What fraction of the group is wearing shorts?
    - What fraction of the group is wearing glasses?
    - What fraction of the group is right-handed?
    - What fraction of the group is boys? girls?
- <u>During:</u>
  - Distribute the materials needed for each group of four – six students. (Color tiles, graph paper, fractangle puzzles, coloring materials)
  - After the human fraction demonstration, give the students five minutes to play with the color tiles.
  - After the five minutes, display the first fractangle puzzle on the document camera. Ask the students to use the graph paper to create an array that represents the number of tiles. Prompt the students to ask them the factors of their array. The students should say that the factors of 15 are 1, 3, 5, and 15. 3, 5, and 15 can represent fractional parts of a whole for this scenario.
  - 1st clue -- Display the first line of the puzzle with the clue (5/15 are red.) Ask the students what does this mean and to display their thinking using the color tiles on the graph paper. Circulate the room checking the students' solutions.
  - 2nd clue – Display the second line of the puzzle with the clue (1/3 are blue). Guide the students in discovering that the unit is actually divided into thirds already. The students should then be able to see that 1 out the 3 parts are blue.

- 3rd clue – Display the third line of the puzzle with the clue (1/5 are green). Encourage the students to solve this portion within their group. Ask them to see what an equivalent fraction for 1/5 would be. They should be able to easily recognize the answer to the fourth clue.
- After the example, students will work in pairs to solve four additional fractangle puzzles.
- Students should record answers on grid paper or the Fractangle Recording Sheet that is provided. They can use markers, crayons, or colored pencils to show the correct fractional parts.
- The fractangle puzzles are coded according to level of difficulty (for differentiation):
  -  = Level 1 (Easy)
  -  = Level 2 (Medium)
  -  = Level 3 (Challenging)

- <u>After:</u>
  - Students will complete an "Exit Slip" to check students' understanding of the material. Place the "Exit Slip" puzzle on the document camera. Students will complete puzzle independently and turn in.
- <u>Extensions:</u>
  - Once the lesson has been taught, this activity can be presented as a math station activity. Copy fraction card sets on different colors to aide in management. The stars in each corner represent the difficulty of the question presented.
  - Students in your highest math group can write their own fractangle puzzles and then present them to a partner to solve.

Assessment Options:

- Exit Slips
- Grade recording sheets

There are 10 tiles altogether.

- 2/5 are blue
- ½ are red
- The rest are yellow

Puzzle #1

There are 10 tiles altogether.

- 20% are red
- 1/5 are blue
- The rest are green and yellow, but not in equal parts.

Puzzle #2

There are 24 tiles altogether.

- 2/3 are green
- 1/6 are blue
- 1/8 are yellow
- The rest is red

Puzzle #3

There are 24 tiles altogether.

- 5/8 are blue
- 1/3 are red
- The rest is yellow

Puzzle #4

There are 21 tiles altogether.

- 3/7 are yellow
- 1/3 are blue
- The rest is red

Puzzle #5

There are 21 tiles altogether.

- 2/3 are red
- The rest are blue and yellow but not in equal parts

Puzzle #6

There are 8 tiles altogether.

- 25% are yellow
- 1/8 are green
- 50% are red
- The rest are blue

Puzzle #7

There are 8 tiles altogether.

- 3/8 are green
- 1/8 are blue
- 25% are yellow
- 25% are red

Puzzle #8

There are 12 tiles altogether.

- 1/3 are red
- ¼ are blue
- The rest are yellow and green, not in equal parts

Puzzle #9

There are 12 tiles altogether.  ➢ 5/6 are green ➢ 1/12 are yellow ➢ The rest are red **Puzzle #10**	There are 15 tiles altogether.  ➢ 2/3 are blue ➢ 1/5 are yellow ➢ The rest are green **Puzzle #6**	There are 15 tiles altogether.  ➢ 2/5 are yellow ➢ 2/5 are red ➢ 1/5 are blue **Puzzle #12**
There are 18 tiles altogether.  ➢ ½ are red ➢ 1/3 is blue ➢ 1/6 is green **Puzzle #13**	There are 20 tiles altogether.  ➢ 2/5 are blue ➢ 10% are green ➢ ½ are yellow **Puzzle #14**	There are 10 tiles altogether.  ➢ 2/5 are blue ➢ 20% are green ➢ The rest are yellow **Puzzle #15**
There are 18 tiles altogether.  ➢ 1/3 are blue ➢ 3/6 are yellow ➢ 1/9 are green ➢ The rest are red **Puzzle #16**	There are 16 tiles altogether.  ➢ 2/8 are blue ➢ 4/16 are blue ➢ ½ are yellow **Puzzle #17**	There are 20 tiles altogether.  ➢ 25% are blue ➢ ½ are yellow ➢ 5/20 are green **Puzzle #18**

There are 24 tiles altogether.  ➢ 2/8 are green ➢ 7/12 are blue ➢ The rest are red and yellow, but not in equal parts. **Puzzle #19**	There are 15 tiles altogether.  ➢ 3/5 are yellow ➢ 1/15 are green ➢ 1/3 are red **Puzzle #20**	There are 10 tiles altogether.  ➢ ½ are blue ➢ 1/15 are yellow ➢ 1/10 are green **Puzzle #21**
There are 16 tiles altogether.  ➢ 6/32 are green ➢ 24/48 are blue ➢ ¼ are yellow ➢ 1/16 are red **Puzzle #22**	There are 8 tiles altogether.  ➢ 6/16 are yellow ➢ 1/8 are green ➢ 3/6 are red **Puzzle #23**	There are 12 tiles altogether.  ➢ 1/6 are blue ➢ 3/9 are yellow ➢ ½ are green **Puzzle #24**
There are 18 tiles altogether.  ➢ 3/9 are yellow ➢ 1/6 are blue ➢ 9/18 are green **Puzzle #25**	There are 20 tiles altogether.  ➢ 3/5 are yellow ➢ 1/10 are green ➢ 3/20 are red **Puzzle #26**	There are 21 tiles altogether.  ➢ 3/7 are blue ➢ 1/3 are green ➢ 5/21 are yellow **Puzzle #27**

There are 12 tiles altogether.  ➢ 6/24 are red ➢ 3/4 are blue **Puzzle #28**	There are 16 tiles altogether.  ➢ 3/8 are red ➢ 1/8 are blue ➢ ½ are green **Puzzle #29**	There are 18 tiles altogether.  ➢ 6/9 are yellow ➢ 1/18 are blue ➢ The rest are green and red, but not equal parts. **Puzzle #30**
There are 15 tiles altogether.  ➢ 5/15 are red ➢ 1/3 is blue ➢ 1/5 is yellow ➢ The rest are green. **Example Puzzle #1**	There are 30 tiles altogether.  ➢ 1/5 is blue ➢ 2/6 are green ➢ ½ are yellow ➢ 2/15 are red **Exit Slip**	Fractangle Puzzles

# of Red: _________
# of Blue: _________
# of Green: _________
# of Yellow: _________

# of Red: _________
# of Blue: _________
# of Green: _________
# of Yellow: _________

# of Red: _________
# of Blue: _________
# of Green: _________
# of Yellow: _________

# of Red: _________
# of Blue: _________
# of Green: _________
# of Yellow: _________

# of Red: _________
# of Blue: _________
# of Green: _________
# of Yellow: _________

# of Red: _________
# of Blue: _________
# of Green: _________
# of Yellow: _________

Fractangle Puzzle Answer Key: (Proceed with caution…we did this really fast!)

Puzzle #1:
- Green: 0
- Red: 5
- Yellow: 1
- Blue: 4

Puzzle #2:
- Green: 1, 2, 4, 5
- Red: 2
- Yellow: 5, 4, 2, 1
- Blue: 2

Puzzle #3:
- Green: 16
- Red: 1
- Yellow: 3
- Blue: 4

Puzzle #4:
- Green: 0
- Red: 8
- Yellow: 1
- Blue: 15

Puzzle #5:
- Green: 0
- Red: 5
- Yellow: 9
- Blue: 7

Puzzle #6:
- Green: 0
- Red: 14
- Yellow: 6, 5, 4, 3, 2, 1
- Blue: 1, 2, 3, 4, 5, 6

Puzzle #7:
- Green: 1
- Red: 4
- Yellow: 2
- Blue: 1

Puzzle #8:
- Green: 3
- Red: 2
- Yellow: 2
- Blue: 1

Puzzle #9:
- Green: 4, 3, 2, 1
- Red: 4
- Yellow: 1, 2, 3, 4
- Blue: 3

Puzzle #10:
- Green: 10
- Red: 1
- Yellow: 1
- Blue: 0

Puzzle #11:
- Green: 2
- Red: 0
- Yellow: 3
- Blue: 10

Puzzle #12:
- Green: 0
- Red: 6
- Yellow: 6
- Blue: 3

Puzzle #13:
- Green: 3
- Red: 9
- Yellow: 0
- Blue: 6

Puzzle #14:
- Green: 2
- Red: 0
- Yellow: 10
- Blue: 8

Puzzle #15:
- Green: 4
- Red: 0
- Yellow: 10
- Blue: 2

Puzzle #16:
- Green: 2
- Red: 1
- Yellow: 9
- Blue: 6

Puzzle #17:
- Green: 4
- Red: 0
- Yellow: 8
- Blue: 4

Puzzle #18:
- Green: 5
- Red: 0
- Yellow: 10
- Blue: 5

Puzzle #19:
- Green: 6
- Red: 1, 3
- Yellow: 3, 1
- Blue: 14

Puzzle #20:
- Green: 1
- Red: 5
- Yellow: 9
- Blue:

Puzzle #21:
- Green: 1
- Red: 0
- Yellow: 4
- Blue: 5

Puzzle #22:
- Green: 1
- Red: 3
- Yellow: 4
- Blue: 8

Puzzle #23:
- Green: 3
- Red: 0
- Yellow: 1
- Blue: 1

Puzzle #24:
- Green: 0
- Red: 6
- Yellow: 4
- Blue: 2

Puzzle #25:

- Green: 9
- Red: 0
- Yellow: 6
- Blue: 3

Puzzle #26:

- Green: 0
- Red: 15
- Yellow: 3
- Blue: 2

Puzzle #27:

- Green: 7
- Red: 0
- Yellow: 5
- Blue: 9

Puzzle #28:

- Green: 0
- Red: 3
- Yellow: 0
- Blue: 9

Puzzle #29:

- Green: 8
- Red: 6
- Yellow: 0
- Blue: 2

Puzzle #30:

- Green: 1, 2, 3, 4
- Red: 4, 3, 2, 1
- Yellow: 12
- Blue: 1