

**MANIPULATIVES:** Use concrete materials, images and representational models to solve math problems.

#### **LEARNING SKILLS**

Prioritization

Response Inhibition

Sustained Attention



#### **INSTRUCTIONAL STRATEGY**

##### **Manipulatives**

Use concrete materials, images and representational models to solve math problems

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#### **LEARNING PREFERENCES**



Body Smart



Picture Smart

#### **ACADEMIC SKILL**

**Grade 6 - 9**

Multiplication and Division: proportions and fractions



#### **Grade Curriculum Focus**

- 6-7 Solve problems involving fractions, including those requiring multiple steps or multiple operations
- 8 Compare proportional situations and determine unknown values in proportional situations
- 9 Apply an understanding of unit fractions and their relationship to other fractional amounts, in various contexts, including the use of measuring tools

# Lesson Objective, Goal and Success Criteria

## Lesson Objectives

1. Construct proportion puzzles by identifying given ratios and unknown values.
2. Apply proportional reasoning skills to arrive at accurate solutions to proportional puzzles.

## Lesson Goal

- Understand the concept of proportions and recognize their relevance in real-life scenarios
- Understand representations of fractions and ratios, using fraction tiles and pattern blocks, as tools for representing

## Success Criteria

1. Accurately represent proportions using pattern blocks
2. Solve proportional puzzles through visual representations



## UDL Instruction

### FULL CLASS AND HANDS ON ACTIVITY - 10 minutes

1. Instruct students to use at least 10 of the pattern blocks to create the first letter of their name.
2. Invite students to share their creations with the class.
3. Discuss how they approached the task and the choices made in representing their initial
4. Introduce the criteria that 1 hexagon is 1 whole. Model for students how to calculate the value of their initial as a fraction, decimal, using a ratio.
5. The teacher will introduce the concept of proportion puzzles using visual aids such as fraction tiles and pattern blocks to represent ratios and unknown values. A common misconception to anticipate is students confuse proportionality with equality. This will be addressed through visual and hands-on activities.



## Differentiated Instruction

### PAIRED AND HANDS ON ACTIVITY - 10 minutes

- Working in pairs, students will solve a puzzle provided by the teacher (see supplementary worksheets).
- Each pair will be given a puzzle based on their ability. The students are expected to work together to figure out the solution to the puzzle. This type of activity promotes teamwork, problem-solving, and can be a fun and engaging way for students to apply their knowledge or skills in a practical context

### FULL CLASS DISCUSSION - 10 minutes

- Bring the students back together to discuss the reflection question:
- How did you know what the missing blocks were? Have students discuss in a small group and then invite volunteers to share with the whole class.



## Measurement of Success

### FULL DISCUSSION- 10 minutes

Students will participate in a quick closing activity where they will share their understanding of how proportion puzzles can be applied to real-life situations using Knowledgehook.



## Materials, References and Resources

### Required Materials

Laptop and presentation screen- \$0 Pattern blocks- \$ Fraction strips- \$ Knowledgehook- \$

### References

Chang, S. H., Lee, N. H., & Koay, P. L. (2017). Teaching and learning with concrete-pictorial-abstract sequence: A proposed model.

Hinton, V. M., & Flores, M. M. (2019). The effects of the concrete-representational-abstract sequence for students at risk for mathematics failure. *Journal of Behavioral Education*, 28(4), 493-516.

Hughes, E. M., Riccomini, P. J., & Witzel, B. (2018). Using concrete-representational-abstract sequence to teach fractions to middle school students with mathematics difficulties. *Journal of Evidence-Based Practices for Schools*, 16(2), 171-190.

### Additional Resources

#### Using the CRA Approach

#### The Best Hands on Fraction Activity Ever

#### Teaching Fractions Using Manipulatives

Knowledgehook<https://www.knowledgehook.com/>

### Supplemental Documents

## Introduction Activity



**Create the first letter of your name using 10 or more pattern blocks. The total value of the pattern blocks should be more than 2. The value of a hexagon is 1 whole.**

### Partner Puzzles



**Create a spaceship using at least 15 pattern blocks. The total value of the pattern blocks you use should be more than 6. The value of a hexagon is 1 whole.**

## Grade 7

### Missing Pattern Blocks

**There were 10 blocks. The value of all of the blocks were  $2\frac{2}{3}$ . What are the missing blocks?**



## Grade 8

## Missing Pattern Blocks

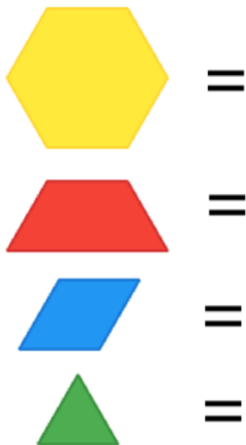
**There were 11 blocks. The value of all of the blocks were  $3\frac{2}{3}$ . What are the missing blocks?**



### Grade 9

**The value of a triangle is 1 whole. What combination of pattern blocks would equal 15?**

**Find the value of each block and then drag the blocks to complete the challenge.**



**Application of Differentiated Instruction- Independent Practice**

### Grade 6-8

Create a person using exactly 15 pattern blocks. The total value should be more than 5 and less than 8. The value of the hexagon is 1 whole.

### Grade 9

There were 10 blocks. The total value of the blocks were  $2\frac{2}{3}$ . What are the missing blocks? Explain how you know these were the missing pattern blocks.

## Measurement of Success- Knowledgehook questions

Grade 6

|                                                                                                                                          |                         |
|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Question 1                                              | Free Form               |
| It takes 1 workday to paint $\frac{1}{8}$ of a house. At this rate, how many workdays will it take to complete painting the whole house? | <div>Show Answers</div> |
| Question 2                                              | Multiple Choice         |
| Cheryl spends \$9.30 for 3 ice cream cones. Her friend, Bev wants 2 ice cream cones. How much should she expect to pay?                  | \$6.20                  |
|                                                                                                                                          | \$3.10                  |
|                                                                                                                                          | \$27.90                 |
|                                                                                                                                          | \$18.60                 |

Grade 7

Arturo has 3 plants in his room. He measures how much each plant has grown. The first plant is  $\frac{7}{12}$  of a foot tall, the second plant is  $\frac{4}{12}$  of a foot tall, and the third plant is  $\frac{5}{12}$  of a foot tall. Which model can be used to find how tall the plants are altogether?

Plant 1

+

Plant 2

+

Plant 3

Plant 1

+

Plant 2

+

Plant 3

Plant 1

+

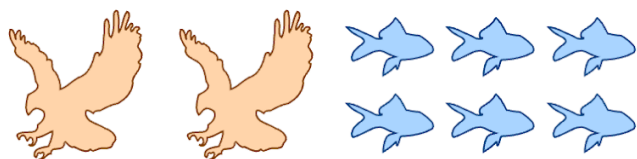
Plant 2

+

Plant 3

Grade 8-9

If 2 hawks need to eat 6 fish a day, how many fish do 12 hawks need to eat?



$$2 : 6 = 12 : \boxed{36}$$

$$6 : 2 = 12 : \boxed{4}$$

$$2 : 6 = 3 : \boxed{7}$$

$$2 : 6 = 6 : \boxed{12}$$