Focus Questions

Background

The student book is organized around three to five investigations, each of which contain three to five problems and a Mathematical Reflection that students explore during class.

In the Teacher Guide the Goals for each unit include two to four big concepts with an elaboration of the essential understandings for each.

In the Teacher Guide, a Focus Question is provided for each problem in an investigation. The Focus Question collapses the mathematical understandings and strategies embedded in the problem into one overarching question. The teacher can use the Focus Question to guide his/her instructional decisions throughout his/her planning, teaching, and reflections on student understanding.

Description

The Goals of the unit describe the mathematics content developed in the unit. The Focus Questions provide a story line for the mathematical development of an investigation. The set of Mathematical Reflections in the student book provide a story line for the mathematical development of the unit. The following contain all of the Goals, Focus Questions and Mathematical Reflections for each unit in CMP3.

Purpose

These stories can serve as an overview of the unit and as a guide for planning, teaching and assessing.

The Goals, Mathematical Reflections, and Focus Questions can be laminated and used a bookmark for the Teacher.

6-4: Covering and Surrounding

Unit Goals, Focus Questions, and Mathematical Reflections

Unit Goals

Area and Perimeter Understand that perimeter is a measure of linear units needed to surround a two-dimensional shape and that area is a measure of square units needed to cover a two-dimensional shape

- Deepen the understanding of area and perimeter of rectangular and nonrectangular shapes
- Relate area to covering a figure
- Relate perimeter to surrounding a figure
- Analyze what it means to measure area and perimeter
- Develop and use formulas for calculating area and perimeter
- Develop techniques for estimating the area and perimeter of an irregular figure
- Explore relationships between perimeter and area, including that one can vary considerably while the other stays fixed
- Visually represent relationships between perimeter and area on a graph
- Solve problems involving area and perimeter of rectangles

Area and Perimeter of Parallelograms and Triangles Understand that the linear measurements of the base, height, and slanted height of parallelograms and triangles are essential to finding the area and perimeter of these shapes

- Analyze how the area of a triangle and the area of a parallelogram are related to each other and to the area of a rectangle
- Recognize that a triangle can be thought of as half of a rectangle whose sides are equal to the base and height of the triangle
- Recognize that a parallelogram can be decomposed into two triangles. Thus the area of a parallelogram is twice the area of a triangle with the same base and height as the parallelogram
- Know that the choice of base of a triangle (or parallelogram) is arbitrary but that the choice of the base determines the height
- Recognize that there are many triangles (or parallelograms) that can be drawn with the same base and height
- Develop formulas and strategies, stated in words or symbols, for finding the area and perimeter of triangles and parallelograms
- Find the side lengths and area of polygons on a coordinate grid
- Solve problems involving area and perimeter of parallelograms and triangles
- Solve problems involving area and perimeter of polygons by composing into rectangles or decomposing into triangles

Surface Area of Prisms and Pyramids and Volume of Rectangular Prisms Understand that the surface area of a three-dimensional shape is the sum of the areas of each two-dimensional surface of the shape and that the volume of a rectangular prism is a measure in cubic units of the capacity of the prism

- Extend the understanding of the volume of rectangular prisms

- Relate volume to filling a three-dimensional figure
- Extend understanding of the strategies for finding the volume of rectangular prisms to accommodate fractional side lengths
- Relate finding area of two-dimensional shapes to finding the surface area of three-dimensional objects
- Develop strategies for finding the surface area of three-dimensional objects made from rectangles and triangles
- Solve problems involving surface area of prisms and pyramids and volume of rectangular prisms

Focus Questions and Mathematical Reflections

Investigation 1 **Designing Bumper Cars: Extending and Building on Area and Perimeter**	**Investigation 2** **Measuring Triangles**	**Investigation 3** **Measuring Parallelograms**	**Investigation 4** **Measuring Surface Area and Volume**
Problem 1.1 Designing Bumper Car Rides: Area and Perimeter **Focus Question:** What are the formulas for finding the area and perimeter of a rectangle? Explain why they work.	**Problem 2.1** Triangles on Grids: Finding Area and Perimeter of Triangles **Focus Question:** What is a formula for finding the area of a triangle?	**Problem 3.1** Parallelograms and Triangles: Finding Area and Perimeter of Parallelograms **Focus Question:** What is a strategy for finding the area of a parallelogram? Explain why the strategy works.	**Problem 4.1** Making Rectangular Boxes **Focus Question:** What is a strategy for finding the surface area of a rectangular prism? Explain why the strategy works.
Problem 1.2 Building Storm Shelters: Constant Area, Changing Perimeter **Focus Question:** For a fixed area, what are the shape and perimeter of the rectangles with the greatest and least perimeters?	**Problem 2.2** More Triangles: Identifying Base and Height **Focus Question:** Does it make any difference which side is used as the base when finding the area of a triangle?	**Problem 3.2** Making Families of Parallelograms: Maintaining the Base and the Height **Focus Question:** What can you say about two parallelograms that have the same base and height?	**Problem 4.2** Filling the Boxes: Finding Volume **Focus Question:** What is a strategy for finding the volume of a rectangular prism? Explain why the strategy works.
Problem 1.3 Fencing in Spaces: Constant Perimeter, Changing Area **Focus Question:** For a fixed perimeter, what are the shape	**Problem 2.3** Making Families of Triangles: Maintaining the Base and the Height **Focus Question:** What can you	**Problem 3.3** Designing Parallelograms Under Constraints **Focus Question:** Under what conditions will two	**Problem 4.3** Designing Gift Boxes: Finding Surface Area **Focus Question:** What is a strategy for finding the surface

and area of the rectangles the greatest and least area?	say is true and what can you say is not true about triangles that have the same base and height?	or more parallelograms have the same area? Do these parallelograms have the same shape? Explain.	area of three-dimensional object? Explain why the strategy works.
	Problem 2.4 Designing Triangles Under Constraints **Focus Question:** What conditions for a triangle produce triangles that have the same area? Do they have the same shape? Explain.	**Problem 3.4** Polygons on Coordinate Grids **Focus Question:** How can you find the area of a polygon drawn on a coordinate graph? On grid paper?	
Mathematical Reflections: 1. a. Explain what area and perimeter of a figure means. b. Describe a strategy for finding the area and perimeter of any two-dimensional shape. c. Describe how you can find the area of a rectangle. Explain why this method works. d. Describe how you can find the perimeter of a rectangle. Explain why this method works. 2. a. Consider all the rectangles with the same area. Describe the rectangle with the least perimeter. Describe the rectangle with the greatest perimeter. b. Consider all the rectangles	**Mathematical Reflections:** 1. a. Describe how to find the area of a triangle. Explain why your method works. b. Describe how to find the perimeter of a triangle. Explain why your method works. 2. a. Does the choice of the base affect the area of a triangle? Does the choice of the base affect the perimeter of a triangle? Explain why or why not? b. What can you say about the area and perimeter of two triangles that have the same base and height? Give evidence to support your answer? 3. How is finding the area of a triangle related to finding the	**Mathematical Reflections:** 1. a. Describe how to find the area of a parallelogram. Explain why your method works. b. Describe how to find the perimeter of a parallelogram. Explain why your method works. 2. a. Does the choice of the base change the area of a parallelogram? Does the choice of the base change the perimeter of a parallelogram? Explain why or why not? b. What can you say about the shape, area, and perimeter of two parallelograms that have the same base and height? Give evidence to support your answer?	**Mathematical Reflections:** 1. a. What information do you need to find the volume of a rectangular prism? Describe a strategy to find the volume of a rectangular prism. b. What information do you need to find the surface area of a rectangular prism? Describe a strategy to find the surface area of a rectangular prism. 2. a. Describe a strategy for finding the surface area of three-dimensional shapes made from rectangles and triangles. b. How does knowing the area of two-dimensional figures help you find the surface area of a three-dimensional shape?

with the same perimeter. Describe the rectangle with the least area. Describe the rectangle with the greatest area. c. Explain how graphing relationships between length and perimeter or length and area helps explain patterns between area and perimeter.	area of a rectangle? How is finding the perimeter of a triangle related to finding the perimeter of a rectangle?	3. How is the area of a parallelogram related to the area of a triangle and a rectangle? How is the perimeter of a parallelogram related to the perimeter of a triangle and a rectangle?	