



## Mathematic Constructions: Area & Perimeter

**Materials:** -Mathematic Constructions Activity Cards

***Kit comes with the following items (replacement of expendable parts will be required):***

- Ruler
- X-acto Knife
- Popsicle sticks
- Kinetic Sand
- Copy of protractor
- Long straight pins
- Foam & Felt (cut to size)

***Items needed to complete project:***

- Pencil/pen
- White foam board
- Glue/wood glue
- Scissors
- Calculator (not required)
- Measuring cup (ounces) (at least 1 -5 ounces)

**Prerequisite(s):** Students should have good understanding of the concept of area (rectangle, square, & triangle); perimeter; fractions & decimals, estimation & rounding; ruler measurements; and basic problem solving. Age range for this activity is estimated to be UE & Middle School appropriate.

**Overview:** The Mathematic Constructions: Area & Perimeter activity kit was developed to further student's understanding of area & perimeter and the application of this understanding. This allows students to explore the abstract alongside the applied and to demonstrate that the numbers are true in the real world application of mathematical formula.

*Note\*\* While this activity is challenging by nature, it allows the student to work in a step-by-step format that encourages discovery & mastery of their work.*

*When children come into contact with nature, they reveal their strength. ~ Maria Montessori*

### **Activity Set-up:**

The Mathematic Constructions Activity Cards were designed to be completed one card at a time. There are 12 cards total. Each card is designed to provide (1) a basic background and/or historical information on the elements of construction and/or housing and (2) instructions for completing the mathematical activity (which includes both abstract mathematical reasoning and calculation and application of the calculation). At the completion of this project, each student or small group of students will have built a finished house and a landscape. The measurements provided are very important....please make sure students double check their measurements. If instructions are not followed correctly, this can result in errors in mathematical calculations and waste of materials (foam board, popsicle sticks, etc...). Each kit contains at least enough expendable materials to complete one or two houses. Replacement of the expendable materials can be found at any hobby store and/or home repair store (Hobby Lobby, Michaels, Home Depot, Lowes, etc...).

### **Important Formulas:**

Area of Rectangle =	$b \cdot h$
Area of Triangle =	$\frac{1}{2} \cdot b \cdot h$
Volume of Rectangle =	$l \cdot w \cdot h$
Perimeter of Rectangle =	$2(l \cdot w)$

### **Activity Card Preparation:**

1. Gather materials together: Activity Card ( 1 -12); Materials listed on Activity Card; Glue
2. Read through instructions. Complete items in order listed on card.
3. Use Mathematic Constructions Student Workbook to write down answers and calculations relevant to each Activity Card.
4. Complete Activity.
5. Return Material to shelf and store construction pieces in a safe place.

### **Attachments Included:**

- Copy of Protractor
- Blue Prints of all foam board cut-outs
- Blue Prints of all expendable pieces
- Mathematic Constructions Student Workbook
- Conversion Chart for Inches cubed to Ounces

Self-Check Answers:

Card 1:

Area of the floor:  $8'' \times 7'' = 56 \text{ inches}^2$   
Area of Carpet Roll:  $3'' \times 5'' = 15 \text{ inches}^2$   
Number of Carpet Rolls Needed:  $56 \text{ inches}^2 / 15 \text{ inches}^2 = 3.74$  or  
approximately 4 carpet rolls  
Cost of carpet rolls:  $4 \text{ rolls} \times \$30.25 = \$121.00$

Card 2:

Area of Door:  $2.25'' \times 2'' = 4.5 \text{ inches}^2$   
Area of Front Wall:  $36 \text{ inches}^2 - 4.5 \text{ inches}^2 = 31.5 \text{ inches}^2$   
Area of Back Wall:  $8'' \times 4.5'' = 36 \text{ inches}^2$

Card 3:

Area of Side Wall:  $7'' \times 4.75'' = 33.25 \text{ inches}^2$

Card 4:

Area of Siding:  $.75'' \times 3'' = 2.25 \text{ inches}^2$   
Number of Siding needed for:  
**Front Wall:**  $31.5 \text{ inches}^2 / 2.25 \text{ inches}^2 = 14$  Siding  
**Back Wall:**  $36 \text{ inches}^2 / 2.25 \text{ inches}^2 = 16$  Siding  
**Side Walls:**  $33.25 \text{ inches}^2 / 2.25 \text{ inches}^2 = 14.78$  or approximately 15  
Siding

Card 5:

Area of Triangular Truss:  $1/2 \times 15/4 \times 61/8 = 915/64 = 14.30 \text{ inches}^2$   
Number of Siding Needed:  $14.30 \text{ inches}^2 / 2.25 \text{ inches}^2 = 6.36$  Siding (for one  
truss) or approximately 7 Siding (for one truss)

Card 6:

Front Wall + Back Wall + Side Wall 1 + Side Wall 2 + Truss 1 + Truss 2 = Number  
of Siding for Complete House ( $14 + 16 + 15 + 15 + 7 + 7 = 74$ )  
Cost of Total Siding for House:  $74 \times \$4.35 = \$321.90$

Card 7:

Total Area of Roof:  $2 (8.5'' \times 6'') = 102 \text{ inches}^2$   
Area of Roof Shingle:  $1'' \times 1'' = 1 \text{ inches}^2$   
Number of Roof Shingles Needed:  $102 \text{ inches}^2 / 1 \text{ inches}^2 = 102$  shingles  
Cost of Shingles for Roof:  $102 \times \$0.59 = \$60.18$

Card 8:

Construction Card

Card 9:

Total Area of Land:  $13.5'' \times 13.5'' = 182.25 \text{ inches}^2$

Area of Land minus the area of the house:  $182.25 \text{ inches}^2 - 56 \text{ inches}^2$  (area of floor) =  $126.25 \text{ inches}^2$

Card 10:

Area of the driveway:  $4.38'' \times 4.88'' = 21.38 \text{ inches}^2$

Volume of the driveway:  $4.38'' \times 4.88'' \times .38'' = 8.13 \text{ inches}^3$

Conversion to ounces:  $8.13 \text{ inches}^3 \times .55 = 4.48 \text{ ounces}$  or 5 ounces of sand needed

Card 11:

Area of Land minus area of driveway:  $126.25 \text{ inches}^2 - 21.38 \text{ inches}^2 = 104.87 \text{ inches}^2$

Area of Roll of Sod:  $5'' \times 1'' = 5 \text{ inches}^2$

Number of Rolls of Sod Needed:  $104.87 \text{ inches}^2 / 5 \text{ inches}^2 = 20.98$  or 21 Rolls of Sod needed

Cost of Sod:  $21 \times \$52.75 = \$1107.75$

Card 12:

Perimeter of Property:  $13.5'' + 13.5'' + 13.5'' + 13.5'' = 54 \text{ inches}$

Length of Popsicle stick:  $6''$

Number of Popsicle sticks needed to span property:  $54 / 6 = 9$  Popsicle sticks Needed

Number of Popsicle sticks needed for fence: 28