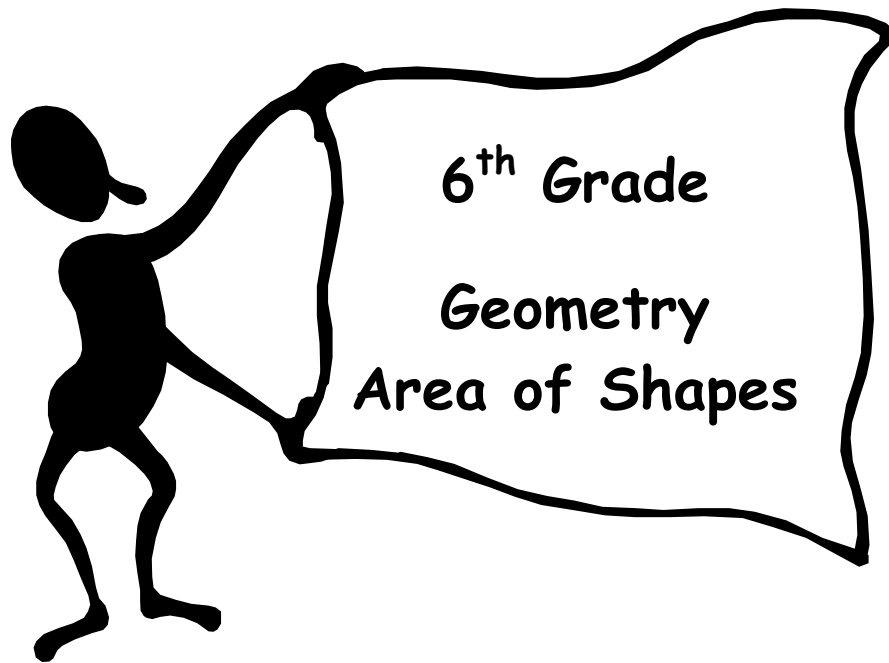


New York City Department of Education Magnet Program District 25 & 28

Edward Bleeker JHS 185Q



Essential Question: How does area affect the appearance of structures?

Suggested Time Frame: 4 weeks

Theme: Architecture

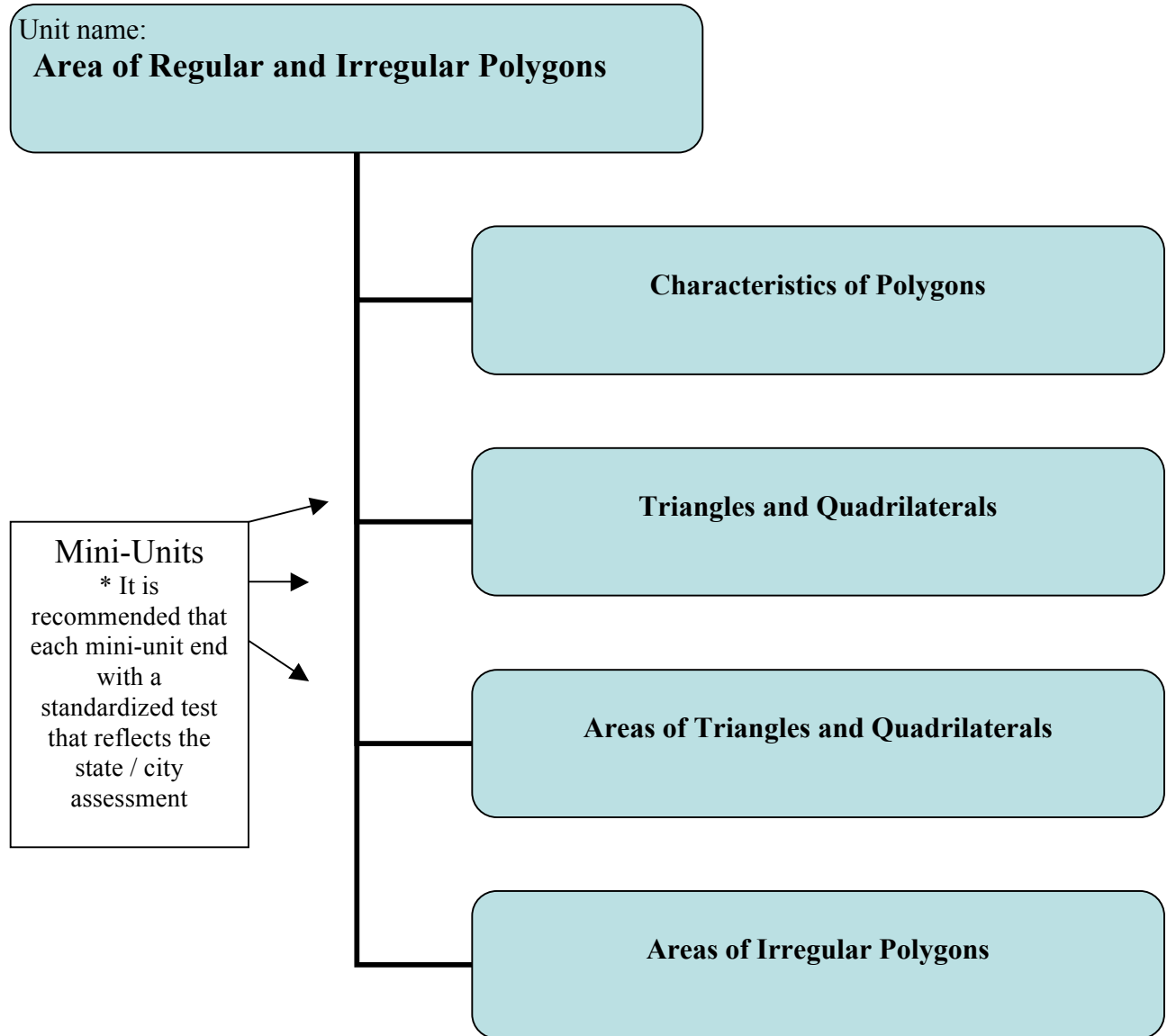
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Graphic Overview of Unit

Suggested Time Frame:

Essential Question: How does area affect the appearance of structures?



Unit's Culminating Project: (briefly explain in 2-3 sentences):
Using a variety of regular and irregular shapes, develop a plan for one floor of a house with given areas for each room. The rooms will be designed with different regular and irregular shapes. Students will design each room so that it has the given area, and will draw the rugs with

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dimensions that will yield the desired area. Given budget restraint and price list, students will select materials to satisfy budget restraint and determine total cost of rugs.

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Stage 1- Desired Results	
<p><u>Standards-Based Learning Goals:</u> 6G2 Determine the area of triangles and quadrilaterals and develop formulas. 6G3 Use a variety of strategies to find the area of regular and irregular polygons. 6A2 Use substitution to evaluate algebraic expressions.</p> <p>Process Standards: 6PS2 Understand that some ways of representing a problem are more efficient than others. 6PS21 Explain the methods and reasoning behind the problem solving strategies used. 6CN7 Apply mathematics to problem situations that develop outside of mathematics. 6CN8 Investigate the presence of mathematics in careers and areas of interest. 6R6 Investigate relationships between different representations and their impact on a given problem.</p>	
Concepts	
<p>Big Ideas for this Unit Geometry is an integral science in building and designing architectural structures</p> <p>Relationships</p> <ul style="list-style-type: none"> • dimensions & area • area & construction <p>Interactions</p> <ul style="list-style-type: none"> • mathematical manipulation of dimensions to yield area 	<p>Magnet School Theme:</p> <ul style="list-style-type: none"> • Architecture <p>Relevant/Connected Big Idea:</p> <p>The use of geometry to address building and designing requirements and plans fits into to the theme of architecture.</p>
<p>Enduring Understandings Students will understand that:</p> <ul style="list-style-type: none"> • Multiple designs achieve the same result • Comparisons determine effectiveness • Balance drives building design • Function is driven by structure 	<p>Overarching Essential Question(s):</p> <p>How does area affect the appearance of structures? Is area necessary in architectural design? Do area restraints lead to singular designs, or can creative designs still be achieved? Does measurement help us understand and describe our world?</p>
Content and Skills	
<p>Content Students will know...</p> <p>Polygons</p> <ul style="list-style-type: none"> • Side, Angle relationships <p>Formulas</p> <p>Triangle</p> <ul style="list-style-type: none"> • Base, Height, $A=1/2(b \times h)$ <p>Square</p> <ul style="list-style-type: none"> • Side, $A=s \times s$ <p>Rectangle</p> <ul style="list-style-type: none"> • Length, width, $A=l \times w$ <p>Parallelogram</p> <ul style="list-style-type: none"> • Base, height, $A=b \times h$ <p>Rhombus</p> <ul style="list-style-type: none"> • Base, height, $A=b \times h$ <p>Trapezoid</p> <ul style="list-style-type: none"> • Base₁, Base₂, Height, $A=1/2(b_1+b_2) \times h$ 	<p>Skills Students will be able to...</p> <ul style="list-style-type: none"> • Evaluate formulas by substituting. • Classify polygons based on various criteria. • Identify the dimensions of polygons and objects resembling polygons. • Understand area concept and apply it in real situations. • Construct irregular shapes by combining regular shapes • Determine the area of real objects resembling irregular shapes. • Adapt designs to fit budget and space requirements. • Describe the relationship of the sides and angles of polygons.

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Irregular Figure • Composed of regular figures	
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Stage 2- Summative Assessment Evidence

If students understand, know and are able to do the items in Stage 1, they should be able to show their understanding by completing an authentic task found in the world beyond the classroom.

➤ Design the Culminating/Summative Task:

G- (goal)

Apply concept of area and other geometric concepts in the design of a home. Create a proposal.

R- (role)

Architect, Project manager

A- (audience)

Investor

S- (situation)

Investor submits project requirements to architect.

P- (purpose and product)

Proposal consisting of floor plans, budgets, materials lists.

S- (standards for performance)

Stay within budget

Create required materials list and cost of materials

Create floor plan

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Student Task

In the space below, write the task exactly as students will see it.

New Home Proposal

Bill Smith, founder of a multi-billion dollar software company, wants to build a new home for his family.

- He wants a home that stands out and is uniquely designed.
 - Each room should be a different shape.
 - He prefers his rooms to be irregular geometric shapes.
- He is very demanding about the size of each room. He wants one irregularly shaped rug in each room. Each rug must have the indicated area.

Room	Area (ft ²)	Rug Area (ft ²)
Living Room	300	280
Master Bedroom	240	60
Second Bedroom	160	40
Guest Bedroom	100	35
Office	100	80
Family Room	220	200
Kitchen	150	20
Dining Room	180	150
Master Bathroom	90	20
Second Bathroom	60	20

- Cost of Flooring Materials (\$ per ft²)

Vinyl Tiles	\$2.99
Ceramic Tiles	\$4.50
Hardwood Flooring	\$5.90
Carpet	\$4.25
Marble	\$25
Slate	19

- You are to create a new home proposal for Mr. Smith. It shall include the following items:
 - Floor plan with dimensions, flooring materials, and rugs labeled.
 - List of materials used. Cost of each material used. Total cost for flooring.
 - Explanation of how each room yields the required area.
 - Explanation of how your design is unique and well-suited for Mr. Smith.

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Rubric for New Home Proposal

	Level 4	Level 3	Level 2	Level 1
Floor plan 20%	Floor plan is attractive, colorful and meaningful.	Floor plan mostly is attractive, colorful and meaningful.	Floor plan is somewhat attractive, colorful and meaningful.	Floor plan is not attractive, colorful and meaningful.
Room and Rug Dimensions 50%	All labeled dimensions yield the given area, and all polygons are different and irregular.	All labeled dimensions yield the given area, and most polygons are different and irregular.	Some labeled dimensions yield the given area, and few polygons are different and irregular.	No labeled dimensions yield the given area, and no polygons are different and irregular.
Materials List 10%	Materials used are clearly listed. All calculations are correct.	Materials used are generally clearly listed. Most calculations are correct.	Materials used are not clearly listed. Major errors in calculations.	Materials are not listed.
Explanation of Area 15%	Student presents a clear, specific understanding of the topic.	Student knowledge of the topic is mostly understood, but not complete	Student knowledge of the topic is partly understood, but not complete.	Student use of the topic is not shown.
Explanation of Uniqueness 5%	Student consistently makes connections between different disciplines, past and present, cause-effect relationships.	Student mostly makes connections between different disciplines, past and present, cause-effect relationships.	Student sometimes makes connections between different disciplines, past and present, cause-effect relationships.	Student does not make connections between different disciplines, past and present, cause-effect relationships.

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Stage 2- Formative Assessment Evidence	
<p>Throughout the unit how will you check to make sure students are mastering the knowledge, skills, and understandings they need to be successful at the summative/culminating task?</p>	
<p>Assessment Formats on the State Test</p>	<p>Weekly Formative Assessments</p>
<p>Multiple Choice and Extended Response Questions</p> <ul style="list-style-type: none"> • Determine the area of a regular polygon. • Given the area of a regular polygon and one missing dimension, determine the missing dimension that will yield the desired area. • Determine the area of irregular polygons with all dimensions given. • Determine the area of irregular polygons with dimensions missing. 	<p>For Content...</p> <ul style="list-style-type: none"> • Classify polygons and give them the correct name. • Identify the key differences between the different quadrilaterals. • Identify the dimensions of regular polygons. • Identify the regular shapes composing an irregular shape.
	<p>For Skills...</p> <ul style="list-style-type: none"> • Apply formulas to determine area of regular polygons. • Determine the area of irregular shapes by separating into component regular shapes. • Given a set of various polygons, categorize them and give reasons for each category. • Identify the dimensions and determine the area of real objects (tables, sails, Frisbees). • Explain how area is utilized in construction projects.
	<p>For Understandings...</p> <ul style="list-style-type: none"> • Show that the same result is achieved with different solution methods or designs. • Compare the area of different polygons that have dimensions involving the same numbers. • Compare the cost of using various building materials to cover the same area. • Show how two different polygons with different dimensions can yield the same area.