






Parallel Model Overview

	<p><u>Lesson Topic:</u> Exploring Mathematical Relationships</p> <p><u>Subject Area(s):</u> Math</p> <p><u>Grade Level(s):</u> Second Grade</p>
	<p><u>Context:</u> This unit can be adapted to meet the needs of a mixed-ability general education class, or a group of gifted learners for differentiated services. Although this was designed as a unit each lesson could be taught separately.</p>
	<p><u>Length:</u> 2-3 weeks, one hour daily sessions.</p>
	<p><u>Lesson Summary:</u> The lessons, included in this unit, address the need for students to see relationships in math. The unit highlights relationships found within mathematical topics as well as relationships found in math and the real world. The first lesson studies the relationships that exist between perimeter and area and what rectangular shape encloses the greatest area with a given perimeter. The second lesson investigates the relationships between faces, edges, and vertices of geometric solids. It explores Euler's Theory and has students apply knowledge of this theory to new problems. The third lesson investigates the use of polygons in the real world. It specifically introduces the use of polygons in construction. Students will examine why engineers and architects select certain shapes for building and methods they use to strengthen structures. The fourth lesson shows students how questions can generate data and how data can be displayed to communicate an idea or persuade. It explores the relationship between data representation and persuasion. We want students to realize that relationships exist between mathematical topics as well as math in the real world.</p>
 <p>Content</p>	<p><u>Parallel(s) Targeted:</u> Core Curriculum: Students are introduced/re-introduced to key facts, concepts, principles, and skills in math</p> <p>Curriculum of Practice: unit requires students to assume the roles of an architect and a marketer to investigate the relationships found among mathematical concepts and occupations.</p> <p>Curriculum of Connections: unit addresses the macroconcept of relationships that exist in in mathematics as well as relationships found</p>



between math skills and real world professions.

Curriculum of Identity: unit encourages students to observe the relationships among mathematical topics and their own lives. It illustrates the importance and usefulness of relationships in math.

Standards:

GEO 2 (2.21) Identify attributes of two-dimensional shapes (triangles, squares, circles, rectangles) and sort accordingly. Explore attributes of other two-dimensional shapes (regular and irregular polygons and non-polygons).

GEO 5 (2.20, 2.22) Identify and sort solids (cube, rectangular solid, sphere, cylinder, cone, square pyramid, according to the number and shapes of faces and the number of edges and corners.

DSP 1 Collect, count, record, and display data. Sort and justify the sorting rule.

DSP 2 Make and interpret charts and schedules. Share findings.

DSP 3 (2.29, 2.23) Make and interpret bar graphs and pictographs. Explain findings. Create and solve one-step addition and subtraction problems with the data.

MEA 2 (2.12) Explore the perimeter of polygons using nonstandard units, inches, and centimeters

MEA 3 (2.13) Explore area with concrete materials and grid paper

MEA 4 (2.14) Explore the concept of volume by filling boxes and building box shapes using

Concept(s):

Relationships



Generalizations/Enduring Understandings:




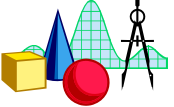
1. Patterns in relationships can be analyzed using reasoning and predictions.
2. Patterns in relationships are used to understand and solve problems.
3. Everything is related in some way.
4. Relationships are defined and classified by their attributes.




Knowledge: (facts and content knowledge from the Program of Studies)

Students will...

- Understand that relationships can be analyzed using reasoning and predictions
- Understand patterns in relationships are used to understand and solve problems.
- Understand that everything is related in some way.
- Understand the relationship between area and perimeter

	<ul style="list-style-type: none"> • Understand the relationship between faces, edges, and vertices • Understand the use of polygons in the real world • Understand that the analysis and interpretation of data depends on how it is displayed. • Understand that graphs are used to organize information into a useful form. • Understand that graphical representations influence predictions and decisions about the world we live in. • Understand that math concepts are related to the real world <p>Skills: (a proficiency, ability, strategy, method, or tool)</p> <ul style="list-style-type: none"> • Compare and contrast similarities and differences among math problems • Find relationships among mathematical concepts and real world professions and among math topics • Think creatively • Solve math problems
 <p>Assessment</p>	<p>The teacher will use pre-assessment, ongoing assessment (both formal and informal), and post assessment to monitor student progress. The teacher will monitor conceptual understandings, factual information, and application of skills at specific intervals throughout the unit. Observations, conversations, and the completed final products will be used to check for effort and competency. At the end of the unit there are released test items from the Virginia Standards of Learning that you could use with the students.</p>
 <p>Introduction</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. How can patterns in relationships help you solve problems? 2. How are perimeter and area related? 3. What patterns can be found between area and perimeter of rectangular shapes? 4. How can you classify geometric shapes? 5. How are faces, vertices, and edges related? 6. How are polygons related to our environment? 7. What is the relationship between construction and polygons? What is the relationship between strength and construction? 8. What is the relationship between data representation and people's perceptions? 9. How is math related to the real world?

<p>Teaching Methods</p>  <p>Learning Activities</p>  <p>Flexible Groupings</p> 	<p>What are the primary teaching methods you will employ in this unit?</p> <ul style="list-style-type: none"> • Direct Instruction • Demonstration/Modeling • Inquiry-Based Instruction • Socratic Questioning • Cooperative Learning <p>What learning activities will be used to engage students?</p> <ul style="list-style-type: none"> • Analytical Thinking Skills: Identifying characteristics, Making observations, Discriminating between same and different, Comparing and contrasting, Categorizing, Seeing relationships, Finding patterns • Critical Thinking Skills: Inductive thinking, Deductive thinking, Identifying missing information • Executive Processes: Metacognition, Generalizing, Problem Solving • Creative Thinking Skills: Listing attributes, Brainstorming <p>How will you use flexible instructional groupings to address differences in readiness, interest, and learning preference?</p> <p>This unit utilizes a variety of grouping strategies (whole class, small groups, pairs, or independent study) that can be used according to readiness level, interest, and learning preference. Pre-assessments will determine readiness and interest-level and will guide the grouping of students. Heterogeneous, whole-class grouping are used to share knowledge, build on each other's ideas, and generate conclusions. Homogenous groups can be utilized when advanced students are ready to move ahead independently and other students may need more assistance. Opportunities for scaffolding instruction are inherent throughout the lessons.</p>
<p>Products</p> 	<p>What are the major products that students will produce?</p> <ul style="list-style-type: none"> • Completed Area and Perimeter worksheet • Completed "Maximum Area" problem • Completed Geometric Solids Chart • Completed "Faces, Edges, And Vertices" worksheet • Completed Newspaper Chair • Completed Floor Plan • Completed Magazine Advertisement

 <p>Resources</p>	<p>What resources will enhance this unit?</p> <ul style="list-style-type: none"> • Architecture Picture books • graphs of student grades • graphs of favorite foods • worksheet for Sarah’s Activity graph • pictures of misleading graph • area/perimeter worksheet, • square tiles (optional) • geometric solids or paper net models (examples provided) • pictures of shapes in construction (provided) • poster board strips • fasteners • newspapers
 <p>Extensions</p>	<p>How will you extend student learning?</p> <p>There are several opportunities for extension activities outlined in the Teacher Reflections.</p>
 <p><i>Ascending Levels</i></p>	<p>Throughout the unit there are opportunities to meet individual students’ needs. Questioning, scaffolding, and grouping can be utilized to provide extra support for students. The unit also addresses the needs of advanced learners by providing them with extensions to delve deeper into the material being studied. For example, students who demonstrate a readiness for independent research may select a famous architect to research. Other extensions are outlined in the teacher reflections portion of the unit.</p>

Lesson 1: Session 1

1. Reactivate prior knowledge of area and perimeter.
2. Ask the students if the area of a rectangular shape can change while the perimeter stays the same.
3. Tell students that they are going to conduct an investigation to answer this question.
4. Distribute the worksheet to students and review the directions. Have students complete the worksheets.
5. As a class create a chart to record the results from each individual investigation on one big chart so students can visually see relationships and patterns between area and perimeter. Ask the students to observe patterns and relationships in the chart. Ask students how perimeter and area are related. Generate a new list of questions students may have after completing the investigation

Modification for Learner Need:

Students can complete the worksheets individually or in pairs depending on individual needs.

Include the length, width, perimeter, and area of the rectangles the students created on the class chart.

Observations can include: as the length increases the width decreases, as the width increases the area increases, the greatest area is when the length and width are the same. Students should also draw the conclusion that a square encloses the greatest area for a given perimeter when working with quadrilaterals. If students complete the optional extension using triangles a equilateral triangle encloses the greatest area for a given perimeter.

Possible new questions:

- a. Can the perimeter of a rectangular shape change while the area stays the same?
- b. Can the area of triangular shape change if the perimeter stays the same?
- c. If so, what type of triangle would give you the greatest area?

Optional Extension You could extend this lesson to include triangles, pentagons, hexagons, etc. Findings would include: Regular polygons will enclose the greatest area for a given perimeter and if you have two regular polygons of the same perimeter the polygon with the greater number of sides encloses the greatest area.

Lesson 1: Session 2

1. To evaluate students' understanding of the concept of "maximum area" pose the following problem to students: *Mrs. Smith is hosting her family's Thanksgiving dinner. She has decided to use square card tables to seat her family. Since she will have to purchase the tables, she wants to use as few tables as possible. Because all of the family wants to sit together, she has to place the card tables together to form rectangles. Only one person can sit on each side of a card table. She has 18 family members coming to dinner. How many tables does Mrs. Smith need to purchase?*
2. Have students complete this problem individually.
3. After all of the students have completed the problem share solutions as a group.
4. We want students to think about how the concepts of this lesson relate to real life events. Ask the students the following questions:
 - a. How can patterns in relationships help you solve problems?
 - b. In what type of situations would you apply the knowledge gained on perimeter and area?
 - c. What occupations may use knowledge of perimeter and area?
 - d. Are there any other questions you have formulated as a result of this lesson?

You may want to write the question on a sheet of paper and distribute to each student.

You may want to pass out square tiles to aid students in solving the problem.

Students should come to the conclusion that a 1×8 or 8×1 is the fewest number of tables she could use. The rectangle that would use the most tables would be a 4×5 or 5×4 .

There is an Area Assessment that uses released test items from the Virginia Standards of Learning that you could use with the students after this lesson.

Lesson 2: Session 1

1. Pass out the geometric solids to each student.
2. Instruct the students to sort the solids into groups and label each group with a sticky, the label should provide a description based on how they sorted the shapes. Have several students share how they sorted their shapes. Ask how all of the shapes in one group are related
3. Ask the students who can sort the shapes in the fewest number of groups. Give the students time to explore. Ask if anyone grouped all of the shapes together. What label did they give the shapes? What do all of the groups have in common?
4. Ask the students if anyone can sort all of the shapes into **two** groups. Give students time to explore. Ask what labels they gave each of the groups. What do all of the shapes in one group have in common? How are they different from the shapes in the other group?
5. Ask students what all of the polyhedrons have in common.
6. Tell the students to only use the shapes in the polyhedron group. Have students sort these shapes and create labels based on their attributes. Ask students to share labels and rationales for grouping shapes together. Ask the students to see if they can form two groups using these shapes. Give students time to explore. Ask students how they sorted their groups. Ask students to share what the pyramids have in common. Ask students what the prisms have in common. How are the two groups similar? How are the two groups different?

You may either use the paper nets provided or plastic models if accessible. Students should have one of each of the following: *triangular prism, rectangular prism, pentagonal prism, hexagonal prism, octagonal prism, cube, triangular pyramid, square pyramid, pentagonal pyramid, hexagonal pyramid, cone, sphere, and cylinder.*

Students should infer that all of the shapes are *solids* and can be placed into one group.

Students should separate the shapes into **polyhedrons** and **non-polyhedrons**. The **polyhedrons** include: The triangular prism, rectangular prism, pentagonal prism, hexagonal prism, octagonal prism, cube, triangular pyramid, square pyramid, pentagonal pyramid, and the hexagonal pyramid. The **non-polyhedrons** include: the cylinder, sphere, and cone. You may have to ask a variety of questions to get students to these two groupings.

Students should draw conclusions that the polyhedrons are enclosed by polygons and that they only have flat surfaces you also want to lead the students to the idea that polyhedrons have vertices, edges, and bases.

Lead the students to group the **pyramids** together and the **prisms** together.

7. Provide students with the definition of **prism**. Provide students with the definition of **pyramids**.

7. Provide students with definitions for **faces, edges, and vertices**. Tell them they will be completing a chart on the number of faces, edges, and bases each polyhedron has. Tell students to be looking for patterns and relationships among the faces, vertices, and edges. Give students time to complete their individual charts.

8. After students have finished their worksheet record answers on a big chart. Have students share how many faces, edges, and vertices they found for each polyhedron. If students disagree with each other stop and review using a model. After the chart is completed ask students if it was easy or difficult to find the vertices, edges, and bases. Ask the students if one of the 3 terms (faces, edges, or vertices) were easier to find. If so, why? Ask the students if anyone noticed a pattern to determine the number of vertices, faces, or edges.

9. If no patterns were discovered have students examine the number of faces for the prisms. Remind the students that a prism has two congruent bases and the rest of the sides are parallelograms. Show the students the triangular prism. Ask students what shape makes up the two bases. *Students should conclude triangles*. Ask the students what shape the other faces will be. *Students should conclude parallelograms*. Ask the students how many sides a triangle has. *Students should respond 3*. Ask the students if they see a relationship between the number of sides of the polygon and the number of faces. Follow the same questioning for the rectangular prism, pentagonal prism, hexagonal prism, and octagonal prism. Ask students how knowing this

Prisms have two congruent parallel faces called bases with the remaining figures being parallelograms. Pyramids have 3 or more triangle faces sharing a common vertex, the base may be any polygon.

Faces, a polygon bounding a polyhedron. **Edges**, a line segment where two faces meet. **Vertices**, a point at which edges meet

Distribute the chart and do the first example together. Give the students time to complete the chart individually. A completed chart is provided at the end of the unit.

If someone did find a pattern or relationship between the terms have them share the pattern. If necessary ask clarifying questions to guide students through identifying patterns. Steps 9-10 outline a procedure teachers could use if no patterns were found. Teachers can follow the format provided or they can use their own line of questioning to lead students to the conclusions. The conclusions that you want students to draw are highlighted in the teacher reflection side.

Lead students to the idea that you need 3 parallelograms to enclose the shape. Point out that since a triangle has 3 sides it needs one parallelogram for each side and two bases.

Students should infer that the number of faces is two more than the number of sides.

relationship can help them solve future problems. Ask if you had a 12 side prism how many faces would it have?

10. If no patterns were discovered have students examine the number of faces for the pyramids. Remind the students that a pyramid has one base and 3 or more triangular faces. Show the students the triangular pyramid. Ask students what the shape makes up the base. *Students should conclude triangle.* Ask the students what shape the other faces will be. *Students should conclude triangles.* Ask the students how many sides a triangle has. Students should respond 3. Follow the same questioning for the rectangular pyramid, pentagonal pyramid, and hexagonal pyramid.

11. Have the students look at the relationship between vertices, faces, and edges. Ask the students if they notice any patterns or relationships. Have students find the sum of the vertices and faces for the triangular prism. Ask how the sum compares to the number of edges. Ask if this formula works for the rectangular prism. Does it work for the other shapes?

Explain that this formula was developed by a famous mathematician named Leonhard Euler (pronounced 'Oiler').

12. Ask the students how this number relationship could help them solve future problems. Ask the students how many faces, vertices and edges an octagonal pyramid would have.

Lead students to the idea that you need 3 triangles to enclose the shape. Point out that since a triangle has 3 sides it needs one triangle for each side and one triangle base.

Students should infer that the number of faces is one more than the number of sides of the base.

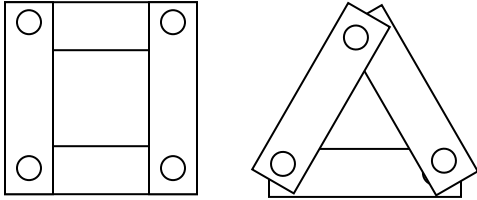
Students should notice that the number of edges is two less than the sum of vertices and faces.

You want students to realize that knowledge of these patterns will help them find the number of edges, vertices, and faces for any polygon without the tedious job of counting them.

There is a Geometric Solid Assessment that uses released test items from the Virginia Standards of Learning that you could use with the students after this lesson.

Lesson Sequence	Teacher Reflections
<p><i>Lesson 3: Session 1</i></p> <ol style="list-style-type: none"> 1. As a class brainstorm a list of polygons and characteristics of the polygons that students know. 2. Ask students where in our environment they see polygons. Ask students why polygons are so prevalent in the world around us. 3. Tell the students that we will be investigating the use of polygons in construction. Pose the question, “What is the strongest polygon?” Record the students’ responses on a chart. Explain that they will be exploring this question today. 4. Distribute one piece of paper and masking tape to each student. Instruct them to make the strongest structure using only the paper and tape. Explain that we will test the strength by stacking books on the structure after the allotted time period is finished. Give the students time to complete their structures. 5. As a class test the strength of each structure by stacking books on top of it until it collapses. Have a class discussion on what characteristics made particular structures stronger. 6. Pass out the pictures of buildings and bridges to the students. Have the students record polygons they see used in the construction of the structures. Explain that the shapes of buildings and other structures are not random. Tell them Engineers and architects go to great measures to ensure both that the structures serve a function and are stable. Two of the most common polygons seen in construction are the triangle and rectangle. Ask students which one they think provides the most stability. 	<p>You may need to review what a polygon is prior to the beginning of the lesson.</p> <p>You may want to go on a scavenger hunt around the building looking for polygons.</p> <p>You can record student responses on chart paper. If students make column structures you can explain that they are not polygons but you could research the use of columns, arches, and domes in construction as an extension.</p> <p>Some pictures are provided. You may also want to search using www.google.com, looking for “images only” and put the photographs into a Powerpoint presentation to be viewed on the classroom’s television through a technology interface connection.</p>

7. Pass out the inch card board strips and fasteners to students. Instruct them to make a square out of 4 of the strips and a triangle out of the remaining 3.



8. Allow a few minutes for the students to “play” with the shapes. Then ask the students, “What shape is more stable?”

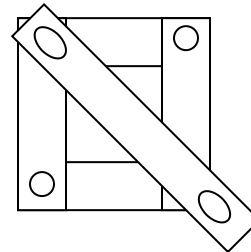
9. Explain that rectangles are common in construction because they are 90° they fit perfectly together. For example, windows fit into walls, doors into frames, and one wing of a building against another wing. Rectangles are also selected because of aesthetics rather than their inherent strength. Whereas a triangle is one of the single most important shapes in engineering because of its stability and strength. The sides of a triangle work together to keep it stable when pressure is placed on it.

10. Pose the question, “How can we make the square stronger?”

The strips should have a hole at each end for the fasteners. The strips should be five and a half inches long and one inch wide. The holes should be a half inch from the ends. Each student should have 7 strips.

The students should come to the conclusion that the triangle is more stable. Unlike the rectangle the triangle doesn't lose its form under pressure whereas the square is flexible and unsupported. The square can be distorted but a triangle cannot be deformed.

Record the students' responses. Students should come to the conclusion that you can add a single support beam between the two diagonal corners to greatly strengthen the rectangle. Distribute the 10 inch paper strip and have students fasten it from one diagonal corner to another. Show examples of how this technique was used in the building pictures students already viewed.



Lesson Sequence	Teacher Reflections
<p>Lesson 3: Session 2</p> <ol style="list-style-type: none">1. Today students are going to apply the previous learning experience to create a chair out of newspaper that could hold the weight of a person.2. Distribute the newspapers and tape to students. In pairs have students work together to design a newspaper chair.3. When all students have completed their chairs you can test to see if they can hold the weight of students or stack books on the chairs.4. Debriefing. Reconvene students to engage them in a discussion on how the use of geometry is prevalent in construction and to reflect on how this affects them individually. Ask the students what practitioners in this discipline think about. Remind the students that engineers and architects select shapes that serve a specific purpose. The purpose could be to add beauty to a building or provide strength and stability.5. Explain to the class that they will be using their mathematical knowledge to think like an Architect and design a new house.	<p>The idea for this activity came from Zoom. Here is a link that shows a video of the Zoom cast constructing a newspaper chair. It may be helpful to view before you have your students complete the activity.</p> <p>http://www.teachersdomain.org/6-8/sci/phys/mfw/znewschair/</p> <p>You want students to leave knowing that engineers and architects select shapes for a specific reason. You also want students to think about the field of engineering affects them personally.</p> <p><i>There is a Polygon Assessment that uses released test items from the Virginia Standards of Learning that you could use with the students after this lesson.</i></p>

Lesson Sequence

Teacher Reflections

Lesson 3: Session 3

1. Tell the students that we will now brainstorm real world jobs that use the previous math skills we have studied.
2. Ask students what careers they think would use geometry and measurement skills to complete their jobs.
3. Have students brainstorm a list of jobs that use geometry and measurement. Record the students' responses on chart paper.
4. Tell students that we are going to learn about an architect's job and how they use geometry and measurement to complete their jobs. Explain that after we research architects we will complete a project where we will Think like an Architect.
5. Read several picture books to students. There are titles listed in the teacher reflection side or you could select your own books. After you read each ask students, "What does an Architect do?" Record the students' responses on chart paper. Follow up with the following questions:
 - What does design mean?
 - Is an architect's job over after they design the building? If not, what else do they do?
 - What does an architect have to consider when designing a building

On the Job With an Architect: Builder of the World by [Jake Miller](#), [Susan Gal](#)
The Art of Construction: Projects and Principles for Beginning Engineers and Architects by [Mario Salvadori](#), [Saralinda Hooker](#), [Christopher Ragus](#) "
Why Buildings Stand Up: The Strength of Architecture by [Mario Salvadori](#)
The Great Bridge-Building Contest by [Bo Zaunders](#), [Roxie Munro](#)
The Man Who Made Parks : The Story of Parkbuilder Frederick Law Olmsted by [Frieda Wishinsky](#), [Song Nan Zhang](#)
The Architecture of Frank Lloyd Wright: Understanding Concepts of Parallel And Perpendicular by [Janey Levy](#)
What Does a Construction Worker Do? (What Does a Community Helper Doby [P. M. Boekhoff](#)

We want students to come to the conclusion that architects design buildings. We want students to realize that after architects draw plans he/she supervise the constructions. Lastly, we want students to understand that architects think about many things when designing a building which include: purpose of the building, safety of the building, and aesthetics of the building are a few of the things architects think about when designing.

Students should consider the purpose of each building. An office would need a lot of small rooms for offices, whereas, a school need medium sized classrooms. The function of the building plays an important role in the design.

Optional Extension: As a class or individual students who demonstrate a readiness for independent research may select a famous architect to research. Several famous architects are Frank Lloyd Wright, Maya Lin, and I.M. Pei.

Lesson Sequence	Teacher Reflections
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Lesson 3: Session 4

1. Explain to the students that they have been hired as architects to design a house for a specific client.
2. Remind students that architects need to think about the needs of the people for whom they are designing the house.
3. Explain to students that they will select a client from the examples provide as well as a location to build the house. Students will need to make sure the house they design matches the client's needs. They will also need to make sure that the location and house work well together. Lastly, they will also need to decide what the house will look like.
4. Show students the PowerPoint slide show of example floor plans and elevations. Point out the symbols used in the floor plans.
5. After students have selected their client and location they will begin to create a floor plan.
7. Tell the students to start the floor plan by drawing the outside shape of the house. Then divide the shape into interior spaces.
8. Students should draw a sketch on scratch paper to decide where they want their rooms and how they will connect. They should label their rooms and include the room dimensions. Then students should draw a final version on graph paper. Use a pencil and draw lightly so you can make changes. The following should be included in the floor plan:
 - Labeled rooms & room dimensions with correct units of measurement
 - Windows, doors, and stairways
 - Architectural symbols

Three websites are listed to provide students with examples of floor plans and elevations. It may be helpful to allows students time to browse the website or view them as a class prior to drawing their floor plans. The following website shows good examples of floor plans and elevations. <http://www.collectivedesigns.com/> This website has many different types of plans that make architecture so unique. View such styles as contemporary, European, ranch, Victorian, and even log homes. <http://www.architecturaldesigns.com/index.asp?src=www.house-floor-plans.com&srcID=BV&sok=Y> The following is a website that illustrates what is usually included with a floor plan. http://houseplans.com/whats_included.asp

A list of common architectural symbols is provided. You may want to make an overhead to share with the students. You could add more symbols to the overhead using student suggestions.

You can draw a floor plan by subtraction or addition. In the addition method you draw the core room and then add more rooms to it. The subtraction method starts with the outside shape of the house which is then divided into interior spaces. You could have students use either method.

Using the example floor plan it may be helpful to measure out the room dimensions so students can visually see how big a 15 x 12 room actually is.

9. After students have completed the floor plan they must compute the square area for each room. Choose one room to illustrate the process to the students.

Explain that window and door areas are subtracted from total area when figuring square footage for walls. Tell students that windows will be a standard size of 4 ft x 4 ft and doors will be a standard size of 6 ft x 3 ft. Standard wall height will be 8 ft.

10. Have students calculate costs of carpet/tile and wall paper/paint for all of the rooms on the floor plan. Students should record cost on the budget sheet.

11. Allow students time to complete their budget sheet. After students have completed their budget sheet have students reflect in their journals the math skills they utilized while completing this project.

12. Reconvene students to engage them in a discussion on how the use of geometry is prevalent in building and to reflect on how this affects them individually. Ask the students what architects think about when designing a floor plan. Ask the student to what degree is this familiar, surprising, and/or intriguing to them. Ask the students, “What is the wisdom this discipline has contributed to the world and how it has affected them?” You may continue the discussion by using the following focusing questions:

- a. To what degree can I see myself contributing to the wisdom this discipline has contributed to the world?

Modification for Learner Need: This portion of the lesson could be given only to students who demonstrate an advanced understanding of area. A calculator may be provided to assist with calculating the costs. You may also choose not to have students calculate the wall sq. ft. unless students demonstrate a readiness for this task.

The example provided uses the kitchen. Since the kitchen is 12 ft. x 7 ft. the total sq. ft. for tile is 84 sq. ft. When computing the wall sq. ft. the first wall was 12 ft. x 8 ft. (the standard ceiling height) minus the 16 sq. ft. for the window. The second wall was 7 ft. x 8 ft. – 18 sq. ft for the door. The third wall was 12 ft. x 8 ft. – 18 sq. ft for the door. The fourth wall was 7 ft. x 8 ft. – 18 sq. ft for the door. The total wall sq. ft. is 234 sq. ft. You will need to show students each step of this process.

A rubric has been included for the students’ evaluation. Teacher should review it with students prior to the completion of their magazine ad. Teacher may also create their own rubric to use as an evaluation.

Optional Extensions: Prior to beginning this lesson you could invite a guest architect speaker to share the designing process with students.

- b. How do people in this discipline think and work?
- c. In what ways do those processes seem familiar, surprising, and/or intriguing to me?
- d. What did I learn?
- e. Did I like being involved with this work?
- f. What was easy for me? What were my strengths? What was difficult for me?
- g. What tools does an architect use in his or her work?
- h. What personality traits support productivity in this field?

These questions could also be incorporated into a journal throughout the lesson for students to reflect upon.

Architectural Symbols

Bathroom



Bushes



Door



Stairs



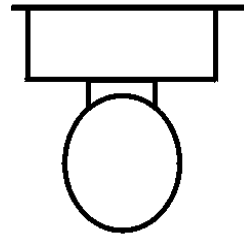
Closet



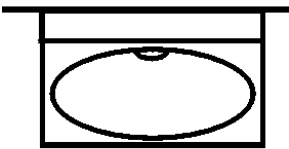
Windows



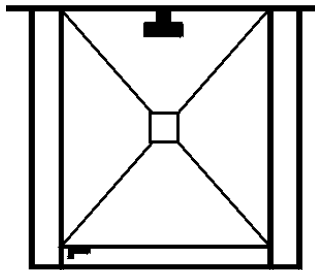
Toilet



Sink



Bed



Site Locations

<p style="text-align: center;">Mountainside</p> <ul style="list-style-type: none">• Offer dramatic views• Building needs to withstand snowy, cold weather• This mountain is popular with skiers, hikers, and bikers so they have a lot of visitors	<p style="text-align: center;">Desert</p> <ul style="list-style-type: none">• Deserts offer dramatic views of the sky and beautiful sunsets• Building must be able to withstand temperatures that are hot during the day and cold at night
<p style="text-align: center;">Forest</p> <ul style="list-style-type: none">• Great place to view wildlife and the changing seasons• This site is bordered by areas of conserved land on two sides so there will always be trees	<p style="text-align: center;">Rural Hilltop</p> <ul style="list-style-type: none">• Afford excellent views of the countryside• Building must be able to withstand windy conditions• The closest neighbors are a few miles away
<p style="text-align: center;">Waterfront</p> <ul style="list-style-type: none">• Excellent views of the ocean• This site shares its beach with neighbors and has many neighbors close by	<p style="text-align: center;">Urban</p> <ul style="list-style-type: none">• Close to cultural and civic attractions• With neighbors on both sides there is little privacy

Client Information

<p>Name: Sally Smith Needs: A large formal entertaining space and a master bedroom retreat. Description of Client: Sally is a high powered advertiser who often entertains business partners and clients. In her spare time she enjoys cooking and relaxing outdoors with a good book.</p>	<p>Name: Joan White Needs: Library and a home office Description of Client: Joan is an author who writes from her house. Her personal library includes hundreds of books. She often gains inspiration from nature and gardening.</p>
<p>Name: Alex Jones Needs: Formal Dining Room, place to retreat Description of Client: Alex is a television executive who spends a lot of time hosting business dinner. However, when he is not entertaining he loves to read and watch movies to escape from his hectic life.</p>	<p>Name: Tony Davis Needs: Workshop/Studio, place to display sculptures. Description of Client: Tony is a sculptor. When he isn't sculpting he has many of his friends visit. So, he needs a place for guests to stay. He enjoys the hustle and bustle of city life.</p>
<p>Name: Jessie Lambert Needs: Workout room, Hot tub, informal kitchen Description of Client: Jessie is a professional soccer player. She loves to exercise and relax her muscles in a hot tub. She is usually on the go so she doesn't cook too often.</p>	<p>Name: Frank Vana Needs: Computer room, band practice space, efficient kitchen Description of Client: Frank is a video game programmer. He hates, cooking, cleaning, and yardwork. When he is not working he plays the guitar in a band and needs a space to practice.</p>
<p>Name: Howard Jenkins Needs: Computer Office, Lots of windows, garden, space to retreat Description of Client: Howard is a nature photographer so he needs a digital studio. His other passions including bird watching and reading.</p>	

Lesson Sequence	Teacher Reflections
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Lesson 4: Session 1

1. Reactivate prior knowledge of graphs
2. Brainstorm a list of ways graphs are used and individuals who may use graphs. Ask the students, “What kinds of questions can generate data?”
3. Ask students if they think studying for a test affects their grade. Show students one of the graphs of student grades and how they performed on tests. Have students analyze the graph and draw conclusions. Ask students if this graph changes their opinions on studying. Show students the second graph. Have students analyze the graph and draw conclusions.
4. On the board have students orally communicate the data from the first graph and the second graph as you write the numbers on the board. Ask students how the graphs are related and discuss what they notice.
5. Conduct a think-pair-share with the questions below:
 - a. Why do the graphs look different if they both have the same data?
 - b. Which graph may a teacher use and why?
 - c. Which graph may students use and why?
 - d. How can the way data is represented influence decisions or an individual’s conclusions?
6. Tell the students that a survey has been taken to determine people's favorite food, choosing between pizza, hotdogs, spaghetti, and hamburgers. Show the results of the first graph and ask student which food was the favorite. Show the results using the second graph and ask students which food was the favorite.
7. Conduct a think pair share with the questions below:

Select the graph that would challenge their beliefs. For example, if they think studying helps grades show them the graph that doesn’t show a significant difference in studying and not studying. Or, if they think studying doesn’t help grades show them the graph that shows a significant difference in studying and not studying.

You want students to conclude that the data is the same for both graphs, although both graphs look very different.

Teachers can ask students additional questions. The questions provided only serve as guidance. We want students to come to the conclusion that graphs influence decisions people make and the same graph can be represented very differently according to the purpose you want it to serve.

It doesn’t matter which graph you show first. The purpose is for the students to visually see that although the graphs look very different they both have the same data.

The goal of this discussion should be for students to come to the conclusion that graphs can serve different purposes and are often used to persuade peoples’ decisions.

- a. Which graph do you think is better? More fair? Why?
- b. Why would someone use the second graph?
- c. Why would someone use the first Graph?

Lesson Sequence	Teacher Reflections
<p>Lesson 4:Session 2</p> <ol style="list-style-type: none">1. Review how students learned that you can represent data in various ways to persuade people. Ask students how data representation and persuasion are related2. Explain to the students that they will be working on a problem that involves graphs and persuasion. Share the following scenario with your students: Sarah and her parents are discussing how she spends her weekend. Her parents feel she is spending too much time watching television on the weekends. However, Sarah says she’s not spending much more time watching television than she is doing chores, homework or having free time.3. Distribute the two worksheets and instruct the students to make two separate graphs according to the directions on the worksheets.4. Divide the class into two groups. One group will argue that Sarah doesn’t spend too much time watching television and one group will argue that Sarah spends too much time watching television. Have them select a graph that would make their argument more persuasive Graph 1 or Graph 2) and explain why they selected they graph they did.5. Using think-pair share ask the students the following questions:<ol style="list-style-type: none">a. How can the data representation influence decisions and conclusions?b. How can the results of a statistical investigation be used to support an argument?c. How does the analysis and interpretation of data depend on its display?	<p>You may want to show the two graphs of student grades as well as the two graphs of favorite foods to serve as a visual reminder.</p> <p>The worksheets can be completed individually, as a whole class, or in pairs. Select whichever method you think will best serve your students.</p> <p>Two completed graphs of Sarah’s activities have been provided. You may want to review them on the overhead and discuss each one before you divide the students into two groups. You want students to notice that one graph shows a significant difference in watching television and completing other activities while the other graph doesn’t show a significant difference between the activities.</p> <p>Optional Extension. You may want students to write a persuasive paragraph from either Sarah or her parents to support either argument.</p> <p>Some other ways people alter graphs to persuade others include: size, titles, and graphics. You may want to find other examples of misleading graphs to share with students using www.google.com, looking for “images” only</p> <p>Optional Extension. Have students look through magazines to find examples of misleading graphs in advertisements.</p>

6. Post both bar graphs on the board. Discuss how the graphs are similar and different Share the two pictures of other ways people distort graphs to persuade.

There is a Statistic & Data Analysis Assessment that uses released test items from the Virginia Standards of Learning that you could use with the students after this lesson.

Lesson 4: Session 3

1. Tell the students that we will now brainstorm real world jobs that use statistics and data analysis.
 2. Ask students what careers they think would use statistics and data analysis to complete their jobs.
 3. Have students brainstorm a list of jobs that use statistics and data analysis. Record the students' responses on chart paper.
 4. Tell students that we are going to learn about a marketer's job and how they use statistics and data analysis to complete their jobs. Explain that after we research marketers we will complete a project where we will Think Like a Marketer.
 5. Research what a marketer or advertiser does. You could use the internet or picture books to find information. "What does an Marketer
6. Explain to students that a magazine advertisement is similar to a persuasive paragraph. It begins with a promise and then uses visual images, techniques, and persuasive words to support it. Visual imagery is the use of people, settings or situations that appeal to consumers. Often the image has little to do with the product. For example, an ad set on a gorgeous beach has no connection to an air freshener or toothpaste, yet disconnected images are often used because they evoke positive feelings. The technique is a method ads use to persuade consumers to buy a product. do?" Record the students' responses on chart paper.
- Most techniques appeal to our need of belonging. A list of common techniques will be discussed later in the lesson. Persuasive words are used to affect your emotions positively or negatively.

Optional Extension: You could invite a marketer or advertiser in as a guest speaker.

occupation, income, lifestyle, interests, etc.

According to a university study, the 12 most persuasive words in the English language are: guarantee, save, money, love, safety, new, proven, easy, health, results, you and discovery. Asks students what other persuasive words they see in magazine ads.

7. The promise of an advertisement is what is suggested that the product will do for the consumer. For example, suppose a shampoo ad shows a lovely woman with shiny thick hair. Her bathroom is spotless. The slogan for the shampoo is “Silky shampoo has made my life better. The ad promises that your hair will be silky, thick, and shiny, your bathroom will be immaculate and your life will be made easier if you purchase Silky shampoo. Share several magazine ads with students and have them verbalize the promise of the ad.

8. Explain to the class that advertisers use techniques to persuade consumers to buy their products. Share the list of Common Advertisement strategies with the students and review each strategy.

9. Distribute magazines to the students as well as the Identifying Common Advertising Strategies Worksheet. Tell the students to look through the magazine in search of advertisements that use the strategies discuss. Students are to complete the worksheet.

10. After students have completed their worksheet reconvene the class. Have students share ads they found as well as the advertising strategies used.

11. Tell students that companies target specific audiences for their advertisements. The target audience is the group or type of people that advertisers want to attract. Groups can be defined by age, gender, ethnic group,

Optional Extension: You could record television commercials and have students use the same worksheet to identify the advertising strategies used. Students could create a commercial as a final product.

12. Show students several different magazines (Family Circle, Teen People, Sports Illustrated, Parenting, etc.). Ask students what kinds of products are advertised in these magazines? In what ways do the advertisers appeal to these different audiences?

11. Select several ads from various magazines and have the students figure out who the target audience is by using the identifying a Target Audience Worksheet.

12. Explain to the class that they will work with a partner to develop a product and create an advertisement to sell their product. You may select one of the following items to design an advertising campaign for: a car, toy, candy bar, or shoe. Your purpose is to select one of these products and make it appealing.

13. Students must make sure that their ad contains the following elements:

- a promise
- a target audience
- 3 advertising strategies (one strategy must be a graph) that support the promise.

A rubric has been included for the students' evaluation. Teachers should review it with students prior to the completion of their magazine ad. Teacher may also create their own rubric to use as an evaluation.

You may have to discuss unbiased and misleading graphs more with students. Tell students if they were selling a candy bar the graph should display the data in an unbiased representation. Ask what this graph would look like.. How would you display the information to help support your argument that this candy bar is better than all of the rest?

Lesson 5: Session 1

1. Debriefing. Reconvene students and lead a discussion on what they have learned from the unit.
2. You could use some of the following questions to facilitate the discussion:
 - How can I use the ideas and skills learned in this unit?
 - What are the key concepts and principles I have learned throughout this unit?
 - How do I use the ideas and skills I have learned to solve problems?
 - What connections do I see between what I have learned and my own life?

You want to highlight the relationships students discovered among the math concepts as well as how math relates to real world careers.

Optional Extension: Students who show an interest or readiness could complete an independent research on another real world profession that uses math. The following is a website that lists some unusual jobs that use math skills.

http://www.thefutureschannel.com/real_world_professionals.html

Common Advertising Strategies

1. Ideal Kids

The kids in commercials are often a little older and a little more perfect than the target audience of the ad. They are, in other words, role models for what the advertiser wants children in the target audience to think they want to be like. A commercial that is targeting eight year-olds, for instance, will show 11 or 12 year-old models playing with an eight year old's toy.

2. Heart Strings

Commercials often create an emotional ambience that draws you into the advertisement and makes you feel good. The McDonald's commercials featuring father and daughter eating out together, or the AT&T Reach Out and Touch Someone ads are good examples. We are more attracted by products that make us feel good.

3. Amazing Toys

Many toy commercials show their toys in life-like fashion, doing incredible things. Airplanes do loop-the-loops and cars do wheelies, dolls cry and spring-loaded missiles hit gorillas dead in the chest. This would be fine if the toys really did these things.

4. Life-like Settings

Barbie struts her stuff on the beach with waves crashing in the background, space aliens fly through dark outer space and all-terrain vehicles leap over rivers and trenches. The rocks, dirt, sand and water don't come with the toys, however.

5. Sounds Good

Music and other sound effects add to the excitement of commercials. Sound can make toys seem more life-like or less life-like, as in a music video. Either way, they help set the mood advertisers want.

6. Cute Celebrities

Teenage Mutant Ninja Turtles sell pizza. Spuds McKenzie sells beer. "Joe Cool" camel sells cigarettes. All of these are ways of helping children identify with products either now or for the future.

7. Family Fun.

"This is something the whole family can do together!" or "This is something Mom will be glad to buy for you." Many commercials show parents enjoying their children's fun as if the toy will bring more family togetherness.

8. Excessive Excitement!

Watch the expressions on children's faces. Never a dull moment, never boring. "This toy is the most fun since fried bananas!" they seem to say. How can your child help thinking the toy's great?

9. Star Power.

Sports heroes, movie stars, and teenage heart throbs tell our children what to eat and what to wear. Children listen, not realizing that the star is paid handsomely for the endorsement.

10. Bandwagon.

The advertiser wants you to think that everyone's doing it and you need to join.

11. Put downs.

The advertiser puts down the competition to make its own product look better.

12. Facts and Figures (Statistics)

The advertiser uses facts and figures (statistics) to make the product seem more trustworthy or better. This includes using graphs and percents.

Common Advertising Strategies

Directions: Select four magazine advertisements. Briefly describe the ad in the *Magazine Ad* column. Place a check in the box for each advertising strategy used in the ad.

Magazine Ad	Ideal Kids	Heart Strings	Amazing Toys	Life-Like Settings	Sounds Good	Cute Celebrities	Family Fun	Excessive Excitement	Star Power	Bandwagon	Put Downs	Facts and Figures

Planning Guide

Describe your product.

What is the promise?

Who is the target audience?

What advertising strategies will you use in your advertisement.

Identifying a Target Audience

Directions: Study the available advertisements and fill in the following information for each advertisement.

Advertisement 1:

Brand Name

Slogans or Words

Pictures: Describe the image on the advertisement.

Who is the target audience and how do you know this?

Advertisement 2:

Brand Name

Slogans or Words

Pictures: Describe the image on the advertisement.

Who is the target audience and how do you know this?

Identifying a Target Audience

Directions: Study the available advertisements and fill in the following information for each advertisement.

Advertisement 3:

Brand Name

Slogans or Words

Pictures: Describe the image on the advertisement.

Who is the target audience and how do you know this?

Advertisement 4:

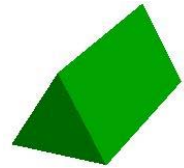
Brand Name

Slogans or Words

Pictures: Describe the image on the advertisement.

Who is the target audience and how do you know this?

Name _____



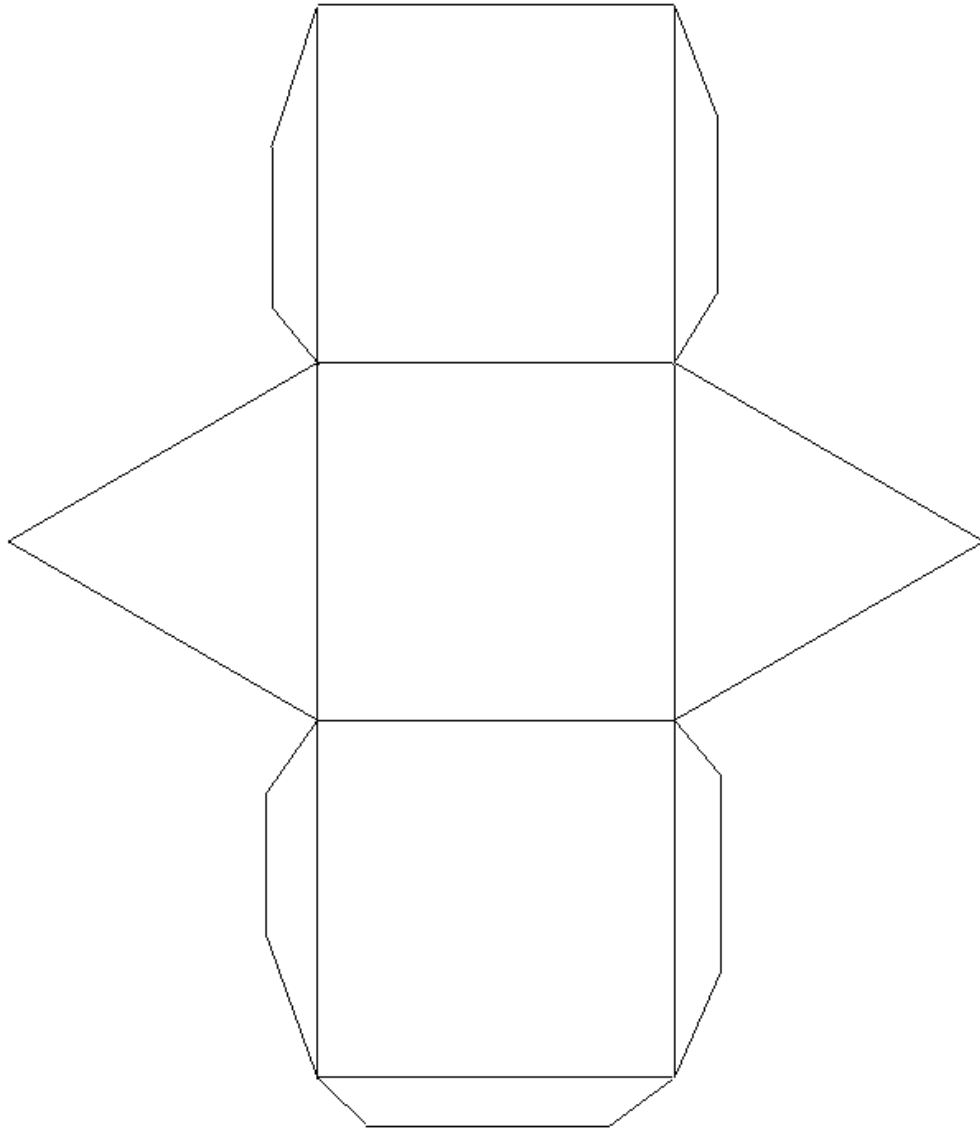
Directions: Using your geometric solids count the number of faces, vertices, and edges for each shape listed below. Record the number counted on the chart. After you have completed the chart answer the question below.

<i>Geometric Solid</i>	<i>Faces</i>	<i>Vertices</i>	<i>Edges</i>
Triangular Prism			
Rectangular Prism			
Pentagonal Prism			
Hexagonal Prism			
Octagonal Prism			
Triangular Pyramid			
Square Pyramid			
Pentagonal Pyramid			
Hexagonal Pyramid			
Cone			
Sphere			
Cylinder			

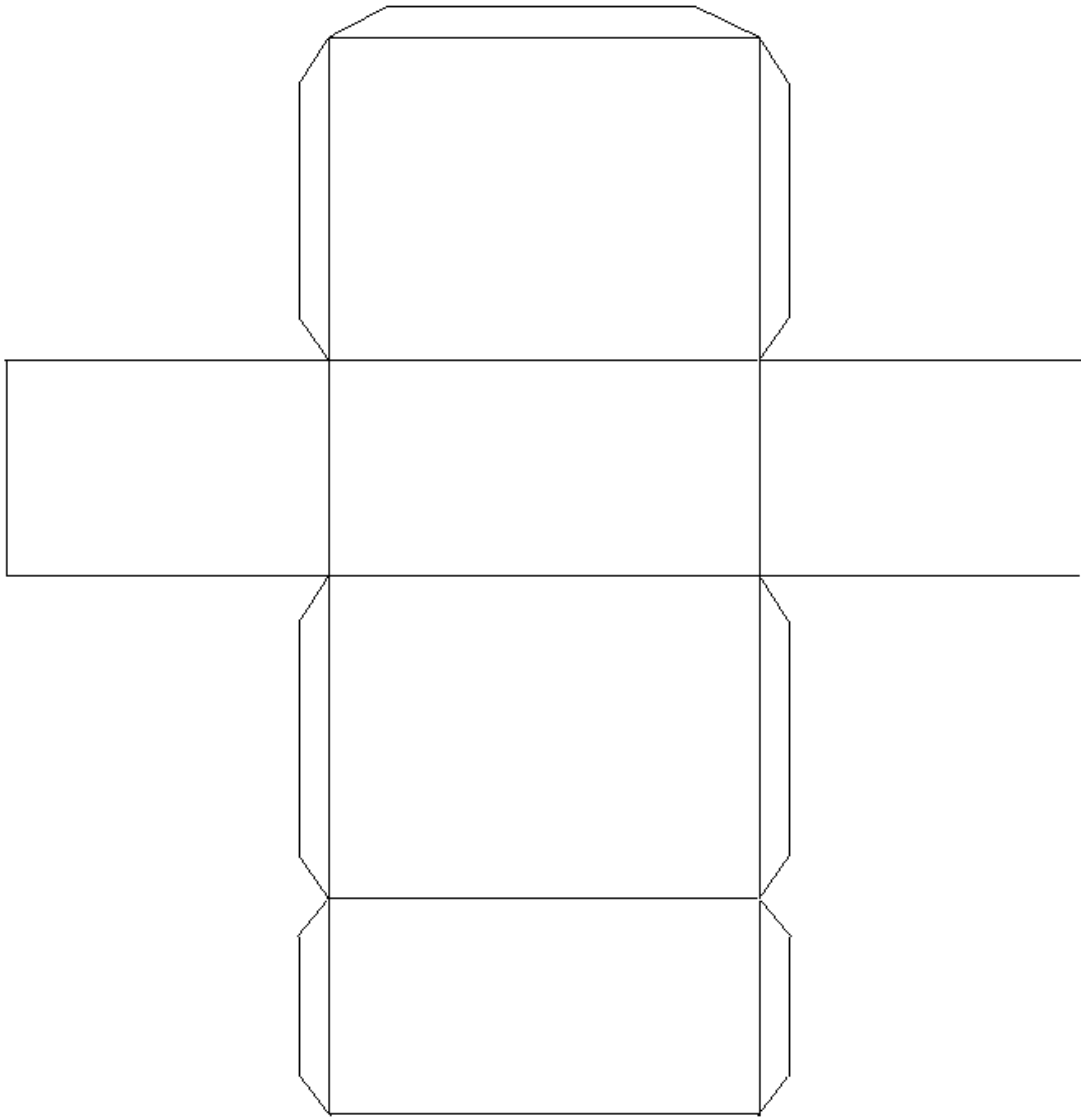
1. Can you find any patterns or relationships between faces, vertices, and edges on the chart?

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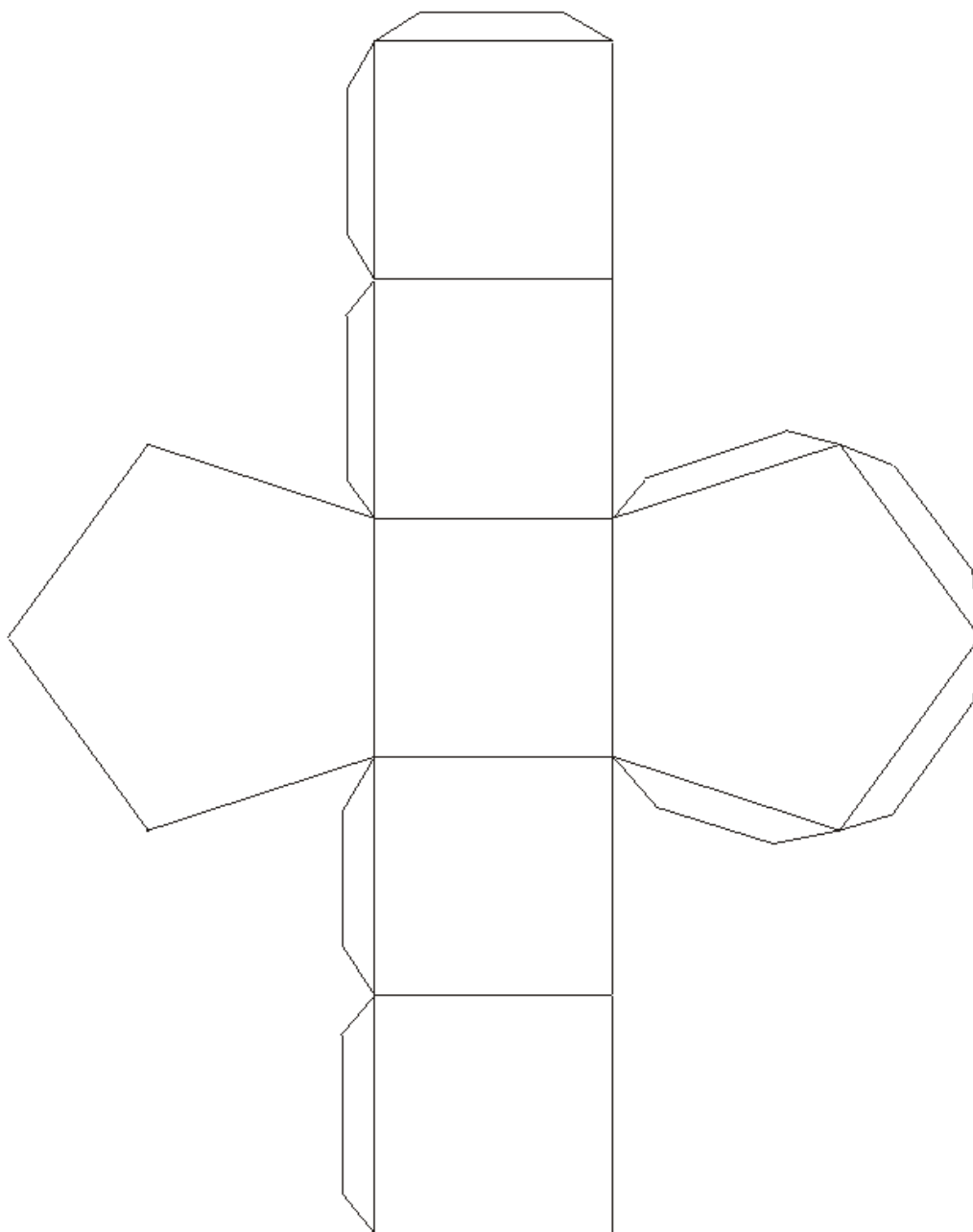
Triangular prism



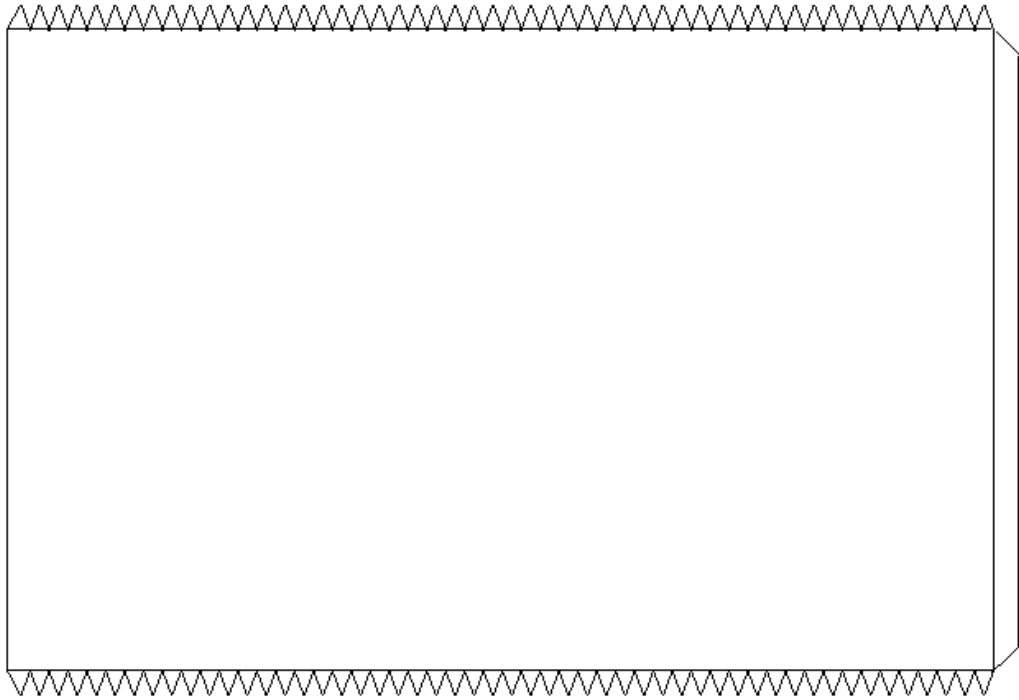
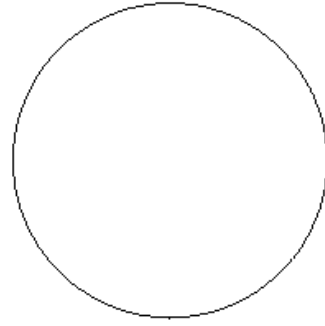
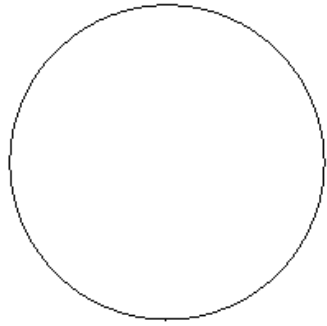
Rectangular Prism

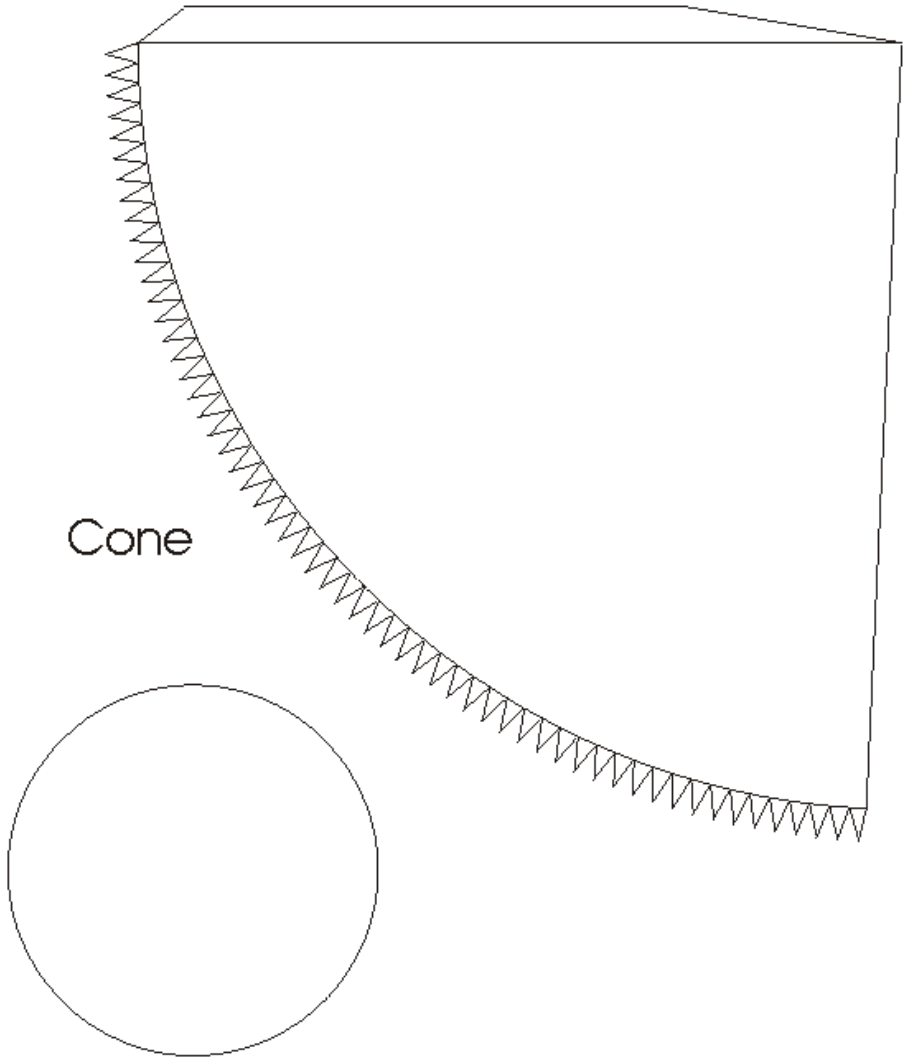


Pentagonal Prism



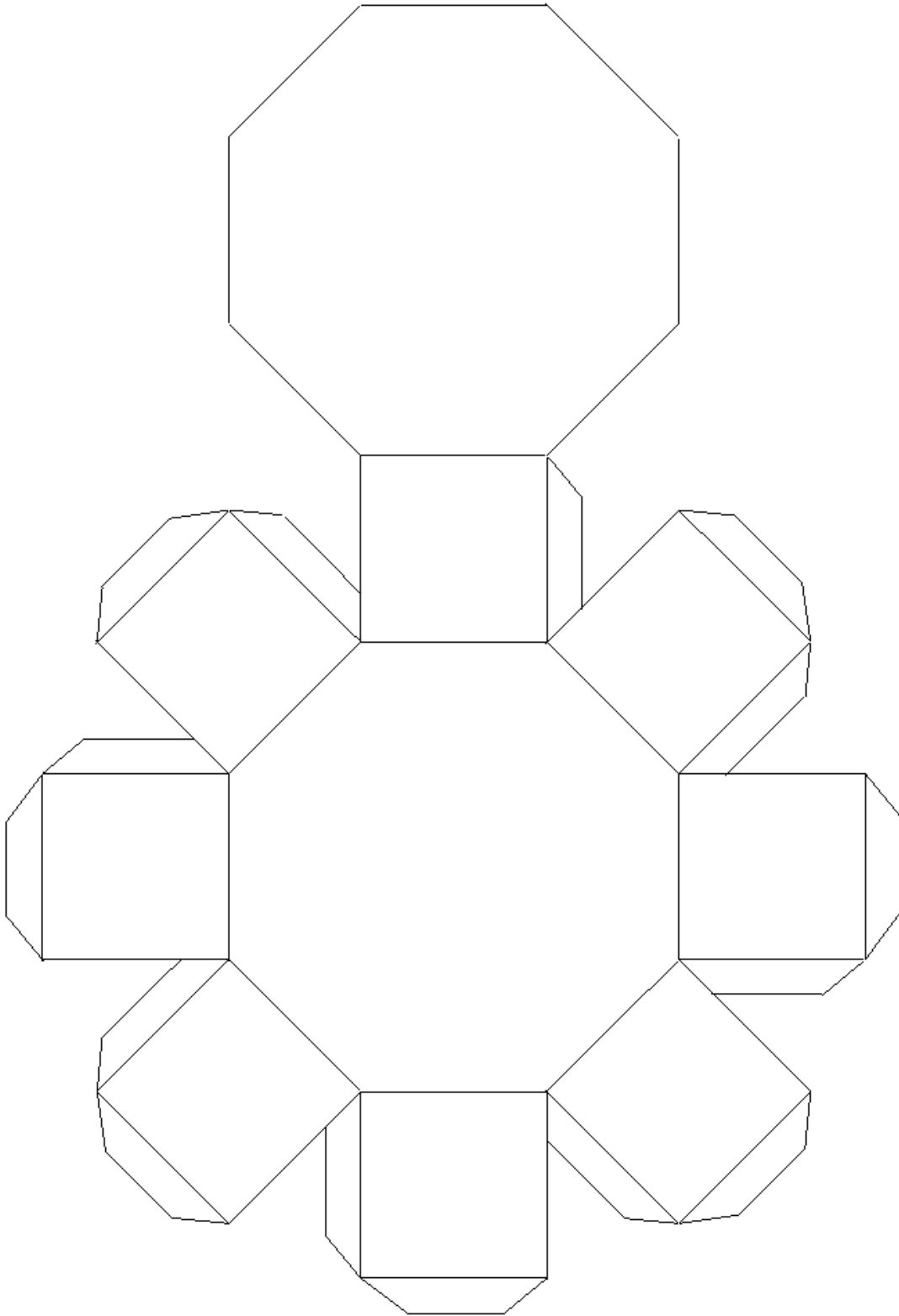
Cylinder





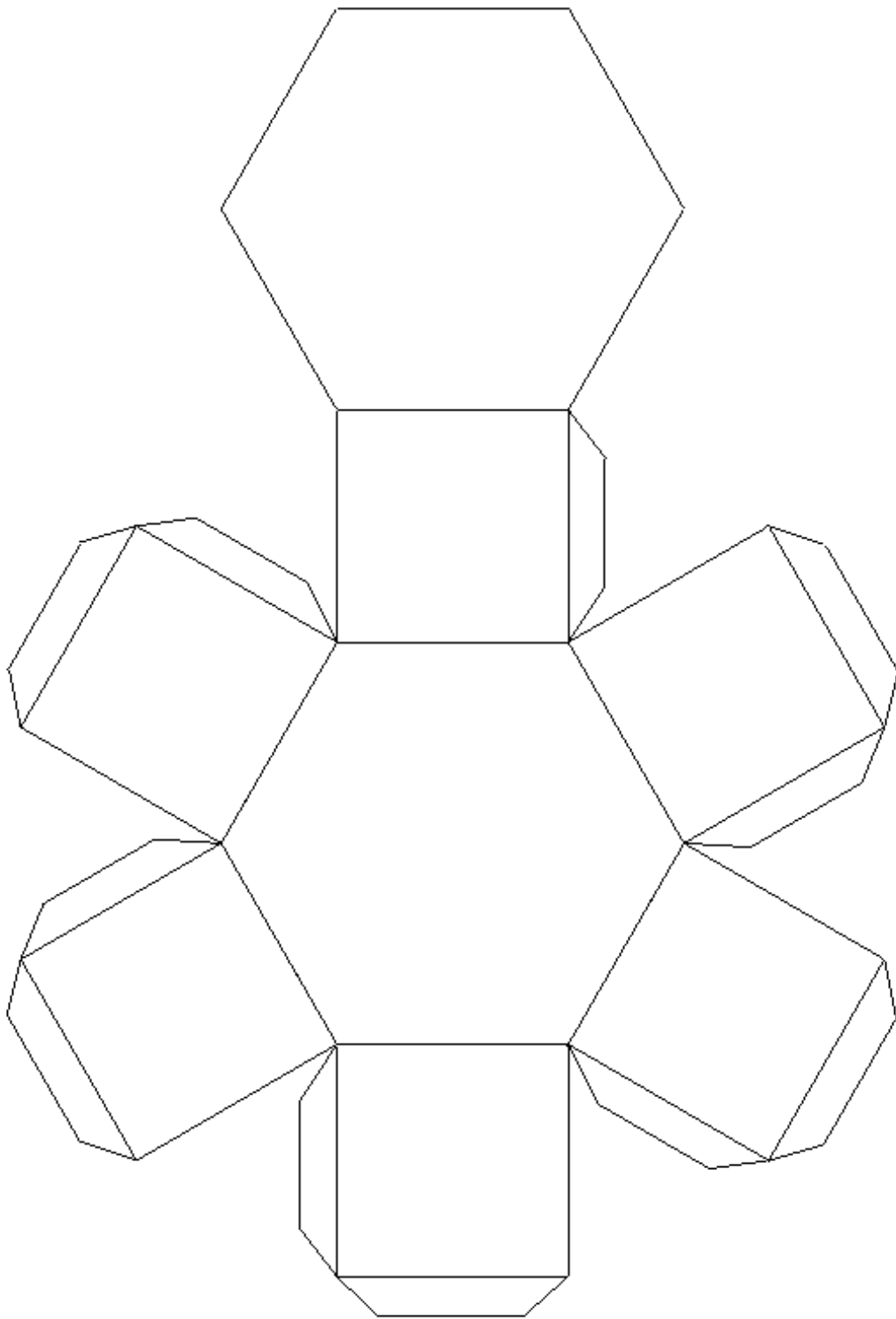
Cone

—
Octagonal Prism



-

Hexagonal Prism



-



Does Sarah Spend Too Much Time Watching Television?

Directions: On a separate sheet of graph paper, draw and label the horizontal and vertical axes of the following two graphs.

Graph 1:

Vertical Axis (Hours) 3, 4, 5, 6, 7, 8, 9, 10

Horizontal Axis (Activity) Free time, Chores, Television, Homework

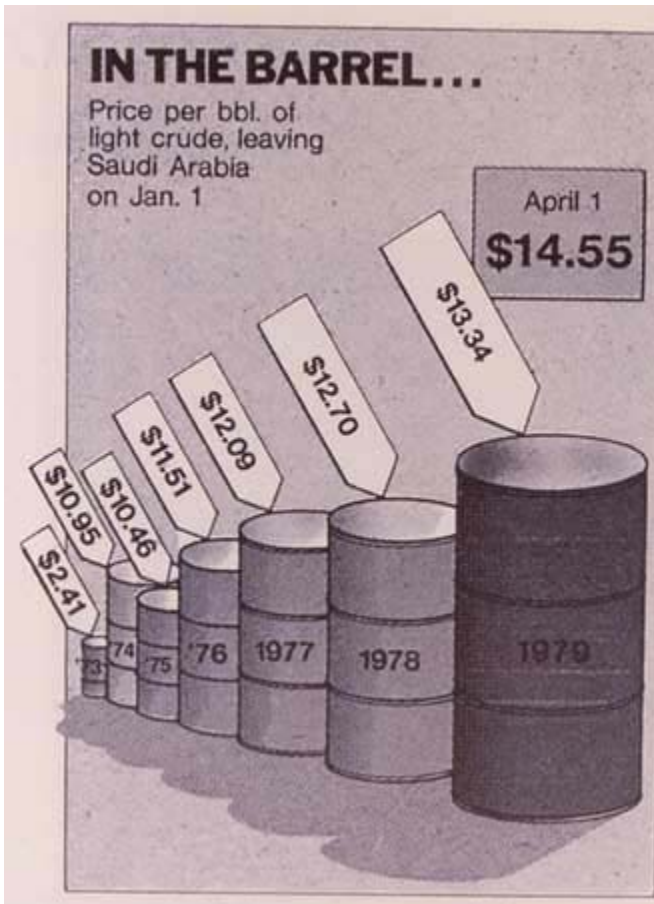
Graph 2:

Vertical Axis (Hours) 0, 10, 20, 30, 40, 50, 60

Horizontal Axis (Activity) Free time, Chores, Television, Homework

How Sarah Spends her Free Time Activity Hours per Weekend

Free Time	Chores	Television	Homework
5	7	10	4



How does the image of a three dimensional barrel overstate the rise in oil prices?

Magazine Advertisement Evaluation

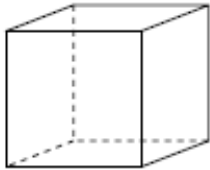
	Novice (5 points)	Apprentice (10 points)	Practitioner (15 points)	Expert (20 points)
Demonstrates understanding of Promise	There is no clear promise in the ad.	A clear promise is attempted which is supported by one of the following visual images, advertising strategies, and persuasive words.	A clear promise is made which is supported by two of the following: visual images advertising strategies, and persuasive words.	A clear promise is made which is supported by visual images, advertising strategies, and persuasive words.
Demonstrates understanding of Audience	Visual elements (picture, color, and font) mismatched with each other and targeted audience.	Visual elements (picture, color, and font) show limited connectivity with each other and targeted audience.	Visual elements (picture, color, and font) show either connectivity with each other OR targeted audience.	Visual elements (picture, color, and font) show strong connectivity with BOTH each other AND targeted audience
Demonstrates understanding of Advertising Strategies	No clearly demonstrated use of any type of advertising strategies.	One type of advertising strategies clearly used. Attempt to use a second not clearly demonstrated	Two types of advertising strategies clearly used. Attempt to use a third not clearly demonstrated.	Three or more types of advertising strategies easily recognized in ad.
General attractiveness of the Ad	Overall look of ad unpleasant: jumbled layout, poorly ordered, clashing colors, unreadable text, and irrelevant graphics.	Overall look of ad somewhat unpleasant: awkward layout, some ordering problems, colors either too vivid or too pale, text that is difficult to read, graphics that barely apply.	Overall look of ad pleasant to the eye: orderly layout, attractive color scheme, readable text, two relevant graphics.	Overall look of ad very attractive to the eye: balanced layout, logical order, attractive color scheme, and readable text, two or more relevant graphics.
Editing and Proofreading	Five or more spelling, punctuation, OR grammatical errors.	Three or four spelling, punctuation, OR grammatical errors	One or two spelling, punctuation, OR grammatical errors.	Completely free of spelling, punctuation, grammatical errors.

Floor Plan Evaluation

	Novice (5 points)	Apprentice (10 points)	Practitioner (15 points)	Expert (20 points)
Floor Plan	<ul style="list-style-type: none"> • Floor Plan is messy and illegible • Few rooms are labeled and room dimensions are accurately measured with correct units • Few windows, doors and stairways are clearly marked • No architectural symbols are used 	<ul style="list-style-type: none"> • Floor Plan is somewhat neatly drawn • Some rooms are labeled and room dimensions are accurately measured with correct units • Some, doors and stairways are clearly marked • Some architectural symbols are used 	<ul style="list-style-type: none"> • Floor Plan is neatly drawn and easy to read • Most rooms are labeled and room dimensions are accurately measured with correct units • Most windows, doors and stairways are clearly marked • Many architectural symbols are used 	<ul style="list-style-type: none"> • Floor Plan is neatly drawn and easy to read • All rooms are labeled and room dimensions are accurately measured with correct units • All windows, doors and stairways are clearly marked • Many architectural symbols are used
Design	Design is incomplete and does not demonstrate client's needs.	Design is complete and included 1 of the client's needs.	Design is carefully thought out and meets most of the client's needs.	Design is well thought out and meets all of the client's needs.
Budget Worksheet	<ul style="list-style-type: none"> • Data is inaccurate and difficult to read • Computing area and cost for each room is inaccurate 	<ul style="list-style-type: none"> • Data is inaccurate and difficult to read • Computing area and cost for each room some rooms are accurate. 	<ul style="list-style-type: none"> • Data is accurate and easy to read • Computing area and cost for most rooms are accurate. 	<ul style="list-style-type: none"> • Data is accurate and easy to read • Computing area and cost for each room is accurate

Geometric Solids Assessment

How many **FACES** does the figure shown below have?

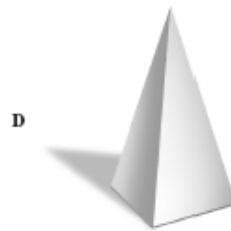
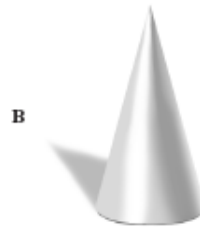
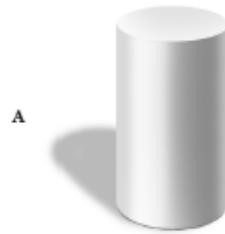


- A 3
- B 4
- C 6
- D 8

Which is a model of a rectangular solid?



Which is a picture of a rectangular solid?

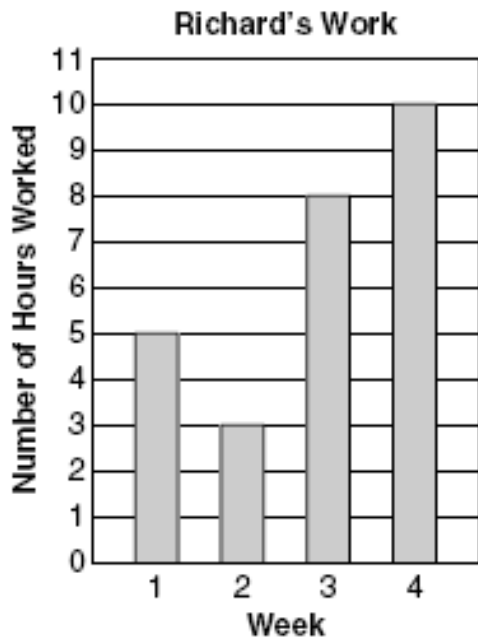


What shape are the faces of a cube?

- F Circle
- G Triangle
- H Square
- J Pentagon

Statistic & Data Analysis Assessment

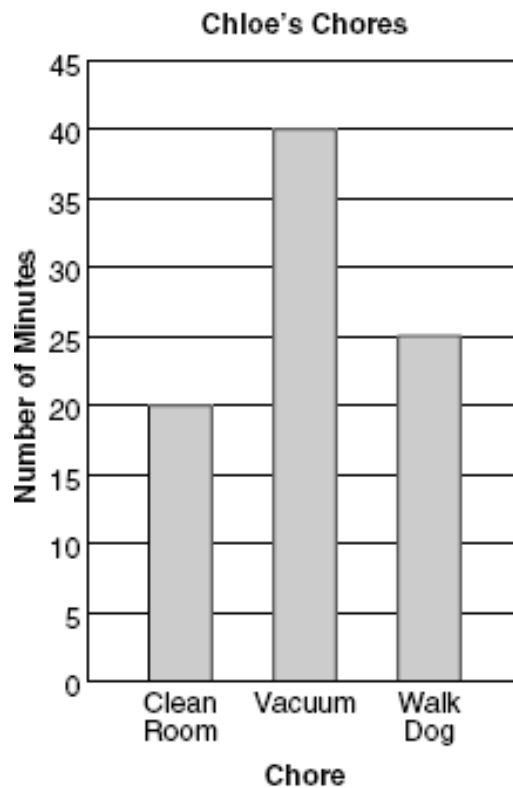
The bar graph below shows the number of hours Richard worked.



How many hours did Richard work altogether?

- F 4
- G 10
- H 16
- J 26

The bar graph below shows the number of minutes it takes Chloe to do each chore.

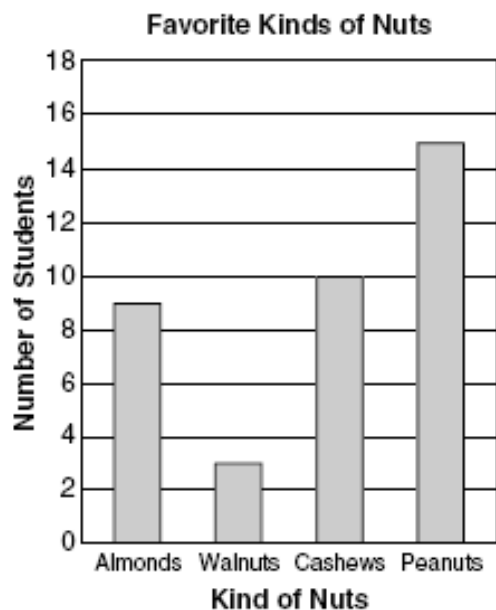


How many minutes does it take Chloe to clean her room and walk the dog all together?

- A 25
- B 35
- C 45
- D 60

Statistic & Data Analysis Assessment

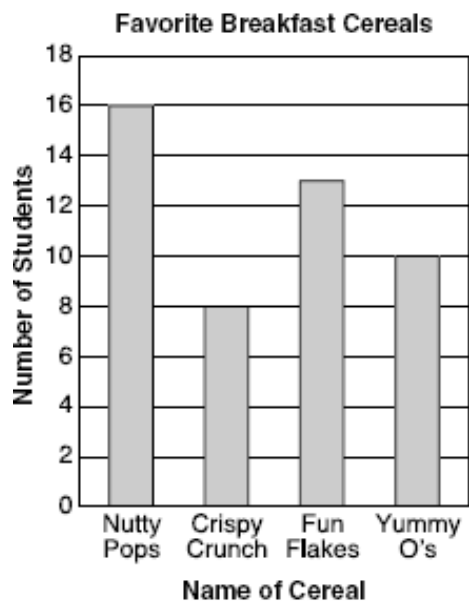
The bar graph below shows the favorite kinds of nuts of the students in a class.



Peanuts were the favorite nut of how many students?

- A 7
- B 8
- C 14
- D 15

The bar graph below shows the favorite breakfast cereals of some students.

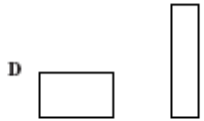


How many MORE students like Nutty Pops than Yummy O's?

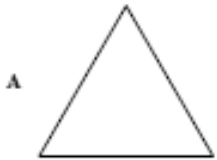
- A 16
- B 6
- C 3
- D 1

Polygon Assessment

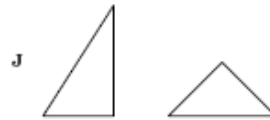
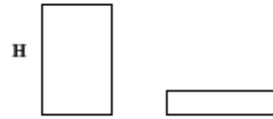
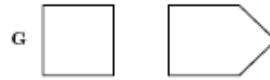
Look at the pairs of shapes. Which is a pair of triangles?



Leo drew a triangle with one square corner. Which could be Leo triangle?

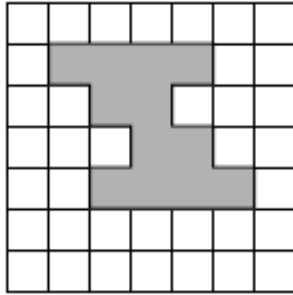


Look at the pairs of shapes. Which is a pair of rectangles?



Area Assessment

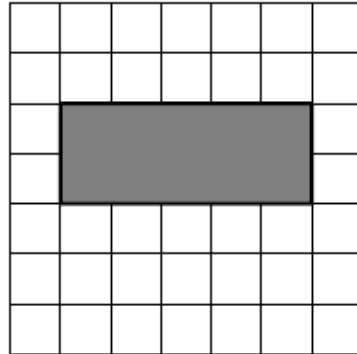
Each small square on the grid is 1 square unit.



How many square units are needed to make the shaded figure?

- A 8
- B 12
- C 15
- D 20

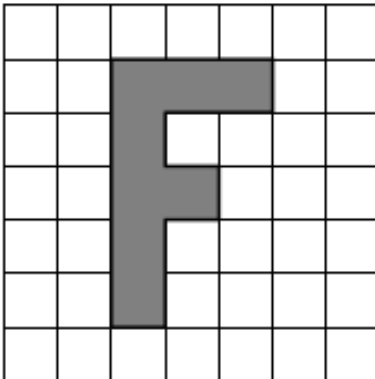
Each small square on the grid is 1 square unit.



How many square units are needed to make the shaded figure shown on the grid?

- F 5
- G 7
- H 10
- J 14

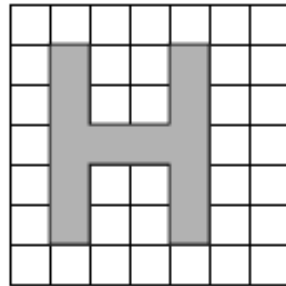
Each small square on the grid is 1 square unit.



How many square units are needed to make the shaded figure shown on the grid?

- F 7
- G 8
- H 15
- J 18

Each small square on the grid is 1 square unit.



How many square units are needed to make the shaded figure?

- F 10
- G 11
- H 12
- J 14

Geometric Solid	Faces	Vertices	Edges
Triangular Prism	5	6	9
Rectangular Prism	6	8	12
Pentagonal Prism	7	10	15
Hexagonal Prism	8	12	18
Octagonal Prism	10	16	24
Triangular Pyramid	4	4	6
Square Pyramid	5	5	8
Pentagonal Pyramid	6	6	10
Hexagonal Pyramid	7	7	12
Cone	1	0	1
Sphere	0	0	0
Cylinder	2	0	2