Title: Area and Geometric Probability

Brief Overview:

Students will examine and expand on applications involving area of rectangles, parallelograms, triangles, trapezoids, and circle through use of, but not limited to, manipulatives, technology, and instruction.

NCTM Content Standard/National Science Education Standard:

- Analyze characteristics and properties of two– and three–dimensional geometric shapes and develop mathematical arguments about geometric relationships
- Use visualization, spatial reasoning, and geometric modeling to solve problems
- Apply appropriate techniques, tools, and formulas to determine measurements

Grade/Level:

6 – 12; Geometry

Duration/Length:

Eight 45 – minute class periods

Student Outcomes:

Students will:

- examine how to find the area & partial area of a rectangle and rectangular figures
- discover the area and partial area formulas for a parallelogram, triangle, and trapezoidal figure using geoboards and manipulatives
- discover the area and partial area formulas of a circle
- be able to find the geometric probability that an event will occur by finding the area of a region
- apply area formulas and geometric probability to a carnival activity

Materials and Resources:

- Graphing calculators
- Geoboards
- Rubber bands
- Square dot paper
- Markers/ Crayons/ Colored Pencils
- Colored paper
- Scissors
- Glue stick/tape

- Ruler
- Patty paper
- Note cards
- Poster board
- Bowls/cups
- Balls
- Tape measures
- Coins
- Marbles
- Cardstock
- Paper plates
- Copies of worksheets:
    - Warming Up To You
    - Probability & Area Vocab–a–gram
    - Composite Connection
    - Adding Up Area
    - Rectangles Everywhere!!
    - Area of a Rectangle Homework
    - Your Turn to Try!!
    - Window Cleaning
    - Unit Project Worksheets
        - Ouline
        - Rubrics
        - Sign–up sheet
    - Picking Parallelograms
    - Parallelogram Memory Game
    - Trying Triangles
    - Coach/ Player Triangle Practice
    - Tricky Trapezoids
    - Area of a Trapezoid Activity
    - Dusty the Dingo's Dog House
    - Area of a Triangle Guided Discovery
    - Going Around in Circles
    - Help Tim Pass!!
    - Pretty Princess Pizza Place
    - Introduction to Probability Notes
    - Probability
    - Crazy Calvin's Carnival Game
    - Pre–assessment
    - Mid–assessment
    - Post–assessment

Development/Procedures:

Day 1

- Pre-assessment

Assess student understanding of evaluating expressions with "Warming Up To You". Correct any mistakes or misconceptions, as the skill of evaluating expressions will be needed when the students evaluate formulas. The "Pre-Assessment" may be given as well, to assess student understanding of this upcoming unit.

Have the students fill out as much of the table, "Probability and Area Vocab-O-gram", to determine which geometry terms the students are already familiar with.

- Exploration
  Distribute Geoboards with rubber bands to the students. Project a transparency of "Composite Connection", and display each step one at a time. Have the students use their geoboards to recall the area formulas for rectangles and squares, and apply them to composite figures. Invite students to the front of the room to display their geoboards and present their solutions.

- Explanation
  Distribute the worksheet, "Adding Up Area" to the students. Model how to partition irregular polygons into rectangles and squares in order to find the area.

- Application
  Explain the usefulness of being able to accurately calculate the area of a rectangular figure and how it applies to a real life situation. Instruct students to find 5 rectangular figures in the class room. Have them write those figures in the activity "Rectangles Everywhere". Then have student measure those figures using a ruler or yard/meter stick. Next have students apply the area formula discussed in class to find the area of each figure.

  Assign "Area of Rectangles Homework" for the students to apply their learning independently at home.

- Differentiation
  - Reteach
    Guide students through problems 1 and 2 of the worksheet, "Your Turn to Try!!", and have the students work independently on problems 3 and 4 to apply what they have learned in the lesson.

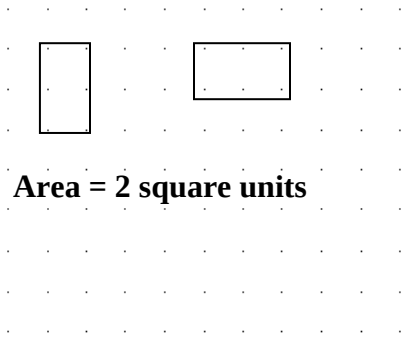
  - Enrich
    Assign the "Window Cleaning" worksheet to have students apply the area formula of a rectangle and utilize unit rates.

- Assessment
  Present the Unit Project choices and discuss the rubrics and timeline of two weeks for completion. Note that student presentations will be done after the summative assessment

Day 2

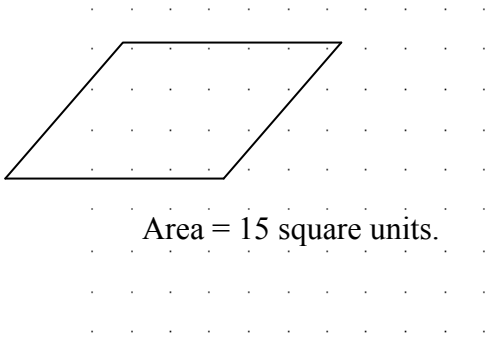
- Exploration

  Give each student a geoboard and rubber bands. Present the following prompt, "Create a rectangular figure with a perimeter of 6 units. What is the area?" Encourage the students to find as many solutions as they can. Record the solutions on the front board.

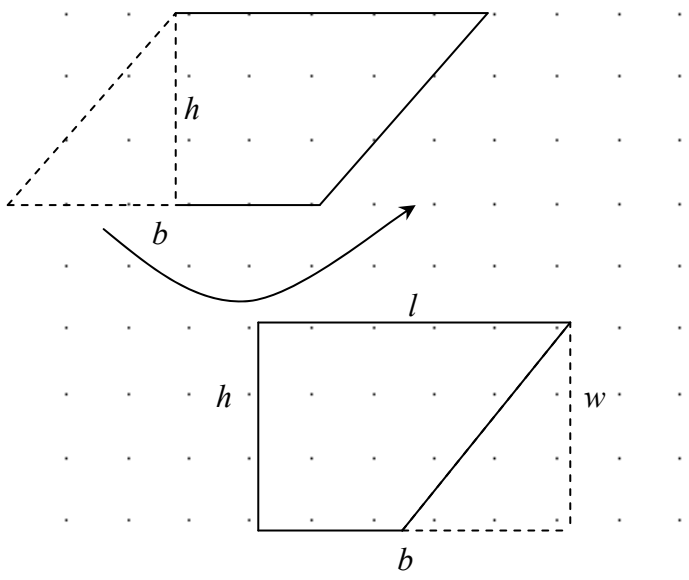


  Have the students create a rectangular figure that is three units by four units. Ask, "What is the area of each rectangle?" Encourage the students to find as many solutions as they can. Record the solutions on the front board.

  Have the students create a parallelogram with a base of five units and a height of three units. Ask, "How could we find the area of the parallelogram?" Elicit various responses, and have the students explain their thinking and methods.



  Model how to partion the parallelogram into a triangle and trapezoid. Explain how the triangle can be moved to the right side of the trapezoid, forming a rectangle. Conclude thar the area formula for a parallelogram is the same as the area formula for a rectangle; $A = lw \Rightarrow A = bh$.

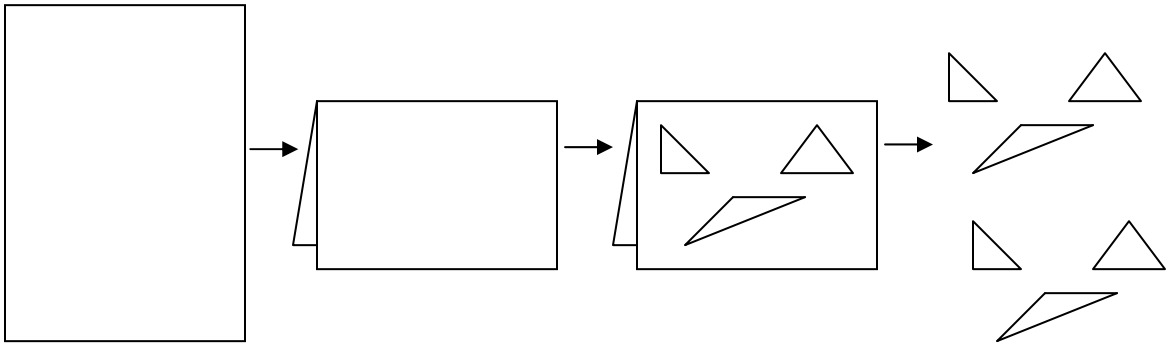


- Explanation
  Display various parallelograms on a geoboard. Have the students copy the parallelogram on their geoboards. Apply the area formula for parallelograms created, and verify the answers by counting the units on the geoboard.

  Project a transparency of "Picking Parallelograms". Allow the students to work through the problems, and then invite student volunteers to the overhead to show their answers and explain their work. Correct any errors and clarify any misconceptions.

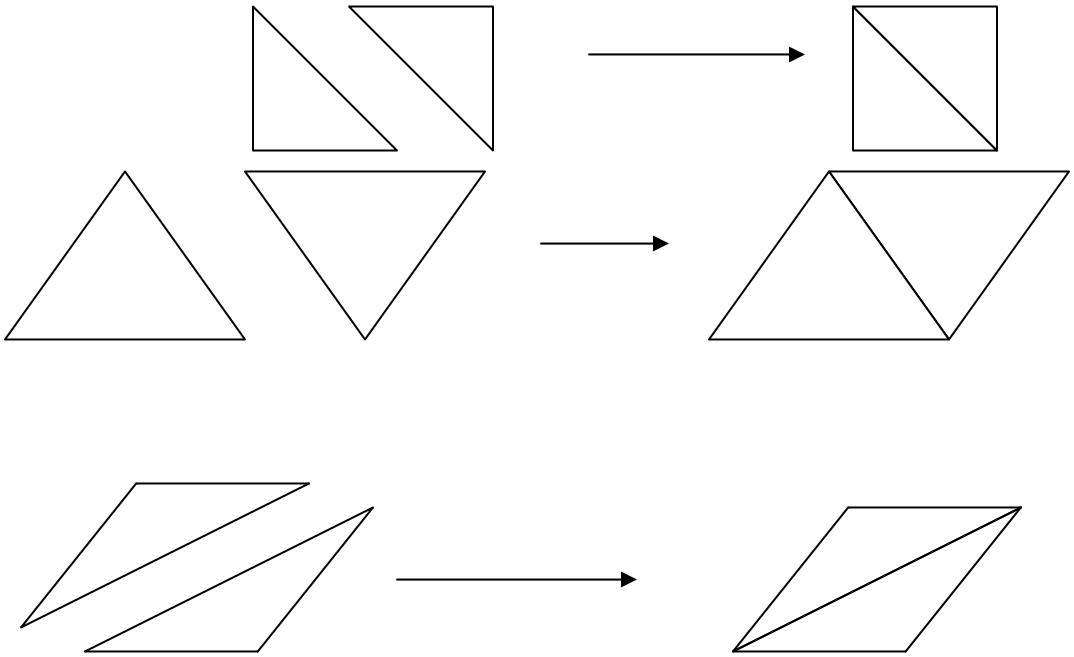
- Application
  Print out the "Memory Game" cards onto card stock, and cut the cards out. Divide the class into pairs, and give each pair a set of cards. Instruct the students to shuffle the cards and lay them face-down. Explain that the rules of the game are that the student is to flip over a problem card, solve it in the workspace provided on the "Parallelogram Memory Game Board", and then flip over the an answer card to try and make a match. Continue play until all cards are matched. Consider awarding a prize to the winning students.

- Exploration
  Give each student a colored piece of paper, a pair of scissors, and a glue stick. Fold their colored paper in half, and leaving the paper folded, have the students draw and cut out a right triangle, an acute triangle, and an obtuse triangle creating two of each of the triangles.



Paper Fold in half Draw triangles Cut out

Distribute copies of "Trying Triangles" and have the students glue their triangles onto the paper as directed. Ask, "If we put the two triangles together what does is create?" (A rectangle or a parallelogram!!)



Develop the area formula for a triangle using the glued triangle pieces. Lead the students to the formula by asking, "How do you find the area of a rectangle or a parallelogram? A rectangle and a parallelogram are both made from two triangles. If the area formula for a rectangle/parallelogram is $A = bh$, how could we find the area of one of the triangles?" Have the students write the area formula for a triangle, $A = \frac{1}{2}bh$, on their papers.

- Explanation
  Model the two triangle examples on the "Trying Triangles" note paper.

- Application
  Divide the class into pairs again. Hand out the "Coach/ Player Triangle Practice" activity to each pair. Explain that one student will act as the player, doing everything the coach tells him/ her to do and one as the coach, which will be giving step–by–step instructions, to complete the first problem. Switch roles and complete the second problem.

- Exploration
  Give each student a piece of patty paper and a copy of "Tricky Trapezoids". Provide the students time to work individually to discover the area formula for a trapezoid using this activity. Divide the class into pairs, and have the students share their results.

- Explanation
  Review the area formula for trapezoids. Model the two trapezoid examples on the "Tricky Trapezoid" note paper.

- Application
  Assign the math crossword puzzle, "Area of trapezoid Activity" for the students to demonstrate what they have learned with respect to finding the area of trapezoids.

- Assessment
  Assess student understanding of applying all the area formulas they have learned up to this point with the open investigation, "Dusty the Dingo's Dog House."

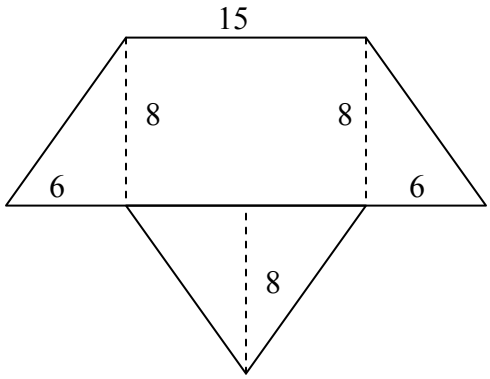
  Remind the students of the Unit project, and that they should have selected their topics and groups for the project. Advise the students to begin the research piece of the project.

  Administer the Mid-assessment after this lesson, if desired. Note that this is a full 45-minute assessment, which will make up an entire day's lesson.

- Differentiation
  - Reteach
    Guide the students through the "Area of a Triangle Guided Discovery", to assist the students in developing and applying the area formula for a triangle.

  - Enrich
    Display the exercises below for the students to solve.

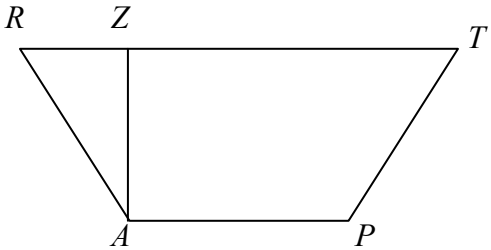
    1. Find the area of the composite figure.



(Answer: 228 square units)

    2. Use the given information to find *TR* in trapezoid *TRAP*.

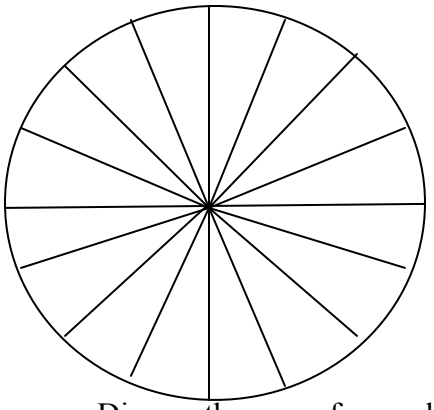
       Area of *TRAP*=272 sq. units
       AP=25
       AZ=17

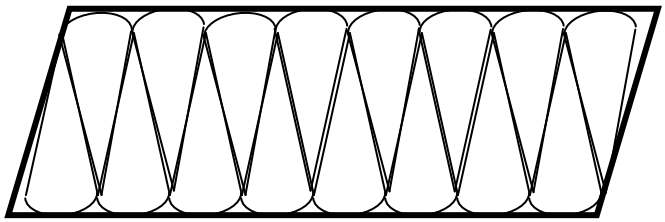


(Answer: *TR* = 7)

Day 3

- Exploration
  Give each student an envelope containing 16 evenly pre-cut pieces of a circle (8 of one color and 8 of another). Instruct students to try to put the pieces together as a circle and then to rearrange the pieces into a parallelogram.





  Discuss the area of a parallelogram, $A=bh$. The height of the figure is the radius of the circle, and the base of the figure is half of the circumference of the circle. Therefore the students can derive the formula for the area of a circle.

$$A=bh$$
$$b=\tfrac{1}{2}C$$
$$b=\tfrac{1}{2}(2\prod r)$$
$$b=\prod r$$
$$h=r$$
$$A=\prod \cdot r \cdot r$$

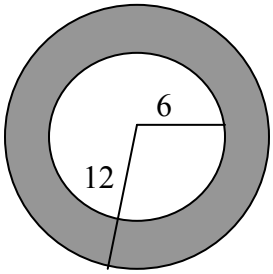
Area of a circle: $A = \pi r^2$

- Explanation
  Work through the examples on the guided discovery, "<u>Going Around in Circles".</u>

- Application
  Divide the class into groups of four for a Round Table activity. Give each student in the group one of the problems from "Pass the Circle Problem". Start each student with the first step of their problem. Instruct the students to pass their problem to the right. Explain that each student will check the work of the previous student and make corrections as necessary, complete the next part of each problem, and pass the problem to the right. Continue the rotation until the problems are complete.

Summarize the lesson with the following problem:

Find the area of the shaded region. Leave your answers exact, in terms of pi.



$$Area_{Large} = 144\pi$$
$$Area_{small} = 36\pi$$
$$Area_{shaded} = Area_{Large} - Area_{small}$$
$$Area_{shaded} = 144\pi - 36\pi = 108\pi$$

- Differentiation
  - Reteach
    Guide the students through "Help Tim Pass!!" to assist the students in developing and applying the area formula for a circle and for finding the area of a shaded region.

  - Enrich
    Complete the "Pretty Princesses Pizza Palace" activity to apply the area of a circle as well as utilize unit rates.

Day 4

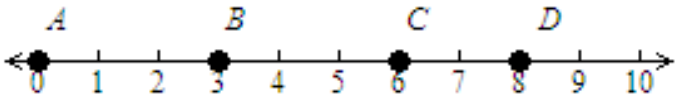
- Exploration
  Present the following questions to the students.

  - Suppose I toss a coin.
    - What is the probability that it will land on a head?
  - I have a bag with ten marbles. The bag has 1 yellow, 2 red, 3 blue, and 4 green.
    - What is the probability that you will pick red?
    - What is the probability of picking blue or yellow?

  Consider modeling the probability tool for the students, such as flipping the coin or having a bag of marbles to pull from. Ask the students to flip the coin or pull the specified marble, and award a small prize if they do so.

- Explanation
  Develop the probability formula from the exploration activity. Distribute copies of "Introduction to Probability Notes". Have the students complete the definition of probability and the formulas accordingly.

Draw a number line on the board and label points *A, B, C,* and *D* as listed below.



Show the students how to find the probability using a segment. Present the following example: "Look at $\overline{AD}$. If a point is randomly selected on $\overline{AD}$, find the probability that it is a point on $\overline{CD}$."

$$\text{P(event)} = \frac{\text{length of favorable segment}}{\text{length of entire segment}} = \frac{2}{8} = \frac{1}{4} = .25 = 25\%$$

Continue instruction with the example, "Using the same $\overline{AD}$, what is the probability that a point chosen at random is on $\overline{BC}$?"

$$\text{P(event)} = \frac{\text{length of favorable segment}}{\text{length of entire segment}} = \frac{3}{8} = .375 = 37.5\%$$

Complete the worksheet with the real life archery problem.

- Application
  Provide ***independent practice*** using the "Probability Worksheet", which has the students practice finding geometric probability.

- Differentiation
  - Reteach
    Provide the students with a paper plate and a piece of cardstock. Have the students cut out a triangle from the cardstock, and cut the paper plate into a semi–circle. Have the students attach the semicircle to the triangle on one end. Have the students use a ruler to measure the dimensions of the composite figure formed, and present the challenge, "A dart hits this dart board. Find the probability that it lands in the triangle."

  - Enrich
    Create a carnival atmosphere with "Crazy Calvin Carnival Project." Consider completing this project with all students, pairing up the 'reteach' students with the 'enrich' students. Provide adequate class time for completion.

Summative Assessment:

Students will be assessed through a unit project and an exam. Both assessments are cumulative, and evaluate the students' ability to apply their knowledge of area formulas and geometric probability. A full 45-minute class period should be devoted to the post-assessment and an additional 45-minute class period should be spent on group presentations of the unit project.

Authors:

Melissa R. Ashby, MA
Gaithersburg High School
Montgomery County Public Schools

Marsha J. Forney, MA
Largo High School
Prince George's County Public Schools

Matthew J. Martini, MAT
Oakland Mills High School
Howard County Public Schools

Warming Up To You Name: _____

Directions: For exercises 1 – 3, evaluate the expression if $r = 6$, $s = 5$, and $t = -3$

(1) $\dfrac{4r + 2s}{t}$

(2) $\dfrac{rst}{2s}$

(3) $\dfrac{r^2 + 2t}{s}$

Directions: For exercises 4 – 5, simplify each expression.

(4) $3x - 4 - 2x + 6$

(5) $2x + 7y - 4 + 3x - 2y$

Warming Up To You Name: _ANSWER KEY____

Directions: For exercises 1 – 3, evaluate the expression if $r = 6$, $s = 5$, and $t = -3$

(1) $\dfrac{4r + 2s}{t} = \dfrac{34}{-3}$

(2) $\dfrac{rst}{2s} = -9$

(3) $\dfrac{r^2 + 2t}{s} = 6$

Directions: For exercises 4 – 5, simplify each expression.

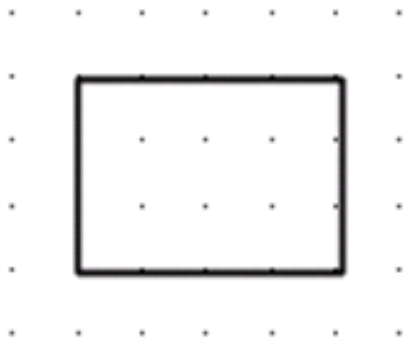
(4) $3x - 4 - 2x + 6 = x + 2$

(5) $2x + 7y - 4 + 3x - 2y = 5x + 5y - 4$

Probability & Area Vocab – O – Gram Name: _____ **Word**	**Sounds Familiar**	**Can give an Example**	**Can Define properly**	**Never heard of it**
Area				
Perimeter				
Triangle				
Rectangle				
Parallelogram				
Circle				
Trapezoid				
Pi				
Circumference				
Radius				
Diameter				
Probability				
Outcome				
Event				
Sample Space				

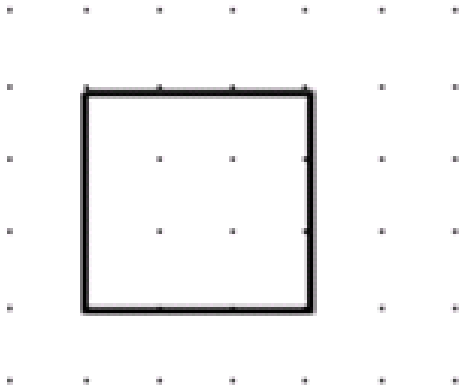
Composite Connections

Create this figure on your geoboard.



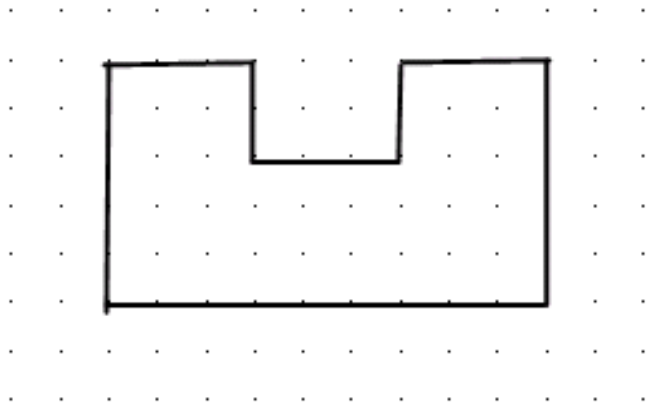
- What is the name of this figure?
- What is the area of this figure?

Create this figure on your geoboard.



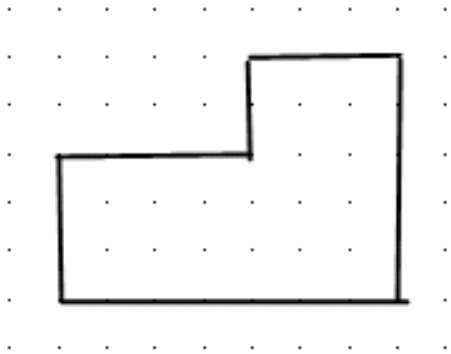
- What is the name of this figure?
- What is the area of this figure?
- What mathematical formula can be applied in order to calculate the area of both polygons pictured above?

Create this figure on your geoboard.



- What is the name of this figure?
- What is the area of this figure?

Create this figure on your geoboard.

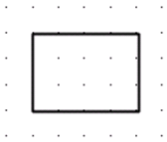


- What is the name of this figure?
- What is the area of this figure?

- How can the area formula for a square and a rectangle be applied when finding the area of the polygons above?

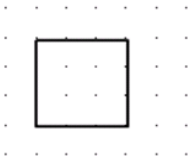
Composite Connections ANSWER KEY

Create this figure on your geoboard.



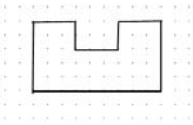
- What is the name of this figure? Rectangle
- What is the area of this figure? $A = lw$

Create this figure on your geoboard.



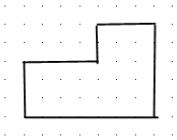
- What is the name of this figure? Square
- What is the area of this figure? 9
- What mathematical formula can be applied in order to calculate the area of both polygons pictured above? $A = lw; A = s^2$

Create this figure on your geoboard.



- What is the name of this figure? Octagon
- What is the area of this figure? 39

Create this figure on your geoboard.

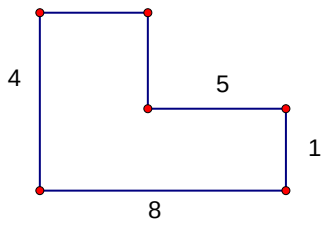


- What is the name of this figure? Hexagon
- What is the area of this figure? 27
- How can the area formula for a square and a rectangle be applied when finding the area of the polygons above? Partition the figure into rectangles and squares

Adding Up Area Name: _____

Directions: Find the area of each figure below. Show all work.

1.



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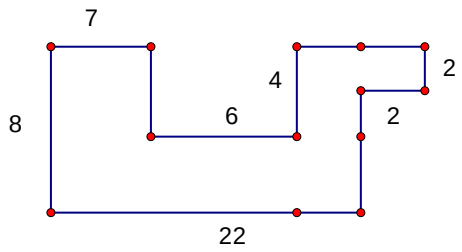
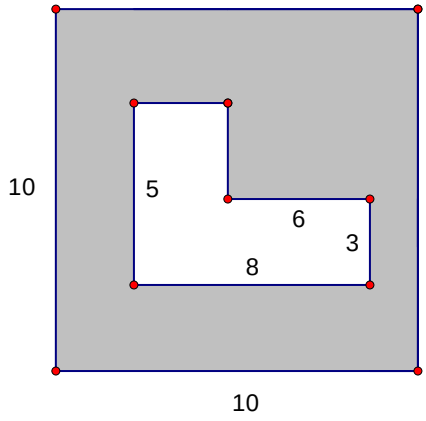


3.



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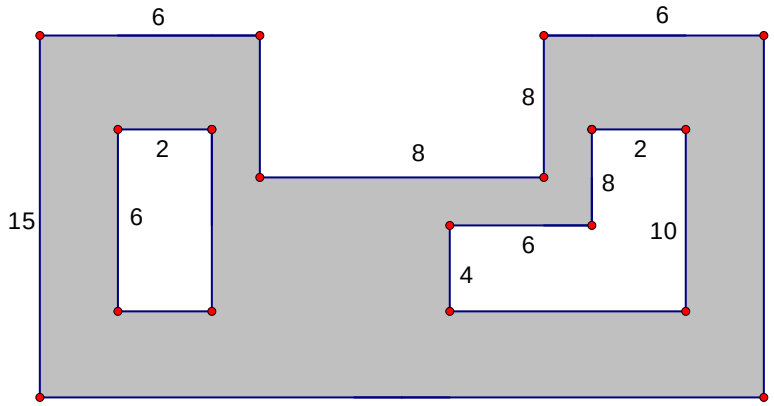
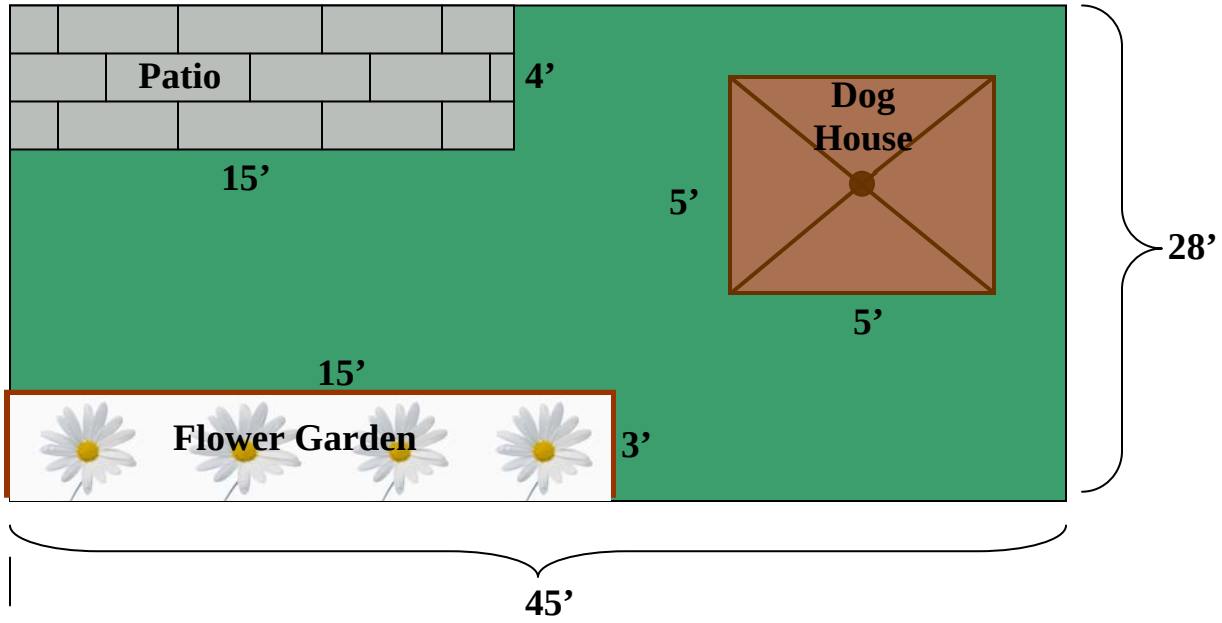


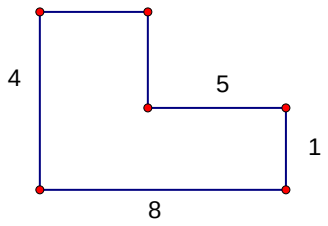
5. Franklin wants to re–sod his backyard. Given the dimensions and diagram below, determine the amount of sod he would need (in ft^2).



Adding Up Area Name: __ANSWER KEY___

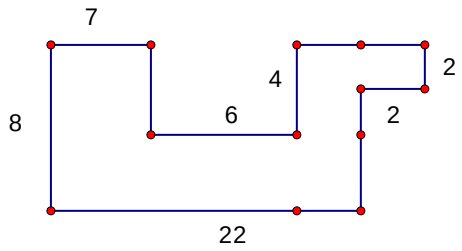
Directions: Find the area of each figure below. Show all work.

1.



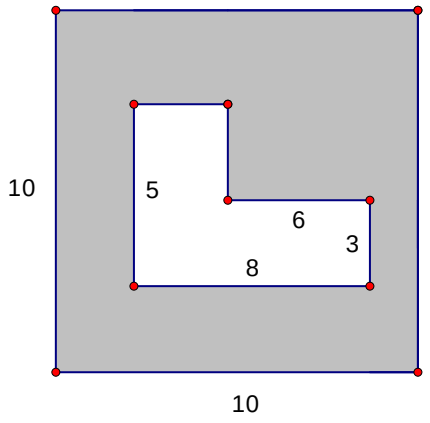
Area = 17

2.



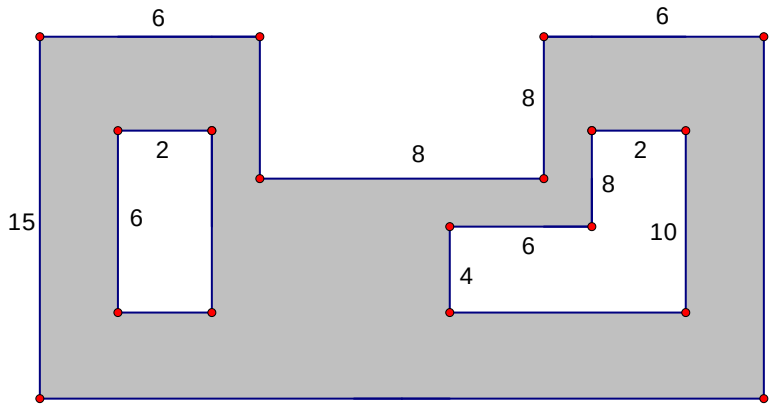
Area = 156

3.



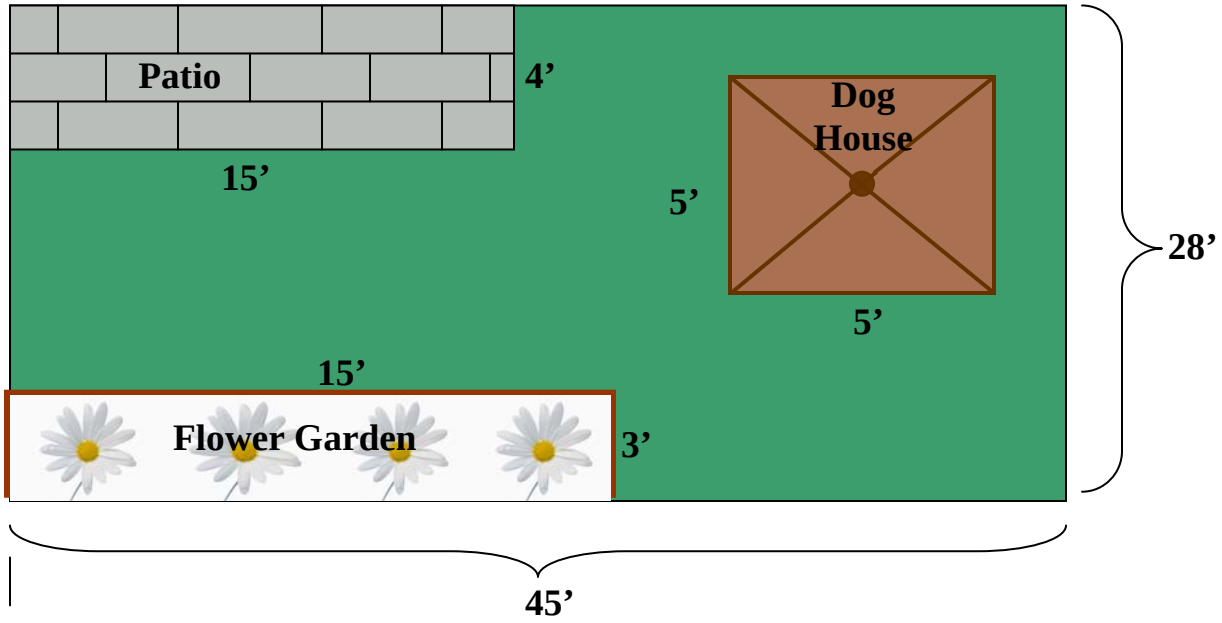
Area = 72

4.



Area = 196

5. Franklin wants to re–sod his backyard. Given the dimensions and diagram below, determine the amount of sod he would need (in ft^2).



Area = 1121 square feet

Rectangles Everywhere!!

Name:_____

Area of Rectangle Formula

Look around the class room. If you notice there are rectangles everywhere!!

Rectangular Object	Measurement of the Base (Don't forget the units!!)	Measurement the Height (Don't forget the units!!)	Area of the object (Make sure to show all work!!)

Area of Rectangles Name: _____

Homework

1. Find three items at home that are rectangular. Draw a picture of the figure below. Measure the sides of the figure and label them on the figure below. Find the perimeter and area. Make sure to show all work.

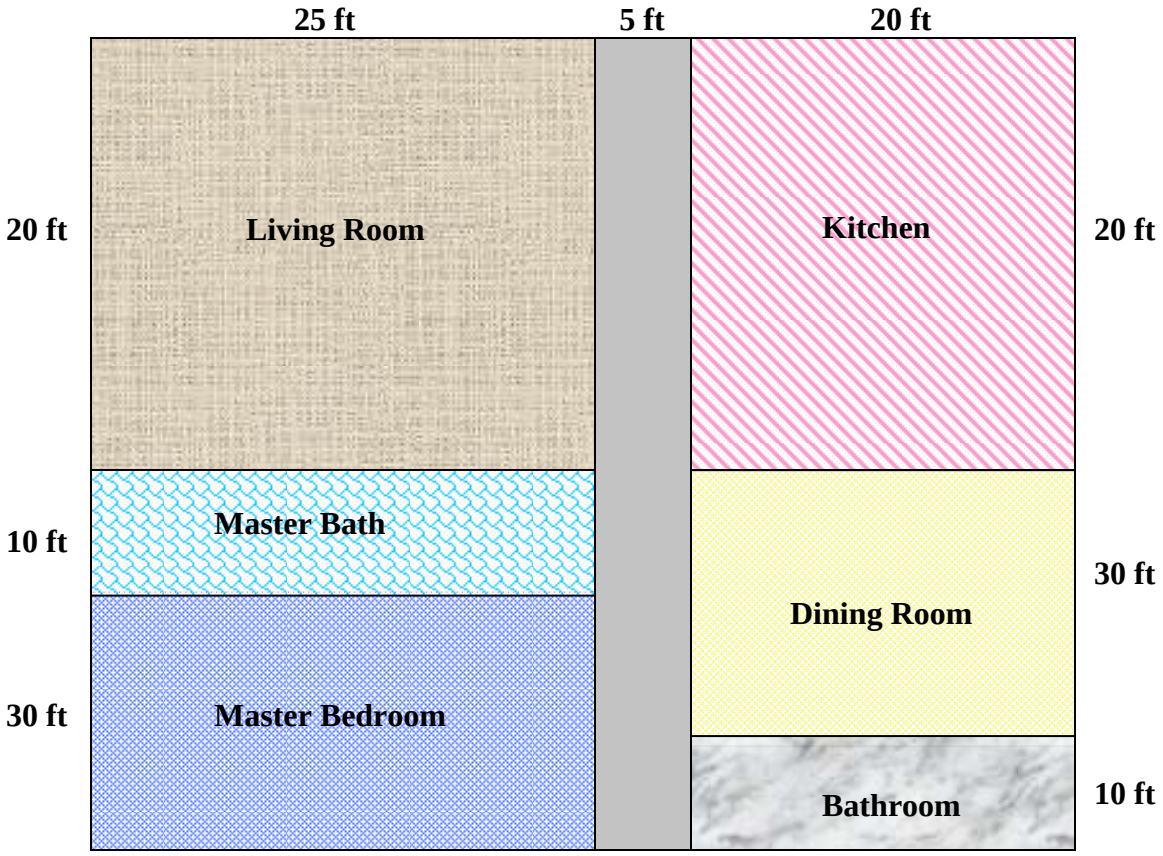
Figure 1	Figure 2	Figure 3
Perimeter:_____ Area:_____	Perimeter:_____ Area:_____	Perimeter:_____ Area:_____

2. The area of a rectangle is 27 square feet. The base is 3 more than twice the height.

- What are the dimensions of the rectangle?

- What is the perimeter?

3. The Johnson Family is trying to sell their home and have decided to upgrade some aspects of their house to make it more desirable for perspective buyers. Their real estate agent has suggested that they re–tile the kitchen and two bathrooms downstairs, and to re-carpet the hallway, master bedroom and living room.



- Find the square footage of each room being re–modeled.
  a. Living Room _____
  b. Master Bed _____
  c. Master Bath _____
  d. Kitchen _____
  e. Hallway _____
  f. Bathroom _____

- If the tile that the Johnsons decide to use cost \$8 per ft^2 & the carpet they have chosen cost \$1.50 per ft^2, determine the total cost of the job.

Area of Rectangles Name: __ANSWER KEY___

Homework

1. Find three items at home that are rectangular. Draw a picture of the figure below. Measure the sides of the figure and label them on the figure below. Find the perimeter and area. Make sure to show all work.

Figure 1	Figure 2	Figure 3
ANSWERS WILL VARY Perimeter:_____ Area:_____	Perimeter:_____ Area:_____	Perimeter:_____ Area:_____

2. The area of a rectangle is 27 square feet. The base is 3 more than twice the height.

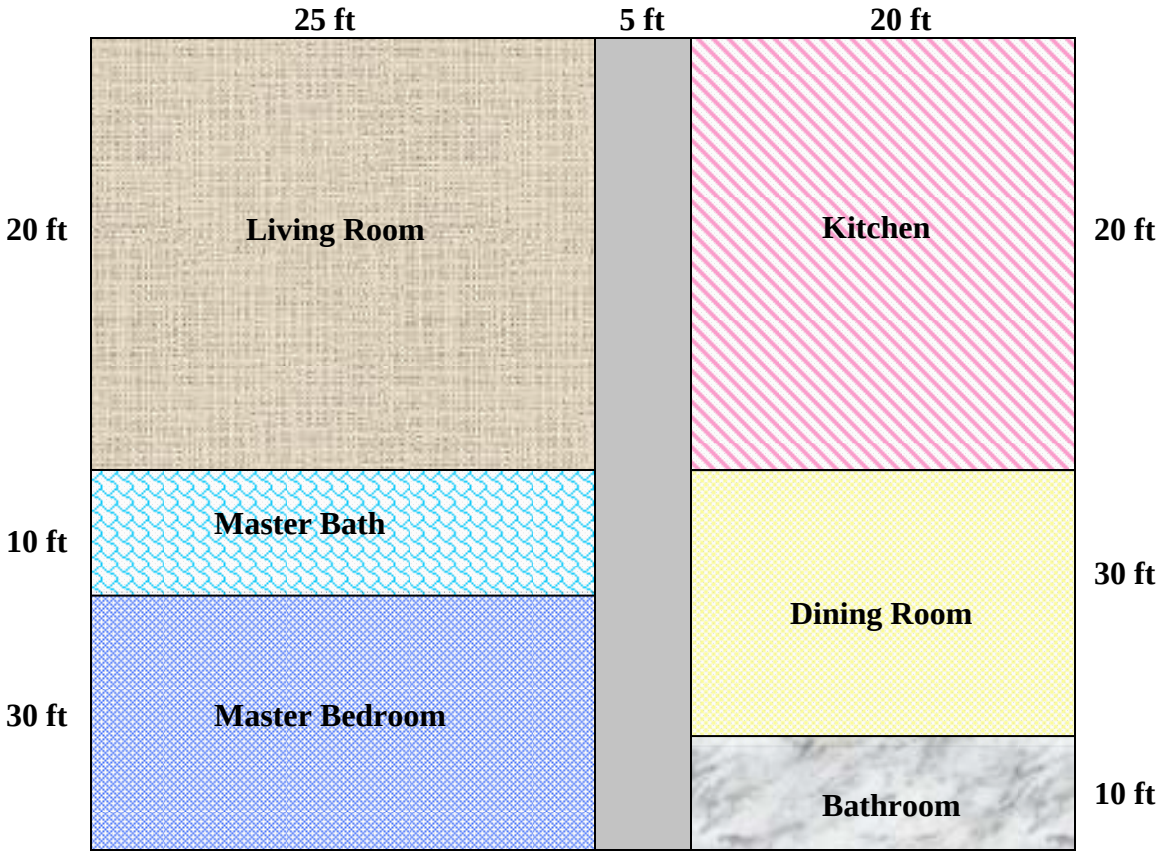
- What are the dimensions of the rectangle?

  x by $2x+3$

- What is the perimeter?

  $6x+6$

3. The Johnson Family is trying to sell their home and have decided to upgrade some aspects of their house to make it more desirable for perspective buyers. Their real estate agent has suggested that they re–tile the kitchen and two bathrooms downstairs, and to re-carpet the hallway, master bedroom and living room.



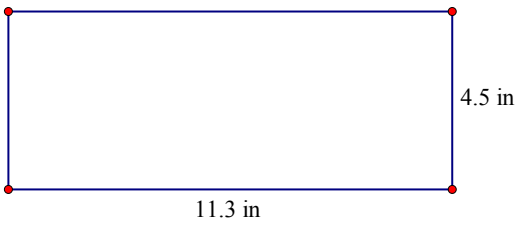
- Find the square footage of each room being re–modeled.
  a. Living Room ____500 sq. ft._____
  b. Master Bed ____750 sq. ft._____
  c. Master Bath ____250 sq. ft._____
  d. Kitchen ____400 sq. ft._____
  e. Hallway ____300 sq. ft_____
  f. Bathroom ____200 sq. ft._____

- If the tile that the Johnsons decide to use cost \$8 per ft^2 & the carpet they have chosen cost \$1.50 per ft^2, determine the total cost of the job.
  Total area re-carpeted: 1550 sq ft (\$1.50) = \$2325
  Total area re-tiled: 850 sq ft (\$8.00) = \$6800
  Total cost of the job: \$2325 + \$6800 = \$9125

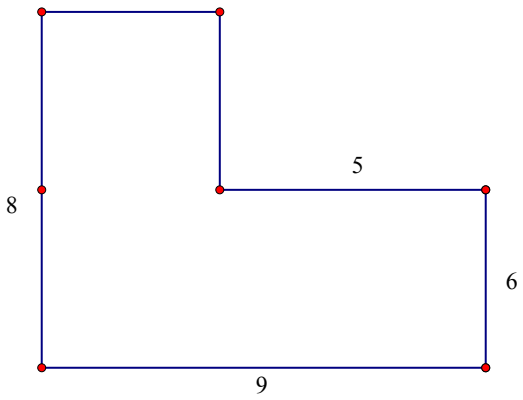
Your Turn to Try!! Name: _____

Directions: Find the area of each figure below. Show all work.

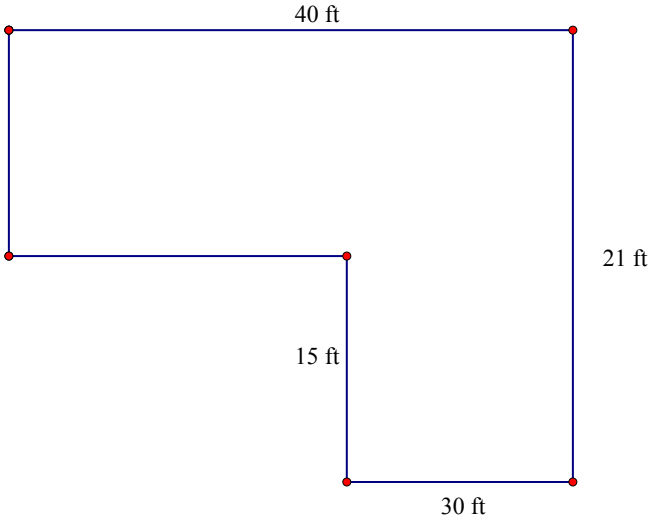
1.



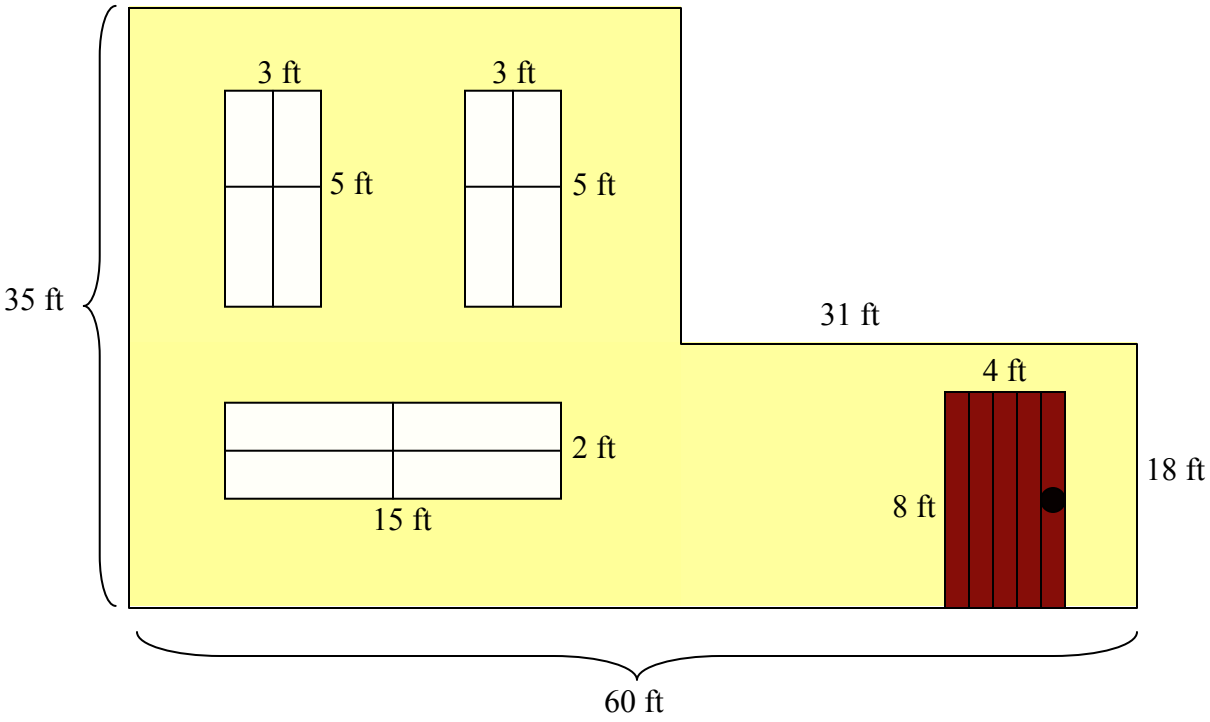
2.



3. Rudy is buying lawn feeder for the lawn shown below. Given the dimensions, estimate the number of square feet of feeder he would need to buy. (figure is not drawn to scale).



4. Mr. Alberts wants to replace the yellow aluminum siding on one side of his house. Use the dimensions and the diagram to answer the questions below:



- Find the area of the section that Mr. Alberts will be replacing. Use mathematics to explain your answer. Use words, symbols, or both in your explanation.

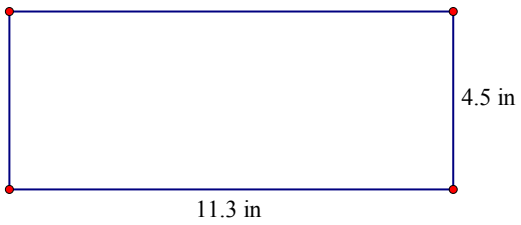
- Mr. Alberts has priced two different companies. Landscaping, Siding & More will charge him $2.50 per square foot of siding, whereas Mr. Siding and Paing will charge him $3.50 per square foot of siding. Determine which company will be the cheaper company to use.

- One of your workers decided to act compulsively and bought 2100 square feet of siding. Would you give the man a raise and praise him, or reprimand him and send him home for the rest of the day? Use mathematics to justify your actions.

Your Turn to Try!! Name: __ANSWER KEY___

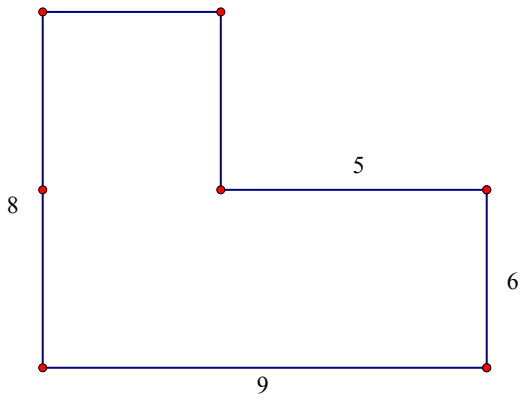
Directions: Find the area of each figure below. Show all work.

1.



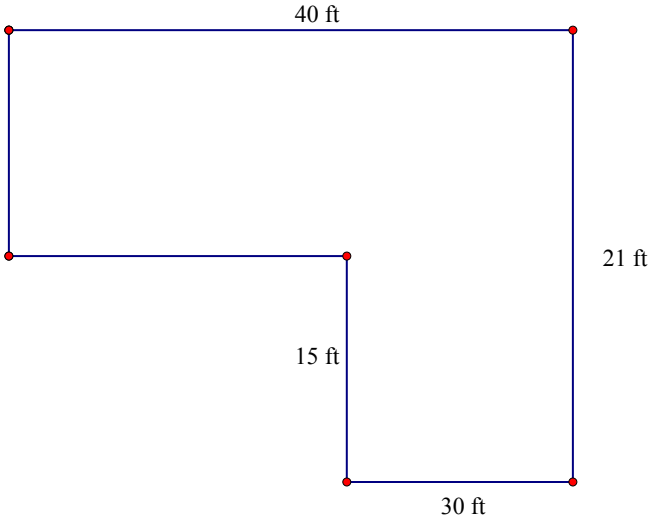
Area = 50.85 sq. in.

2.



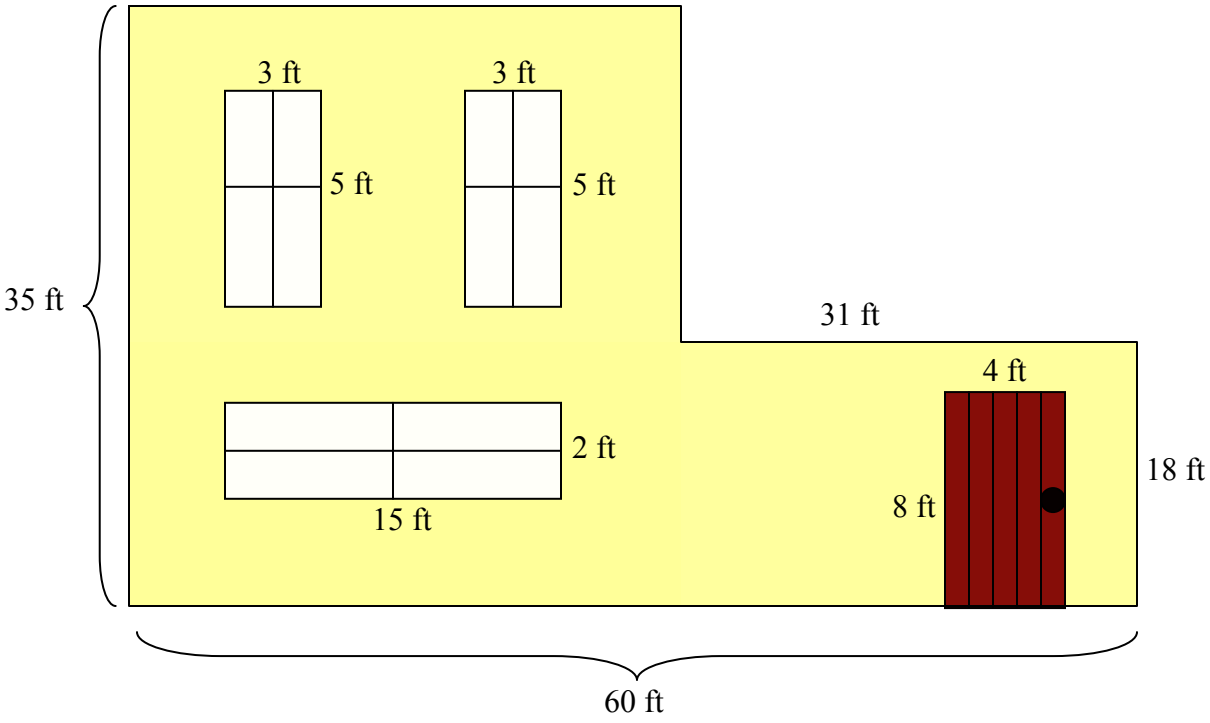
Area = 62

3. Rudy is buying lawn feeder for the lawn shown below. Given the dimensions, estimate the number of square feet of feeder he would need to buy. (figure is not drawn to scale).



Area = 690 sq. ft.

4. Mr. Alberts wants to replace the yellow aluminum siding on one side of his house. Use the dimensions and the diagram to answer the questions below:



- Find the area of the section that Mr. Alberts will be replacing. Use mathematics to explain your answer. Use words, symbols, or both in your explanation.

  1481 sq ft

- Mr. Alberts has priced two different companies. Landscaping, Siding & More will charge him $2.50 per square foot of siding, whereas Mr. Siding and Paing will charge him $3.50 per square foot of siding. Determine which company will be the cheaper company to use.

  Landscaping, Siding and More is cheaper at $3702.50. Mr. Siding and Paing charges $5183.50

- One of your workers decided to act compulsively and bought 2100 square feet of siding. Would you give the man a raise and praise him, or reprimand him and send him home for the rest of the day? Use mathematics to justify your actions.

  Reprimand the employee. He bought way too much siding and cost the company between $1547.50 – $2166.50

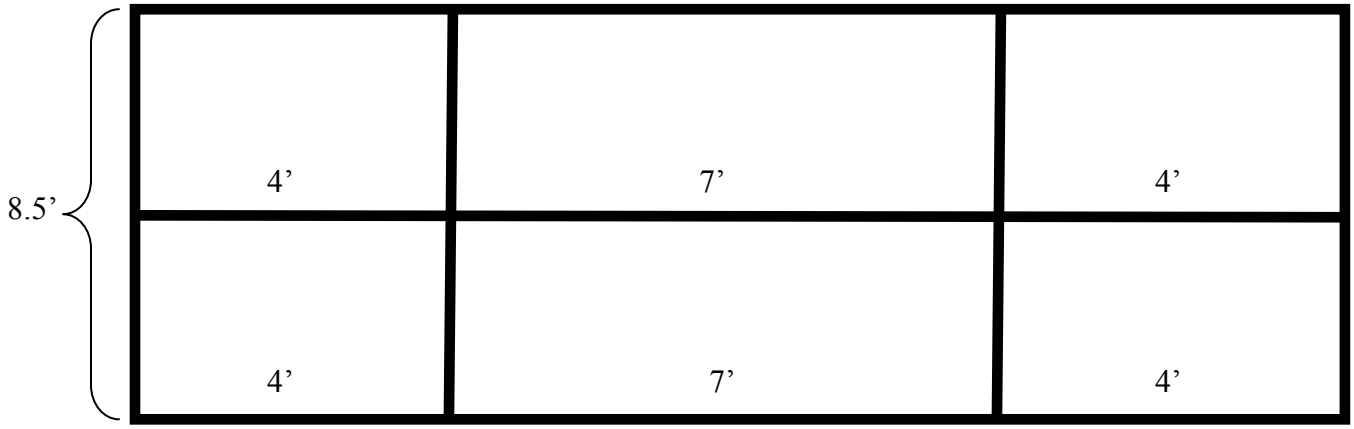
Area of a Rectangle
Enrichment

Name _____

~Window Cleaning~

Jacob's window cleaning service specializes in window treatment and protection. They wash and protect your windows in 2 very easy steps. The wash your windows with a space age cleanser, then protect it with 2 coats of a clear protective poly-sheer. In order to calculate the amount of each to bring and the cost, they lay out a detailed plan to present to their customers. The Smith family has submitted this diagram to Jacob to have their bay window cleaned and protected before the holidays. Use the diagram and inventory list to determine the amount cleanser and poly-sheer they will have to bring and what the cost of supplies will be to the Smith family.

Note: The frame and the dividers in the window are 1''



Supply	Cost	Coverage
Cleanser	$2.75 a liter	50 ft^2
Poly-sheer	$8.50 a liter	75 ft^2

Window Cleaning Enrichment Answer Key:

The amount of window space can be found by subtracting 3 inches from the length and width, leaving a window area of 121.68 ft^2 (8.25' X 14.75').

Therefore, they would need 5 liters of soap at $2.75 a piece, which is $13.75

They would need 4 liters of Poly sheer (remember 2 coats) @ 8.50 a liter, which cost $34, thus adding the two cost together their total cost of supplies would be $47.75

Unit Projects

I. History of Mathematics

a. Research the Egyptian mathematician Heron. Include:
   i. Biographical information

   ii. Discuss his formula for finding area of a triangle

   iii. Compare and contrast it with the more commonly used $A = \frac{1}{2}bh$

b. Presentation must include some type of visuals and worked examples to demonstrate its usefulness.

II. Construction

a. Design a floor plan for a new building/house. Include:
   i. Dimensions of every room (drawn to scale)

   ii. Calculate the square footage of:
      1. each room
      2. living space (excludes hallways and foyers)
      3. total square footage

   iii. A scale model of your design (bonus points will be awarded for creativity and quality of model)

III. Game Show

a. Design a probability themed game show that involves area. Include:
   i. Colorful and creative game boards and or designs. (Remember, it's a game show, the flashier, the better)

   ii. Include all rules of the game show and design the prize(s) that will be awarded

   iii. Have a working proto–type & be prepared to play it in class.

Heron Research Project Rubric

	Criteria	***Below Level 1***			***Level 1***		***Level 2***		***Level 3***		***Level 4***			***Total***
Knowledge	Using historically accurate information	Use of historical information not passable			Limited use of historical information		Accurate for the most part, but some important info is not		All information historically accurate and partially relevant		All information used is historically accurate and relevant to the topic			
		0	2	4	5	5.5	6	6.5	7	7.5	8	9	10	
Application of Math	Examples are worked correctly and explained properly	Examples are missing and/or incorrect. Explanation is weak			Examples are partially correct, explanation is mediocre		Examples are correct, explanation is lacking		Examples are correct, explanation is strong		Examples are correct and explained clearly			
		0	2	4	5	5.5	6	6.5	7	7.5	8	9	10	
Presentation	Presentation is visually esthetic and informatively correct and interesting	Presentation is lacking visuals, information is wrong and/or missing			Visuals are crude and elementary, information is minimal		Visuals are esthetically moderate, information is correct		Visuals are esthetically pleasing, information is interesting and correct		Visuals are esthetically superb, and information is clearly presented and accurate			
		0	2	4	5	5.5	6	6.5	7	7.5	8	9	10	
											Final Score /30			%
											Grade			

Areas of Strength	Areas in need of Improvement

Final Comments

Probability and Area Unit Project Name: _____

Construction Project Rubric

	Criteria	***Below Level 1***			***Level 1***		***Level 2***		***Level 3***		***Level 4***			***Total***
Floorplan	Floorplan must be drawn to scale, detailed correctly and be aesthetically sound	Detail is missing, not scaled, lack of straightedge tool used			Floor plan was drawn with a ruler Detail is lacking, project is messy		Dimensions labeled, ruler used, project lacks depth and challenge		Challenging floor plan, aesthetically pleasing, and presented		Superb floor plan, meticulous detail and aesthetically superior.			
		0	2	4	5	5.5	6	6.5	7	7.5	8	9	10	
Application of Math	Examples are worked correctly and explained properly	Examples are missing and/or incorrect. Explanation is weak			Examples are partially correct, explanation is mediocre		Examples are correct, explanation is lacking		Examples are correct, explanation is strong		Examples are correct and explained clearly			
		0	2	4	5	5.5	6	6.5	7	7.5	8	9	10	
Scale Model & Presentation	Presentation is visually esthetic and informatively correct and interesting	Presentation is lacking visuals, information is wrong and/or missing			Visuals are crude and elementary, information is minimal		Visuals are esthetically moderate, information is correct		Visuals are esthetically pleasing, information is interesting and correct		Visuals are esthetically superb, and information is clearly presented and accurate			
		0	2	4	5	5.5	6	6.5	7	7.5	8	9	10	
											Final Score /30			%
											Grade			

Areas of Strength	Areas in need of Improvement

Final Comments

Probability and Area Unit Project Name: _____

Game Show Project Rubric

	Criteria	***Below Level 1***			***Level 1***		***Level 2***		***Level 3***		***Level 4***			***Total***
Concept Development	Game show has a logical set–up, all pieces are present and conceptually precise	Concept is not developed at all and show has no premise			Concept is moderately developed, but lacks any further development		Concept has been developed some what, but lacks details		Concept has been developed and rules are relevant and applicable		Concept has been developed superbly and rules and regulations are consistent and gameplay superb			
		0	2	4	5	5.5	6	6.5	7	7.5	8	9	10	
Application of Math	Examples are worked correctly and explained properly	Examples are missing and/or incorrect. Explanation is weak			Examples are partially correct, explanation is mediocre		Examples are correct, explanation is lacking		Examples are correct, explanation is strong		Examples are correct and explained clearly			
		0	2	4	5	5.5	6	6.5	7	7.5	8	9	10	
Presentation	Presentation is visually esthetic and informatively correct and interesting	Presentation is lacking visuals, information is wrong and/or missing			Visuals are crude and elementary, information is minimal		Visuals are esthetically moderate, information is correct		Visuals are esthetically pleasing, information is interesting and correct		Visuals are esthetically superb, and information is clearly presented and accurate			
		0	2	4	5	5.5	6	6.5	7	7.5	8	9	10	
											Final Score /30			%
											Grade			

Areas of Strength	Areas in need of Improvement

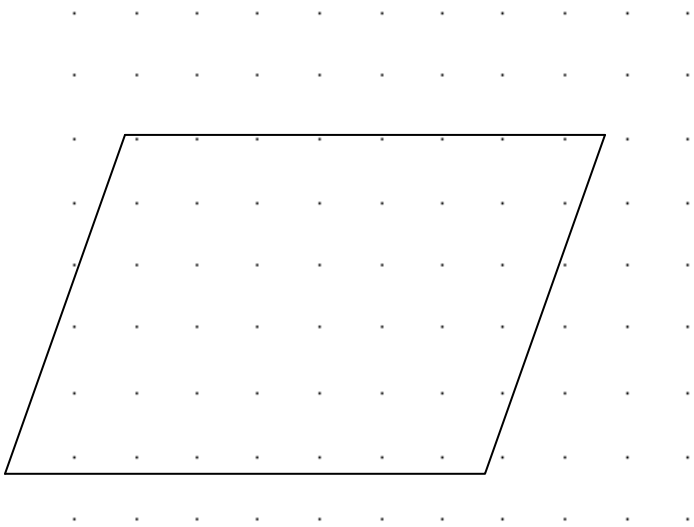
Final Comments	

Project Sign–up Sheet

Name(s)	Heron Project	Construction Project	Game Show Project

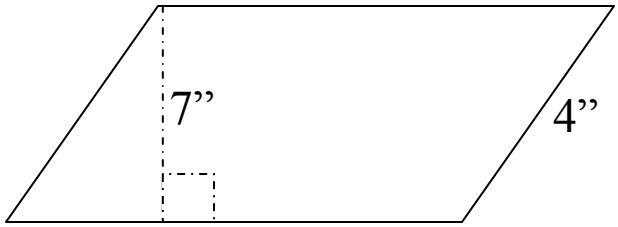
Picking Parallelograms

1. Use your geoboard to create this parallelogram. Determine the area.



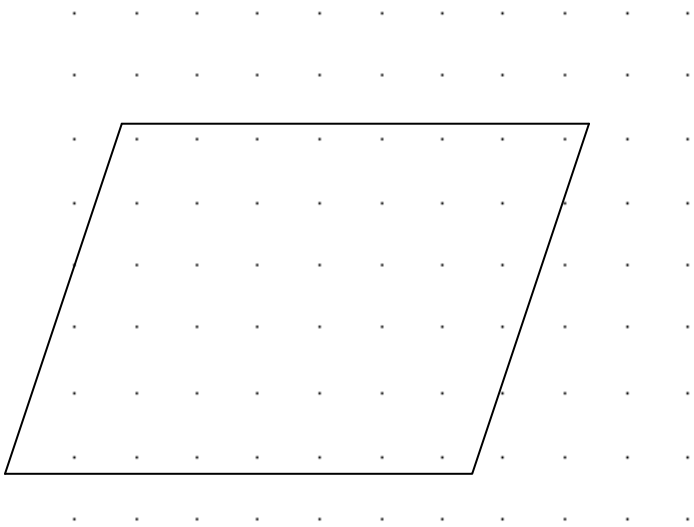
2. The area of a parallelogram is 36 square units and the height is 4. Determine the base.

3. The perimeter of a parallelogram is 28 inches. If the height of the parallelogram is 7 inches, what is the area of the parallelogram?



Picking Parallelograms ANSWER KEY

1. Use your geoboard to create this parallelogram. Determine the area.

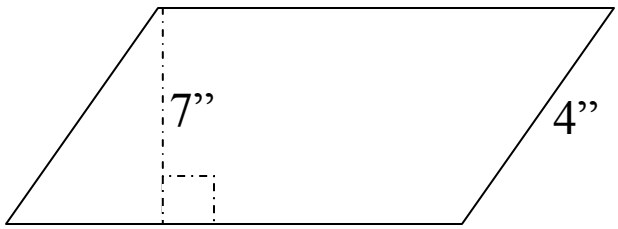


35 square units

2. The area of a parallelogram is 36 square units and the height is 4. Determine the base.

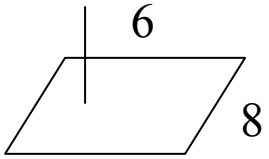
9 units

3. The perimeter of a parallelogram is 28 inches. If the height of the parallelogram is 7 inches, what is the area of the parallelogram?



70 square units

Parallelogram Memory Game

	60 sq. units
	60.68 sq. units
The area of a parallelogram is 120 square units. If the height is 10 units, determine the base.	12 units
The perimeter of the below parallelogram is 24 units. Find the area 	24 sq. units
The height of a triangle is x units and the area is $9x$ units. If the area is 81 square units, solve for x.	3 units

Parallelogram Memory Game Board

Problem	Work and Solution

Trying Triangles Name: _____

- Paste your right triangles here:

  - How could we find the area of the whole figure?

  - How could we find the area of just one of the triangle?

- Paste your acute and obtuse triangles here:

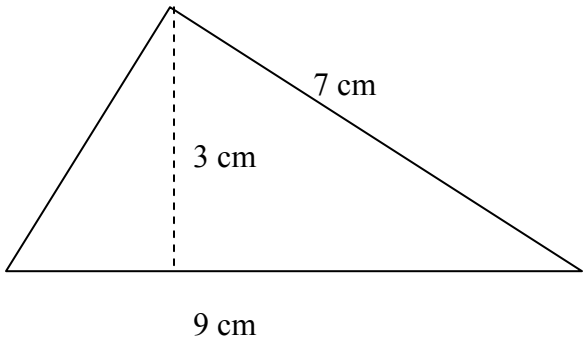
  - How could we find the area of the whole figure?

  - How could we find the area of just one of the triangle?

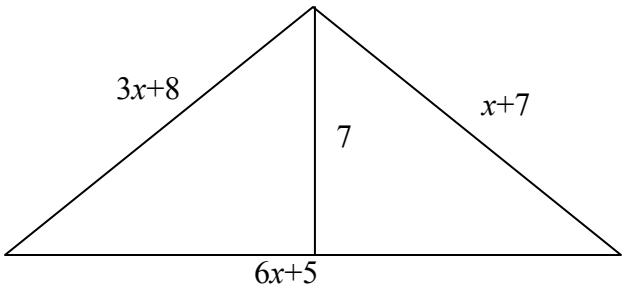
Area of Triangle Formula

Let's try some examples!

1. Determine the area of the following triangle.



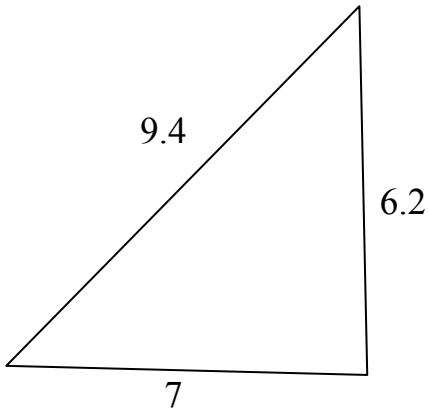
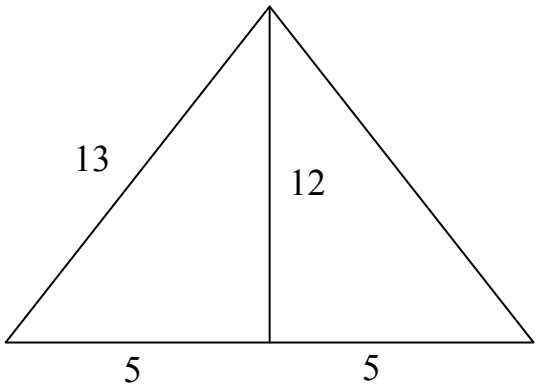
2. If the perimeter of the triangle below is 60, solve for x and then the area.



Coach/ Player Triangle Practice Name: _____

The Rules:

- Person 1 will start as the coach telling the player step–by–step instructions on how to solve their problem.
- The player is allowed to help the coach if he/ she is confused.
- Once the player and the coach agree on the answer, then person 2 will start as the coach and will tell the player the step–by–step instructions as above.
- You must show all work!!!

Coach: _____ Player: _____  Base: Height: Area:	Coach: _____ Player: _____  Base: Height: Area:

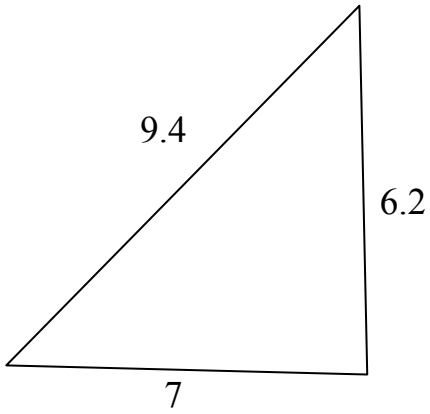
Coach/ Player Triangle Practice Name: __ANSWER KEY___

The Rules:

- Person 1 will start as the coach telling the player step–by–step instructions on how to solve their problem.
- The player is allowed to help the coach if he/ she is confused.
- Once the player and the coach agree on the answer, then person 2 will start as the coach and will tell the player the step–by–step instructions as above.
- You must show all work!!!

Coach: _____

Player: _____



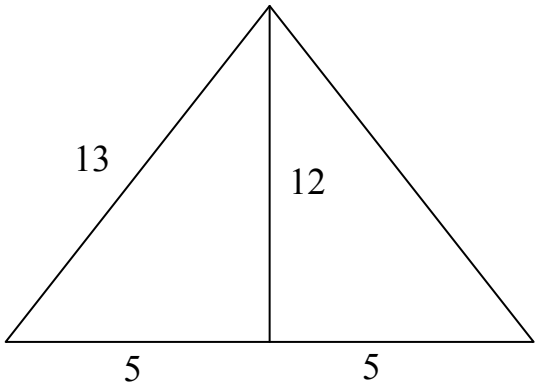
Base: 7 units
Height: 6.2 units

Area:

$$A = \frac{1}{2}bh$$
$$= \frac{1}{2} \cdot 7 \cdot 6.2$$
$$= 21.6 \text{ sq. units}$$

Coach: _____

Player: _____



Base: 10 units
Height: 12 units

Area:

$$A = \frac{1}{2}bh$$
$$= \frac{1}{2} \cdot 10 \cdot 12$$
$$= 60 \text{ sq. units}$$

Tricky Trapezoids Name: _____

Directions: Follow the directions below to discover the area formula for a trapezoid.

Workspace

1. In the workspace above, use your straightedge to draw two parallel lines of different lengths. Label the two lines b_1 and b_2.

2. Use your straightedge to connect the endpoints of the two parallel lines.

3. Construct the altitude of the trapezoid and label it h.

4. Trace the trapezoid just created onto a piece of patty paper.

5. Line up the trapezoid on the patty paper with the trapezoid drawn in the space above to create a parallelogram

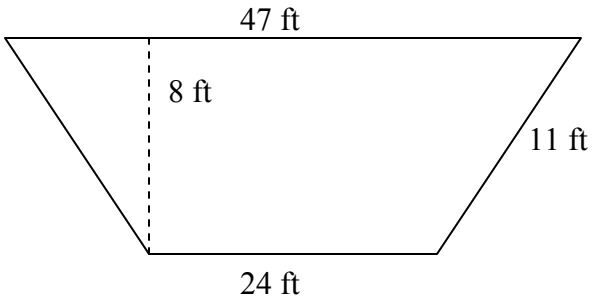
Directions: Now, answer the following questions based on your construction.

6. How could we find the area of the parallelogram?

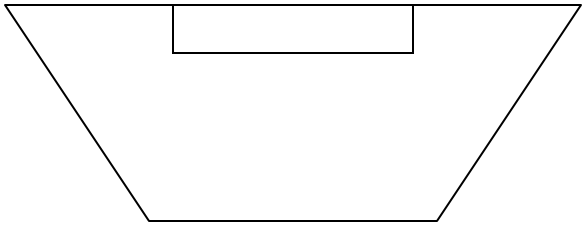
7. How could we find the area of one of the trapezoids?

Directions: Apply the area formula for trapezoids for the examples below.

8. Determine the area of the following trapezoid.



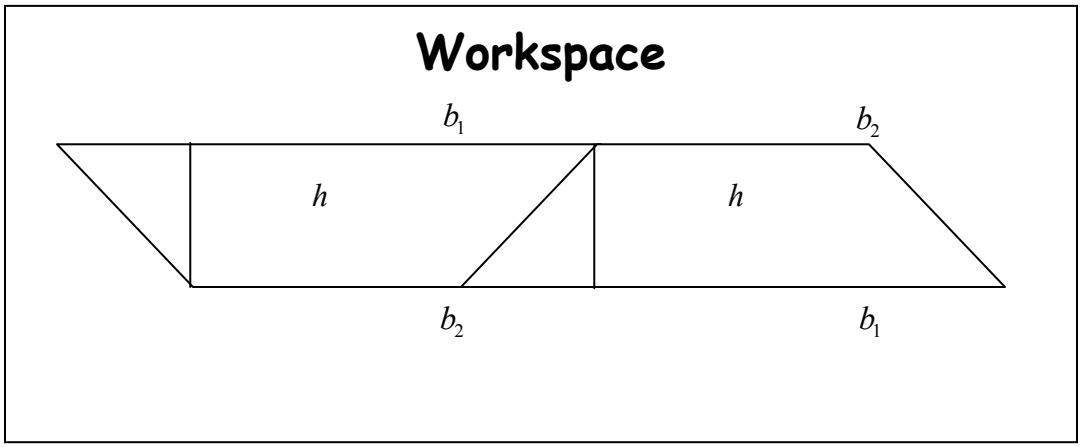
9. Josh's living room is a trapezoidal shape. The parallel walls have lengths of 20 and 25 feet, and the room is 15 feet wide. He also has a rectangular fireplace that is 2 feet by 6 feet. He wants to put wood flooring down in his living room. How many feet of wood flooring would he need to buy?



10. For Josh's room in question 10 above, each square foot of wood flooring costs $2.45. How much will the wood flooring cost?

Tricky Trapezoids Name: __ANSWER KEY___

Directions: Follow the directions below to discover the area formula for a trapezoid.



1. In the workspace above, use your straightedge to draw two parallel lines of different lengths. Label the two lines b_1 and b_2.

2. Use your straightedge to connect the endpoints of the two parallel lines.

3. Construct the altitude of the trapezoid and label it *h*.

4. Trace the trapezoid just created onto a piece of patty paper.

5. Line up the trapezoid on the patty paper with the trapezoid drawn in the space above to create a parallelogram

Directions: Now, answer the following questions based on your construction.

6. How could we find the area of the parallelogram?

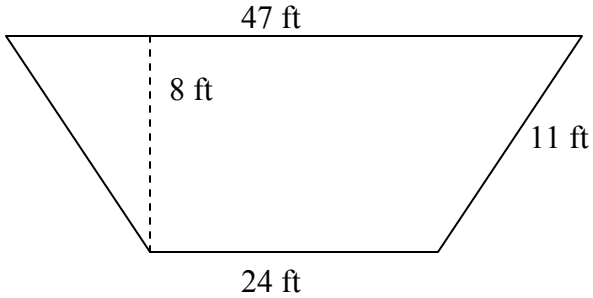
$$A = (b_1 + b_2)h$$

7. How could we find the area of one of the trapezoids?

$$A = \frac{(b_1 + b_2)h}{2}$$

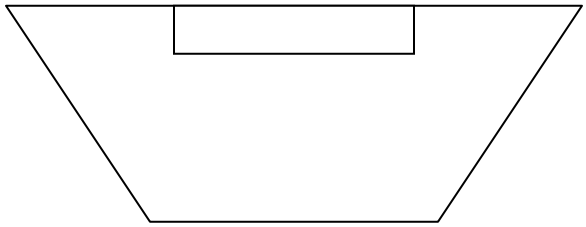
Directions: Apply the area formula for trapezoids for the examples below.

8. Determine the area of the following trapezoid.



$$A = \frac{(b_1 + b_2)h}{2}$$
$$= \frac{(24+47)\cdot 8}{2}$$
$$= 284 \text{ square units}$$

9. Josh's living room is a trapezoidal shape. The parallel walls have lengths of 20 and 25 feet, and the room is 15 feet wide. He also has a rectangular fireplace that is 2 feet by 6 feet. He wants to put wood flooring down in his living room. How many feet of wood flooring would he need to buy?



Area of floor

$$A = \frac{(b_1 + b_2)h}{2}$$
$$= \frac{(20+25)\cdot 15}{2}$$
$$= 337.5 \text{ square units}$$

Area of Fireplace = 12 square feet

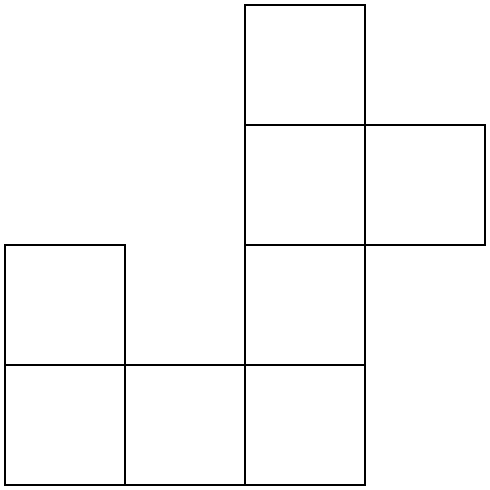
Total area of flooring = 337.5 – 12 = 325.5 square feet

10. For Josh's room in question 10 above, each square foot of wood flooring costs $2.45. How much will the wood flooring cost?

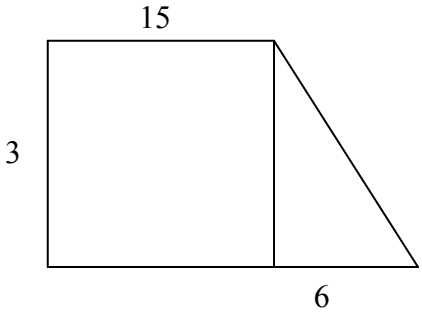
$$325.5 \cdot 2.45 = \$797.48$$

Area of a Trapezoid Activity Name: _____

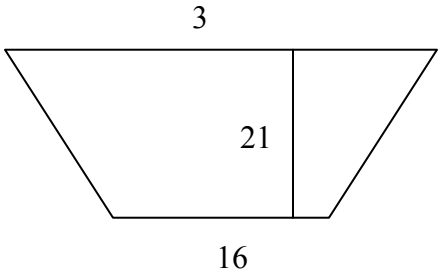
Answer each question. Use the answers to fill in the squares of the 'crossword puzzle' below. DO NOT INCLUDE UNITS OF MEASUREMENT. Note: figures are not drawn to scale.



1. Determine the area of the following trapezoid.



2. Determine the area of the following trapezoid.



3. If the area of a trapezoid is 1000 sq. units, if the two bases are 15 and 5, determine the height of the trapezoid.

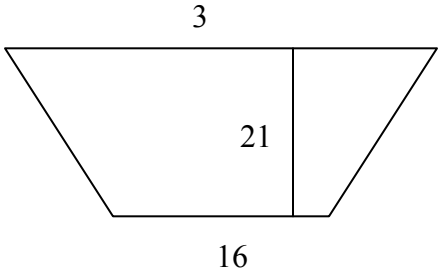
Area of a Trapezoid Activity Name: _____

Answer each question. Use the answers to fill in the squares of the 'crossword puzzle' below. DO NOT INCLUDE UNITS OF MEASUREMENT. Note: figures are not drawn to scale.

		3	
		2	0
6		1	
3	9	9	

1. Determine the area of the following trapezoid. 63

2. Determine the area of the following trapezoid. 399



3. If the area of a trapezoid is 1000 sq. units, if the two bases are 15 and 35, determine the height of the trapezoid. 20

Dusty the Dingo's Dog House Name: _____

Your family just got a new puppy. Your parents know that you are in geometry and want your help to design each part of the puppy's dog house. Your mother wants the dog house to have a rectangular base, trapezoidal faces, parallelogram sides and triangular roof tops. The entry way of the dog house will be a rectangular shape. The left side of the dog house will have TWO square windows and the right side will have one large rectangular window.

The veterinarian said your dog should only grow to be about 2 feet tall (24 inches). Make sure your dog will be able to fit into the house.

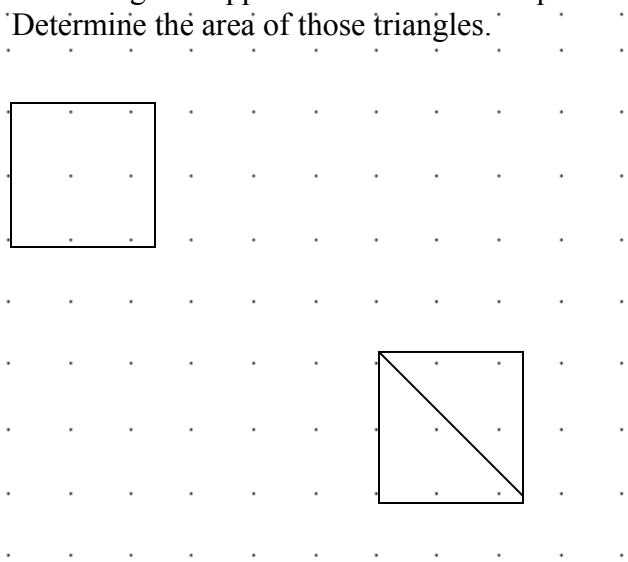
Draw a sketch of the whole dog house below. Then, use the chart to draw a each piece of the dog house, and find the area of each side of the dog house.

Part of Dog House	Rough Sketch	Area of Figure
Rectangular Base (More than 2 feet/24 inches)		
Trapezoidal Face (Entry) (The entry way of the dog house will be a rectangular shape.)		
Trapezoidal Face (Back)		
Parallelogram Side (Left) (TWO square windows)		
Trapezoidal Side (Right) (one large rectangular window)		
Triangular Roof Tops		
Total		

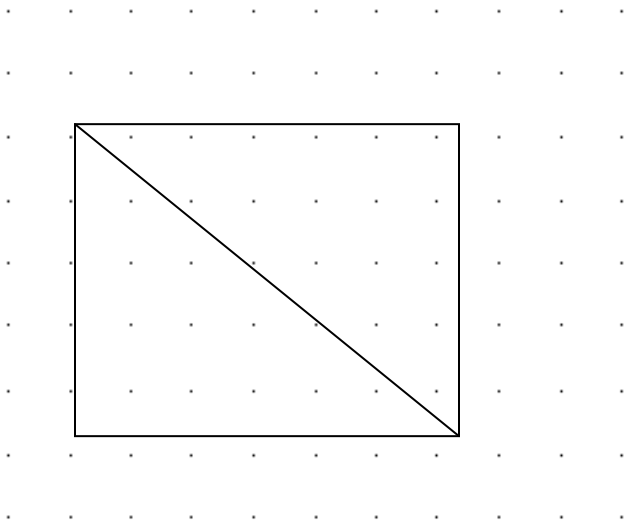
Area of a Triangle Name: _____
Guided Discovery

- Create a 2x2 square on the geoboard. What is the area?

1. Bisect the square by connecting two opposite vertices of the square with a rubber band. This forms two triangles. Determine the area of those triangles.



2. Create a 5x6 rectangle and divide this rectangle. Add a diagonal, determine the area of each of the triangles we created.



3. What formula do you think we could use to determine the area of a triangle?

Guided Practice:
Let's try it one more time!!

4. Create a rectangle with a perimeter of 12 units. What is the area of your rectangle?

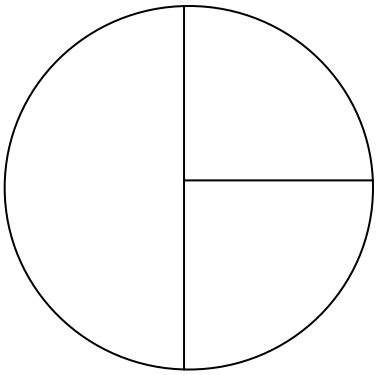
5. Add a diagonal to the rectangle you created above. Determine the area of each of the triangles now created.

6. Use the area formula for a triangle to verify the area calculated in number 6 above. Be sure to show your calculations.

Going Around in Circles Name: _____

Part I: Parts of a circle

1. Label the parts of the circle:



Word Bank

Radius

Diameter

Circumference

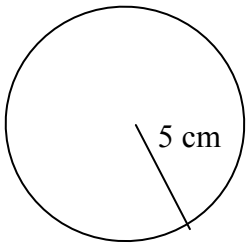
Area

Part II: Area and Circumference

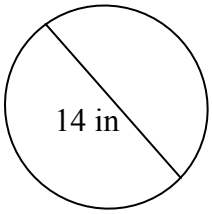
Area of a Circle	**Circumference of a Circle**

2. Find the area of the circles; leave your answers in terms of pi.

Example 1

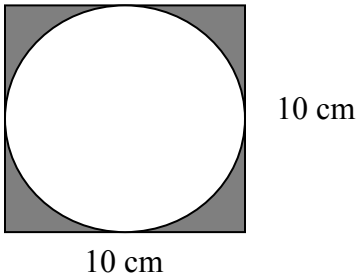


Example 2



Example 3: Find the radius of a circle if the area is 400π sq. inches.

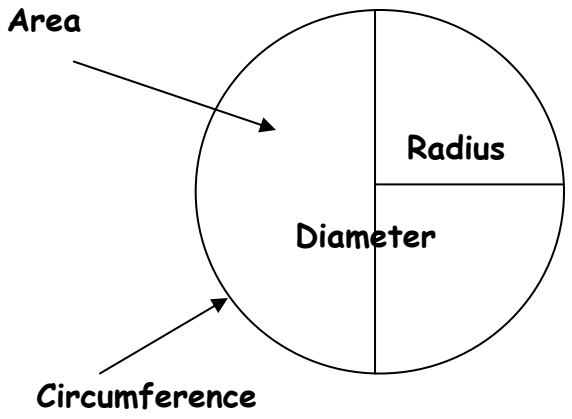
Example 4: Find the area of the shaded region.



Going Around in Circles Name: _ANSWER KEY____

Part I: Parts of a circle

1. Label the parts of the circle:



Word Bank

Radius

Diameter

Circumference

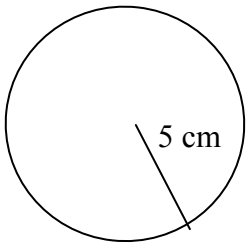
Area

Part II: Area and Circumference

Area of a Circle	Circumference of a Circle
$A = \pi r^2$	$C = \pi d$ or $C = 2\pi r$

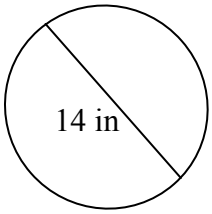
2. Find the area of the circles; leave your answers in terms of pi.

Example 1



$A = 25\pi$ cm^2

Example 2

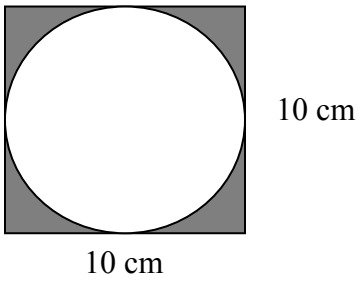


$A = 49\pi$ in^2

Example 3: Find the radius of a circle if the area is 400π sq. inches.

$$r = 20\,\text{in}$$

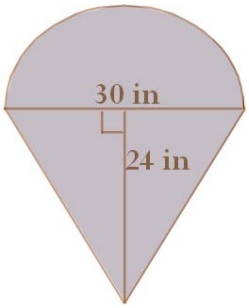
Example 4: Find the area of the shaded region.



$$A = (100 - 25\pi)\,\text{cm}^2$$

Pass the Circle Problem Name: _____

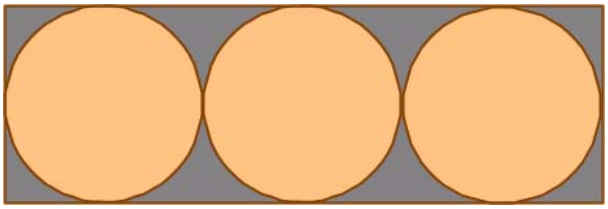
Find the area of the shaded figure. Leave answers in terms of pi.



1. Identify the parts	Ex: $h_{\text{triangle}} = 24$ in Student Initial:___
2. Find the area of the semi–circle	Student Initial:___
3. Find the area of the triangle	Student Initial:___
4. Find the area of the whole figure	Student Initial:___

Pass the Circle Problem Name: _____

Find the area of the shaded figure. Leave answers in terms of pi.

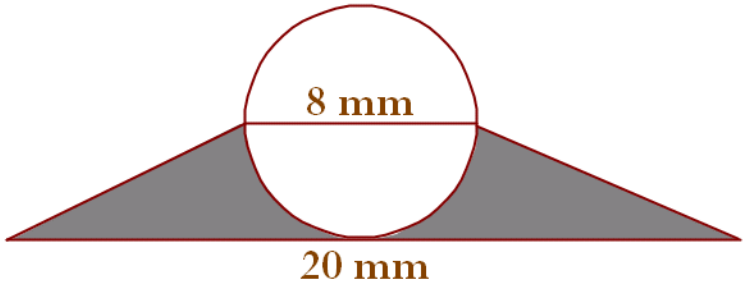


60cm

1. Identify the parts	Ex: $b_{\text{rectangle}} = 60$ cm Student Initial:___
2. Find the area of the rectangle	Student Initial:___
3. Find the one circle	Student Initial:___
4. Find the area of the shaded figure	Student Initial:___

Pass the Circle Problem Name: _____

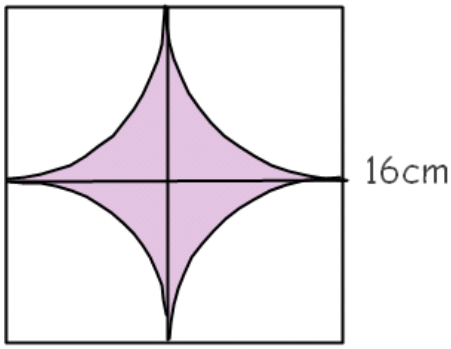
Find the area of the shaded figure. Leave answers in terms of pi.



1. Identify the parts	Ex: $b_{\text{trapezoid}} = 20$ mm Student Initial:___
2. Find the area of the Trapezoid	Student Initial:___
3. Find the circle	Student Initial:___
4. Find the area of the shaded figure	Student Initial:___

Pass the Circle Problem Name: _____

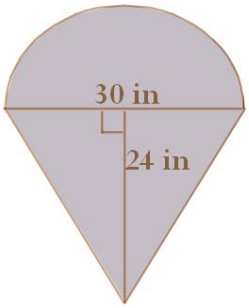
Find the area of the shaded figure. Leave answers in terms of pi.



1. Identify the parts	Ex: $s = 16\,\text{cm}$ Student Initial:___
2. Find the area of the square	Student Initial:___
3. Find the circle	Student Initial:___
4. Find the area of the shaded figure	Student Initial:___

Pass the Circle Problem Name: _ANSWER KEY____

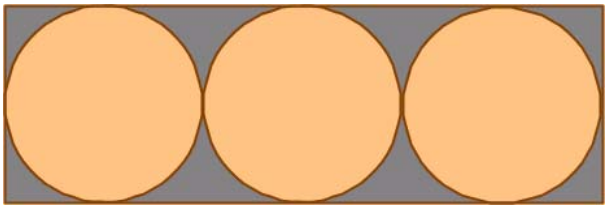
Find the area of the shaded figure. Leave answers in terms of pi.



1. Identify the parts	Ex: $h_{\text{triangle}} = 24$ in $b_{\text{triangle}} = 30$ in $r = 15$ in Student Initial:___
2. Find the area of the semi–circle	Area of Circle $= 225\pi$ Area of Semi - Circle $= 112.5\pi$ square cm Student Initial:___
3. Find the area of the triangle	Area of Triangle $= \frac{1}{2} \cdot 30 \cdot 24 = 360$ square cm Student Initial:___
4. Find the area of the whole figure	$112.5\pi + 360$ square cm Student Initial:___

Pass the Circle Problem Name: _ANSWER KEY____

Find the area of the shaded figure. Leave answers in terms of pi.

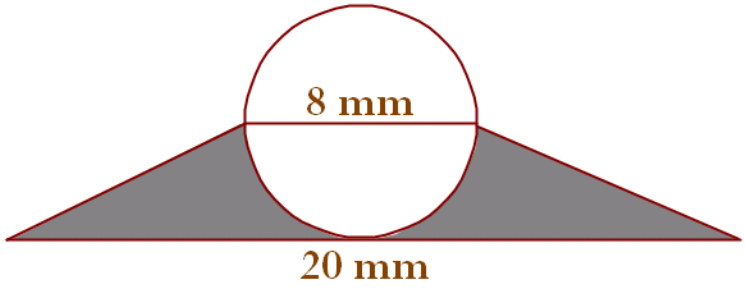


60cm

1. Identify the parts	Ex: $b_{\text{rectangle}} = 60\text{ cm}$ $h_{\text{rectangle}} = d = 20\text{ cm}$ Student Initial:___
2. Find the area of the rectangle	Area of rectangle $= 60 \cdot 20 = 1200$ square cm Student Initial:___
3. Find the one circle	Area of Circle $= 100\pi$ square cm Student Initial:___
4. Find the area of the shaded figure	$100 - 300\pi$ square cm Student Initial:___

Pass the Circle Problem Name: _ANSWER KEY____

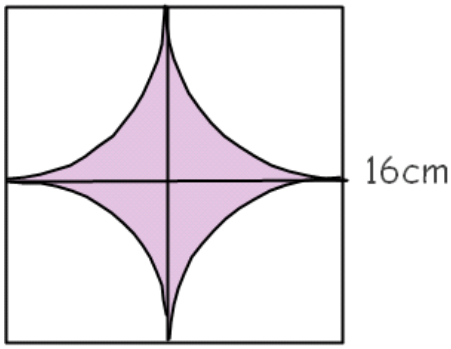
Find the area of the shaded figure. Leave answers in terms of pi.



1. Identify the parts	Ex: $b_{\text{trapezoid}} = 20$ mm $b_{2\text{-trapezoid}} = 8$ mm $h = r = 4$ mm Student Initial:___
2. Find the area of the Trapezoid	Area of trapezoid $= \frac{1}{2}(20+8)\cdot 4 = 56$ square mm Student Initial:___
3. Find the circle	Area of circle $= 16\pi$ square mm Student Initial:___
4. Find the area of the shaded figure	$56 - 8\pi$ square mm Student Initial:___

Pass the Circle Problem Name: _ANSWER KEY____

Find the area of the shaded figure. Leave answers in terms of pi.



1. Identify the parts	Ex: $s = 16\,\text{cm}$ Student Initial:___
2. Find the area of the square	Area of square $= 16 \cdot 16 = 256$ square cm Student Initial:___
3. Find the circle	Area of circle $= 64\pi$ square mm Student Initial:___
4. Find the area of the shaded figure	$256 - 64\pi$ square cm Student Initial:___

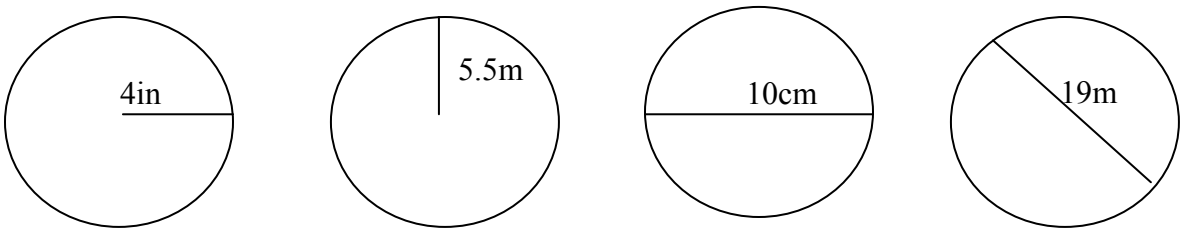
Help Tim Pass!!

Name:_____

Tim skipped the lesson on finding the area of a circle!! Help Tim solve the following problems and find the mistakes he made on his paper.

1. The formula to find the area of a circle is A=_____.

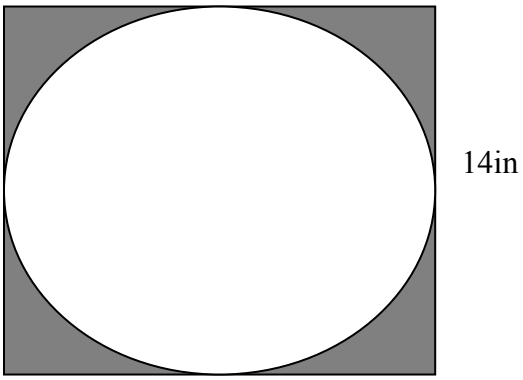
2. Find the area of the following circles. Note figures are not drawn to scale.



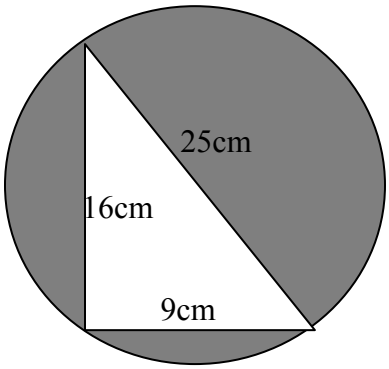
Tim's work:
$A=4in \times 4in \times \pi$
$A=16\pi in$

Tim's work:
$A=10cm \times 10cm \times \pi$
$A=100\pi cm$

3. Find the area of the shaded regions. (Note: you need to find the area of all the shapes.)



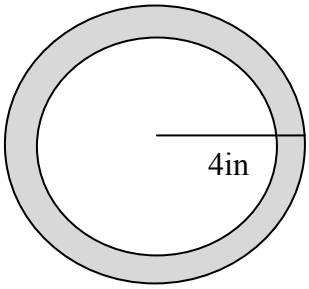
Tim's work:
$r=7,\ d=14$
$A_{circle}=\pi r^2=\pi(14)^2=28\pi$
$A_{square}=14\times14=28$
$A_{shaded}= A_{square} - A_{circle}$
$A_{shaded}= 28 - 28\pi$



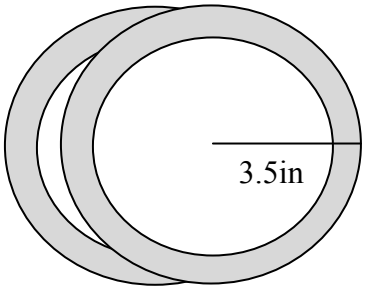
Pretty Princesses Pizza Palace Name: _____

Pretty Princess owns a pizza palace. She has specials on 4 different types of pizza. Determine which pizza is the better deal based on the price and the area of the pizza. Make sure to show all your work beside the special.

Cheese Pizza

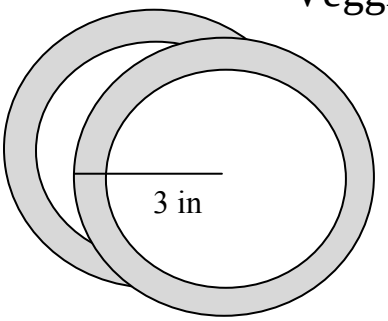


1 Cheese Pizza for $9.99



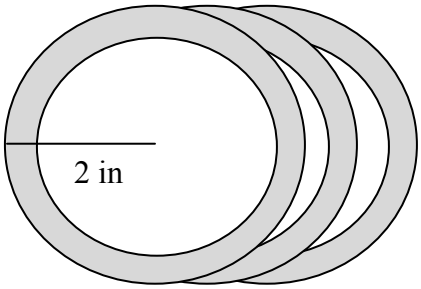
2 Cheese Pizzas for $19.99

Veggie Pizza



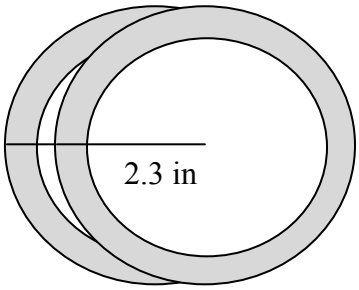
2 Veggie Pizzas for $15.00

3 Veggie Pizzas for $19.99

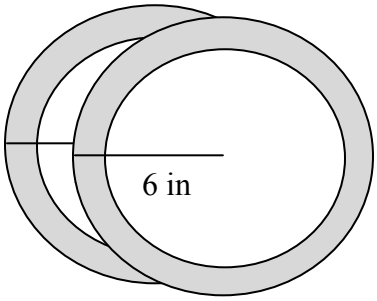


Hawaiian Pizza

2 Hawaiian Pizzas for $14.99

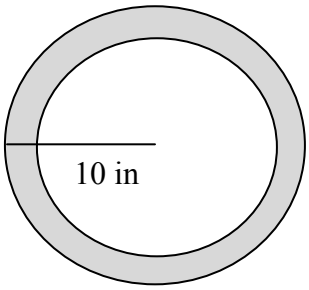


2 Hawaiian Pizzas for $29.99

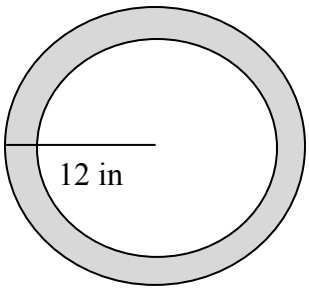


Pepperoni Pizza

1 Pepperoni Pizzas for $15.00



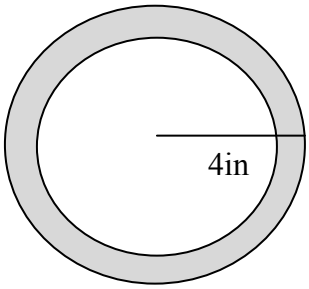
1 Pepperoni Pizzas for $22.99



Pretty Princesses Pizza Palace Name: _____

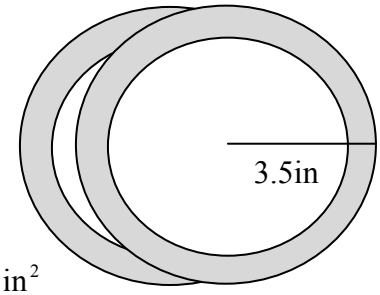
Pretty Princess owns a pizza palace. She has specials on 4 different types of pizza. Determine which pizza is the better deal based on the price and the area of the pizza. Make sure to show all your work beside the special.

Cheese Pizza



1 Cheese Pizza for $9.99

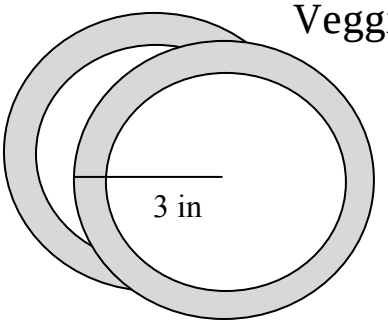
$$\frac{\text{Price}}{\text{Area}} = \frac{\$9.99}{16\pi \text{ in}^2} = \$0.20 \text{ per in}^2$$



2 Cheese Pizzas for $19.99

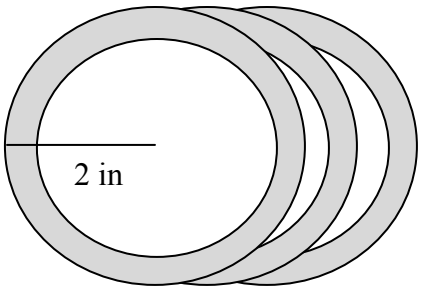
$$\frac{\text{Price}}{\text{Area}} = \frac{\$19.99}{2 \cdot 3.5^2 \pi \text{ in}^2} = \$0.26 \text{ per in}^2$$

Veggie Pizza



2 Veggie Pizzas for $15.00

$$\frac{\text{Price}}{\text{Area}} = \frac{\$15.00}{2 \cdot 9\pi \text{ in}^2} = \$0.27 \text{ per in}^2$$

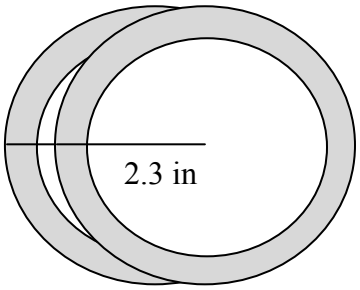


3 Veggie Pizzas for $19.99

$$\frac{\text{Price}}{\text{Area}} = \frac{\$19.99}{3 \cdot 4\pi \text{ in}^2} = \$0.53 \text{ per in}^2$$

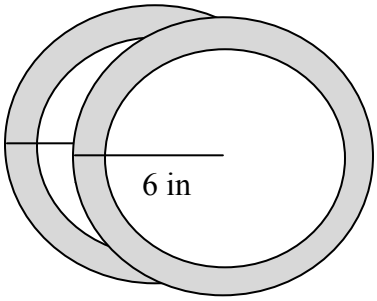
Hawaiian Pizza

2 Hawaiian Pizzas for $14.99



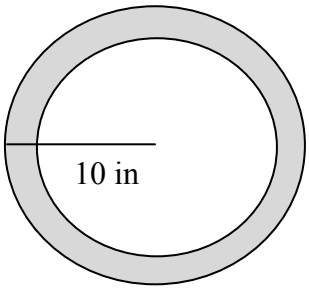
$$\frac{\text{Price}}{\text{Area}} = \frac{\$14.99}{2 \cdot 2.3^2 \pi \text{ in}^2} = \$0.45 \text{ per in}^2$$

2 Hawaiian Pizzas for $29.99



$$\frac{\text{Price}}{\text{Area}} = \frac{\$29.99}{2 \cdot 36\pi \text{ in}^2} = \$0.13 \text{ per in}^2$$

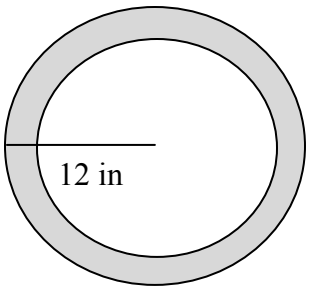
Pepperoni Pizza



1 Pepperoni Pizzas for $15.00

$$\frac{\text{Price}}{\text{Area}} = \frac{\$15.00}{100\pi \text{ in}^2} = \$0.05 \text{ per in}^2$$

1 Pepperoni Pizzas for $22.99



$$\frac{\text{Price}}{\text{Area}} = \frac{\$22.99}{144\pi \text{ in}^2} = \$0.05 \text{ per in}^2$$

Introduction to Probability Notes Name: _____

Probability is a number from 0 to 1 that indicates how likely an event is to occur. Probability can be written as a percent or decimal.

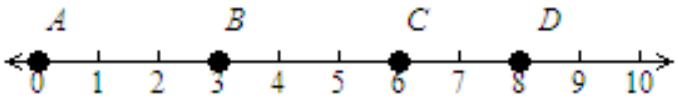
A probability of 0 (0%) means the event cannot occur.
A probability of 1 (100%) means the event must occur.

$$P(\text{event}) = \frac{\text{favorable outcomes}}{\text{possible outcomes}}$$

$$P(\text{event}) = \frac{\text{length of favorable segment}}{\text{length of entire segment}}$$

$$P(\text{event}) = \frac{\text{area of favorable region}}{\text{area of entire region}}$$

Number Line Example:



Example 1: Find the probability that a randomly selected point from $\overline{AD}$, is on $\overline{CD}$.

Example 2: Find the probability that a randomly selected point from $\overline{AD}$, is on $\overline{BC}$.

Introduction to Probability Notes Name: _ANSWER KEY____

Probability is a number from 0 to 1 that indicates how likely an event is to occur. Probability can be written as a percent or decimal.

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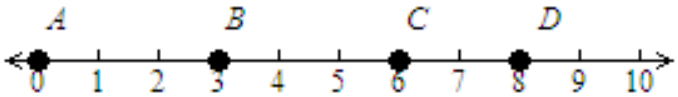
$$P(\text{event}) = \frac{\text{favorable outcomes}}{\text{possible outcomes}}$$

$$P(\text{event}) = \frac{\text{length of favorable segment}}{\text{length of entire segment}}$$

$$P(\text{event}) = \frac{\text{area of favorable region}}{\text{area of entire region}}$$

Number Line Example:



Example 1: Find the probability that a randomly selected point from $\overline{AD}$, is on $\overline{CD}$.

$$\frac{2}{8} = \frac{1}{4} = 0.254 = 25\%$$

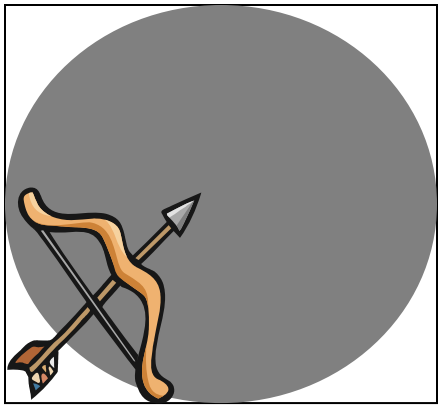
Example 2: Find the probability that a randomly selected point from $\overline{AD}$, is on $\overline{BC}$.

$$\frac{3}{8} = 0.375 = 37.5\%$$

Example 3:

Archery is the skill of shooting with a bow and arrow. In daily practice throwing darts at boards is similar to archery. Find the probability that a dart thrown randomly at the square board will hit inside the circle.

4 cm



$A_{\text{Square}} = 16\ \text{cm}^2$

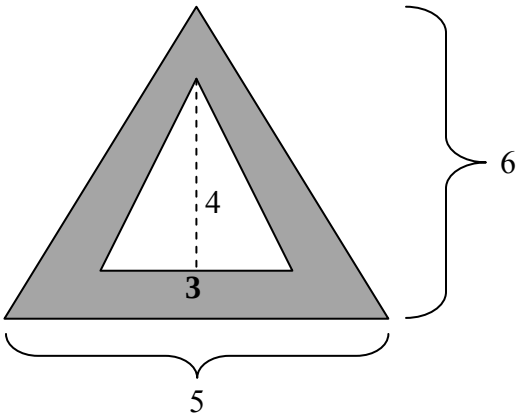
$A_{\text{Circle}} = 4\pi\ \text{cm}^2$

$$\text{Probability of hitting target} = \frac{4\pi}{16} = \frac{\pi}{4}$$

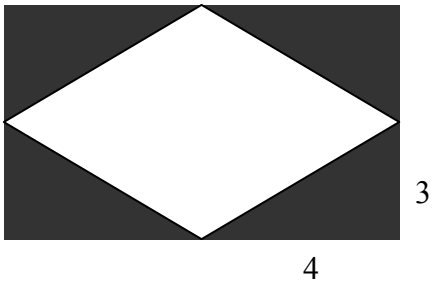
Probability Worksheet Name: _____

Directions: **Consider the targets below.** Find the probability that an arrow will land in the shaded region. Make sure to show all work. Note: figures are not drawn to scale.

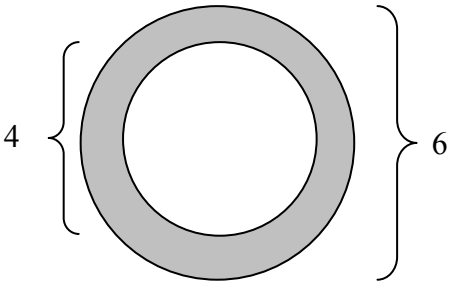
1.



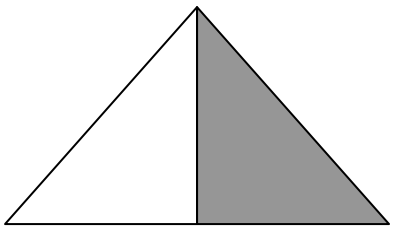
2.



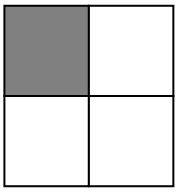
3.



4.



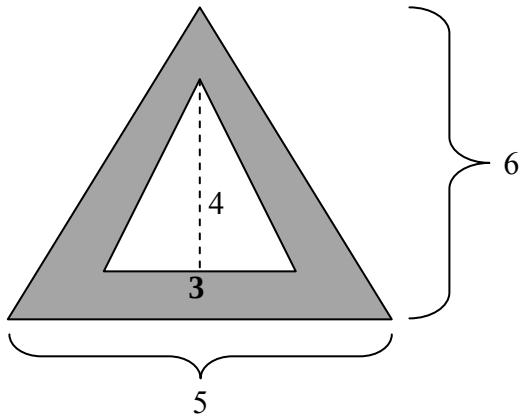
5.



Probability Worksheet Name: __ANSWER KEY___

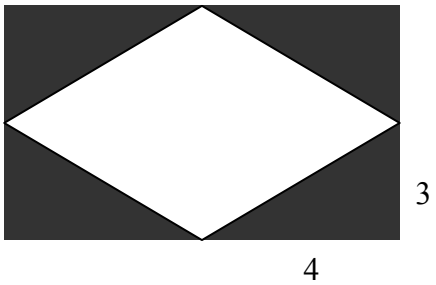
Directions: **Consider the targets below.** Find the probability that an arrow will land in the shaded region. Make sure to show all work. Note: figures are not drawn to scale.

1.



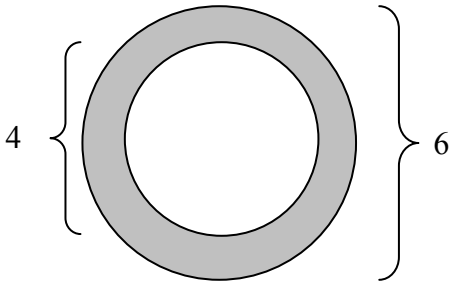
$$\frac{9}{15} = \frac{3}{5} = 0.6 = 60\%$$

2.



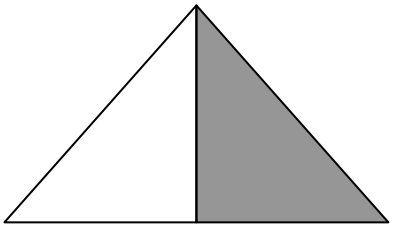
$$\frac{24}{48} = \frac{1}{2} = 0.5 = 50\%$$

3.



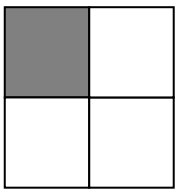
$$\frac{5\pi}{9\pi} = \frac{5}{9} = 0.56 = 56\%$$

4.



$$\frac{1}{2} = 50\%$$

5.



$$\frac{1}{4} = 25\%$$

Crazy Calvin's Carnival Games Name: _____

The carnival is coming to the classroom! Crazy Calvin, owner of Crazy Calvin's Carnival Games, wants to bring a carnival to your school. Calvin is offering a contest for students to see who can design the best carnival game!

Use what you have been learning about geometric probability to design a game for your classmates, and to present to Crazy Calvin. Calvin will award prizes to the winners of the games. Determine the probability of winning your game, so that he knows how many prizes to buy.

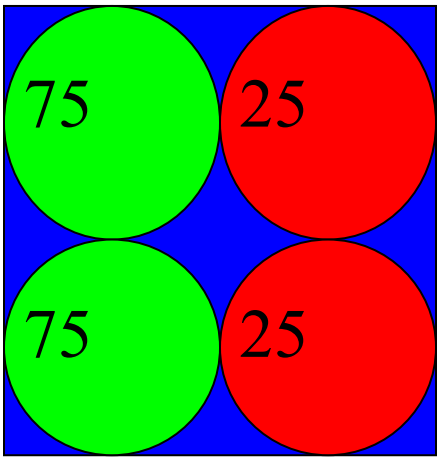
Calvin will provide you with poster board, colored paper, markers, colored pencils, crayons, glue, glue sticks, bowls, cups, marbles, balls, rulers, and tape measures. You will need to bring in any other materials your group will need from home.

You need to complete each one of Calvin's five deadlines in order to receive your full pay. You will receive a maximum of $50 for each step of his process. Each day you do not complete your work by the deadline Calvin will deduction $10 from you pay! Included in your pay is participating in the Carnival Day, where the class will get to try each other's games!

Step	Assignment	Due Date	Pay
1	Rough Sketch of the Game and Outline of the Rules		____ /$50
2	Final Sketch of the Game and Outline of the Rules		____ /$50
3	Actual Game Construction		____ /$50
4	Determining the probability of winning		____ /$50
5	Participating in Carnival Activity		____ /$50
6	Final Project		Total earned: _____ /$250

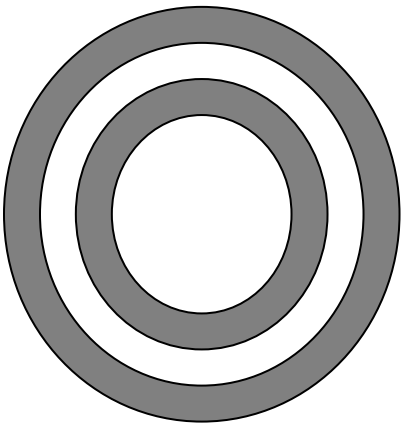
Examples of carnival games:

Can you get a perfect 100?



Players stand behind this line and will have 2 attempts to throw a ball to get 100 points

Can You Make it in the Shaded Area?



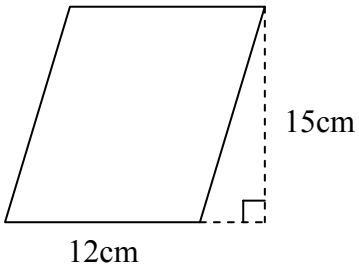
Players stand behind this line and will have 3 attempts to throw a dart in the shaded region

Area and Geometric Probability Name: _____

Pre-Assessment

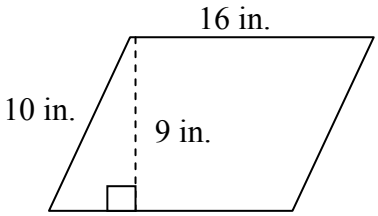
Directions: For exercises 1 – 14, select the letter of the choice that answers the question. Note: figures are not drawn to scale.

1. Find the area.



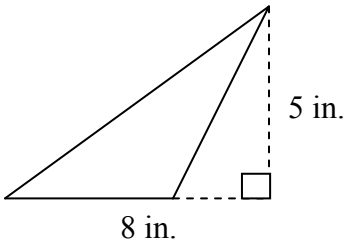
a. 108 cm^2 b. 180 cm^2 c. 90 cm^2 d. 170 cm^2

2. Find the area.



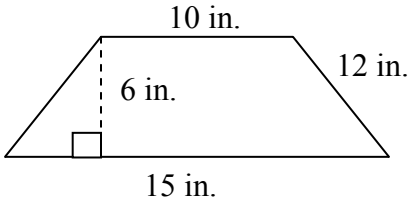
a. 144 in^2 b. 152 in^2 c. 162 in^2 d. 184 in^2

3. Find the area.



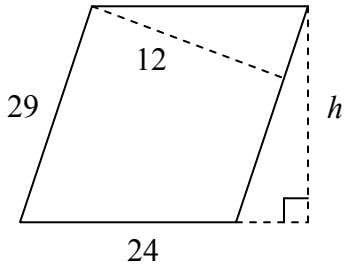
a. 10 in^2 b. 15 in^2 c. 20 in^2 d. 40 in^2

4. Find the area.



a. 150 in^2 b. 37.5 in^2 c. 300 in^2 d. 75 in^2

5. Find the value of h in the parallelogram.

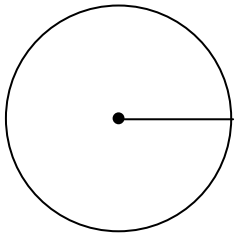


a. 19.33 units b. 14.5 units c. 19.5 units d. 15.4 units

6. Identify the quadrilateral below.

a. Square b. Rhombus c. Parallelogram d. Rectangle

7. Identify the formula for the area of a circle

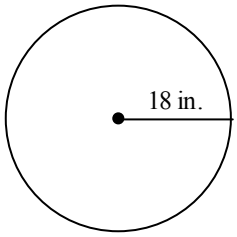


a. $A = 2\pi r$ b. $A = \frac{1}{2}\pi$ c. $A = \pi r^2$ d. $A = 2\pi r^2$

8. The formula, $A = \frac{1}{2}bh$, is the formula for finding the area of which shape?

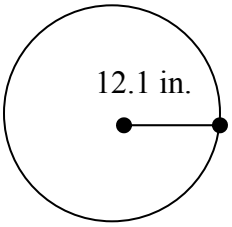
a. Trapezoid b. Rhombus c. Parallelogram d. Triangle

9. Find the area. Leave your answer in terms of π.



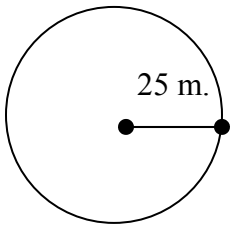
a. 18π in^2 b. 36π in^2 c. 324π in^2 d. 289π in^2

10. Find the area of the circle. Leave your answer in terms of π.



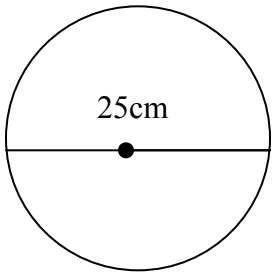
a. 146.41π in^2 b. 24.2π in^2 c. 144.1π in^2 d. 135.1π in^2

11. Find the area of the circle. Round your answer to the nearest hundredth.



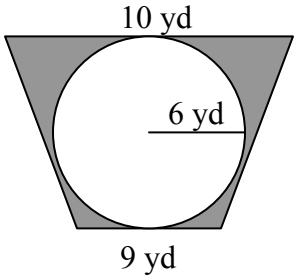
a. $1693.00\ m^2$ b. $1963.50\ m^2$ c. $1639.49\ m^2$ d. $1963.49\ m^2$

12. Find the area of the circle. Round your answer to the nearest hundredth.



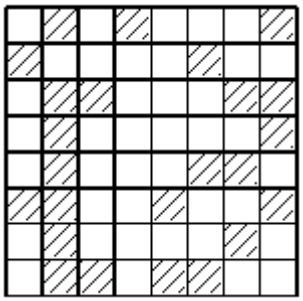
a. $625\ cm^2$ b. $156.25\ cm^2$ c. $490.87\ cm^2$ d. $312.50\ cm^2$

13. Find the area of the shaded portion of the figure. Leave your answer in terms of π.



a. $(114-36\pi)\,\text{yd}^2$ b. $(114-6\pi)\,\text{yd}^2$ c. $(228-36\pi)\,\text{yd}^2$ d. $(228-6\pi)\,\text{yd}^2$

14. What is the probability that a point chosen at random on the grid will lie in the shaded region?



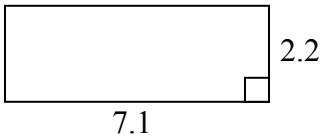
a. $\frac{4}{5}$ b. $\frac{3}{5}$ c. $\frac{5}{8}$ d. $\frac{3}{8}$

Area and Geometric Probability Name: _____

Mid-Assessment

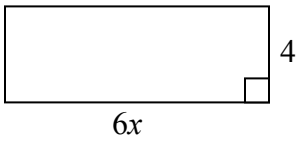
Directions: For exercises 1 – 8, select the letter of the choice that answers the question. Note: figures are not drawn to scale.

1. Find the area.



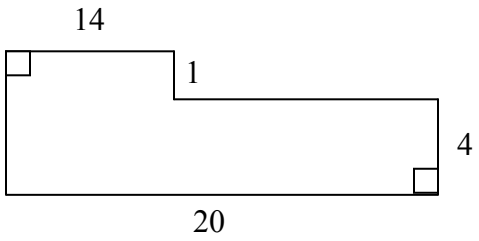
a. 9.3 sq. units b. 18.6 sq. units c. 15.62 sq. units d. 16 sq. units

2. Find the area.



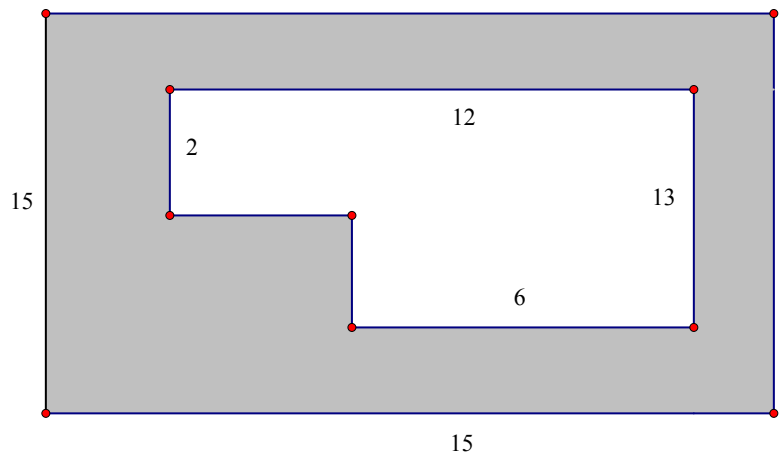
a. $10x$ units^2 b. $24x^2$ units^2 c. $12x+8$ units^2 d. $24x$ units^2

3. Find the area.



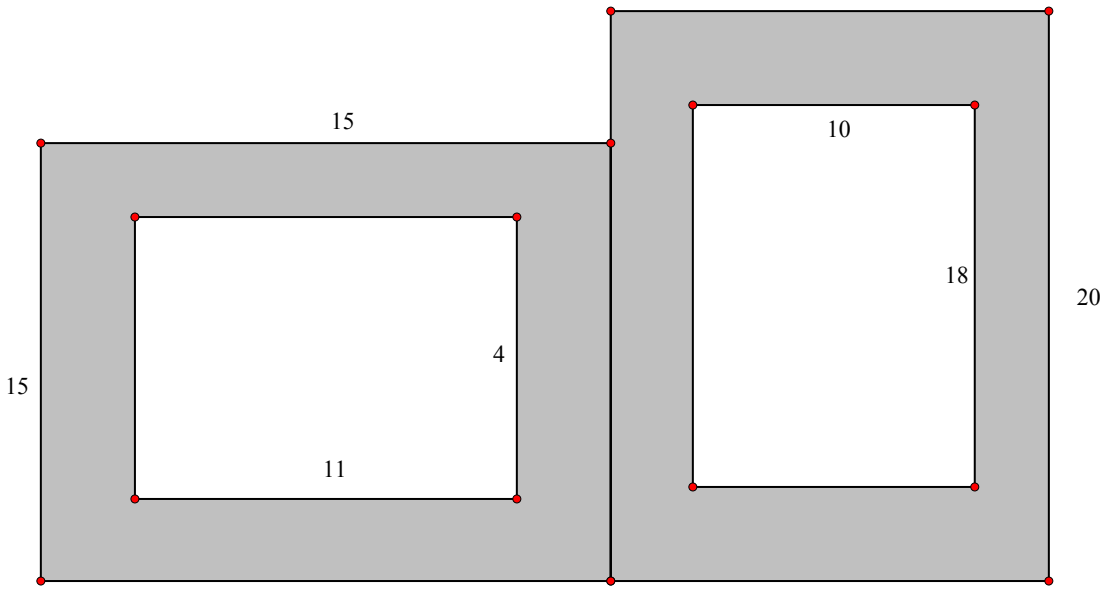
a. 136 units^2 b. 50 units^2 c. 280 units^2 d. 160 units^2

4. Find the area of the shaded region.



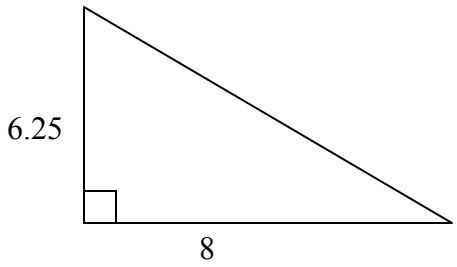
a. 69 units^2 b. 135 units^2 c. 63 units^2 d. 225 units^2

5. Find the area of the shaded region.



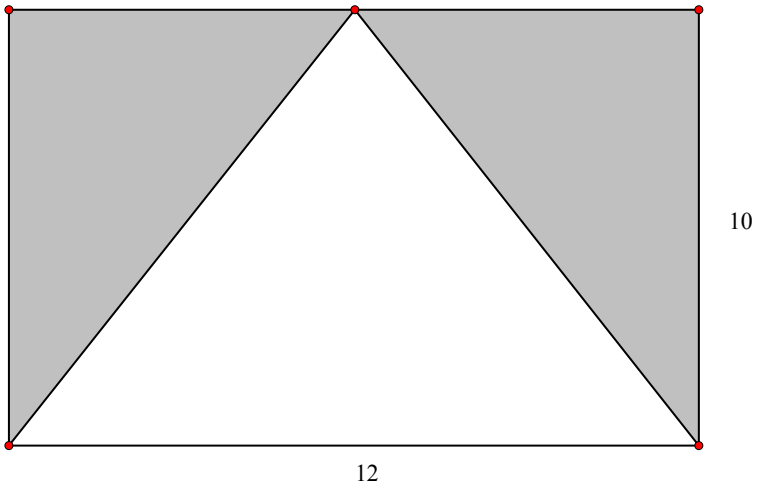
a. 301 units^2 b. 600 units^2 c. 300 units^2 d. 376 units^2

6. Find the area.



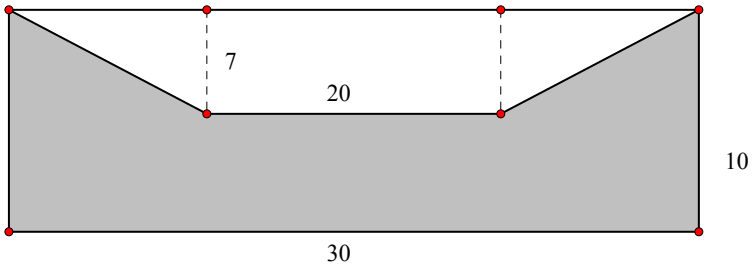
a. 14.25 units^2 b. 25 units^2 c. 10.25 units^2 d. 12.5 units^2

7. Find the area of the shaded region



a. 44 units^2 b. 120 units^2 c. 100 units^2 d. 60 units^2

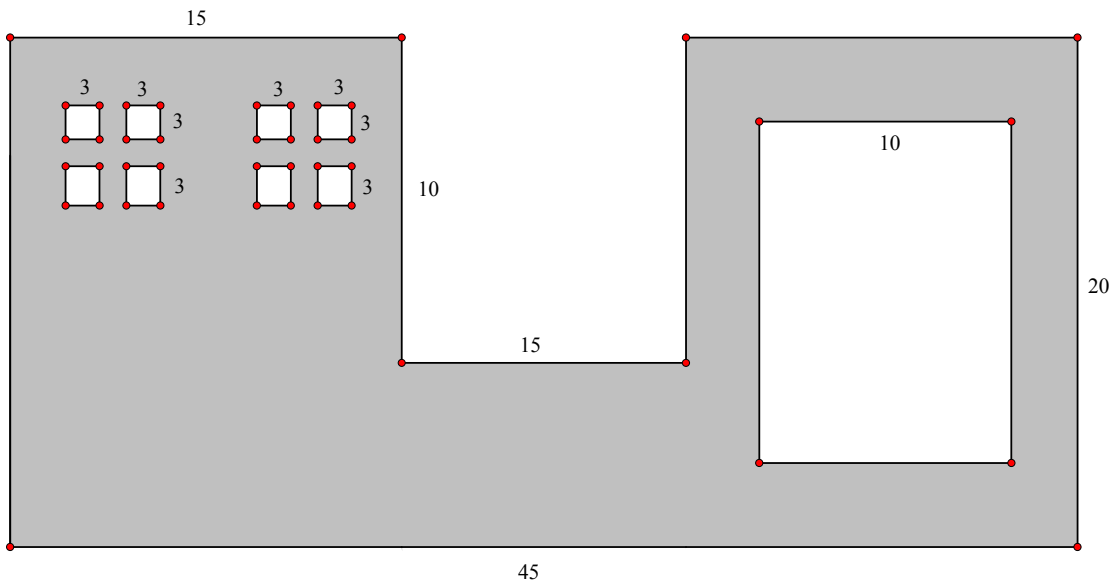
8. Find the area of the shaded region.



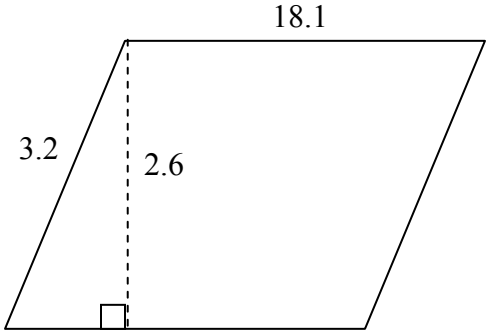
a. 125 units^2 b. 160 units^2 c. 175 units^2 d. 300 units^2

Directions: For exercises 9 – 12, show all work that leads to your answer. Note: figures are not drawn to scale.

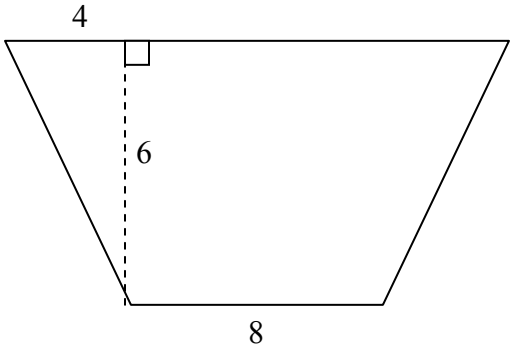
9. Find the area of the shaded region below.



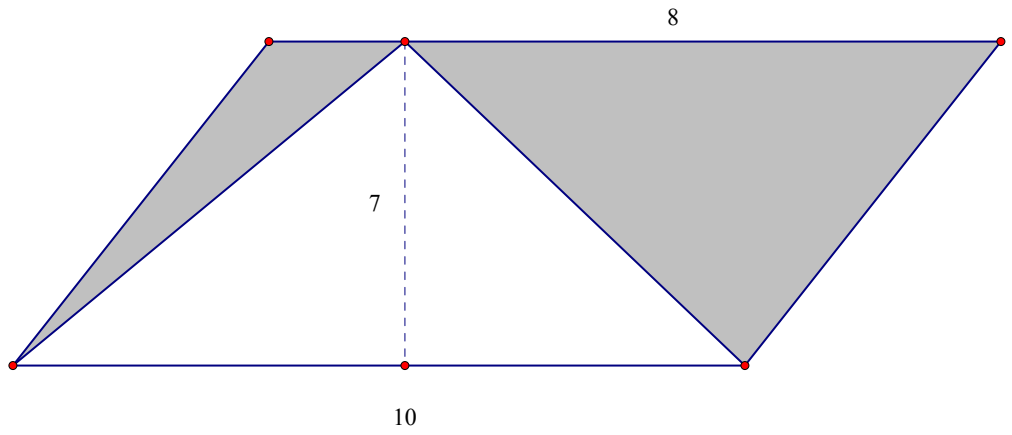
10. Find the area.



11. Find the area.

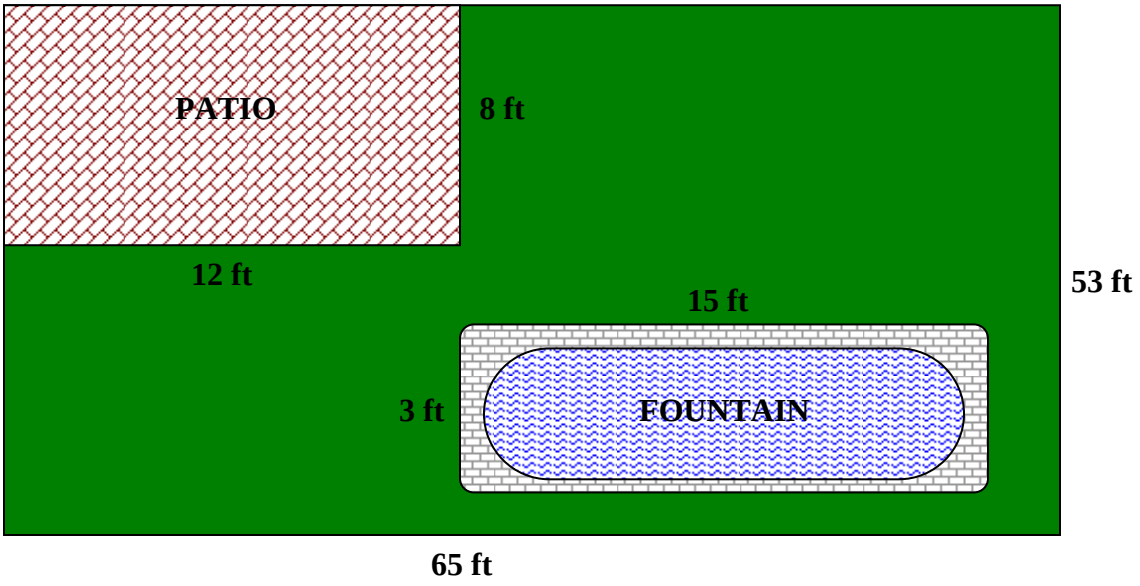


12. Find the area of the shaded region.



Directions: For exercises 13 – 15, show all work that leads to your answer. Note: figures are not drawn to scale.

13. Louis plans on fertilizing his yard and needs to know the square footage. Use the diagram and dimensions below to answer the following questions



- Find the square footage of Louis's yard.
- If one bag covers 50 sq ft, determine the number of bags that Louis will have to buy.
- If one bag of fertilizer cost $1.95, and Louis has a working budget of $125, can he complete the job? Use mathematics to explain your answer. What suggestions would you have for Louis?

14. Determine the area of the yellow “X” in the Jamaican national flag, given the dimensions

15. Nicole cuts out a Jack – O – Lantern for Halloween. Use the fact that each square represents one square inch, determine the area of the face of the Jack – O – Lantern. (Include the stem)

Area and Geometric Probability Name: _____

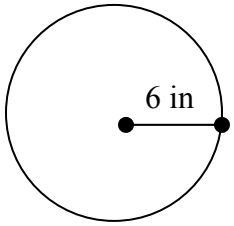
Post-Assessment

Directions: For exercises 1 – 9, match the corresponding concept, definition or formula with the correct word.

_____	1. $A = \frac{1}{2}Bh$	A.	List of all possible outcomes of a particular experiment
_____	2. Outcome	B.	Quadrilateral that has 2 sets of parrallel lines
_____	3. Sample Space	C.	Distance from the center of a circle to its edge
_____	4. Area	D.	Wanted outcome from an experiment
_____	5. Radius	E.	Quadrilateral that has only 1 set of parrallel lines
_____	6. $A = h(\frac{b_1 + b_2}{2})$	F.	Area of a triangle
_____	7. Parallelogram	G.	Possible result from an experiment
_____	8. Event	H.	Area of a trapezoid
_____	9. Trapezoid	I	Quantative measure of a two dimensional plane

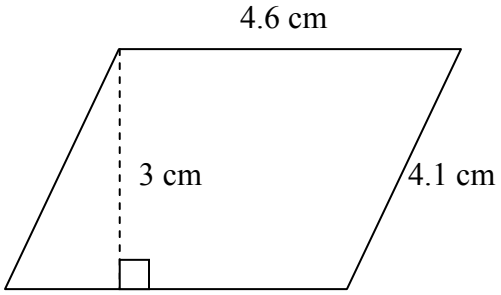
Directions: For exercises 10 – 19, select the letter of the choice that answers the question. Note: figures are not drawn to scale.

10. Find the area. Leave your answer in terms of π.



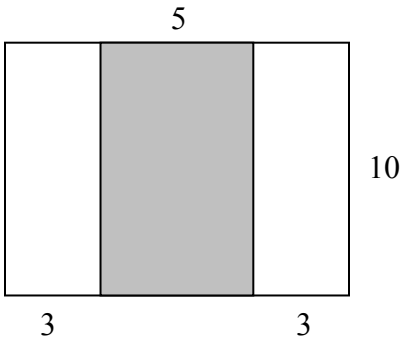
a. 12π in^2 b. 36π in^2 c. 3π in^2 d. 15π in^2

11. Find the area.



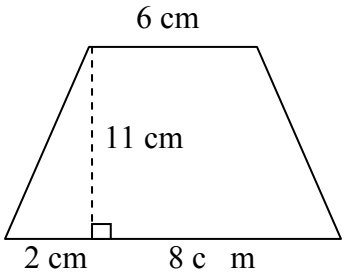
a. 13.8 cm^2 b. 18.86 cm^2 c. 12.3 cm^2 d. 56.58 cm^2

12. Find the probability of landing on the shaded region.



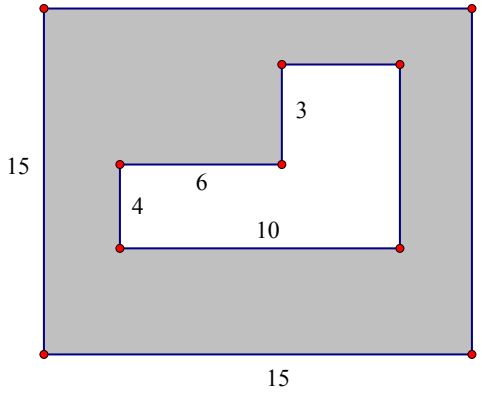
a. $\frac{5}{11}$ b. $\frac{1}{2}$ c. $\frac{3}{5}$ d. $\frac{11}{5}$

13. Find the area.



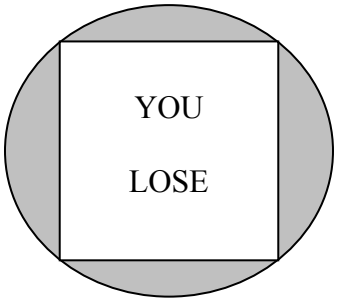
a. $13.8\ cm^2$ b. $18.86\ cm^2$ c. $12.3\ cm^2$ d. $56.58\ cm^2$

14. Find the area of the shaded region.



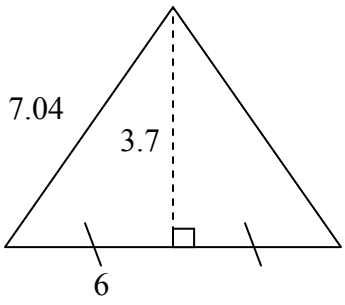
a. 52 units^2 b. 300 units^2 c. 176 units^2 d. 248 units^2

15. Find the probability of landing in the shaded region, and winning a prize! The radius of the circle is 6 inches and the square has a perimeter of 24 inches.



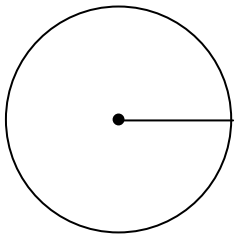
a. 113.4% b. 1.68% c. 68% d. 32%

16. Find the area.



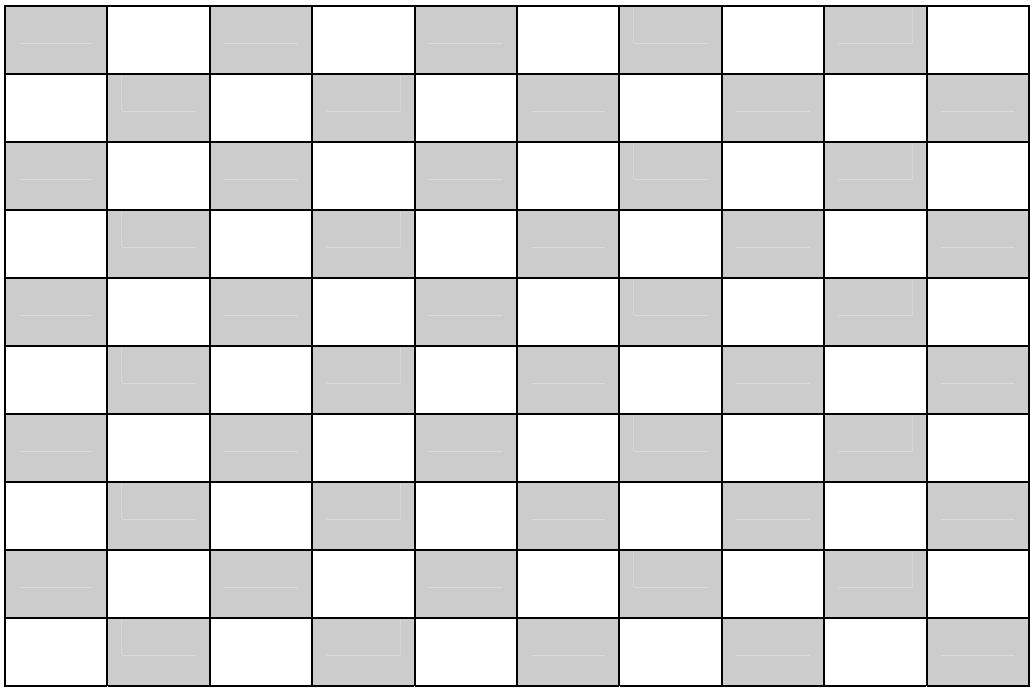
a. 11.1 units^2 b. 22.2 units^2 c. 42.24 units^2 d. 156 units^2

17. Find the radius of the circle if the area is 62.74.



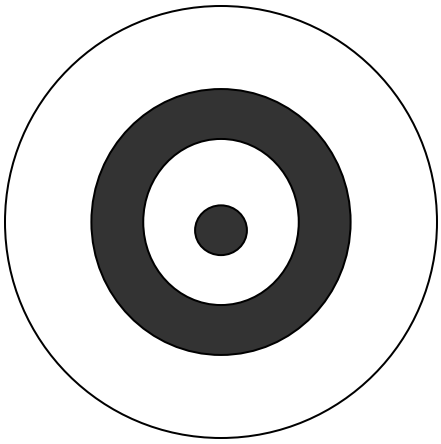
a. 20.06 units b. 4.47 units c. 6.22 units d. 5 units

18. A fly lands at random on the checker board below; find the probability of the fly landing on a shaded square:



a. 100% b. $\frac{1}{2}$ c. $\frac{49}{100}$ d. 0%

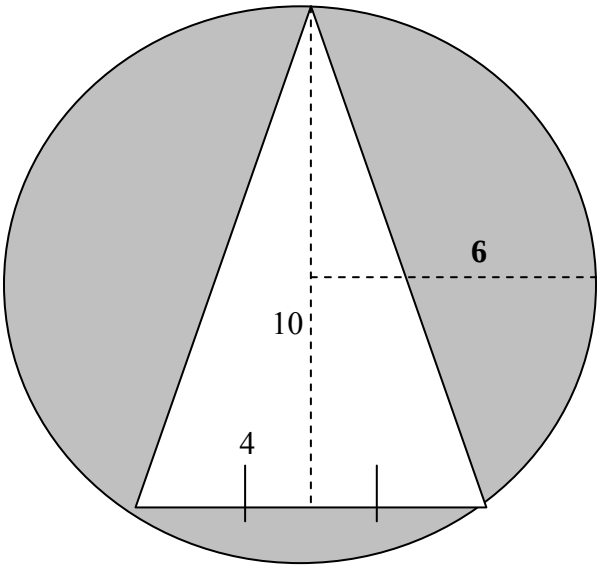
19. Find the probability of hitting the 'bulls' eye' in the target below. If the radius of the bulls' eye is 1.5' and the radius of the whole target is 5'



a. $\frac{5}{1.5}\pi$ b. $\frac{2.25}{25}$ c. $\frac{1.5}{5}$ d. $\frac{2.25}{25}\pi$

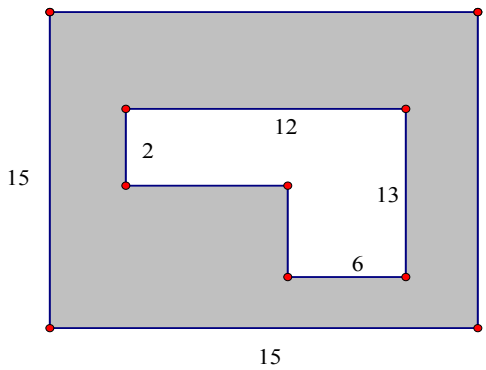
Directions: For exercises 20 – 27, show all work that leads to your answer. Note: figures are not drawn to scale.

20. Find the area of the shaded region below. (Use 3.14 for π)

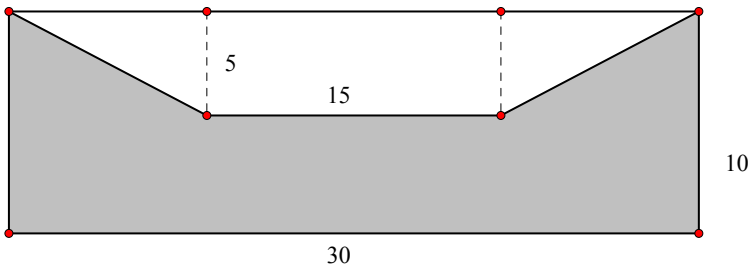


21. Find the probability of landing on the "Spin Again" section of the Wheel of Fortune spinner if the wheel has a circumference of 12 feet and it is split up into 23 equal parts. Draw a diagram to help figure out the answer.

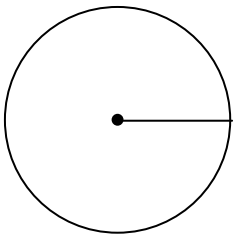
22. Find the area of the shaded region



23. Find the area of the shaded region

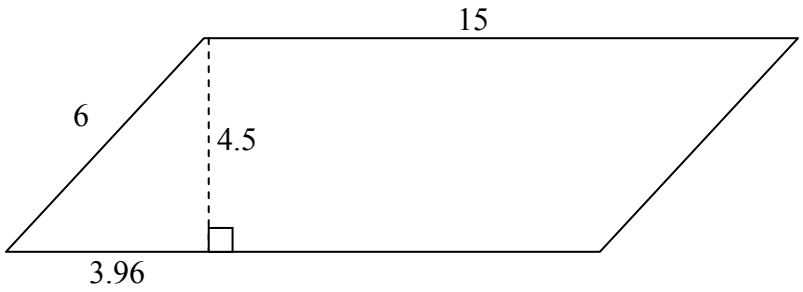


24. Find the length of the radius of a circle that has an area of 143π.

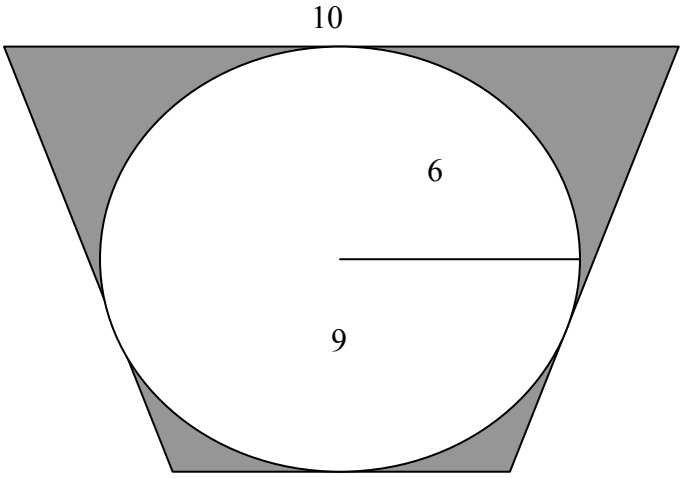


25. The area of the rectangle below is 384.635 cm^2, with a length of 17.89 cm. Find the perimeter of the rectangle

26. Find the area.

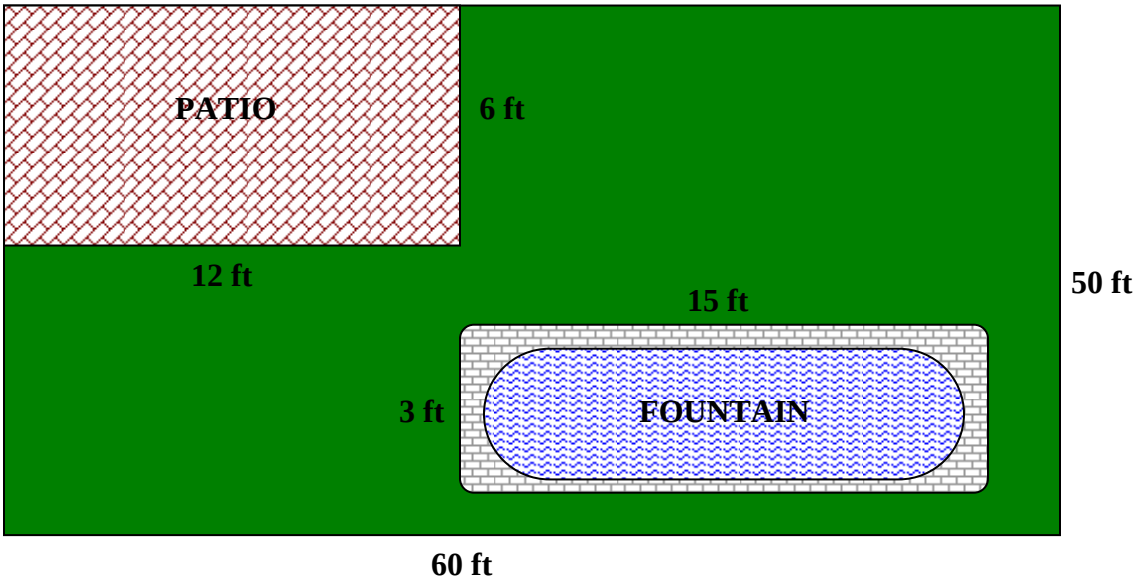


27. A game involves players trying to hit the shaded sections of a board to win a prize. Determine the probability of a dart landing in the shaded region and a prize being won. You may express your answers as a fraction, decimal or percent.



Directions: For exercises 28 – 30, show all work that leads to your answer. Note: figures are not drawn to scale.

13. Louis plans on fertilizing his yard and needs to know the square footage. Use the diagram and dimensions below to answer the following questions

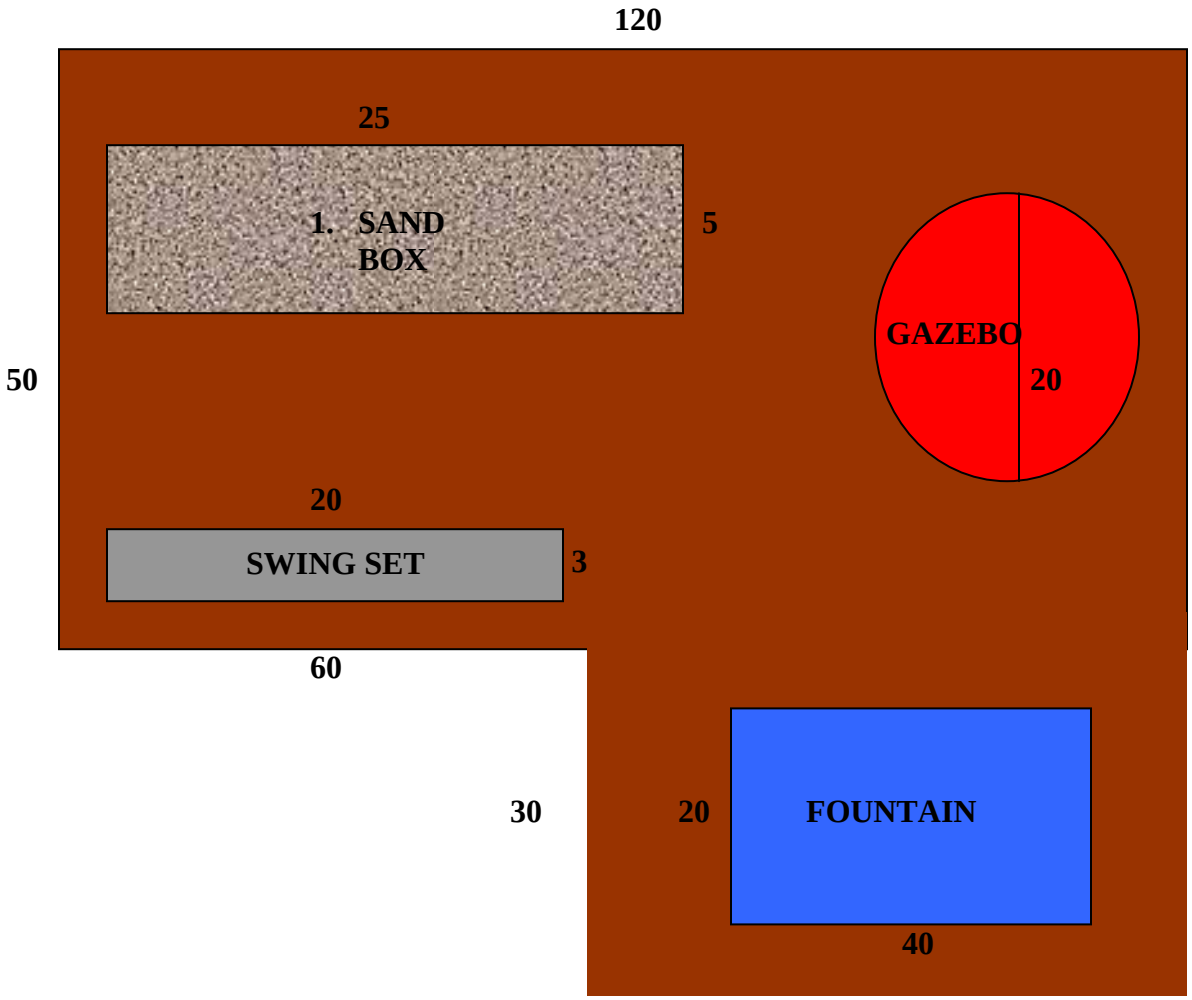


- Find the square footage of Louis's yard.

- If one bag covers 75 sq ft, determine the number of bags that Louis will have to buy.

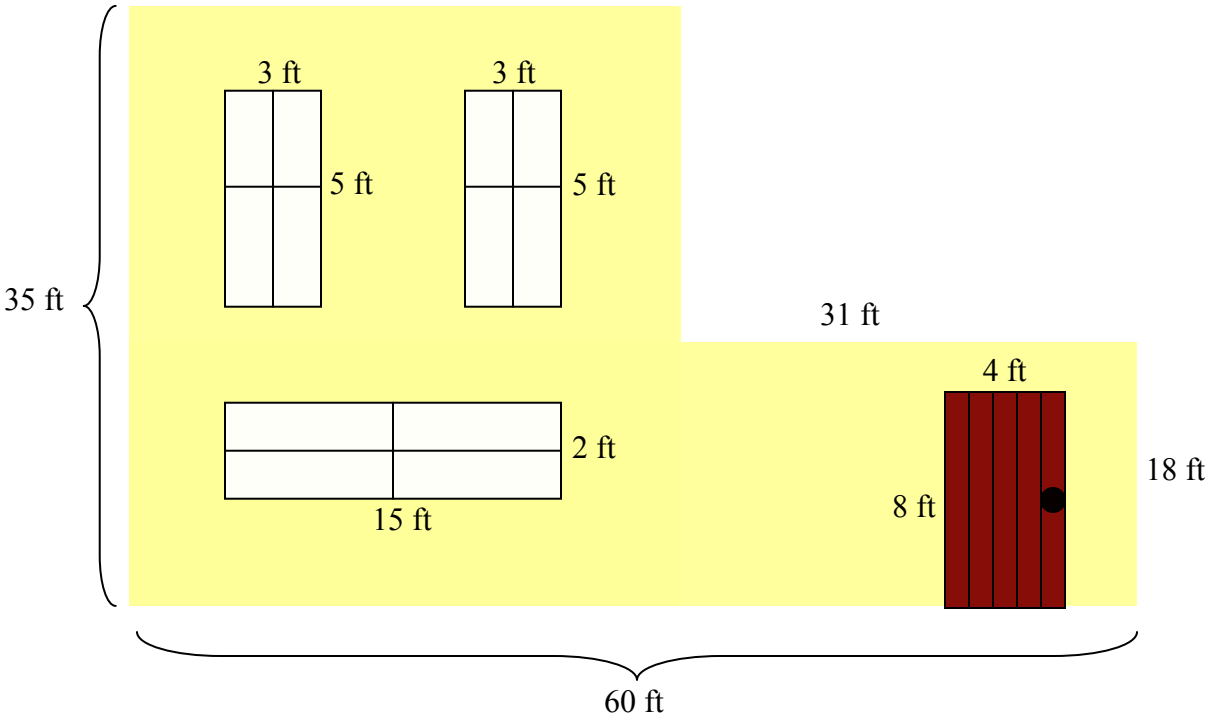
- If one bag of fertilizer cost $1.95, and Louis has a working budget of $150, can he complete the job? Use mathematics to explain your answer. What suggestions would you have for Louis?

29. The Columbia Association needs to reset the foam safety pads at one of their playgrounds. Given the dimensions of the playground and location of the playsets, coordinate a project based team to fix their problem. They will need to know the cost and timeframe for the whole project. A box of foam pads cost $150 and comes in packs of 20. It takes approximately 2 hours to lay a box.



- Determine the square footage of the padding that needs to be bought.
- Determine the cost of the project.
- Determine the length of time that it will take to complete.

30. Mr. Alberts wants to replace the yellow aluminum siding on one side of his house. Use the dimensions and the diagram to answer the questions below:



- Find the area of the section that Mr. Alberts will be replacing. Use mathematics to explain your answer. Use words, symbols, or both in your explanation.

- Mr. Alberts has priced two different companies. Landscaping, Siding & More will charge him $2.50 per square foot of siding, whereas Mr. Siding and Paing will charge him $3.50 per square foot of siding. Determine which company will be the cheaper company to use.

- One of your workers decided to act compulsively and bought 2100 square feet of siding. Would you give the man a raise and praise him, or reprimand him and send him home for the rest of the day? Use mathematics to justify your actions.

Area and Geometric Probability ANSWER KEYS
Assessments

Pre-Assessment	
1.	B
2.	A
3.	C
4.	D
5.	B
6.	D
7.	C
8.	D
9.	C
10.	A
11.	B
12.	C
13.	A
14.	D

Mid-Assessment	
1.	C
2.	D
3.	A
4.	B
5.	A
6.	B
7.	D
8.	A
9.	614
10.	47.06
11.	72
12.	35
13.	• 3298 sq ft • 66 bags would be needed (65.96 is the exact answer) • The total cost of this project would be $128.63, which is too expensive for Louis's budget, therefore he has two options: Fertilize what he can with $125 or find cheaper fertilizer to complete the project
14.	$A = (L \cdot W) - \{2(\frac{1}{2} \cdot Bh) + 2(\frac{1}{2} \cdot Bh)\}$ $= (3 \cdot 2) - \{2(\frac{1}{2} \cdot 1 \cdot 1) + 2(\frac{1}{2} \cdot 2.75 \cdot 75)$ $= 6 - 2.06$ $A = 2.94\ ft^2\ \ is\ area\ of\ the\ yellow\ "x".$
15.	10.5 square units Area of the Jack-O-Lantern equals: 15. Stem is 1, face of Jack-O-Lantern is 14. Area of the cut outs equals 4.5 (3 for the mouth and .5 for the eyes and nose). Thus 15 – 4.5 = 10.5

Post-Assessment	
1.	F
2.	G
3.	A
4.	I
5.	C
6.	H
7.	B
8.	D
9.	E
10.	B
11.	A
12.	A
13.	C
14.	D
15.	C
16.	B
17.	B
18.	B
19.	B
20.	73.04
21.	4.3%
22.	135
23.	187.5
24.	11.96
25.	78.78
26.	67.5
27.	0.8%
28.	• 2883 • 39 bags • $76, under budget

	29.	• 6501 sq. ft. • $48,900 • 163 hrs.
	30.	• 1481 sq. ft • $3702.50 $5183.10 • Reprimand He didn't calculate what was needed, bought way too much and cost you thousands of dollars.