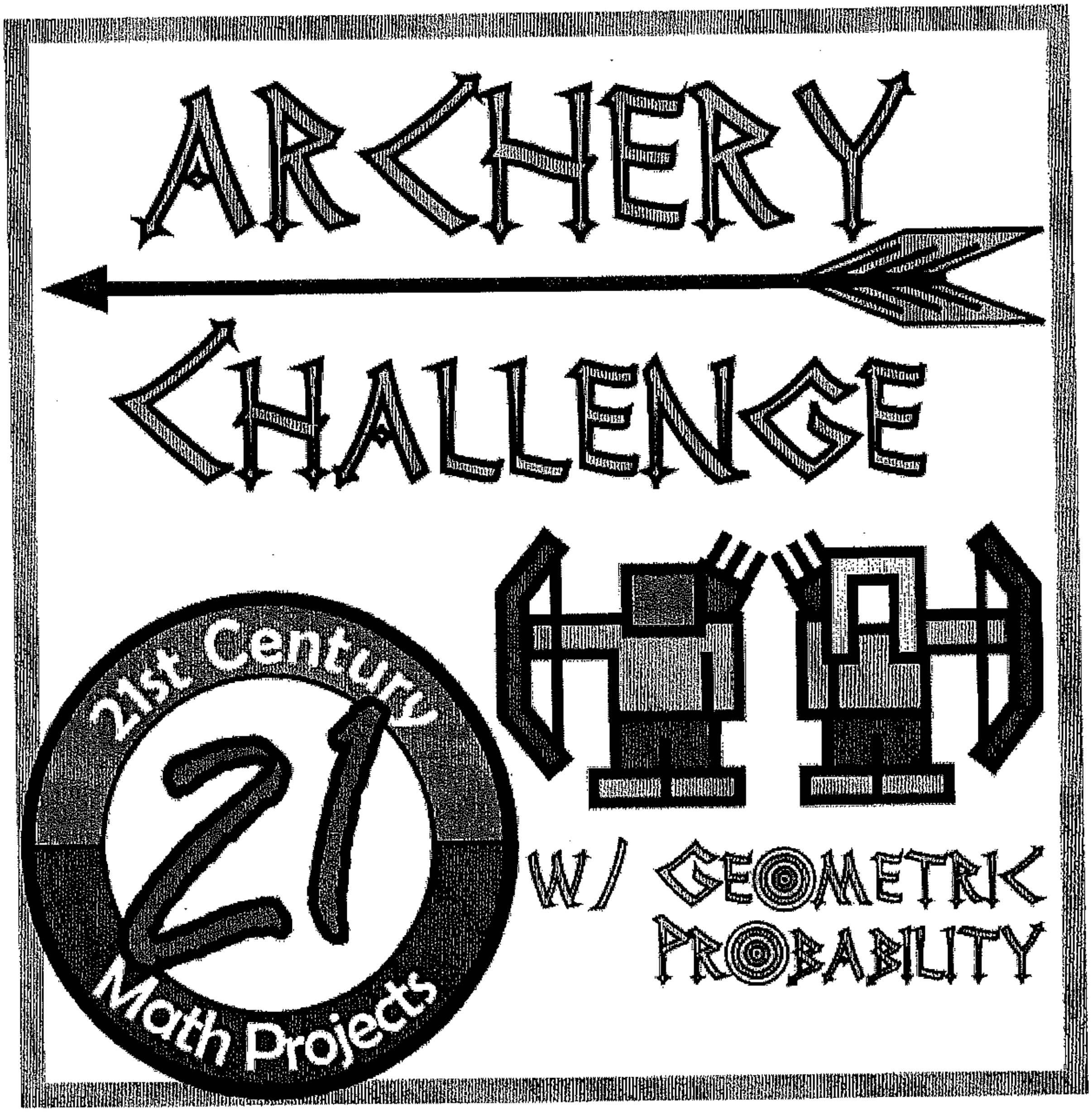
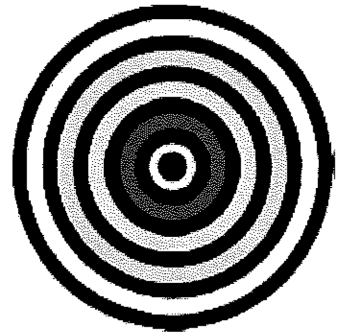

ARCHERY
CHALLENGE
W/ GEOMETRIC
PROBABILITY
21st Century
21
Math Projects

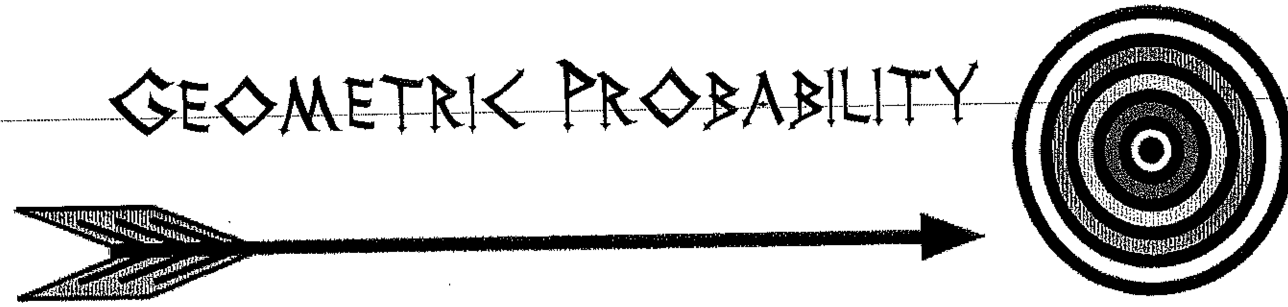
GEOMETRIC PROBABILITY



GRADING RUBRIC:

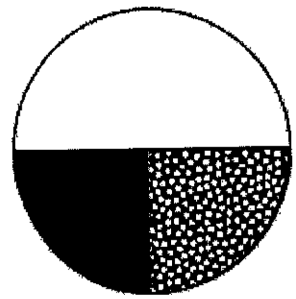
ITEM:	POINTS POSSIBLE:
Target Practice - Problems #1-5	5
Build a Bullseye - Design	5
Build a Bullseye - Calculations	3
The Archery Challenge	8
TOTAL:	/ 21 points
Extra Credit Awarded to Archery Challenge Winners	

GEOMETRIC PROBABILITY



Suppose a point on a target is randomly selected. What is the probability that the point lands on the bullseye? When you mix geometry, probability and a whole lot of randomness, what you end up with is geometric probability. In simple cases, it has most to do with calculating areas -- lots of areas. To find a geometric probability you use the ratio:

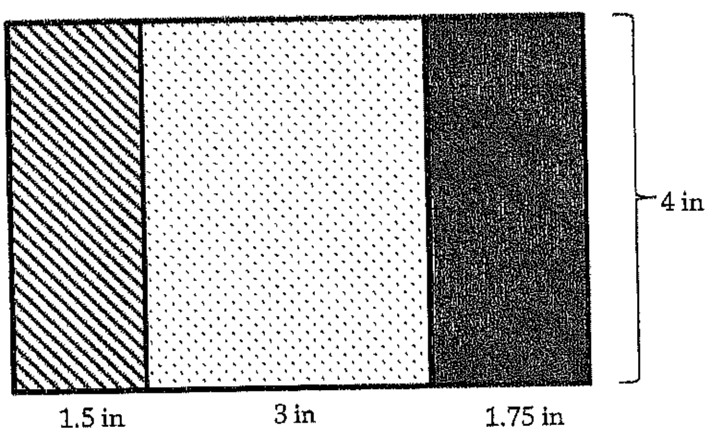
$$\frac{\textit{area of interest}}{\textit{total area}} = \text{probability}$$



Usually this will require examining measurements and calculation. In a simple example to the right, it is easy. If a point were randomly chosen on this circle, the probability of it being black is 25%, the probability of it being white is 50% and the probability of polka dots is 25%.

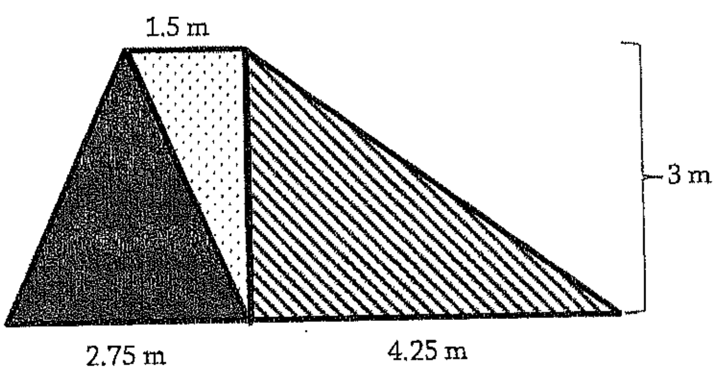
Use the diagrams to determine the probability of a random point being selected from the regions as specified.

1.



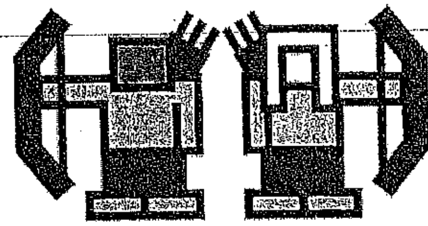
FIND THE PROBABILITY OF LANDING ON...

2.



FIND THE PROBABILITY OF LANDING ON...

Name ____________ Date ____________ Period ____________



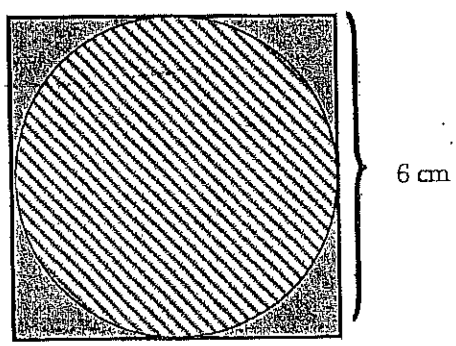
TARGET PRACTICE

When determining geometric probability it is often the case that regions will overlap. In order to calculate these areas, you must be analytical. These types of problems are often referred to as *area dissections*. An area dissection will require that you find whole areas and subtract off unnecessary parts. When you finally determine the areas, you'll be ready to find the geometric probability!

Name ______________ Date ______________ Period ______________

Use the diagrams to determine the probability of a random point being selected from the regions as specified.

1.



FIND THE PROBABILITY OF LANDING ON...

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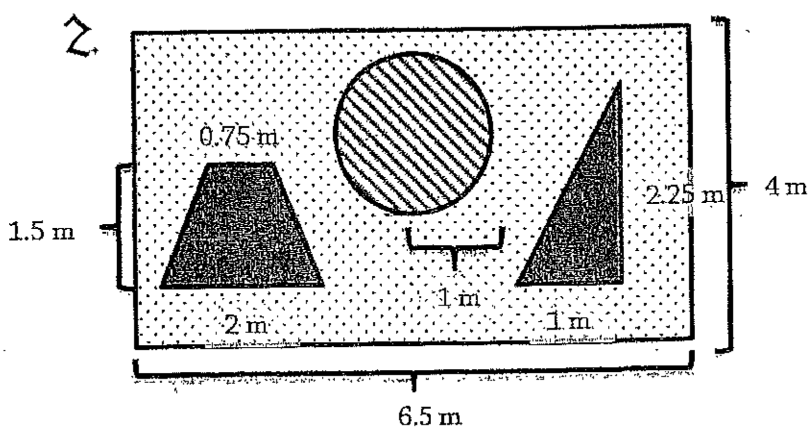
2.



FIND THE PROBABILITY OF LANDING ON...

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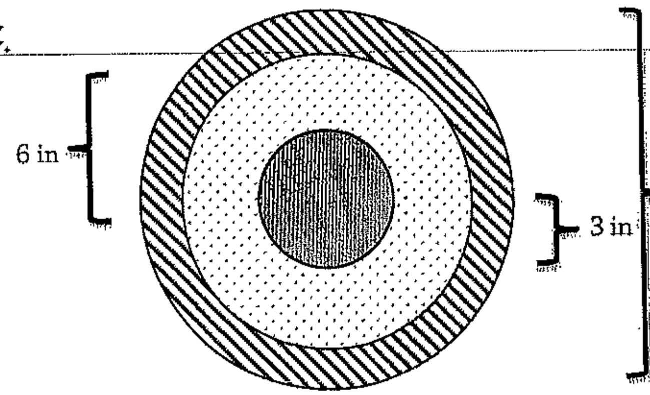
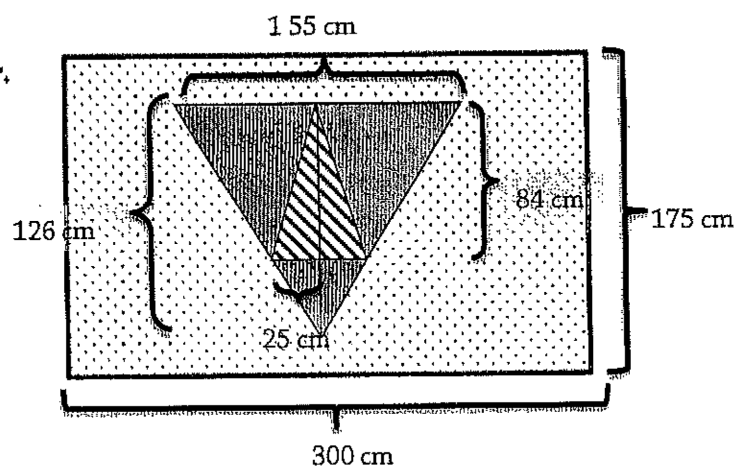
____

3.



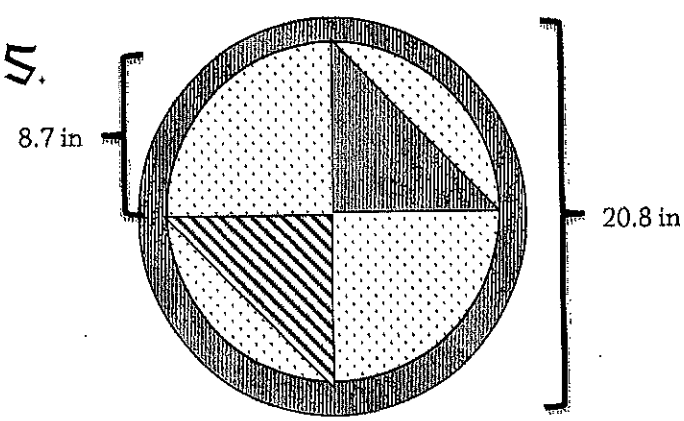
FIND THE PROBABILITY OF LANDING ON...

4.



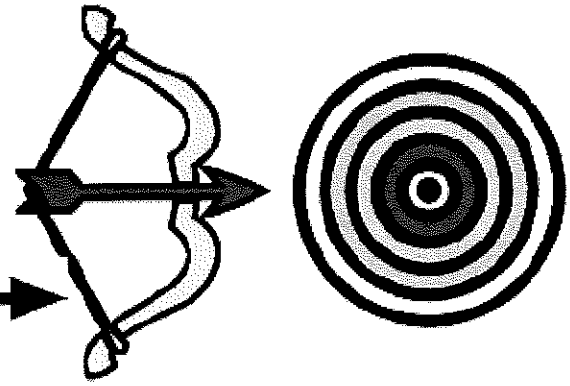
FIND THE PROBABILITY OF LANDING ON...

5.



FIND THE PROBABILITY OF LANDING ON...

BUILD-A-BULLSEYE



DESIGN

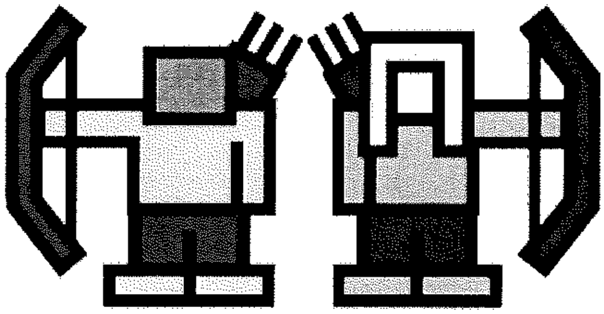
Now it's time to put your geometric probability skills to use. You will design a probability game board that should meet the following requirements:

- You must have three defined areas (can be colors or shades)
- Your measurements must be in inches
- You must use at least three geometric shapes
- You must use at least two area dissections
- The target must be drawn by hand and must be neat (use a ruler, protractor, etc.)

CALCULATIONS

Use your target to determine the probability of a random point being selected from the regions as specified.

	Probability



The Archery Challenge

GAMEPLAY

In each round, there will be targets made of geometric shapes. Your job is to compute the probabilities of hitting each color as a percentage (within $\pm.5\%$). The team that answers first will select a team member to shoot a Nerf Bow & Arrow at the board from the "close line". The other teams will shoot from the "far line" if they get the correct answer.

SCORING

The probability of the target struck (as a percentage) will be the points awarded to the team. If the team misses the board or gets the answer incorrect, it counts as 100 points. The object of the game is to have the LEAST points. The team with the least points at the end of the game will win.

1.

	Probability
Blue	
Red	
Green	

2.

	Probability
Purple	
Black	
Red	

3.

	Probability
Orange	
Blue	
Purple	

4.

	Probability
Blue	
Yellow	
Red	

5.

	Probability
Blue	
Purple	
Black	

6.

	Probability
Blue	
Yellow	

GROUP EXAMPLE #1

	Probability

GROUP EXAMPLE #2

	Probability