Notes: **GEOMETRIC PROBABILITY**

Content Objective: ***I will be able to use lengths and areas to find geometric probability and also be able to calculate real-world probabilities.***

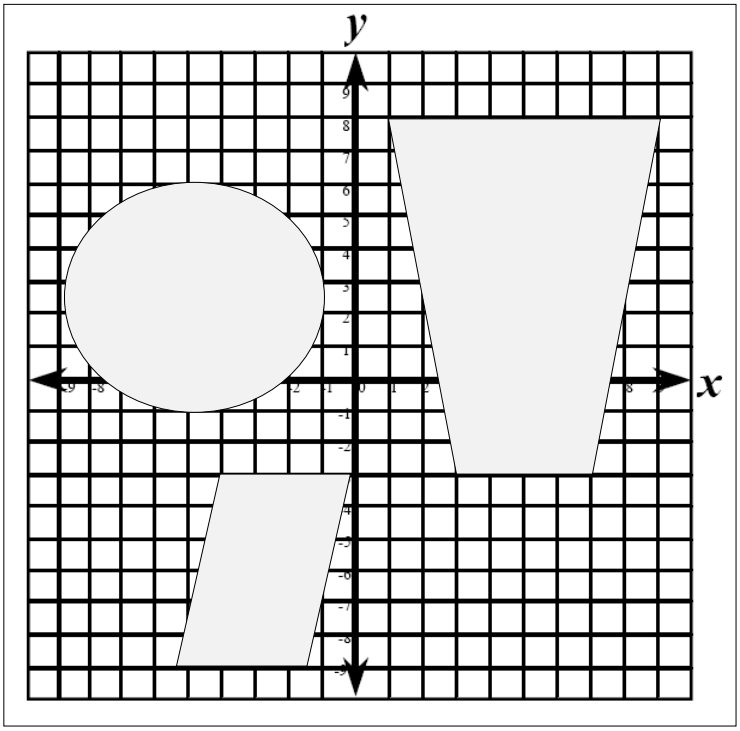
TERM	DESCRIPTION	EXAMPLE
Probability	$\frac{\text{\# of favorable outcomes}}{\text{\# of total outcomes}}$	**Probability of flipping a coin and landing on heads is** $\frac{1}{2}$

Geometric Probability is a _____ that involves a geometric measure such as _____ or _____.

EXAMPLE 1: *What is the geometric probability that a point chosen at random lies within the trapezoid?*

a. Calculate the area of the grid (total outcome). _____

b. Calculate the area of the trapezoid (favorable outcome). _____



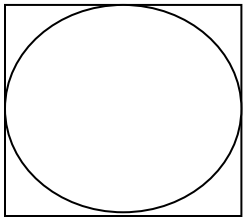
To calculate the geometric probability that a point chosen at random lies within the trapezoid we need to compare the area of the trapezoid to the area of the grid.

Probability = $\frac{\text{Area of the trapezoid}}{\text{Area of the grid}}$ = _____ or _____%.

QUICK CHECK: *What is the geometric probability that a point chosen at random lies within the parallelogram?*

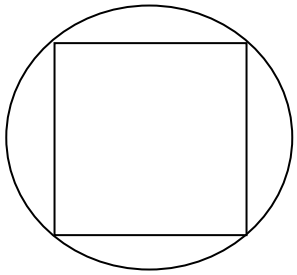
Probability = $\frac{\text{Area of the parallelogram}}{\text{Area of the grid}}$ = _____ or _____%.

EXAMPLE 2: *If a circle with a radius of 10 cm is placed inside a square with a length of 20 cm, what is the probability that a dart thrown will land inside of the circle?*



$\frac{\text{\# of favorable outcomes}}{\text{\# of total outcomes}} = \frac{\textit{the area of the circle}}{\textit{the area of the square}}$ = _____ or _____ %

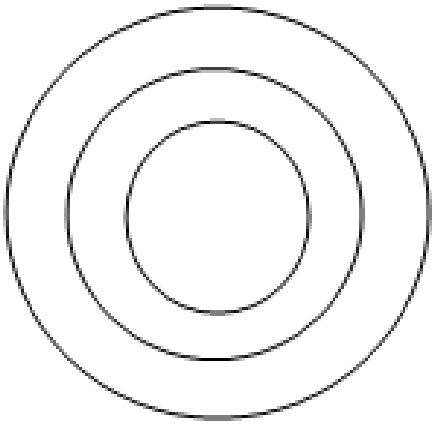
QUICK CHECK: *If a square with a length of 15 in. is placed inside a circle with a radius of* $7.5\sqrt{2}$ *in., what is the probability that a dart thrown with will inside of the square?*



$\frac{\text{\# of favorable outcomes}}{\text{\# of total outcomes}} = \frac{\textit{the area of the square}}{\textit{the area of the circle}}$ = _____ or _____ %

EXAMPLE 3: *The Diameter of the bulls-eye is 4 cm. The radius of the middle circle is 6cm. The radius of the outer circle is 10 cm. What is the probability that a dart thrown at the board will land anywhere inside the middle circle but not the bulls-eye?*

$\frac{\text{\# of favorable outcomes}}{\text{\# of total outcomes}} = \frac{\textit{area of the middle circle – bulls-eye}}{\textit{area of the outer circle}}$



a. Calculate the area of the middle circle. _____

b. Calculate the area of the bulls-eye. _____

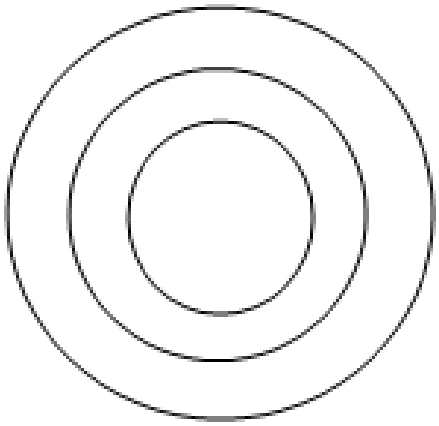
c. Calculate the area of the favorable outcome._____

d. Calculate the area of the total outcome._____

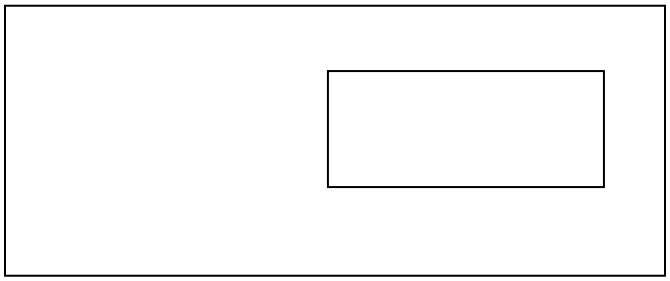
$\frac{\text{\# of favorable outcomes}}{\text{\# of total outcomes}} = \frac{\textit{area of the middle circle – bulls-eye}}{\textit{area of the outer circle}}$ = _____or _____%

QUICK CHECK: *What is the probability that a dart thrown at the board will land anywhere inside the bulls-eye?*

$\frac{\text{\# of favorable outcomes}}{\text{\# of total outcomes}} = \frac{\textit{area of the bulls-eye}}{\textit{area of the outer circle}}$ = _____or _____%



EXAMPLE 4: *You are playing a shuffle board game, where a puck needs to land in a designated rectangular area to score points. The length of the board is 10 ft and the width is 5 ft. The length of the designated area is 4.2 ft and the width is 3.5 ft. What is the probability that the puck will land in the inner rectangle and score points?*



$$\frac{\text{\# of favorable outcomes}}{\text{\# of total outcomes}} = \frac{\textit{area of the inner rectangle}}{\textit{area of the shuffle board}}$$

a. Calculate the area of the inner rectangle._____

b. Calculate the area of the shuffle board._____

$$\frac{\text{\# of favorable outcomes}}{\text{\# of total outcomes}} = \frac{\textit{area of the inner rectangle}}{\textit{area of the shuffle board}} = \_\_\_\_\_ \text{ or } \_\_\_\_\_\%$$

QUICK CHECK: *What is the probability that the puck will land in the outer rectangle and?*

$$\frac{\text{\# of favorable outcomes}}{\text{\# of total outcomes}} = \frac{\text{area of the outer rectangle - the inner rectangle}}{\text{area of the shuffle board}}$$

_____ or _____%