Math Virtual Learning

Geometry/Honors Geometry

May 22, 2020

Geometry/Honors Geometry
Lesson: May 22, 2020

Objective/Learning Target:
Students will solve problems involving geometric probability.

Warm-Up:

Find the probability.

5) You flip a coin and then roll a fair six-sided die. The coin lands heads-up and the die shows an even number.

6) You roll a fair six-sided die twice. The first roll shows a five and the second roll shows a six.

Warm-Up Answers

5) You flip a coin and then roll a fair six-sided die. The coin lands heads-up and the die shows an even number.

$$\frac{1}{4} = 0.25$$

6) You roll a fair six-sided die twice. The first roll shows a five and the second roll shows a six.

$$\frac{1}{36} \approx 0.028$$

Geometric probability involves the distributions of length, area, and volume for geometric objects under stated conditions. The same basic concept behind probability applies, but instead of calculating total outcomes and particular outcomes, it often involves calculating total area and particular area of a geometric figure, and the resulted probability is calculated using the formula
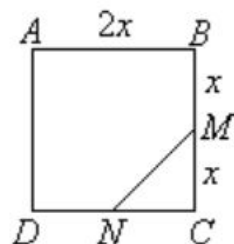
$$P = \frac{\text{Area of the particular region}}{\text{Area of the total region}}.$$

Example:
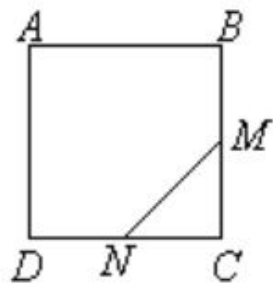
ABCD is a square. *M* is the midpoint of *BC* and *N* is the midpoint of *CD*. A point is selected at random in the square. Calculate the probability that it lies in the triangle *MCN*.
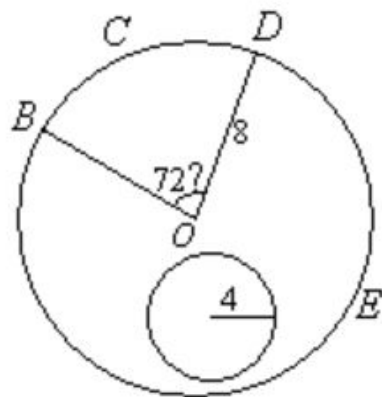
Solution:

Let $2x$ be the length of the square.

Area of square $= 2x \times 2x = 4x^2$

Area of triangle $MCN = \dfrac{1}{2}x^2$

$$P(\text{point in the triangle}) = \frac{1}{2}x^2 \div 4x^2$$

$$= \frac{1}{2}x^2 \times \frac{1}{4x^2}$$

$$= \frac{1}{8}$$

Example:

The figure shows a circle with centre *O* and radius 8 cm. Ð *BOD* = 72°. The radius of the smaller circle is 4 cm. A point is selected at random inside the larger circle *BCDE*.

Calculate the probability that the point lies

a) inside the sector *BODC*.

b) inside the smaller circle

c) neither in the sector *BODC* nor in the smaller circle.

Solution:

a) $\dfrac{72}{360} = \dfrac{1}{5}$

Area of sector *BODC* = $\dfrac{1}{5}$ × area of the large circle

Probability that the point lies in sector *BODC* = $\dfrac{1}{5}$

b) $\dfrac{\text{area of smaller circle}}{\text{area of larger circle}} = \dfrac{\pi \times 4^2}{\pi \times 8^2} = \dfrac{1}{4}$

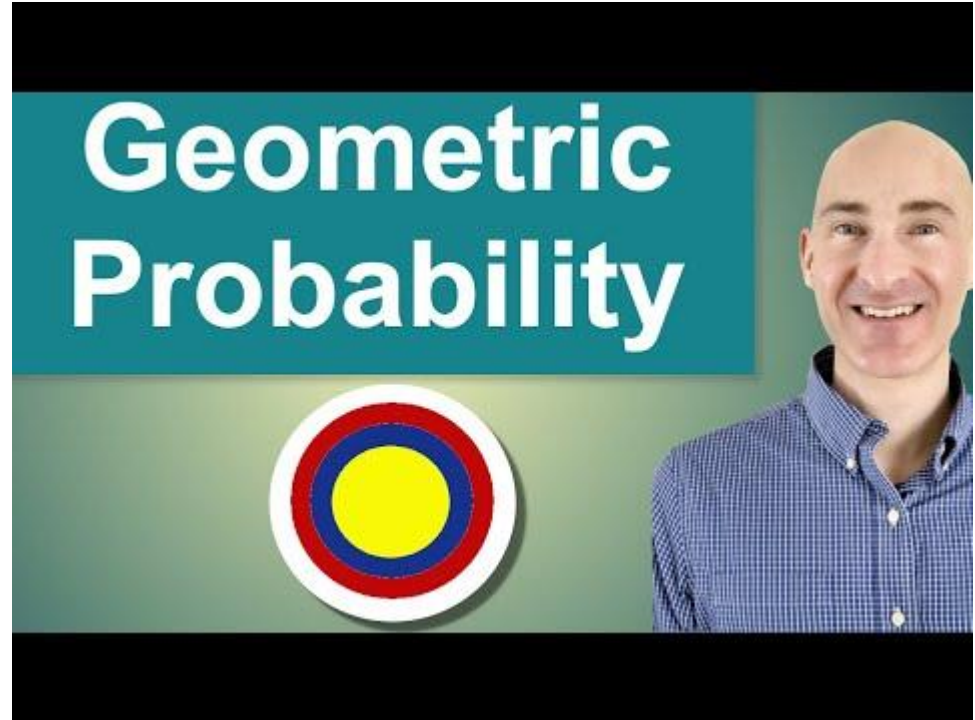Area of smaller circle = $\dfrac{1}{4}$ × area of the large circle

Probability that the point lies in the smaller circle = $\dfrac{1}{4}$

c) Probability that the point does not lie in sector *BODC* or the smaller circle

$= 1 - \dfrac{1}{5} - \dfrac{1}{4} = \dfrac{11}{20}$

Please watch the video:

Examples of finding the

Measure of an arc length

Practice:

Example 1:
A circle with radius 2 lies inside a square with side length 6. A dart lands randomly inside the square. What is the probability the dart lands inside the circle? Give the exact probability and the probability as a percent rounded to the nearest tenth.

Example 2:
A point is chosen at random on the given figure. What is the probability that the point is in the yellow region?

Example 3:
A square is inscribed in a circle. What is the probability that a point chosen inside the circle will be inside the square?
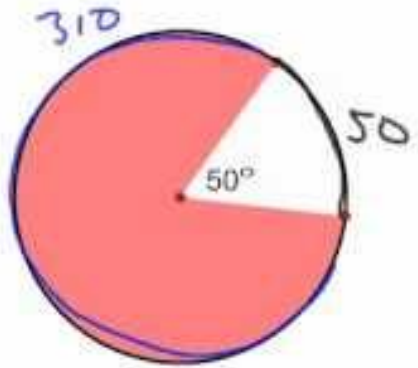
Video Answers

Untitled * - SMART Notebook

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7.8 Geometric Probability Using Area

Problem 1:
Find the probability that a point chosen at random inside the circle will be inside the shaded region.

310

50

50°

Extend Page

Additional Practice

[Khan Academy Practice](#)

Click on the link and practice 10 problems. Look at the explanation if you make a mistake: [IXL Geometric Probability](#)