Name _____ Date _____

LESSON 11.7

Study Guide

For use with pages 770–777

GOAL **Use lengths and areas to find geometric probabilities.**

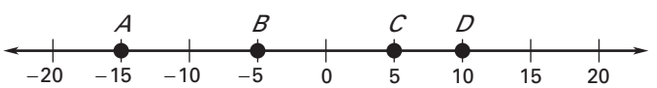
Vocabulary

The **probability** of an event is a measure of the likelihood that the event will occur.

A **geometric probability** is the ratio that involves a geometric measure, such as length or area.

EXAMPLE 1 Use lengths to find a geometric probability

Find the probability that a point chosen randomly on $\overline{AD}$ is on the given line segment. Express your answer as a fraction, a decimal, and a percent.



a. $\overline{AC}$ **b.** $\overline{BC}$

Solution

a. $P(\text{Point is on } \overline{AC}) = \dfrac{\text{Length of } \overline{AC}}{\text{Length of } \overline{AD}}$

$= \dfrac{|5 - (-15)|}{|10 - (-15)|} = \dfrac{20}{25}$

The probability that the point is on $\overline{AC}$ is $\frac{4}{5}$, 0.8, or 80%.

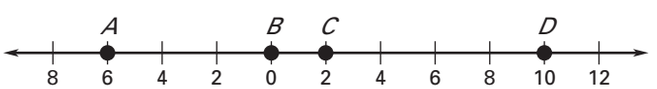
b. $P(\text{Point is on } \overline{BC}) = \dfrac{\text{Length of } \overline{BC}}{\text{Length of } \overline{AD}}$

$= \dfrac{|5 - (-5)|}{|10 - (-15)|} = \dfrac{10}{25}$

The probability that a randomly chosen point is on $\overline{BC}$ is $\frac{2}{5}$, 0.4, or 40%.

Exercises for Example 1

Find the probability that a point chosen at random on $\overline{AD}$ is on the given line segment. Express your answer as a fraction, a decimal, and a percent.



1. $\overline{AB}$ **2.** $\overline{BC}$ **3.** $\overline{AC}$ **4.** $\overline{BD}$

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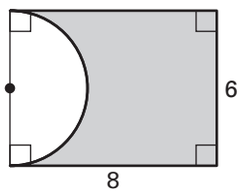
EXAMPLE 2 Use areas to find a geometric probability

Find the probability that a point chosen at random in the figure lies in the shaded region. Express your answer as a percent.



Solution

STEP 1 **Find** the area of the whole rectangle, using the formula $A = bh$.

$A = bh = 6(8) = 48$ square units

STEP 2 **Find** the area of the shaded region.

The radius of the circle is one half the length of the base of the rectangle. So, $r = 3$.

The area of the semicircle is one half the area of the circle. So,

$A = \frac{1}{2}\pi r^2 = \frac{1}{2}\pi \cdot (3)^2 \approx 5.65$ square units.

Area of shaded region = Area of rectangle − Area of semicircle

$\approx 48 - 5.65$

$= 42.35$ square units

STEP 3 **Find** the ratio of the area of the shaded region to the total area of the figure.

$$P(\text{Point lies in shaded region}) = \frac{\text{Area of shaded region}}{\text{Area of total figure}}$$

$$= \frac{42.35}{48}$$

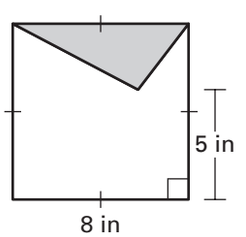
$$\approx 88.2\%$$

The probability that a randomly chosen point lies in the shaded region is about 88.2%.

Exercises for Example 2

Find the probability that a point chosen at random in the figure lies in the shaded region. Express the answer as a percent.

5.



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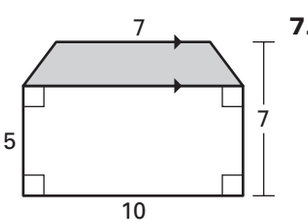

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