Finding Lengths in a Regular N-gon

To find the area of a regular n-gon with radius r, you may need to first find the apothem a or the side length s.

You can use…	…when you know n and…	Example(s) to Reference
$a^2+b^2=c^2$	Need to Know 2 side lengths. (r and a OR r and s)	Example # 5
SOH-CAH-TOA	Need to only Know one side length * Need to find central angle	Example # 6
Special Right Δ's 30°-60°-90° or 45°-45°-90°	Need to Know only one side length * Need to find central angle	Example # 7

Chapter 11.7: Use Geometric Probability

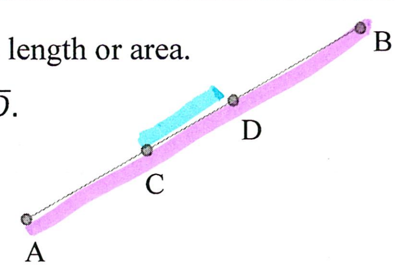
Probability: the likelihood that an event will occur.

Probability = # of favorable outcomes (what you want to happen) / # of possible outcomes

$P = 0$	$P = 0.25$	$P = 0.50$	$P = 0.75$	$P = 1$
0%	25%	50%	75%	100%
Impossible	Unlikely	Equally likely to occur or not occur	Likely	Certain

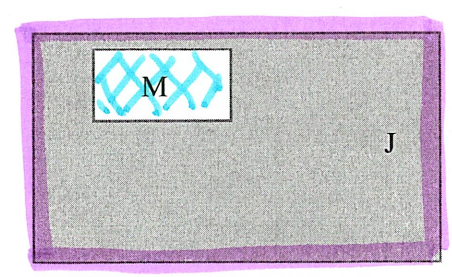
Geometric Probability: A ratio that involves a geometric measure such as length or area.

Probability and Length: Let $\overline{AB}$ be a segment that contains the segment $\overline{CD}$. If a point K on $\overline{AB}$ is chosen at random, then the probability that it is on $\overline{CD}$ is the ratio of the length of $\overline{CD}$ to the length of $\overline{AB}$.



P(K is on $\overline{CD}$) = length of $\overline{CD}$ (what you want to happen/land) / length of $\overline{AB}$ (Total distance)

Probability and Area: Let J be a region that contains region M. If a point K in J is chosen at random, then the probability that it is in region M is that ratio of the area of M to the area of J.



P(K is in region M) = Area of M (what you want to happen/land) / Area of J (Total Area) total distance = 16 units

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.

↓ Simplified

a.) $\overline{AB}$ = 6 units

$P\left(\text{pt is on } \overline{AB}\right) = \frac{6}{16}$ (÷2)

$P = \frac{3}{8}$

$P = 0.375$

$P = 37.5\%$

b.) $\overline{BC}$ = 2 units

$P\left(\text{pt is on } \overline{BC}\right) = \frac{2}{16}$ (÷2)

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

$P = 0.125$

$P = 12.5\%$

c.) $\overline{AC}$ = 8 units

$P\left(\text{pt is on } \overline{AC}\right) = \frac{8}{16}$ (÷8)

$P = \frac{1}{2}$

$P = 0.50$

$P = 50\%$

d.) $\overline{BD}$ = 10 units

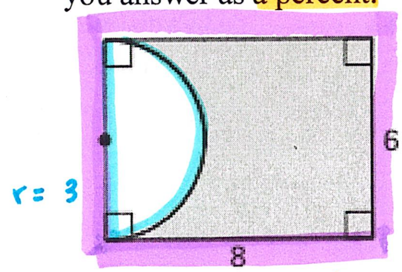
$P\left(\text{pt is on } \overline{BD}\right) = \frac{10}{16}$ (÷2)

$P = \frac{5}{8}$

$P = 0.625$

$P = 62.5\%$

Example #2: Find the probability that a point chosen at random in the figure lies in the shaded region. Express you answer as a percent.



* Shaded Area = Total Area − Non shaded Area *

Total Area = (8)(6)

= 48 units²

Non-Shaded Area = $\frac{\pi(3)^2}{2}$ ← half circle

= 4.5π units²

Shaded Area = 48 − 4.5π

= 33.86 units²

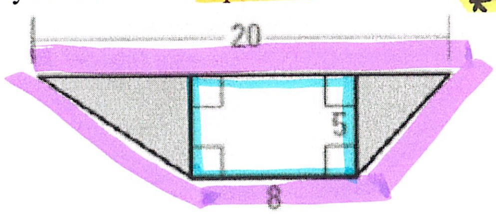
$P\left(\text{pt lies in shaded region}\right) = \frac{33.86}{48}$

= 0.705

P = 70.5%

Example #3: Find the probability that a point chosen at random in the figure lies in the shaded region. Express you answer as a percent.

* Shaded Area = Total Area − Non-shaded Area *



Total Area = $\frac{5(8+20)}{2}$

= 70 units²

Unshaded Area = (8)(5)

= 40 units²

Shaded Area = 70 − 40

= 30 units²

$P\left(\text{pt lies in shaded region}\right) = \frac{30}{70}$

= 0.429

P = 42.9%