Geometric Probability Day #2- notes

Geometric Probability The probability that a point in a figure will lie in a particular part of the figure can be calculated by dividing the area of the part of the figure by the area of the entire figure. The quotient is called the **geometric probability** for the part of the figure.

If a point in region A is chosen at random, then the probability $P(B)$ that the point is in region B, which is in the interior of region A, is
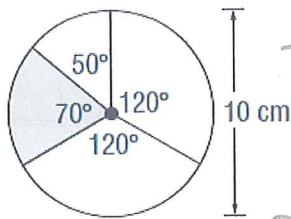
$$P(B) = \frac{\text{area of region } B}{\text{area of region } A}.$$

Find the area of both regions and then find the probability that a point chosen at random lies in the shaded region. Round your answers to the nearest tenth.

$$\frac{\text{angle}}{360} \cdot \text{area}$$
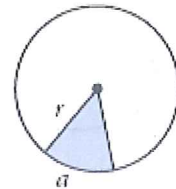
Examples:

1.

50°
70° 120°
120°

10 cm

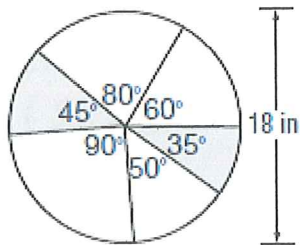Shaded: $\frac{70}{360} \cdot \pi(5)^2 = 15.3 \text{ cm}^2$

Total: $\pi(5)^2 = 25\pi$
$= 78.5 \text{ cm}^2$

Probability: $\frac{15.3}{78.5} = .1949$

$= \boxed{19.5\%}$

$$\frac{a}{360} \cdot \pi r^2 = A_{\text{sector}}$$

$$\frac{a}{360} \cdot \bigcirc = \triangle$$

2.

45° 80° 60°
90° 35°
50°

18 in.

Shaded: $\frac{80}{360} \cdot \pi(9)^2 = 56.5 \text{ in}^2$
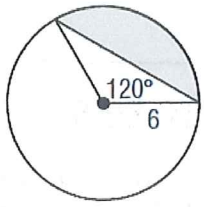
Total: $\pi(9)^2 = 81\pi = 254.5 \text{ in}^2$

Probability: $\frac{56.5}{254.5} = .222$

$= \boxed{22.2\%}$

3.

Shaded: $\frac{120}{360} \cdot 6^2\pi - \frac{1}{2}(6)(6)\sin 120$
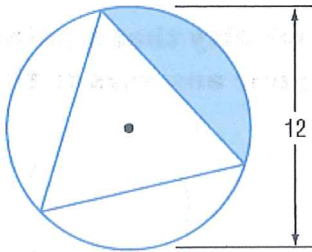
$A: 37.7 - 15.6 = 22.1 \text{ units}^2$

Total $= \pi 6^2 = 36\pi = 113.1 \text{ units}^2$

Probability: $\frac{22.1}{113.1} = .195 \approx \boxed{19.5\%}$

4.

Shade $= \frac{1}{3}(O - \triangle)$

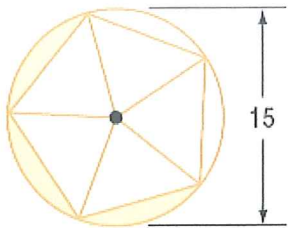$A = \frac{1}{3}(\pi 6^2 - 3(\frac{1}{2}) 6 \cdot 6 \sin 120)$

$A \approx \frac{1}{3}(113.1 - 46.8)$

$A \approx \frac{1}{3}(66.3) \approx 22.1 \text{ units}^2$

Total: $\pi (6)^2 = 113.1 \text{ units}^2$

Probability: $\frac{22.1}{113.1} = .195$

$= \boxed{19.5\%}$

5.

Shaded: $\frac{3}{5}(O - \text{pentagon})$

$A = \frac{3}{5}(\pi 7.5^2 - 5(\frac{1}{2})(7.5)^2 \sin 72)$

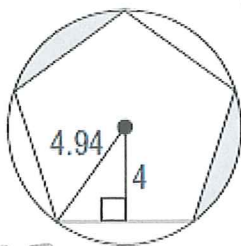$A = \frac{3}{5}(56.25\pi - 133.7) = \frac{3}{5}(43.0)$

$A = 25.8 \text{ units}^2$

Total $= 56.25\pi = 176.7 \text{ units}^2$

Probability: $\frac{25.8}{176.7} = .146$

$= \boxed{14.6\%}$

6.

Shaded: $\frac{2}{5}(O - \text{pentagon})$

$A = \frac{2}{5}(\pi 4.94^2 - 5(\frac{1}{2})(4.94)^2 \sin 72)$

$A = \frac{2}{5}(24.4\pi - 58.0)$

$A = \frac{2}{5}(18.7) = 7.5 \text{ units}^2$

Total: $\pi(4.94)^2 = 15.5 \text{ units}^2$

Probability: $\frac{7.5}{15.5}$

$= .484$

$\boxed{48.4\%}$