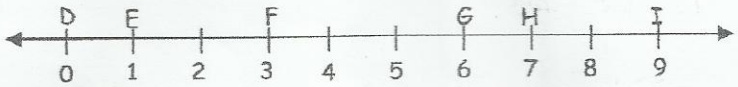
Notes – 10.8 – Geometric Probability

Length Probability Postulate:

If a point on $\overline{AB}$ is chosen at random and C is between A and B, then the probability that the point is on $\overline{AC}$ is:

$$\frac{\text{length } \overline{AC}}{\text{length } \overline{AB}}$$

Ex.



What is the probability a point chosen at random on $\overline{DI}$ is also a part of:

(a) $\overline{EF}$

$\frac{EF}{DI} \rightarrow \boxed{\frac{2}{9} \text{ or } 22.\overline{2}\%}$

(b) $\overline{FI}$

$\frac{FI}{DI} \rightarrow \frac{6}{9} \rightarrow \boxed{\frac{2}{3} \text{ or } 66.\overline{6}\%}$

Area Probability Postulate

If a point in region A is chosen at random, then the probability that the point is in region B, which is in the interior of region A, is:

$$\frac{\text{area of region B}}{\text{area of region A}}$$

Ex. Joanna designed a new dart game. A dart in section A earns 10 points; a dart in section B earns 5 points; a dart in section C earns 2 points. Find the probability of earning each score.

radius of circle A = 2 in.

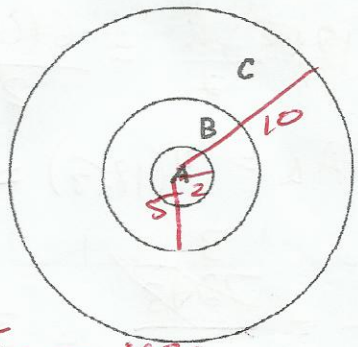
radius of circle B = 5 in.

radius of circle C = 10 in.

$A_{\odot A} = 4\pi$

$A_{\odot B} = 25\pi$

$A_{\odot C} = 100\pi$

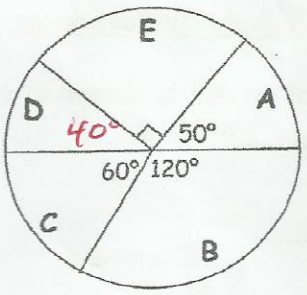


10 pts. (A) $\rightarrow \frac{4\pi}{100\pi} = 4\%$

5 pts (B – A) $\rightarrow \frac{21\pi}{100\pi} = 21\%$

2 pts (C – B) $\rightarrow \frac{75\pi}{100\pi} = 75\%$

Ex. Find the probability that a point chosen at random in this circle will be in the given section.



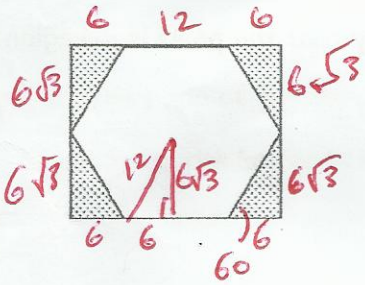
(a) A $\frac{50}{360} = \frac{5}{36} \approx 13.9\%$

(b) C $\frac{60}{360} = \frac{1}{6} \approx 16.7\%$

(c) D $\frac{40}{360} = \frac{1}{9} \approx 11.1\%$

Ex. Find the probability that a point chosen at random in each figure lies in the shaded region. Round your answer to the nearest hundredth.

(a)



Regular hexagon (sides = 12 cm) inside a rectangle

$A_\triangle = \frac{bh}{2} = \frac{6(6\sqrt{3})}{2} = 18\sqrt{3}$

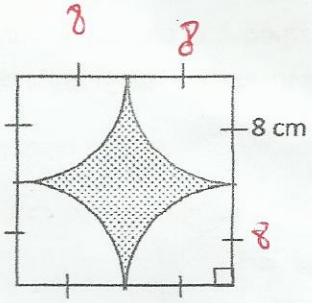
$4A_\triangle = 4(18\sqrt{3}) = 72\sqrt{3}$

$\frac{4A_\triangle}{A_\square} = \frac{72\sqrt{3}}{24(12\sqrt{3})} = \frac{3}{12} = \frac{1}{4} = 25\%$

or

.25

(b)



$A_\square = 256$

$A_\odot = 64\pi$

$\frac{256 - 64\pi}{256}$

.22