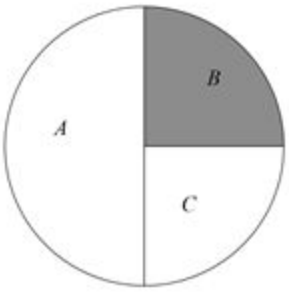
GEOMETRIC PROBABILITY

Spinners: If the sector areas are not equal, there is not the same probability of getting each outcome.



Example: For the spinner shown,

$\Omega = \{A, B, C\}$ but you do NOT have a 1/3 chance of getting an A for this spinner.

P(A) = ½ P(B) = P(C) = ¼

The probability of landing in the "shaded region" (use when given measurements) is

$$P(shaded) = \frac{\text{Area of Shaded Region}}{\text{Area of Entire Shape}}$$

Example: Determine the probability of landing in the shaded region.

radius of circle = 4 mm
base of triangle = 5 mm
height of triangle = 6 mm

$$\begin{aligned}\text{Area of Shaded Region} &= \text{Area of Circle} - \text{Area of Triangle}\\ &= \pi r^2 - \frac{hb}{2}\\ &= \pi(4)^2 - \frac{(6)(5)}{2}\\ &= 16\pi - 15\end{aligned}$$

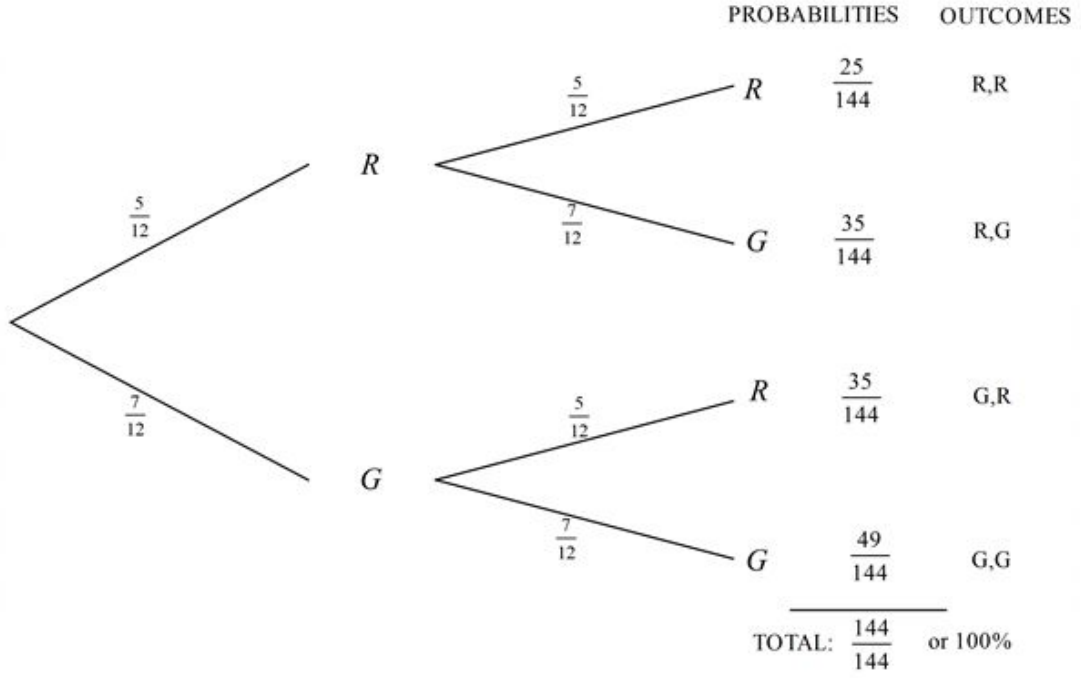
$$\begin{aligned}\text{P(shaded)} &= \frac{Area\ Shaded}{Area\ Circle}\\ &= \frac{16\pi - 15}{16\pi}\\ &= 0.70\end{aligned}$$

TREE DIAGRAMS

Tree diagrams can be used to help us determine the probability of compound events as well as a list of all of the possible outcomes

Tree Diagrams (with Independent Events)

Example: You have 5 red marbles and 7 green marbles in a bag. You select one marble, replace it in the bag, and then select a second marble. What is the probability of selecting at least one red marble?



Because it is WITH REPLACEMENT, each of the probabilities for drawing a red marble remain the same and each of the probabilities for drawing a green marble remain the same.

As you move from left to right along the branches you **MULTIPLY** the probabilities.

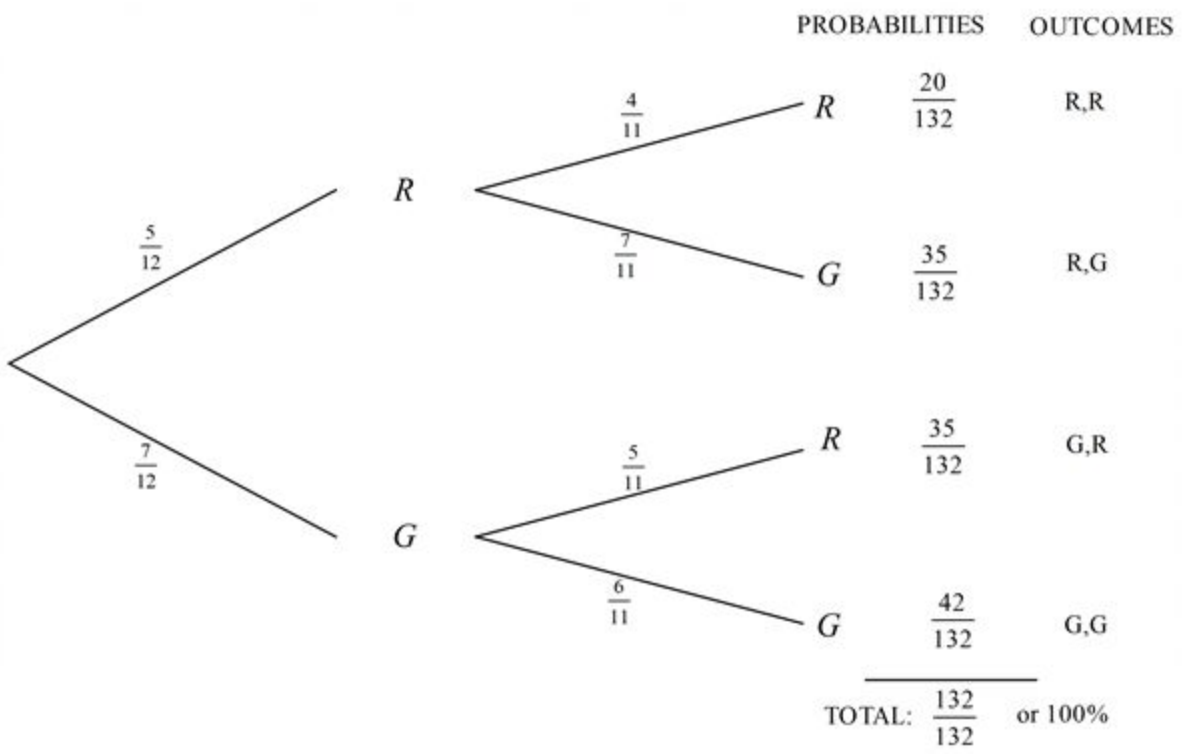
If you've done the tree correctly then the probabilities for each final outcome (the last column of probabilities) will add up to 1. This is one of the few times when you should NOT REDUCE your fractions!! Also notice that each "grouping" of branches adds up to 1.

The outcomes with at least one red marble are (R,R) (R,G) and (G,R), to find the probability on any one of these occurring, we ADD their respective probabilities:

Tree Diagrams $P(\text{at least one red marble}) = \frac{25}{144} + \frac{35}{144} + \frac{35}{144}$ **(with Dependent Events)**

$$= \frac{95}{144}$$

Example: You have 5 red marbles and 7 green marbles in a bag. You select one marble, DO NOT replace it in the bag, and then select a second marble. What is the probability of selecting at least one red marble?



So, **WITHOUT REPLACEMENT**,

$$\text{P(at least one red marble)} = \frac{20}{132}+\frac{35}{132}+\frac{35}{132}$$

$$= \frac{90}{132}$$

$$= \frac{15}{22} \text{ (reduce your final answer)}$$