

# 8.1

# Quick Notes

## Bayes' Formula

1) If a sample space (S) is partitioned into n pairwise disjoint sets,  $A_1, A_2, A_3, \dots, A_n$ ,

Where  $A_1 \cup A_2 \cup A_3 \cup \dots \cup A_n = S$ , then

$$P(A_j|E) = \frac{P(A_j)P(E|A_j)}{P(A_1)P(E|A_1) + P(A_2)P(E|A_2) + \dots + P(A_n)P(E|A_n)}$$

## (BOARDWORK)

1) 62% of all Martians are male (the rest female). 73% of male Martians own death rays. 41% of female Martians own death rays.

- a) What percentage of Martians own a death ray? (For a and b, first use the formula, then make a tree.)
- b) If a randomly selected Martian owns a death ray, find the probability that they are male.

2) 2% of the population has a disease. If a person has the disease, there is a 95% chance that they will test positive for the disease. If they don't have the disease, there is a 7% chance that they will test positive for the disease.

- a) Find the probability that a randomly selected person will test positive for the disease.
- b) If a person tests positive, find the probability that they have the disease.

3) Brighto makes 46% of their light bulbs in California, 31% of their bulbs in Texas, and 23% in Michigan. 6% of the bulbs produced in California are defective. 2% of the bulbs produced in Texas are defective, and 3% of the bulbs from Michigan are defective. One bulb is randomly selected,

- a) If a bulb is found to be defective, find the probability that it came from California.
- b) If a bulb is not defective, find the probability that it came from Michigan.
- c) If a bulb is not defective, find the probability that it didn't come from Texas.