

Warm-up 4/17/17  
Expand this binomial.

$$(2x - 6)^5$$

$$+(-6)^5$$

$$(2x)^5 + 5(2x)^4(-6)^1 + 10(2x)^3(-6)^2 + 10(2x)^2(-6)^3 + 5(2x)(-6)^4$$

$$32x^5 - 480x^4 + 2880x^3 - 8640x^2 + 12960x - 7776$$

### 9.3: Probability

Find the probability of each event.

(a) Tossing a tail on one toss of a fair coin

$$\frac{1}{2}$$

(b) Tossing two heads in a row on two tosses of a fair coin

$$\frac{1}{4}$$

(c) Drawing a queen from a standard deck of 52 cards

$$\frac{4}{52} = \frac{1}{13}$$

(d) Rolling a sum of 4 on a single roll of two fair dice

$$\frac{3}{36} = \frac{1}{12}$$

Probability of an Event (Equally Likely Outcomes)

If  $E$  is an event in a finite, nonempty sample space  $S$  of equally likely outcomes, then the probability of the event  $E$  is

$$P(E) = \frac{\text{the number of outcomes in } E}{\text{the number of outcomes in } S}$$

Die 1 Die 2	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

Find the probability of rolling a sum divisible by 3 on a roll of two fair dice.

$$\frac{12}{36} = \frac{1}{3}$$

Find the probability of rolling a sum greater than 7 on a roll of two fair dice.

$$\frac{15}{36} = \frac{5}{12}$$

Multiplication Principle of Probability

Suppose an event A has probability  $p_1$  and event B has probability  $p_2$  under the assumption that A occurs. Then the probability that both A and B occur is  $p_1p_2$ .

Sal opens a box of a dozen chocolate cremes and offers two of them to Val. Val likes vanilla cremes the best, but all the chocolates look alike on the outside. If four of the twelve chocolates are vanilla, what is the probability that both of Val's picks turn out to be vanilla?

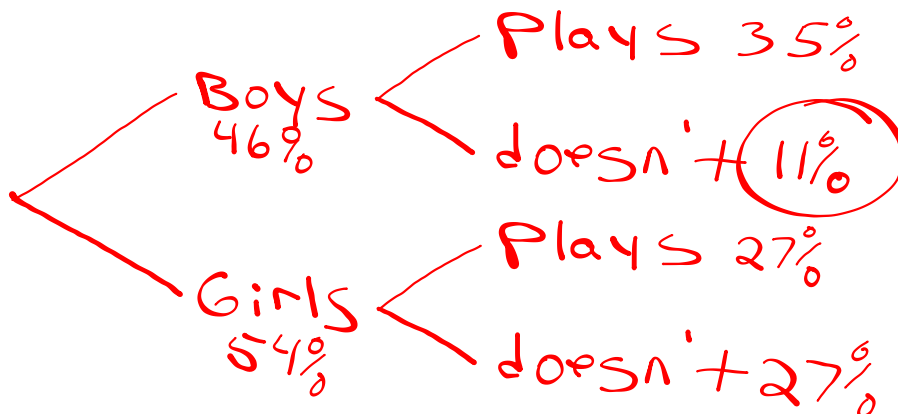
$$\frac{4}{12} \cdot \frac{3}{11} = \frac{1}{11}$$

If you pick two cards from a standard deck of 52 cards, what is the probability that you get two diamonds?

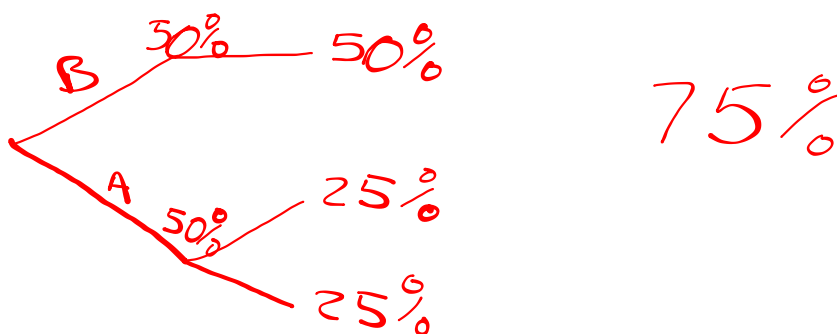
$$\frac{13}{52} \cdot \frac{12}{51} = \frac{1}{17}$$

**Tree diagrams** are good for visualizing the Multiplication Principle of Probability.

In a large high school, 54% of the students are girls and 62% of the students play sports. Half of the girls at the school play sports. If a student is chosen at random, what is the probability that it is a boy who does not play sports?



Two identical cookie jars are on a counter. Jar A contains 2 chocolate chip and 2 peanut butter cookies, while jar B contains 1 chocolate chip cookie. We select a cookie at random. What is the probability that it is a chocolate chip cookie?



What is the probability that a cookie came from jar A, given that it is chocolate chip?

Assignment: pp. 666 - 668

1 - 9, 11 - 22, 29 - 31, 36, 53, 54, 56