

# Notes Key

Sunday, December 6, 2015 4:12 PM

Precalculus  
Section 10.1

## A World of Probability

### Do you feel lucky?

Often times, fans will buy tickets for a specific game or session of a sports tournament without knowing which specific teams or players will be playing. Imagine you buy tickets to watch one game of a 6 team Math tournament in which all teams play one another once in a round-robin format.

How many total games will be played?

$${}^6C_2 = \frac{6 \cdot 5}{2} = 15$$

What is the probability that you were lucky enough to buy tickets to the match-up of your two favorite teams, the Precalculus Predators and Trigonometric Titans?

$$\frac{1}{15}$$

### Heads? I win! Tails? You lose!

A fair coin is tossed 5 times. What is the probability that the 5 tosses result in exactly 4 heads?

$$\frac{{}^5C_4}{2^5}$$

### Probabilities you know

Scott and Brad are competing with a third contestant on Fear Factor who just scored a time of 45 seconds on the last task. Scott believes that he has a 0.85 probability of beating the time and Brad thinks that he has a .60 probability of beating the time. What is the probability that:

a. Scott does not beat the time?

$$1 - 0.85 = .15$$

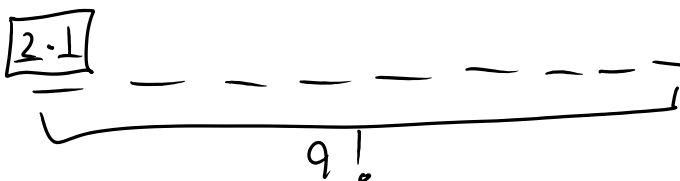
b. Scott beats the time and Brad does not beat the time?

No Interaction

### I thought the movie started at 7:30pm!

A couple and eight of their friends are running late for a movie, so in the darkened theater, they randomly sit down in a row. What is the probability that the couple happens to sit next to each other?

$$\frac{2! \cdot 9!}{10!}$$



Politics!

A town council consists of eight democrats, seven republicans, and five independents. A committee of three is chosen randomly by pulling names from a hat. What is the probability that the committee contains:

- a) 2 democrats and 1 republican?

$$\frac{8^2 \cdot 7^1}{20^3}$$

Sample space:  $20^3$

- b) three independents?

$$\frac{5^3}{20^3}$$

- c) no independents?

$$\frac{15^3}{20^3}$$

or  $1 - \left(\frac{5^3}{20^3}\right) - \left(\frac{5^2 \cdot 15^1}{20^3}\right) - \left(\frac{5^1 \cdot 15^2}{20^3}\right)$

- d) Without performing any calculations, which would be larger – the probability the committee only contains republicans or the probability the committee only contains democrats? Why?

Vary

Roll 'em!

Two six-sided dice are tossed. (Did you know that the "dots" on dice are called pips?)

- a) What is the probability that the total is nine?

$3+6 \quad 4+5 \quad 5+4 \quad 6+3$

Sample space:  $6 \cdot 6$

$$\frac{4}{36} = \boxed{\frac{1}{9}}$$

- b) What is the probability that the total is at least nine?

part a +  $5+5 \quad 6+5 \quad 5+6 \quad 6+6 \quad 4+6 \quad 6+4$   
 $\frac{4}{36} + \frac{1}{36} + \frac{1}{36} + \frac{1}{36} + \frac{1}{36} + \frac{1}{36} + \frac{1}{36} = \frac{10}{36}$

- c) What is the probability that the total is odd?

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

$$\boxed{\frac{5}{18}}$$

Marriage!

A group of 5 married couples elects a committee of four to plan their group social outings. If the committee is chosen at random, what is the probability that the committee includes no two people who are married to each other?

Sample space:  $10^4$

$$\left(\frac{2^1 \cdot 2^1 \cdot 2^1 \cdot 2^1}{10^4}\right) \cdot 5^4 \quad \text{or} \quad \frac{10}{10} \cdot \frac{8}{9} \cdot \frac{6}{8} \cdot \frac{4}{7}$$