Precalc13.3

Find the probability of an event
Find the odds for success and failure of an event

$P_2 = \dfrac{1}{6}$

permutation

$P_{odd} = \dfrac{3}{6} = \dfrac{1}{2}$

combination

probability : how likely?

sample space number of $=$ ———
             options   denom

success $\dfrac{S}{T}$

failure $\dfrac{F}{T}$

complement

odds

0 $.5$ 1
0% 50% 100%
$\dfrac{0}{1}$ $\dfrac{1}{2}$ $\dfrac{1}{1}$
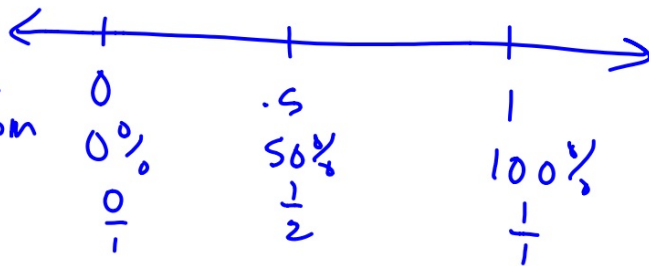
activity: P$_{cubes}$, Odd$_{scubes}$

If an event can succeed in s ways and fail in f ways, then the probability of success $P(s)$ and the probability of failure $P(f)$ are as follows.

$$P(s) = \frac{s}{s+f} \qquad P(f) = \frac{f}{s+f}$$

s+f = total # outcomes

1 **MARKET RESEARCH** What is the probability of any one household being chosen to participate for the Nielsen Media Research group?

Real World Application

MARKET RESEARCH To determine television ratings, Nielsen Media Research estimates how many people are watching any given television program. This is done by selecting a sample audience, having them record their viewing habits in a journal, and then counting the number of viewers for each program. There are about 100 million households in the U.S., and only 5000 are selected for the sample group. What is the probability of any one household being selected to participate? *This problem will be solved in Example 1.*
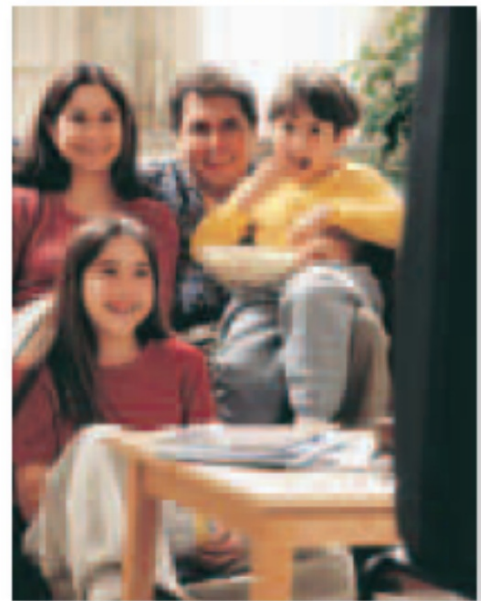
$$\frac{5000}{100,000,000} = \frac{5}{100,000} = \frac{1}{20,000}$$

$15 = T$

2 A bag contains 5 yellow, 6 blue, and 4 white marbles.

white vs not white
complement

a. What is the probability that a marble selected at random will be yellow?

b. What is the probability that a marble selected at random will *not* be white?

$\frac{11}{15}$

$$\frac{15}{15} - \frac{4}{15} = \frac{11}{15}$$

informally.........formally

Complement $P_a + P_{no \, Ya} = 1$

$1 - (\quad) =$

21

A box contains 3 tennis balls, 7 softballs, and 11 baseballs. One ball is chosen at random. Find each probability.

5. P(softball)

6. P(not a baseball)

7. P(golf ball)

$P_{(\quad)} = \frac{7}{21} = \frac{1}{3}$

$\frac{10}{21}$

$\frac{0}{21} = 0$

$P(\text{not softball}) = \frac{14}{21} = \frac{2}{3}$

3 A circuit board with 20 computer chips contains 4 chips that are defective. If 3 chips are selected at random, what is the probability that all 3 are defective?

$$_4C_3 = \frac{4 \cdot 3 \cdot 2}{3 \cdot 2 \cdot 1}$$

$$_{20}C_4 = \frac{20 \cdot 19 \cdot 18 \cdot 17}{4!} = 4845$$

$$\frac{4}{4845} = 0.08 \%$$

$$P(s) + P(f) = \frac{\overset{=???}{s}}{s + f} + \frac{f}{s + f}$$

$$\frac{s}{s+f} + \frac{f}{s+f} = \frac{s+f}{s+f} = 1$$

complements: $1 - P_{(\ )} = P_{(\ )}$

4 **The CyberToy Company has determined that out of a production run of 50 toys, 17 are defective. If 5 toys are chosen at random, what is the probability that at least 1 is defective?**

$$\frac{5C_1}{50C_{17}}$$

$$\frac{50!}{[17!(33!)]}$$

5

50 49 48 47 46 45 44 43 42 41

40 39 38 37 36 35 34 (33.....1)

17!

$$\frac{5}{9.85 \times 10^{12}}$$

$$1 - 5.1 \times 10^{-13}$$

$$\frac{6 \; B \quad \text{trig}}{10} \quad 4 \; R \quad \text{proof}$$

5 Katrina must select at random a chip from a box to determine which question she will receive in a mathematics contest. There are 6 blue and 4 red chips in the box. If she selects a blue chip, she will have to solve a trigonometry problem. If the chip is red, she will have to write a geometry proof.

odds

a. What is the ~~probability~~ that Katrina will draw a red chip? $\frac{2}{5}$

b. What are the odds that Katrina will have to write a geometry proof?

$$\frac{P_s}{P_f} \qquad P_s : P_f$$

$$\frac{2}{5} \quad \frac{6}{3}$$

$$\frac{\frac{3}{5}}{\frac{3}{5}}$$

http://www.youtube.com/watch?v=_s7qgNMqDJl

$$P_S \quad \frac{1}{24} \qquad P_F \quad \frac{23}{24}$$

$$\frac{\frac{1}{24}}{\frac{23}{24}} \longrightarrow \frac{24}{23} \qquad 1:23$$

$$P_g = \frac{7}{20} \qquad P_{\sim g} \; \frac{13}{20}$$

Odds $_{\text{candy}}$

$$7:13$$

$$8:12$$

3. Write about the difference between the probability of the successful outcome of an event and the odds of the successful outcome of an event.

ODDS:

6 Twelve male and 16 female students have been selected as equal qualifiers for 6 college scholarships. If the awarded recipients are to be chosen at random, what are the odds that 3 will be male and 3 will be female?

Powerball ticket:
What is probability of winning the jackpot?
What are the OODS of winning the jackpot?