

## 1/18 Algebra 1 - Downing

- \* 11.4A Theoretical/Experimental Probability
  - Probability - the measure of how likely an event is to occur. (written as fractions or decimals from 0 to 1, or as percents from 0% to 100%) Ex:  $\frac{1}{2}$  or .5 or 50%

- Outcome - Each possible result of a probability experiment or situation
- Sample Space - the set of all possible outcomes
- Event - an outcome or set of outcomes

If you roll a die: 1 2 3 4 5 6 <sup>sample space</sup>  
                          ↑   ↑   ↑   ↑   ↑  
                          ea. one individually is an outcome  
event: rolling an odd # = 1, 3, 5

- Favorable outcomes - outcomes for a specified event (ex: rolling a 3, rolling an even #, rolling a # other than 2, etc.)
- \* • Theoretical probability - the ratio of the # of favorable outcomes to the total # of outcomes. (Probability it SHOULD happen.)
- $P(\text{event}) = \frac{\# \text{ of favorable outcomes}}{\# \text{ of total outcomes in sample space}}$

Ex: probability of rolling a 3    Roll a die 1 2 3 4 5 6  
 $= P(\text{rolling a 3}) = \frac{1}{6}$

$$P(\text{rolling even \#}) = \frac{3 \text{ (2, 4 or 6)}}{6 \text{ (total outcomes)}} = \frac{1}{2}$$

$$P(\text{rolling a \# < 5}) = \frac{4 \text{ (favorable)}}{6 \text{ (total outcomes)}} = \frac{2}{3}$$

$P(\bar{A})$

- Complement of event  $E$ , is the set of all outcomes NOT in event  $E$ .

$$P(A) + P(\bar{A}) = 1 \quad \text{or} \quad P(\bar{A}) = 1 - P(A)$$

- prob of something happening and " " " not " will always = 1

- 52 cards in Deck

13 clubs, 13 spades, 13  $\hearts$ , 13  $\diamonds$ .

$$P(\text{select a Jack}) = \frac{4 \text{ (favorable outcomes)}}{52 \text{ (possible outcomes)}} = \frac{1}{13} \text{ chance of selecting a Jack}$$

$$P(\text{select a card not a Jack}) = 1 - \frac{1}{13} = \frac{13}{13} - \frac{1}{13} = \frac{12}{13} \text{ * (complement)}$$

\* Experimental Probability - the ratio of the # of times the event occurs to the # of trials. after its already happened.

- Each repetition of an experiment is called a trial.

\* Experimental Prob =  $\frac{\text{\# of times favorable event occurred}}{\text{total \# of trials}}$

Ex: Draw a card from the deck, record it and replace it

Results:  $\diamond$     $\hearts$     $\spades$     $\clubs$   
           20    18   17   25

$$20 + 18 + 17 + 25 = 80$$

Find exp. prob. of ...

①  $P(\text{club}) = \text{Prob I draw club from deck} = \frac{25}{80} = .31 \text{ or } 31\%$

- 80 trials that already happened

②  $P(\text{not a } \hearts) = \frac{20 + 17 + 25}{80} = \frac{62}{80} = \frac{31}{40} = .78$

OR  $1 - \frac{18}{80} = 1 - \text{prob it was a } \hearts = \frac{80}{80} - \frac{18}{80} = \frac{62}{80}$

③  $P(\text{red card}) = \frac{20 + 18}{80} = \frac{38}{80} = .48$