Warm-up

1) In a game at the fair there is a 0.3 chance of picking a winner. What is the probability that you win exactly 4 of your next 10 tries?

$${}_{10}C_4\,(0.3)^4(0.7)^6 = 0.2001$$

2) How many ways can you rearrange the letters in "CORRECT"?

$$\frac{7!}{(2!2!)} = 1{,}260$$

3) How many ways can 8 friends get in line for a movie?

$$8! = {}_8P_8 = 40{,}320$$

4) How many 5 digit passwords are possible if the code cannot start with a 0 and no digit can repeat?

$$\underline{9}\cdot\underline{9}\cdot\underline{8}\cdot\underline{7}\cdot\underline{6} = 27{,}216$$

Expand the binomial

1) **middle** term of $(2 + x)^4$

$24x^2$

2) **middle** term of $(x + 5)^{12}$

$14{,}437{,}500\,x^6$

3) **middle** term of $(a - 3)^8$

$5{,}670\,a^4$

4) **middle** term of $(2x + 3y)^{10}$

$1{,}959{,}552\,x^5y^5$

1: The probability that Andres gets a hit when at bat is 1/5. What is the probability that he gets exactly 4 hits during his next 10 at bats?

0.0881

2: A die is rolled 8 times. Find the probability of getting exactly 2 fours.

0.2605

3: During a player's turn in a certain board game, players must spin a spinner. The four possible colors she can land on are green, blue, red, or yellow. If the probability for all four colors is equal, what is the probability of landing on green exactly 5 times out of 10 spins?

$${}_{10}C_5 \left(\frac{1}{4}\right)^5 \left(\frac{3}{4}\right)^5$$

0.0584

4: Suppose a coin is weighted so that the probability of getting heads in any one toss is 90%. What is the probability of getting exactly 7 heads in 8 tosses?

0.3826

Unit 2: Bullet Points

In your WB after 208

Fundamental Counting Principle (FCP) – selecting one from each group; multiply the number of options within each group

Ex. Choosing classes, picking out an outfit, phone numbers, burgers…

Combination – selecting multiple from a group when the order doesn't matter nCr

Ex. Electing members to a committee, picking movies from a list, calling a group of kids

Permutation – selecting multiple from a group when the order does matter nPr

Ex. Electing a president and secretary, finishing a race, standing in line, picking order

Repetition – Arranging a group when values / items repeat

Ex. Rearranging letters in a word, arranging silverware / candles / lights

Circular – Arrangement in a circle with no reference point

Ex. Standing around a campfire, sitting around a table (reference points make it linear)

Probability - $\frac{\text{Success}}{\text{Total}}$ $\frac{\text{what we want to happen}}{\text{what could happen}}$

Conditional – finding probability when a piece of information about the outcome(s) is given; divide the probability of both events by the probability of the given event

Ex. What is the probability that a random card is a club, given that it is black?

Multiple Events – probability of one event followed by another (usually has a THEN / AND), multiply the probability for each event

Independent – first event doesn't affect later events

Ex. Flipping a coin, selecting a card then replacing

Dependent – first event affects the next event

Ex. Selecting cards without replacing

If order does not matter combinations can sometimes simplify the work

Multiple Outcomes – probability of one event has multiple criteria for success (usually has OR), add the probability for each possible outcome

Inclusive – sets of outcomes that have overlapping values (need to subtract the overlap)
Ex. Rolling an even number or greater than a 3

Exclusive – sets of outcomes that do not have overlapping values
Ex. Rolling an even number or a 5

Expected Value – given outcomes and probabilities, determine the anticipated outcome, especially over many repetitions (sometimes already in a table, sometimes you have to do all the set up yourself)

1) Identify the potential gains
2) Multiply each gain by its probability
3) Find the sum

Ex. 1/10 win \$5, 1/5 win \$3 all others lose \$2. What is the expected value?

Binomial Expansion – finding the middle term of an expanded binomial,
instead of expanding the entire binomial we can skip right to the term we want
combination out front / first term / second term (with exponents ½ the original)

Ex. Find the middle term $(2x + 4)^{14}$

Binomial Experiment – a probability question of multiple <u>independent</u> events with the same individual probabilities when there are 2 possible outcomes (usually have **EXACTLY**)

Set up is the same as Binomial Expansion just instead of first and second term we fill in those parts with probability of success and probability of failure

Ex. Jim flips a coin 14 times, what is the probability of getting exactly 10 heads?

****Know which types of questions have key words / which ones have key concepts and know what each word or concept matches up with as far as steps of operations****

Today:

1) **Finish WB 208 (All, 1-24)**

Show Work

2) **If you would like more practice I can give you some**

3) **Complete any missing work**

4) **Help those around you**

5) **Don't distract others**