

NAME: _____

Key

DATE: _____

HOUR: _____

Chapter 12 Test Review

Section 12.1: The Counting Principle

Success criteria:	Rating: Low..... I got this!					
- I can label events as independent or dependent	<table style="margin: auto; border: none;"> <tr> <td style="padding: 0 10px;">1</td> <td style="padding: 0 10px;">2</td> <td style="padding: 0 10px;">3</td> <td style="padding: 0 10px;">4</td> <td style="padding: 0 10px;">5</td> </tr> </table>	1	2	3	4	5
1	2	3	4	5		
State whether the events are <i>independent</i> or <i>dependent</i> .						
1. <u>D</u> Finishing in first, second, or third place in a ten-person race 2. <u>I</u> Choosing a pizza size and a topping for the pizza 3. <u>D</u> Seventy-five raffle tickets are placed in a jar. Three tickets are then selected, one after the other, without replacing a ticket after it is chosen. 4. <u>I</u> The 232 members of the freshmen class all vote by secret ballot for the class representative to the Student Senate.						
- I can use the Fundamental Counting Principle to solve problems	<table style="margin: auto; border: none;"> <tr> <td style="padding: 0 10px;">1</td> <td style="padding: 0 10px;">2</td> <td style="padding: 0 10px;">3</td> <td style="padding: 0 10px;">4</td> <td style="padding: 0 10px;">5</td> </tr> </table>	1	2	3	4	5
1	2	3	4	5		
- I can solve problems involving independent events	<table style="margin: auto; border: none;"> <tr> <td style="padding: 0 10px;">1</td> <td style="padding: 0 10px;">2</td> <td style="padding: 0 10px;">3</td> <td style="padding: 0 10px;">4</td> <td style="padding: 0 10px;">5</td> </tr> </table>	1	2	3	4	5
1	2	3	4	5		
1. Mike is playing the role of Oliver in his school's production of <i>Oliver Twist</i> . The wardrobe crew has presented Mike with 5 pairs of pants and 4 shirts that he can wear. From how many possible costumes consisting of a pair of pants and a shirt does Mike have to choose? <div style="text-align: center; margin: 10px 0;"> $\frac{5}{\text{pants}} \cdot \frac{4}{\text{shirts}} = 20 \text{ costumes}$ </div> 2. Jenny has decided to buy a pickup truck. Her choices include either a V-6 engine or a V-8 engine, a standard cab or an extended cab, and 2-wheel drive or 4-wheel drive. How many possible models does she have to choose from? <div style="text-align: center; margin: 10px 0;"> $\frac{2}{\text{Engine}} \cdot \frac{2}{\text{cab}} \cdot \frac{2}{\text{Drive}} = 8 \text{ models}$ </div> 3. A Mexican restaurant offers chicken, beef, or vegetarian fajitas wrapped with either corn or flour tortillas and topped with either mild, medium, or hot salsa. How many different choices of fajitas does a customer have? <div style="text-align: center; margin: 10px 0;"> $\frac{3}{\text{meat}} \cdot \frac{2}{\text{tort.}} \cdot \frac{3}{\text{salsa}} = 18 \text{ fajitas}$ </div>						

- I can solve problems involving dependent events	1	2	3	4	5
1. The 10-member steering committee that is preparing a study of the public transportation needs of Clawson will select a chairperson, vice-chairperson, and secretary from the committee. No person can serve in more than one position. In how many ways can the three positions be filled?	$\frac{10}{\text{chair}} \cdot \frac{9}{\text{v.c.}} \cdot \frac{8}{\text{sec}} = 720 \text{ ways}$				
2. In how many ways can the four call letters of a radio station be arranged if the first letter must be W or K and no letters repeat?	$\underline{2} \cdot \underline{24} \cdot \underline{23} \cdot \underline{22} = 24,288 \text{ ways}$				
3. How many 7-digital phone numbers can be formed if the first digit cannot be 0 or 1, and no digital can be repeated?	$\underline{8} \quad \underline{9} \quad \underline{8} \quad \underline{7} \quad \underline{6} \quad \underline{5} \quad \underline{4} = 483,840 \text{ numbers}$				
4. At a local concert there are five bands that need to be placed on the flyers to be placed around town to advertise the concert. If the headlining act must be placed first or last, how many different ways can the names appear on the flyer?	$\frac{1}{H} \cdot 4 \cdot 3 \cdot 2 \cdot 1 + 4 \cdot 3 \cdot 2 \cdot 1 \cdot \frac{1}{H} = 48 \text{ ways}$				

Section 12.2: Permutations and Combinations

Success criteria:	Rating:				
	Low..... I got this!				
- I can calculate a permutation	1	2	3	4	5
- I can calculate a combination	1	2	3	4	5

Evaluate each expression:

1. $P(6, 3) = \underline{120}$ 2. ${}^5P_5 = \underline{120}$ 3. $C(8, 7) = \underline{8}$ 4. ${}^5C_5 = \underline{1}$

5. $C(12, 4) \cdot C(8, 3) = \underline{27720}$

- I can determine if an event represents a permutation or a combination	1	2	3	4	5
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Determine whether each situation involves a *permutation* or *combination*. Then find the number of possibilities.

1. Seating 8 students in 8 seats in the front row of the school auditorium.
Permutation

2. Checking out 3 library books from a list of 8 books for a research paper.
Combination

3. Choosing 2 movies to rent from 5 movies.

Comb

4. The first-, second-, and third-place finishers in a race with 10 contestants.

Perm

5. Placing a red rose bush, a yellow rose bush, a white rose bush, and a pink rose bush in a row in a planter.

Perm

6. An arrangement of the letters in the word *isosceles*.

Perm

- I can calculate a permutation with repetition

1 2 3 4 5

1. How many different ways can the letters of the word *STEREO* be arranged?

$$\frac{6!}{2!} = 360 \text{ ways}$$

2. How many different ways can the letters of the word ~~ADDITIONALLY~~ be arranged?

$$\frac{12!}{2! \cdot 2! \cdot 2! \cdot 2!} = 299,376,000 \text{ ways}$$

- I can calculate permutations involving multiple events

1 2 3 4 5

1. Don has 10 books that he needs to put on two different shelves. If five books are randomly selected to be put away on the first shelf, how many different ways could he put five of the books away?

$$5! = 120 \text{ ways}$$

2. There are 8 students competing in a school spelling bee. If awards are given for first and second place, how many ways can awards be given out?

$$8 \cdot 7 = 56 \text{ ways}$$

3. Jenny has the DVD of each ^{of 5} seasons for her favorite television show. She recently moved to a new apartment and is unpacking the box that she put the DVDs in. If she randomly pulls the DVDs out the box and places them on the shelf, how many ways can she arrange them and have Season 1 and Season 2 in the correct spot?

$$\frac{{}^5C_1 \cdot {}^5C_1 \cdot {}^5C_3}{{}^5C_5} = \frac{5 \cdot 5 \cdot 10}{1} = 250 \text{ ways}$$

- I can calculate combinations involving multiple events

1 2 3 4 5

1. Six cards are drawn from a standard deck of cards. How many hands will contain three hearts and three spades?

$${}^{13}C_3 \cdot {}^{13}C_3 = 286 \cdot 286 = 81,796$$

2. Mr. Jones has 10 employees at his small local business. If he needs to send three of them to a local conference, how many different ways can he select three employees to go to the conference?

$${}^{10}C_3 = 120$$

Section 12.3: Probability

Success criteria:	Rating:				
	Low..... I got this!				
- I can calculate the probability of events	1	2	3	4	5
<p>One bag of candy contains 15 red candies, 10 yellow candies, and 6 green candies. Find the probability of each selection.</p> <p>1. Picking a red candy $\frac{15}{31} = 48.3\%$</p> <p>2. Picking a green candy $\frac{6}{31} = 19.4\%$</p> <p>3. Not picking a yellow candy $\frac{21}{31} = 67.7\%$</p> <p>4. Not picking a red candy $\frac{16}{31} = 51.6\%$</p>					
- I can use combinations to calculate the probability of an event	1	2	3	4	5
<p>1. A board game is played with tiles with letters on one side. There are 56 tiles with consonants and 42 tiles with vowels. Each player must choose seven of the tiles at the beginning of the game. What is the probability that a player select 4 consonants and three vowels?</p> $\frac{{}^{56}C_4 \cdot {}^{42}C_3}{{}^{98}C_7} = \frac{4216489200}{13834413152} = 30.5\%$					
- I can use permutations to calculate the probability of an event	1	2	3	4	5
<p>An administrative assistant has 4 blue file folders, 3 red folders, and 3 yellow folders on her desk. Each folder contains different information, so two folders of the same color should be viewed as being different. She puts the file folders randomly in a box to be taken to a meeting. Find each probability.</p> <p>1. P(4 blue, 3 red, 3 yellow, in that order)</p> $\frac{4P4 \cdot 3P3 \cdot 3P3}{10P10} = \frac{24 \cdot 6 \cdot 6}{3628800} = \frac{864}{3628800} = \frac{1}{4200}$					

2. P(first 2 blue, last 2 blue)

$$\frac{4P2 \cdot 6P6 \cdot 2P2}{10P10} = \frac{12 \cdot 720 \cdot 2}{3628800} = \frac{17280}{3628800} = \frac{1}{210}$$

Section 12.4: Multiplying Probabilities

Success criteria:	Rating: Low..... I got this!				
	1	2	3	4	5
<p>- I can calculate the probability of two or more independent events to occur</p> <p>A die is rolled three times. Find the probability of each event.</p> <p>1. A 1 is rolled, then a 2, then a 3. $\frac{1}{6} \cdot \frac{1}{6} \cdot \frac{1}{6} = \frac{1}{216}$</p> <p>2. A 1 or 2 is rolled, then a 3, then a 5 or a 6. $\left(\frac{1}{6} + \frac{1}{6}\right) \cdot \frac{1}{6} \cdot \left(\frac{1}{6} + \frac{1}{6}\right) = \frac{2}{6} \cdot \frac{1}{6} \cdot \frac{2}{6} = \frac{4}{216} = \frac{1}{54}$</p> <p>3. 2 odd numbers are rolled, then a 6. $\frac{3}{6} \cdot \frac{3}{6} \cdot \frac{1}{6} = \frac{9}{216} = \frac{1}{24}$</p> <p>4. A number less than 3 is rolled, then a 3, then a number greater than 3. $\frac{2}{6} \cdot \frac{1}{6} \cdot \frac{3}{6} = \frac{6}{216} = \frac{1}{36}$</p>					
<p>- I can calculate the probability of two or more dependent events to occur</p> <p>1. The cup on the teacher's desk holds 4 red pens and 7 black pens. What is the probability of her selecting first a black pen, then a red one? $\frac{7P1 \cdot 4P1}{11P2} = \frac{28}{110} = \frac{14}{55} = \frac{25.45\%}{}$</p> <p>2. What is the probability of drawing two cards showing odd numbers from a set of cards that show the first 20 counting numbers if the first card is not replaced before the second is chosen? $\frac{10P2}{20P2} = \frac{10}{20} \cdot \frac{9}{19} = \frac{90}{380} = \frac{9}{38} = 23.7\%$</p>					

3. A basket contains 4 plums, 6 peaches, and 5 oranges. What is the probability of picking 2 oranges, then a peach if 3 pieces of fruit are selected at random?

$$\frac{5}{15} \cdot \frac{4}{14} \cdot \frac{6}{13} = \frac{120}{2730} = \frac{4}{91}$$

Section 12.5: Adding Probabilities

Success criteria:	Rating: Low..... I got this!				
- I can determine if an event is mutually exclusive or inclusive	1	2	3	4	5
Indicate whether the events in each pair are <i>inclusive</i> or <i>mutually exclusive</i> .					
1. Drawing a queen from a standard deck of cards; drawing a diamond from a standard deck of cards. <u>inclusive</u>					
2. Drawing a jack from a standard deck of cards; drawing a king from a standard deck of cards. <u>mut. exclusive</u>					
- I can calculate the probability of mutually exclusive events	1	2	3	4	5
1. A bag contains 45 dyed eggs: 15 yellow, 12 green, and 18 red. What is the probability of selecting a green or a red egg? $\frac{12}{45} + \frac{18}{45} = \frac{30}{45} = \frac{2}{3} = 66.7\%$					
2. The letters from the words LOVE and LIVE are placed on cards and put in a box. What is the probability of selecting an L or an O from the box? $\frac{2}{8} + \frac{1}{8} = \frac{3}{8} = 37.5\%$					
3. A pair of dice is rolled, and the two numbers are added. What is the probability that the sum is either a 5 or a 7? $\frac{10}{36} = \frac{5}{18} = 28\%$					
- I can calculate the probability of inclusive events	1	2	3	4	5
1. What is the probability of drawing a red card or an Ace from a standard deck of cards? $\frac{26}{52} + \frac{4}{52} - \frac{2}{52} = \frac{28}{52} = \frac{7}{13}$					
2. Three cards are selected from a standard deck of 52 cards. What is the probability of selecting a king, a queen, or a red card? $\frac{4}{52} + \frac{4}{52} + \frac{26}{52} - \frac{4}{52} = \frac{30}{52} = \frac{15}{26}$					
3. A pair of dice is rolled. What is the probability that the sum is odd or a multiple of 3? odd 3, 5, 7, 9, 11 3, 6, 9, 12 $\frac{24}{36} = \frac{2}{3}$					