Solve each problem in Column A. Draw a line to the correct answer in Column B. The first one is done for you.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. If you have watermelon, cantaloupe and honeydew, how many combinations of two fruits are there?</td>
<td>A. 15</td>
</tr>
<tr>
<td>2. How many three-letter combinations are possible using the letters D, E, F, G, and H?</td>
<td>B. 21</td>
</tr>
<tr>
<td>3. How many different two-person debating teams can be chosen from six students?</td>
<td>C. 10</td>
</tr>
<tr>
<td>4. At Pizza Pan, you can choose two toppings at no extra cost for your pizza. The toppings are mushrooms, sausage, peppers, and extra cheese. How many different two-topping pizzas could you order?</td>
<td>D. 3</td>
</tr>
<tr>
<td>5. How many different three-person relay teams are possible with four people?</td>
<td>E. 6</td>
</tr>
<tr>
<td>6. The students in Mr. Trumbull's English class need to read 2 books from a list of 7 books. How many different combinations of books are possible?</td>
<td>F. 4</td>
</tr>
</tbody>
</table>
1. A chef has some broccoli, cauliflower, carrots, and squash to make a vegetarian dish. List the possible combinations if he uses only 3 vegetables in the dish.

___________________________________________________
___________________________________________________
___________________________________________________

2. Lauren, Manuel, Nick, Opal, and Pat are forming groups of two to work on a drama production. List the different combinations of students that are possible using the first initial of each name.

___________________________________________________
___________________________________________________

3. Keiko has seven colors of lanyard. She uses three different colors to make a key chain. How many different combinations can she choose?

___________________________________________________
___________________________________________________

4. On Sundays at Ice Cream Heaven, you can choose two free toppings for your sundae. The toppings are nuts, hot fudge, caramel, and sprinkles. How many different combinations of toppings can you order?

___________________________________________________
___________________________________________________

5. How many different three-person relay teams can be chosen from six students?

___________________________________________________
___________________________________________________

6. The students in Mrs. Mandel's class need to choose two class representatives from six nominated students. How many different combinations of class representatives are possible?

___________________________________________________
___________________________________________________

7. There are four varieties of muffins available at the Coffee Shop. How many different ways can you choose three different muffins?

___________________________________________________
___________________________________________________

8. How many two-person carpools are possible with seven people?

___________________________________________________
1. If you have tomatoes, red peppers, onions, green peppers, and mushrooms, how many combinations of three vegetables are there? 

2. How many three-letter combinations are possible from P, Q, R, S, T, and U? 

3. Kim has seven colors of hair ribbons: red, white, pink, green, blue, black, and purple. She uses two different colors to make a bow. How many different combinations of colors can she choose? 

4. Les, Dennis, Greg, and Philip are pairing up to play doubles tennis. In how many different ways can they pair up? 

5. You can choose two side dishes for your chicken dinner. The choices are mashed potatoes, roasted potatoes, squash, carrots, string beans, stuffing, broccoli, or corn. How many different side dish combinations could you order? 

6. How many different five-person relay teams can be chosen from seven students? 

7. The students in Mr. Cohen’s science class need to complete three experiments at home from a list of seven topics. How many different combinations of experiments are possible? 

8. Lena, Drew, Michaela, Trey, Nancy, and Jonah are pairing up to play one-on-one basketball. In how many different ways can they pair up? 

Find the number of combinations.

9. 8 things taken 4 at a time 

10. 6 things taken 4 at a time 

11. 8 things taken 5 at a time 

12. 7 things taken 6 at a time 

13. 7 things taken 4 at a time 

14. 8 things taken 6 at a time
Problem Solving

Combinations

Write the correct answer.

1. Six friends are going to play a ball game. Each team has 3 players. How many different team combinations are possible?

**Solution:**
Make a list of all possible combinations.

1, 2, 3 and 4, 5, 6
1, 2, 4 and 3, 5, 6
1, 2, 5 and 3, 4, 6
1, 2, 6 and 3, 4, 5
1, 3, 4 and 2, 5, 6
1, 3, 5 and 2, 4, 6
1, 3, 6 and 2, 4, 5
1, 4, 5 and 2, 3, 6
1, 4, 6 and 2, 3, 5
1, 5, 6 and 2, 3, 4

There are 20 different possible team combinations.

2. Yung wants to visit 3 of the 5 Great Lakes this summer. How many different combinations of lakes are possible?

The Great Lakes are Huron, Ontario, Michigan, Erie, and Superior.

**Solution:**
Make a list.

Huron, Ontario, Michigan
Huron, Ontario, __________
Huron, Ontario, __________
Huron, Michigan, __________
Huron, __________, __________
Huron, Erie, __________
Ontario, Michigan, __________
Ontario, __________, __________
Michigan, Erie, __________
Michigan, __________, __________

Count all the combinations.

There are __________ different possible combinations.

Choose the letter for the best answer.

3. Eight children are playing a trivia game. They want to make teams of 2 players each. How many different team combinations are possible?

A 21 combinations
B 28 combinations
C 56 combinations

4. At Washington Middle School, a student takes 4 core classes a day. There are 6 different core classes offered. How many different combinations of classes are there?

A 10 combinations
B 15 combinations
C 24 combinations
Review for Mastery

Combinations

A combination is a selection of objects in which the order is not important. You can make a list to find the number of combinations.

The school district is going to plant two types of trees around the playground. The landscaper has five kinds of trees to choose from.

Let the letters A, B, C, D, and E represent the different kinds of trees. You can make an organized list of all possible combinations.

Tree A with each other tree:  AB  AC  AD  AE
Tree B with each other tree:  BA  BC  BD  BE
Tree C with each other tree:  CA  CB  CD  CE
Tree D with each other tree:  DA  DB  DC  DE
Tree E with each other tree:  EA  EB  EC  ED

1. How many groups of 2 trees are in the list?  

2. AB is the same combination as  
AC is the same combination as  
AD is the same combination as  
AE is the same combination as  
BC is the same combination as  
BD is the same combination as  
BE is the same combination as  
CD is the same combination as  
CE is the same combination as  

3. Cross out each of the duplications in the list above. How many are left?  

4. Make an organized list of all possible two-letter combinations using the letters U, V, W, X, Y, and Z. Cross out each duplication.

UV,  
WU,  
YU,  

VU,  
XU,  
ZU,  

There are  combinations of 6 letters taken 2 at a time.

**Lesson 11-7**

**You Can Count on It!**

You can use the Fundamental Counting Principle to help you find a formula that gives the number of combinations that are possible when \( x \) objects are taken \( n \) objects at a time. Remember, the Fundamental Counting Principle states that if a first event can occur in \( a \) ways, and a second event can occur in \( b \) ways, then the two events can occur together in \( a \cdot b \) ways.

**Suppose there are six students. How many different teams of three students can be chosen?**

1. Use the Fundamental Counting Principle to find how many ways three of the students can be chosen for a team.

<table>
<thead>
<tr>
<th>Choices for the first student</th>
<th>Choices left for the second student</th>
<th>Choices left for the third student</th>
<th>Total number of ways</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>5</td>
<td>4</td>
<td>( \times )</td>
</tr>
</tbody>
</table>

\[ 6 \times 5 \times 4 = \text{______ ways} \]

2. Use the Fundamental Counting Principle to find how many ways any group of three students can be ordered.

<table>
<thead>
<tr>
<th>Choices for the first student</th>
<th>Choices left for the second student</th>
<th>Choices left for the third student</th>
<th>Total number of orders</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>5</td>
<td>4</td>
<td>( \times )</td>
</tr>
</tbody>
</table>

\[ 6 \times 5 \times 4 = \text{______ orders} \]

3. The order in which the three students are chosen for the team does not matter, because changing the order does not change the team. So, to find the total number of teams that are possible, divide the number of ways three students can be chosen (Problem 1) by the total number of orders (Problem 2).

\[ \frac{\text{______ ways}}{\text{______ orders}} = \text{______ teams} \]

**Use the Fundamental Counting Principle and the formula, Number of Combinations = Number of Ways \( ÷ \) Number of Orders, to find the number of combinations.**

4. 9 things taken 5 at a time

5. 12 things taken 3 at a time

6. 10 things taken 4 at a time

7. 12 things taken 4 at a time
Here are three different frozen yogurt flavors: vanilla, chocolate, strawberry. How many combinations of only two different flavors can you make?

Order does not matter. If you choose a scoop of vanilla first and a scoop of chocolate second, it is the same combination as choosing chocolate first and then vanilla.

Making a list can help you picture the possible combinations of two different flavors.

<table>
<thead>
<tr>
<th>Scoop 1</th>
<th>Scoop 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>vanilla</td>
<td>chocolate</td>
</tr>
<tr>
<td>vanilla</td>
<td>strawberry</td>
</tr>
<tr>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

Use the chart to answer each question.

1. What flavor can you pair with strawberry to make a new combination?

2. Does pairing a scoop of strawberry with a scoop of vanilla make a new combination? Why or why not?

3. How many different combinations of two different flavors of yogurt can you make with three flavors?

4. Assume banana is added as another choice. Fill in the table to list all the combinations that can be made using two different flavors.

<table>
<thead>
<tr>
<th>Scoop 1</th>
<th>Scoop 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Puzzles, Twisters & Teasers

Banana-Rama!

Find the number of possible combination of pairs for each set of items below. Match the letters with the correct answers to solve the riddle.

1. peas, potatoes, corn, carrots, beans
   combinations: _______ A

2. Call of the Wild, Treasure Island, Peter Pan
   combinations: _______ E

3. bananas, apples
   combinations: _______ N

4. N'Sync, Britney Spears, Backstreet Boys, Janet Jackson
   combinations: _______ X

5. chocolate, vanilla, strawberry, pineapple, butter pecan, toffee, mint, blueberry, raspberry, cherry
   combinations: _______ B

6. Rob, Karen, Sari, George, Lemuel, Jenny, Tom, Lesley
   combinations: _______ C

7. blue shirt, black shirt, yellow shirt, white shirt, green shirt, brown shirt, gray shirt
   combinations: _______ H

8. Winston Churchill
   combinations: _______ P

9. Monet, Manet, Renoir, Pissarro, Degas, Cassatt, Picasso, Van Gogh, Gauguin
   combinations: _______ T

10. tennis ball, golf ball, football, soccer ball, basketball, snow ball
    combinations: _______ S

How is a flamingo like a bunch of bananas?

They’re both pink, _______ _______ _______ E _______ T

____ 3 6 28 0

____ ______ E ______ A ______ N ______ 15 .

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