

## Welcome Back MYP Math 9!

|   | Assignment<br>Effort Grade<br>(Circle One) | Comments<br>(What was interesting or<br>challenging?) |
|---|--|---|
| <b>Monday</b><br>Date: <u>5 - 14</u><br>Topic: <u>Counting Techniques</u> | 0 1 2                                      |   |
| <b>Tuesday</b><br>Date: _____<br>Topic: _____                             | 0 1 2                                      |   |
| <b>Wednesday</b><br>Date: _____<br>Topic: _____                           | 0 1 2                                      |   |
| <b>Thursday</b><br>Date: _____<br>Topic: _____                            | 0 1 2                                      |   |
| <b>Friday</b><br>Date: _____<br>Topic: _____                              | 0 1 2                                      |   |

## Class Plan

1) Warm-up

2) Ice Cream: Cones vs. Bowls

3) Conclusion

4) If time....

Practice via....



Warm-up: Vote! 2nd hour vote :)

Ice cream cone

Bowl of ice cream



|||| |

|||| ||

**Which do you prefer?**

**Think: What's the difference?**

## Ice Cream Cones vs. Bowls of Ice Cream

- 1) List all 2-scoop cones and bowls
- 2) Contrast cones vs. bowls

**Ice Cream Cones vs. Bowls of Ice Cream**      Flavors: {Chocolate, Vanilla, and Strawberry}

**CONES:** If you have 3 different flavors of ice-cream, how many different 2-scoop **cones** could you arrange? List **ALL** arrangements.

**BOWLS:** If you have 3 different flavors of ice-cream, how many different 2-scoop **bowls** could you choose? List **ALL** choices.

**CONTRAST CONES & BOWLS:** What is the difference between the number of ways we can **arrange** cones and **choose** bowls using the same flavors of ice-cream?



## 3) Questions 1 & 2, then conclusion

1. Zach, Ahmed, Jayden, and Corey are in a competition. How many ways could we award 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> place? **Does the order matter?** List all possible outcomes.

2. Mark, Rhama, Jacob, and Angie are looking to join student council but there are only 3 open spots. List the different ways the three students could be chosen. **Does the order matter?**

**Conclusion:** .What is the difference between the questions 1 and 2?

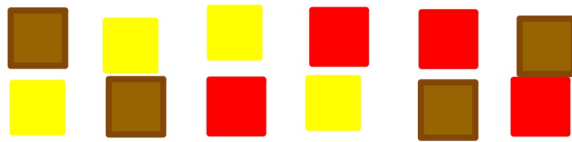
## 4) Done?

Begin exercises, or ask for a challenge!

**Ice Cream Cones vs. Bowls of Ice Cream**

Flavors: {Chocolate, Vanilla, and Strawberry}

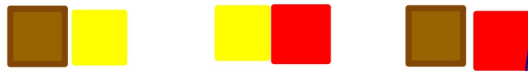
**CONES:** If you have 3 different flavors of ice-cream, how many different 2-scoop **cones** could you arrange? List **ALL** arrangements.



6 cones



**BOWLS:** If you have 3 different flavors of ice-cream, how many different 2-scoop **bowls** could you choose? List **ALL** choices.



3 bowls



**CONTRAST CONES & BOWLS:** What is the difference between the number of ways we can **arrange** cones and **choose** bowls using the same flavors of ice-cream?

In the cone you stack them  
(order is important)

## Investigation Solutions

Counting: Arranging and Choosing

Name \_\_\_\_\_

Ice Cream Cones vs. Bowls of Ice Cream

Flavors: {Chocolate, Vanilla, and Strawberry}

**CONES:** If you have 3 different flavors of ice-cream, how many different 2-scoop cones could you arrange? List **ALL** arrangements.

$\begin{matrix} C & V & C & S & V & S \\ V & C & S & C & S & V \end{matrix} \} 6 \text{ options}$

**BOWLS:** If you have 3 different flavors of ice-cream, how many different 2-scoop bowls could you choose? List **ALL** choices.

$CV, CS, VS \} 3 \text{ options}$

**CONTRAST CONES & BOWLS:** What is the difference between the number of ways we can *arrange* cones and *choose* bowls using the same flavors of ice-cream?

Cones need order - one on top of the other scoop...  
Bowls can be mixed-up - Chocolate & Vanilla <sup>same Van.</sup> as Choc.

1. Zach, Ahmed, Jayden, and Corey are in a competition. How many ways could we award 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> place? **Does the order matter?** List all possible outcomes.



Zach  
Zach  
Zach  
Zach  
Zach  
Zach

Corey  
Corey  
Jayden  
Ahmed  
Ahmed  
Jayden

Ahmed  
Jayden  
Ahmed  
Jayden  
Corey  
Corey

Zach  
1<sup>st</sup> place

6

2. Mark, Rhama, Jacob, and Angie are looking to join student council but there are only 3 open spots. List the different ways the three students could be chosen. **Does the order matter?**

$MJA \quad JAM \quad JMA$   
 $MAJ \quad AJM \quad AMJ$

} Same 3 people  
 } on student  
 } council  
 $6 = 3! = 3 \cdot 2 \cdot 1 = 6$

**Conclusion:** Contrast the difference of question 1 & 2.

Prizes = order matters (#1)

Council =  $\frac{4 \cdot 3 \cdot 2 \cdot 1}{6} = \frac{24}{6} = 4$   
 order is not important



MRJ (6 diff)  
 MRA (6 diff)  
 RJA (6 diff)  
 MAJ (6 diff)





## Investigation Solutions

1. Zach, Ahmed, Jayden, and Corey are in a competition. How many ways could we award 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> place? **Does the order matter?** List all possible outcomes. **PRIZES! ORDER MATTERS**

|     |     |     |     |
|-----|-----|-----|-----|
| ZAJ | AJC | JAZ | CAZ |
| ZAC | ACJ | JAC | CAJ |
| ZJC | AJZ | JCA | CZA |
| ZJA | AZJ | JCZ | CZJ |
| ZCA | ACZ | JZA | CJZ |
| ZCJ | AZC | JZC | CJA |

$$\frac{4}{1^{st}} \times \frac{3}{2^{nd}} \times \frac{2}{3^{rd}}$$

24 ways to award 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>

2. Mark, Rhama, Jacob, and Angie are looking to join student council but there are only 3 open spots. List the different ways the three students could be chosen. **Does the order matter?**

MRJ RJA  
MRA  
MJA

Since the 3 spots do not have titles or positions, the order **DOES NOT MATTER**. MJA = AJM

**Conclusion:** Contrast the difference of question 1 & 2.

Question 1 needs order since prizes are given.

Question 1 has a lot of repetition: MJA = JAM = AJM = AMJ...

What are the 2 types of problems we have been dealing with today?

Question 1.

Permutation: Order MATTERS!

Question 2.

Combination: order DOES NOT MATTER!



## Contrast cones vs. bowls

### DIFFERENCES BETWEEN PERMUTATIONS AND COMBINATIONS

#### PERMUTATIONS

Arranging people,  
digits, numbers,  
alphabets, letters,  
colours.

*Cones*

Keywords:  
Arrangements,  
arrange,...

#### COMBINATIONS

Selection of menu,  
food,  
clothes, subjects,  
teams.

*Bowl*

Keywords:  
Select, choice,...

## Game Time!



1) Choose team name, get:

- Rules:
- 1) Teacher randomly selects problem.
  - 2) Teams work on paper together - record group response on whiteboard.
  - 3) Times up: Teams show their board, **correct answer = 1 point**
  - 4) **After 2 points:** One team member gets a shot at 1, 2, or 3 points.



## Teams (2nd hour)

1) Dragon

|||||

2) Abbey's

||

3)

4)

5)

6)

## Teams (4th hour)

1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

4) \_\_\_\_\_

5) \_\_\_\_\_

6) \_\_\_\_\_

## Teams (7th hour)

1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

4) \_\_\_\_\_

5) \_\_\_\_\_

6) \_\_\_\_\_

## **Exercises**

Identify the following as a Combination (***selecting, choosing***) or a Permutation (***arranging***); check your notes from class to remind yourself of the definition.

1. The number of possible 7 digit phone numbers.

***Answer:***



## **Exercises**

Identify the following as a Combination (***selecting, choosing***) or a Permutation (***arranging***); check your notes from class to remind yourself of the definition.

2. The number of 2 digit numbers you can make out of the numbers 1, 2, 3, and 4 without repeating any digit.

***Answer:* PERMUTATION**

## **Exercises**

Identify the following as a Combination (***selecting, choosing***) or a Permutation (***arranging***); check your notes from class to remind yourself of the definition.

3. The number of 5-member teams that can be formed in a class of 12 students.

***Answer:* COMBINATION**

## **Exercises**

Identify the following as a Combination (***selecting, choosing***) or a Permutation (***arranging***); check your notes from class to remind yourself of the definition.

4. The number of ways can you select a committee of 3 students out of 10 students.

***Answer:* COMBINATION**

## **Exercises**

Identify the following as a Combination (***selecting, choosing***) or a Permutation (***arranging***); check your notes from class to remind yourself of the definition.

5. The number of ways we could choose 4 summer books to read out of the 7 in the Harry Potter series.

***Answer:* PERMUTATION**

## Exercises

Identify the following as a Combination (*selecting, choosing*) or a Permutation (*arranging*); check your notes from class to remind yourself of the definition.

6. The number of ways we could choose a president, vice president, and treasurer out of the 19 kids in 3<sup>rd</sup> hour.

***Answer:* PERMUTATION**

## Exercises

Identify the following as a Combination (*selecting, choosing*) or a Permutation (*arranging*); check your notes from class to remind yourself of the definition.

7. The number of ways we could select the Varsity basketball team of 12 out of the 40 who tried out.

**Answer: COMBINATION**

## Exercises

Identify the following as a Combination (*selecting, choosing*) or a Permutation (*arranging*); check your notes from class to remind yourself of the definition.

8. Picking a team captain, pitcher, and shortstop from a group of Baseball players.

Answer: **PERMUTATION**

## Exercises

Identify the following as a Combination (*selecting, choosing*) or a Permutation (*arranging*); check your notes from class to remind yourself of the definition.

9. Making a fruit salad with four different fruits from a refrigerator that contains 5 varieties of fruit.

**Answer: COMBINATION**



## Exercises

10. List the possible ways a president and a secretary could be arranged from students A, B, and C.  
Is this a permutation or a combination?

## Answer:

10. List the possible ways a president and a secretary could be arranged from students A, B, and C.  
Is this a permutation or a combination? *Permutation*

$$\frac{3}{\text{Pres.}} \times \frac{2}{\text{Secretary}} = \underline{6} \text{ ways}$$

AB BA CA }  
AC BC CB } 6

## Exercises

11. List the possible ways that a 3-person team could be made from students A, B, C, D, and E.  
Is this a permutation or a combination?

## Answer:

11. List the possible ways that a 3-person team could be made from students A, B, C, D, and E.  
Is this a permutation or a combination? *Combination*

ABC ACD BCD  
ABD ACE BCE  
ABE ADE BDE

*CDE* } 10 ways

$$\frac{5 \times 4 \times 3}{6 \text{ repeats}} = \frac{60}{6} = 10$$

Note: ABC = ACB = BAC = BCA = CAB = CBA!

## Exercises

12. List the possible ways 3 toppings could be added to a burger: Lettuce, avocado, pickles and tomatoes. **Is this a permutation or a combination?**

## Answer:

12. List the possible ways 3 toppings could be added to a burger: Lettuce, avocado, pickles and tomatoes. **Is this a permutation or a combination?** *Permutation (one topping on top of the other)*

|     |     |     |        |     |     |
|-----|-----|-----|--------|-----|-----|
| LAP | LPT | ALP | PAT    | PLT | TPL |
| LAT | LTP | APL | PTA    | PTL | TLP |
| LPA | APT | ALT | PAL    | TAP | TAL |
| LTA | ATP | ATL | PLATPA | TLA |     |

$4 \times 3 \times 2 = 24$