

## Welcome MYP 9 Mathematics!

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
<b>Monday</b> Date: <b>5-21</b> Topic: <b>3E.1 &amp; 3E.2 Venn Diagrams</b>	0 1 2	
<b>Tuesday</b> Date: <b>5-22</b> Topic: <b>Venn Diagrams Day 2</b>	0 1 2	
<b>Wednesday</b> Date: <b>5-23</b> Topic: <b>Venn Diagrams Day 3</b>	0 1 2	
<b>Thursday</b> Date: _____ Topic: _____	0 1 2	
<b>Friday</b> Date: _____ Topic: _____	0 1 2	

## Class Plan

- 1) Warm-up - homework questions?
- 2) Partner practice: Examine Rubric, Real-life Venn Diagrams

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### PROBABILITIES FROM VENN DIAGRAM

In **Chapter 3** we studied **Venn diagrams**. We saw that they consist of a rectangle which represents the universal set, and circles within it which represent subsets. In probability questions, the circles in a Venn diagram are used to represent particular events.

- 3) Practice

## **Rubric: Criterion D, Real-life application**

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The student is able to:

- i. **identify** the relevant elements of the authentic real-life situation
- ii. **select** appropriate mathematical strategies to model the authentic real-life situation
- iii. **apply** the selected mathematical strategies to reach a correct solution to the authentic real-life situation
- iv. **Verify** the degree of accuracy of the solution
- v. **justify** whether the solution makes sense in the context of the authentic real-life situation

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Students do **without** error:

- Create a correct Venn diagram
- Verify sample space
- Shade correct region
- Write correct set notation
- Interpret set notation
- Calculate probabilities
- Justify response with evidence from diagram and probabilities
- Justify realism of scenario

## Criterion D: Real Life Application

Do: 2014 Olympics with your partner.



Consider strengths: Partner assessment will be similar to unit 7  
- all members will need to contribute to the documents/ assessment.

Done: Social Media Practice



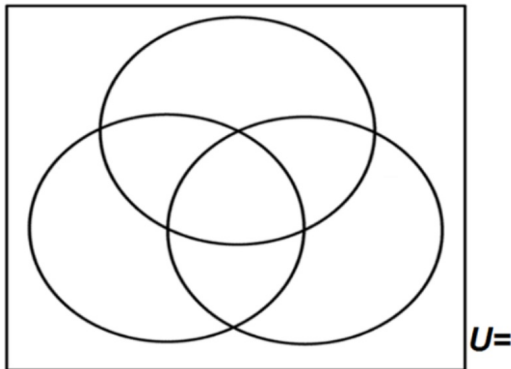
## Criterion D: Real Life Application

### Scenario: 2014 Winter Games

88 countries competed in the 2014 Winter games. Of these countries, 21 won gold medals, 22 won silver medals, and 24 won bronze medals.

18 countries won gold and silver medals, 21 countries won silver and bronze medals, and 20 countries won gold and bronze medals. 18 countries won all three types of medal.

1. Complete a Venn diagram using the information above.



## 2014 Winter Games Application

**2. Verify the sample space is 88 counties.**

**3. Shade the Venn diagram.**

i) Shade the region showing countries that were awarded Silver and Bronze, but not Gold.

ii) Write this information in set notation. \_\_\_\_\_

**4. State value and interpret the following notation:**

i)  $G \cap S \cap B =$  \_\_\_\_\_

ii)  $(G \cup S \cup B)' =$  \_\_\_\_\_

iii)  $G \cap S' \cap B' =$  \_\_\_\_\_

## 2014 Winter Games Application

**5. Find the probabilities of the countries who:**

i) Did not win any medals. What is this notation? \_\_\_\_\_

ii) Won silver and bronze medals, but not gold. What is this notation? \_\_\_\_\_

iii) Won exactly one type of medal. What is this notation? \_\_\_\_\_

## 2014 Winter Games Application

**6. Suppose 400 countries were competing.** How many of the 400 would you expect to win gold? ... How many countries are there in the world? **Is this realistic?**

**7. What can you conclude about the distribution of medals at the 2014 Olympics? Why?**



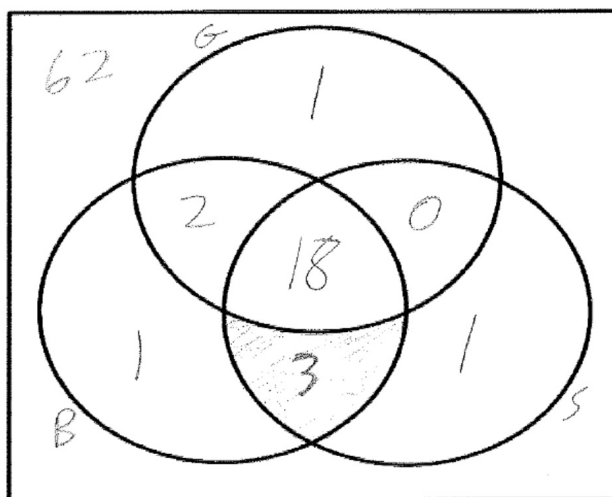
## 2014 Winter Games Application

8. Write 2-3 probability questions that can be answered using the Venn diagram.

## 2014 Winter Games Application Solutions

1. Complete a Venn diagram using the information above.

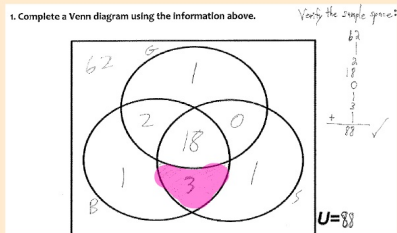
Verify the sample space:



$$\begin{array}{r} 62 \\ + 2 \\ + 18 \\ + 0 \\ + 3 \\ \hline 88 \end{array} \checkmark$$

$U=88$

## 2014 Winter Games Application Solutions



### 2. Shade the Venn diagram.

- i) Shade the region showing countries that were awarded Silver and Bronze, but not Gold.
- ii) Write this information in set notation.  $(B \cap S) \cap G^c$

### 3. Interpret the following notation:

- i)  $G \cap S \cap B =$  Countries that won all three types of medals.
- ii)  $(G \cup S \cup B)^c =$  Countries that did not win any medals.
- iii)  $G \cap S' \cap B' =$  Countries that won gold medals, but no silver or bronze medals.

## 2014 Winter Games Application Solutions

4. Write in set notation, then find the probabilities.

i) No medals

$$P((G \cup S \cup B)^c) = \frac{62}{88} = \frac{31}{44}$$

ii) Silver and bronze, but not gold medals

$$P((S \cap B) \cap G^c) = \frac{3}{88}$$

iii) Exactly one type of medal?

$$P(\underbrace{(S \cap B^c \cap G^c)}_1 \cup \underbrace{(S^c \cap B \cap G^c)}_1 \cup \underbrace{(S^c \cap B^c \cap G)}_1) = \frac{3}{88}$$

5. Suppose 400 countries were competing. How many of the 400 would you expect to win gold? ... How many counties are there in the world?

$$X = \frac{\frac{21}{88}}{400} \cdot 400 = 95.75$$

$P(G) = \frac{21}{88}$

## 2014 Winter Games Application Solutions

196 countries in the world.  
6. What can you conclude about the distribution of medals at the 2014 Olympics? Why?

Most countries do not win a medal. There are only a few countries that take the majority of medals, since there were 67 medals and only 26 countries receiving them.

$$\downarrow 1 + 1 + 1 + 2(2+3+0) + 3(18) = 67$$

## 2014 Winter Games Application Solutions

7. Write 2-3 probability questions that can be answered using the venn diagram.

If a country is chosen at random:  
1.) Find the probability that the country won a gold and bronze.  
 $P(G \cap B) = \frac{20}{88} = \frac{5}{22}$

2.) Find the probability that the country won a gold or bronze.  
 $P(G \cup B) = \frac{25}{88}$

3.) Find the probability that the country won exactly 2 medals.  
 $P[(G \cap B \cap S) \cup (G \cap B \cap S^c) \cup (G \cap B \cap S)] = \frac{5}{88}$   
3 + 0 + 2

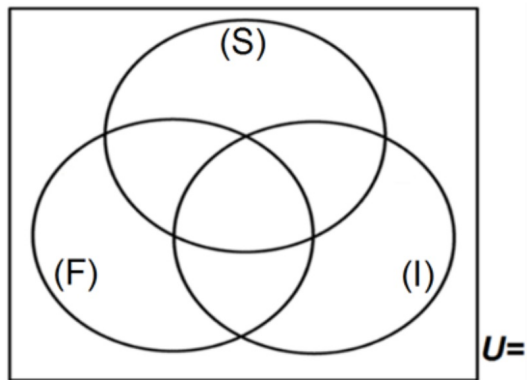
## Social Media Practice

**Scenario:** Students who use Facebook (F), Instagram (I), and Snapchat (S) applications.

120 9<sup>th</sup> grade students were surveyed on which social media applications they use. In this group of students 33 use Facebook, 74 use Instagram, and 96 use Snapchat.

25 students use Facebook and Snapchat, while 23 students use Facebook and Instagram. There are 21 students who use all three applications and 8 who do not use any of them.

1. Complete a Venn diagram using the information above.



## Social Media Practice

### 2. Shade the Venn diagram.

i) Verify your sample space is 120 students.

ii) Shade the region showing students that use Snapchat and Instagram, but not Facebook.

iii) Use set notation to represent the shaded region. \_\_\_\_\_

### 3. State the value and interpret the following notation:

i)  $(F \cup I \cup S)'$  = \_\_\_\_\_

ii)  $F \cap I \cap S$  = \_\_\_\_\_

iii)  $F \cap I' \cap S$  = \_\_\_\_\_

iv)  $F' \cap I' \cap S$  = \_\_\_\_\_



## Social Media Practice

A student is selected at random from those who took the survey.

4. Write in set notation, then find the probabilities:

i) Snapchat or Instagram

ii) Snapchat and Instagram, but not Facebook

iii) Facebook only

iv) Exactly two social media applications

## Social Media Practice

5. Suppose 575 9<sup>th</sup> graders were in this survey. Predict how many of the 575 would use Instagram or Facebook. **Show detailed work, and justify the accuracy of your answer.**

6. Defend whether the solution is, or is not, realistic.

## Social Media Practice

7. Look back at the information in your Venn diagram.

i) Based on your knowledge of high school students, is this representation realistic?

ii) Support your conclusion in i) using evidence from this assessment.

## Social Media Practice Solutions

**Scenario:** Students who use Facebook (F), Instagram (I), and Snapchat (S) applications.

120 9<sup>th</sup> grade students were surveyed on which social media applications they use. In this group of students 33 use Facebook, 74 use Instagram, and 96 use Snapchat.

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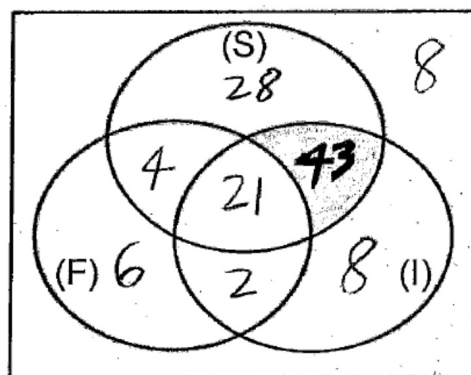
$$F \cap S \cap I = 21$$

$$(F \cup S \cup I)' = 8$$

$$S \cup I = 106$$

$$S + I = 170$$

$$S \cap I = 64$$



$$S = 96$$

$$I = 74$$

$$F = 33$$

$$F \cap S = 25$$

$$F \cap I = 23$$

$$U = 120$$

## Social Media Practice Solutions

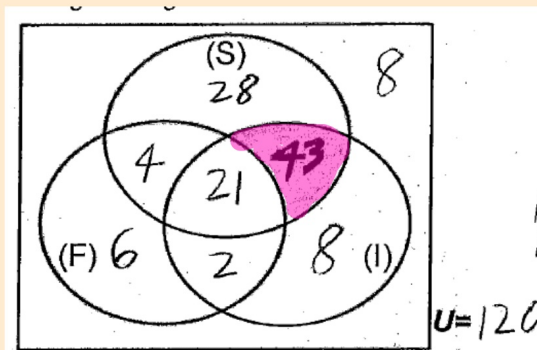
2. Shade the Venn diagram.

i) Verify your sample space is 120 students.

$$6 + 4 + 28 + 21 + 2 + 13 + 8 + 8 = 120 \checkmark$$

ii) Shade the region showing students that use Snapchat and Instagram, but not Facebook.

iii) Use set notation to represent the shaded region.  $S \cap I \setminus F$



## Social Media Practice Solutions

3. State the value and interpret the following notation:

- i)  $(F \cup I \cup S)'$  = 8 Students who don't use any of the three.
- ii)  $F \cap I \cap S$  = 21 Students who use Snapchat, FB, and IG.
- iii)  $F \cap I' \cap S$  = 4 Students who use Facebook and SC, but not IG.
- iv)  $F' \cap I' \cap S$  = 28 Students who only use Snapchat.

## Social Media Practice Solutions

A student is selected at random from those who took the survey.

4. Write in set notation, then find the probabilities:

i) Snapchat or Instagram

$$P(S \cup I) = \frac{106}{120} = \frac{53}{60}$$

ii) Snapchat and Instagram, but not Facebook

$$P(S \cap I \cap F^c) = \frac{43}{120}$$

iii) Facebook only

$$P(F \cap I^c \cap S^c) = \frac{6}{120} = \frac{1}{20}$$

iv) Exactly two social media applications

$$P((F \cap I \cap S^c) \cup (F \cap I^c \cap S) \cup (F^c \cap I \cap S)) = \frac{49}{120}$$

## Social Media Practice Solutions

6. Defend whether the solution is, or is not, realistic.

I'd say this is fairly realistic besides there being 5 of a person in the end result of the problem which wouldn't really happen. A lot of ~~people~~ use Facebook and Instagram and it would make sense for a little over 100 people to use either of the <sup>two</sup> in a population of 525 students.

7. Look back at the information in your Venn diagram.

i) Based on your knowledge of high school students, is this representation realistic?

I'd say so. It shows a lot of people using social media, which is realistic and demonstrates which social media apps are more popular among high schoolers.

ii) Support your conclusion in i) using evidence from this assessment.

Only 8 out of 120 people don't use social media which shows a lot of people use social media. Snapchat is the most used, Instagram the next most, and Facebook the least just like our real-life 9th graders in my experience.



## Social Media Practice Solutions

### Another possible response...

5. Suppose 575 9<sup>th</sup> graders were in this survey. Predict how many of the 575 would use Instagram or Facebook. Show detailed work, and justify the accuracy of your answer.

$$P(I \cup F) = \frac{84}{180}$$

based on our 180 sample space

$$\frac{84}{180} = \frac{x}{575}$$
$$\frac{575 \cdot 84}{180} = x$$

$x = 402.5$  students would use ig or facebook out of a sample space of 575 students

\* The answer wouldn't be accurate, because you can't have a half a person!

6. Defend whether the solution is, or is not, realistic.

I would defend that the solution is semi-realistic. It would not be perfect, in any way, though, because you can't have a half of a person, like in the solution. I would say the range of the answer, if you were, to say, round it to 403, would be accurate, most teen students that I know have Instagram, so the statement that the majority (403) students have either an Instagram or Facebook is realistic.

## Social Media Practice Solutions

### Another possible response...

7. Look back at the information in your Venn diagram.

i) Based on your knowledge of high school students, is this representation realistic?

I would say that, based on my knowledge, this representation is realistic. Most all people (students) I know have at least one form of social media, and very few that don't have any. I also see that Snapchat is the most popular and Instagram is 2nd.

ii) Support your conclusion in i) using evidence from this assessment.

From this Venn Diagram, we can say the majority of students have social media ( $\frac{112}{120} \approx 93.3\%$ ) and very few, about 7%, don't have any. From the knowledge I have of high schoolers, this is accurate as I only know a very few people who don't have any social media. I also see, in real life, that the most popular social media is Snapchat, which is the most popular in our sample space with a probability of  $\frac{9}{120}$  or  $80\%$  of students have it. Also, Instagram is 2nd most popular, in real life and is our survey, with  $\frac{74}{120}$  (or  $\approx 61.6\%$ ) having it. Finally, I know no one who only has Facebook, which is accurate to this data because only 5% of students only have Facebook.