

Math 2 Unit 14 Worksheet 1
Probability and Sample Space

Name: _____
Date: _____ Per: _____

[1-3] Find the probability for each situation.

1. A 6-sided number cube is rolled one time:
a) What is the sample space (possible outcomes)?

- b) Find each of the probabilities below:

$P(3) =$ _____

$P(\text{number} \leq 6) =$ _____

$P(\text{even}) =$ _____

$P(\text{number} < 10) =$ _____

$P(\text{number} > 2) =$ _____

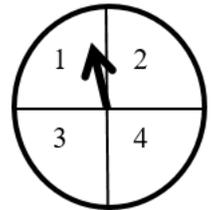
$P(\text{number} > 10) =$ _____

- c) What does it mean if the probability of an event is 0?

- d) What does it mean if the probability of an event is 1?

2. Use the spinner to the right to answer the following questions:

- a) What is the sample space (possible outcomes) for one spin of the spinner?



- b) What is the probability of spinning a 2 in one spin? $P(2) =$ _____

- c) What is the sample space (possible outcomes) for the **sum** of 3 spins of the spinner shown?

- d) What is the probability of getting each sum with 3 spins of the spinner?

$P(\text{sum of } 12) =$ _____

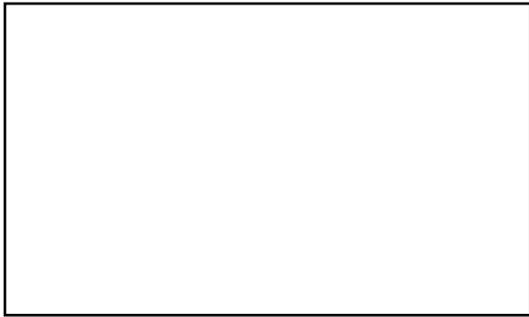
$P(\text{sum of } 2) =$ _____

$P(\text{sum} < 20) =$ _____

[3-7] Use a Venn Diagram to display the following situations (sample space) and find the probability.

3. 20 students are taking Math 2 during 3rd period, and 40 students are taking Math 1 during 3rd period.

a) Complete the Venn diagram



b) If one student is selected what is:

$$P(\text{Math 1}) = \underline{\hspace{2cm}}$$

$$P(\text{Math 2}) = \underline{\hspace{2cm}}$$

4. Within a track team there are 15 members who run sprints, 10 members who are long jumpers, and 6 members who both run sprints and long jump.

a) Complete the Venn diagram



b) If one student is selected what is:

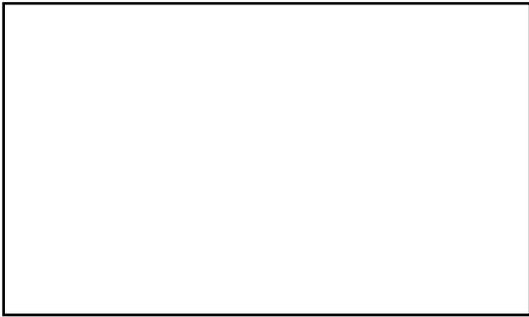
$$P(\text{Both}) = \underline{\hspace{2cm}}$$

$$P(\text{Sprint Only}) = \underline{\hspace{2cm}}$$

$$P(\text{Long Jump}) = \underline{\hspace{2cm}}$$

5. In a sample of 100 'A' students, 60 have an A in math, and 35 have an A in math and English.

a) Complete the Venn diagram



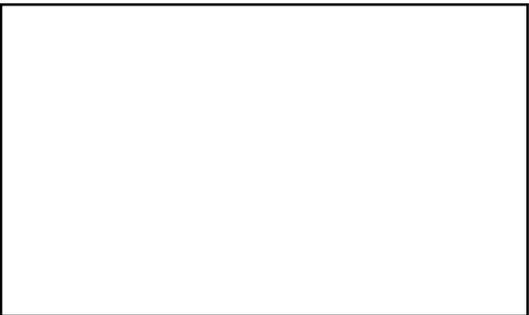
b) If one student is selected what is:

$$P(\text{A in only Math}) = \underline{\hspace{2cm}}$$

$$P(\text{A in only English}) = \underline{\hspace{2cm}}$$

6. In a sample of 50 business professionals, 20 have flown in the past year for business, and 40 have driven. Of these, 15 have done both.

a) Complete the Venn diagram



b) If one person is selected what is:

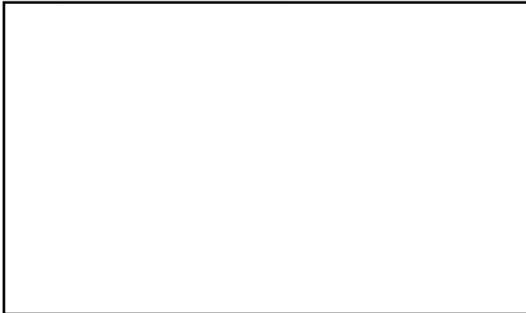
$$P(\text{Driven but not Flown}) = \underline{\hspace{2cm}}$$

$$P(\text{Neither Driven nor Flown}) = \underline{\hspace{2cm}}$$

$$P(\text{Both}) = \underline{\hspace{2cm}}$$

7. Baskin Robbins tested two new flavors: chocolate caramel swirl and raspberry. In a sample of 100 customers, they recorded the following data:
- 24 liked only raspberry
 - The number of customers that like only chocolate swirl is twice the number that like both chocolate swirl and raspberry
 - the number of customers that liked both new flavors is equal to the number of customers that liked neither

a) Complete the Venn Diagram



b) If one student is selected what is

$$P(\text{Customer likes only Raspberry}) = \underline{\hspace{2cm}}$$

$$P(\text{Customer likes Neither}) = \underline{\hspace{2cm}}$$

$$P(\text{Customer likes Both}) = \underline{\hspace{2cm}}$$

[8-9] Complete the two-way table and find the probability.

8. In a sample of 200 students, 35 females have 1st period math, 65 have 1st period English, 55 males have 1st period math, and 45 have 1st period English.

a) Complete the table:

	English	Math	Total
Male			
Female			
Total			

b) If one student is chosen at random:

$$P(\text{Math}) = \underline{\hspace{2cm}}$$

$$P(\text{Female}) = \underline{\hspace{2cm}}$$

$$P(\text{Male in English 1st Period}) = \underline{\hspace{2cm}}$$

9. 150 juniors and senior were surveyed about whether they had a job outside of school. Partial results are in the 2-way table below.

a) Complete the table

	Job	No Job	Total
Junior	43		
Senior		24	91
Total	110		150

b) If one student is chosen at random:

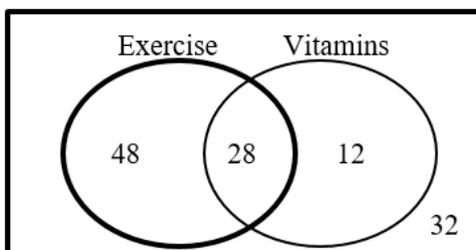
$$P(\text{Senior}) = \underline{\hspace{2cm}}$$

$$P(\text{No job}) = \underline{\hspace{2cm}}$$

$$P(\text{Junior without a job}) = \underline{\hspace{2cm}}$$

[10] Use the Venn diagram to complete the 2-way table.

10. A doctor collects data on exercise habits and vitamin use for 120 randomly-chosen patients. The results are displayed in the Venn diagram below. Use the Venn diagram to complete the 2-way table.



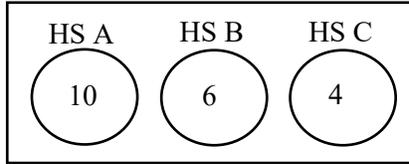
	Vitamins	No Vitamins	Total
Regular Exercise			
No Exercise			
Total			120

Math 2 Unit 14 Worksheet 2
Probability and Mutually Exclusive Events

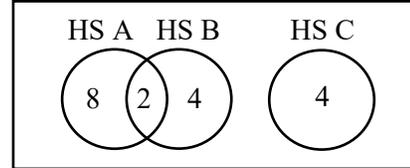
Name: _____
 Date: _____ Per: _____

1. Elena's competition soccer team has girls from 3 different high schools. Ten girls go to high school A, six girls go to high school B, and four girls go to high school C.

Stephanie says this Venn diagram can be used to display the information about Elena's team:



Nick said he thinks it is possible that the Venn diagram could look like this:



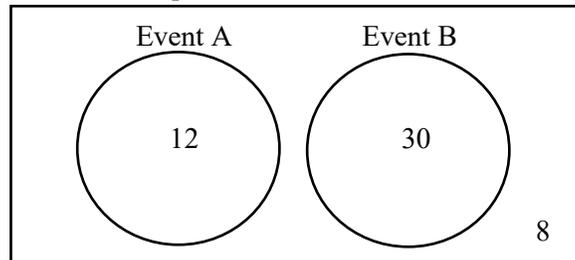
- a) Do you agree with Nick or Stephanie? Explain your reasoning.
- b) What would it mean if Nick's was correct?

Mutually Exclusive events, also called **Disjoint** events, can never both happen at the same time. When one occurs, it means the other cannot possibly occur.

[2-5] Decide if each of the pairs of events are mutually exclusive. Circle yes or no.

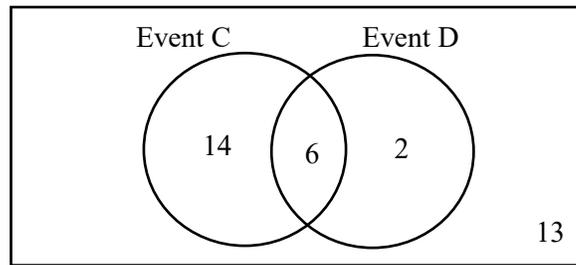
	Mutually Exclusive	
2. Event A: wore blue yesterday Event B: wore yellow yesterday	yes	no
3. Event A: born in Fresno, CA Event B: born in Atlanta, GA	yes	no
4. Event A: loves pizza Event B: hates chocolate	yes	no
5. Event A: junior in high school Event B: freshman in high school	yes	no

[6-9] Use the Venn diagram below to answer the questions.



6. Are Event A and Event B mutually exclusive? _____
7. $P(\text{choosing a person from Event B}) =$ _____
8. $P(\text{choosing a person from Event A or Event B}) =$ _____
9. $P(\text{choosing a person from Event A and Event B}) =$ _____

[10-14] Use the Venn diagram below to answer the questions.



10. Are Event C and Event D mutually exclusive? _____
11. $P(\text{choosing a person from Event C}) =$ _____
12. $P(\text{choosing a person from Event C or Event D}) =$ _____
13. $P(\text{choosing a person from Event C and Event D}) =$ _____
14. $P(\text{choosing a person not from Event C or Event D}) =$ _____

Did you know?...

Probabilities can be expressed as:

Fractions
 $P(A) = \frac{1}{4}$

Decimals
 $P(A) = 0.25$

Percents
 $P(A) = 25\%$

[15-19] A and B are mutually exclusive events.

$P(A) = 0.55$ and $P(B) = 0.25$

15. Draw a Venn diagram to represent the situation. Your decimals should add up to 1.00 (100%)

16. $P(A \text{ or } B) =$ _____

17. $P(\text{not } A) =$ _____

18. $P(\text{not } A \text{ or } B) =$ _____

19. $P(A \text{ and } B) =$ _____

20. In your own words, describe how the events of drawing a diamond or drawing a club from a standard deck of playing cards are mutually exclusive.

[21-23] A pair of dice are rolled; one is red, and one is white. The sum is recorded.

21. What is the sample space (possible outcomes) for this sum?

The possible outcomes for rolling these two dice are shown in the table below. Answer the following probability questions:

		White					
		1	2	3	4	5	6
Red	1	1,1	1,2	1,3	1,4	1,5	1,6
	2	2,1	2,2	2,3	2,4	2,5	2,6
	3	3,1	3,2	3,3	3,4	3,5	3,6
	4	4,1	4,2	4,3	4,4	4,5	4,6
	5	5,1	5,2	5,3	5,4	5,5	5,6
	6	6,1	6,2	6,3	6,4	6,5	6,6

- a) $P(\text{roll sum of } 7) =$ _____
- b) $P(\text{roll sum of } 3 \text{ or } 11) =$ _____
- c) $P(\text{rolling doubles}) =$ _____
- d) $P(\text{roll an even sum}) =$ _____

22. If event A is rolling doubles and event B is a sum of 7, are the 2 events mutually exclusive? Explain your reasoning.

23. If event A is rolling doubles, create an event B so that event A and B are not mutually exclusive. Explain your reasoning.

Math 2 Unit 14 Worksheet 3
Conditional Probability and Independent Events

Name: _____
Date: _____ **Per:** _____

[1-9] Use the two-way table below to find each probability. Your answer should be in one of the following forms: a reduced fraction, a decimal rounded to the nearest hundredth, or a whole percent.

	Blue	Red	White	Total
Car	40	12	78	130
Truck	20	28	22	70
Total	60	40	100	200

1. $P(\text{car and blue}) =$ _____ 2. $P(\text{white or truck}) =$ _____ 3. $P(\text{not red}) =$ _____
4. $P(\text{car and not blue}) =$ _____ 5. $P(\text{red and white}) =$ _____ 6. $P(\text{car or truck}) =$ _____
7. $P(\text{red}|\text{truck}) =$ _____ 8. $P(\text{car}|\text{blue or red}) =$ _____ 9. $P(\text{not car}|\text{not white}) =$ _____

[10-16] Complete the two-way table below and then find each probability. Your answer should be in one of the following forms: a reduced fraction, a decimal rounded to the nearest hundredth, or a whole percent.

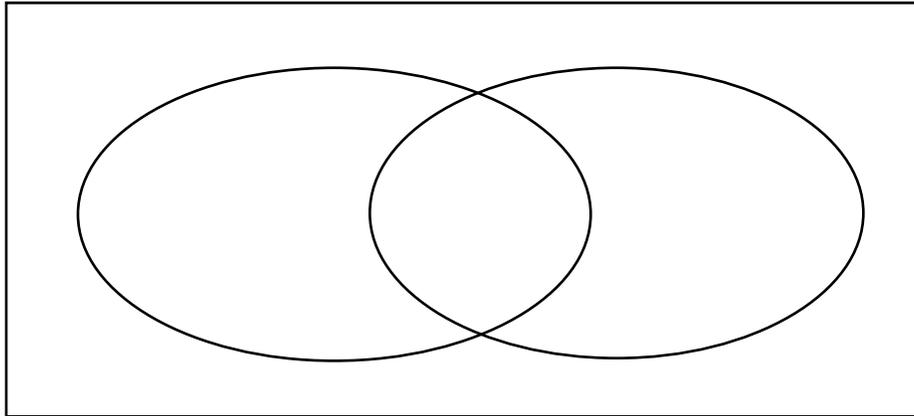
	Hamburger	Pizza	Sandwich	Total
Freshman	150		75	425
Sophomore		185	10	275
Junior	40			
Total		450		900

10. $P(\text{hamburger}) =$ _____ 11. $P(\text{junior}) =$ _____
12. $P(\text{hamburger or sophomore}) =$ _____ 13. $P(\text{pizza or freshman}) =$ _____
14. $P(\text{junior}|\text{sandwich}) =$ _____ 15. $P(\text{not freshman}|\text{not pizza}) =$ _____

16. In a few sentences explain how you determine if two events given in numbers [1 – 9] or [10 – 15] are mutually exclusive.

[17-23] 80 people from Fresno visited New York last year. 55 of them visited Buffalo, 40 visited Rochester, and 30 visited both Buffalo and Rochester.

17. Draw a Venn Diagram to display the information. Make sure to label your diagram.



18. How many people visited Buffalo only? 18. _____

19. How many people visited neither Buffalo nor Rochester? 19. _____

20. What is the probability that one of the 80 people picked at random would have visited either Buffalo or Rochester? 20. _____

21. What is the probability that one of the 80 people picked at random would have visited both Buffalo and Rochester? 21. _____

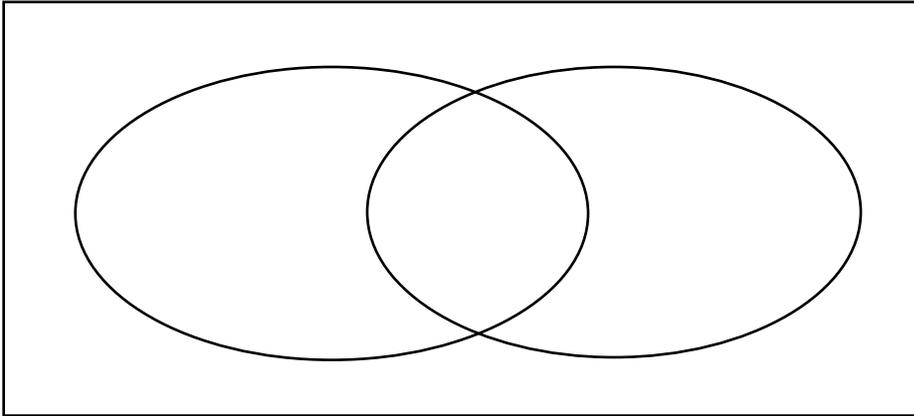
22. Are the events “visited Buffalo” and “visited Rochester” mutually exclusive? Justify your answer.

23. Are the events “visited Buffalo” and “visited Rochester” **independent**? Justify your answer mathematically using the test for independence.

[24-30]

There are 100 players who participate in the tournament match. Among the 100 players, 60 player will play in baseball match, 40 players will play in a football match and 24 players will play in both the baseball and football match.

24. Draw a Venn Diagram to display the information. Make sure to label your diagram.



25. How many people play football only? 25. _____

26. How many people play neither baseball nor football? 26. _____

27. What is the probability that one of the 100 players picked at random would have played either baseball or football? 27. _____

28. What is the probability that one of the 100 players picked at random would have played both baseball and football? 28. _____

29. Are the events “playing baseball” and “playing football” mutually exclusive? Justify your answer.

30. Are the events “playing baseball” and “playing football” **independent**? Justify your answer mathematically using the test for independence.

Math 2 Unit 14
Review Worksheet

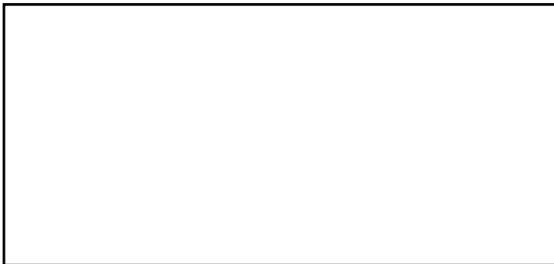
Name: _____
Date: _____ **Per:** _____

1. What is a **sample space**? _____
2. What is the sample space for a single roll of a six-sided number cube? 2. _____

[3-4] Use a Venn Diagram to display the following situations.

3. The baseball team has 11 team members that play infield positions, eight that play outfield positions, and four that play both infield and outfield positions. There are 22 players on team.
4. In a sample of 95 business professionals, 40 have flown in the past year for business, and 60 have driven. 25 have both flown and driven for business.

a) Draw the Venn diagram.



b) How many baseball players only play infield positions?

a) Draw the Venn diagram.



b) How many have neither flown nor driven for business?

5. What is the name for two events, C and D, where the probability of event C happening does not affect the probability of event D happening?
6. Give an example of two events that are described by question 5 above.
7. What is the name for two events, J and K, that cannot happen at the same time?
8. Give an example of two events that described by question 7 above.

[9-12] A bag contains forty marbles. Fourteen are red. Eight are blue. Six are white. Twelve are green.
Find each probability if one marble is chosen. Write your answer as a fraction reduced to lowest terms.

9. $P(\text{red}) =$ _____

10. $P(\text{green}) =$ _____

11. $P(\text{blue or white}) =$ _____

12. $P(\text{not red}) =$ _____

[13-14] Use a dice sum outcome table to help you find the probabilities. Acceptable answers include reduced fractions, decimals rounded to the nearest hundredth, or whole percentages.

	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

13. Rolling Two Dice find the $P(\text{rolling a sum of 6 or 8}) =$ _____

14. Rolling Two Dice find the $P(\text{one of the dice is a 4 given the sum of the two dice is 9}) =$ _____

[15-17] Q and R are mutually exclusive events.

$P(Q) = 0.62$ $P(R) = 0.12$

15. $P(Q \text{ and } R) =$ _____

16. $P(Q \text{ or } R) =$ _____

17. $P(\text{not } Q \text{ or } R) =$ _____

[18-21] List (I) for independent or (D) for dependent events.

18. You roll a two on a die and spin a six on a spinner. 18. _____

19. You pick an ace from a deck of cards and then pick another card without replacing the first card back into the deck. 19. _____

20. You flip a coin. If you get tails, then you roll a die. 20. _____

21. It is a block day (a Wednesday or a Thursday), and you attend math class. 21. _____

[22–31] Use the 2-way frequency table of favorite classes to find each probability.

Acceptable answers are reduced fractions, decimals rounded to the hundredths, or whole percentages. If the 2 events are mutually exclusive, say so.

	English	Math	Science	Total
9th	90	80	130	300
10th	110	140	75	325
11th	50	180	145	375
Total	250	400	350	1000

22. $P(10\text{th grade and Math}) =$ _____ 23. $P(9\text{th grade or Science}) =$ _____
24. $P(10\text{th grade or 11th grade}) =$ _____ 25. $P(\text{English or Math}) =$ _____
26. $P(9\text{th grade and 11th grade}) =$ _____ 27. $P(\text{Math} \mid 11\text{th grade}) =$ _____
28. $P(10\text{th grade} \mid \text{English}) =$ _____ 29. $P(\text{not 11th grade} \mid \text{not Science}) =$ _____
30. If one student is chosen from above, what is the probability the student likes Science given that they are a 10th grader?
31. If one student is chosen from above, what is the probability the student is a 10th grader, given that they like Science?

32. Use a Venn Diagram to display the following situation, label your diagram appropriately.

The tennis team has 14 members including the managers. 6 play singles, 10 play doubles, 4 play both singles and doubles (managers handle equipment, but do not play).

a) How many on the team play only singles?

b) How many managers are there?

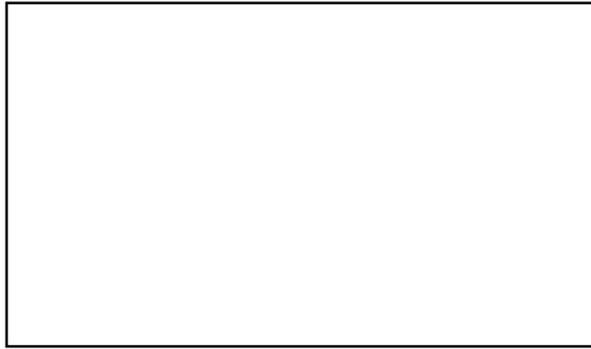
c) One of the team members is selected to represent the team at the awards ceremony. What is the probability the team member only plays doubles?



[33-39] Draw and correctly label a Venn diagram to display the information.

250 Fresnoans visited the East Coast last summer. 100 visited New York City and Washington D.C. In total 150 visited Washington D.C., 20 visited neither New York City nor Washington D.C.

33. Draw a Venn diagram to represent the situation.



34. How many of the 250 Fresnoans visited New York City?

35. How many of the 250 visited somewhere other than Washington D.C.?

36. What is the probability that one of the 250 people chosen at random would have visited either Washington D.C. or New York City?

37. What is the probability that one of the 250 people chosen at random would have visited both Washington D.C. and New York City?

38. Are the events “visiting Washington D.C.” and “visiting New York City” mutually exclusive?

39. Are the events “visiting Washington D.C.” and “visiting New York City” independent? Justify your answer mathematically using the test for independence.