Unit 8

Lesson 2

Introduction to Probability

Unit 8 – Probability

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$0 \leq x \leq 100$ for %

Probability of an Event: $P(E) = \frac{\textit{Number of Favorable Outcomes}}{\textit{Total Number of Outcomes}}$

Your answer can be written as a fraction **or as a** percent.

Note that **P(A^C)** is every outcome **except (or not)** A, so we can find P(A^C) by finding 1-P(A).

- An experiment consists of tossing three coins.

  $2 \times 2 \times 2 = 8$

  1. List the sample space for the outcomes of the experiment: HHH THH HHT TTT HTH THT HTT TTH = 8

  2. Find the following probabilities:

     a. $P(\textit{all heads})$ 1/8 = 12.5%

     b. $P(\textit{exactly two tails})$ 3/8 = 37.5%

     c. $P(\textit{no heads})$ 1/8 = 12.5%

     d. $P(\textit{at least one tail})$ 7/8 = 87.5%

- A bag contains six red marbles, four blue marbles, two yellow marbles and 3 white marbles. One marble is drawn at random.

R,R,R,R,R,R, B,B,B,B Y,Y, W,W,W = 15

3. List the sample space for this experiment: _____

4. Find the following probabilities:

a. $P(red)$ 6/15 = 40%

b. $P(blue\ or\ white)$ 4+3/15 = 7/15 = 47%

c. $P(not\ yellow)$ 1 - 2/15 = 13/15 = 87%

d. $P(red, blue\ or\ yellow)$ 6+4+2/15 = 12/15 = 80%

- A card is drawn at random from a standard deck of cards.

5. Find the following probabilities:

a. $P(heart)$ $13/52 = 25\%$

b. $P(black\ card)$ $26/52 = 50\%$

c. $P(2\ or\ jack)$ $\frac{4+4}{52}$ $8/52$ 15%

d. $P(not\ a\ heart)$ $1 - 13/52$ $1 - 25\%$ 75%

- Two dice are rolled. Complete the chart to show the possible outcome on each roll.

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

- Then complete the chart to show the sum for each roll.

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

6. Find the following probabilities:

a. $P(sum\ of\ 8)$ 5/36 = 14%

b. $P\ (sum\ of\ 13)$ 0%

c. $P(sum > 9)$ 6/36 = 17%

greater

d. $P\ (sum \leq 5)$ 6/36 = 17%

less than

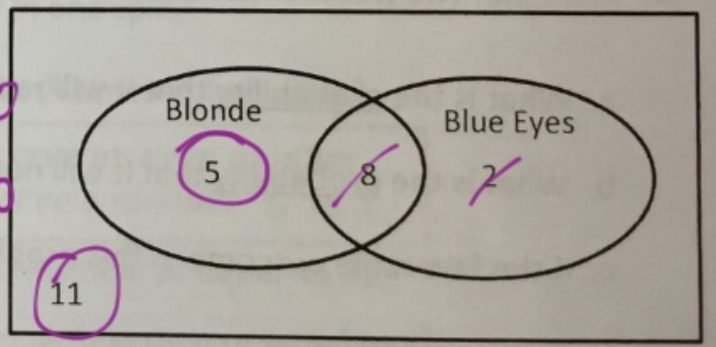
- Given the Venn Diagram below, find the probability of the following if a student was selected at random:

a. P(blonde hair) 13/26 = 50%

b. P(blonde hair and blue eyes) 8/26 = 31%

c. P(blonde hair or blue eyes) 15/26 = 58%

d. P(not blue eyes) 16/26 = 62%



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- The following two-way table represents the data students collected on gender and whether the student had pierced ears for the 178 people in the class.

Pierced Ears?

Gender	Yes	No	Total
Female	19	71	90
Male	84	4	88
Total	103	75	178

Let A: *Male* and Let B: *Pierced Ears*

a. $P(B) = \frac{103/178}{58\%}$ b. $P(A \text{ and } B) = \frac{84/178}{47\%}$ c. $P(A \text{ or } B) = \frac{88+19 \; 107/178}{60\%}$

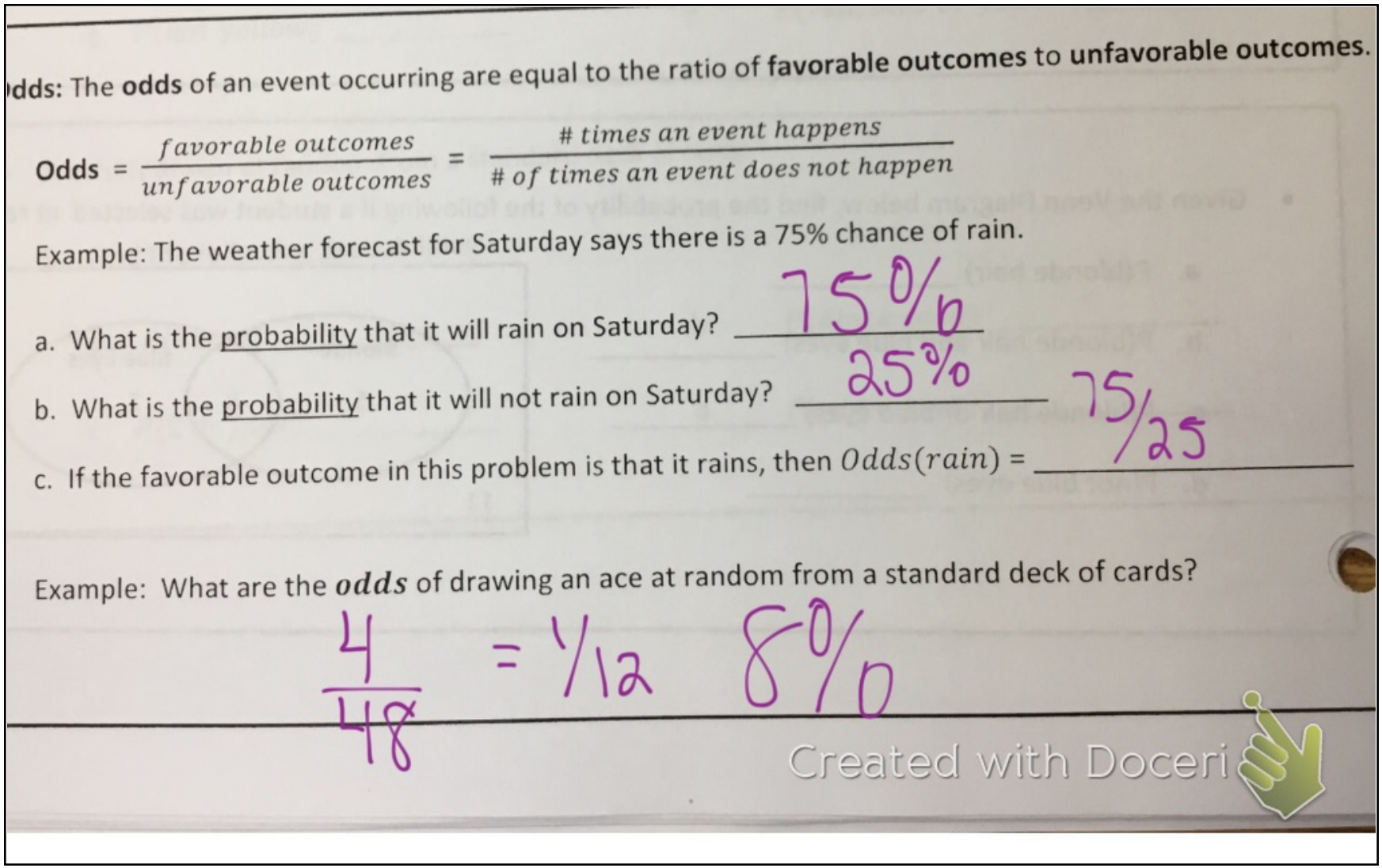
- In an apartment complex, 40% of residents read USA today. Only 25% read the New York Times. Five percent of the residents read both papers. Suppose we select a resident of the complex at random and record which of the two papers the person reads.

USA Today

NY Times	Yes	No	Total
Yes	5%	20%	25%
No	35%	40%	75%
Total	40%	60%	100%

a. $P(\text{person reads } \textbf{at least one} \text{ of the two papers}) =$ 60%

b. $P(\text{person doesn't read either of the two papers}) =$ 40%



dds: The **odds** of an event occurring are equal to the ratio of **favorable outcomes** to **unfavorable outcomes.**

$$\textbf{Odds} = \frac{favorable\ outcomes}{unfavorable\ outcomes} = \frac{\#\ times\ an\ event\ happens}{\#\ of\ times\ an\ event\ does\ not\ happen}$$

Example: The weather forecast for Saturday says there is a 75% chance of rain.

a. What is the probability that it will rain on Saturday? 75%

b. What is the probability that it will not rain on Saturday? 25%

c. If the favorable outcome in this problem is that it rains, then $Odds(rain)$ = 75/25

Example: What are the ***odds*** of drawing an ace at random from a standard deck of cards?

$\frac{4}{48} = 1/12$ 8%

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HW: 11-12