HW 12-2

Last row of Table: 119, 154, 116, 114, 6, 6

1. See table on work slide.
2. a) .562 b) .494
   c) Part (a), P(yes given female), is greater. Reasons why will vary.
      There are more female voters
   d) .438
3. a) See table on work slide.
   b) Factory A had more cars at 400 highly rated cars while Factory B had 300.
   c) .67 or 67%
   d) .75 or 75%
   e) Factory B has the higher probability of highly rated cars at 75% while Factory A's was 67%. In part (b), Factory A had a higher number of highly rated cars, but combining those #s with the #cars assembled at each factory resulted in Factory B having the higher percentage of highly rated cars.

Alg 2 HW 12-2

Use this original summary of data to analyze if males and females responded similarly to the survey question about building a new high school.

	Should our town build a new high school?					
	Yes		No		No answer	
Age (in years)	Male	Female	Male	Female	Male	Female
18-25	29	32	8	6	0	0
26-40	53	60	40	44	2	4
41-65	30	36	44	35	2	2
66 and older	7	26	24	29	2	0
Total	119	154	116	114	6	6

1. Complete the following two-way frequency table:

	Yes	No	No Answer	Total
Male	119	116	6	241
Female	154	114	6	274
Total	273	230	12	515

2. Use the above two-way frequency table to answer the following questions:
   a. If a randomly selected eligible voter is a female, what is the probability she will vote to build a new high school? $\frac{154}{274}$ or .562
   b. If a randomly selected eligible voter is male, what is the probability he will vote to build a new high school? $\frac{119}{241}$ or .494
   c. Using your probabilities from parts a and b, which is greater and why? Part a, the probability a female votes to build a new high school is greater than the male's. Reasons vary. There are more eligible female voters than males (274 vs 241). Females rate the need for a new high school greater than males do.
   d. If a randomly selected eligible voter is female, what is the probability she will not vote to build a new high school?

$$\frac{114+6}{274} = \frac{120}{274} \text{ or } .438$$

3. An automobile company has two factories assembling its luxury cars. The company is interested in whether consumers rate cars produced at one factory more highly than cars produced at the other factory. Factory A assembles 60% of the cars. A recent survey indicated that 70% of the cars made by this company (both factories combined) were highly rated. This same survey indicated that 10% of all cars made by this company were both made at Factory B and were not highly rated.

a. Create a hypothetical 1000 two-way table based on the results of this survey by filling in the table below.

$.60 \times 1000 = 600$

	Car Was Highly Rated by Consumers	Car Was Not Highly Rated by Consumers	Total
Factory A	400	200	600
Factory B	300	100	400
Total	700	300	1000

$.70(1000) = 700$ $.10(1000)$

b. Which factory had a higher number of cars highly rated? Justify your answer.
Factory A had 400 highly rated cars and Factory B had 300, so Factory A had more cars.

c. A randomly selected car was assembled in Factory A. What is the probability this car is highly rated? $\frac{400}{600}$ or $\frac{2}{3}$ or .67 or 67%

d. A randomly selected car was assembled in Factory B. What is the probability this car is highly rated? $\frac{300}{400}$ or $\frac{3}{4}$ or .75 or 75%

e. Which factory has the higher probability of cars highly rated? Is this answer different than your part b answer? Explain your findings.
Factory B has the higher probability of highly rated cars - 75% vs Factory A's 67%. In part b, Factory A had a higher number of highly rated cars (400 vs 300), but combining those #s with the # cars assembled at each factory, Factory B has the higher percentage of highly rated cars.

70% → 700

$\frac{700}{1000}$

70% = .70 → calc

math - enter - enter.

$.70(1000) = 700$

$\frac{70}{100} = \frac{x}{1000}$

Day 3 Calculate Probability Using Two-Way Tables

Example 1: Students at Rufus King High School were discussing some of the challenges of finding space for athletic teams to practice after school. Part of the problem, according to Kristen, is that the females are more likely to be involved in after-school athletic programs (a.s.a.p.) than males. However, the athletic director assigns the available facilities as if males are more likely to be involved. Before suggesting changes to the assignments, the students decided to investigate.

Suppose the following information is known about Rufus King High School: 40% of students are involved in one or more of the after-school athletic programs offered at the school. It is also known that 58% of the school's students are female. The students decide to construct a hypothetical 1000 two-way table, like Table 3, to organize the data.

Table 3: Participation in after-school athletic program (Yes or No) by gender

Quest #4 below

	Yes - Participate in After-School Athletic Program	No - Do Not Participate in After-School Athletic Program	Total
Females	232	348	580
Males	168	252	420
Total	400	600	1000

1. Fill in the table with ONLY the given information.

2. Based only on the cells you completed which of the following probabilities can be calculated, and which cannot be calculated? Calculate the probability if it can be calculated. If it cannot be calculated, indicate why.

   a. The probability that a randomly selected student is female. $580/1000 = .58$

   b. The probability that a randomly selected student participates in a.s.a.p.
   $400/1000 = .40$

   c. The probability that a randomly selected student who does not participate in the a.s.a.p.is male.
   No not enough info

   d. The probability that a randomly selected male student participates in the a.s.a.p.
   No not enough info

Correct the numbering of these problems in your notes.

3. The athletic director indicated that 23.2% of the students at Rufus King are females and participate in a.s.a.p. Based on this information, complete Table 3.

4. What percent of the students are males who do not participate in a.s.a.p.?

$252/1000 = .252 = 25.2\%$

Example 2: The completed hypothetical 1000 table organizes information in a way that makes it possible to answer various questions. For example, you can investigate whether females at the school are more likely to be involved in the after-school athletic programs.

Consider the following events:

- Let "A" represent the event "a randomly selected student is female."
- Let "not A" represent the "complement of A." The complement of A represents the event "a randomly selected student is not (female)," which is equivalent to the event "a randomly selected student is male."

~A or A'

- Let "B" represent the event "a randomly selected student participates in the after-school athletic program."
- Let "not B" represent the "complement of B." The complement of B represents the event "a randomly selected student does not participate in the a.s.a.p."

~B, B'

$A \cup B$

- Let "A or B" (described as A union B) represent the event "a randomly selected student is female or participates in the a.sap."

$A \cap B$

- Let "A and B" (described as A intersect B) represent the event "a randomly selected student is female and part. in the a.s.a.p."

A = female, B = participates after school

1. Based on the previous descriptions, describe the following events in words:

   a. Not A or Not B.

   Male or does not part. in a.s.a.p.

   b. A and Not B.

   Female and does not part. in a.s.a.p.

A = female, B = participates after school

	Yes - Participate in ASAP (B)	No - Do Not Participate in ASAP (Not B)	Total
Females (A)	232	348	580
Males (Not A)	168	252	420
Total	400	600	1000

2. Based on the above descriptions and Table 3, determine the probability of each of the following events as a fraction and a decimal (rounded to 3 decimal places) :

a. A $= 580/1000 = .580$

b. B $= 400/1000 = .400$

c. Not A $= 420/1000 = .420$

d. Not B $= 600/1000 = .600$

e. A or B $= P(A) + P(B) - P(A \text{ and } B)$

$$\frac{580 + 400 - 232}{1000} = \frac{748}{1000}$$

$.748$

f. A and B $232/1000 = .232$

A = female, B = participates after school

	Yes - Participate in ASAP	No - Do Not Participate in ASAP	Total
Females	232	348	580
Males	168	252	420
Total	400	600	1000

3. Determine the following values:

a. The probability of A plus the probability of Not A.

$.580 + .420 = 1$

b. The probability of B plus the probability of Not B.

$.400 + .600 = 1$

c. What do you notice about the results of parts (a) and (b)? Explain.

Both probabilities sum to 1. This makes sense because we are adding the probability of ***an event happening*** *and the probability of* ***an event not happening****. This guarentees a certainty.*