

# Probability Review before Quiz

Unit 6 Day 6 Probability

# Warm-up: Day 6

1. A committee is to be formed consisting of 1 freshman, 1 sophomore, 2 juniors, and 2 seniors. How many ways can this committee be formed from 5 freshmen, 5 sophomores, 8 juniors, and 10 seniors?
2. Consider a deck of cards labeled 1-10. Let set A = even #s and set B = # greater than 8. Find the  $P(A \text{ or } B)$ . (Remember, this is  $P(A \cup B)$ .)
3. Using the situation from problem #2, what is the probability you select an even number given you selected a number greater than 8? (Remember, this is  $P(A | B)$ .)
4. A gift store sells gym bags in 10 colors, with 8 straps, and 2 designs. How many different gym bags are available?
5. The ski club with ten members is to choose three officers captain, co-captain, and secretary. How many ways can those offices be filled?
6. The local pizza shop allows you to order a pizza with at most 5 toppings for \$9.99. If there are a total of 12 types of toppings, how many different pizzas could you order?

**Done Early? Work on the “Given with Tree Diagrams” section at the end of the Notes Handout**

# Warm-up Answers

1. A committee is to be formed consisting of 1 freshman, 1 sophomore, 2 juniors, and 2 seniors. How many ways can this committee be formed from 5 freshmen, 5 sophomores, 8 juniors, and 10 seniors?

$${}_5C_1 \cdot {}_5C_1 \cdot {}_8C_2 \cdot {}_{10}C_2 = 31,500$$

2. Consider a set of cards labeled 1-10. Let set A = even numbers and set B = # greater than 8. Find the probability of A or B.

$$P(A \text{ or } B) = 5/10 + 2/10 - 1/10 = 6/10 = 3/5$$

3. Using the situation from problem #3, what is the probability you select an even number given you selected a number greater than 8?

$$(1/10) / (2/10) = 5/10 = 1/2$$

# Warm-up Answers

4. A gift store sells gym bags in 10 colors, with 8 straps, and 2 designs. How many different gym bags are available?

$$10(8)(2) = \mathbf{160}$$

5. The ski club with ten members is to choose three officers captain, co-captain, and secretary. How many ways can those offices be filled?

$${}_{10}P_3 = \mathbf{720}$$

6. The local pizza shop allows you to order a pizza with at most 5 toppings for \$9.99. If there are a total of 12 types of toppings, how many different pizzas could you order?

$${}_{12}C_5 + {}_{12}C_4 + {}_{12}C_3 + {}_{12}C_2 + {}_{12}C_1 + {}_{12}C_0 = \mathbf{1586}$$

# Homework Discussion

# Tonight's Homework

Packet p. 12 and 13

~~Omit problem #1 & 2 for now~~

Please complete #1 and 2 also

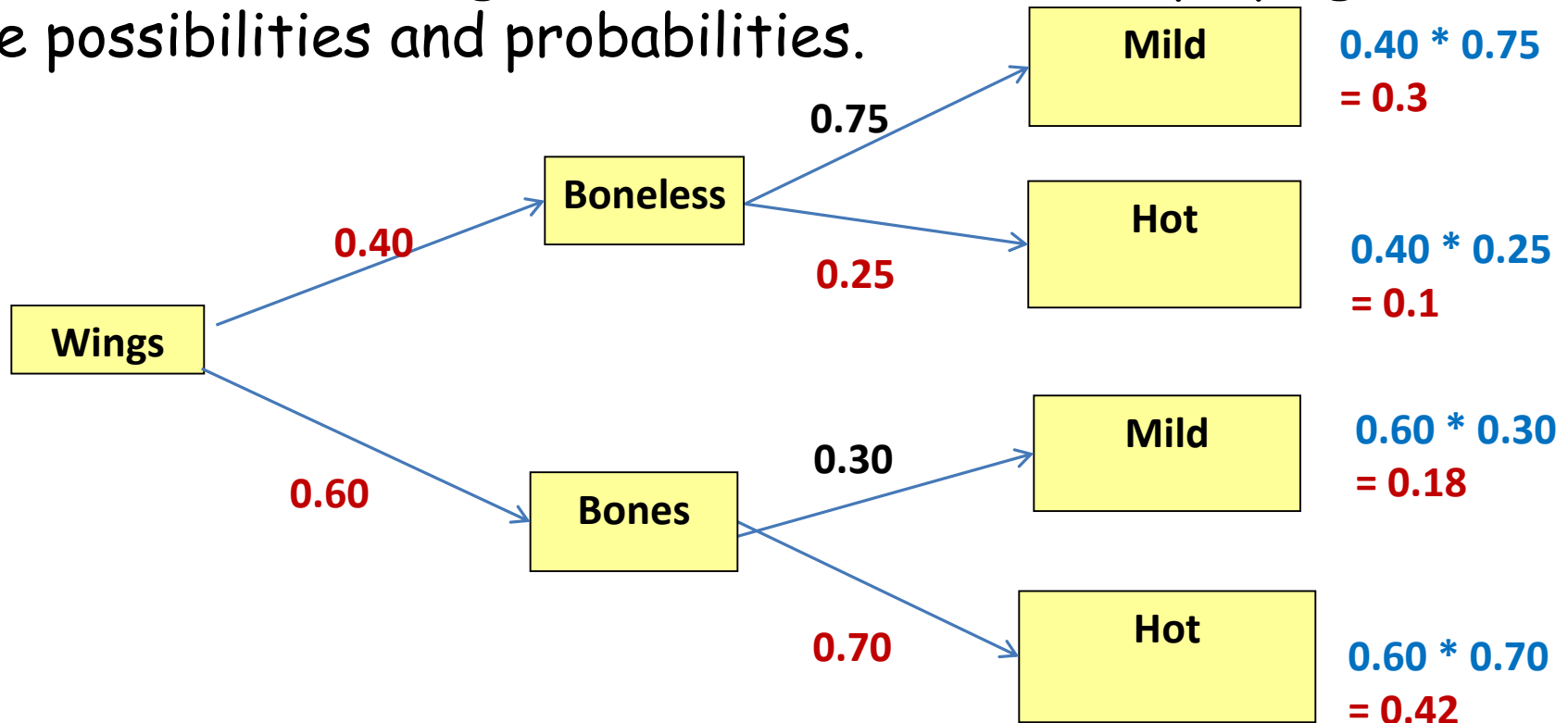
Study for Quiz - Tomorrow!



# Complete #1-9 On last page of notes handout

Ex: Suppose you manage a restaurant that serves chicken wings that are mild or hot, and boneless or regular. From your experience you know that of boneless wings bought, 75% of them are mild, and of the regular wings bought, 70% are hot. Only 4 out of 10 costumers buy boneless wings.

1) Create a tree diagram for the scenario displaying all the possibilities and probabilities.



2) P(boneless and hot wings)

$$(.4)(.25) = .1$$

10%

3) P(hot | boneless)

$$\frac{(.4)(.25)}{(.4)} = .25 = 25\%$$

4) P(hot)

$$(.4)(.25) + (.6)(.7) = .52 = 52\%$$

5) P(boneless | hot)

$$\frac{(.4)(.25)}{(.4)(.25) + (.6)(.7)} = .192$$

= 19.2%

6) P( mild wings)

$$(.4)(.75) + (.6)(.3) = .48$$

48%

7) If a person orders regular wings, what is the probability they choose mild?

30%

8) P(boneless | mild)

$$\frac{(.4)(.75)}{(.4)(.75) + (.6)(.3)} = .625 = 62.5\%$$

9) Of the boneless wings, what is the probability someone orders mild?

75%



# Practice

- 1) When rolling a die twice, find the probability of rolling an odd number then a multiple of 2.
- 2) When rolling a die twice, find the probability of rolling an odd number and a multiple of 2.
- 3) When rolling a die once, find the probability of rolling a number greater than 3 or a multiple of 3.
  
- 4) Mike noticed that a lot of the students taking the ACT were also taking the SAT. In fact, of the 80 students in his grade, 32 students were taking the ACT, 48 students were taking the SAT, and 12 students took both the ACT and the SAT.
  - a) Draw a Venn diagram and help Mike with his calculations.
  - b) Calculate  $P(\text{ACT} \cup \text{SAT})$
  - c) Calculate  $P(\text{ACT} \cap \text{SAT})$
  - d) Calculate the probability of selecting a student at random who was either taking the ACT or SAT, but not both.
  - e) Calculate  $P(\text{Not taking any test})$

# Practice Answers

- 1) When rolling a die twice, find the probability of rolling an odd number then a multiple of 2.

$$\begin{aligned} P(\text{odd}) * P(\text{mult. of } 2) &= \\ 3/6 * 3/6 &= 9/36 = \mathbf{1/4} \end{aligned}$$

- 2) When rolling a die twice, find the probability of rolling an odd number and a multiple of 2.

$$\begin{aligned} P(\text{odd, then mult. of } 2) + P(\text{mult. of } 2, \text{ then odd}) \\ P(\text{odd}) * P(\text{mult. of } 2) + P(\text{mult. of } 2) * P(\text{odd}) &= \\ 3/6 * 3/6 + 3/6 * 3/6 &= 9/36 + 9/36 = \mathbf{1/2} \end{aligned}$$

- 3) When rolling a die once, find the probability of rolling a number greater than 3 or a multiple of 3.

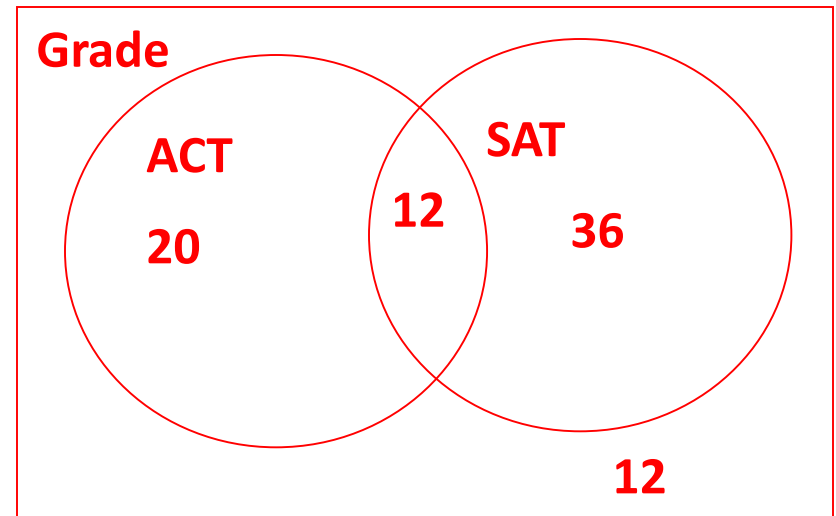
Mutually Inclusive Events

$$\begin{aligned} P(>3) + P(\text{mult. of } 3) - P(>3 \ \& \ \text{mult. of } 3) &= \\ 3/6 + 2/6 - 1/6 &= 4/6 = \mathbf{2/3} \end{aligned}$$

# Practice Answers

4) Mike noticed that a lot of the students taking the ACT were also taking the SAT. In fact, of the 80 students in his grade, 32 students were taking the ACT, 48 students were taking the SAT, and 12 students took both the ACT and the SAT.

a) Draw a Venn diagram and help Jack with his calculations.



b) Calculate  $P(\text{ACT} \cup \text{SAT})$

$$= \text{take ACT or SAT} = 68/80 = 17/20$$

c) Calculate  $P(\text{ACT} \cap \text{SAT})$

$$= \text{take ACT \& SAT} = 12/80 = 3/20$$

d) Calculate the probability of selecting a student at random who was either taking the ACT or SAT, but not both.

$$56/80 = 7/10$$

e) Calculate  $P(\text{Not taking any test}^c)$

$$= \text{complement of not taking the test} \\ = \text{taking a test} = 68/80 = 17/20$$

# Quiz 2 Review - on Notebook Paper

Are You Ready For Your Last Quiz In Honors Math II??

Some things to Know, Memorize, AND Understand how to use are...

## What are the formulas?

$${}_n P_r = \underline{\hspace{2cm}}$$

$${}_n C_r = \underline{\hspace{2cm}}$$

Factorial:

For any integer  $n > 0$ ,

$$n! = \underline{n(n-1)(n-2)(n-3)\dots(3)(2)(1)}$$

If  $n=0$ ,  $0! = \underline{\hspace{1cm}}$

$$\text{Ex: } 4! = \underline{\hspace{2cm}}$$

## Fill in the notation ↓

Intersection of two sets (A \_\_\_ B):

If A and B are **Independent** events, then

$$P(A \text{ and } B) = P(A \text{ ___ } B) = \underline{\hspace{2cm}}$$

## Fill in the vocab. ↑

If A and B are **Dependent** events, then

$$P(A, \text{ then } B) = \underline{\hspace{2cm}}$$

Union of two sets (A \_\_\_ B):

If A and B are **Mutually Inclusive or Exclusive** Events

$$P(A \text{ or } B) = P(A \text{ ___ } B) = \underline{\hspace{2cm}}$$

Complement of a set:

If A and B are **Conditional** Events

$$P(\text{not } A) = P(\underline{\hspace{1cm}}) = \underline{\hspace{2cm}}$$

$$P(A \text{ given } B) = P(A \text{ ___ } B) = \underline{\hspace{2cm}}$$

# Quiz 2 Review **KEY**

Are You Ready For Your Last Quiz In Honors Math 2??

Some things to Know, Memorize, AND Understand how to use are...

$${}_n P_r = \frac{n!}{(n-r)!} \quad {}_n C_r = \frac{n!}{(n-r)! \bullet r!}$$

Factorial:

For any integer  $n > 0$ ,

$$n! = \frac{n(n-1)(n-2)(n-3)\dots(3)(2)(1)}{1}$$

If  $n=0$ ,  $0! = \underline{1}$

$$\text{Ex: } 4! = 4 \cdot 3 \cdot 2 \cdot 1$$

**Intersection** of two sets ( $A \cap B$ ):

**All the elements that appear in both sets**

(the "overlap" of the two sets)

If A and B are **Independent** events, then

$$P(A \text{ and } B) = P(A \cap B) = \underline{P(A) \cdot P(B)}$$

If A and B are **Dependent** events, then

$$P(A, \text{ then } B) = \underline{P(A) \cdot P(B \text{ after } A)}$$

**\*\*assume success on 1<sup>st</sup> draw\*\***

**Union** of two sets ( $A \cup B$ ):

**Everything in either set**

(the items in A or B alone or both)

If A and B are **Mutually Inclusive or Exclusive** Events

$$P(A \text{ or } B) = P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

**Compliment** of a set:

all elements in the universal set

that are **NOT** in the initial set

$$P(\text{not } A) = P(A^c) = 1 - P(A)$$

If A and B are **Conditional** Events

$$P(A \text{ given } B) = P(A|B) = \frac{P(A \text{ and } B)}{P(B)}$$



A committee is to be formed consisting of 1 freshman, 1 sophomore, 2 juniors, and 2 seniors.

How many ways can this committee be formed from 5 freshmen, 5 sophomores, 8 juniors, and 10 seniors?

$${}_5C_1 \cdot {}_5C_1 \cdot {}_8C_2 \cdot {}_{10}C_2 = 31,500$$

A local telephone number consists of 7 digits, and the first number cannot begin with 0 or 1. How many different local telephone numbers are possible?

$$8 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 8,000,000$$



How many distinguishable ways can the letters in CASTRO be written?

$$6! = 720$$

How many distinguishable ways  
can the letters in MISSISSIPPI be  
written?

$$\frac{11!}{(4!4!2!)} = 34,650$$

How many different 7 card hands  
are possible from a standard 52  
card deck?

$${}_{52}C_7 = 133,784,560$$

2 coins are tossed. What is the probability of getting at least one tail?

HH

HT

TH

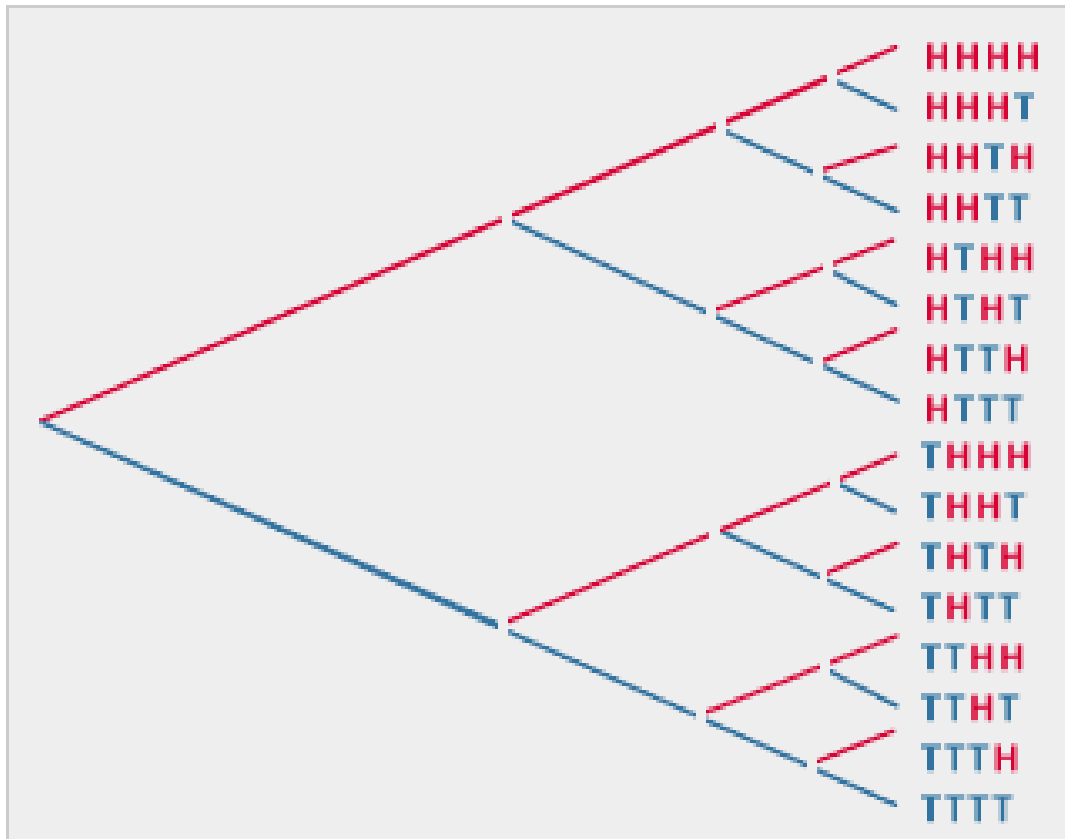
TT

$\frac{3}{4}$

Write as a fraction.

Write as a fraction.

4 coins are tossed. What is the probability of getting at least 3 tails?



5/16

From a standard deck of 52 cards,  
find the probability of getting a  
club, or a face card.

$$\frac{13}{52} + \frac{12}{52} - \frac{3}{52} = \frac{22}{52} = \frac{11}{26}$$

Write as a fraction.

John moves to Thailand, and only speaks English. On his first day of school he is given a 10 question multiple choice quiz in Thai, each with 4 options. What is the probability that John will guess all 10 questions correctly?

$$(1/4)^{10} = 9.5 \times 10^{-7}$$

A bag contains 3 blue, 4 purple, and 5 red marbles. 3 marbles are drawn. Find the probability of drawing:

a) 2 red and a blue

b) a blue, given you drew 2 reds

a)  $\frac{3}{22}$  Possibilities: red, red, blue ( $\frac{1}{22}$ )  
blue, red, red ( $\frac{1}{22}$ )  
red, blue, red ( $\frac{1}{22}$ )

b)  $\frac{3}{10}$

Write as a fraction.



A dice is rolled. Find the probability of rolling a number that is less than 5, or even.

$$\frac{4}{6} + \frac{3}{6} - \frac{2}{6} = \frac{5}{6}$$

Write as a fraction.

A store sells T-shirts in 5 colors, 9 designs, and 3 sizes. How many different T-shirts are available?

$$5 \times 9 \times 3 = 135$$

The odds of an event occurring are 15 to 7.  
What is the probability of the event occurring?

$15/22$

Write as a fraction.

A high school basketball team leads at halftime in 45% of the games in a season. The team wins 75% of the time when they have a halftime lead, but wins only 9% of the time when they do not have a halftime lead. Write as a percent. Round to the nearest tenth.

a) What is the probability that the team wins a particular game during the season? 38.7%

b)  $P(\text{lose})$  61.3%

c)  $P(\text{Does not lead} \mid \text{win})$  12.8%

d)  $P(\text{Leads} \mid \text{lose})$  18.4%

e) Does not lead and wins 4.95%

Of 100 students, 23 are taking Calculus, 29 are taking French, and 12 are taking both Calculus and French. If a student is picked at random, what is the probability that the student is taking Calculus or French?

$$40/100 = 2/5$$

In a student body election, there are three candidates for president, four candidates for vice president, and five candidates for secretary. How many possible groups of officers are there?

$$3 \times 4 \times 5 = 60$$

*OR*

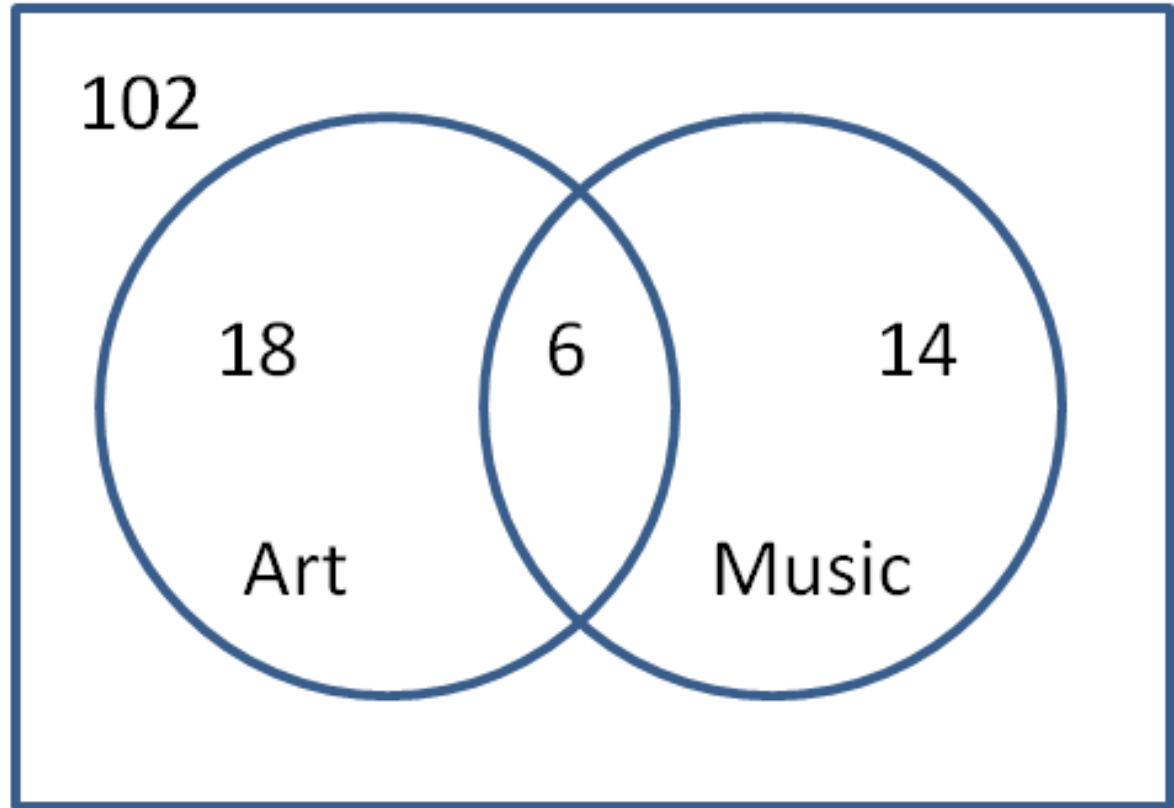
$${}_3C_1 \cdot {}_4C_1 \cdot {}_5C_1 = 60$$

# Extra Practice

(if not completed)



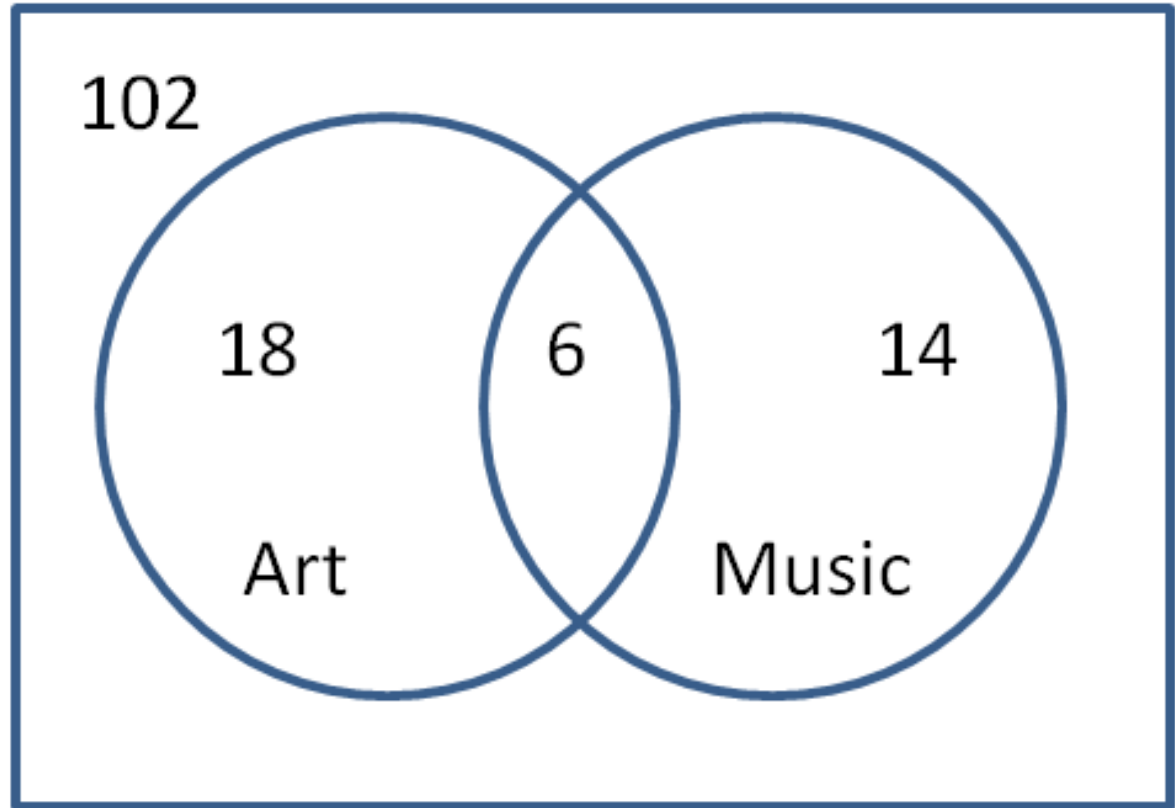
Given the following Venn Diagram, how many students are taking an art AND a music class?





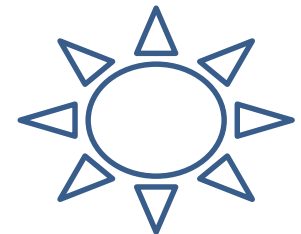
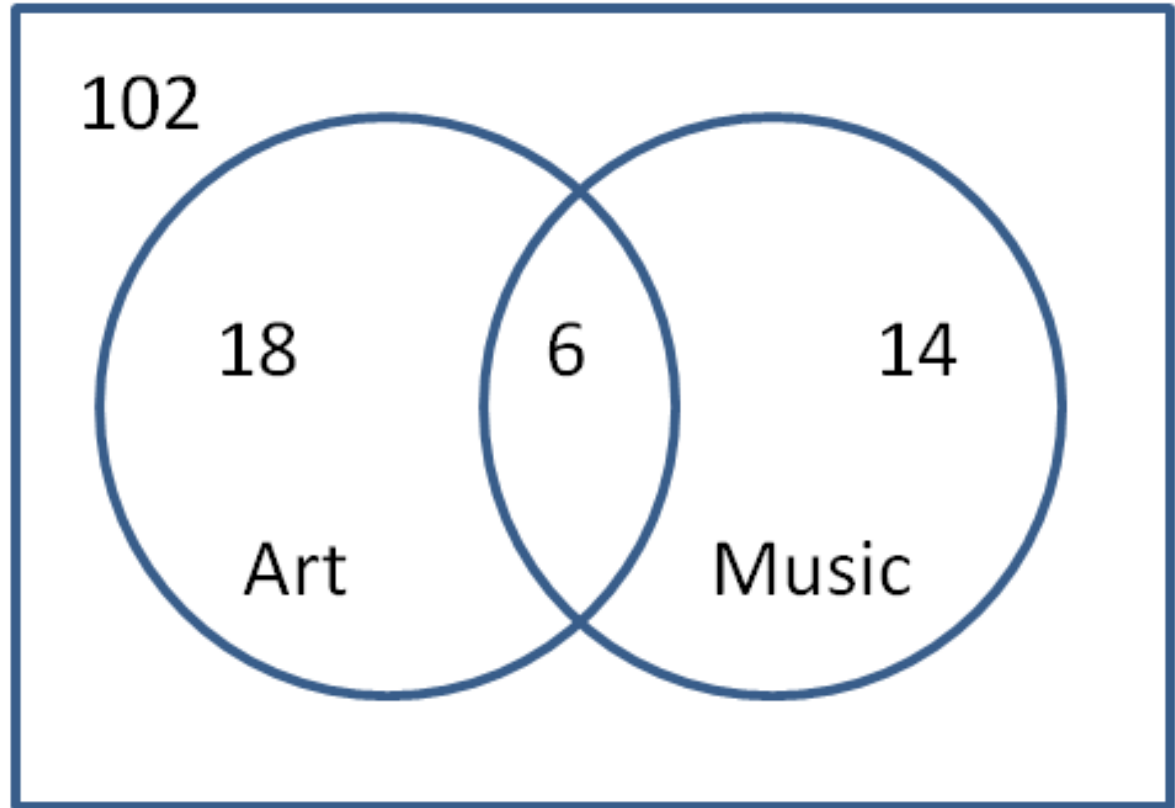
6

Given the following Venn Diagram, how many students are taking an art OR a music class?



38

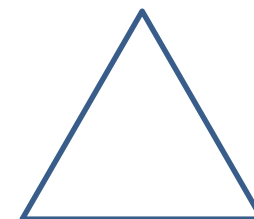
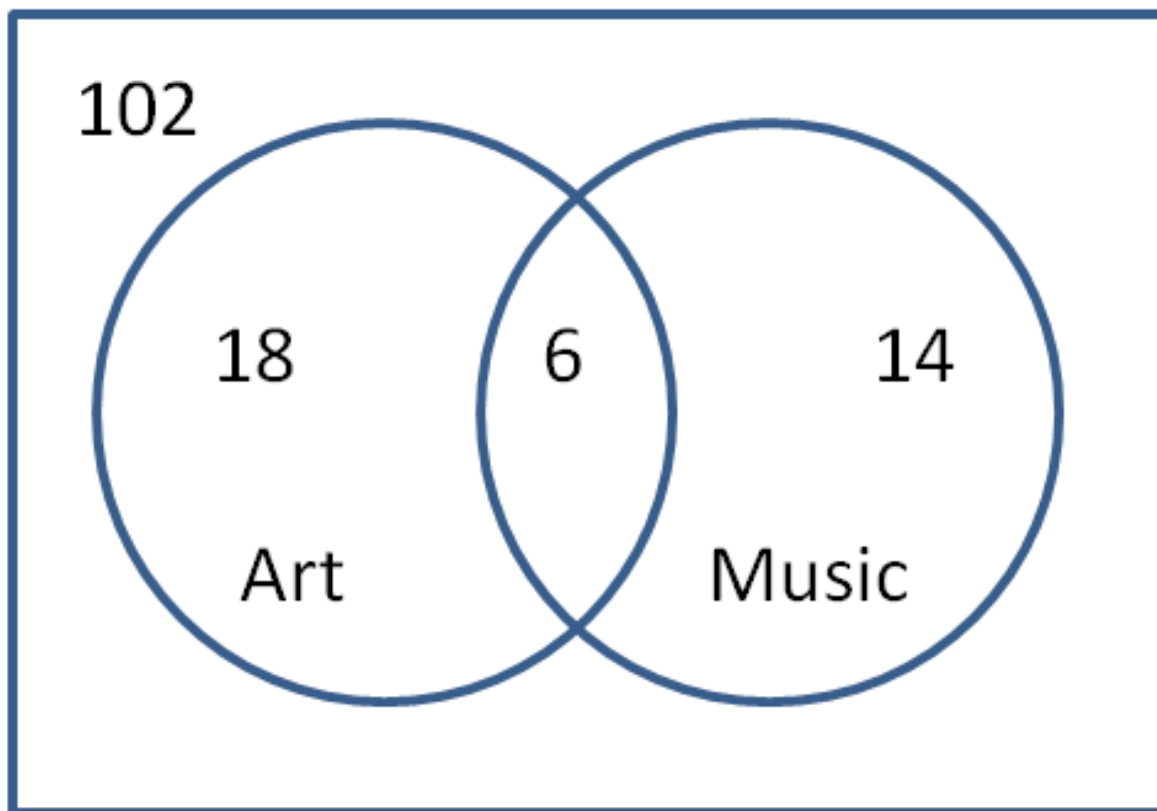
Given the following Venn Diagram, how many students are in the Venn Diagram?



140

Given the following Venn Diagram, find the PROBABILITY that a student is taking an art AND a music class.

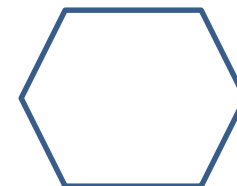
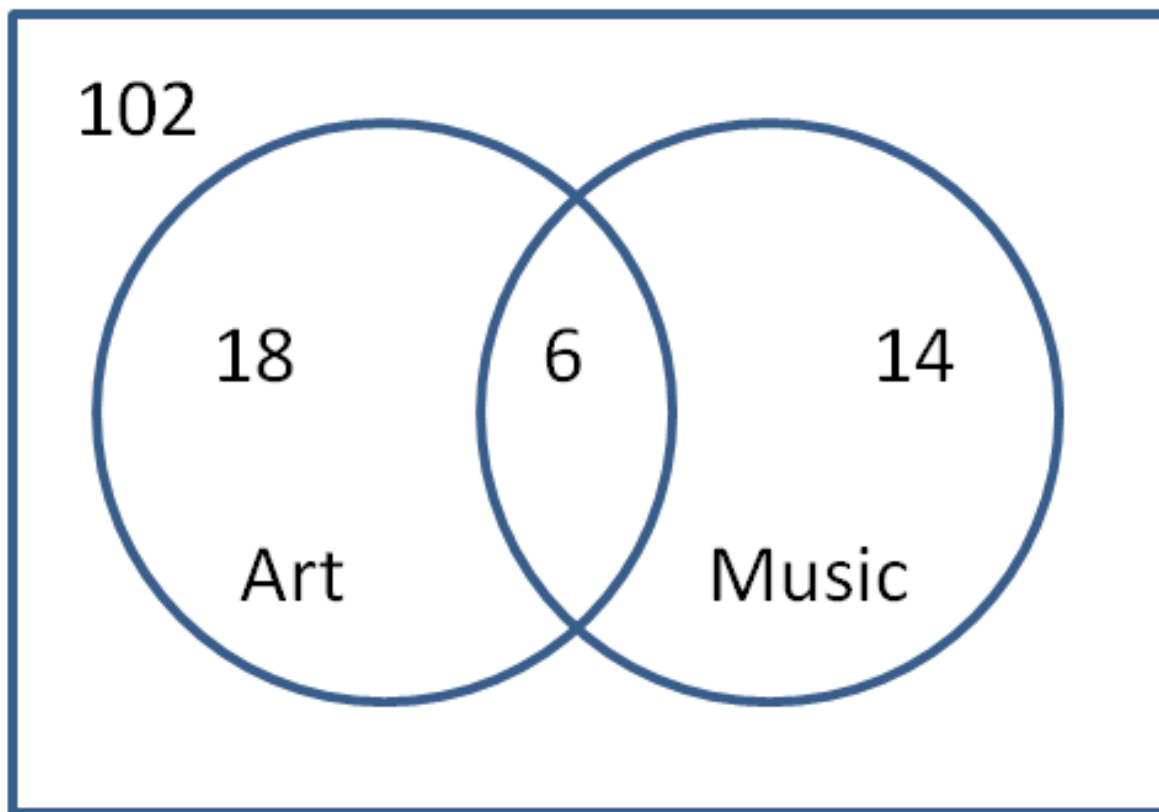
$$P(\text{art AND music}) = \underline{\hspace{2cm}}$$



$\frac{6}{140}$  or  $\frac{3}{70}$

Given the following Venn Diagram, find the PROBABILITY that a student is taking an art OR a music class.

$$P(\text{art OR music}) = \underline{\hspace{2cm}}$$





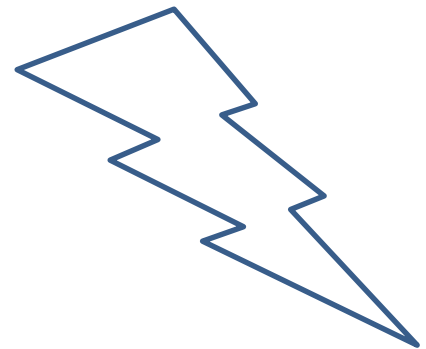
$$38 / 140$$

or

$$19 / 70$$

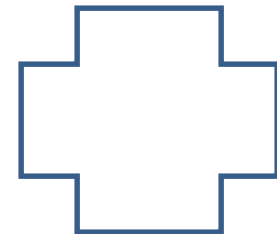
The probability of an event + the probability of its complement = \_\_\_\_\_

$$P(A) + P(A^C) = \underline{\hspace{2cm}}$$



1

The probability of rain tomorrow is 40%. What is the probability that it doesn't rain?



0.60

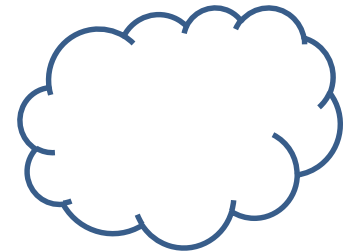
The probability of rain tomorrow is 40%. What are the odds of rain?



4:6 or 2:3

At SWGHS, 30% of the students are sophomores.  
48% of the students are female.

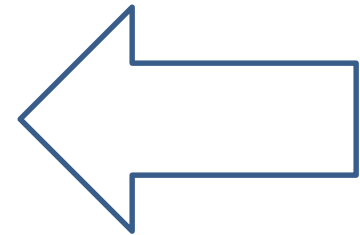
What is the probability that a student is a female  
AND a sophomore?





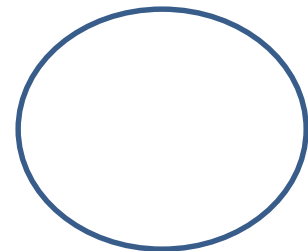
14.4%

A coin and a die are tossed/rolled. What is the probability of getting tails and a 4.



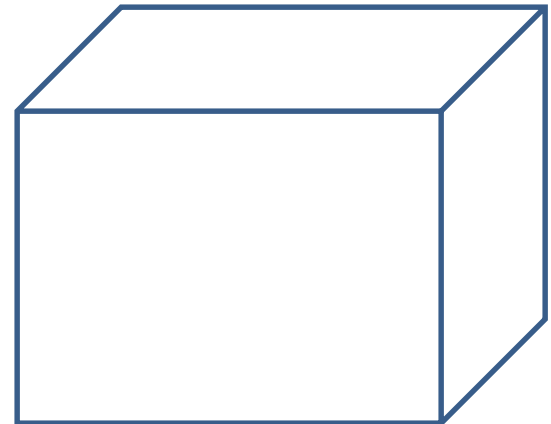
1 / 12

If the probability of receiving a piece of mail is 25% on any given day, what is the probability of receiving a piece of mail today and no mail tomorrow?



18.75%

Given a standard deck of cards, what is the probability of drawing a diamond?



25%

Given a standard deck of cards, what is the probability of drawing a king?





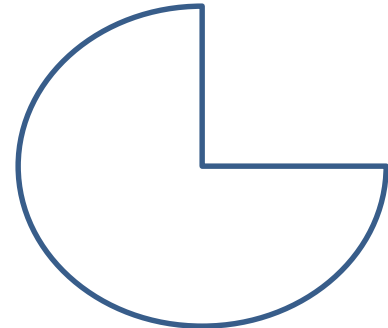
1/13

Given a standard deck of cards, what is the probability of drawing the king of diamonds?



1/52

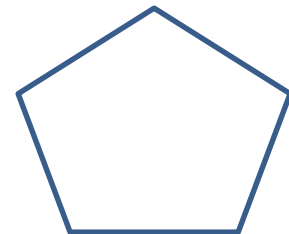
Given a standard deck of cards, what is the probability of drawing a king OR a diamond?



16/52 or

4/13

Given a standard deck of cards, what are the  
ODDS of drawing a diamond?



13:39

or

1:3

# Tonight's Homework

Packet p. 12 and 13

~~Omit problem #1 & 2 for now~~

Please complete #1 and 2 also

Study for Quiz - Tomorrow!

