Welcome!

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
Monday Date: 5 - 7 Topic: Hidden Figures	0 1 2	
Tuesday Date: 5 - 8 Topic: Experimental vs. Theoretical Probability	0 1 2	
Wednesday Date: 5 - 9 Topic: 14G Tree Diagrams	0 1 2	
Thursday Date: _____ Topic: _____	0 1 2	
Friday Date: _____ Topic: _____	0 1 2	

Class Plan:

1. Warm-up 

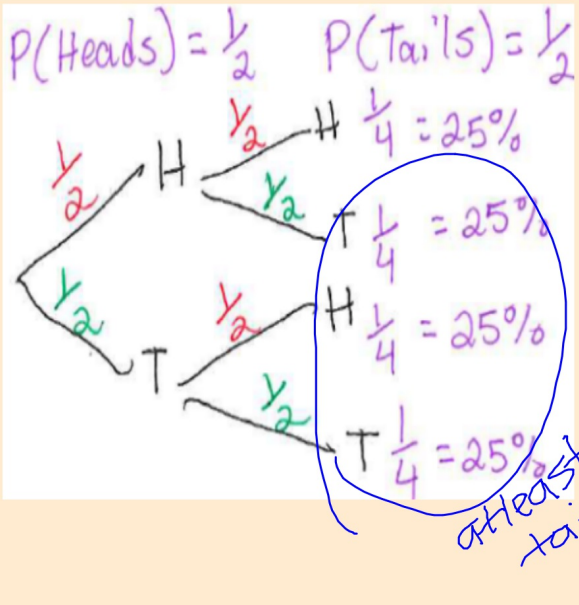
2. SKUNK!

Will you get skunked? ;)

3. 14H Sampling With and Without Replacement

4. Practice

Warm-up: The tree diagram shows the outcomes of flipping a coin twice.



a) Find the probability of two heads.

$\frac{1}{4} = 25\%$

b) Find the probability of ***atleast*** one tail.

$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$

$= 75\%$

SKUNK RULES (1 is BAD!)

- Shake two dice
- **GOAL: highest score.**
- Prior to each role,choose to stand or sit. After you sit... you can't stand back up until next column.
- Only way to gain points is by standing.
- **If you are standing and a 1 is rolled...you will get 0 for the column.**
- If you are sitting you are saving the points you already have in the column

Questions?

SKUNK RULES (1 is BAD!)

Questions to consider during the game:

1) What is probability of rolling a one with 2 die?

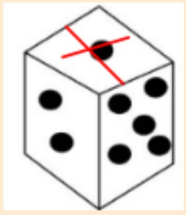
2) What is probability of rolling ***two*** ones with 2 dice?

3) How else could this game be played?

Questions?

1) Draw game board.
2) Stand up and record 1st roll.
3) Choose to sit or stand.
4) ...Repeat..

No ones! :)



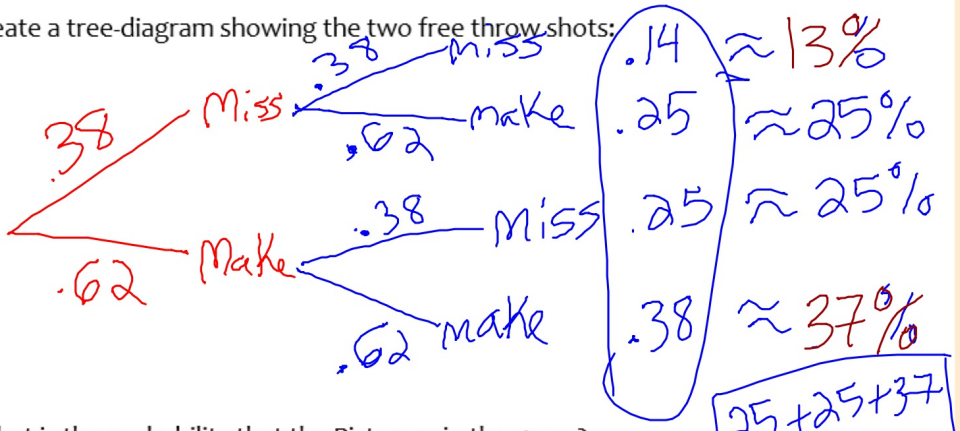
S	K	U	N	K
	5 6	1 1 1 8 8		6

Example A

The Pistons and the Bulls are tied, and time has run out in the game. The Pistons have a player at the free throw line, and he has two shots to make. He usually makes 62% of his free throws attempts. P(F) = .62 P(F)' = .38

i. What is the probability that the Pistons' player at the free throw line ***misses*** his shot?

ii. Create a tree-diagram showing the two free throw shots:



iii. What is the probability that the Pistons win the game?

100 − 13 = 87%

25 + 25 + 37 = 87%

Example A

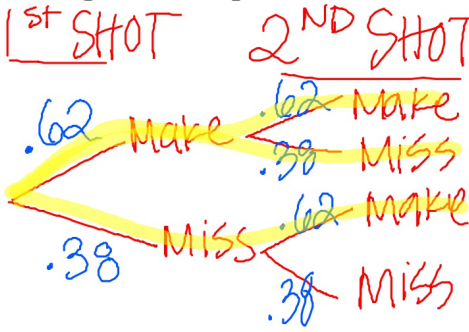
P(WIN) ≈ 86%

The Pistons and the Bulls are tied, and time has run out in the game. The Pistons have a player at the free throw line, and he has two shots to make. He usually makes 62% of his free throws attempts.

P(MISS) = 38%

i. What is the probability that the Pistons' player at the free throw line ***misses*** his shot?

ii. Create a tree-diagram showing the two free throw shots:



(.62)(.62) = .3844
(.62)(.38) = .2356
(.38)(.62) = .2356

iii. What is the probability that the Pistons win the game?

P(AT LEAST 1 SHOT MADE) = .3844 + 2(.2356) = .8556

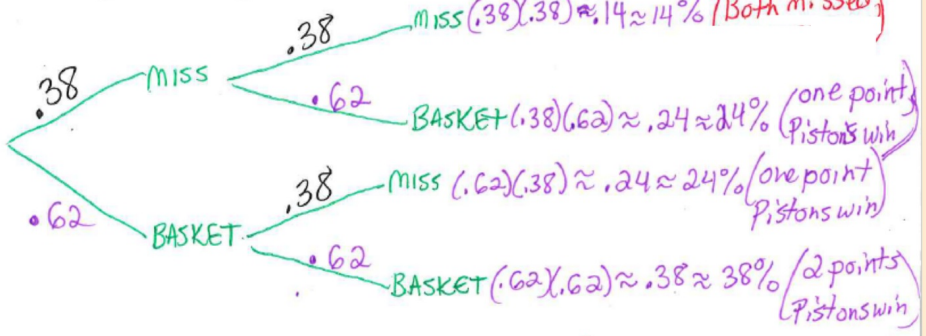
Solution

The Pistons and the Bulls are tied, and time has run out in the game. The Pistons have a player at the free throw line, and he has two shots to make. He usually makes 62% of his free throws attempts.

$100 - 62 = 38$

i. What is the probability that the Pistons' player at the free throw line ***misses*** his shot? 38%

ii. Create a tree-diagram showing the two free throw shots:

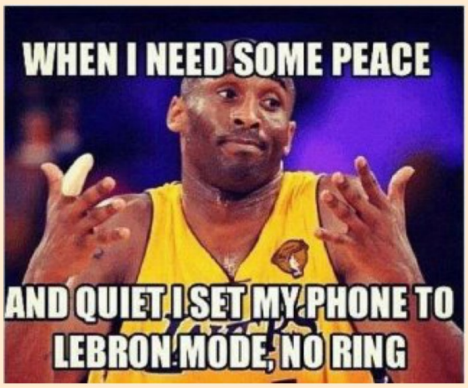


iii. What is the probability that the Pistons win the game?

Pistons win if atleast on shot goes in!

24% + 24% 38% = 86%

Joke Break!



Q: How do basketball players stay cool during a game?

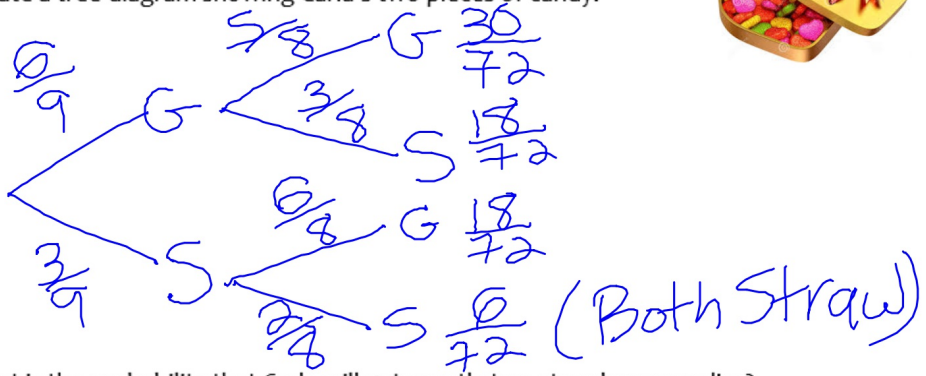
A: They stand near their fans!

Example B

$P(G) = \frac{6}{9} = \frac{2}{3}$ $P(S) = \frac{3}{9} = \frac{1}{3}$

A box of candy contains 6 grape pieces and 3 strawberry pieces. Carla takes one piece from the box and eats it. She then takes a second piece and eats the candy.

ii. Create a tree-diagram showing Carla's two pieces of candy:



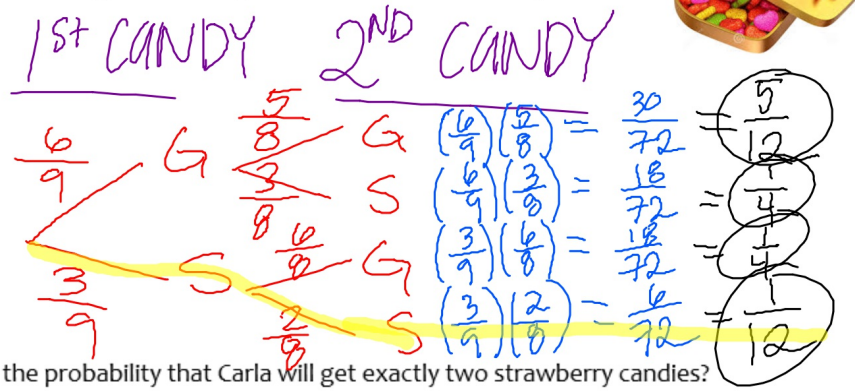
ii. What is the probability that Carla will get exactly two strawberry candies?

$P(S \text{ and } S) = \frac{6}{72} = \frac{1}{12} \approx 8\%$

Example B

A box of candy contains 6 grape pieces and 3 strawberry pieces. Carla takes one piece from the box and eats it. She then takes a second piece and eats the candy.

ii. Create a tree-diagram showing Carla's two pieces of candy:



ii. What is the probability that Carla will get exactly two strawberry candies?

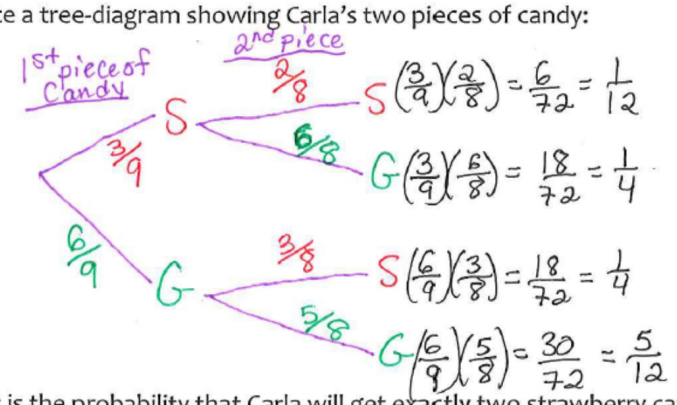
$$P(S \text{ \& } S) = \frac{1}{12}$$

Solution

Example B

A box of candy contains 6 grape pieces and 3 strawberry pieces. Carla takes one piece from the box and eats it. She then takes a second piece and eats the candy.

ii. Create a tree-diagram showing Carla's two pieces of candy:



ii. What is the probability that Carla will get exactly two strawberry candies?

$P(1^{st}\text{ straw. and }2^{nd}\text{ straw.}) = \left(\frac{3}{9}\right)\left(\frac{2}{8}\right) = \frac{6}{72} = \frac{1}{12} \approx 8\%$ chance

Example A vs. Example B

How are the two examples different?

decimals/%
Consistent Prob.

diff Prob

fractions
Probabilities change

Example A vs. Example B

How are the two examples different?

1ST EVENT INDEPENDENT OF 2ND EVENT

CARLA EATS CANDY — 2ND EVENT DEPENDS ON 1ST

H SAMPLING WITH AND WITHOUT REPLACEMENT

Sampling is the process of selecting one object from a large group and inspecting it for some particular feature. The object is then either:

- put back, which we call **sampling with replacement**, or
- put to one side, which we call **sampling without replacement**.

Sometimes the inspection process makes it impossible to return the object to the large group. In these cases we have no option but to sample without replacement.

For example:

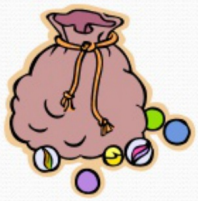
- Is the chocolate hard or soft-centred? Bite it or squeeze it to see.
- Does the egg contain one or two yolks? Break it open and see.
- Is the object correctly made? Pull it apart to see.

What is an independent event?

- Independent events are events where the outcome of one event **does not affect** the outcome of the other events
  - Example:
  - Tossing a coin and rolling a number cube are independent events.

What is a dependent event?

- If the outcome of one event **affects** the outcome of another, then the events are said to be Dependent Events.
  - Example: No replacement
  - Taking out a marble from a bag containing some marbles and not replacing it, and then taking out a second marble are dependent events.



Exercises...

Tree Diagrams Day 2

(Mixture of With & Without Replacement)

***Work together at your table!

Exercises....

EXERCISE 14H

1 A box contains 6 red and 3 yellow tickets. Two tickets are drawn at random, the first being *replaced* before the second is drawn.

a Draw a tree diagram to represent the sample space.

b Hence, determine the probability that:

i both tickets are red **ii** both tickets are yellow

iii the first ticket is red and the second is yellow

iv one ticket is red and the other is yellow.

Exercises....

4 A cook selects an egg at random from a carton containing 7 ordinary eggs and 5 double-yolk eggs. She cracks the egg into a bowl and sees whether it has two yolks or not. She then selects another egg at random from the carton and checks it.

Let S represent a single-yolk egg, and D represent a double-yolk egg.

a Draw a tree diagram to illustrate this process.

b Find the probability that both eggs had:

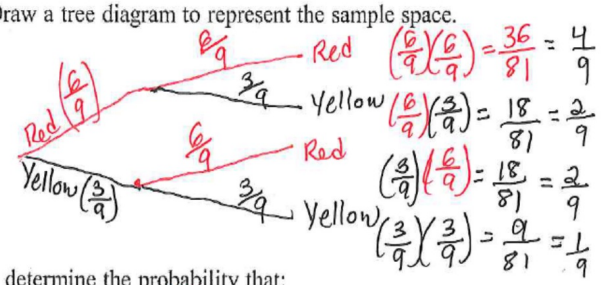
i two yolks **ii** only one yolk.

SOLUTIONS

EXERCISE 14H

1 A box contains 6 red and 3 yellow tickets. Two tickets are drawn at random, the first being *replaced* before the second is drawn.

a Draw a tree diagram to represent the sample space.



b Hence, determine the probability that:

i both tickets are red $\frac{36}{81} = \frac{4}{9}$

ii both tickets are yellow $\frac{9}{81} = \frac{1}{9}$

iii the first ticket is red and the second is yellow $\left(\frac{6}{9}\right)\left(\frac{3}{9}\right) = \frac{18}{81} = \frac{2}{9}$

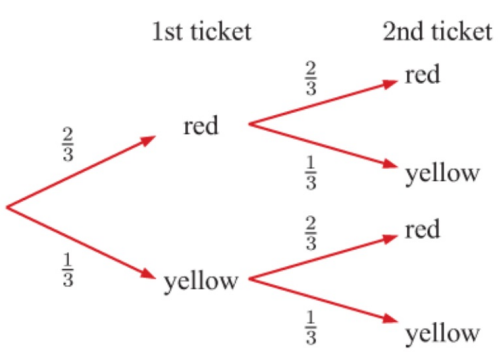
iv one ticket is red and the other is yellow.

$P(\text{Red, then yellow } \underline{\text{OR}} \text{ yellow, then red}) = \left(\frac{6}{9}\right)\left(\frac{3}{9}\right) + \left(\frac{3}{9}\right)\left(\frac{6}{9}\right) = \frac{18}{81} + \frac{18}{81} = \frac{36}{81} = \frac{4}{9}$

SOLUTIONS

EXERCISE 14H

1 a

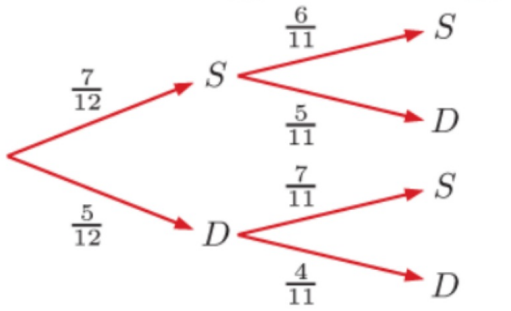


b i $\frac{4}{9}$ ii $\frac{1}{9}$ iii $\frac{2}{9}$ iv $\frac{4}{9}$

2 **a** $\frac{2}{7}$ **b** $\frac{1}{7}$ **c** $\frac{2}{7}$ **d** $\frac{4}{7}$

SOLUTIONS

4 **a**



b **i** $\frac{5}{33}$

ii $\frac{7}{22}$