What do you Expect?

Investigation II

Probability

Labsheet 2.1

The Addition Game

Roll number	Sum	Odd or even?
1	11	O
2	11	O
3	7	O
4	11	O
5	7	O
6	11	O
7	8	E
8	9	O
9	11	O
10	7	O
11	9	O
12	10	E
13	7	O
14	6	E
15	6	E
16	8	E
17	8	E
18	7	O

13 Odd 5 Even

Roll number	Sum	Odd or even?
19	10	E
20	11	O
21	9	O
22	4	E
23	3	O
24	11	O
25	11	O
26	2	E
27	8	E
28	6	E
29	10	E
30	6	E
31	8	E
32	8	E
33	5	O
34	8	E
35	4	E
36	2	E

6 Odd 12 Even

19 Odd 17 Even

P(Odd Sum) $\frac{\text{\# of odd sums}}{\text{\# of turns}}$ $\frac{19}{36}$

P(Even Sum) $\frac{\text{\# of even sums}}{\text{\# of turns}}$ $\frac{17}{36}$

Group	Odd	Even
	11 22	14
	11 15	21
	18	18
	17	19
	20	16
	11 19	17
	24	12
	11 18	18
	17	24

Number Cube w 2 throws of 6

START

Cube 1	Cube 2		Outcomes
6 ×	6		36
1	1	1-1	2
	2	1-2	3
	3	1-3	4
	4	1-4	5
	5	1-5	6
	6	1-6	7
2	1	2-1	3
	2	2-2	4
	3	2-3	5
	4	2-4	6
	5	2-5	7
	6	2-6	8
3	1	3-1	4
	2	3-2	5
	3	3-3	6
	4	3-4	7
	5	3-5	8
	6	3-6	9
4	1	4-1	5
	2	4-2	6
	3	4-3	7
	4	4-4	8
	5	4-5	9
	6	4-6	10
5	1	5-1	6
	2	5-2	7
	3	5-3	8
	4	5-4	9
	5	5-5	10
	6	5-6	11
6	1	6-1	7
	2	6-2	8
	3	6-3	9
	4	6-4	10
	5	6-5	11
	6	6-6	12

2	2-1	1
3	3-11	2
4	4-111	3
5	5-1111	4
6	6-~~11~~	5
7	7-~~111~~	6
8	8-~~111~~	5
9	9-1111	4
10	10-111	3
11	11-11	2
12	12-1	1

Odd 2 4 6 4 2

Even 1 3 5 5 3

18 Odd

18 Even

P(odd sum)

$\frac{\text{\# of odd sums}}{\text{\# of outcomes}}$

$\frac{18}{36} \rightarrow \frac{1}{2}$

P(even sum)

$\frac{\text{\# of even sums}}{\text{\# of outcomes}}$

$\frac{18}{36} \rightarrow \frac{1}{2}$

Analyzing Number-Cube Games

→ A Die w/ numbers 1-6

In Investigation 1, you used various strategies to find probabilities associated with games of chance. You found *experimental probabilities* by playing a game several times and evaluating the results, and you found *theoretical probabilities* by analyzing the possible outcomes of a game. In this investigation, you will explore experimental and theoretical probabilities involved in some number-cube games.

2.1 Playing the Addition Game

In this problem, you will play the Addition Game with a partner and try to determine whether it is fair.

Addition Game Rules

- Player A and Player B take turns rolling two number cubes.
- If the sum of the numbers rolled is odd, Player A scores 1 point.
- If the sum of the numbers rolled is even, Player B scores 1 point.
- The player with the most points after 36 rolls wins.

Problem 2.1

Play the Addition Game with a partner. Keep track of your results.

A. Based on your data, what is the experimental probability of rolling an odd sum? An even sum? See Other sheet

B. List all the possible pairs of numbers you can roll with two number cubes.

C. What is the theoretical probability of rolling an odd sum? An even sum?

D. Do you think the Addition Game is a fair game? Explain why or why not.

And points are the same

Yes there are equal odd and even outcomes both have a $\frac{18}{36}$ chance of winning or a $\frac{1}{2}$ chance

Problem 2.1 Follow-Up

1. Min-wei invented a game based on the sum of two number cubes. In her game, Player A scores 1 point for sums of 6 or 7, and Player B scores 1 point for any other sum. Min-wei thought this would be a fair game because sums of 6 and 7 occur so often. Is this a fair game? Explain why or why not.
2. Royce invented a game based on the sum of two number cubes. In his game, Player A scores 3 points if the sum is a multiple of 3, and Player B scores 1 point if the sum is *not* a multiple of 3. Is Royce's game a fair game? Explain why or why not.

See Notebook

The Multiplication Game

Roll number	Product	Odd or even?
1	5	O
2	1	O
3	12	E
4	1	O
5	5	O
6	5	O
7	36	E
8	10	E
9	10	E
10	6	E
11	1	O
12	18	E
13	5	O
14	18	E
15	24	E
16	4	E
17	15	O
18	4	E

Roll number	Product	Odd or even?
19	15	O
20	4	E
21	8	E
22	20	E
23	10	E
24	2	E
25	4	E
26	30	E
27	3	O
28	10	E
29	30	E
30	3	O
31	18	E
32	4	E
33	2	E
34	30	E
35	30	E
36	6	E

8 Odd 10 Even

30 Odd 15 Even

11 Odd - 25 Even

Class	Odd	Even
	6	30
III	8	28
I	7	29
I	10	26
	4	32
	13	23
	11	25
	16	20
Finish ↓	19	17
	9	27
Total		

2.2 Playing the Multiplication Game

In the Addition Game, players score points based on the sum of the numbers rolled on two number cubes. In the Multiplication Game, scoring depends on the *product* of the numbers rolled.

Label

Experimental

Products

P(Odd) $\frac{\text{\# of odd}}{\text{\# of turns}}$ $\frac{11}{36}$

P(Even) $\frac{\text{\# of Even}}{\text{\# of turns}}$ $\frac{25}{36}$

Multiplication Game Rules

- Player A and Player B take turns rolling two number cubes.
- If the product of the numbers rolled is odd, Player A scores 1 point.
- If the product of the numbers rolled is even, Player B scores 1 point.
- The player with the most points after 36 rolls wins.

Problem 2.2

Play the Multiplication Game with a partner. Keep track of your results.

A. Based on your data, what is the experimental probability of rolling an odd product? An even product?

B. What is the theoretical probability of rolling an odd product? An even product?

C. Do you think the Multiplication Game is fair? Explain why or why not.

D. If the game consisted of 100 rolls instead of 36, how many points would you expect each player to have at the end of the game?

Cube 1

X	1	2	3	4	5	6
1	A 1	B 2	A 3	B 4	A 5	B 6
2	B 2	A 4	B 6	A 8	B 10	A 12
3	A 3	B 6	A 9	B 12	A 15	B 18
4	B 4	A 8	B 12	A 18	B 22	A 26
5	A 5	B 10	A 15	B 20	A 25	B 30
6	B 6	A 12	B 18	A 24	B 30	A 36

Cube 2

$36 - 9 = 27$

Theoretical

Products

B: P(odd) $\frac{\text{\# of odd}}{\text{\# of outcomes}}$ $\frac{9}{36} = \frac{3}{12} = \frac{1}{4}$ P(Even) $\frac{\text{\# of even}}{\text{\# of outcome}}$ $\frac{27}{36} = \frac{3}{4}$

C: No it is not fair, A only has a $\frac{1}{4}$ chance of winning

D: Odd: $100 \div \frac{1}{4} = 25$, Even: $100 \div \frac{3}{4} = 75$

(A) Odd will have 25 points Even (B) will have 75 points

The game can be fair if Player A will score 3 points for every match they score.

Problem 2.2 Follow-Up

1. How could you make the Multiplication Game a fair game?
2. Invent a fair two-person game based on the product of two number cubes. A player should score 1 point each time he or she scores. You will need to decide which player scores on which kinds of products. Explain why your game is fair.

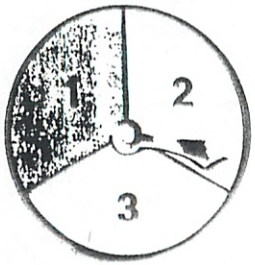
Applications

In 1–4, find the probability of getting the given result when two number cubes are rolled.

1. a sum of 4
2. a sum less than 6
3. a sum of 7 or 11
4. a pair of 5s

See Notebook

5. Suppose you were to spin the spinner below and then roll a number cube.



a. Make an organized list of the possible outcomes.

b. What is the probability that you will get a 1 on both the number cube and the spinner?

c. What is the probability that you will *not* get a 1 on both the number cube and the spinner?

d. What is the probability that you will get a 1 on the number cube or the spinner?

e. What is the probability that you will get the same number on the number cube and the spinner?

f. What is the probability that the sum of the number on the spinner and the number on the number cube will be greater than 8?

g. What is the probability that the product of the number on the spinner and the number on the number cube will be 0?

6. Chris did an experiment using the spinner and number cube from question 5. For each trial, he spun the spinner and then rolled the number cube. He was surprised to find that he got a 1 on both the spinner and the number cube in 4 out of 36 trials.

a. Based on his results, what is the experimental probability of getting a 1 on both the number cube and the spinner?

b. Chris compared the experimental probability of getting a 1 on both the number cube and the spinner to the theoretical probability. He decided that something must be wrong with the spinner or the number cube, since these probabilities are not the same. Do you agree? Why or why not?

7. Raymundo invented the Prime Number Multiplication game. In this game, two number cubes are rolled. Player A scores 10 points if the product is prime, and Player B scores 1 point if the product is not prime. Raymundo thinks this scoring system is reasonable because there are many more ways to roll a nonprime product than a prime product.

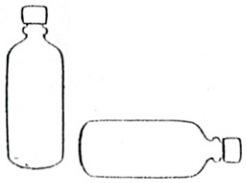
a. If the cubes are rolled 100 times, how many points would you expect Player A to score? How many points would you expect Player B to score?

b. Is Raymundo's game a fair game? Explain why or why not. Make it fair

8. Rachel says that if she rolls two number cubes 36 times, she will get a product of 1 exactly once. Luis said that she cannot be sure this will happen exactly once, but it will probably happen very few times. Who is right? Explain your reasoning.

9. Rachel told Luis that if she rolls two number cubes 100 times, she will *never* get a product of 23. Luis told her that she can't be sure. Who is right? Explain your reasoning.

10. Juanita is trying to decide whether to play a certain game at an amusement park. It takes one ticket to play the game. A player flips two plastic bottles. If both bottles land standing up, the player wins ten tickets to use for rides and games. Juanita has been watching people play the game for a while and has recorded the results in a table:



Both land on side	One lands on side and one lands standing up	Both land standing up
𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 ||||	𝍸 𝍸 𝍸 𝍸 ||||	||

a. Based on Juanita's results, what is the experimental probability of winning the game?

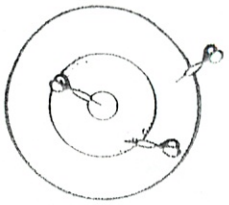
b. If Juanita played this game 20 times, how many times could she expect to win?

c. How many tickets could Juanita expect to be ahead or behind after playing the game 20 times? Explain your reasoning.

d. Is it possible to find the theoretical probability of winning this game? Why or why not?

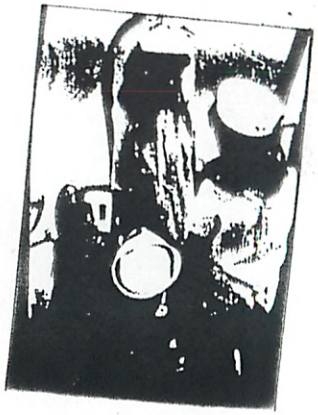
In 11–15, tell whether theoretical or experimental probability is being used.

?½ E **11.** Kelly played darts on a board made of concentric blue, red, and yellow regions. The dart landed in the red region 7 times and in the other regions a total of 13 times. Kelly stated that on her next throw, the dart has a 35% chance of landing in the red region.



? E **12.** For 10 minutes before school each day, some students from Ms. MacAfee's class recorded the types of vehicles that passed by the school. They wanted to figure out whether it was more likely for a car or a truck to pass by. After a week of observing, the students used their data to predict that a car is more likely to pass by than a truck.

T **13.** Emma is in the fun house at the amusement park. She must choose from among three exits. At one exit, visitors get squirted with water. At another exit, visitors get sprayed with whipped cream. At a third exit, visitors must walk through mud. Emma does not know which exit is which. She decides that if she selects an exit at random, she has a $\frac{1}{3}$ chance of getting sprayed with whipped cream.



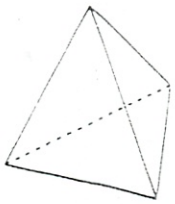
?2 E **14.** Waldo buys a pair of weighted number cubes at a novelty store. In 30 rolls, he gets a sum of 2 eleven times. Waldo figures that if he rolls the number cubes 100 times, he will get a sum of 2 about 37 times.

T **15.** Tina keeps a pack of 20 colored pencils in her backpack. When her science teacher asks the students to design a cover for their science projects, Tina pulls out a colored pencil without looking. She figures she has about a 5% chance of picking her favorite color, orange.

Investigation 2

Use these problems for additional practice after Investigation 2.

1. A 4-sided die is a pyramid with four faces that are congruent equilateral triangles. The shape of a 4-sided die is also called a *tetrahedron*.



The faces of a 4-sided die are labeled with the numbers 1, 2, 3, and 4. A roll of a 4-sided die is determined by the number on the face the die lands on. Below are the rules of a game played with two 4-sided dice.

- Player I and Player II take turns rolling two 4-sided dice.
- If the sum of the numbers rolled is odd, Player I gets a point.
- If the sum of the numbers rolled is even, Player II gets a point.
- The player with the most points after 32 rolls wins.

a. Make a table that shows all the possible outcomes of rolling two 4-sided dice.

b. What is the probability of rolling a sum of 5?

c. What is the probability of rolling a sum of 4?

d. What is the probability of rolling a sum of 7?

e. Do you think the game is fair? Explain your reasoning.

f. Suppose that, in 32 rolls, a sum of 8 is rolled twice. Would you consider this unusual? Explain your reasoning.

2. A standard deck of playing cards has 52 cards. The deck is divided into 4 *suits*: spades, hearts, diamonds, and clubs. There are 13 cards of each suit.

a. If you randomly draw a card from a standard deck of playing cards, what is the probability that you will draw a heart?

b. If you draw 12 cards, how many clubs could you expect to draw? Explain your reasoning.

c. If you remove all the diamonds from a deck of cards and then draw 12 cards, how many clubs could you expect to draw? Explain your reasoning.

d. Are the probabilities you found in parts a–c experimental probabilities or theoretical probabilities? Explain your reasoning.

Michael Plasmeier
2/3/2004
P.D.: 6

Building A PC

Parts:	Hard Drive	Monitor	RAM	Floppy
	20 GB	15-in CRT	128 MB	Yes
	80 GB	17-in CRT	256 MB	No
	120 GB	15-in Flat Screen	512 MB	
		17-in Flat Screen		

Key:

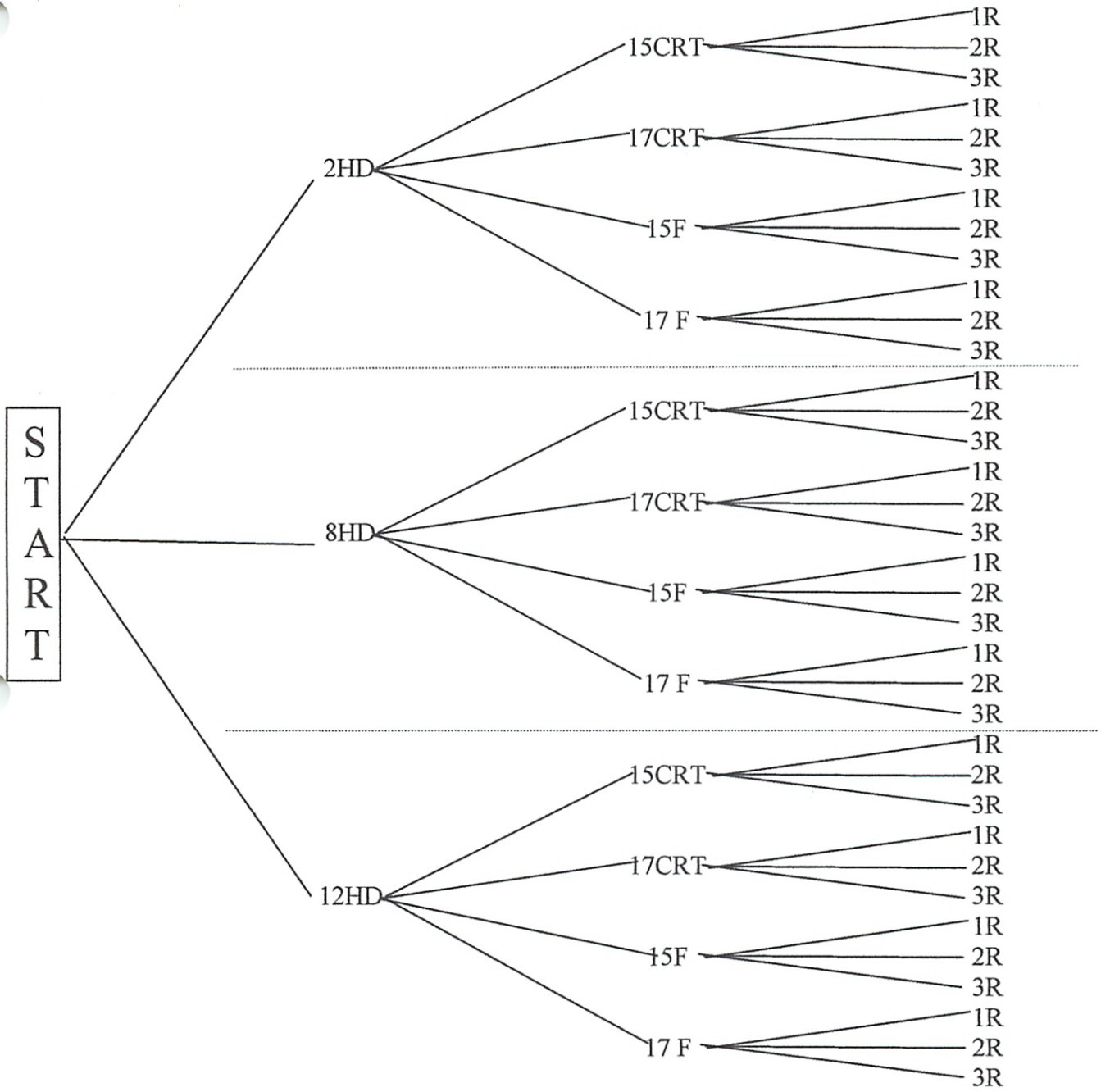
Item	Abbreviation
20 GB Hard Drive	2HD
80 GB Hard Drive	8HD
120 GB Hard Drive	12HD
15-in CRT Monitor	15C
17-in CRT Monitor	17C
15-in Flat Panel Monitor	15F
17-in Flat Panel Monitor	17F
128 MB RAM	1R
256 MB RAM	2R
512 MB RAM	3R

Tree: Next Page

Questions:

1. What is the probability of getting my computer with a 80GB Hard Drive, a 15-in Flat Panel monitor, and 128MB of RAM?
2. What is the probability of getting a CRT Monitor?
3. What is the probability of getting more the 256MB of RAM?
4. What is the probability of getting an 80GB Hard Drive, and 128MB of RAM?
5. What is the probability of getting a Flat Panel monitor and a 120GB Hard Drive?

Hard Drive		Monitor		RAM
3	x	4	x	3 = 36 Outcomes



30/30 A

Name Michael Plasmeier Date

Check-Up 1

1. Let's Make a Meal is a restaurant that lets customers design their own meals by choosing items from three categories. The Kid's Choice Make-a-Meal Deal gives children 12 and under one entree, one side dish, and a drink for $2.99.

Kid's Choice Menu		
Entrees	**Side dishes**	**Drinks**
Hamburger	French fries	Milk
Hot dog	Carrot sticks	Soda
Cheese pizza	Salad	Juice
Chicken strips		

Desert
Yogert
Fruit

a. How many different Kid's Choice meals can be designed? Tree + Checked

4 entrees × 3 salads × 3 drinks = 36 outcomes or # of possible meals that can be designed

b. If meals are made randomly, what is the probability that a Kid's Choice meal will include a salad? P=

P(Salad) $\frac{\text{\# of salads}}{\text{\# of outcomes}}$ $\frac{12}{36} \rightarrow \frac{1}{3}$

c. If meals are made randomly, what is the probability of a Kid's Choice meal having a hamburger, French fries, and a soda? P=

P(hamburge, fries, soda) $\frac{\text{\# of hamburger, fries, soda}}{\text{\# of outcomes}}$ $\frac{1}{36}$

d. For 50¢ more, children can also have a dessert: either a fruit cup or frozen yogurt. How many different Kid's Choice meals can be designed that include a dessert? Tree + Check

4 entress × 3 sides × 3 drinks × 2 deserts = 72 Outcomes # of possible meals that can be now designed

2. Mrs. Evarts played a game with a spinner and a coin. For each turn, she spun the spinner once and tossed the coin once.

a) Create a counting tree to find all the possible outcomes of a turn in Mrs Evarts' game. Tree + List + Check

4 colors × 2 sides = 8 outcomes

b) Are all the outcomes equally likely? Explain why or why not. Y

Yes because there is an equal chance of selecting 1 color and 1 side. Each outcome has a $\frac{1}{8}$ chance

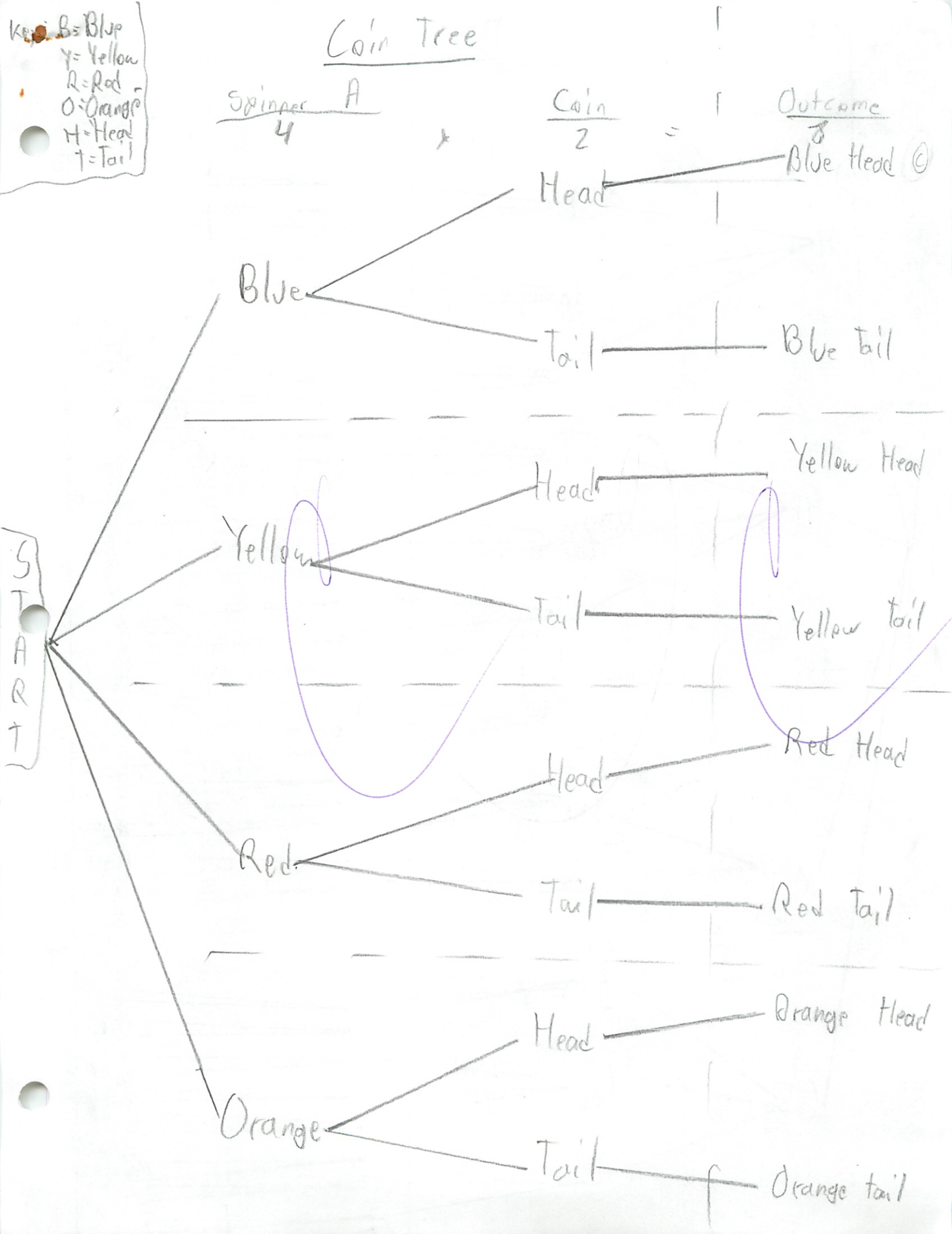
c) What is the probability that Mrs Evarts will spin blue and toss a head on a turn? P=

$P(\text{Blue Head}) = \frac{\#\text{ of Blue Heads}}{\#\text{ of Outcomes}} = \frac{1}{8}$

Key: B = Blue
Y = Yellow
R = Red
O = Orange
H = Head
T = Tail

Coin Tree

Spinner A		Coin		Outcome
4	×	2	=	8

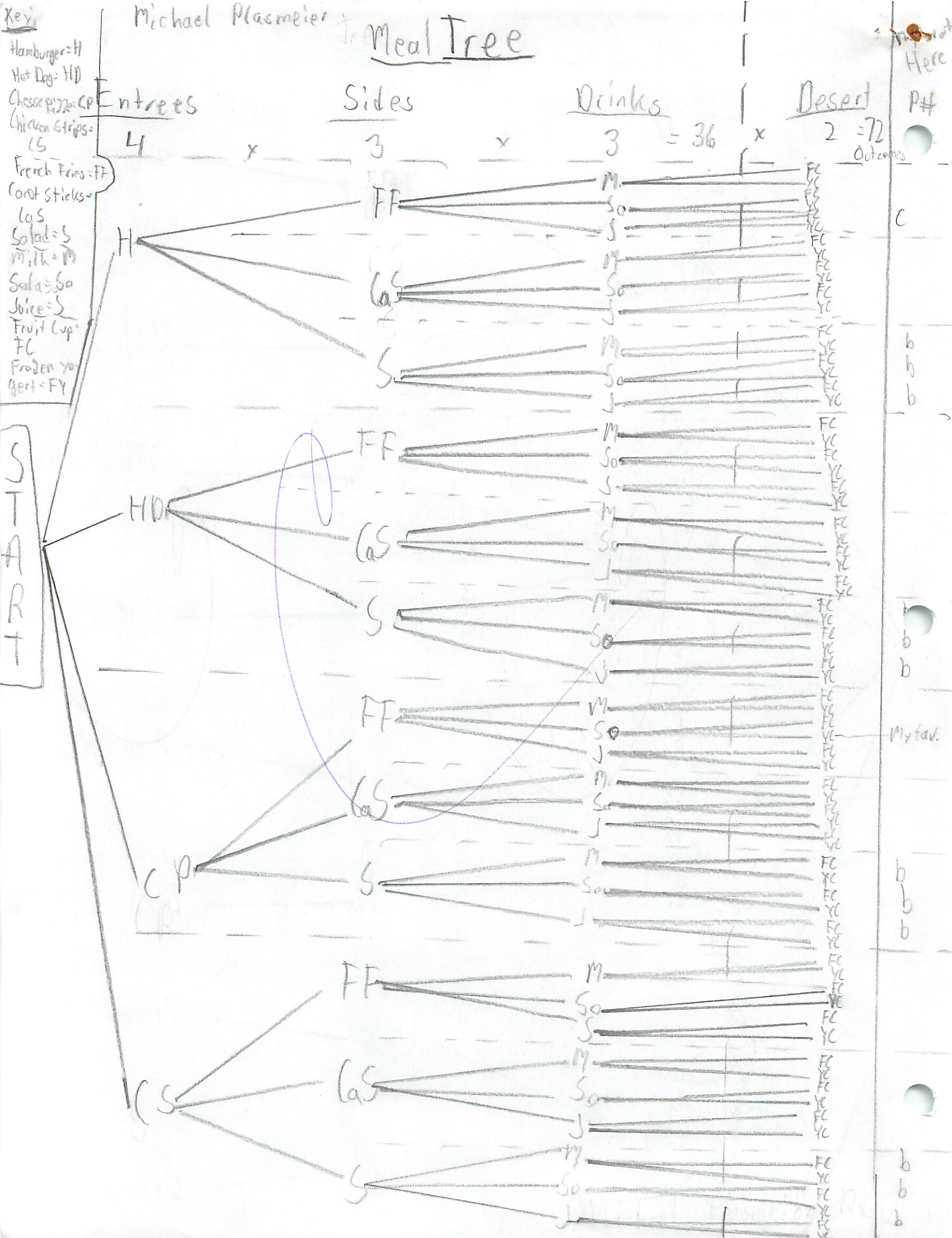


Michael Plasmeier

Meal Tree

Key:
Hamburger = H
Hot Dog = HD
Cheese Pizza = CP
Chicken Strips = CS
French Fries = FF
Carrot Sticks = CaS
Salad = S
Milk = M
Soda = So
Juice = J
Fruit Cup = FC
Frozen yogurt = FY

Entrees		Sides		Drinks		Desert		
4	x	3	x	3 = 36	x	2 = 72 Outcomes		



Here

P#

C

b
b
b

b
b
b

b
b
b

b
b
b

2/4

Practice Quiz – Probability

Name: Michael Plasmeier

The **Somers** Café is a restaurant that lets customers design their own meals by choosing items from three categories. The Senior's Choice give adults over 60 *one entree, one side dish and a drink* for $3.50.

Senior's Choice Menu

Entrees	Side Dishes	Drinks
Chicken	Salad	Coffee
Beef	Cole Slaw	Tea
Fish		
3	2	2

Key
C = Chicken
B = Beef
F = Fish
S = Salad
CS = Cole Slaw
CO = Coffee
T = Tea
Y = Yogurt
A = Apple Sauce

1) How many different Senior's Choice meals can be designed? Use a counting tree.

-------- Show tree on the back -------

3 entrees x 2 sides x 2 drinks = 12 outcomes

2) If meals are made randomly, what is the probability that a Senior's Choice meal will include a salad?

Won't Need

P(Salad) $\frac{\text{\# of salads}}{\text{\# of outcomes}}$ $\frac{6}{12} \rightarrow \frac{1}{2} \rightarrow .5 \rightarrow 50\%$

3) If meals are made randomly, what is the probability of a Senior's Choice meal including Beef, Cole Slaw and a Coffee?

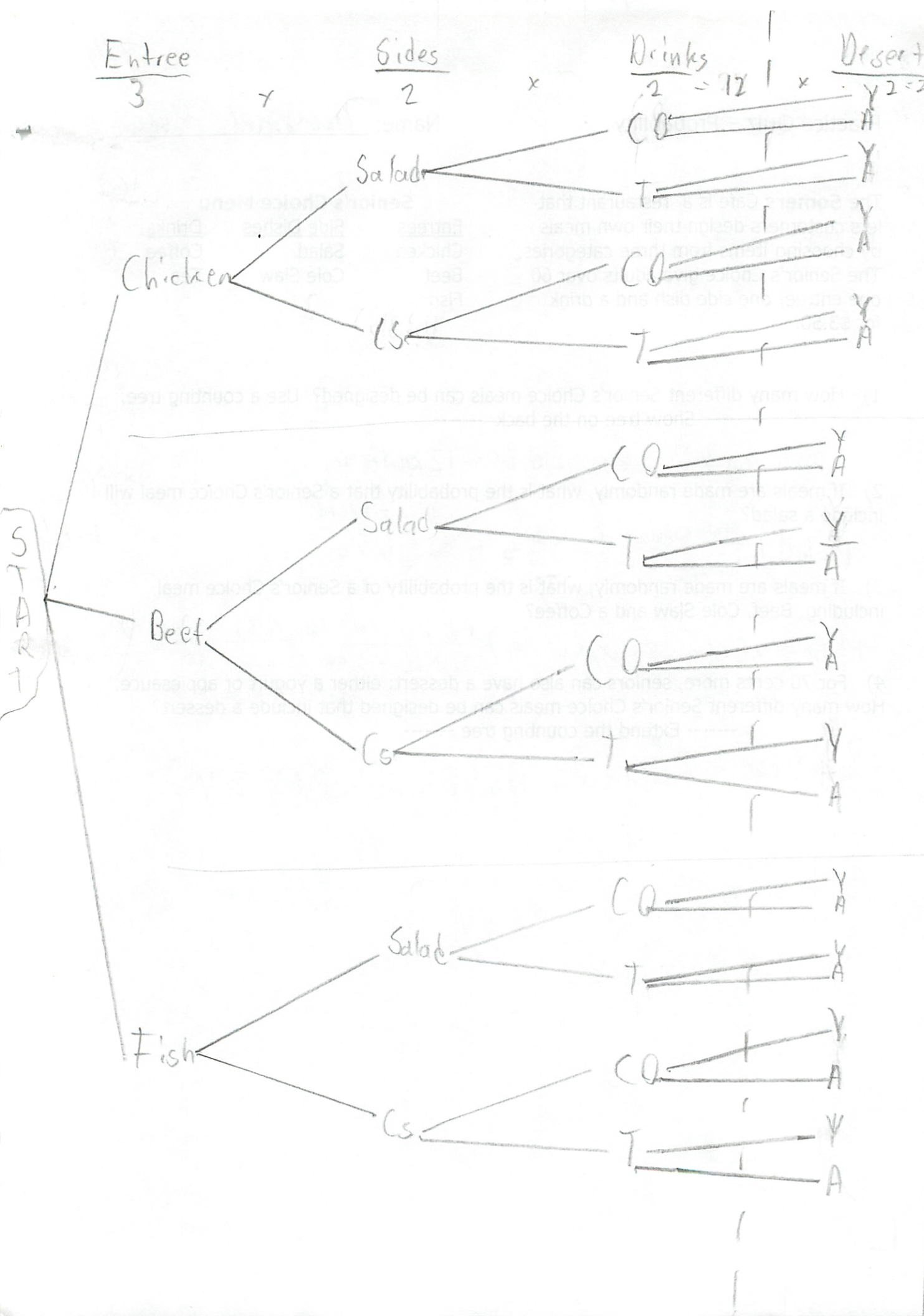
P(Beef, Cole Slaw, Coffee) $\frac{\text{\# of Beef, Cole Slaw, Coffee}}{\text{\# of outcomes}}$ $\frac{1}{12} \rightarrow$ P

4) For 70 cents more, seniors can also have a dessert: either a yogurt or applesauce. How many different Senior's Choice meals can be designed that include a dessert?

------- Extend the counting tree -------

3 entrees x 2 sides x 2 drinks x 2 deserts = 24 new outcomes

Entree		Sides		Drinks		Desert	Problem
3	×	2	×	2 = 12	×	2 = 24	



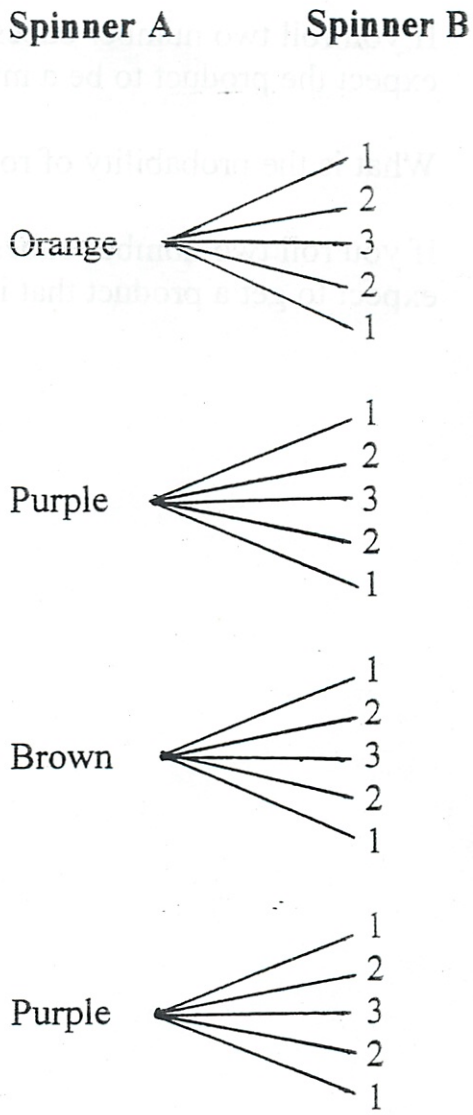
2
2
2
2
3
2
2

Michael Plasmeier

Review -- Probability (2)

Int(9)

1) Joe and Kevin are analyzing a game involving two different spinners. For each turn, a player spins each spinner once. To help them find theoretical probabilities Joe and Kevin made the counting tree at right.



1) Design two spinners that could be the spinners used by Joe and Kevin.

2) List all the possible outcomes of spinning each spinner once.

3) Based on your spinners, what is the probability of getting purple on spinner A and 2 on spinner B?

4) Based on your spinners, what is the probability of *not* getting 1 on spinner B?

Part 2) a) When you roll two number cubes, what is the probability that the product of the numbers will be a multiple of 6?

b) If you roll two number cubes 100 times, about how many times can you expect the product to be a multiple of 6?

c) What is the probability of rolling a product that is a multiple of 11?

d) If you roll two number cubes a million times, how many times can you expect to get a product that is a multiple of 7?

38/40 ★

98 Adv to date 2/26

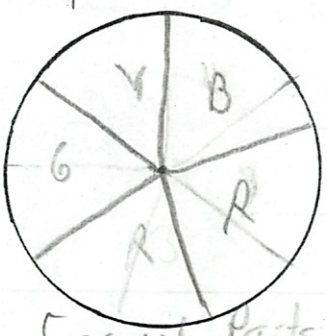
Prog Report 3

Quiz -- Probability
Answer Sheet
"Connections"

Name: Michael Plasmeier

16) a) Spinners

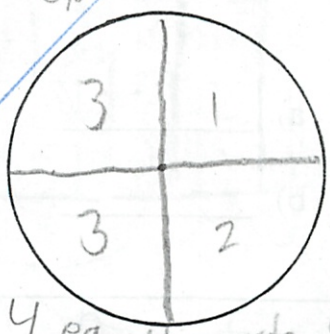
Spinner A



key
B = Blue
R = Red
G = Green
Y = Yellow

5 equal parts - 72° each

Spinner B



4 equal parts 90° each

b) List all possible outcomes

B1 R1 R1 G1 Y1
B2 R2 R2 G2 Y2
B3 R3 R3 G3 Y3
B3 R3 R3 G3 Y3

20 outcomes

c) Red 3

d) $\frac{1}{5}$ → $P(R3) \frac{\text{\# of R3's}}{\text{\# of outcomes}} \frac{4}{20} \to \frac{2}{10} \to \frac{1}{5}$

e) $\frac{1}{2}$ → $P(\text{not } 3) \frac{\text{\# of not 3s}}{\text{\# of outcomes}} \frac{10}{20} \to \frac{1}{2}$

17) List of Outcomes **OR** Table

x	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	4	6	8	10	12
3	3	6	9	12	15	18
4	4	8	12	16	20	24
5	5	10	15	20	25	30
6	6	12	18	24	30	36

~~24~~ looks 36 (6×6)

a) $\frac{11}{24}$ 36 P(multiple of 5) $\frac{\text{\# of multiple of 5}}{\text{\# of outcomes}}$ $\frac{11}{24}$ -1

b) ~~42~~ 30 $\frac{11}{24} \times 100 = 42$ multiple of 5 -1

c) 0 P(multiple of 7) $\frac{\text{\# of multiple of 7}}{\text{\# of outcomes}}$ $\frac{0}{24}$

d) 0 $0 \times 1\text{ million} = 0$ times

$\frac{11}{24} \times \frac{100}{100}$

$11 \times 100 = 24\square$

$\frac{1100}{24} = \frac{24\square}{24}$

$425 = \square$

$425 \div 42$

$\begin{array}{r} 425 \\ 24\overline{)1100} \\ 1040 \\ 60 \\ -48 \\ 12 \end{array}$ 40

$\begin{array}{r} 240 \\ 15 \\ \hline 1200 \\ 240 \\ \hline 1640 \end{array}$

a) _____ b) _____ c) _____ d) _____

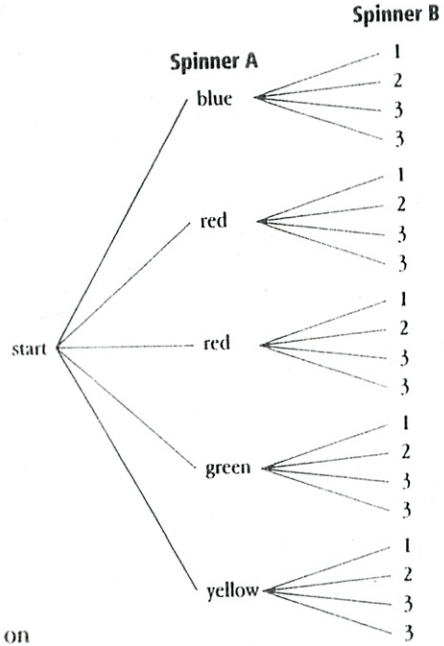
18) $\frac{1}{18}$; David has a $\frac{1}{18}$ chance because 2 breads times 3 meats × 3 cheese is 18 different combos (2×3×3=18)

19) No, ; because not 1 has has a higher chance of happing. It has a $\frac{5}{6}$ chance of getting a not 1. She should make a full tree instead of trying to be lazy.

Name: Michael Plasmeier

Connections

16. Marinda and Isaiah are analyzing a game involving two different spinners. For each turn, a player spins each spinner once. To help them find theoretical probabilities, Marinda and Isaiah made the counting tree at right.



a. Design two spinners that could be the spinners used by Marinda and Isaiah.

b. List all the possible outcomes of spinning each spinner once.

c. Which color/number combination has the greatest probability of occurring?

d. Based on your spinners, what is the probability of getting red on spinner A and 3 on spinner B?

e. Based on your spinners, what is the probability of *not* getting 3 on spinner B?

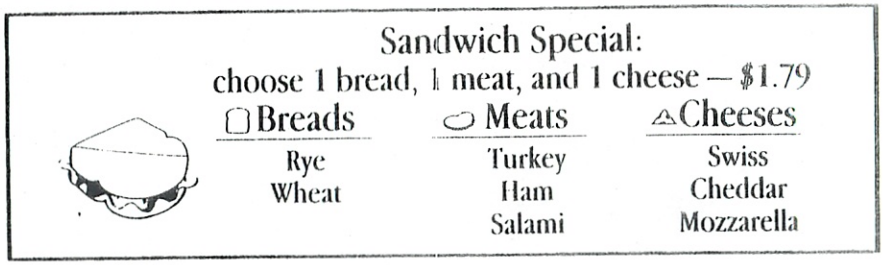
17. a. When you roll two number cubes, what is the probability that the product of the numbers will be a multiple of 5?

b. If you roll two number cubes 100 times, about how many times can you expect the product to be a multiple of 5?

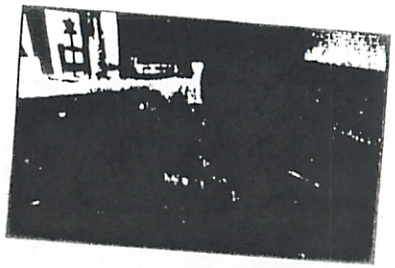
c. What is the probability of rolling a product that is a multiple of 7?

d. If you roll two number cubes a million times, how many times can you expect to get a product that is a multiple of 7?

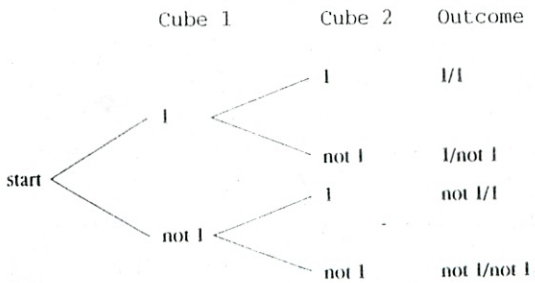
18. David went to Miceli's Deli for lunch. He saw the sign below:



David couldn't decide which kind of sandwich he wanted, so he told the sandwich maker to surprise him. If the sandwich maker chooses the bread, meat, and cheese at random, what is the probability that David will get a turkey sandwich on wheat bread with cheddar cheese? Explain your reasoning.



19. Tricia wants to determine the probability of getting two 1s when two number cubes are rolled. She made a counting tree and used it to list the possible outcomes.



She says that, since there are four possible outcomes, the probability of getting 1 on both number cubes is $\frac{1}{4}$. Is Tricia right? Why or why not?

Name Michael Olsmeier Date

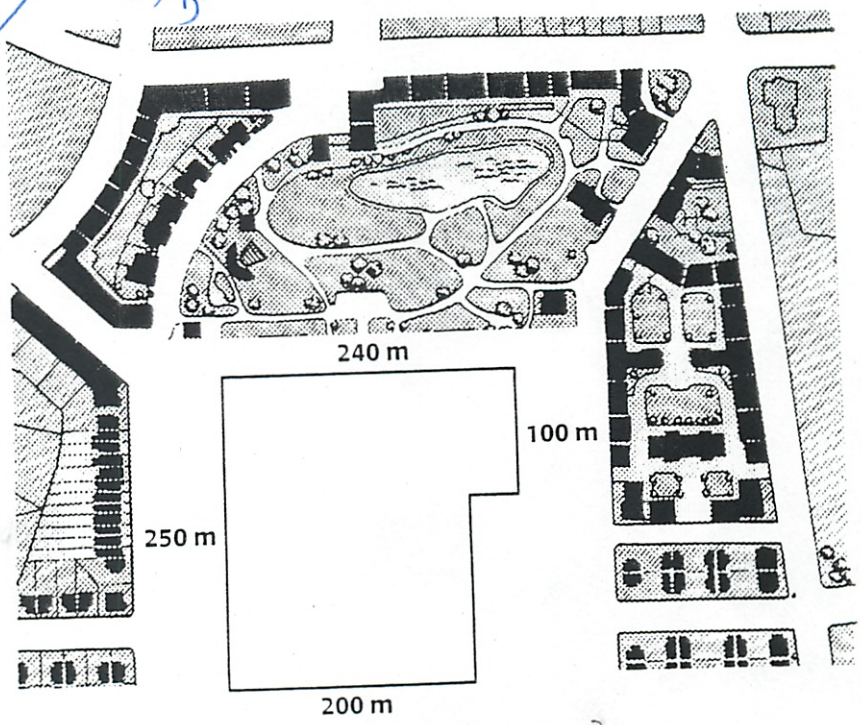
THE NEW NEIGHBORHOOD

100* 50/50

Use additional paper as needed.

In a suburban neighborhood, an old warehouse was condemned and demolished, and now there is new space for housing. The restrictions here are not as severe as in the Parkway/City Center debate. A house on this lot can take up 900 square meters of space, while a town house can take up 600 square meters.

The city planners estimate the population of the new neighborhood to be at least 200 people. On the average, four people can live in each house, while two can live in each town house.



1. Compute the total available area for the new neighborhood. 54000 m^2

2. Find *three* housing plans made up of combinations of houses and town houses *(H, T)* that have areas equal to the total area computed in problem **1.** Prove Area only

3. Plot your housing plans *(H, T)* that you found in problem **2** on a graph. Draw a dividing line for the area constraint. Shade in your graph to show the feasible region that meets this constraint. *Note:* Remember to label the horizontal and vertical axes and the dividing lines of your graph.

4. Find *three* housing plans made up of combinations of houses and town houses *(H, T)* that satisfy the population constraint mentioned above.

5. Plot your housing plans *(H, T)* that you found in problem **4** on the same graph that you made for problem **3.** Draw a new dividing line to show the population constraint. Shade in your graph to show the feasible region that meets this constraint. list 10 points

5b. Find 3 plans for both constraints. Prove.

6. To complicate matters, the government has an ordinance stating that the number of town houses should be no more than three times the number of houses. Which housing plan *(H, T)* would satisfy all three constraints? Plot the housing plans that work on the same graph you made for problem **5.** Shade in your graph to show the feasible region that meets all three constraints. Find 3 plans, prove.

Extra Credit

NOTE: Remember to label the axes and dividing lines of your graph.

Michael Plasmeier p1 1/21

#1 54000 m^2

#2 House 900 m^2
Townhouse 600 m^2
Total 54000 m^2

H = # of houses
T = # of townhouses
[H, T]

$900H + 600T = 54000$

If $H = 0$, then $600T = 54000$
$T = 90$. (0, 90)

If $T = 0$, then $900H = 54000$
$H = 60$ (60, 0)

600 | 54000
90

9 | 54000
60

House → 900 m^2 × 2 → 1800 m^2
Townhouse → 600 m^2 → × 3 → 1800 m^2
2 houses = 3 townhouses

$\frac{\Delta T}{\Delta H}$ $-\frac{3}{2}$ or $\frac{3}{-2}$

[2, -3] or [-2, 3]

[2, -3]
(0, 90)
(2, 87)
(4, 84)
(6, 81)
(8, 78)
(10, 75)
(12, 72)
(14, 69)

p2

(16, 66)
(18, 63)
(20, 60)
(22, 57)
(24, 54)
(26, 51)
(28, 48)
(30, 45)
(32, 42)
(34, 39)
(36, 36)
(38, 33)
(40, 30)
(42, 27)
(44, 24)
(46, 21)
(48, 18)
(50, 15)
(52, 12)
(54, 9)
(56, 6)
(58, 3)
(60, 0)

#2

(H, T)

(24, 54)

Area 21600, 32400 = 54000 m² ✓

(34, 39)

Area 30600, 23400 = 54000 m² ✓

(40, 30)

Area 36000, 18000 m² = 54000 m² ✓

#3 See Graph

#4 House 4 people
Townhouse 2 people
200 people total

$4H + 2T = 200$

If $H = 0$, then $2T = 200$
$T = 100$ (0, 100)

If $T = 0$, then $4H = 200$
$H = 50$ (50, 0)

2 townhouse : 1 house

$\frac{T}{H}$ $\frac{-2}{1}$ or $\frac{2}{-1}$

(1, -2) or (-1, 2)

P3

#4

(0, 100)		(1, 1)
[1, -2] (1, 98)		(4, 92)
(2, 96)	people	16, 184 = 200 people ✓
(3, 94)		
(4, 92)		(7, 86)
(5, 90)	People	(28, 172) = 200 people ✓
(6, 88)		
(7, 86)		(8, 84)
(8, 84)	People	32, 168 = 200 people ✓
(9, 82)		
(10, 80)		

#5 See Graph

#6 (1-1, 1)
(42, 22)

Area 37800, 13200 = 50000 m² ✓
People 168, 44 = 212 people ✓
= ✓

(20, 60)

Area 18000, 3600 = 54000 m² ✓
People 80, 120 = 200 people ✓
= ✓

p4

(H,T)

(52,12)

Area 46800, 7200 = 53000 m² ✓

People 208, 24 = 232 people ✓

= ✓

#6 H of Townhouses is not more than 3x # of houses

$T \leq 3H$

1 townhouse = 3 house

(+3, +1)

(3,1)
(6,2)
(9,3)
(12,4)
(15,5)

52, 12

12 not more than

Graph 2 which one fits 3 constraints exactly

#6

(H,T)

(52,12)

Area 46800, 7200 = 53000 m² ✓

People 208, 24 = 232 people ✓

$T \leq 3H$ $12 \leq (52 \times 3)$ ✓

156 = ✓

(50,10)

Area 45000, 6000 = 51000 m² ✓

People 200, 20 = 220 people ✓

$T \leq 3H$ $10 \leq (50 \times 3)$ ✓

156 ✓

p5

(H, t)

(54, 2)

$\times 3$ 4 $\times 9$ 486

54 $\times 9$ 2

Area 48600, 1200 = 49800 m^2 ✓

People 216, 4 = 220 people ✓

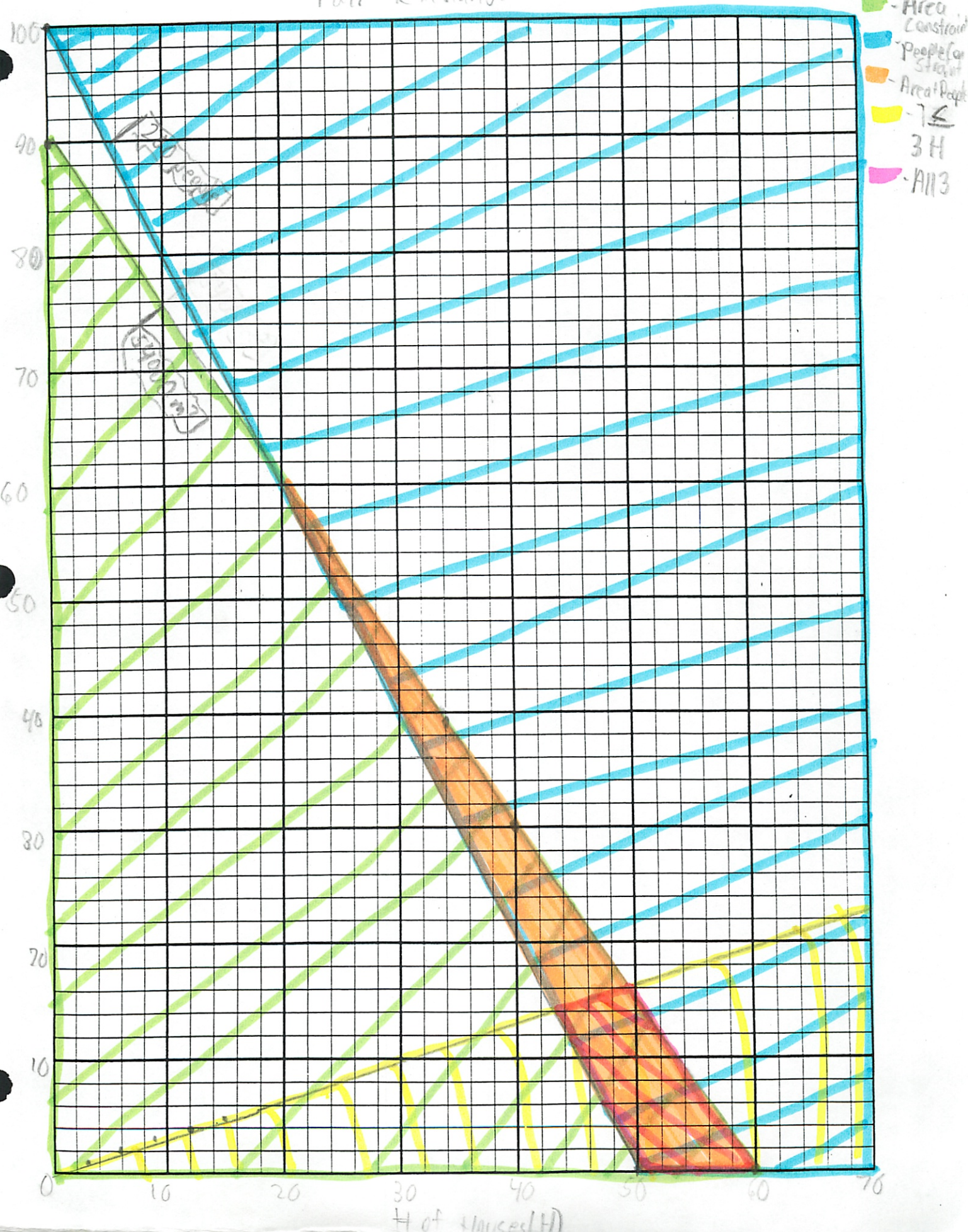
$t \leq 3H$ $2 \leq (54 \times 3)$ ✓

126

✓

Michael Plasmeier

Fair Exchange



Math

Terra Nova

Review

TerraNova

Practice Test

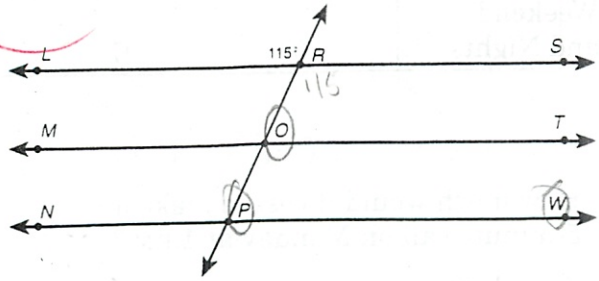
Michael Plasmeier

Part 1 Mixed Problems

Sort-Of Explain

Choose the correct answer for each problem.

1. If the three horizontal lines are parallel, what is the measure of $\angle OPW$?



Ⓐ 85°
Ⓑ 50°
Ⓒ 65°
Ⓓ 30°

2. A rectangular swimming pool has a length of 25 feet and a width of 15 feet. The swimming pool cover must have a 1-foot overhang on each side of the pool. What is the area of the pool cover?

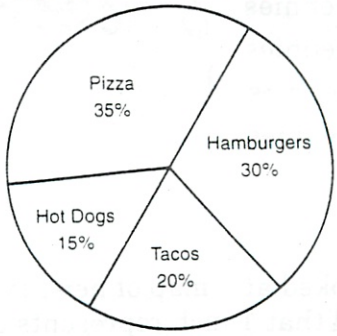
Ⓐ 375 ft^2
Ⓑ 379 ft^2
Ⓒ 459 ft^2
Ⓓ 416 ft^2

3. What will 457,429 be when it is rounded to the nearest thousand?

Ⓐ 458,000
Ⓑ 457,400
Ⓒ 457,000
Ⓓ 457,500

The following circle graph contains information about 200 students' favorite fast foods. Use the graph to answer questions 4 through 6.

FAVORITE FAST FOODS



4. How many students prefer pizza?

Ⓐ 35
Ⓑ 70
Ⓒ 17
Ⓓ 20

5. How many more students prefer hamburgers than hot dogs?

Ⓐ 15
Ⓑ 45
Ⓒ 30
Ⓓ 2

6. What fraction of the students prefer tacos?

Ⓐ $\frac{1}{25}$
Ⓑ $\frac{1}{10}$
Ⓒ $\frac{1}{20}$
Ⓓ $\frac{1}{5}$

Go on to next page

7. Jake puts pennies into a jar each morning and lets his brother take half of the pennies out each evening. Jake put 10 pennies into the empty jar on Monday morning. On Tuesday he put in 15 pennies. On Wednesday he put in 12 pennies. How many pennies are in the jar on Thursday morning before Jake puts his pennies in?

Ⓐ 37 pennies
Ⓑ 18 pennies
Ⓒ 11 pennies
Ⓓ 19 pennies

8. Paula looked at a map of her city. The map indicated that 1 inch represents 3 miles. Paula's home and City Hall are $2\frac{1}{3}$ inches apart on the map. What is the distance between her home and City Hall?

Ⓐ $6\frac{1}{2}$ miles
Ⓑ 7 miles
Ⓒ 14 miles
Ⓓ $5\frac{1}{3}$ miles

9. Which of the following is true about a right angle?

Ⓐ It measures less than 90°.
Ⓑ It measures exactly 90°.
Ⓒ It measures more than 90°.
Ⓓ It is an obtuse angle.

10. Jack has half as much money as Cliff. Cliff has $6.00 more than Tim, and Tim has $10.00. How much money does Jack have?

Ⓐ $ 3.00
Ⓑ $ 8.00
Ⓒ $ 6.00
Ⓓ $10.00

Work Backwards

The long-distance telephone rates between two cities are given in the chart below. Use the information in the chart to answer questions 11 through 13.

Time	First Minute	Each Additional Minute
Weekday	.20	.14
Evening	.15	.11
Weekend and Nights	.10	.07

11. How much would it cost to make a 5-minute call on Monday at 1 P.M.?

Ⓐ $1.00
Ⓑ $0.70
Ⓒ $0.56
Ⓓ $0.76

12. How much more would it cost to make an 11-minute call in the evening than on the weekend?

Ⓐ $0.44
Ⓑ $0.10
Ⓒ $0.45
Ⓓ $0.55

13. What fraction of the weekday rate is the weekend rate?

Ⓐ $\frac{1}{5}$
Ⓑ $\frac{1}{4}$
Ⓒ $\frac{1}{3}$
Ⓓ $\frac{1}{2}$

Go on to next page

14. On Monday the average temperature was 7°C. On Tuesday it was 0°C. On Wednesday it was 1°C. On Thursday it was -4°C, and on Friday it was 4°C. Between which two days was there the greatest temperature change?

Ⓐ Thursday and Friday
Ⓑ Wednesday and Thursday
Ⓒ Tuesday and Wednesday
Ⓓ Monday and Tuesday

Do 90% 1st then do 10%

15. Which of these is another way to write 500,000,000 + 9,000,000 + 2,000 + 8?

Ⓐ 59,002,008
Ⓑ 509,200,008
Ⓒ 59,200,800
Ⓓ 509,002,008

509,002,008

16. Which of these statements is true about the number that will replace the box?

$$7.586 \div 100 = \square$$

Ⓐ The number is less than 74.
Ⓑ The number is exactly 74.
Ⓒ The number is between 74 and 75.
Ⓓ The number is more than 75.

75.86

17. The Austin family of four went to dinner at Bailey's Steakhouse. The bill, before taxes, came to $59.80. Mr. Austin had a 10% discount coupon. After the discount was deducted, the meal tax of 6% was added. What was the cost of the dinner?

Ⓐ $53.82
Ⓑ $63.39
Ⓒ $57.05
Ⓓ $61.58

59.80
- 2.39
57.41

3 3
59.80
x .04 ← Do 90% instead
2.392 0

Check

Tax after discount have to do 2
* first -10% then +6% - not -4%

18. Sara's scores on three math tests are 83, 86, and 86. If on her next math test she scores between 95 and 100, what will her average score be?

Ⓐ less than 85
Ⓑ 85
Ⓒ between 85 and 90
Ⓓ between 90 and 95

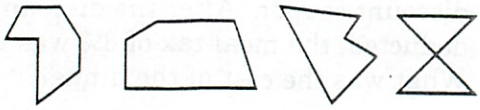
83
86
86
95
350

87
4|350 30

19. Lien has a bookshelf that is 36 inches long. She has 12 books of the same size that she wants to put on this shelf. What information is needed to determine if the books will fit on the shelf?

Ⓐ the number of pages in each book
Ⓑ the weight of each book
Ⓒ the thickness of each book
Ⓓ the age of each book

20. Which of these figures has no sides that appear to be parallel?



Ⓐ Ⓑ Ⓒ Ⓓ

21. What fraction is missing from the number pattern?

$$2, \frac{7}{4}, \frac{3}{2}, \_\_, 1, \frac{3}{4}$$

Ⓐ $\frac{4}{3}$

Ⓑ $\frac{5}{4}$

Ⓒ $\frac{2}{2}$

Ⓓ $\frac{11}{8}$

$\frac{6}{4}$ $\frac{5}{4}$ $\frac{1}{4}$

Rule

22. Abena read $\frac{1}{4}$ of her book on Monday, $\frac{3}{8}$ of her book on Wednesday, and $\frac{1}{12}$ of her book on Friday, and she finished the book on Saturday. On which day did Abena read the most of her book?

Ⓐ Monday

Ⓑ Wednesday

Ⓒ Friday

Ⓓ Saturday

$\frac{2}{8} + \frac{3}{8} + \frac{1}{12}$

Check

23. It takes 25 minutes to bake a batch of brownies. Kelly can bake only one batch at a time. How many batches can she bake in 3 hours?

Ⓐ 5

Ⓑ 6

Ⓒ 7

Ⓓ 8

6

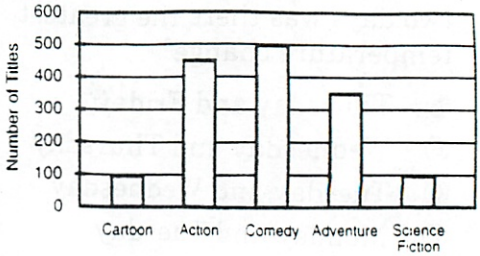
3h

180

25
25
25
25
25
125

180
125
45
25
20

The following bar graph represents the quantity of each type of movie in a video store. Use the graph to answer questions 24 through 26.



24. Which types of movies contain the same number of titles?

Ⓐ cartoon and action

Ⓑ action and comedy

Ⓒ action and adventure

Ⓓ cartoon and science fiction

25. How many more action movies are there than cartoons?

Ⓐ 350

Ⓑ 400

Ⓒ 250

Ⓓ 450

450
100

26. Each movie rents for $2.50 per night. If Ellen rents 2 action movies and 1 comedy for 2 nights, how much would it cost?

Ⓐ $ 2.50

Ⓑ $ 7.50

Ⓒ $10.00

Ⓓ $15.00

3 x 2 = 6 nights

2.50
× 6
15.00

Go to Netflex to save

Go on to next page

27. Asa has exactly 5 coins. Which of the following could **not** be correct?

Ⓐ Asa has $1.25.
Ⓑ Asa has $0.35.
Ⓒ Asa has $0.21.
Ⓓ Asa has $0.08.

DDNNN

N

QQQQQ

I see

28. Which decimal is another way to write fifteen and four tenths?

Ⓐ 15.04
Ⓑ 15.4
Ⓒ 1.54
Ⓓ 15.004

29. Mai's calculator is not working correctly. Each time she enters in a number, the calculator automatically changes it to another number. Below are some examples of the numbers Mai entered and the numbers the calculator changed them into. Which of the following rules best describes what the calculator is doing to the numbers?

Mai's Entries	Calculator Numbers
25	2.5
50	5
-20	-2
-10	-1

÷10

Ⓐ dividing by 2
Ⓑ subtracting half the number
Ⓒ dividing by 10
Ⓓ multiplying by 10

30. Carlos had some baseball cards. He gave 5 to Tony. Now Carlos has 23 baseball cards. Which of the following equations could represent this information?

Ⓐ $23 - n = 5$
Ⓑ $5 - n = 23$
Ⓒ $n + 5 = 23$
Ⓓ $n - 5 = 23$

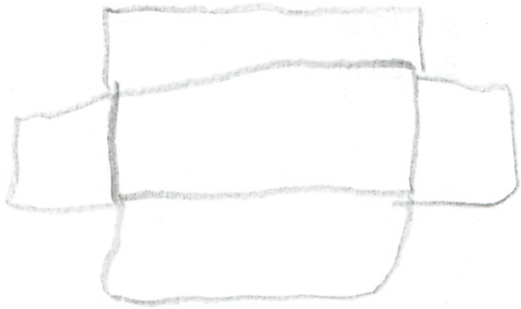
31. Seniors at Minot High School have the opportunity to travel to Ireland. At last count 68% of the 450 seniors are going on the trip this year. How many students are going?

Ⓐ 412
Ⓑ 144
Ⓒ 306
Ⓓ 298

3
450
.68
3600
27000
306.00

32. A shoe box without a lid is taken apart by cutting along each of its edges. What shapes do you get?

Ⓐ 6 squares
Ⓑ 5 triangles
Ⓒ 5 rectangles
Ⓓ 6 rectangles



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33. What is the circumference of a circle that has a diameter of 18 cm? ($\pi = 3.14$)

Ⓐ 21.14 cm^2
Ⓑ 56.52 cm
Ⓒ 254.34 cm^2
Ⓓ 28.27 cm

Circumference (C)
Radius (r)
Diameter (d)

$\frac{C}{d} = \pi$
$C = \pi \times d$
$C = 3.14 \times 18$ cm
$C = 56.52$
$\frac{C}{d} = \frac{\pi}{1}$

I just guessed

34. Mando has 10 pencils in his book bag. Three are blue, 4 are red, 2 are green, and 1 is yellow. If Mando selects a pencil from his book bag without looking, what is the probability he will **not** select a red pencil?

Ⓐ $\frac{3}{5}$
Ⓑ $\frac{2}{5}$
Ⓒ $\frac{4}{5}$
Ⓓ $\frac{1}{5}$

3B
4R
2G
1Y

$\frac{6}{10} \rightarrow \frac{3}{5}$

35. A rectangle has a perimeter of 30 m. The length is 10 m. What is the width?

Ⓐ 5 m
Ⓑ 10 m
Ⓒ 15 m
Ⓓ 20 m

10
5 30 5
10

36. Which of these statements about measures is correct?

Ⓐ It is about 200 miles from New York to Los Angeles.
Ⓑ It is about 50 yards from the floor to the ceiling in a classroom.
Ⓒ A regular hot dog is about 3 feet long.
Ⓓ A slice of sandwich bread is about $\frac{3}{8}$ to $\frac{5}{8}$ inch thick.

37. Which of these is another way to write 4.27×10^5?

Ⓐ .0427
Ⓑ 42,700
Ⓒ 4,270
Ⓓ 427,000

Large → right
Small → left

Go over
4.27

38. The same number can replace each box to make the number sentence true. What is the number?

$2 \times (\square \times \square) = 6 \times \square$

3 3 3

Ⓐ 2
Ⓑ 3
Ⓒ 5
Ⓓ 8

18 18

Go on to next page

39. Rolf divided up his compact disc collection. He gave $\frac{1}{3}$ of the discs to Aileen, 5 discs to Tom, 7 discs to Jill, and kept 4 discs for himself. How many discs were in Rolf's collection to begin with?

Ⓐ 16
Ⓑ 20
Ⓒ 24
Ⓓ 30

5
7
4
16 × 2 = 32

= $\frac{2}{3}$ of discs

40. Which of these numbers is both a multiple of 4 and a factor of 40?

Ⓐ 12
Ⓑ 10
Ⓒ 20
Ⓓ 2

not a x of 4

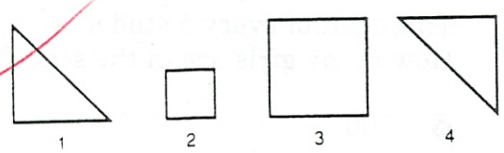
x	4, 8, 12, 16, etc.
fac	1 2 4 10 20 40 etc.

factor multiple
4 × 5 = 20

Go over

41. Which two figures are congruent?

isn't that equal



Ⓐ figures 1 and 3
Ⓑ figures 2 and 3
Ⓒ figures 1 and 4
Ⓓ figures 3 and 4

Go over

Same size + shape

42. Larry wants to buy his sister a birthday present. He saved $15 from his job at the shoe store, and his mother gave him $10 more. Larry's sister would like a red sweater that costs $40 but is on sale at a 25% discount. Using the information in this problem, which question can **not** be answered?

Ⓐ How much money does Larry have?
Ⓑ What is the sale price of the sweater?
Ⓒ How much money does Larry make per hour at the shoe store?
Ⓓ How much more money does Larry need to buy the sweater?

25
$30

43. Which of these is another way to write 5 hours 42 minutes?

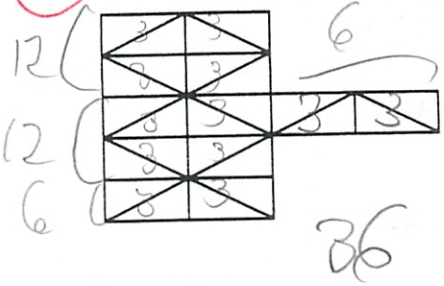
Ⓐ $5\frac{3}{4}$ hours
Ⓑ 5.8 hours
Ⓒ 20,520 seconds
Ⓓ 340 minutes

$\frac{42}{60} \to \frac{21}{30}$

60
5
300
42

342 min
60
20520

44. If the area of the smaller figure is $1\frac{1}{2}$ feet^2, what is the area of the larger figure?



Ⓐ 26 ft^2
Ⓑ 12 ft^2
Ⓒ 36 ft^2
Ⓓ 24 ft^2

Go on to next page

45. Juanita spends 4 quarters and 2 dimes for lunch; pays 3 nickels and 3 pennies in library fines; and has 1 quarter, 1 dime, and 2 nickels left. How much money did she have to start with?

Ⓐ $1.38
Ⓑ $0.45
Ⓒ $1.83
Ⓓ $0.93

1.20
.18
.45
1.83

46. Which of these groups represents three ways to write $\frac{4}{20}$?

Ⓐ $\frac{2}{10}, \frac{40}{200}, 0.25$
Ⓑ $\frac{20}{100}, 0.20, \frac{1}{5}$
Ⓒ $0.30, \frac{400}{2,000}, \frac{6}{30}$
Ⓓ $\frac{3}{15}, 0.2, \frac{9}{50}$

$\frac{1}{5}$ $\frac{2}{10}$ $\frac{20}{100}$

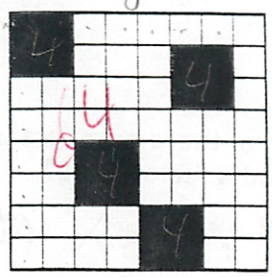
47. Which of these expresses $6 \times 6 \times 6 \times 6$ in exponential notation?

Ⓐ 4^6
Ⓑ 6×4
Ⓒ 6^4
Ⓓ $6^2 + 6^2$

48. The numbers 2, 4, 10, and 20 fall into which category of numbers?

Ⓐ multiples of 10
Ⓑ factors of 100
Ⓒ prime numbers
Ⓓ composite numbers

49. What percent of the figure is shaded?



Ⓐ 25%
Ⓑ 30%
Ⓒ 16%
Ⓓ $33\frac{1}{3}$%

$\frac{16}{64} \rightarrow \frac{2}{32}$

$\frac{4}{16}$ $\frac{2}{8}$

$\frac{1}{4}$

25%

50. In Siko's school, there are 500 students. Three out of every 5 students are girls. How many girls are in the school?

Ⓐ 300
Ⓑ 200
Ⓒ 350
Ⓓ 150

STOP

29/30 ★

Michael Plasmeier

1. 7 inches
2. $\frac{5}{4}$
3. 306 seniors
4. 24 ticks
5. Wensday
6. 11 pennies
7. 1/4 25% · suppose to be percent ! Duh!
8. 300 students
9. 6-20
10. $57.05
11. 56.52 cm
12. 459 ft
13. 8
14. 427,000
15. 5 meters

Remember to lable answer

Quiz -- PreTest
Be sure to show work

Name: Michael Plasmeier

1. Paula looked at a map of her city. The map indicated that 1 inch represents 3 miles. Paula's home and City Hall are $2\frac{1}{3}$ inches apart on the map. What is the distance between her home and City Hall?

$2 \times 3 = 6$
$\frac{1}{3} \times 3 = 1$
7 inches

2. What fraction is missing from the number pattern?

$2, \frac{7}{4}, \frac{3}{2}, \_\_\_, 1, \frac{3}{4}$

Rule $-\frac{1}{4}$

$2 \to \frac{8}{4}$
$7 \to \frac{7}{4}$
$\frac{3}{2} \to \frac{6}{4}$
$\frac{5}{4}$
$1 \to \frac{4}{4}$
$3 \to \frac{3}{4}$

3. Seniors at Minot High School have the opportunity to travel to Ireland. At last count 68% of the 450 seniors are going on the trip this year. How many students are going?

450 seniors
.68 percent
= 3600 seniors
+ 27000 seniors
30600 seniors
306 seniors

4. Rolf divided up his compact disc collection. He gave $\frac{1}{3}$ of the discs to Aileen, 5 discs to Tom, 7 discs to Jill, and kept 4 discs for himself. How many discs were in Rolf's collection to begin with?

5
+ 7
+ 4
16 = $\frac{2}{3}$ of collection
$16 \div 2 = 8 = \frac{1}{3}$ of collection

5
+ 7
+ 4
+ 8
24 discs

5. Abena read $\frac{1}{4}$ of her book on Monday, $\frac{3}{8}$ of her book on Wednesday, and $\frac{1}{12}$ of her book on Friday, and she finished the book on Saturday. On which day did Abena read the most of her book?

Wednesday

$\frac{1}{4} \to .25$
$\frac{3}{8} \to .375$ Biggest
$\frac{1}{12} \to .0825$
? $\to .2925$

.7075
1.0000
-0.7075
.2925

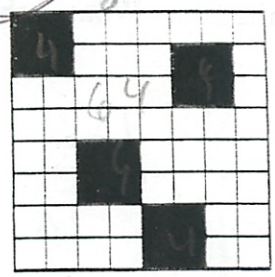
125
-3
375

6. Jake puts pennies into a jar each morning and lets his brother take half of the pennies out each evening. Jake put 10 pennies into the empty jar on Monday morning. On Tuesday he put in 15 pennies. On Wednesday he put in 12 pennies. How many pennies are in the jar on Thursday morning before Jake puts his pennies in?

In 10
Out -5
At night 5
Tue + 15
20
- 10
10

+12
22
-11
11 pennies

7. What percent of the figure is shaded?



$\frac{4+4+4+4}{8\times8} \to \frac{16}{64} \to \frac{8}{32} \to \frac{4}{16} \to \frac{1}{4}$

10. The Austin family of four went to dinner at Bailey's Steakhouse. The bill, before taxes, came to $59.80. Mr. Austin had a 10% discount coupon. After the discount was deducted, the meal tax of 6% was added. What was the cost of the dinner?

59.80
− 10%
or 59.80
+ .9
53.820
53.82

+ 6%
or 53.82
× 1.06
32292
538200
57.0492
$57.05

8. In Siko's school, there are 500 students. Three out of every 5 students are girls. How many girls are in the school?

$\frac{3 \text{ girls}}{5 \text{ total}}$ × ? 300 students
× ? 500
3

11. What is the circumference of a circle that has a diameter of 18 cm? (π = 3.14)

$\frac{C}{d} \times \frac{\pi}{1}$

$C \times 1 = d \times \pi$

$C = 18\text{cm} \times 3.14$

$C = 56.52\text{cm}$

3.14
× 18
2512
3140
56.52

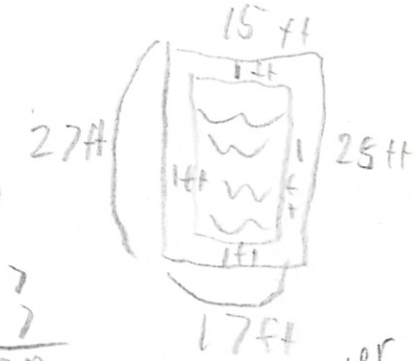
9. Which of these numbers is both a multiple of 4 and a factor of 40?

Ⓐ 12
Ⓑ 10
Ⓒ 20
Ⓓ 2

M	4	8	12	16	20	24
F	1	2	4	8	20	40

and on

12. A rectangular swimming pool has a length of 25 feet and a width of 15 feet. The swimming pool cover must have a 1-foot overhang on each side of the pool. What is the area of the pool cover?



l × w = a
27 × 17 = a
27 × 17 = 459
459 ft

27
17
189
270
459

over

13. Jack has half as much money as Cliff. Cliff has \$6.00 more than Tim, and Tim has \$10.00. How much money does Jack have?

Tim | \$10
Cliff | T + 6 = 10 + 6 = \$16
Jack | C × $\frac{1}{2}$ = 16 × $\frac{1}{2}$ = \$8

15. A rectangle has a perimeter of 30 m. The length is 10 m. What is the width?

l = 10 m
5 m | P = 30 | 5 m
l = 10 m

30
−10
−10
10 for sides / 2 = 5 for each side

5 meter

14. ~~Which of these is another way to~~ How do you write 4.27×10^5?

10^5 → 5 to the right

4.27000
1 2 3 4 5

427000

Computation: Integers (+ − × ÷)

The term *integers* describes the full set of positive and negative whole numbers and zero.

Math Need-to-Knows:

Test Tip!

+ move in a *positive* direction (right)

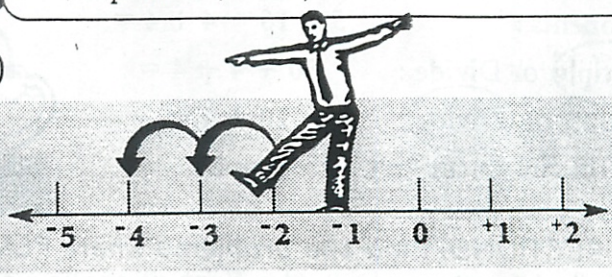
− move in a *negative* direction (left)

When *no sign* is shown, the integer is *positive* (3 = ⁺3)

A

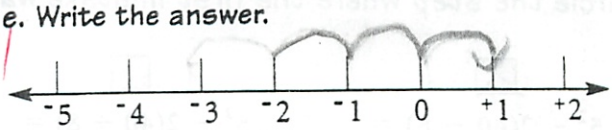
To ADD AND SUBTRACT INTEGERS, pretend you are a little person walking up or down a number line. (Don't laugh! This works!)

⁻1	−	3	=	-4
where to start	what direction to move	how many spaces to move		where you end up

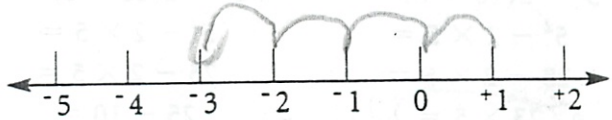


DIRECTIONS: Show the problem on the number line. Write the answer.

1. ⁻2 (where to start) + (what direction to move) 3 (how many spaces to move) = 1 (where you end up) Answer all Q's



2. 1 − 4 = -3



So what if you do not have a number line. Just imagine it!

3. ⁻4 (where to start) + (what direction to move) 3 (how many spaces to move) = -1 (where you end up)

4. 2 − 6 = -4

5. 1 − 6 = -5

B

To MULTIPLY AND DIVIDE INTEGERS, use the rules in the box to decide if the answer will be positive or negative. Then multiply or divide as usual.

DIRECTIONS: Circle to tell about each problem and solve.

RULES

Signs match ⇨ Positive answer
⁻30 ÷ ⁻6 = 5

Signs don't match ⇨ Negative answer
⁻30 ÷ 6 = ⁻5

PROBLEM	SIGNS MATCH?		ANSWER WILL BE		ANSWER
1. ⁻6 × ⁻3 =	Yes	No	Positive	Negative	18
2. ⁻27 ÷ 3 =	Yes	No	Positive	Negative	-9
3. ⁻72 ÷ ⁻8 =	Yes	No	Positive	Negative	9

Practice Test: Fill in the circle of each correct answer.

1 ⁻3 − 5 =
- A ⁻2
- B 2
- C ⁻8
- D ⁻11
- E Not Shown

2 ⁻6 + 14 =
- F ⁻8
- G 8
- H 20
- J ⁻20
- K Not Shown

3 ⁻24 × 3 =
- A 8
- B ⁻8
- C 72
- D ⁻72
- E Not Shown

4 ⁻6 ÷ ⁻1 =
- F ⁻1
- G 6
- H ⁻6
- J ⁻7
- K Not Shown

1. (A)(B)(C)(D)(E) 2. (F)(G)(H)(J)(K) 3. (A)(B)(C)(D)(E) 4. (F)(G)(H)(J)(K)

Computation: Order of Operations

Just because an equation has more than one step doesn't mean it's hard. Use PEMDAS. Do *one step at a time.*

Like this: $5 \times (12 + 4) \div 2^2 + 4 =$

Parentheses : $5 \times 16 \div 2^2 + 4 =$

Exponents : $5 \times 16 \div 4 + 4 =$

Multiply or Divide : $80 \div 4 + 4 =$

Multiply or Divide: $20 + 4 =$

Add or Subtract : $= 24$

Learn PEMDAS! **Test Tip!**

Solve each equation in steps.

Use this helper:

- **P** Parentheses/ Brackets
- **E** Exponents
- In order from left to right: **M** Multiplication, **D** Division
- In order from left to right: **A** Addition, **S** Subtraction

A

DIRECTIONS: Find the problems where PEMDAS is used incorrectly. Mark an X in the box. Circle the step where the first mistake was made.

1. ☒

$5^2 - 2(40 \div 8) =$
$5^2 - 2 \times 5 =$
$25 - 2 \times 5 =$
$23 \times 5 =$
$= 115$

Did − 1st

☐

$5^2 - 2(40 \div 8) =$
$5^2 - 2 \times 5 =$
$25 - 2 \times 5 =$
$25 - 10 =$
$= 15$

2. ☐

$(12 \div 2)^2 + 2 \times 5 - 4 =$
$6^2 + 2 \times 5 - 4 =$
$36 + 2 \times 5 - 4 =$
$36 + 10 - 4 =$
$46 - 4 =$
$= 42$

They did power 1st

☒

$(12 \div 2)^2 + 2 \times 5 - 4 =$
$12 \div 4 + 2 \times 5 - 4 =$
$3 + 2 \times 5 - 4 =$
$5 \times 5 - 4 =$
$5 \times 1 =$
$= 5$

B

DIRECTIONS: Use PEMDAS to solve each problem. Show your work.

1 P E M D A S

$-3(-3 - 6) =$

-3×-9

27

2 P E M D A S

$-2(4\frac{3}{4} - 1\frac{1}{4}) =$

$-2 \times 3\frac{1}{2} =$

$-2 \times 3.5 =$

-7

3 P E M D A S

$(12 \times 3) - (16 - 2) \div 7 =$

$36 - 14 \div 7 =$

$36 - 2 =$

34

4 P E M D A S

$(4 - 8 \times 3) + 6^2 \div 2 =$

$(4 - 24) + 6^2 \div 2 =$

$-20 + 6^2 \div 2 =$

$-20 + 36 \div 2 =$

$-20 + 18 =$

-2

5 P E M D A S

$6 \times 5 + (12 - 4) \div 8 =$

$6 \times 5 + 8 \div 8 =$

$30 + 1 =$

31

6 P E M D A S

$10 \times 2 \div (3 \times 2 + 4) - 1^2 =$

$10 \times 2 \div (6 + 4) - 1^2 =$

$10 \times 2 \div 10 - 1^2 =$

$10 \times 2 \div 10 - 1 =$

$2 - 1 =$

1

Practice Test: Fill in the circle of each correct answer.

1 $-11 + (5^2 \div 5) =$

A -13 D 8
B -9 E NH
C -6

$-11 + (25 \div 5)$
$-11 + 5$
-6

2 $3(6^2 - 35) + \frac{(5 + 1)}{2} =$

F $72\frac{1}{2}$ J 71
G 5 K NH
H $28\frac{1}{2}$

3 $-3(-3 - 3) - 3 =$

A -12 D 15
B 24 E NH
C 6

1. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ 2. Ⓕ Ⓖ Ⓗ Ⓙ Ⓚ 3. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

Computation: Percents

To compute with percents, change the percent to a decimal.

20% = .20 *or* .2, <u>not</u> .02

45% = .45 100% = 1 6% = .06

When dealing with percents, the word "*of*" means multiply.

25% of 80 means:

$\boxed{.25} \times \boxed{80} = \boxed{20}$

↑ what percent ↑ of ↑ original amount ↑ percentage

Test Tip! *Use Common Sense!*

Sometimes you can use common sense to eliminate answer choices that cannot be correct.

If 50% is half, then:

- ☑ 25% is half of half.
- ☑ 40% is less than half.

A DIRECTIONS: Tell what each percent problem means. Then compute to find the answer.

1. 75% of 60

$\boxed{.75} \times \boxed{60} = \boxed{45}$

2. 150% of 48

$\boxed{1.5} \times \boxed{48} = \boxed{72}$

3. 10% of 360

$\boxed{.1} \times \boxed{360} = \boxed{36}$

4. 4% of 25

$\boxed{.04} \times \boxed{25} = \boxed{1}$

B DIRECTIONS: Try this shortcut. You can find 10% of any number quickly! Just move the decimal one place to the left. Now, try it. Write the answers.

1 10% of 550	2 10% of 80	3 10% of 63
4 Hint: 30% is 3 × 10%. 30% of 60	5 Hint: 5% is half of 10%. 5% of 60	6 Now try this! 35% of 60
7 60% of 50	8 140% of 80	9 25% of 110

Practice Test: Fill in the circle of each correct answer. Mark *NG* for *Not Given*.

1 75% of 200
A 50 D 125
B 75 E NG
C 150

2 30% of 20
F 3 J 50
G 6 K NG
H 13

3 15% of 600
A 75 D 160
B 90 E NG
C 115

4 40% of 40
F 4 J 16
G 10 K NG
H 12

5 20% of 200
A 12 D 80
B 20 E NG
C 40

6 60% of 6.8
F .68 J 12.8
G 4.08 K NG
H 6.2

Think!

1. A B C D E 3. A B C D E 5. A B C D E
2. F G H J K 4. F G H J K 6. F G H J K