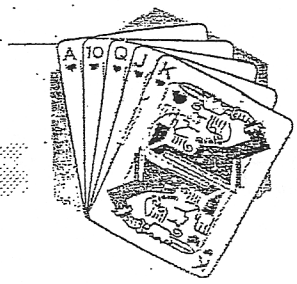


You can use a calculator anywhere on this.

Name Answer Key

Date _____

Period _____

Probability Take Home and Check

Problems are leveled: A = basic B = moderate C= challenging

1) What is the sample space when 2 coins are tossed? (A)

1) 1st event: coin 1 — T, H; 2nd event: coin 2 — T, H

Sample Space

T,T T,H H,T H,H

2) At Kennedy Middle School, 3 out of 5 students make the honor roll. What is the probability that a student does not make the honor roll? Give your answer as a fraction, decimal and percent. (A)

2) Since $\frac{3}{5}$ make the honor roll, $\frac{2}{5}$ do not make it.

$\frac{2}{5} = .4 = 40\%$

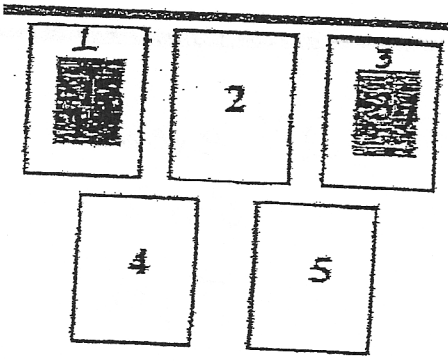
3) A large basket of fruit contains 3 oranges, 2 apples and 5 bananas. If a piece of fruit is chosen at random, what is the probability of getting an orange or a banana? Give your answer as a fraction, decimal and percent. (A)

3) $\frac{8}{10} = \frac{4}{5} = .8 = 80\%$

You do not multiply them together because it is not 2 different events.

A pair of dice is rolled. What is the probability of getting a sum of 2? Give your answer as a fraction, decimal and percent.

④ $\frac{1}{36} = .0278 = 2.78\%$



A card from above is drawn at random. Write the probabilities as fractions and percents.

a) P(1)
b) P(6)
c) P(shaded)
d) P(not shaded)
e) P(<8)
f) P(odd)
g) P(divisible by 2)

Then make a line of probability and put a-g on the line.

⑤ a) $\frac{1}{5} = .2 = 20\%$

b) 0

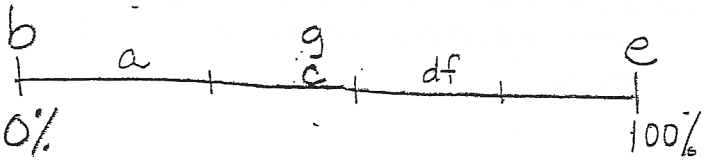
c) $\frac{2}{5} = .4 = 40\%$

d) $\frac{3}{5} = .6 = 60\%$

e) $\frac{5}{5} = 1 = 100\%$

f) $\frac{3}{5} = .6 = 60\%$

g) $\frac{2}{5} = .4 = 40\%$



Which best describes a sample space?

An event
A number of unsuccessful outcomes
A set of all possible outcomes of an event
A set of successful outcomes

⑥ C

7) (B) When traveling from Midland to Houston, a tourist plans to make stops at Austin and San Antonio. There are 2 scenic routes from Midland to Austin. There are 4 scenic routes from Austin to San Antonio, and 2 scenic routes from San Antonio to Houston. How many different scenic routes can the tourist take? Show the work!

(7) M → A, A → SA, SA → H

$2 \cdot 4 \cdot 2 = 16$ scenic routes

8) (A) A coin purse contains 3 pennies, a nickel, 3 dimes and 2 quarters. If the first coin is not replaced before the second coin is drawn, what is the probability that the first coin is a dime and the second coin is a quarter?

(8)

$\frac{3}{9} \cdot \frac{2}{8}$

reduce $\frac{\cancel{3}^{1}}{\cancel{9}_{3}} \cdot \frac{\cancel{2}^{1}}{\cancel{8}_{4}} = \frac{1}{12} = 0.0833 = 8.33\%$

9) (A) Mr. Potato Head makes chairs. He uses leather, corduroy, vinyl or plastic for the upholstery. The frames are made of oak, maple or ash.

a) How many choices does a customer have?

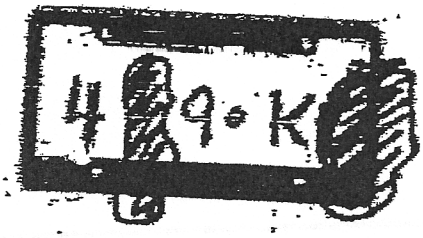
b) What is the probability that a choice is oak with leather upholstery?

(9)

a) $4 \cdot 3 = \boxed{12}$

b) $\frac{1}{3} \cdot \frac{1}{4} = \boxed{\frac{1}{12}}$

10) A witness observed the license plate of a speeding car leaving the scene of an accident. One of the three digits and two of the three letters on the license plate were covered with mud. You know that the three digits are followed by three letters on all license plates. What is the greatest number of license plates that you would have to check to find the owner of the car?



(10)

4 · ___ 9 · K · ___ · ___

0 1 2 3 4 5 6 7 8 9 → 10

A → Z → 26

A → Z → 26

$10 \cdot 26 \cdot 26 =$

6760 license plates

Which word should go in the blank: Sometimes, always or never?

) The probability of an event that may occur is never expressed as a whole number.

) The experimental probability of an event is Sometimes the same as the theoretical or mathematical probability of an event. In an experiment, all possible outcomes are Sometimes equally likely.

(11)

a) never (it is always a fraction/ decimal/ percent between 0 - 1)

b) sometimes

c) sometimes

12) A school found that 9 out of 10 students like pizza. If three students are chosen at random with replacement, what is the probability that all three students like pizza?

(B)

1st Student 2nd student 3rd Studen

(12) $\frac{9}{10} \cdot \frac{9}{10} \cdot \frac{9}{10} =$

$\frac{729}{1000} = 0.729$ or 72.9%

13) A multiple choice test has 3 questions. Each question is answered with an a, b, c or d. How many outcomes are possible?

(B)

(13) Quest 1 Quest 2 Quest 3

$4 \cdot 4 \cdot 4 =$ 64 ways

14) If a school offers 9 different subjects, how many different schedules of 5 classes are possible? A student can have one subject only once.

(C)

(14) You are choosing 5 classes but there are 9 subjects. You have 5 decisions to make, and 9 choices at the outset.

$9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 =$

15,120 schedules

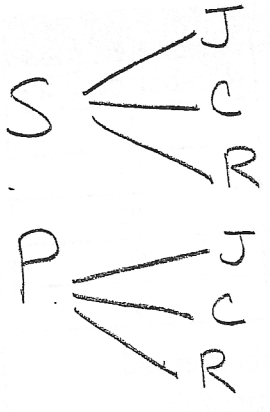
15) Draw a tree diagram and tell how many possible outcomes?

(A)

Smith or Patel for President

Jones, Chin, or Rosen for Vice President

(15)



16) *Decide whether the possible resulting events* (A) are equally likely. Write yes or no.

a) You roll a number cube. You roll an even number, or you roll an odd number.

b) A baby is born. The baby is left-handed, or the baby is right-handed.

c) You toss a marshmallow. The marshmallow lands on its end, or the marshmallow lands on its side.

d) You draw a card from a standard deck of 52 playing cards with no jokers. The card is a heart, the card is a club, the card is a diamond, or the card is a spade.

e) You toss a coin three times. You get three heads, you get two heads and a tail, you get a head and two tails, or you get three tails.

(16)

a) yes

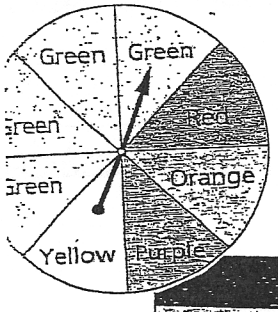
b) no

c) no

d) yes

e) no

17) (A) The spinner below is used in a board game. The table below shows the actual number of times the spinner landed on different colors after being spun 40 times.



Spinner Results	
Color	Number of Spins
Purple	4
Red	7
Green	20
Yellow	6
Orange	3

Which color has the same theoretical and experimental probability of the arrow landing on it? Explain your answer.

(17)

Theoretical probability of:

green $\frac{4}{8}$ or $\frac{1}{2}$

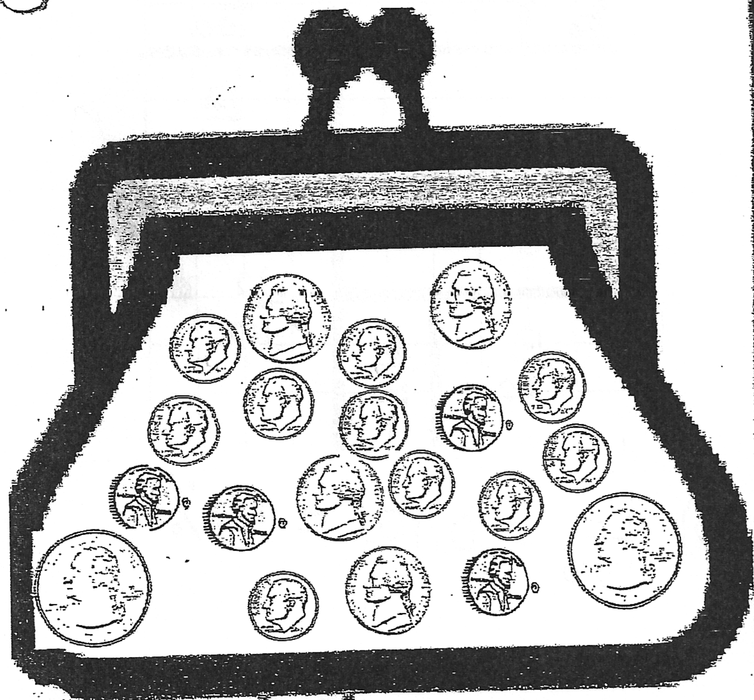
red $\frac{1}{8}$

orange $\frac{1}{8}$

purple $\frac{1}{8}$

yellow $\frac{1}{8}$

(A) Find the probability of each scenario below if you pick one coin from the purse and then another without replacing the first.



a) P (quarter, then dime)
b) P (dime, then penny)
c) P (penny, then penny)
d) P (quarter, then dime, then penny)

P = 4
N = 4
D = 10
Q = 2
} 20 total

a) $\frac{2}{20} \cdot \frac{10}{19} = \boxed{\frac{1}{19}}$

b) $\frac{10}{20} \cdot \frac{4}{19} = \boxed{\frac{2}{19}}$

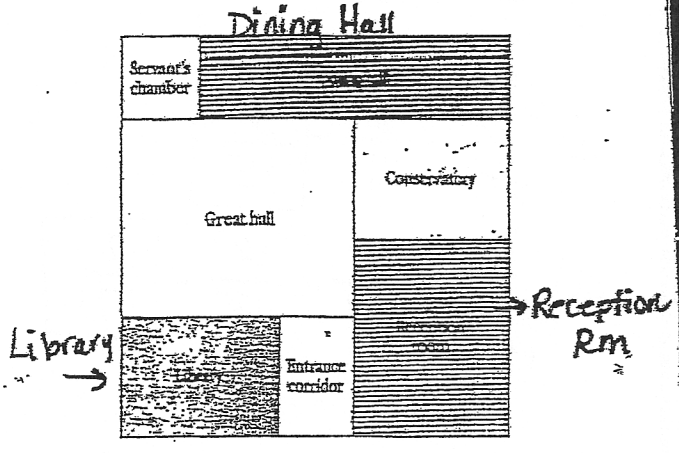
c) $\frac{4}{20} \cdot \frac{3}{19} = \boxed{\frac{3}{95}}$

d) $\frac{2}{20} \cdot \frac{10}{19} \cdot \frac{4}{18} = \boxed{\frac{2}{171}}$

19) When you play the 1st level of the Treasure Hunt Game, the computer hides a treasure on the 1st floor of the palace. The floor plan is pictured below. The computer gives the player clues about where the treasure is located. After each clue, the player must guess which room the treasure is in. The computer continues to give clues until the player finds the treasure. The first time you play Level1, the treasure is hidden in the library.

(C)

Level 1



a) On the computer screen, the 1st floor of the palace is 10 inches by 10 inches. Use this information to divide up the 1st floor.

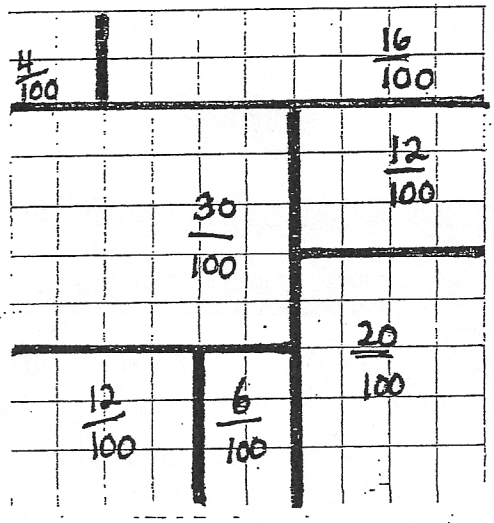
b) What is the probability that the treasure Will be hidden in the library the second time you play Level 1?

c) Bob says, "because the computer randomly picks the location of the treasure, it is just as likely to be hidden in the entrance corridor as in the great hall." Is Bob correct?

d) NEW GAME: (Note: Treasure cannot land in the same area during the same game.)
What is the probability that the treasure will land in the servant's chamber and then in the conservatory?

19) Use a grid. It helps to see the sections.

a)



b) $\frac{12}{100} = 0.12 = 12\%$

c) No, because the probability of the treasure being in the entrance would be 6% whereas the great hall would be 30%

d) $\frac{4}{100} \cdot \frac{12}{96} = \frac{1}{200} = .005 =$ **0.5%**

20)

(B) 1) *Julie develops a new carnival game for the fair* at Dale Street School. A bucket contains four blue marbles and one orange marble. Without looking, a player draws one marble from the bucket, replaces it, and then draws a second marble. If the marble is orange on both draws, the player wins.

The Carnival Committee has decided to charge players four 50 cent tickets to play the game. Prizes awarded to the winners will cost the school $5 each.

a) If 100 people play Julie's game, how much money will the school collect? How much money can they expect to pay out in prizes?

b) If 5 people play Julie's game, what ~~are the odds~~ is the probability of them ALL winning?

21) Dependent or Independent? (D or I?)

(A)
a) I choose a stick from the cup for a refresh question. I do not put it back in and then choose someone to answer the next question.
b) You choose a member of a baseball team to be the pitcher. You then choose a different member of the team to be the catcher.
c) You roll an odd number on a number cube. You then roll the number cube again and roll an even number.
d) A teacher is randomly assigning you, your friend, and 4 other students to 6 different seats. You are assigned the first seat. Your friend is assigned the second seat.

(20)

a) Bucket = B 4
O 1

$2.00 → play × 100 = $200

prizes = $5

$\frac{1}{25}$ chance of winning $\left(\frac{1}{5} \cdot \frac{1}{5}\right)$

$\frac{4}{100}$ chance of winning

$5 × 4 winners = $20 paid out

b) $\frac{1}{25} \cdot \frac{1}{25} \cdot \frac{1}{25} \cdot \frac{1}{25} \cdot \frac{1}{25} = \frac{1^5}{25^5} =$

$\frac{1}{9{,}765{,}625}$

(21)

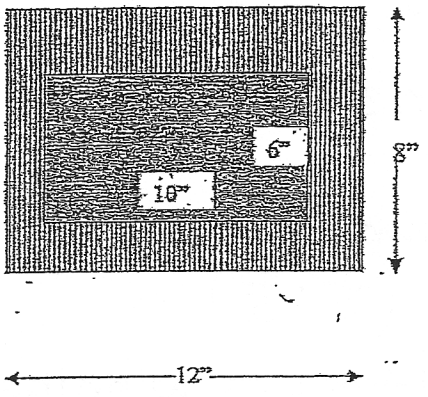
a) dependent

b) dependent

c) independent

d) dependent

22) You win $10 in the Toss-A-Penny game at an amusement park if you toss a penny which lands in the shaded area below. You win $20 if you toss a penny which lands in the striped area.



a) Find P (landing in a shaded area)
b) Find P (landing in a striped area)
c) If you toss 200 pennies one after the other, in which area do you think more pennies will land? Give a reason for your answer.

(22)

Total Area = $12 \cdot 8 = 96$ in²

Area Shaded = $6 \cdot 10 = 60$ in²

Area Striped = $96 - 60 = 36$ in²

a) $\frac{60}{96} = \frac{5}{8} = 0.625 = 62.5\%$

b) $\frac{36}{96} = \frac{3}{8} = 0.375 = 37.5\%$

c) Shaded, because it covers more area.

23) A coin is tossed and a 6 sided die is rolled.

a) Find the probability of getting a head on the coin and a 6 on the die.

b) Explain the theoretical and experimental probability using this example.

(23)

a) $\frac{1}{2} \cdot \frac{1}{6} = \frac{1}{12}$

b) The theoretical is $\frac{1}{12}$. The experimental would be actually performing this experiment and recording the results.

24) The experimental probability of a penny landing on tails is $\frac{9}{16}$. If the penny landed on heads 21 times, how many times was the coin tossed?

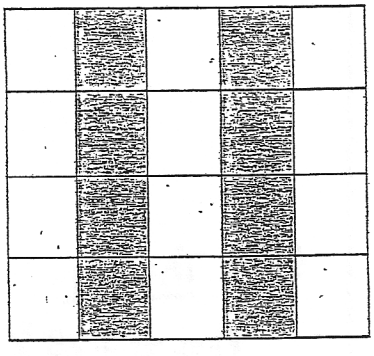
(B)

25) Jordan's sock drawer has 8 white, 5 black, 7 navy, 3 khaki, and 12 other pairs of socks. She randomly selected a pair of socks 20 times, and from these 20 draws she selected a navy pair 6 times. Compare and contrast the theoretical and experimental probability.

(B)

26) Find the probability that a randomly thrown dart will land in a shaded region of the figure below.

(A)



24) $\frac{9}{16}$ = tails so

$\frac{7}{16}$ = heads

$\frac{7}{16} = \frac{21}{x}$

$21 \cdot 16 = 7x$

$336 = 7x$

$48 = x$

The coin was tossed 48 times

25) Theoretical probability of choosing a navy pair =

$\frac{7}{35} = \frac{1}{5} = 20\%$

Experimental probability of choosing a navy pair 6 times out of 20 =

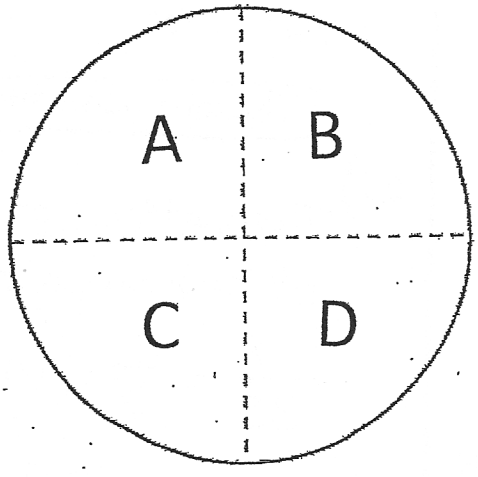
$\frac{6}{20} = \frac{3}{10} = 30\%$

26) $\frac{8 \text{ sections}}{20 \text{ sections}}$ out of

$\frac{4}{10} = 0.4 = 40\%$

27) a) Design an experiment to simulate 30 spins of a spinner that has equal sections labeled A, B, C, and D.

(A)



b) Find the experimental probability of each letter.

c) Compare the experimental probabilities with the theoretical probabilities.

Answers will vary.

27)

a) I took 4 index cards and wrote A B C D on them. I shuffled them, turned them face down and drew from the cards 30 times with replacement

results:

B	C	A	B	D
C	A	B	B	C
C	D	B	C	D
D	B	A	D	A
D	C	D	B	C
D	B	C	D	A

b) probability of $A = \frac{5}{30}$

$B = \frac{8}{30}$

$C = \frac{8}{30}$

$D = \frac{9}{30}$

c)

Theory	Experiment
$A = \frac{1}{4} = 25\%$	$\frac{5}{30} = \frac{1}{6} = 16.6\%$
$B = \frac{1}{4} = 25\%$	$\frac{8}{30} = 26.6\%$
$C = \frac{1}{4} = 25\%$	$\frac{8}{30} = 26.6\%$
$D = \frac{1}{4} = 25\%$	$\frac{9}{30} = 30\%$

Answers will vary.

28) (B) At the Midland Middle School, about 2 out of every 6 students are in the school band. Design a simulation and generate 20 trials to estimate the probability that the next 2 students to enter the lunchroom are in the school band.

a) How will you represent 2 out of every 6 students?

20 Trials of 2 students

b) How will you generate the data?

c) Generate the data and record it in the table.

d) Describe the favorable outcomes.

e) Count the number of favorable outcomes in your data. What is the probability that the next 2 students who enter the lunchroom will be in the school band?

28)

a) I will use a number cube to simulate 2 out of 6 students in the band. Rolling a one or a two equals students in the band (favorable outcome) Rolling a 3,4,5,6 will equal students not in the band (unfavorable outcome).

b) I rolled 2 dice (one for each of the 2 students) 20 times.

c)

20 Trials

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

d) There are 3 favorable outcomes: 1,1 1,2 1,2

e) $\frac{3}{20} = 15\%$

29) John's record shows that he makes $\frac{1}{3}$ of his shots in basketball. He wants to know the probability that he will make at least 2 of his next 3 shots.

(C)

a) Describe a spinner that could be used in a simulation. What spin would represent making a shot?

b) For each trial, how many times will you spin the spinner? What will be a favorable outcome?

c) Show the sample space for the outcomes. Which of the outcomes represent favorable outcomes?

d) Based on the sample space, what is the theoretical probability that John will make at least 2 of his next 3 shots?

** answers will vary **

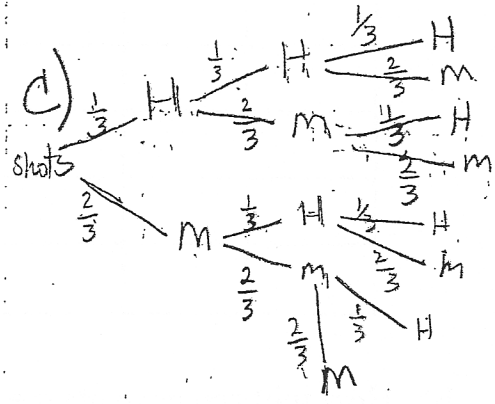
29)

a)

Hit = making a shot

b) 3 times, H m m
m H m
m m H

c)



H H H ✓
H H m ✓
H m H ✓
H m m
m H H ✓
m H m
m m H
m m m

d)

H H m
$\frac{1}{3} \cdot \frac{1}{3} \cdot \frac{2}{3} = \frac{2}{27} \times 3 = \frac{6}{27}$

H H H
$\frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3} = \frac{1}{27} \times 1 = + \frac{1}{27}$

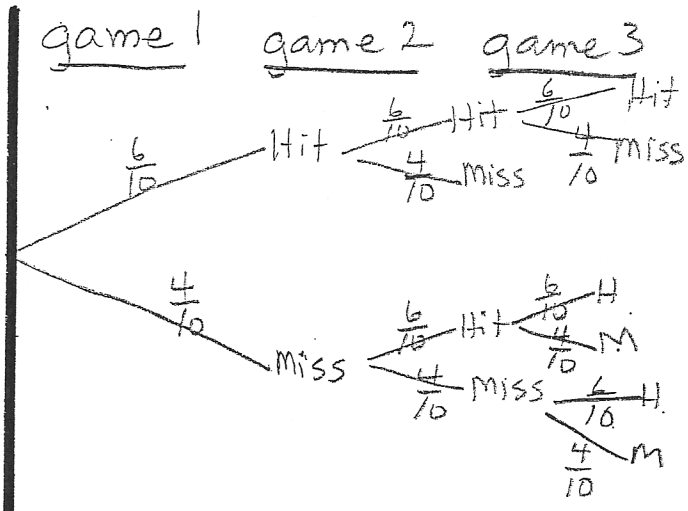
Total probability $= \frac{7}{27}$

30) A basketball player makes 6 out of every ten foul shots during games. Create a tree diagram for the last 3 games of the season. Then, find

a) the probability that the player makes a foul shot in each of the 3 games.

b) the probability that the player makes foul shots in the 1st and 3rd games.

c) the probability that the player misses each of 3 foul shots (one in each of the 3 games).



a) $\frac{6}{10} \cdot \frac{6}{10} \cdot \frac{6}{10} = \frac{216}{1000} = \frac{27}{125}$

b) $\frac{6}{10} \cdot \frac{4}{10} \cdot \frac{6}{10} = \frac{144}{1000} = \frac{18}{125}$

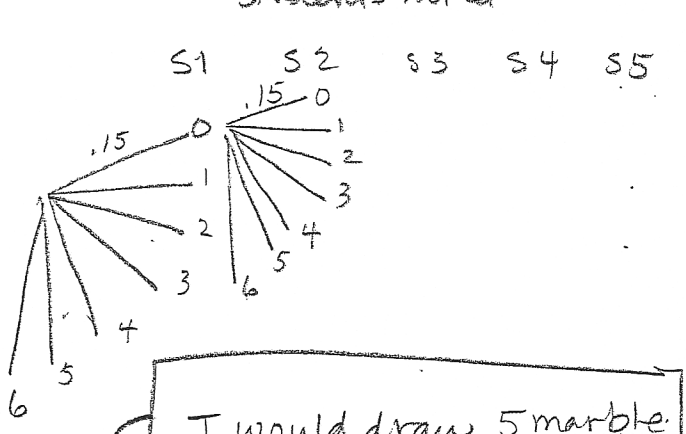
c) $\frac{4}{10} \cdot \frac{4}{10} \cdot \frac{4}{10} = \frac{64}{1000} = \frac{16}{125}$

31) Consider the following probability distribution for the number of siblings students in a class have.

# of siblings	0	1	2	3	4	5	6
probability	0.15	0.35	0.30	0.10	0.05	0.03	0.02

$= 1.0$

Explain how you could use simulation to estimate the probability that you will need to ask at least five students the question, "Are you an only child?"



I would draw 5 marble with replacement

You could use 100 marbles

with 15 that are Red

35 " " Green

30 " " Yellow

10 " " White

5 " " Blue

3 " " Black

2 " " Orange

$.15^5 = 0.00003375$