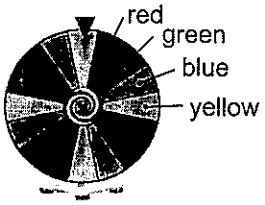
Probability

CHAPTER 10

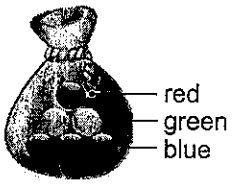
Skill Builder

1 Probability Experiments INTRODUCED

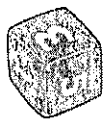
1 List all the possible outcomes from spinning the following prize wheel:



2 Six marbles are placed into a bag; 3 blue, 2 green and 1 red. A magician puts his hand in and pulls out 2 of them. Using a probability tree, list all the possible outcomes from this probability experiment. How many possible outcomes are there?



3 A twelve-sided die and a regular six-sided die are both rolled at the same time and the numbers shown on each die are added. Make a table to show all possible outcomes for this event.



4 A game is played with two 6-sided dice. The dice are tossed and the two numbers shown are added together. All possible outcomes are shown in the table below. Prizes are to be awarded for only one of these totals. If you want to give away as many prizes as possible, which total should you choose?

	2	3	4
5	6	7	8
9	10	11	12

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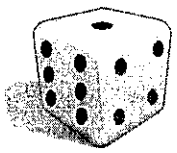
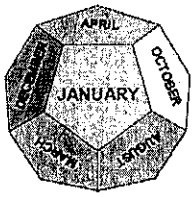
5 Record the results of 12 die tosses using a tally table as shown below:



#	Tally
1	
2	
3	
4	
5	
6	

6 A 12-sided die with the names of the months on it was tossed many times and the results recorded in the tally table below. According to the results of this experiment, which month is the die most likely to land on?

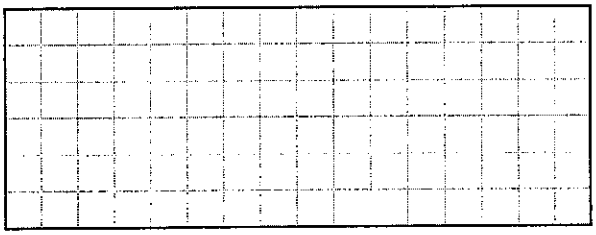


Month	Tally
January	I
February	𝍸 IIII
March	II
April	I
May	II
June	
July	𝍸
August	I
September	III
October	I
November	III
December	IIII

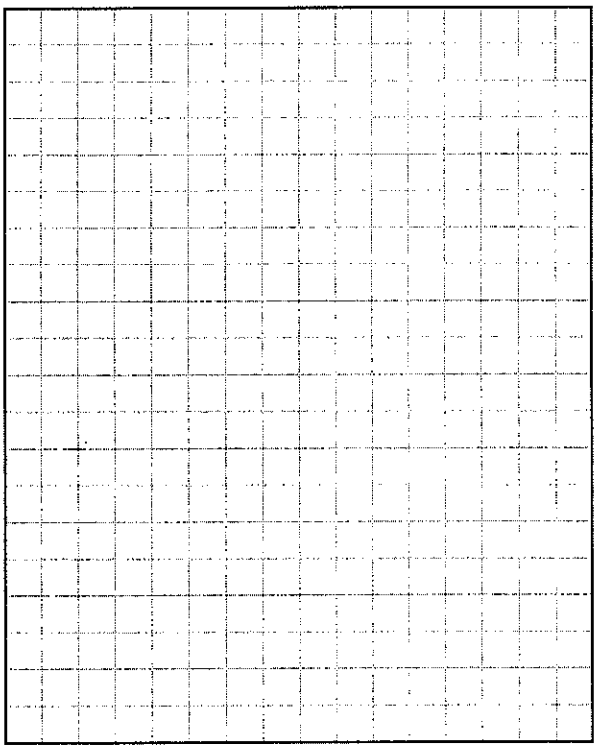
7 Thumb tacks can fall and land in one of two ways. Draw a probability tree to show all of the outcomes when two thumb tacks are dropped.

Sideways

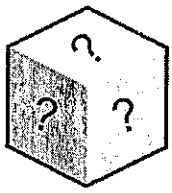
Upwards



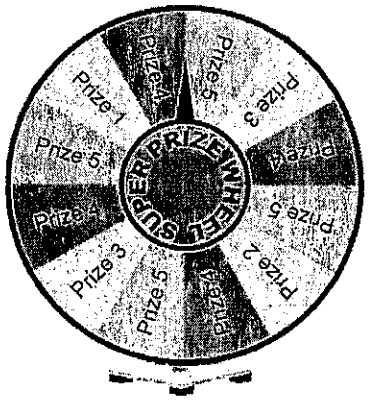
8 A magician took a standard deck of 52 cards, and removed the face cards (jacks, queens and kings). He asked a boy from the audience to draw a card and tell him the suit of the card and whether it was odd or even. Draw a probability tree to display all the possible outcomes of this event.



9 How could you design a die that has a better chance of landing on the number '6'?



10 One of five prizes can be won on the "Super Prize Wheel" shown below. Is there an equally likely chance of winning each of the prizes? Justify your response.



Skill Builder

2 Representing Probability

INTRODUCED

1 Rate the following events as either "Certain", "Possible" or "Impossible":

- The first day of summer in the Northern Hemisphere is the longest day of the year.

_____

- Rolling a sum greater than 12 with two six-sided dice.

_____

- A person flips a coin and gets "heads" five times in a row.

_____

- Cars can drive through a snow storm.

_____

2 The probabilities of some events are shown below. Use the terms "Certain", "Possible" or "Impossible" to rate the chances of each one:

P(winning) = 0.9

_____

P(blue) = 0

_____

$P(4) = \frac{3}{8}$

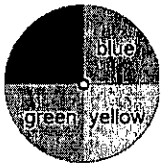
_____

P(rain) = 100%

_____

3 Which one of the following two events is more likely?

Landing on red



Rolling an even number on a die

_____

My Calculations

4 Four regional running champions are listed in the table below with their chances of winning the finals. Based on this data, who is more likely to win the race?

Name	Probability of winning
Eugenie	$P(\text{winning}) = \frac{2}{3}$
Serena	P(winning) = 0.7
Maria	P(winning) = 80%
Ana	$P(\text{winning}) = \frac{3}{5}$

_____

My Calculations

5 As Henry was snacking on his box of crackers, he recorded the shape of each one in a tally table. If each box is manufactured with the same shapes inside, what is the probability that Henry will select a circle first next time?

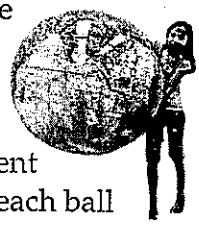
Shape	Tally
Triangle	𝍸 IIII
Rectangle	𝍸 I
Hexagon	IIII
Circle	III
Trapezoid	𝍸 III

My Calculations

6 Sarah laid 24 different crayons on her desk. If she closes her eyes, what is the probability that she will randomly choose the white, gray or black crayon?

My Calculations

7 Olivia had a beach ball globe of the world. She wondered what percentage of the globe was covered in water, so she designed an experiment to find out. She tossed the beach ball into the air and caught it. Then she recorded whether the tip of her right index finger was touching land or water. Her tally is shown below.



Land	𝍸 𝍸 𝍸
Water	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸

a. What is the probability that her finger would be touching land or water after any toss?

My Calculations

b. Based on the experiment, what percentage of the earth is probably covered in water?

My Calculations

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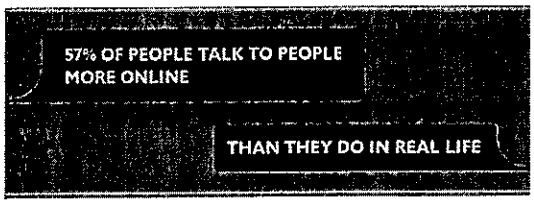
8 According to the advertisement below, what is the probability of randomly selecting someone who talks more online than in real life? Give your answer as a decimal.



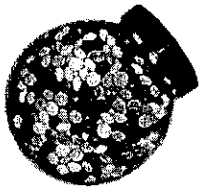
My Calculations

9 Fill in the table below to give the equivalent probabilities for events A, B, C, D and E.

EVENT	DECIMALS	FRACTIONS	PERCENTAGE
A	P(A) = 0.1		
B		P(B) = $\frac{2}{5}$	
C			P(C) = 30%
D	P(D) = 0.45		
E			P(E) = 5%

My Calculations

10 To raise money for her school, Jenny organized a guessing competition in her local community. People paid $1 to guess how many skittles were in a candy jar and the correct entry won the jar of candy. Mike thought that he might have a 10% chance of winning the competition. What probability, then, does he give himself of losing the competition?



3 Theoretical & Experimental Probability INTRODUCED

Skill Builder

1 Which of the following events have a theoretical probability and which ones do not?

i. P(getting an A on the next math exam)

_____

ii. P(selecting the Ace of diamonds)

_____

iii. P(winning the lotto)

_____

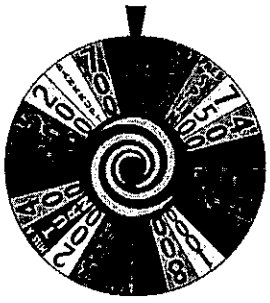
iv. P(receiving a phone call during supper)

_____

v. P(getting bitten by a mosquito)

_____

2 Kurt is a contestant on a game show. His next spin of the prize wheel determines his final prize. Which of the following are possible outcomes?



- Getting another spin _____
- Winning nothing _____
- Winning $100 _____
- Winning $800 _____
- Winning a car _____

3 Jack's teacher was playing a game with her class. They had to guess the number that she was thinking of between 1 and 20. The class had played the game 10 times and Jack had correctly guessed the number on 2 occasions. Compare the theoretical and the experimental probability of Jack correctly guessing the number.

_____

My Calculations

4 A card is chosen randomly from a standard 52-card deck. Its suit is recorded and is then shuffled back into the deck. The first 10 outcomes are listed below. Calculate the difference between the theoretical probability and the experimental probability of the next card being a Heart ♥.

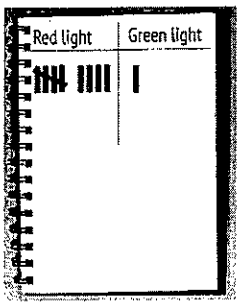
{♠, ♦, ♣, ♣, ♠, ♥, ♦, ♠, ♣, ♠}

_____

My Calculations

Skill Builder

5 Kayla couldn't help but notice that every time she drove towards a particular set of traffic lights, they seemed to turn red. She decided to record the traffic light colour in a notebook to observe the data. Using Kayla's data, calculate the probability that the light will be red next time she drives through this intersection. Give your answer as a percentage.



My Calculations

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6 Kate surveyed the students in her class and asked them how many siblings they had. Her results are recorded in the tally table below. Based on her survey, how many people, in a school of 500 students, are expected to have two siblings?

# of siblings	Tally
0	𝍸 | | |
1	𝍸 𝍸 | |
2	𝍸 𝍸 𝍸
3	| |
4	| |
5	|

My Calculations

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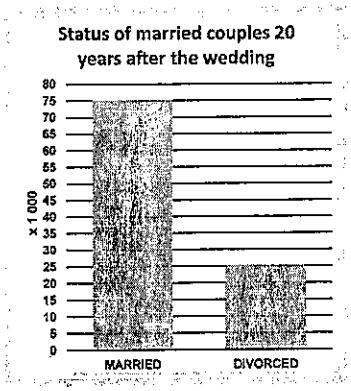
7 According to the data shown in the graph, what is the probability that a newly-wed couple will still be married after 20 years? Give your answer as a percentage.



My Calculations

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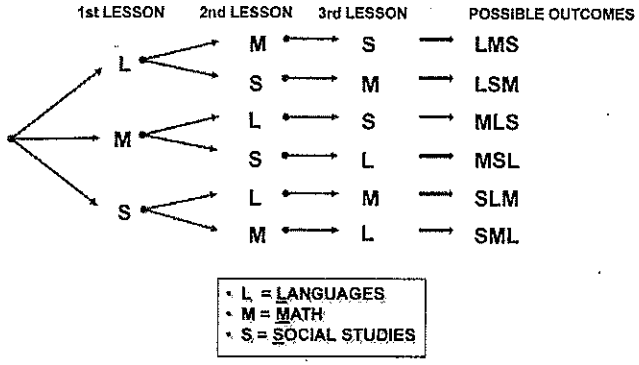
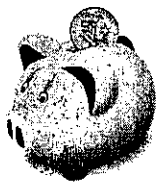
8 Every day at school, Malcolm has at least 1 Language, 1 Math and 1 Social Studies lesson. For the past 3 weeks, Malcolm's teacher has been asking her students to choose the order of these lessons each day. The tree diagram shows all possibilities of the selection process. How many times, over 3 weeks, would you expect Malcolm to have started the day with Math?



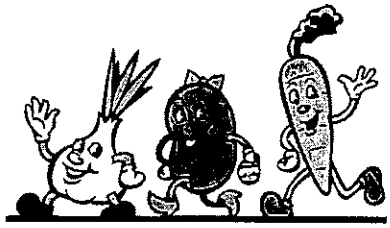
My Calculations

9 Emma has a piggy bank that contains 2 × $2, 1 × $1, 3 quarters, 4 dimes and 5 nickels. She needs a quarter to play an arcade game. How many coins can she expect to choose before randomly selecting a quarter.



My Calculations

10 According to their records, 20% of the students at Conmore Elementary School are vegetarians. If 150 students have signed up for the end of year camp, how many are expected to be vegetarian?



My Calculations