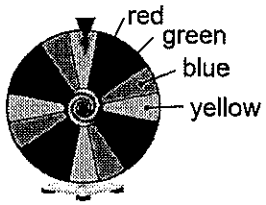
Probability

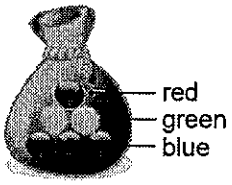
Skill Builder

1 Probability Experiments REVIEW

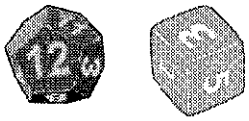
1 List all the possible outcomes from spinning the following prize wheel:



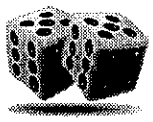
2 Six marbles are placed into a bag; 3 blue, 2 green and 1 red. A magician puts his hand in and pulls out 2 of them. Using a probability tree, list all the possible outcomes from this probability experiment. How many possible outcomes are there?



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.



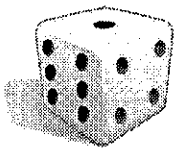
4 A game is played with two 6-sided dice. The dice are tossed and the two numbers shown are added together. All possible outcomes are shown in the table below. Prizes are to be awarded for only one of these totals. If you want to give away as many prizes as possible, which total should you choose?



	2	3	4
5	6	7	8
9	10	11	12

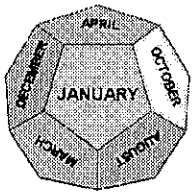
Skill Builder

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?

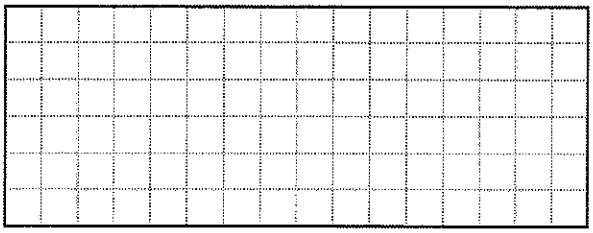


MONTH	TALLY
JANUARY	|
FEBRUARY	𝍸 ||||
MARCH	||
APRIL	|
MAY	||
JUNE	
JULY	𝍸
AUGUST	|
SEPTEMBER	|||
OCTOBER	|
NOVEMBER	|||
DECEMBER	||||

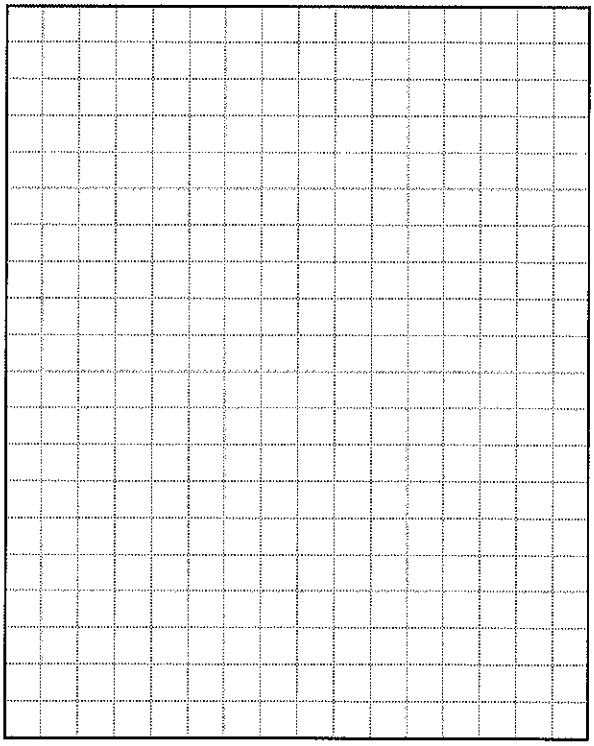
7 Thumb tacks can fall and land in one of two ways. Draw a probability tree to show all of the outcomes when two thumb tacks are dropped.

Sideways

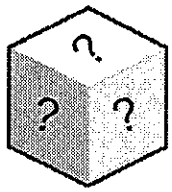
Upwards



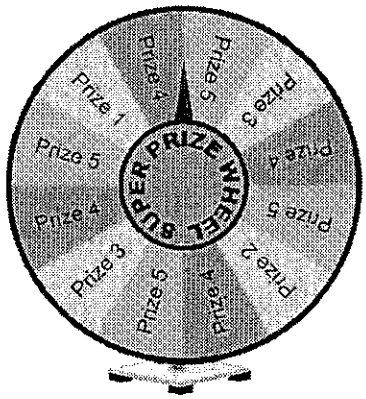
8 A magician took a standard deck of 52 cards, and removed the face cards (jacks, queens and kings). He asked a boy from the audience to draw a card and tell him the suit of the card and whether it was odd or even. Draw a probability tree to display all the possible outcomes of this event.



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 REVIEW

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

_____

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

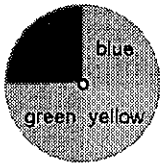
_____

P(rain) = 100%

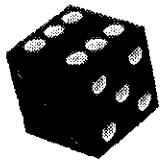
_____

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(winning) = $\frac{2}{3}$
Serena	P(winning) = 0.7
Maria	P(winning) = 80%
Ana	P(winning) = $\frac{3}{5}$

_____

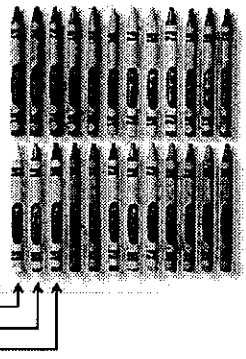
My Calculations

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 ||||
RECTANGLE	𝍸 |
HEXAGON	||||
CIRCLE	|||
TRAPEZOID	𝍸 |||

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?

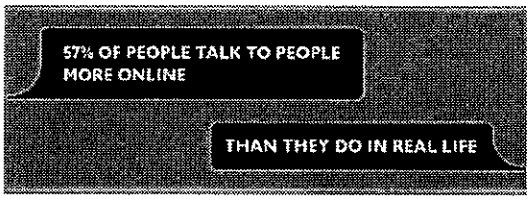
My Calculations

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

My Calculations

Skill Builder

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.



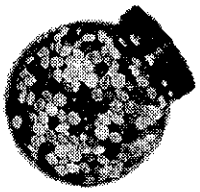
My Calculations

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 REVIEW

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)

_____

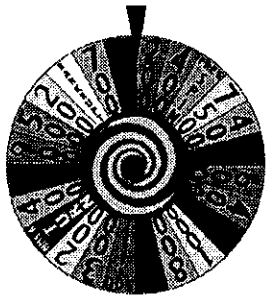
iv. P(receiving a phone call during supper)

_____

v. P(getting bitten by a mosquito)

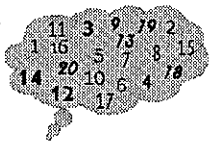
_____

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 ♥.

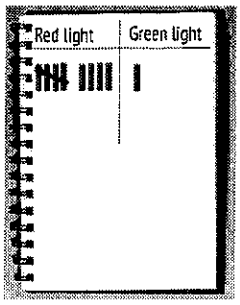
{♠, ♦, ♣, ♣, ♠, ♥, ♦, ♠, ♣, ♠}

_____

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 ||
2	𝍸 𝍸
3	||
4	||
5	|

My Calculations

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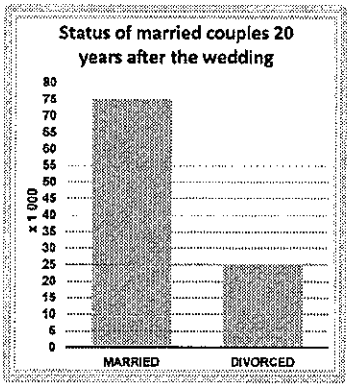
7 According to the data shown in the graph, what is the probability that a newly-wed couple will still be married after 20 years? Give your answer as a percentage.



My Calculations

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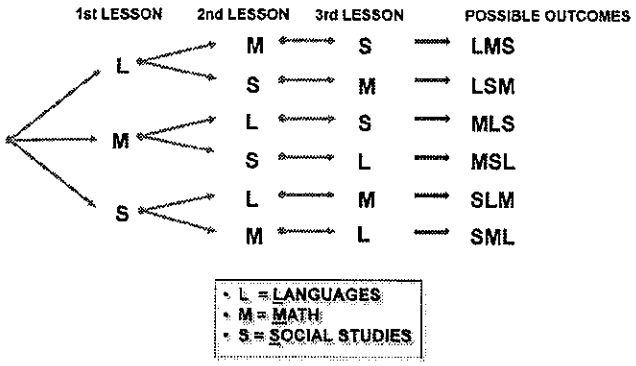
8 Every day at school, Malcolm has at least 1 Language, 1 Math and 1 Social Studies lesson. For the past 3 weeks, Malcolm's teacher has been asking her students to choose the order of these lessons each day. The tree diagram shows all possibilities of the selection process. How many times, over 3 weeks,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



My Calculations

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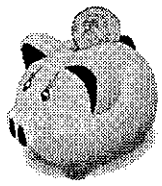
9 Emma has a piggy bank that contains 2 × $2, 1 × $1, 3 quarters, 4 dimes and 5 nickels. She needs a quarter to play an arcade game. How many coins can she expect to choose before randomly selecting a quarter.



My Calculations

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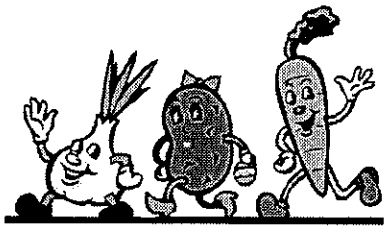
10 According to their records, 20% of the students at Conmore Elementary School are vegetarians. If 150 students have signed up for the end of year camp, how many are expected to be vegetarian?



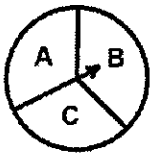
My Calculations

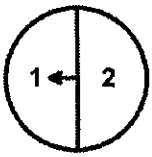
Skill Builder

4 Tree Diagrams EVALUATED

1 A coin is tossed three times. Draw a tree diagram and list the possible results for this situation.

2 The pointers on the spinners below are turned one after the other. Draw a tree diagram and list the possible outcomes for this situation.



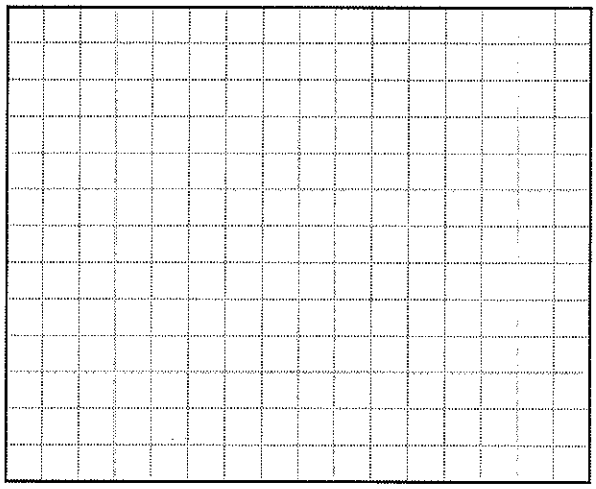


3 Ross, Chandler and Joey are playing golf. By using a tree diagram, determine all of the possible outcomes (who finishes first, second and third).

4 There are three marbles in a bag: a red one, a blue one and a green one. If the marbles are drawn from the bag one at a time without replacing them, what are the possible orders of the marbles drawn? Use a tree diagram.

5 If a coin is tossed three times, how many of the outcomes have exactly two tails?

6 David, Eddie and Frank have a 100 yard foot race. If you use a tree diagram to determine all of the possible outcomes of this race, in how many ways can Frank be the winner?



7 If a coin is tossed twice, how many of the outcomes have at most one tail?

8 If a coin is tossed three times, how many of the outcomes have at most one head?

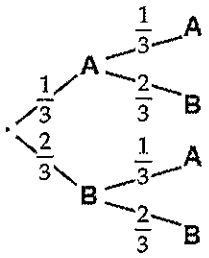
9 If a coin is tossed twice, how many of the outcomes have at least one head?

10 If a coin is tossed three times, how many of theoutcomes have at least one tail?

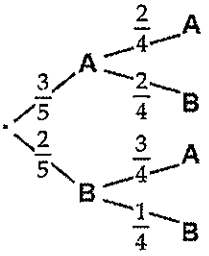
Skill Builder

5 Tree Diagrams and Consecutive Events EVALUATED

1 Given the tree diagram below, find P_{AB}.



2 Given the tree diagram below, find P_{BB}.



3 If a coin is flipped twice, what is the probability of getting a head on the first toss and a tail on the second toss?

4 If a coin is flipped twice, what is the probability that of getting 2 heads in a row?

5 A bubble gum machine has grape gum balls and cherry gum balls. If there are 10 grape ones and 12 cherry ones in the machine, what is the probability of getting two consecutive grape gum balls out of the bubble gum machine?

6 A golf bag has 5 Nike golf balls and 7 Callaway golf balls in its side pocket. If you pull out two golf balls, one at a time, without replacement, what is the probability of picking 2 Callaway golf balls?

7 Students in a Grade 10 class are being randomly selected to win a day pass at a water park. There are 15 girls and 10 boys in the Grade 10 class. If a student can only win one day pass, what is the probability that the two winners are of the opposite sex?

8 A standard 52-card deck has 26 black cards and 26 red cards. What is the probability of drawing different coloured cards on two consecutive draws if we do not replace the card we drew on the first draw?

9 A coin is flipped twice: what is the probability of getting the same result on consecutive tosses?

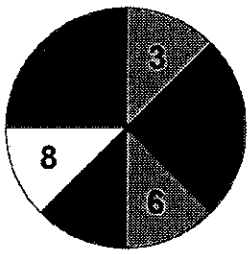
10 A coin is flipped twice. What is the probability of not getting a head on both tosses?

6 Calculating the Probability of Complementary Events EVALUATED

Skill Builder

1 If an event is described as picking a face card from a deck of cards, identify the complement of the event.

2 Determine the complement of landing on a number greater than 6 using the following spinner.



3 Karen is picking a number between 1 and 100. What is the complement to picking a multiple of 5?

4 When tossing a fair standard die, determine the complement of rolling a number less than 3.

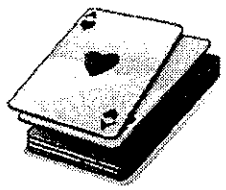
5 The probability of drawing a red marble from a bag is $\frac{3}{16}$. What is the probability of the complementary event?

6 The probability of getting a sum of 6 when rolling two dice is $\frac{5}{36}$. Determine the probability of the complement.

Skill Builder

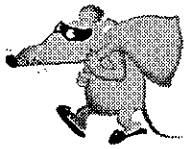
7 Mark has a bag of cookies. There are 3 chocolate chip cookies, 5 pumpkin cranberry cookies, 8 sugar cookies and 4 peanut butter cookies. Determine the probability of the complement of randomly selecting a sugar cookie.

8 Determine the probability of the complement of picking a 2, 3 or 4 from a deck of cards.



9 Freddy is tossing a coin and a fair standard die. Determine the probability of not getting a head on the coin and rolling an even number.

10 When playing a board game, Tyler must roll a die and draw a marble from the mouse's bag. There are four possible marbles that he can select; red, yellow, green or blue. What is the probability of not getting an odd number and a green marble?



Skill Builder

9 Using Probability to Make Predictions EVALUATED

1 Heather scores on 70% of the shots she takes at the goal in a soccer game. If she takes 120 shots in a season, predict how many goals she will score.

2 Blaine can make 40% of his darts hit the bull's eye when throwing at the target. On Saturday, he made 80 throws while playing darts with friends. Predict how many will land on the bull's eye (the centre of the dart board).

3 The table below shows the last 100 visitors to a website about the Great Lakes and which lake they clicked on first. Of the next 2,000 visitors, how many will click on Lake Ontario first?

Lake	Number of Visitors
Huron	13
Ontario	28
Michigan	14
Erie	29
Superior	16

My Calculations

4 The table below shows the type of apple that the last 20 customers purchased at Frank's Fruit Farm. Frank generally gets about 300 customers on Saturdays. Predict how many Empire apples he should have available.

Type of Apple	# of bags sold
Gala	4
Empire	8
Paula Red	2
Honey Crisp	1
Red Delicious	5

My Calculations

5 Leo rolls a six-sided die 1200 times. About how many times should he expect to roll a number less than 3?

My Calculations

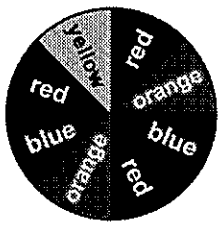
6 Joshua has a bag of 10 marbles. There are 3 green, 2 blue, 1 red and 4 yellow marbles. Joshua pulls out a marble, writes down the colour and then returns the marble back to the bag. If he pulls out a marble 80 times, make a prediction of how many of these will be blue or red.

My Calculations

7 At a local parade, Jenny is tossing candy to the audience. The candies she has purchased include 5 different flavours (raspberry, cherry, strawberry, watermelon, and orange). Each flavour is equally as likely in the bag of candy. If she throws 4000 pieces of candy to the audience, how many of the pieces will be raspberry?

My Calculations

8 Peyton uses the spinner below during a game. If he spins the spinner 160 times, predict how many times Peyton should have landed on blue.



My Calculations

9 While studying skunks, Martin tagged 30 skunks from his area. He released the skunks. Then he returned to study more skunks in the area. Out of the next 15 skunks he found, 4 of them were already tagged. Using this information, make a prediction about how many skunks are in the area.

My Calculations

Skill Builder

10 Malia is studying trout in a local creek. She catches, marks and releases 20 trout. When she returned a week later, she caught 80 more trout, but 5 of them were already marked. Predict how many trout are in the creek.

My Calculations