UNIT 11

Probability

Learning Goals

- use the language of probability
- conduct experiments and predict results
- use fractions to describe probability
- use tree diagrams to find probabilities
- use probability to pose and solve problems

Key Words

- certain
- likely
- outcome
- likelihood
- unlikely
- impossible
- equally likely
- experiment
- fair game
- tree diagram
- combination

- Is it more likely that the secret fish is silver or pink? Why?
- Tyler picks a small fish without looking. How likely is it that the fish is blue? Red? Yellow? Green?
- How likely is it that the next customer will win the free gift?

LESSON 1

The Likelihood of Events

How will you know what to wear when you leave the house tomorrow?

You cannot be **certain** of the weather. In each season, some weather conditions are more **likely** than others.

Explore

You will need a class list.

- Cut out each name.
  Place the names in a paper bag.
  Take turns drawing a name from the bag without looking.
  Replace the name before the next student draws.
- How likely is each **outcome**?
  Use these words to describe each outcome:
  impossible, unlikely, likely, certain
  - Someone in your class is chosen.
  - The student chosen is in grade 5.
  - Your name is chosen.
  - The student chosen is not in your class.
  - The name of the student chosen begins with a consonant.
- Conduct the experiment 20 times.
- Record your results.
  Compare the results to your predictions.

Show *and* Share

Compare your results with those of another group of students. Are they the same?
How did you decide how likely each outcome was?
Can you use a different word to describe the likelihood of any of the outcomes? Explain.

Likelihood means how likely something is to happen.

Connect

Suzanne puts 5 red tiles, 1 yellow tile, and 1 blue tile into a paper bag.
Without looking, Marius draws a tile from the bag.
What is the likelihood of each outcome?

- Marius draws a red tile.
- Marius draws a coloured tile.
- Marius draws a yellow tile.
- Marius draws a green tile.

There are 7 tiles in the bag.
Marius could pick any 1 of the 7 tiles.
There are 7 possible outcomes.

5 of the 7 tiles are red.
It is likely that Marius draws a red tile.

All the tiles are coloured.
It is certain that Marius draws a coloured tile.

Only 1 of the 7 tiles is yellow.
It is **unlikely** that Marius draws a yellow tile.

There are no green tiles in the bag.
It is **impossible** for Marius to draw a green tile.

Practice

1. Describe a situation that is:
- **a)** likely
- **b)** unlikely
- **c)** certain
- **d)** impossible

Numbers Every Day

Number Strategies

Estimate each sum.
Which strategies did you use?

1254 + 3861

3868 + 4444

6514 + 2022

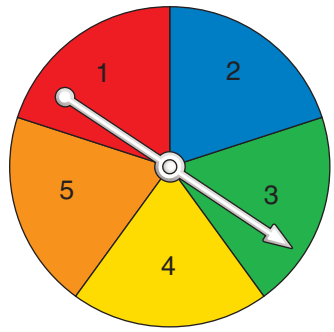
2901 + 3101

2. Describe each outcome.
Use these words: impossible, unlikely, likely, certain

a) Someone in your class will win a raffle.
b) Someone in your class is 10 years old.
c) It will rain tomorrow.
d) Your favourite team will win the Stanley Cup this year.
e) You will have math homework next Wednesday.

3. There are 2 paper bags.
Each bag has 1 red tile and 10 green tiles.
Without looking, you draw 1 tile from each bag.
Order these events from least likely to most likely.
a) You draw 2 red tiles.
b) You draw 2 coloured tiles.
c) You draw 2 yellow tiles.
d) You draw 2 green tiles.
e) You draw 1 green tile and 1 red tile.

4. Alex and Rebecca spin the pointer on this spinner.
Alex gets a point if the spinner lands on an even number.
Rebecca gets a point if it lands on an odd number.
Each person spins the pointer 20 times.
The person with more points wins.
Who is more likely to win? How do you know?



5. Design each spinner:
a) Yellow is more likely than red.
Red is more likely than blue.
b) Blue and green are equally likely, but less likely than yellow.
c) Yellow is certain.
How did you decide on the number of sectors and the colours?

Reflect

What is the difference between an impossible event and an unlikely event? Use examples to explain.

At Home

Pick an event you think is likely.
Ask family members if they think this event is certain, likely, unlikely, or impossible.
Are their answers the same as yours? Explain.

LESSON 2

Calculating Probability

Explore

Game

Sum Fun

You will need 2 number cubes each labelled 1 to 6.

- Take turns rolling the number cubes.
- Find the sum of the 2 numbers rolled.
  If the sum is even, you score a point.
  If the sum is odd, your partner scores a point.
- Record the results in a table.
- The first player to score 20 points wins.
- Who do you think will have more points after 36 turns?
  Explain.

Show *and* Share

Compare your results with those of another pair of students. Explain any differences.
Which is more likely, an even sum or an odd sum?
How do you know?
How could you find the probability of an even sum?
An odd sum?

Numbers Every Day

Number Strategies

Find each product:

0.71×100
7.1×100
71×100
710×100

What patterns do you see in the factors and the products?

Lesson Focus | Predict, then find the probability of outcomes.

Connect

Jamie and Alexis are playing *Predicting Products*.
They take turns rolling 2 number cubes, each labelled 1 to 6.
If the product of the 2 numbers rolled is odd, Jamie gets a point.
If the product is even, Alexis gets a point.
Who will have more points after 20 turns?

Jamie	Alexis
Odd Product	Even Product

Organize the possible outcomes in a table.
This will help you predict the winner.

From the table:
- There are 36 possible outcomes.
- 27 outcomes are even products.
- 9 outcomes are odd products.

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

You say: "The probability of getting an even product is 27 out of 36."
"The probability of getting an odd product is 9 out of 36."

You write:

Probability $= \frac{27}{36}$

Probability $= \frac{9}{36}$

Practice

1. Two number cubes are rolled. Both cubes are labelled 1 to 6.
The numbers rolled are added.
What is the probability of each outcome?

a) The sum is 12.

b) The sum is less than 4.

c) The sum is 7.

d) The sum is 2.

2. Misha rolls two number cubes labelled 1 to 6.
She finds the product of the 2 numbers rolled.
Find the probability of each outcome.

a) The product is 2. **b)** The product is 36.
c) The product is 12. **d)** The product is 13.
e) The product is greater than 25.

3. Dave and Bob play a game.
Each tosses a coin.
If the outcomes are the same, Dave scores a point.
If the outcomes are different, Bob scores a point.
The first person to score 20 points is the winner.

a) Who do you think will win? Explain.
b) Do you think this is a fair game?
Use pictures, words, and numbers to explain.

4. Vicki and Alastair have a spinner each.
They play this game:

- Each player spins his or her pointer.
- If the pointers land on the same colour, Vicki scores a point.
- If the pointers land on different colours, Alastair scores a point.

a) Design spinners so Vicki is more likely to win.
b) Design spinners so Alastair is more likely to win.
c) Design spinners so the game is fair.

5. Design a fair game that uses 2 number cubes.
Describe the rules of the game.
How do you know the game is fair?

Reflect

What does it mean when we say,
"Two outcomes are equally likely."?
Use an example to explain.

Math Link

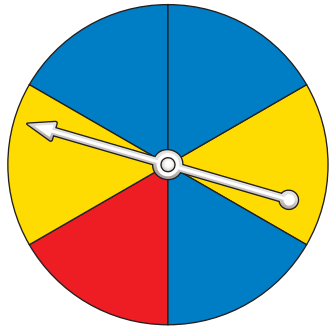
Your World

A meteorologist studies the weather.
She uses computers, satellites, and radar to predict if it will rain or snow.

LESSON 3

Probability and Fractions

This spinner has 6 equal sectors.
The probability the pointer will land on blue is 3 out of 6, or $\frac{3}{6}$.
The probability it will land on yellow is $\frac{2}{6}$.
The probability it will land on red is $\frac{1}{6}$.



Explore

You will need 1-cm grid paper.

Design a square game board with 4 colours to meet these conditions.

- The probability of landing on a blue square is $\frac{5}{8}$.
- The probability of landing on a red square is $\frac{1}{8}$.
- The probability of landing on a yellow square is $\frac{1}{16}$.

Show *and* Share

Compare your game board with that of another pair of students.
How are they the same? How are they different?
What is the probability of landing on the fourth colour?
How could you make a game board with a different number of squares?

Connect

Jenny and Maryann put coloured cubes into a bag.
They chose colours so:
It is equally likely a red, green, or yellow cube is selected.
The probability of drawing a blue cube is $\frac{2}{5}$.

How many cubes of each colour should Jenny and Maryann use?

The probability of drawing a blue cube is to be $\frac{2}{5}$.
So, 2 of every 5 cubes must be blue.
The total number of cubes must be a multiple of 5.
There are many ways to fill the bag.

➤ Suppose Jenny and Maryann used 5 cubes.
Two cubes must be blue.
Drawing a red, green, or yellow cube must be equally likely.
So, put 1 red, 1 green, and 1 yellow cube into the bag.

➤ Suppose Jenny and Maryann use 10 cubes.
$\frac{2}{5} = \frac{4}{10}$, so 4 of the 10 cubes must be blue.

The remaining 6 cubes must be divided equally among red, green, and yellow.
So, Jenny and Maryann placed 2 red, 2 green, and 2 yellow cubes in the bag.

Practice

1. A paper bag contains 2 green tiles, 4 yellow tiles, and 1 blue tile.
Liz draws a tile without looking.
What is the probability the tile is green?
Yellow? Blue?
Use fractions in your answers.

Numbers Every Day

Number Strategies

Find each sum:

12.87 + 0.15
128.7 + 0.15
1287 + 0.15

2. Dave tossed a coin 20 times. Heads turned up 12 times.

a) How many times did tails turn up?

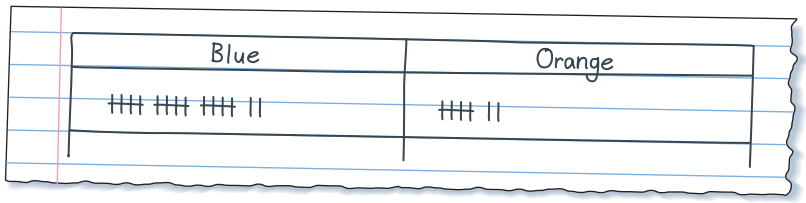
b) What fraction of tosses turned up heads?

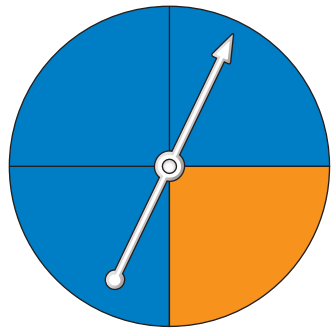
c) What fraction of tosses turned up tails?

d) Are these results what you would expect? Explain.

e) Dave tosses the coin 100 times.
What would you expect the results to be? Explain.

3. Avril spins the pointer on this spinner several times.
Here are her results.





a) How many times did Avril spin the spinner?
How do you know?

b) What fraction of the spins were blue?

c) What fraction of the spins were orange?

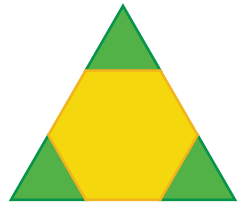
d) Were Avril's results what you would have expected? Explain.

4. A solid with 10 congruent faces is a decahedron.
Shannon and Joshua roll a decahedron
labelled 1 to 10.

a) What is the probability Shannon rolls an odd number?

b) Joshua says there is a probability of $\frac{1}{5}$ for rolling a number with a certain digit. What is the digit?

5. Sharma made this game board
using foam Pattern Blocks.



a) What is the probability of landing on yellow?

b) Create a game board where the probability of landing on blue is $\frac{1}{4}$, and on yellow is $\frac{3}{4}$.

Reflect

How can we use fractions to describe probabilities?
Use pictures, numbers, and words to explain.

LESSON 4

Tree Diagrams

Explore

You will need a coin, a number cube labelled 1 to 6, and a 2-colour counter.

- What are all the possible outcomes of rolling the number cube, tossing the coin, and tossing the counter?
- One student rolls the number cube, another tosses the coin, and the third tosses the counter.
- Record your results.
- Repeat the experiment 10 times.
  How many different outcomes did you find?
  How do you know if you have all of them?

Show *and* Share

Share your work with another group of students.
Did you find the same outcomes? Explain.
Did you record your results in the same way?
If not, is one way clearer than the other? Explain.
What patterns did you see?

Connect

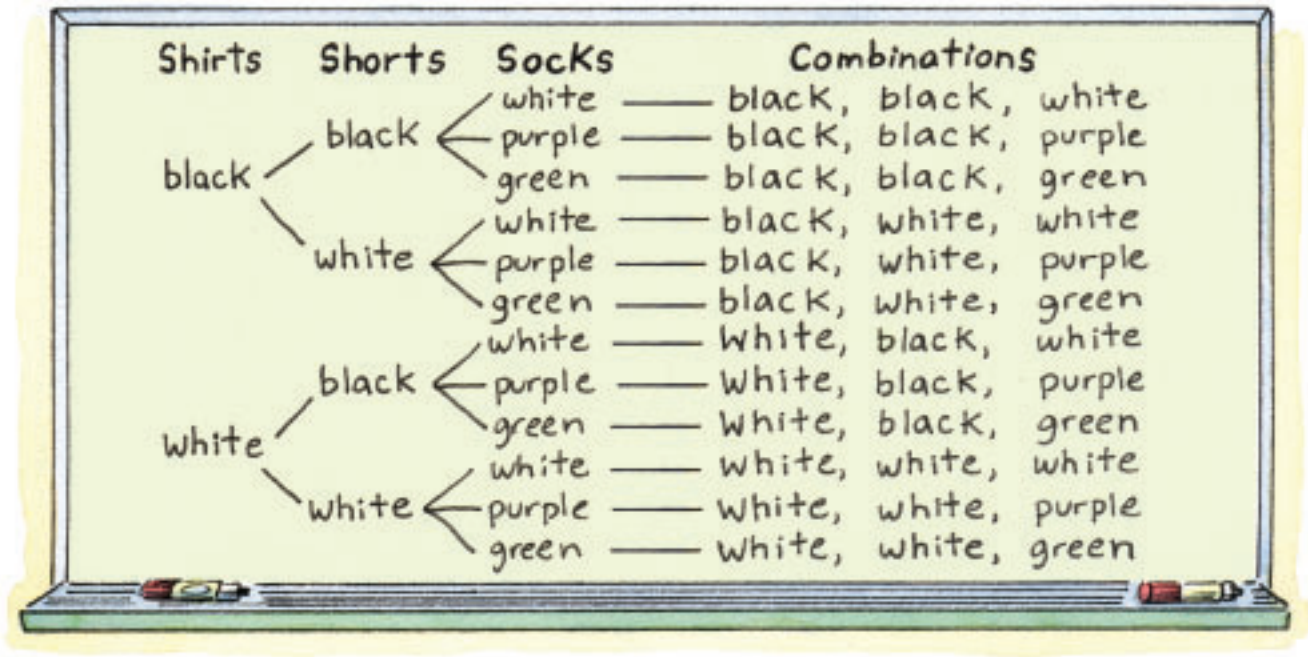
A student is getting dressed in the dark for soccer.
He can pick:

- a black shirt or a white shirt
- black shorts or white shorts
- white socks, purple socks, or green socks

- How many different **combinations** of shirt, shorts, and socks can he make?

Lesson Focus | Use a tree diagram to count outcomes.

➤ Draw a tree diagram.
First, list the shirts.
Next to each shirt, list the shorts.
Next to each pair of shorts, list the socks.
Then list all possible combinations.



There are 12 different combinations.

➤ What is the probability the student has purple socks?
Look at the tree diagram.

Four of the 12 combinations include purple socks.
Since the socks are chosen without looking,
the probability of purple socks is $\frac{4}{12}$, or $\frac{1}{3}$.

Probability = $\frac{1}{3}$

Practice

1. Suneel wants to buy a Raptors jersey and shorts.
The jersey comes in purple, red, and black.
The shorts come in purple and white.

a) How many different colour combinations could Suneel choose?

b) Suppose Suneel picks the colours without looking. What is the probability that both pieces of clothing will be purple?

2. Suppose you visit the nation's capital, Ottawa, on a class trip.
Your class wants to see Parliament Hill, the Supreme Court, and the Canadian Mint.
In how many different orders can you see these sites?

3. Jawaan, Carl, Orenda, and Tansy run the 4 by 100-m relay race.

a) Show the possible orders the 4 students could run in.

b) The coach decides the relay order by picking names out of a hat.
What is the probability Tansy will run first?

c) Is this really how the order would be decided? Explain.

4. Use the information in question 3.
Jawaan is the fastest runner on the relay team.
The coach decides he should run last.
How many different running orders are possible now?

Reflect

How do tree diagrams help you find all possible outcomes?
Use an example to explain.

Numbers Every Day

Mental Math

Estimate each difference.
Which strategies did you use?

4048 − 53
7782 − 3078
1212 − 161
9999 − 9901

LESSON 5

Strategies Toolkit

Explore

Ali, Brian, and Caitlin are to be photographed together.
How many different ways can they be arranged in a line?
What is the probability that Brian and Caitlin will be next to each other?

Show *and* Share

Describe the strategy you used to solve this problem.

Connect

Mayhew School has 4 championship banners to hang in a hallway.
The banners for basketball, volleyball, cross-country, and track and field are hung in line.
How many different ways can the banners be hung?
What is the probability that the banner for basketball will be next to that for volleyball?

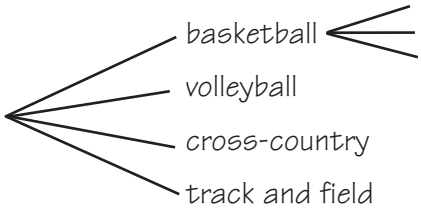
What do you know?
- There are 4 different banners.
- The banners hang in line.

Think of a strategy to help you solve the problem.
- You can **use a model**.

Strategies

- **Make a table.**
- **Use a model.**
- **Draw a diagram.**
- **Solve a simpler problem.**
- **Work backward.**
- **Guess and check.**
- **Make an organized list.**
- **Use a pattern.**
- **Draw a graph**

Use a tree diagram as a model.
Record the different arrangements.
The tree diagram is started below.



Copy and complete the diagram.
How many different arrangements are there?
What is the probability that the banners for basketball and volleyball are beside each other?

How could you have solved this problem another way?

Practice

Choose one of the **Strategies**

1. Matthias is framing a photo of himself to give to his mother as a present. He will use:
- a photo of himself at home, at school, or playing baseball
- a white border or a black border
- a silver frame or a wood frame

How many different presents can he make?

2. Mr. Roe has cards labelled 1, 2, and 3.
He arranges the cards to make a 3-digit number.
What is the probability that the 3-digit number is less than 200?

Reflect

How can using a model help you solve a problem?
Use an example to explain.

LESSON 6

Probability in Games

Explore

Game

What's the Difference?

You will need 2 number cubes, each labelled 1 to 6.

- Each player rolls 1 number cube.
- Find the difference of the numbers rolled.
  If the difference is less than 3, one player gets a point.
  If the difference is 3 or greater, the other player gets a point.
  The first player to score 10 points wins.
- Who do you think is more likely to win? Explain.
- Play the game 10 times.
  Record your results.
  How do your results compare to your prediction? Explain.

Show *and* Share

Share your results with another pair of students.
Do you think this game is fair? Explain.
If not, how could you make it fair?

Connect

Maude and Claude play a game with cards.
The standard deck of playing cards has 52 cards.
There are 4 suits: spades, diamonds, hearts, and clubs
Each suit has 13 cards.



Maude picks a card and records the suit.
She replaces the card in the deck and shuffles the cards.
Claude picks a card.
If Claude's card is the same suit as Maude's,
he scores a point.
If Claude's card is a different suit,
Maude scores a point.
The player with the most points after 10 turns wins.

➤ Which player has a better chance of winning? Explain.

Suppose Maude draws a heart.
To score a point, Claude must draw a heart.
There are 13 hearts in the deck, and 39 other cards.
The probability Claude draws a heart is $\frac{13}{52}$.
The probability Claude does not draw a heart is $\frac{39}{52}$.
So, Maude has a better chance of scoring a point
than Claude.

➤ How could you change the game to make it fair?

Suppose Claude gets a point if his card
is the same colour as Maude's.
If the two cards are different colours,
Maude gets a point.

There are 26 red cards and 26 black cards
in the deck.
The probability Claude draws a red card is $\frac{26}{52}$.
The probability Claude draws a black card is $\frac{26}{52}$.
Now, Claude and Maude have equal chances
of scoring a point.

Numbers Every Day

Number Strategies

Arrange the digits
2, 6, 9, and 0
so the difference is as close
as possible to 5.0.

□.□ – □.□

Practice

1. Brandon and Carla play this game:
Each rolls a number cube labelled 1 to 6.
They use the numbers rolled to make a fraction.
Brandon's number is the numerator.
Carla's number is the denominator.
Carla wins a point if the fraction is less than or equal to 1.
Brandon wins a point if the fraction is greater than 1.
Who do you think has the better chance of winning? Explain.
Play the game with a partner.
Did your results agree with your prediction?

Game

2. Design a fair game that involves tossing 3 coins.
Describe the rules of your game.
Explain how you know the game is fair.

3. Create a game that is not fair.
Describe how you could change the rules to make the game fair.

4. The *Game of Pig* involves strategy and probability.
Here are the rules:

- Roll two number cubes each labelled 1 to 6.
  Find the sum of the numbers rolled.
  These are the points you score.
- You may choose to stop, or you may roll again.
  If you roll a double, your turn is over.
  You score no points for your turn.
- The first player to score 100 points wins.

What strategies could you use to win the *The Game of Pig*?

Reflect

Describe a game you have played that involves strategy and probability.

At Home

List 5 games you like to play.
Which games involve probability?
What other factors affect who wins the game?

Professional Sports Coach

Time out! It's late in the game and the score is close. Your team's coach wants to send out the best players for the last few minutes. But who to send? The top scorers? The best defensive players? The fastest players? The biggest players? The least-tired players?

The professional sports coach uses probabilities, based on an analysis of sports statistics, to help make player and play decisions. The coach knows which players and plays the opposing team is likely to use. From past performances, the coach knows the strengths and weaknesses of both teams. All this information is used in making choices where victory seems most probable. Sometimes, however, a coach may decide to do something completely different, simply because the other team is expecting a choice based on probabilities. The element of surprise has worked in many sports victories!

Unit 11 Show What You Know

LESSON

1 2 3

1. Each letter of the word MATHEMATICS is written on a card. The cards are shuffled. One card is drawn without looking.

a) Which letter is most likely to be drawn?

b) Which letter is least likely to be drawn?

c) What is the probability of drawing each letter?

1 2

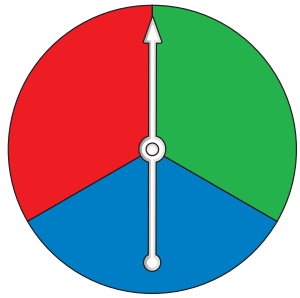
2. Order these events from most likely to least likely. State each probability as a fraction.

a) The pointer on this spinner landing on red

b) Tossing a coin and getting heads

c) Rolling a number cube and getting 5

d) Drawing a diamond from a standard deck of playing cards



Spinner A

2

3. Two number cubes are rolled. Each is labelled 1 to 6. Find the probability of each outcome.

a) The product of the numbers rolled is 1.

b) The product is 30.

c) The product is less than 6.

d) The product is greater than 7.

2 3 6

4. Lynda has a standard deck of 52 playing cards. She shuffles the deck, then draws a card without looking.

a) What is the probability Lynda draws a red card?

b) What is the probability Lynda draws a 4?

c) What is the probability Lynda draws the 4 of diamonds?

LESSON

3

5. Troy rolled a number cube 36 times.
A 6 was rolled 11 times.
1, 2, 3, 4, and 5 were rolled the same number of times.

a) What fraction of rolls were a 3?

b) What fraction of rolls were an even number?

c) Are these results different from what you would expect? Explain.

6. Haley is going to a Calgary Flames game.
She wants to buy an authentic team jersey.
The jersey comes in red, white, or black.
She also wants a cap. It comes in black or navy blue.

a) How many different combinations can Haley choose from?

b) Suppose Haley picks a jersey and cap without looking.
What is the probability that both pieces of clothing will be black?

4

7. In the game *Monopoly*, you roll 2 number cubes, each labelled 1 to 6.
You must roll a double to get out of jail.
What is the probability you will roll a double?
How do you know?

UNIT 11

Learning Goals

- ☑ use the language of probability
- ☑ conduct experiments and predict results
- ☑ use fractions to describe probability
- ☑ use tree diagrams to find probabilities
- ☑ use probability to pose and solve problems

Unit Problem

At the Pet Store!

Work with a partner.
You will need:

- Snap Cubes
- a paper bag
- Bristol board

Part 1 Lucky Silver

A large tank contains 50 fish.
Suppose you pick a fish at random.

- The probability you pick a silver fish is $\frac{1}{10}$.
- The probability you pick a red fish is $\frac{2}{5}$.
- It is equally likely that you will pick one of the remaining orange, blue, black, white, or pink fish.

How many fish of each colour are in the tank?

Part 2 Red, Yellow, and Blue

➤ Choose 3 colours of Snap Cubes to represent 3 different colours of fish.
Put cubes into a bag to match these probabilities:

- The probabilities of picking a yellow fish and a blue fish are the same.
- The probability of picking a red fish is greater.

➤ Try your experiment.
Without looking, draw a cube from the bag.
Have your partner record the colour.
Return the cube to the bag.

➤ Draw a cube 10 times.
Switch roles.
Do your results match the stated probabilities?
Explain.

Part 3

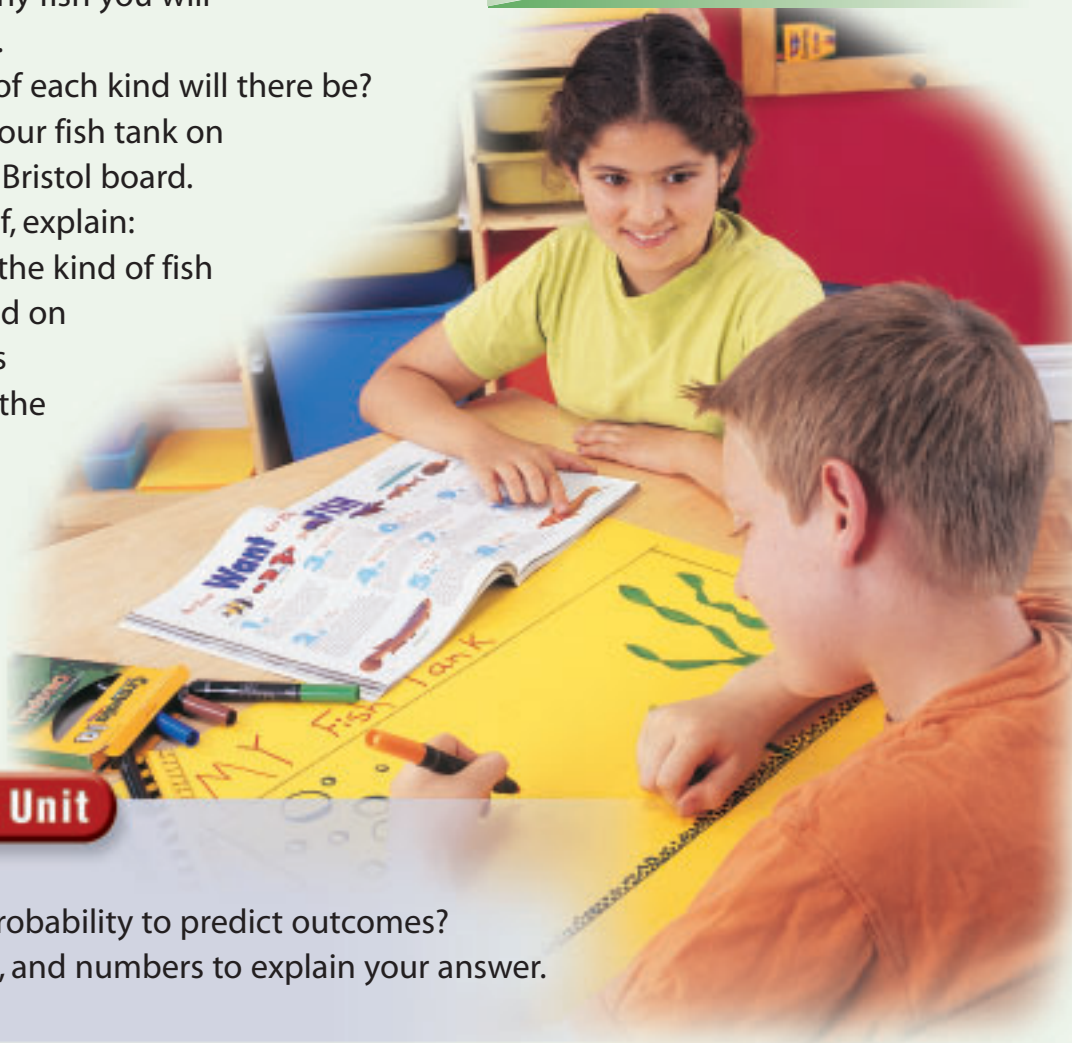
Suppose you are starting a fish tank.

➤ Choose 3 or 4 kinds of fish.
- Decide on the probability of picking each kind of fish.
- Decide how many fish you will have altogether.
  How many fish of each kind will there be?

➤ Make a poster of your fish tank on the top half of the Bristol board.
On the bottom half, explain:
- how you chose the kind of fish
- how you decided on the probabilities
- how you found the number of fish of each kind

Check List

Your work should show
- ☑ specific answers to each of the probability questions, using fractions where appropriate
- ☑ any tables and diagrams you use to find and record your answers
- ☑ clear explanations of your procedures and results
- ☑ correct use of the language of probability



Reflect on the Unit

How can you use probability to predict outcomes?
Use pictures, words, and numbers to explain your answer.

Cross Strand Investigation

The Domino Effect

You will need dominoes, a metre stick, a stopwatch, and grid paper.

Part 1

- Begin with 20 dominoes.
  Stand them on end, 3 cm apart.
  Use a stopwatch.
  Push one domino at one end, so all the dominoes fall.
  Time how long it takes them to fall.
  Record the number of dominoes and the time in a table.
- Repeat with 30 dominoes, 40 dominoes, 50 dominoes, up to 80 dominoes.
- Describe any patterns you see in the table.
- Predict how long it would take 120 dominoes to fall.
  How did you make your prediction?

Part 2

Draw a line graph to display the data in your table.
Describe the graph.
About how long would it take 35 dominoes to topple?
How do you know?

Display Your Work

Report your findings using pictures, numbers, and words.

Take It Further

Investigate different arrangements of dominoes.
What effect does placing the dominoes closer together have on the time it takes them to topple? Explain.
Arrange the dominoes in a curve.
How long does it take them to topple?

Units 1–11 Cumulative Review

UNIT 1

1. Here is the table for an Input/Output machine.

a) The patterns continue.
Write the next 3 input and output numbers.

b) Draw the Input/Output machine for this table.

Input	Output
99	33
96	32
93	31
90	30

UNIT 2

2. Find each result.

a) $2206 + 985$

b) $3436 - 3351$

c) $3689 - 468$

d) 73×24

e) $7808 \div 8$

f) 44×82

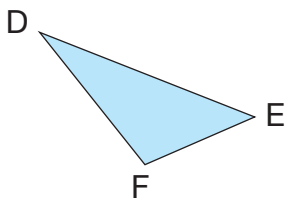
3. Ryan earned $162 babysitting and doing odd jobs.
He earned $5 per hour for 12 h of babysitting.
How much did he earn doing odd jobs?

UNIT 3

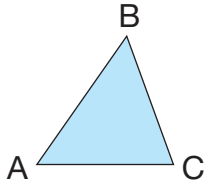
4. Is a rhombus a regular polygon?
How do you know?

5. Name each triangle 2 ways.
How did you choose each name?

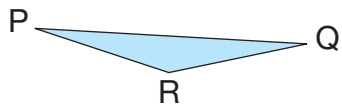
a)



b)



c)



UNIT 4

6. Add, subtract, multiply, or divide.

a) $4.68 - 3.2$

b) $48.7 \div 10$

c) $153.9 \div 10$

d) $12.4 - 3.03$

e) 4.68×100

f) $5.8 + 2.02$

g) $0.56 + 5.6$

h) 20.31×10

7. A decimal with hundredths rounds to 2.
What might the decimal be? Give 3 different answers.

UNIT 5

8. Find the mean and the mode of each set of data.

a) 11, 16, 15, 13, 8, 20, 8

b) 44, 32, 50, 44, 50, 33, 47, 44

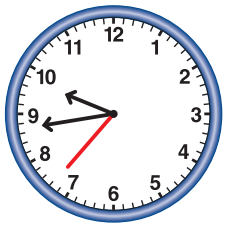
5

9. The table shows the number of Canadians that visited various countries in 2002.
Display these data in a graph.
Which type of graph did you choose to draw? Why?

Country	Canadian Visitors (thousands)
Australia	108
China	140
Cuba	331
France	505
Germany	255
Mexico	607
United Kingdom	720

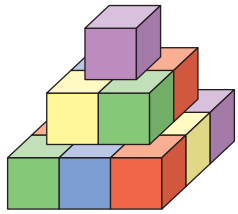
6

10. Use SI notation to write:



a) the exact time
b) the time to the nearest minute

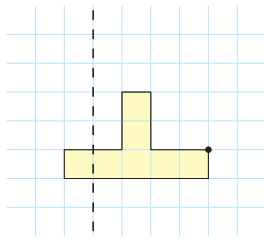
11. This object was made with centimetre cubes.
Find the volume of the object in cubic centimetres and in millilitres.



12. Mobin bought groceries for $71.29.
He paid with two $20 bills and four $10 bills.
He got this change: a $5 bill, a toonie, a loonie, 2 quarters, 3 dimes, and a penny
Did Mobin get the correct change?
How do you know?

7

13. Copy this figure on 1-cm grid paper.
Draw the image after each transformation.



a) a reflection in the broken line
b) a $\frac{1}{2}$ turn clockwise about the dot
c) a translation of 6 squares left

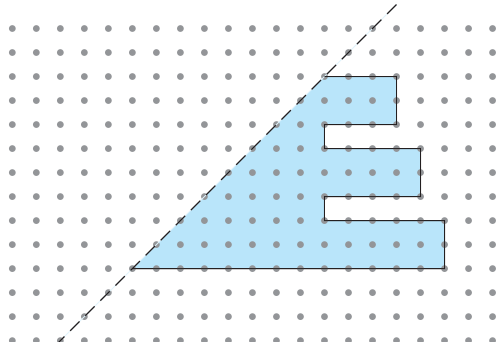
14. Use dot paper.

a) Draw a polygon on dot paper. Label it A.

b) Draw a polygon that is congruent to Polygon A.
Label it B.
How do you know Polygons A and B are congruent?

c) Draw a polygon that is not congruent to Polygons A and B.
Label it C.
How did you decide how to draw Polygon C?

15. Copy the figure and the broken line on dot paper.
Use the broken line as a mirror line.
Draw the mirror image of the figure so the two figures form a new figure.
Is the new figure symmetrical?
How do you know?



16. Copy each statement.
Write a fraction to make each statement true.

a) $1\frac{4}{5} < \square$ **b)** $\frac{7}{10} < \square$ **c)** $\square < \frac{6}{5}$ **d)** $\frac{13}{4} < \square$

17. Write each fraction or mixed number as a decimal.
Then write the decimals in order from least to greatest.
$\frac{15}{4}, \frac{4}{5}, \frac{3}{10}, \frac{9}{2}, \frac{21}{10}$

18. Draw a picture to represent each decimal.
Then write 2 fractions for each decimal.

a) 0.4 **b)** 0.35 **c)** 0.9 **d)** 0.25

19. Find each product or quotient.

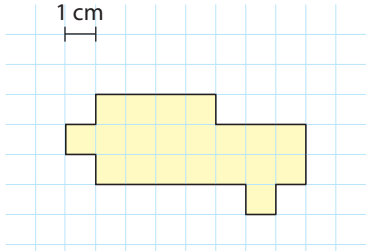
a) 8.63×2 **b)** $29.82 \div 7$ **c)** $45.4 \div 5$ **d)** 3.02×9

20. An ice cream cone costs $1.97.
Hunter bought 5 ice cream cones.
How much did Hunter pay?

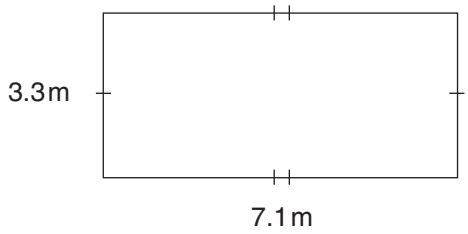
9

21. Find the area and the perimeter of each figure.
Write each perimeter in a different unit.

a)



b)



22. What might the dimensions of each rectangle be?
Give 3 different answers.

a) a rectangle with perimeter 42 cm

b) a rectangle with area 36 m^2

10

23. Multiply 30×4.
Use the product 30×4 to find each missing factor.

a) $30 \times \square = 150$ **b)** $\square \times 30 = 240$

c) $900 = 30 \times \square$ **d)** $30 \times \square = 330$

24. Copy and complete each table for fractions with numerators to 10.

Fraction	Decimal	Fraction	Decimal
$\frac{1}{2}$		$\frac{1}{4}$	
$\frac{2}{2}$		$\frac{2}{4}$	
$\frac{3}{2}$		$\frac{3}{4}$	

11

25. Keltie rolls two number cubes.
Each number cube is labelled 3 to 8.
Find the probability of each outcome.

a) The product of the numbers rolled is 40.

b) The sum of the numbers rolled is less than 8.

c) The product of the numbers rolled is 65.