

2.2 Rates & Unit Rates

Pg 60 Q# 4-6, 8-10, 14, 17-19

3. a) Give two examples of rates that are common in every day life. Share your examples with a classmate.
- b) What units measure each of the rates in part a)?
- c) Explain why a rate cannot be expressed as a percent.

Check Your Understanding

Practise

For help with #4 to #6, refer to Example 1 on pages 56–57.

4. Determine the unit rate in each situation.
 - a) An orca swims 110 km in 2 h.
 - b) A Canada goose flies 800 km in 12.5 h.
 - c) Cathy plants 45 daffodils in 30 min.
5. What is the unit rate in each?
 - a) A blue whale eats 8 t of krill in 2 days.
 - b) The cruising speed of a blue whale allows it to travel 193 km in 10 h.
 - c) A bull moose bellows 15 times in $2\frac{1}{2}$ h.
6. Gina earns \$78.00 for working 6 h. Asad makes \$192.50 after working 14 h. Determine each person's unit rate of pay. Who has a greater hourly rate of pay?

For help with #7 to #9, refer to Example 2 on pages 57–58.

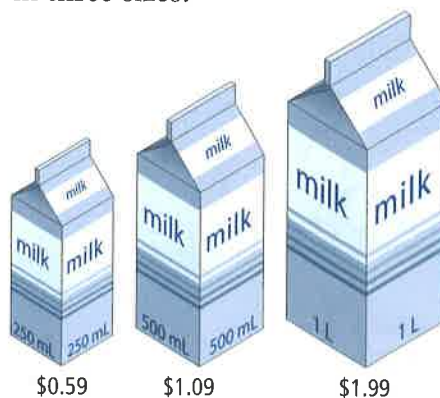
7. The table shows the price of different-sized packages of mixed nuts.

Nut Package	Mass	Price
1	300 g	\$2.19
2	500 g	\$3.09
3	700 g	\$4.83

- a) What is the unit price per 100 g for each package?

- b) Which package is the best buy? Explain your choice.

8. Fraser is shopping for milk. It is available in three sizes.



- a) What is the unit price for each carton of milk?
- b) What is the unit price per 100 mL for the 1-L carton?
- c) Which carton of milk is the best buy? Explain why.

9. Mala is shopping for honey. Her favourite brand is available in two sizes.



- a) Estimate which is the better buy. Show your thinking.
- b) Determine the better buy. Show your work.

Apply

10. Trevor rode his mountain bike 84 km in 3 h. Jillian rode 70 km in 2.5 h. Who is the faster cyclist? How do you know?
11. Shannon buys 12 granola bars for \$9.96.
- Determine the price per bar. Give your answer in dollars and cents.
 - Explain whether your answer in part a) is a ratio or a rate.
12. The rate at which glaciers melt is increasing globally. The Saskatchewan Glacier near Banff has receded 1.5 km in the last 75 years. The Peyto Glacier shown below receded 1320 m from 1923 to 1993. Which glacier had the greater annual rate of melting?



13. The table shows driving information for three drivers. Metric fuel consumption is measured in L/100 km, or litres per kilometre.

Driver	Distance (km)	Fuel Used (L)
Joe	400	28
Sarah	840	60
Martin	245	20

- What is the fuel consumption for Sarah's vehicle in litres per kilometre? Give your answer to four decimal places.
- How could you change the answer in part a) to express it in L/100 km?
- Which driver's vehicle had the lowest fuel consumption?

14. Conversion rates among currencies vary from day to day. The numbers in the table give the value in foreign currency of one Canadian dollar on one particular day.

Canadian	U.S.	Australian	European Union
1.00 dollar	0.8857 dollars	1.1527 dollars	0.6940 euros

- What was the value of \$600 Canadian in euros?
 - What was the value of \$375 Canadian in U.S. dollars?
 - What was the value of \$450 Canadian in Australian dollars?
15. Cindy Klassen from Winnipeg, Manitoba, won five speed skating medals at the 2006 Olympics. As of March 2006, she held the world record in the 1000 m, the 1500 m, and the 3000 m distances. Her times are shown in the table.

Time (min:s)	Distance (m)
1:13.11	1000
1:51.79	1500
3:53.34	3000



- Express each time in seconds.
- What was Cindy's speed in metres per second for her 1500 m record?
- How far does she skate in 10 s for the 3000 m distance?

Extend

16. Twins, Daniel and Grace, take turns mowing the lawn. Last week Grace mowed the lawn in 45 min. This week Daniel mowed the lawn in 40 min.
- What is the average mowing rate per hour for each twin? Give each answer to the nearest hundredth.
 - What is the difference between Daniel's and Grace's mowing rates?
17. The time it takes a planet to make one revolution of its axis is a day on that planet. Consider each planet to be a sphere. So, if you are standing on the equator of a planet, you are travelling in a circle as the planet spins on its axis. Use the table to find the rotation rate in kilometres per hour for each planet.

Planet	Radius at Equator (km)	Length of Day (h)
Venus	6 051	2 808
Earth	6 378	24
Saturn	60 268	10 233

The formula relating the circumference, C , of a circle to its radius is $C = 2 \times \pi \times r$.

18. Chad went to the bank to get some U.S. dollars for a trip to the Grand Canyon. He paid \$500 Canadian and received \$441.15 U.S.
- What was the conversion rate for exchanging Canadian dollars to U.S. dollars? Give your answer to four decimal places. What does your answer represent?
 - How many U.S. dollars would Chad receive for \$700 Canadian at the rate in part a)?
 - Two days later, Chad returned to the bank and converted the \$441.15 U.S. back to Canadian dollars. He received only \$492.25 Canadian. What was the bank's conversion rate on that day for exchanging U.S. dollars to Canadian dollars? Give your answer to four decimal places.
 - How many U.S. dollars would Chad receive for \$700 Canadian at the rate in part c)?
19. Express 60 km/h in metres per second.

MATH LINK

Kheer is a traditional rice pudding made in India and Pakistan. Pakistani kheer tends to be thicker than the Indian version. Look at the recipe for kheer. If the original recipe serves four people, calculate the quantity of each ingredient you need to serve 10 people. Use ratios and rates to support your reasoning.



Kheer

Ingredients:

- 125 mL rice (basmati)
- 1 L milk
- 50 mL raisins
- 250 mL sugar
- 5 mL cardamom (or nutmeg)
- 50 mL almonds (slivered)

Method:

- Wash rice well.
- Boil milk and add rice. Simmer on low heat until rice is soft, stirring frequently to prevent sticking.
- When the rice is cooked and the mixture gets a semi-thick creamy consistency, add sugar and stir well.
- Remove from heat and add cardamom, slivered almonds, and raisins.
- Serve warm or chilled.