Applications of Percents

Mike's mother is taking him with his friends Tran and Gerry to a go-kart track in Saskatoon for his birthday.

Discuss the Math

How can you apply percents to solve problems?

1. The sign shows the cost of go-karting. What is the cost per lap if you purchase the 20-lap package?

Welcome To Funtrack

$1.75/lap or 20 laps for $30.00

2. Tran was not sure if he will like go-karting so he asks for tickets for 5 laps only. The other three each choose the 20-lap tickets. Estimate, and then calculate, the total cost of the tickets before tax.

3. An adult and three children qualify for the 25% family discount.
   a) Calculate the amount of the discount.
   b) What is the total cost of the tickets after the discount?

4. GST is added to the cost of go-karting.
   a) What percent is the GST in Canada?
   b) Use your knowledge of percent to estimate the amount of GST.
   c) Use a calculator to find the exact amount of the GST to be added to the go-karting bill.
   d) What is the total cost of the tickets, including tax?

Literacy Link

GST means Goods and Services Tax.

PST means Provincial Sales Tax.

5. Each person is required to wear a helmet. Helmet rental is $5.00 plus GST and PST.

   a) What is the cost to rent four helmets before tax?

   b) The PST in Saskatchewan is 5%. How much PST and GST is charged to rent four helmets?

   c) What is the cost to rent four helmets, including tax?

6. What is the total cost for go-karting?

Reflect on Your Findings

7. a) What total amount of tax is charged in your area?

   b) Describe how you could estimate the total tax on a purchase in your area. Would your estimate be high or low?

   c) How could you estimate and calculate a discount?

Example: Use Percents to Make Comparisons

Lauren bought and planted two packages of flower seeds to use in her science fair project. Package A contained 44 seeds of which 32 grew into plants. Package B contained 36 seeds of which 27 grew into plants. Which package of seeds was better?

Solution

Method 1: Estimate the Percents

Use mental math techniques to estimate the percent of growth.

Package A:
32 out of 44 seeds grew.
50% of 44 is half of 44.
Half of 44 is 22.
25% is half of 50%.
Half of 22 is 11.
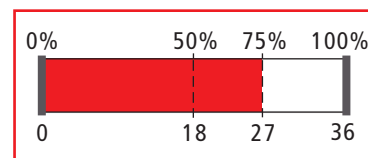50% + 25% = 75%
    22 + 11 = 33   *A little high.*

A little less than 75% of the seeds from Package A grew.

Package B:
27 out of 36 seeds grew.
50% of 36 is half of 36.
Half of 36 is 18.
25% is half of 50%.
Half of 18 is 9.
50% + 25% = 75%
    18 + 9 = 27

Exactly 75% of the seeds from Package B grew.

Package B was better than Package A.

Method 2: Calculate the Percents

Package A: *Package B:*

C 32 ÷ 44 = 0.727272727   C 27 ÷ 36 = 0.75

$\frac{32}{44} = 0.7\overline{2}$ $\frac{27}{36} = 0.75$

> When you round a decimal value, the number becomes approximate.

≈ 0.727 to 3 decimal places

0.727 = 72.7%   0.75 = 75%

Package A had 72.7% growth.   Package B had 75% growth.

Since 75% > 72.7%, Package B was better than Package A.

Key Ideas

- Decimal numbers and percents are often easier to compare than fractions.
- When you round a decimal value, the number becomes approximate. Fractions are exact numbers.

Communicate the Ideas

1. **a)** Measure the heights of yourself, a friend, and the classroom door.
   b) Explain how to estimate your height as a percent and as a fraction of the door height.
   c) How can you calculate your height as a percent and as a fraction of the door height?
   d) Check your suggestions for b) and c) with the height of your friend. Do they work?

2. Bruce is practising throwing darts. He hits the bulls-eye 26 times out of 40 shots.
   a) Show this result as a fraction, a decimal number, and a percent.
   b) Which type of number do you think is best to explain his results? Justify your response.

3. Carly and Shannon are practising their free-throw shots. Carly makes 23 out of 25 shots. Shannon makes 18 out of 20 shots.
   a) Show each girl's result using a fraction, a decimal number, and a percent.
   b) Which type of number is best to compare their results? Explain why.

4. Estimate which percent is larger. Then calculate each percent.

   a) 50% of 184 or 25% of 208

   b) 10% of 640 or 1% of 325

   c) 35% of 140 or 70% of 60

5. 1% of a number is $5.40.

   a) What is 10% of the number?

   b) What is 25% of the number?

   c) What is 100% of the number?

   d) How is the answer in c) related to the answer in b)?

For help with #6 and #7, refer to the Example on pages 141–142.

6. Melissa's father bought two groups of chicken eggs to hatch for his kindergarten class. First he bought 28 eggs of which 14 hatched. Then he bought 36 eggs of which 20 hatched. Which group of eggs was better?

7. A school librarian placed two orders for new books. There were 68 books in the first order of which 24 were adventure novels. There were 82 books in the second order of which 35 were adventure novels. Which order of books had the greater percent of adventure novels?

8. Natalie volunteers in the community library. On Tuesday, 378 people visited the library, and 342 people signed out books. On Thursday, 480 people visited the library, and 420 people signed out books. On what day did a greater percent of people sign out books?

9. Desmond wants to list the foods shown in descending order according to the percent of protein content.

Food	Protein (g)	Mass of Food (g)
Roast turkey	18	84
Ground beef	30	142
Almonds	10	45
Tuna	32	150

   a) What is the percent of protein for each food? Give your answers to the nearest tenth of a percent.

   b) Arrange the foods in descending order of their percent of protein content.

10. A vacation package at a travel agency costs $1240. The package is advertised at 20% off. What is the new price of the package? Show your reasoning.

11. A snowboard shop is clearing last year's stock at 35% off.

SALE 35% OFF!

$199.99

   a) Estimate the amount of discount for boots that were regularly priced at $199.99.

   b) Calculate the amount of discount.

   c) What is the final sale price before tax?

12. A transit company wants to raise its fares by 15% beginning April 1st. Current ticket prices are $1.90 for adults and $1.40 for students.

  a) What is the exact value of each increased ticket price?

  b) Transit officials want to have ticket prices ending in 0 or 5. Do you think this is a good idea? Explain.

  c) What are the increased ticket prices rounded to the nearest multiple of 5?

13. Naomi is the manager of a restaurant in Yellowknife. Her annual salary is $40 691.00. After a performance review, her boss awards her a pay raise of 8.5%.

  a) What is the amount of her salary increase?

  b) What is her new annual salary?

14. The chart shows the weekly pay for a number of part-time workers. Each worker gets a pay raise as shown.

Worker	Weekly Pay	Weekly Pay Raise
Meagan	$210.00	$30.00
Carl	$378.95	$45.50
Billi	$410.50	$41.55

  a) Which worker received the largest dollar increase?

  b) What is the percent increase for each worker? Give each answer to the nearest tenth of a percent.

  c) Which worker received the largest percent increase?

15. The chart gives the lengths of some Western Canadian rivers.

River	Length (km)
Churchill	1608
Fraser	1368
MacKenzie	1800
North Saskatchewan	1392
Thelon	904

  a) What is the length of the Fraser River as a percent of the length of the MacKenzie River? Round your answer to the nearest whole percent.

  b) Estimate the length of the Thelon River as a percent of the length of the Churchill River. Express your estimate as a whole percent.


16. The table shows the number of boys and girls in a school who wear glasses.

	Wear Glasses	Total Population
Girls	120	420
Boys	136	450
Total	256	870

  a) Estimate the percent of girls who wear glasses.

  b) What percent of the boys wear glasses? Give your answer to the nearest tenth of a percent.

  c) What percent of all the students who wear glasses are boys? Give your answer to the nearest tenth of a percent.

  d) What is the number of girls who do not wear glasses as a percent of the total school population? Give your answer to the nearest tenth of a percent.

17. Alicia is planning a trip to the beach while visiting relatives abroad. She needs to buy each item shown.

Sun Screen LOTION

$5.49

$21.87

$11.99
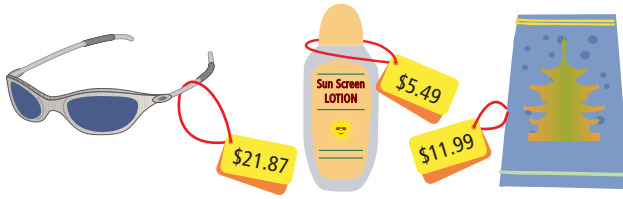
a) Estimate her total cost before tax.

b) The country she is visiting charges 5% tax on purchases. Estimate her total cost after tax.

18. A northern airline flies passengers and freight from Winnipeg to Baker Lake with stops in Churchill and Rankin Inlet. One plane can carry up to 50 passengers with no freight. To each location along the flight, the plane carries a different amount of freight.

Location	Amount of Load as Freight		
	Percent	**Decimal**	**Fraction**
Winnipeg	10%		
Churchill		0.50	
Rankin Inlet			$\frac{1}{4}$
Baker Lake		0.75	

a) Copy and complete the table showing the amount of load that is carried as freight to each location along the flight.

b) For each location, what percent of the load is carried as passengers?

Extend

19. 81 is 45% of what number?

20. 30% of a number is 48.

a) What is 80% of the same number?

b) What is the number?

21. Emon spends 80% of his income and saves the rest. He saves $11 000 a year. What is his annual income before any deductions?

22. There were 760 girls and 740 boys who wrote a grade 6 achievement test. 65% of the girls and 55% of the boys scored more than 60%. What percent of the population that wrote the test scored 60% or less? Give your answer to the nearest whole percent.

MATH LINK

Collect at least ten headlines or advertisements that use fractions, decimals, or percents from newspapers, magazines, the Internet, or signs.

Copy and complete this table in your notebook. Use it to show the numbers in each headline in three different ways.

Sentence or Phrase	Source	Fraction	Decimal	Percent
Almost 60%, or 700 000 tonnes, of Canada's beef is produced in Alberta.	http://www.mysource	$\frac{60}{100} = \frac{3}{5}$	0.60	60%
Sunglasses 25% off	store window	$\frac{25}{100} = \frac{1}{4}$	0.25	25%