

Goldstream Village

Math Trail



The archway spans Goldstream Avenue between Langford Centre and the Goldstream Station residential/retail complex. The grid iron architecture invokes the train heritage of E & N Railway and the refurbished trestles of the Galloping Goose Trail, both of which run through Langford. The arch itself is painted in Langford's signature burgundy and proudly flies the City flag above the stout wooden pillars. The signs are green and gold: two colours that pay tribute to Langford's lush surroundings including Goldstream Provincial Park, and the adventurous goldpanning history of the community.

~ The City of Langford

Created by Carla Evans
For Jill Britton
Math 113
March 2011



Welcome to the beautiful Goldstream Village in Langford, BC. Along this street there are many shapes and designs, along with patterns and numbers.

Let's get to exploring!

What is a Math Trail?

A trail in which children create, or follow, that allows them to experience the math they have learned in a classroom setting to be applied to the real world. A math trail can be made of any number of questions along a path in any area. Great examples of areas include, but are not limited to, schools, parks, city centres, and residential neighbourhoods. A math trail simply allows a child to explore and experience math in their environment.

"You will find math in the darnest places"

~ Mr. Spirit, Donald Duck in Mathmagic Land

What do you need?

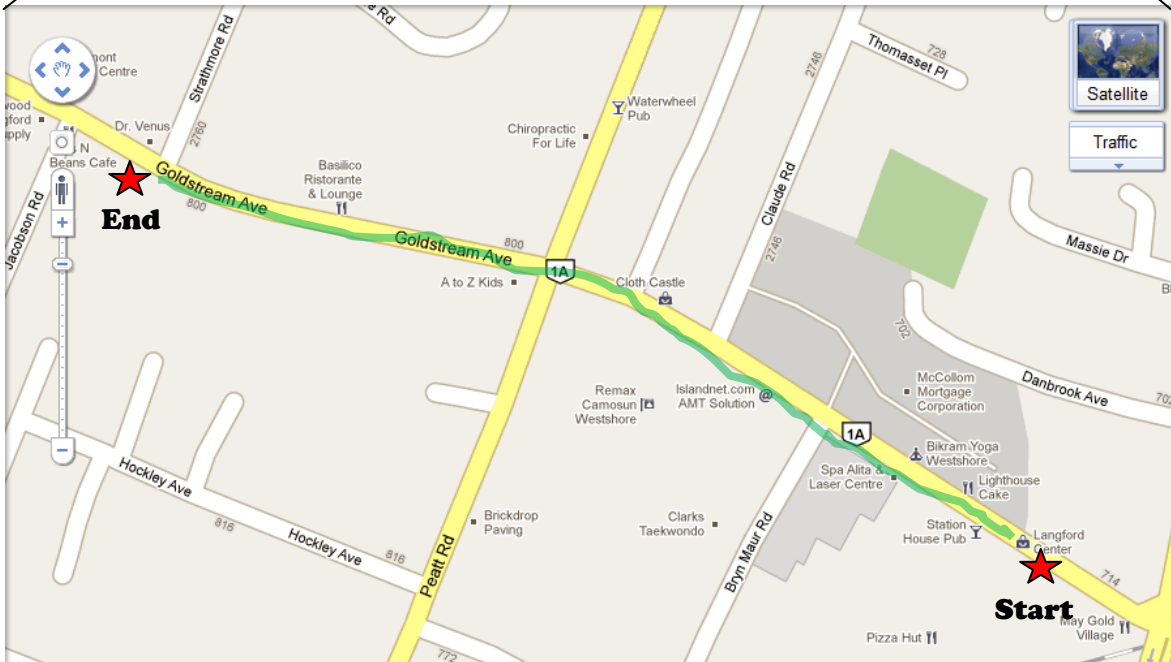
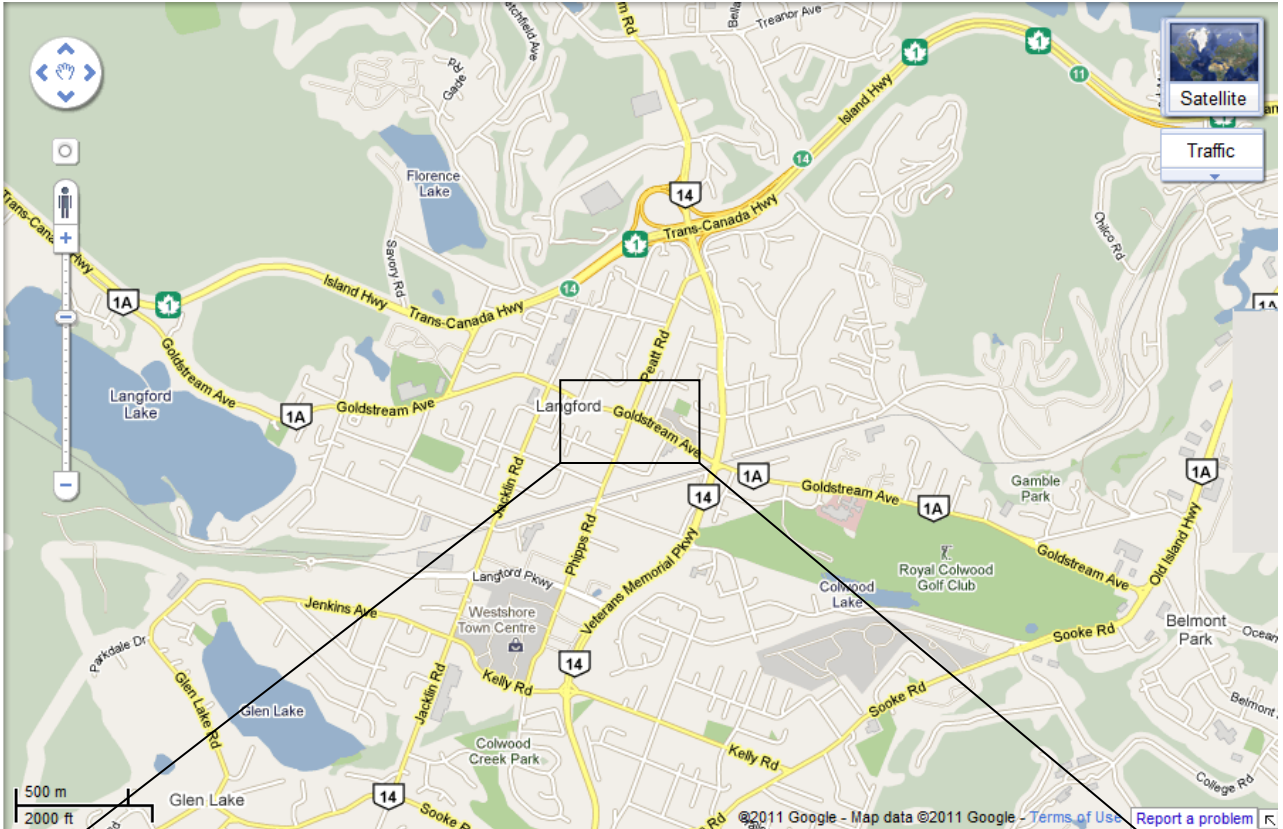
- Yourself
- Your math brain
- Pencil
- Paper and clipboard (or something to easily write on)
- Tape Measure (optional)
- Calculator (optional)
- Map (provided on next page)

The Goldstream Math Trail

This math trail has been designed for Grade 8 math students. All the questions and methods of finding the outcomes, if desired, can be altered to be adapted towards any other grade level. To access the Prescribed Learning Outcomes for specific grades you can visit <http://www.bced.gov.bc.ca/irp/subject.php?lang=en&subject=Mathematics>.

Maps

Langford, BC



700-900 Block Goldstream Avenue

✦ **Welcome to Goldstream Village Archway**

Starting at the 700 block of Goldstream Avenue you will see the welcome archway.



a) What shapes make the arch? What shape is the most common and why do you believe it is used?

- b) The pillars are standing on two stone stands. How would you estimate how many rocks make the stand?
- c) *Optional – Use a tape measure and measure the stand. What is the surface area?



✦ **Follow the Salmon Brick Road**



- a) As you walk down Goldstream Avenue, do you notice the pattern on the sidewalk? What shapes do you see?
- b) How do these shapes fit together and why does the combination work?
- c) What is type of pattern is this?

✦ **Langford Trolley**

Walking down the salmon brick road you pass the Langford Trolley Bank of Montreal stop.



MILLSTREAM ROUTE	Loop 2	Loop 4	Loop 6	Loop 7	Loop 9	Loop 11
Depart West Shore Town Centre	10:40	12:00	1:20	2:40	4:00	5:20
City Centre Park	10:42	12:02	1:22	2:42	4:02	5:22
Wal-Mart	10:44	12:04	1:24	2:44	4:04	5:24
E&N Rail	10:46	12:06	1:26	2:46	4:06	5:26
Centennial Park	10:49	12:09	1:29	2:49	4:09	5:29
Spencer	10:50	12:10	1:30	2:50	4:10	5:30
Gordon United	10:51	12:11	1:31	2:51	4:11	5:31
Lavender Square	10:52	12:12	1:32	2:52	4:12	5:32
Bank of Montreal	10:53	12:13	1:33	2:53	4:13	5:33
Reflections	10:54	12:14	1:34	2:54	4:14	5:34
Marlisa	10:55	12:15	1:35	2:55	4:15	5:35
Pharmasave	10:58	12:18	1:38	2:58	4:18	5:38
The Market	11:00	12:20	1:40	3:00	4:20	5:40
Millstream Village	11:02	12:22	1:42	3:02	4:22	5:42
Home Depot	11:03	12:23	1:43	3:03	4:23	5:43
Fire Hall	11:04	12:24	1:44	3:04	4:24	5:44
Massie	11:05	12:25	1:45	3:05	4:25	5:45
Westbrook Mall	11:06	12:26	1:46	3:06	4:26	5:46
Strathmore	11:07	12:27	1:47	3:07	4:27	5:47
Carlow	11:09	12:29	1:49	3:09	4:29	5:49
Station	11:13	12:33	1:53	3:13	4:33	5:53
Phipps	11:15	12:35	1:55	3:15	4:35	5:55
Brittany	11:18	12:38	1:58	3:18	4:38	5:58
Wal-Mart	11:20	12:40	2:00	3:20	4:40	6:00

- How often does the bus stop here?
- If I wanted take the bus to Millstream Village, how long would the ride approximately take?
- To get to the firehall by 12:50pm, what time do I have to be at this stop?

★ Goldstream Station

The bus stop is also next to the Goldstream Station shopping plaza. Look at the address numbers attached to the sign.

- What do you notice about the numbers?
- Why do you think they are like that?



✦ Goudy Library



As you walk along further you will pass the Goudy Public Library.

- If you have a children's card you pay \$0.10 per book per day and \$1.50 per DVD per day in fines if it is overdue. Write an equation to determine fines.
- You have checked out 5 books and 3 DVDs. Unfortunately, you also returned them 3 days after the due date. What was the total fine?
- You can have up to a maximum of \$10 dollars on your account before you are prevented from further borrowing until it is paid. Are you over \$10? If so, at least how much do you have to pay to get under it, so you are able to check out items?

✦ Planting Circles

Just after the library, but before the fountain, you will see three planters (2 terracotta and 1 grey)

- Using your hands (as a unit) find the diameter and radius of the circle. Using the formula for the circumference of a circle ($C = 2\pi r$). Verify using your hands find the circumference of the circle at the top of the planter.
- Using the formula for the area of circle ($A = \pi r^2$). Find the area of the top soil surrounding the plants.



★ Fountain



You have reached the centerpiece feature of Goldstream Village, the fountain at the roundabout.

- Do you notice a pattern that the water cycles through? Is it a simple pattern or complex?
- Approximately how long is the cycle?

★ At the Caprice

Admission

General Admission \$6.75
(Book of 6 - \$33.75)

Children & Golden Age \$ 4.50
(Book of 6 - \$22.50)

- How much is it a family of four (2 kids and 1 parent and 1 grandparent)?
- With tax (12%) how much is the grand total?
- How does a person save if they have a book of tickets?



✦ Langford Professional Building

Go to the stairs.

- How would you calculate the surface area of the side you see under the stairs?
- It's April Fools Day. You want to fill the area underneath with packing peanuts. How would you calculate the volume of the area underneath to know how much packing peanuts you need? How would you find the volume?



✦ Crosswalk Signals



You have reached the Goldstream Avenue and Peatt Road intersection. (For your safety please do NOT stop in the middle of the street while crossing.)

- Press the button to cross. When the signal has changed to walk count how long it takes before it changes back to the hand.
- About how far did you make it across before it changed? Would it be safe to start crossing once the hand appears?

✦ **Wooden Patio Entrance**

Walk up the street past the consignment shop. You will pass the Jesken Aerie Assisted Living Residence. To the right of the building you will see a patio area with this wooden arbour entrance.

- Ignore the design, find lines of symmetry in the shape.
- Is the design symmetrical? Why or why not?



✦ **Westshore Barber Shop**



Across the driveway of Jesken Aerie, is the barber shop.

	A.M.	P.M.
MONDAY	10:00	7:00
TUESDAY	8:30	5:30
WEDNESDAY	8:30	5:30
THURSDAY	8:30	5:30
FRIDAY	8:30	5:30
SATURDAY	CLOSED	
SUNDAY	CLOSED	

- How many hours is the barber shop open in a week?
- If the barber makes \$15.50 per hour. How much does he make if he works all the hours in the week?

 **Tim Hortons**

Keep walking along Goldstream. You will reach Tim Hortons. Go to one of the circular tables outside.



- a) What do you notice about this picnic table in comparison to ones you have seen in the past? What do you notice about the shape?
- b) How many people can you fit at it? How would you go about finding the solution? How many methods can you think of the solution?

You are on the side of the building there is a parking lot. Find the parking spot with the accessible symbol painted on it (below). Find a free parking spot near it that does not have any symbols on it. (to the right)



Using your feet as units, find the following:

- What is the area of the accessible spot?
- What is the area of the other spot?
- Which one is larger? By how much?

Let's go inside!

You and your friend are exhausted from the math trail. You decide to go into Tim Hortons and order two medium hot chocolates and 2 donuts. If tax was 12%, how much change would you get back from five dollars?

ALWAYS BAKERY FRESH		EACH	1/2 DOZEN	DOZEN
DONUTS		9¢	45¢	64¢
MUFFINS		11¢	56¢	99¢
GOURMET COOKIES		89¢	459¢	699¢
CINNAMON ROLLS		119¢	409¢	614¢
DANISH	145¢	CROISSANTS	145¢	
TIMBITS	19 10/	190 20/	339 40/	599
ENGLISH MUFFINS				104
BAGEL WITH BUTTER	115	WITH CREAM CHEESE	185	
TEA BISCUITS • PLAIN	60	• CHEESE OR RAISIN	90	
OATMEAL	199	YOGURT & BERRIES	199	

Ask for a nutrition guide or visit us at timhortons.com

HOT BEVERAGES	SMALL	MEDIUM	LARGE	X-LARGE
COFFEE	116	128	152	167
DECAF/PRESSED DECAF	116	128	152	167
FRENCH VANILLA	147	156	183	219
Cappuccino	167	183	205	232
TIM MUG WITH COFFEE			399	469
HOT CHOCOLATE	116	128	152	167
STEEPED/SPECIALTY TEA	116	128	152	167
HOT SMOOTHIE <small>AVAILABLE IN 4 TIM HORTONS</small>	147	156	183	219

You have reached the end of the math trail.

Hopefully, you have some change and are able to enjoy a donut or drink for all your hard work. I had a lot of fun creating this math trail and I hope you enjoyed going through it. Now that you have experienced a math trail....go try making one yourself.



The End!

**Thanks for
visiting Langford!**

Goldstream Village

Math Trail

Answer Key



Answer Key

✦ **Welcome to Goldstream Village Archway**

Starting at the 700 block of Goldstream Avenue

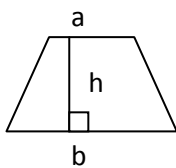
- a) What shapes make the arch? What shape is the most common and why do you believe it is used?

Arcs, triangles, ovals, arcs (chords), rectangles,

- b) The pillars are standing on two stone stands. How would you estimate how many rocks make the outside of stand?

The stand is a 3D trapezoid (aka trapezoidal prism or square frustrum). (Multiple possibilities for estimation.) Count one side and multiply by four sides. Count half the area and double for one side and multiply by four for the four sides.

- c) *Optional – Use a tape measure and measure the stand. What is the surface area? What is the volume?



Area of a trapezoid: $A = h \left(\frac{a+b}{2} \right)$

$a = 86 \text{ inches}$
 $b = 109 \text{ inches}$
 $h = 61 \text{ inches}$

$$A = 61 \left(\frac{86 + 109}{2} \right)$$

$$A = 61 \left(\frac{86 + 109}{2} \right)$$

$$A = 61(97.5)$$

$$A = 5947.5 \text{ inches}^2$$

✦ **Follow the Salmon Brick Road**

- a) As you walk down Goldstream Avenue, do you notice the pattern on the sidewalk? What shapes do you see?

Squares and octagonals

- b) How do these shapes fit together and why does the combination work?

The highlighted shape of the octagonal and square are joined are reduplicated and joined through rotation.



- c) What type of pattern is this?

This is a tessellating pattern.

✦ **Langford Trolley**

Walking down the salmon brick road you pass the Langford Trolley Bank of Montreal stop.

- a) How often does the bus stop here?

*The bus stops here at 10:53am, 12:13pm, 1:33 pm, 2:53 pm, 4:13 pm, 5:33 pm.
(12:13-10:53= 1h 20, 1:33-12:13= 1h 20, 2:53-1:33= 1h 20, 4:13-2:53 = 1h 20,
5:33-4:13= 1h 20)*

*The bus stops here every 1 hour and 20 minutes between the period of 10:53am
and 5:33pm.*

- b) If I wanted take the bus to Millstream Village, how long would the ride approximately take?

11:02am – 10:53am = 9minutes

*If I take the bus at 10:53 and arrive at Millstream Village at 11:02am, the bus ride
would be approximately 9 minutes.*

- c) To get to the firehall by 12:50pm, what time do I have to be at this stop?

*I would need to take the 12:13pm bus here and I would arrive at the firehall by
12:24pm and I would be there 26 minutes early.*

✦ **Goldstream Station**

The bus stop is also next to the Goldstream Station shopping plaza. Look at the address numbers attached to the sign.

- a) What do you notice about the numbers?

The address numbers are all odd (735, 737, 745, 751, 755)

- b) Why do you think they are like that?

Any reasonable answer appropriate. Examples:

- 1) Safety: Letter carriers need to deliver mail safely; therefore, when letter carriers sort their mail in order with even in one bundle and odd in another and will walk up one side of the road and then back down the other side.*
- 2) Easier to find an address if it alternates 1 on one side and 2 on the opposite and alternate. A person would know to look on the one side for the building if the address was even and odd on the other side.*

✦ **Goudy Library**

As you walk along further you will pass the Goudy Public Library.

- d) If you have a children's card you pay \$0.10 per book per day and \$1.50 per DVD per day in fines if it is overdue. Write an equation to determine fines.

Let b = the number of books

Let D = the number of DVDs

Let d = the days they are overdue

Let f = the total fine

$f = d(\$0.10b + \$1.50D)$

- a) You have checked out 5 books and 3 dvds. Unfortunately, you also returned them 3 days after the due date. What was the total fine?

$$f = d(\$0.10b + \$1.50D)$$

$$b = 5 \text{ books}$$

$$D = 3 \text{ DVDs}$$

$$d = 3 \text{ days overdue}$$

$$f = 3[\$0.10(5) + \$1.50(3)]$$

$$f = 3(\$0.50 + \$4.50)$$

$$f = 3(\$5.00)$$

$$f = \$15.00$$

The total fine for these items being overdue is \$15.00.

- b) You can have up to a maximum of \$10 dollars on your account before you are prevented from further borrowing until it is paid. Are you over \$10? If so, at least how much do you have to pay to get under it, so you are able to check out items?

The fines are \$15.00. To be under \$10, the amount needs to come down to \$9.99.

$$\$15.00 - \$9.99 = \$5.01$$

I need to pay at least \$5.01 to have the fines under \$10.00.

★ **Planting Circles**

Just after the library, but before the fountain, you will see three planters (2 terracotta and 1 grey)

- a) Using your hands (as a unit) find the diameter and radius of the circle. Using the formula for the circumference of a circle ($C = 2\pi r$). Verify using your hands find the circumference of the circle at the top of the planter.

Answers will vary depending on size of hands and which way they use their hands. Sample of measures:

	Grey			Terracotta		
	wrist to finger	inches	cm	wrist to finger	inches	cm
Diameter	5.5	42	107	5	35	89
Radius	2.75	21	53.5	2.5	17.5	44.5
Circumference	18.5	132	336	17.5	110.25	280

- b) Using the formula for the area of circle ($A = \pi r^2$). Find the area of the top soil surrounding the plants.

Answers will vary with size of hands used.

Using the above measurements

Grey

$$A = \pi r^2$$

$$A = \pi 2.75^2$$

$$A \cong 23.75 \text{ hands}^2$$

$$\text{Actual: } 1384.74 \text{ inches}^2 \text{ (8987.465cm}^2\text{)}$$

Terracotta

$$A = \pi r^2$$

$$A = \pi 2.5^2$$

$$A \cong 19.63 \text{ hands}^2$$

$$\text{Actual: } 961.625 \text{ inches}^2 \text{ (6732.85cm}^2\text{)}$$

★ **Fountain**

You have reached the centerpiece feature of Goldstream Village, the fountain at the roundabout.

- a) Do you notice a pattern that the water cycles through? Is it a simple pattern or complex?

(Note the answer is subject to the fountain working and pattern that was observed March 2011). The pattern is complex as each phase somewhat overlaps. And the second half of the phases is the same as the first but with the four flower-like spray.

- b) Approximately how long is the cycle?

Approximately 23 seconds.

★ **At the Caprice**

Admission

General Admission \$6.75
(Book of 6 - \$33.75)

Children & Golden Age \$ 4.50
(Book of 6 - \$22.50)

- a) How much is it a family of four (2 kids and 1 parent and 1 grandparent)?

3 tickets at \$4.50 and 1 ticket at \$6.75

$$\$4.50 + \$6.75 = \$11.25.$$

The total will be \$11.25.

- b) With tax (12%) how much is the grand total?

$$\$11.25 \times 1.12 = \$ 12.60$$

The grand total will be \$12.60.

- c) How does a person save if they have a book of tickets?

General

$$\$33.75 \div 6 = \$5.625 \text{ (round to } \$5.63)$$

$$\$6.75 - \$5.63 = \$1.12$$

\$1.12 will be saved per general admission rate.

Children & Golden Age

$$\$22.50 \div 6 = \$3.75$$

$$\$4.50 - \$3.75 = \$0.75$$

\$0.75 will be saved per child or golden age admission rate.

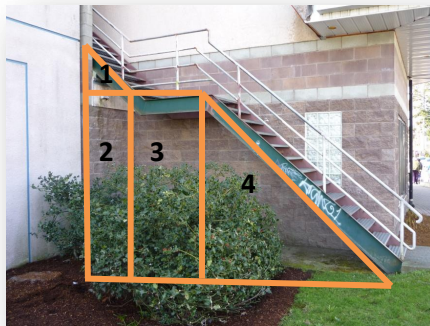
★ **Langford Professional Building**

Go to the stairs.

- a) How would you calculate the surface area of the side you see under the stairs?

Calculate in sections. Find the area of the each shape.

2 rectangles and 2 triangles



- b) It's April Fools Day. You want to fill the area underneath with packing peanuts. How would you calculate the volume of the area underneath to know how much packing peanuts you need? How would you find the volume?

Take the total area under the stairs and multiple by the length of the stairs.

★ **Crosswalk Signals**

You have reached the Goldstream Avenue and Peatt Road intersection. (For your safety please do NOT stop in the middle of the street while crossing.)

- a) Press the button to cross. When the signal has changed to walk count how long it takes before it changes back to the hand.

The signal lasts approximately 7 seconds.

- b) About how far did you make it across before it changed? Would it be safe to start crossing once the hand appears?

You will cross approximately a third to a half the way across. The hand will last approximately another 20 seconds. It may not be safe to start crossing once the hand appears as it takes almost 20 seconds to cross. It will depend how long after the signal changes do you start crossing.

★ **Wooden Patio Entrance**

Walk up the street past the consignment shop. You will pass the Jesken Aerie Assisted Living Residence. To the right of the building you will see a patio area with this wooden arbour entrance.

- a) Ignore the design, find lines of symmetry in the shape.

There is a vertical line of symmetry.



- b) Is the design symmetrical? Why or why not?

The design is not symmetrical. It is of First Nations design. On one side of the top portion there is a head and the other a tail. The shape is symmetrical but the design is not.

✦ **Westshore Barber Shop**

Across the driveway of Jesken Aerie, is the barber shop.

a) How many hours is the barber shop open in a week?

Day of week	Hours
Monday	9
Tuesday	9
Wednesday	9
Thursday	9
Friday	9
Saturday	0
Sunday	0

$$9 \times 5 = 45$$

b) If the barber makes \$15.50 per hour. How much does he make if he works all the hours in the week?

Let h = the number of hours he worked

Let m = the amount of money earned

$$m = \$15.50h$$

$$m = \$15.50 (45)$$

$$m = \$675.00$$

✦ **Tim Hortons**

1. Keep walking along Goldstream. You will reach Tim Hortons. Go to one of the circular tables outside.

a) What do you notice about this picnic table in comparison to ones you have seen in the past? What do you notice about the shape?

It is circular. The table itself is a circle and the three seats are arcs that surround the table.

b) How many people can you fit at it? How would you go about finding the solution? How many methods can you think of to find the solution?

Multiple answers, the question is to provoke thought and problem solving.

Examples: Estimate how many can sit on one and multiply by three. Find people to sit at the table and count the people or sit them on one seat and multiply by three. To expand, they can also at that the answer is subject to the size of the people (ie kids vs adults), and the combination you get to sit at the table.

2. You on the side of the building there is a parking lot. Find the parking spot with the accessible symbol painted on it (below). Find a free parking spot near it that does not have any symbols on it. (to the right). Using your feet as units, find the following:

a) What is the area of the accessible spot?

Answers will vary depending on the size of feet.

	Shoes	Feet	Metres
Length	18	19.2	5.84
width	13.5	11.8	3.60
Area($A = l \times w$)	$A = 18 \times 13.5$ $= 243 \text{ shoes}^2$	$A = 230 \times 142$ $= 226.56 \text{ ft}^2$	$A = 5.84 \times 3.6$ $= 21.024 \text{ m}^2$

b) What is the area of the other spot?

Answers will vary depending on the size of feet.

	Shoes	Feet	Metres
Length	18	19.2	5.84
width	10.5	9.5	2.90
Area($A = l \times w$)	$A = 18 \times 13.5$ $= 189 \text{ shoes}^2$	$A = 19.2 \times 9.5$ $= 184.2 \text{ ft}^2$	$A = 5.84 \times 3.6$ $= 16.936 \text{ m}^2$

c) Which one is larger? By how much?

Answers will vary depending on the size of feet.

The accessible spot will be larger by approximately:

	Shoes	Feet	Metres
Difference	$243 - 189$ $= 54 \text{ shoes}^2$	$226.56 - 184.2$ $= 41.8 \text{ ft}^2$	$21.084 - 16.936$ $= 4.148 \text{ m}^2$

Let's go inside!

3. You and your friend are exhausted from the math trail. You decide to go into Tim Hortons and order two medium hot chocolates and 2 donuts. If tax was 12%, how much change would you get back from five dollars?

Medium hot chocolate - \$1.28

Donut - \$0.90

Subtotal = $2(\$1.28) + 1(\$0.90) = \$4.36$

With taxes = $\$4.36 \times 1.12 = \$4.8832 = \$4.88$

Tender = \$5.00

Change = $\$5.00 - \$4.88 = \$0.12$

We would receive \$0.12 in change.

The End