Unit 6 : Summative Activity – Can you win at Tim's?

MEL4E

Minds On: 30 Action: 175 Consolidate:20 Total=225 min	**Learning Goals:** • Analyse a promotional lottery in the community (e.g. new car buyers have a chance to win, "roll-up-the-rim-to-win" promotions, bottle cap promotions, set of prizes in cereal boxes) Note: This summative task will take at least three days.	**Materials** • BLM 6.S.1 - 6.S.5 • MEL4E_U6_2007_rutw_rules.pdf • Tim Horton's Data • Highlighters • File Folders

			Assessment Opportunities
Minds On…	**Whole Class → Summative Instructions** Introduce the task on BLM6.S.1 and explain how students will be assessed. Provide students with an enlarged copy of the Tim Horton's Roll Up the Rim to Win Contest Rules (MEL4E_U6_2007_rutw_rules.pdf). Discuss key information on the contest such as contest regions, prize distribution. Provide students a copy of the Tim Horton's Data BLM6.S.2, and provide an overview of the data focusing on your home region.		Tim Horton's Data Available at : http://www.timhortons.com/english/english.html
Action!	**Pairs → Investigation** Instruct each pair of students to select one other region that they will compare their local data with. BLM6.S.3 is the first task; it requires the students to determine the percentage of the prizes that have been allotted for your region and compare this with the region they have selected. Students will analyze the data to determine which region has a higher probability of winning. BLM 6.S.4 is the second task; it asks the students to determine the probability that a person will win with any particular cup size in their region, as well as in the combined regions. BLM 6.S.5 is the third task; it requires the students to determine the total income and value of the total prizes for each of the regions. Students calculate the percent of the money spent that will be returned in prizes. Don't handout all tasks at once as this may overwhelm them – instead only handout each successive BLM when they have completed the last one. Circulate while students complete the tasks to help students stay organized and on task; but also to ensure that students are not feeling overwhelmed, encourage them as they work through this. **Mathematical Process Focus: All** **Expectations/Summative Task/Rubric:** Collect student work to evaluate using the rubric.		Keep students work in a folder in the classroom.
Consolidate Debrief	**Individual→Reflection** As students complete each of the tasks there are reflection questions to guide them to the final three questions of the summative task.		
	Home Activity or Further Classroom Consolidation Extension to summative task: For your region discuss a scenario that may guarantee you a winner. Write this in the form of a letter to a friend convincing them to buy their coffee this particular way. Be sure to include the probabilities you calculated in the activities.		

6.S.1: Summative Task MEL4E



Can you improve your 'luck' and ensure a win with Rrroll Up The Rim To Win?

Does the SIZE of drink you buy make any difference to your chances of winning?

Does the LOCATION of the Tim Horton's make any difference to your chances of winning?

What percentage of the money spent on beverages during the contest will be given back as prizes? (Does this vary by region?)

To answer the above questions you will be…

- Analyzing the data for the current Tim Horton's RRRoll Up The Rim To Win Contest in the region that we live in
- Comparing your chances here with the chances in another Region.
- Calculating specific probabilities for winning different categories of prizes

Note: Tim Horton's divides North America (mostly Canada!) into EIGHT different prize regions

Your work will be evaluated using the following rubric

Criteria	Level 1	Level 2	Level 3	Level 4
Reasoning And Proving				
Reading, viewing, listening, and interpreting mathematical language, charts, and graphs across a range of media	Misinterprets a major part of the information, but carries on to make some otherwise reasonable statements	Misinterprets part of the information, but carries on to make some otherwise reasonable statements	Correctly interprets the information, and makes reasonable statements	Correctly interprets the information, and makes subtle or insightful statements
Making inferences, conclusions and justifications	Justification of the answer presented has a limited connection to the data	Justification of the answer presented has some connection to the data	Justification of the answer presented has a direct connection to the data	Justification of the answer has a direct connection to the data, with evidence of reflection
Connecting				
Making connections among mathematical concepts and procedures	Makes weak connections to probability	Makes simple connections to probability	Makes appropriate connections to probability	Makes strong connections to probability
Communicating				
Appropriate use of mathematical vocabulary	Sometimes uses mathematical vocabulary correctly when expected	Usually uses mathematical vocabulary correctly when expected	Consistently uses mathematical vocabulary correctly when expected	Consistently uses mathematical vocabulary correctly, recognizing novel opportunities for its use
Degree of clarity in explanations and justification in reporting	Explanations and justifications are partially understandable	Explanations and justifications are understandable by me, but would likely be unclear to others	Explanations and justifications are clear for a range of audiences	Explanations and justifications are particularly clear and detailed

6.S.2: Prizes and Prize Distribution MEL4E

REGION	APPROX. GEOGRAPHIC AREA	APPROX. NO. OF STORES PARTICIPATING	APPROX NO. OF CASES (1000 CUPS PER CASE)	APPROX. NO. OF CASES PER STORE
1	British Columbia	156	3,412 medium 3,792 large 2,275 extra large	22 cases 24 cases 15 cases
2	Alberta & Saskatchewan	185	4,742 medium 6,013 large 3,579 extra large	26 cases 33 cases 19 cases
3	Manitoba and Central & Northern Ontario	309	12,656 medium 15,008 large 4,078 extra large	41 cases 49 cases 13 cases
4	Western & Southern Ontario	791	32,657 medium 38,507 large 10,579 extra large	41 cases 49 cases 13 cases
5	Eastern Ontario	168	6,854 medium 9,181 large 2,127 extra large	41 cases 55 cases 13 cases
6	Quebec (excludes Bas St.-Laurent, Gaspésie & Iles-de-la-Madeleine) & Labrador	240	7,712 medium 4,149 large 1,454 extra large	32 cases 17 cases 6 cases
7	Atlantic Provinces (excludes Labrador) & Quebec region of Bas St.-Laurent, Gaspésie & Iles-de-la-Madeleine	369	16,179 medium 14,608 large 2,240 extra large	44 cases 40 cases 6 cases
8	USA(New York, Ohio, Michigan, Maine, Kentucky & West Virginia)	163	1,616 medium 2,362 large 2,238 extra large	10 cases 14 cases 13 cases
	PROJECTED TOTALS	**2,381**	**208,000**	
	ALL REGIONS	85 828 medium cases (1000 cups per case) 93 620 large cases (1000 cups per case) 28 570 extra large cases (1000 cups per case)		

4. PRIZES

A) Thirty (30) Buick Rendezvous AWD CXL Plus (Year 2003) vehicles finished in an Arrow Silver Grey colour are available to be won. Included features: Versatrak, all-wheel drive (AWD), Remote keyless entry, Dual zone automatic heating & air conditioning, Cruise control, Power seats, windows and mirrors, AM/FM stereo with cassette and CD player and 8 speaker premium sound system, Driver Information Centre, On Star ® in-vehicle communications including one year Safety & Security Plan. Winners are responsible for having or obtaining a valid drivers license and must pay vehicle insurance. In Canada, G. S.T., H.S.T., sales tax, shipping, preparation and vehicle license are included. Approximate retail value in Canada before any applicable taxes is $42,890.00 CDN. each. In U.S.A., sales tax, shipping, preparation charge and vehicle license are included. The approximate retail value before any applicable taxes in the U.S.A. is $32,125.00 U.S. each.

B) One Hundred (100) Panasonic DVD Home Theatres are available to be won. Included in each theatre package is a 53" HD Widescreen Projection TV and a Surround Sound 5-Disc DVD / CD System (which includes a DVD receiver, 5 speakers plus sub woofer, and 4 speaker stands). Approximate Canadian retail value before any applicable taxes is $5,199.98 CDN each. G. S.T., H.S.T., and applicable provincial taxes are included. In the U.S. applicable sales taxes are included. The approximate retail value in the U.S.A. before any applicable taxes is $2,439.80 U.S. each.

C) Five Hundred (500) Cash prizes of one thousand dollars ($1,000.00) are available to be won. The cash prize of $1,000.00 will paid out in the currency of the winner's country of residence. Residence shall be based on where a prize claimant ordinarily resides. Country of residence is limited to Canada and the U.S. (excluding Florida). In the event of a dispute, the country of residence shall be determined by Contest Sponsor in its sole discretion based on evidence provided by prize claimant. Contest Sponsor reserves the right to make independent investigation, if necessary. Cash prizes must be accepted as awarded in the form of a cheque.

D) Seven Thousand Five Hundred (7,500) Raleigh Mountain Bikes are available to be won. Features include: 21 speeds, aluminum dual suspension frame, Shimano gears, quick release saddle and front tire, kick stand. Some assembly is required. Approximate Canadian retail value before any applicable taxes is $429.00 CDN each. G.S.T., H.S.T., and applicable provincial taxes are included. In the U.S. applicable sales taxes are included. The approximate retail value in the U.S.A before any applicable taxes is $229.00 U.S. each.

E) Food Prizes: Eligible "winning" RIM TABS have been distributed as follows: approximately 111 contest cups per medium case of 1,000, approximately 111 cups per large case of 1,000, approximately 111 cups per extra large case of 1,000 are printed with "winning" RIM TABS. Those "winning" RIM TABS are for the following prizes and have the following approximate values: (i) coffee: small at $0.98 (N/A) each, medium at $1.07 ($1.00) each, large at $1.21 ($1.15) each, extra large at $1.40 ($1.30) each (winner's choice) (ii) cookie: regular at $0.40 ($0.35) each, (iii) muffin at $0.99 ($0.95) each or (iv) donut at $0.70 ($0.65) each. NOTE: The first price listed for each prize in 4E above is approximate Canadian retail prices. Approximate U.S. retail prices are shown in parentheses.

Total approximate retail value of all prizes is $24,359,754.00 Canadian or $21,268,842.00 U.S.

PRIZE DISTRIBUTION

5. Distribution of the prizes described in Rule 4 (A, B, C, D), will be as set out below. Note: "Regions" are defined in Rule 3. Approximate distribution of "winning" contest tabs by region and by various contest cup sizes are as listed below. Distribution of prizes within the region is random. Also note that "M" refers to medium contest cups, "L" to large contest cups and "XL" to extra large contest cups.

PRIZE/REGION	1	2	3	4	5	6	7	8	ALL
30 Buick Rendezvous (randomly distributed into cases of contest cups)	M=1 L=1 XL=0	M=1 L=2 XL=1	M=1 L=1 XL=1	M=3 L=3 XL=2	M=1 L=1 XL=0	M=2 L=1 XL=1	M=3 L=2 XL=1	M=0 L=1 XL=0	
TOTAL	**2**	**4**	**3**	**8**	**2**	**4**	**6**	**1**	
100 Panasonic DVD Theatre (randomly distributed into cases of contest cups)	M=2 L=2 XL=1	M=2 L=3 XL=2	M=6 L=7 XL=2	M=16 L=18 XL=5	M=3 L=5 XL=1	M=3 L=2 XL=1	M=8 L=7 XL=1	M=1 L=1 XL=1	
TOTAL	**5**	**7**	**15**	**39**	**9**	**6**	**16**	**3**	
500 Cash Prizes of $1,000 (randomly distributed into cases of contest cups)	M=8 L=9 XL=6	M=11 L=14 XL=9	M=30 L=36 XL=10	M=79 L=92 XL=25	M=17 L=22 XL=5	M=19 L=10 XL=3	M=39 L=35 XL=5	M=4 L=6 XL=6	
TOTAL	**23**	**34**	**76**	**196**	**44**	**32**	**79**	**16**	
7,500 Raleigh Mountain Bike (randomly distributed into cases of contest cups)	M=123 L=137 XL=82	M=170 L=217 XL=129	M=457 L=541 XL=147	M=1,178 L=1,388 XL=381	M=247 L=331 XL=77	M=278 L=150 XL=52	M=583 L=527 XL=81	M=58 L=85 XL=81	
TOTAL	**342**	**516**	**1,145**	**2,947**	**655**	**480**	**1,191**	**224**	
TOTAL PRIZES	**372**	**561**	**1,239**	**3,190**	**710**	**522**	**1,292**		

6.S.3: Can you win at Tim's? MEL4E

Instructions:

1. a) Copy the prize data for your region in the first column of chart. Determine the number of food prizes for your region and include this in the first column.
   b) Calculate the prize totals for each size nation-wide, and then record them in the second column of the chart.
   c) Calculate the probability of each prize in your region (Your Region ÷ All Regions). Express the probability as a percentage (correct to 1 decimal place - ex 12.7639% would be 12.8%). Record this information in the "last" column.

Prize/Region	Home Region _____	All Regions	Percentage
30 Buick Rendezvous (randomly distributed into cases of contest cups)	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL_____	M = _____ L = _____ XL = _____ TOTAL _____
100 Panasonic DVD Theatres (randomly distributed into cases of contest cups)	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL_____	M = _____ L = _____ XL = _____ TOTAL _____
500 Cash Prizes of $1,000 (randomly distributed into cases of contest cups)	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL_____	M = _____ L = _____ XL = _____ TOTAL _____
7,500 Raleigh Mountain Bike (randomly distributed into cases of contest cups)	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL_____	M = _____ L = _____ XL = _____ TOTAL _____
Food Prizes	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL_____	M = _____ L = _____ XL = _____ TOTAL _____
Total Prizes	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL_____	M = _____ L = _____ XL = _____ TOTAL _____

2. Repeat question 1 for a different region that you want to compare it to.

Prize/Region	Slected Region _____	All Regions	Percentage
30 Buick Rendezvous (randomly distributed into cases of contest cups)	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL _____
100 Panasonic DVD Theatres (randomly distributed into cases of contest cups)	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL _____
500 Cash Prizes of $1,000 (randomly distributed into cases of contest cups)	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL _____
7,500 Raleigh Mountain Bike (randomly distributed into cases of contest cups)	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL _____
Food Prizes	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL _____
Total Prizes	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL _____	M = _____ L = _____ XL = _____ TOTAL _____

Reflection Questions:

1) Were there any percentages that surprised you for your region? Explain.

2) Which region has a higher chance of receiving a prize, your home region or the one you compared it to? What is the difference in the probability?

6.S.4: Can you win at Tim's? Part 2 MEL4E

Instructions:

3. a) Enter the number of prizes in the first column.
   b) Calculate the number of cups per store.
   c) Calculate the probability of winning a prize for each specific size of a cup.

   NOTE: For the major prizes, the probabilities are very small. Write down three digits AFTER the zeroes!

   d) Repeat (a) - (c) for the total data for ALL REGIONS and for the region you are comparing to.

PRIZE		Your Home Region :_____		
		# of prizes	# of cups	Probability of winning (Decimal - 3 figures AFTER the zeroes)
30 Buick Rendezvous 	M			
	L			
	XL			
100 Panasonic DVD Theatre 	M			
	L			
	XL			
500 Cash Prizes of $1,000 	M			
	L			
	XL			
7,500 Raleigh Mountain Bike 	M			
	L			
	XL			
Food Prizes 	M			
	L			
	XL			
TOTAL PRIZES 	M			
	L			
	XL			

6.S.4: Can you win at Tim's? Part 2 (continued) MEL4E

PRIZE		ALL REGIONS		
		# of prizes	# of cups	Probability of winning (Decimal - 3 figures AFTER the zeroes)
30 Buick Rendezvous 	M			
	L			
	XL			
100 Panasonic DVD Theatre 	M			
	L			
	XL			
500 Cash Prizes of $1,000 	M			
	L			
	XL			
7,500 Raleigh Mountain Bike 	M			
	L			
	XL			
Food Prizes 	M			
	L			
	XL			
TOTAL PRIZES 	M			
	L			
	XL			

6.S.4: Can you win at Tim's? Part 2 (continued) MEL4E

PRIZE		Selected Region _____		
		# of prizes	# of cups	Probability of winning (Decimal - 3 figures AFTER the zeroes)
30 Buick Rendezvous 	M			
	L			
	XL			
100 Panasonic DVD Theatre 	M			
	L			
	XL			
500 Cash Prizes of $1,000 	M			
	L			
	XL			
7,500 Raleigh Mountain Bike 	M			
	L			
	XL			
Food Prizes 	M			
	L			
	XL			
TOTAL PRIZES 	M			
	L			
	XL			

6.S.4: Can you win at Tim's? Part 2 (continued) MEL4E

Reflection Questions:

1) Were there any probabilities that surprised you for your region?
Explain.

2) a) Which size of cup seem to have the highest probability for your region?

b) Was this the same size of a cup for ALL REGIONS?

c) Was this the same size of a cup for the region you are comparing it to?

d) Why do you think it is or isn't?

6.S.5: Can you win at Tim's? Part 3 MEL4E

Instructions:

4. Determine the total amount spent in each region by multiplying the number of cups (1000 cups per case) by the money spent per cup for each individual size. Record your answers in the chart below.

Hot Beverage Income per Region					
REGION	**APPROX. GEOGRAPHIC AREA**	**APPROX. NO. OF CASES PER STORE**	**# of cups M L XL**	**Money Spent M = $1.07 L = $1.21 XL = $1.40**	**Income**
1	British Columbia	22 cases 24 cases 15 cases			
2	Alberta & Saskatchewan	26 cases 33 cases 19 cases			
3	Manitoba and Central & Northern Ontario	41 cases 49 cases 13 cases			
4	Western & Southern Ontario	41 cases 49 cases 13 cases			
5	Eastern Ontario	41 cases 55 cases 13 cases			
6	Quebec & Labrador	32 cases 17 cases 6 cases			
7	Atlantic Provinces & Quebec region of Bas St.-Laurent, Gaspésie & Iles-de-la-Madeleine	44 cases 40 cases 6 cases			
8	USA(New York, Ohio, Michigan, Maine, Kentucky & West Virginia)	10 cases 14 cases 13 cases			
	ALL REGIONS	..... cases ..... cases ..... cases			

6.S.5: Can you win at Tim's? Part 3 (continued) MEL4E

Instructions:

5) a) Calculate the average value of a food prize. See Section E on BLM6.S.3.
(Hint: add all the prices and divide by the number of item you added together)
Record this value in the first row of the following table.

b) Calculate the value of the food prizes for each of the sizes of cups for each region. (Hint: multiply the number of food prize winnings by the average food prize value that was calculated in part a)

c) Calculate the total of value of the food prizes for each of the regions.
Record on the table below.

	Total VALUE OF Coffee and Food Prizes per Region							
Average value of food prize								
Value of the food prizes from the M cups	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Value of the food prizes from the L cups	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Value of the food prizes form the XL cups	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Total Coffee and Food Prizes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**

6.S.5: Can you win at Tim's? Part 3 (continued) MEL4E

Instructions:

6) Determine the total value of the prizes for each of the regions. See BLM6.S.3, Sections A to D. The table below includes information for the number of prizes that are allotted for each region. Record results in the table below.

PRIZE/REGION	1	2	3	4	5	6	7	8
30 Buick Rendezvous	M=1 L=1 XL=0	M=1 L=2 XL=1	M=1 L=1 XL=1	M=3 L=3 XL=2	M=1 L=1 XL=0	M=2 L=1 XL=1	M=3 L=2 XL=1	M=0 L=1 XL=0
TOTAL	**2**	**4**	**3**	**8**	**2**	**4**	**6**	**1**
100 Panasonic DVD Theatre	M=2 L=2 XL=1	M=2 L=3 XL=2	M=6 L=7 XL=2	M=16 L=18 XL=5	M=3 L=5 XL=1	M=3 L=2 XL=1	M=8 L=7 XL=1	M=1 L=1 XL=1
TOTAL	**5**	**7**	**15**	**39**	**9**	**6**	**16**	**3**
500 Cash Prizes of $1,000	M=8 L=9 XL=6	M=11 L=14 XL=9	M=30 L=36 XL=10	M=79 L=92 XL=25	M=17 L=22 XL=5	M=19 L=10 XL=3	M=39 L=35 XL=5	M=4 L=6 XL=6
TOTAL	**23**	**34**	**76**	**196**	**44**	**32**	**79**	**16**
7,500 Raleigh Mountain Bike	M=123 L=137 XL=82	M=170 L=217 XL=129	M=457 L=541 XL=147	M=1,178 L=1,388 XL=381	M=247 L=331 XL=77	M=278 L=150 XL=52	M=583 L=527 XL=81	M=58 L=85 XL=81
TOTAL	**342**	**516**	**1,145**	**2,947**	**655**	**480**	**1,191**	**224**
TOTAL PRIZES	**372**	**561**	**1,239**	**3,190**	**710**	**522**	**1,292**	**244**

	TOTAL VALUE OF PRIZES per Region							
A) Buick Rendezvous								
B) Panasonic DVD Theatre								
C) Cash Prize of $1000								
D) 7500 Raleigh Mountain Bike								
E) Coffee and Food Prizes (See previous chart)								
TOTAL								

6.S.5: Can you win at Tim's? Part 3 (continued) MEL4E

Instructions:

7) a) Copy the Total Value of Prizes and the Total Hot Beverage Income for each of the regions, in the table below.

b) Calculate the percent of money spent on hot beverages given back as prizes. Record results in the last column.

Percent of Money Spent on Hot Beverages Given Back as Prizes			
	A	B	A ÷ B x 100
	Total Value of Prizes	Total Hot Beverage Income	Percent
1			
2			
3			
4			
5			
6			
7			
8			
Total			

Reflection Questions:

1) Is the distribution for the total amount of prizes allotted for each region fair, based on the amount of income that Tim Horton's receives? Explain.

6.S.5: Can you win at Tim's? Part 3 (continued) MEL4E

Instructions:

8) a) Find the number of stores in your region. See BLM6.S.3.

b) What would be the expected number of hot beverage sales in your region?

c) What would be the expected value of the total prizes that would be allotted to a store in your region?

9) Reflecting on the three tasks and your previous reflections, answer the following questions, and justify your reasoning.

a) Does the size of the drink make a difference to the chances of winning? Explain.

b) Does the location of the store make a difference to the chances of winning? Explain.

c) Does the amount of money that a person spends on beverages, make a difference on their chances of winning? Explain.

d) Can you improve your luck to ensure a win with Rrrroll up the Rim to Win? Explain.