Mathematics 20-2 Course Review

You have now learned all of the concepts for Math 20-2. This course review includes a summary table of topics and review problems for each *Unit*. Many of the problems include a solution and your task is to show how the solution was found. You will self-assess your work in the review using the following rubric, like you did for each *Coach's Corner*.

Category	Strategy and Procedures	Response to Questions
	The student...	*The student...*
4	• uses efficient and effective strategies to solve the problem(s)	• provides detailed explanations and follows directions appropriately to complete all questions
3	• uses effective strategies to solve the problem(s)	• provides clear explanations and follows directions adequately to complete most questions
2	• uses effective strategies inconsistently to solve the problem(s)	• provides incomplete explanations and follows some directions to complete a few questions
1	• does not use effective strategies to solve the problem(s)	• provides incomplete explanations and does not follow directions to complete some questions

When you submit this course review, your marker will choose one question from each Unit to mark.

Unit 1: Radicals

Concept	I know how to do that	I'm going to review that topic
Estimate, compare, and order radicals.		
Express an entire radical as a mixed radical.		
Express a mixed radical as an entire radical.		
Perform operations on radicals – add, subtract, multiply, and divide.		
Rationalize the denominator of a radical expression.		
Determine variable restrictions for radical expressions and equations.		
Determine the roots of a radical equation (the solution).		
Verify the roots (solution) of a radical equation.		
Determine the extraneous roots by verification.		

Unit 1: Radicals Review Questions

(4) 1. Convert each mixed radical to an entire radical and each entire radical to the simplest mixed radical.

a. $12\sqrt{7}$

Answer is $\sqrt{1008}$

b. $\sqrt[3]{-192}$

Answer is $-4\sqrt[3]{3}$

c. $-6\sqrt[3]{13}$

Answer is $\sqrt[3]{-2808}$

d. $\sqrt{72}$

Answer is $6\sqrt{2}$

(3) 2. Simplify each of the following expressions.

a. $3\sqrt{5}-7\sqrt{2}+3\sqrt{2}+4\sqrt{5}$

Answer is $7\sqrt{5}-4\sqrt{2}$

b. $2\sqrt{3}(8\sqrt{2}+4\sqrt{7})$

Answer is $16\sqrt{6}+8\sqrt{21}$

c. $\dfrac{9\sqrt{72}}{2\sqrt{24}}$

Answer is $\dfrac{9\sqrt{3}}{2}$

(4) 3. State the restrictions on the variables and then simplify each of the following expressions.

a. $x\sqrt{12x^4}$

Answer is $2x^3\sqrt{3}$

b. $(3x\sqrt{x^2})(2\sqrt{x^5})$

Answer is $6x^4\sqrt{x}$

(3) 4. Consider the equation $-7 = 2 - \sqrt{12x - 3}$.

a. State the restrictions on x.

Answer is $x \geq \frac{1}{4}$

b. Solve the equation.

Answer is $x = 7$

c. Is the solution extraneous? Explain.

Answer is No

Unit 2: Quadratic Functions

Concepts	I know how to do that	I'm going to review that topic
Determine the coordinates of the vertex of the graph of a quadratic function, with and without technology.		
Determine the equation of the axis of symmetry, given the x-intercepts of the graph of a quadratic function.		
Determine the y-coordinate of the vertex of the graph of a quadratic function given its equation and the equation of the axis of symmetry and state whether or not it is a maximum or minimum value.		
Determine the domain and range of a quadratic function.		
Sketch the graph of a quadratic function.		
Solve a contextual problem involving some or all of the characteristics of a quadratic function.		
Determine the intercepts of the graph of a quadratic function, with and without technology.		
Determine the roots of a quadratic equation and verify by substitution.		
Determine the roots of a quadratic equation by factoring, using the quadratic formula and using technology.		
State the relationships between the roots of an equation, the zeros of the related function, and the x-intercepts of the graph of that function.		
Determine the nature of the roots of a quadratic function (how many, real or non-real).		
Express a quadratic function in factored form given the x-intercepts of its graph or the zeros of the function.		
Solve a contextual problem by modelling a situation with a quadratic function.		

Unit 2: Quadratic Functions Review Questions

(4)

1. Determine the x-intercepts, y-intercept, equation of the axis of symmetry, and vertex for each of the following functions.

   a. $f(x) = 3(x-2)^2 - 6$ with zeros of 0.59 and 3.41

x-intercepts	
y-intercept	
equation of the axis of symmetry	
vertex	

   b. $g(x) = (x-4)(x+7)$

x-intercepts	
y-intercept	
equation of the axis of symmetry	
vertex	

(3)

2. Determine the standard form of a quadratic function whose graph has a y-intercept of 8 and a vertex at (–2,–4).

Answer is $f(x) = 3x^2 + 12x + 8$

(4)

3. Solve each of the following equations using the method identified. Verify all solutions.

   a. $x^2 + x = 6$, by factoring

Answer is $x = -3, 2$

b. $2x^2 - 5 = 3x$, using the quadratic formula

Answer is $x = -1, 2.5$

(3) 4. The distance a car will skid after its brakes lock can be modelled by the equation $d = kv^2$, where d is the stopping distance, in metres, k is a constant based on road conditions, and v is the velocity of the car, in metres per second, at the moment the brakes lock.

a. If $k = 0.04$, how far will a car skid if it was travelling at 32 m/s?

Answer is 41 m

b. If a car skids 79 m when $k = 0.031$, how fast was the car travelling?

Answer is 50 m/s

(3) 5. The length of a rectangle is 4 units more than the width. If the rectangle has an area of 77 square units, what are the length and width of the rectangle?

Answer is $w = 7$, $l = 11$

Unit 3: Logic and Reasoning

Concepts	I know how to do that	I'm going to review that topic
Make a conjecture based on patterns		
Provide and explain counterexamples		
Compare inductive and deductive reasoning		
Prove a conjecture		
Determine if an argument is valid		
Identify errors in a proof		
Solve problems using deductive reasoning		

Unit 3: Logic and Reasoning Review Questions

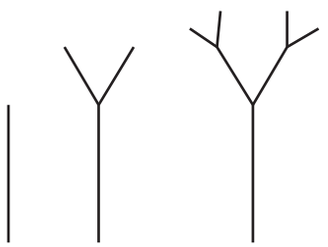
(4)

1. Conjecture the next two elements for each pattern. Describe the pattern.

   a. 5, 8, 14, 26, 50

   Answer is 98, 194

   b.



(2) 2. Ashley claims that the sum of four multiples of 6 will be a multiple of 12. Is Ashley's conjecture reasonable? If not provide a counterexample.

Answer is No

(3) 3. Prove that the perimeter will be even for any rectangle with natural number side lengths.

(4) 4. Two girls, Bella and Destiny, and two boys, Ryan and José, each have a different favourite colour: red, green, blue, and black. Use the following clues to determine each person's favourite colour.

- One person's name and favourite colour start with the same letter.
- Bella doesn't like black.
- One of the boys likes blue.

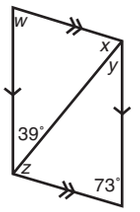
Unit 4: Geometry

Concepts	I know how to do that	I'm going to review that topic
Prove properties of angles formed by transversals and parallel lines.		
Determine if two lines are parallel.		
Draw parallel lines using a compass or protractor.		
Determine unknown angles using parallel lines, angles, and triangles.		
Determine and use a rule for determining the interior angle sum of a polygon.		
Identify and correct errors in a geometric proof.		
Prove that two triangles are congruent.		
Solve problems using angles and triangles.		
Determine if a solution to a geometric problem is reasonable and correct it if necessary.		
Explain a proof of the sine law.		
Explain a proof of the cosine law.		
Draw a diagram to represent a word problem that uses triangles.		
Solve problems using the sine law.		
Solve problems using the cosine law.		
Solve problems that involve more than one triangle.		

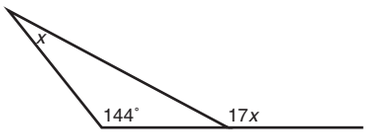
Unit 4: Geometry Review Questions

4

1. Determine the unknown values identified in the following diagrams. Explain how you determined each unknown.

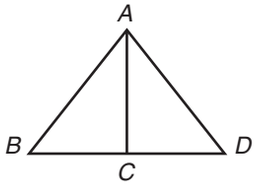
a. 

Answer is $w = 73°$, $x = 68°$, $y = 39°$, $z = 68°$

b. 

Answer is $x = 9°$, $17x = 153°$

(4) 2. Given $AC \perp BD$ and C is the midpoint of BD, prove that $\angle B = \angle D$.



Statement	Justification

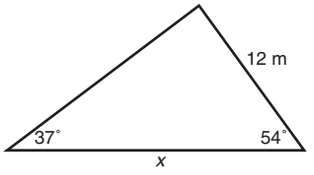
(3) 3. The interior angles of a polygon each measure 150°. How many sides does the polygon have?

Answer is 12

(3) 4. Luna is building a two piece roof for her shed. The width of the shed is 8 ft, one roof piece is 4 ft long and the other is 6 ft long. What angle is formed at the peak of the roof?

Answer is 104°

(3) 5. Determine the length of x.



Answer is 20 m

Unit 5: Proportional Reasoning

Concepts	I know how to do that	I'm going to review that topic
Interpret and compare rates and unit rates.		
Convert rates to different units.		
Use graphs to interpret and represent rates.		
Explain the solutions to problems involving rates.		
Draw scale diagrams of 2-D shapes.		
Determine the scale factors for 2-D shapes and 3-D objects.		
Determine unknown dimensions given the scale factor of 2-D shapes and 3-D objects.		
Solve problems involving factors and scale diagrams.		
Determine the area of 2-D shapes given a scale diagram.		
Determine the surface area of 3-D objects given a scale diagram.		
Explain how scale factor, area, surface area, and volume are related.		
Solve problems involving scale factor, area, surface area, and volume.		

Unit 5: Proportional Reasoning Review Questions

(4)

1. Wit is planning on replacing the floor tiles in his kitchen. Wit has found four types of tiles he likes, and wants to compare their prices.

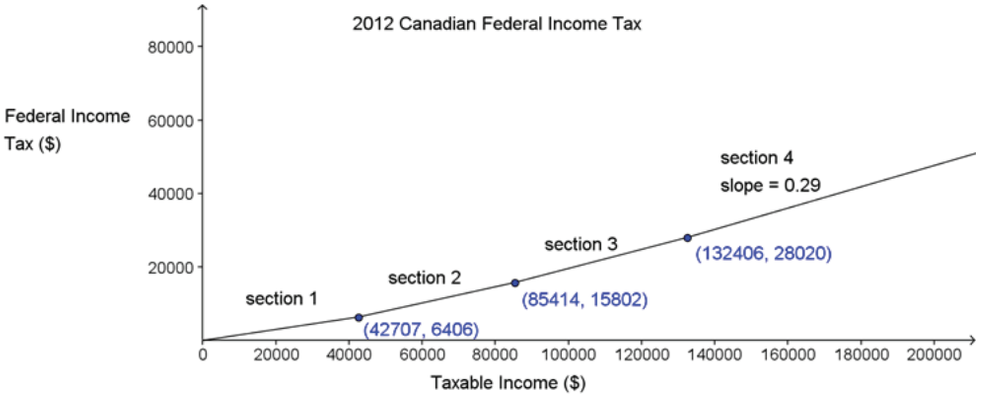
	Tile A	Tile B	Tile C	Tile D
Tile dimensions (in.)	12 × 24	18 × 18	3 × 6	12 × 12
Tiles per carton	8	6	43	15
Price per carton	$31.84	$39.99	$23.77	$33.35

List the tiles from least to greatest cost for the project.

Answer is A, B, D, C

4

2. In Canada, federal income tax is calculated as a percent of your taxable income. As you earn more, the rate of taxation also increases.

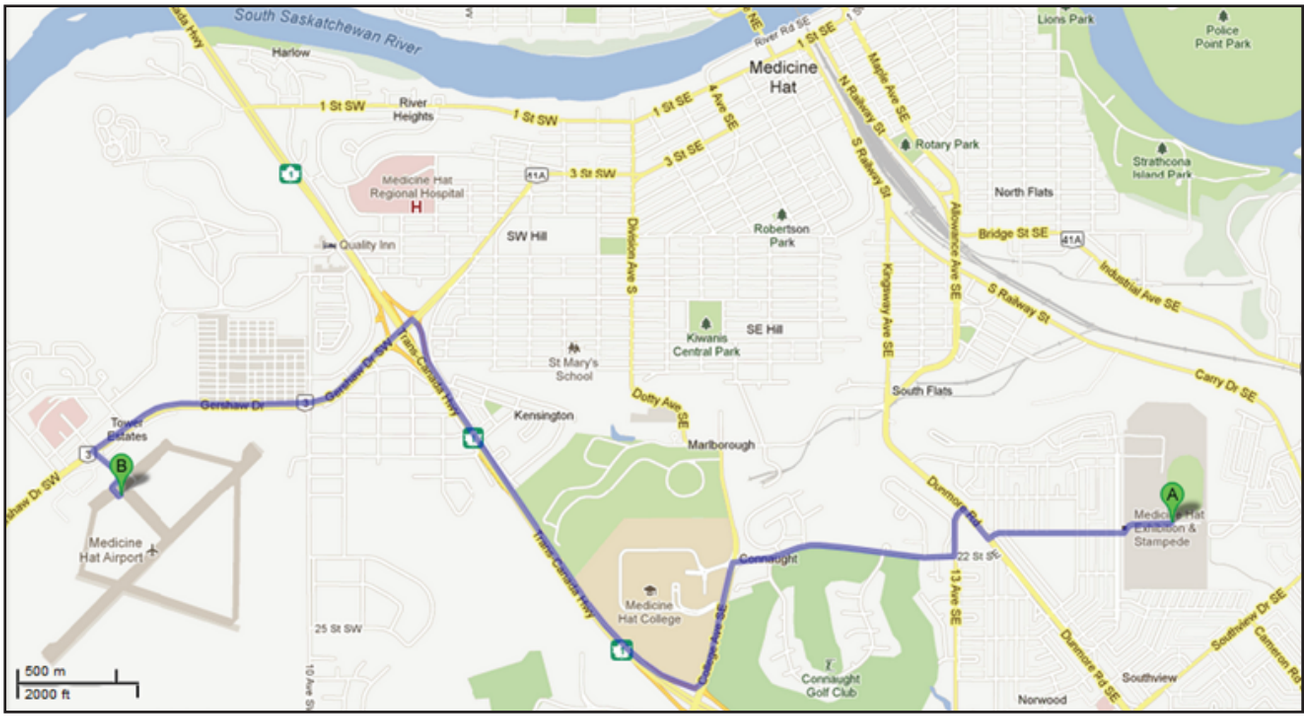


a. Determine the slope of section 1, section 2, and section 3.

Answer is section 1 slope = 0.15, section 2 slope = 0.22, section 3 slope = 0.26

b. Explain what the slopes represent.

(3) 3. Estimate the driving distance from the Medicine Hat Exhibition and Stampede to the Medicine Hat Airport.



© *maps.google.ca*

Answer is approximately 8 km

(2) 4. A bushel is a unit of volume often used to measure dry, agriculture commodities, and one bushel is approximately 32 L. A 1:50 scale model of a grain bin is capable of holding 0.112 bushels. How many bushels can the full-size bin hold?

Answer is 14 000 bushels

Unit 6: Statistics

Concepts	I know how to do that	I'm going to review that topic
Explain what standard deviation means and how it can be used to compare data sets.		
Calculate the mean and standard deviation of a set of data using technology.		
Use an example to describe the properties of a normal curve.		
Determine if a data set is approximately normal.		
Compare the properties of two normally distributed data sets.		
Determine areas under a normal curve.		
Determine a z-score from an area under a normal curve.		
Solve problems that use the normal distribution.		
Explain what confidence interval, margin of error, and confidence level mean.		
Describe how the sample size is related to the margin of error, confidence intervals, and confidence level.		
Make predictions about a population from sample data.		
Support a position by analyzing statistical data presented in the media.		

Unit 6: Statistic Review Questions

(3) 1. In NCAA volleyball, a set consists of teams playing until one team reaches 25 points and has at least a two point advantage. A player is awarded a service ace if she serves the ball, it crosses the net, and lands in-bounds before an opposing player can touch it, or the opposing player touches it and then it hits the ground.

The following two tables show the number of aces per set for the top 10 freshmen and the top ten seniors of the NCAA during the 2012 season.

Freshmen	Aces Per Set
Savannah Blinn	0.51
Karin Palgutova	0.46
Brooke Stamnes	0.46
Daly Santana	0.44
Lauren Behrens	0.43
Kryssi Daniels	0.43
Julia Doyle	0.37
Taylor Edwards	0.37
Samantha Bricio	0.36
Claire Van Dyk	0.35

Seniors	Aces Per Set
Christine Edwards	0.95
Monique Mead	0.48
Sydney Kordic	0.44
Jessica Hays	0.43
Krysta Gardner	0.42
Kaytlyn Dill	0.41
Jocelyn Levig	0.41
Kim Black	0.41
Megan Munce	0.41
Courtney Johnk	0.40

Courtesy: www.ncaa.com

a. Determine the mean and standard deviation for each group.

	Freshmen	Seniors
μ		
σ		

b. Describe how the two groups compare.

c. Repeat part a. and b. without Savannah Blinn and Christine Edwards. Explain the change.

3

2. Consider the following data set.

105	106	95	96	116	94	99	120	113	107
88	90	113	107	116	91	105	77	110	83
99	99	82	86	96	102	81	112	106	89
94	109	68	82	83	116	81	68	84	96
90	109	101	100	102	115	86	105	104	104

a. Is the data set normally distributed? Explain.

Answer is yes

b. Determine the z-score of a data value of 123.

Answer is 2

c. Based on the z-score, what percentage of data values do you expect to be above 123?

Answer is 2.2%

(3)

3. The thickness of paper is often measured using basis weight: the weight of 3000 square feet of that paper in a roll. The statistics for three truckloads of paper rolls that were expected to have basis weights of 40 pounds are shown in the table below.

	Mean (lbs.)	Standard Deviation
Lot 1	41.20	0.59
Lot 2	42.14	0.89
Lot 3	42.61	1.19

a. Describe how the three truckloads compare.

b. Assuming the basis weights are normally distributed, what is the percentage of Lot 1 rolls with basis weights above 40 pounds?

Answer is 97.9%

c. Assuming the Lot 3 basis weights are normally distributed, over which weight will 90% of the rolls lie?

Answer is 41.09 lbs

(3) 4.

Table 1
Percentage distribution of children and adolescents, by body mass index (BMI) category (based on World Health Organization cut-offs), age group and sex, household populations aged 5 to 17, 2009 to 2011

	Thinness			Normal weight			Overweight			Obesity		
		95% confidence interval			95% confidence interval			95% confidence interval			95% confidence interval	
	%	from	to	%	from	to	%	from	to	%	from	to
Total	2.2[E]	1.1	4.1	66.4	62.8	69.8	19.8	16.6	23.4	11.7	9.9	13.7
Age group (years)												
5 to 11	F	…	…	65.5	61.7	69.2	19.7	16.4	23.4	13.1	10.5	16.3
12 to 17	F	…	…	67.2	60.2	73.6	19.9	15.0	25.8	10.2	7.3	14.1
Boys	F	…	…	62.3	56.3	68.0	19.4	15.1	24.4	15.1	12.6	17.9
Age group (years)												
5 to 11	F	…	…	59.0	51.9	65.7	19.8	14.8	26.0	19.5	15.5	24.1
12 to 17	F	…	…	65.6	55.3	74.6	18.9[E]	12.6	27.5	10.7*	7.5	15.0
Girls	1.0[E]	0.6	1.6	70.8	64.6	76.3	20.2	15.8	25.6	8.0[†]	5.7	11.1
Age group (years)												
5 to 11	1.5[E]	0.7	3.1	72.6[†]	69.8	75.2	19.6	16.1	23.6	6.3[†E]	4.1	9.8
12 to 17	F	…	…	69.0	58.5	77.9	20.9	14.9	28.6	9.6[E]	6.0	15.1

* significantly different from ages 5 to 11 ($p<0.05$)
[†] significantly different from boys ($p<0.05$)
[E] use with caution
F too unreliable to be published
… not applicable
Source: 2009 to 2011 Canadian Health Measures Survey.

Source: www.statcan.gc.ca

a. Describe the information given in the table.

b. Determine the margin of error for overweight boys.

Answer is 4.65 percentage points

c. Predict how this margin of error would change if a 99% confidence level had been used.

After all required components of Units 1 to 7 have been completed, marked and returned to you, review the concepts. Contact your teacher to discuss any concepts that you are unsure about. When you are ready, contact your exam supervisor or your local ADLC office to schedule an appointment to write the Final Exam.

Course Evaluation Questions

Please answer the following questions to help us improve the course. Please consider all aspects of the course in your responses, such as examples, practice exercises, videos, applets, assignments, quizzes, exams, the seven units, and the course project. The more detail you can provide, the more helpful your responses will be.

1. Why did you take Math 20-2?

2. What did you like about the course?

3. What didn't you like about the course?

4. In what part of the course did you learn the most?

5. What part(s) of the course did you find easiest to learn? The hardest to learn?

6. If you could make a change to the course, what would it be?