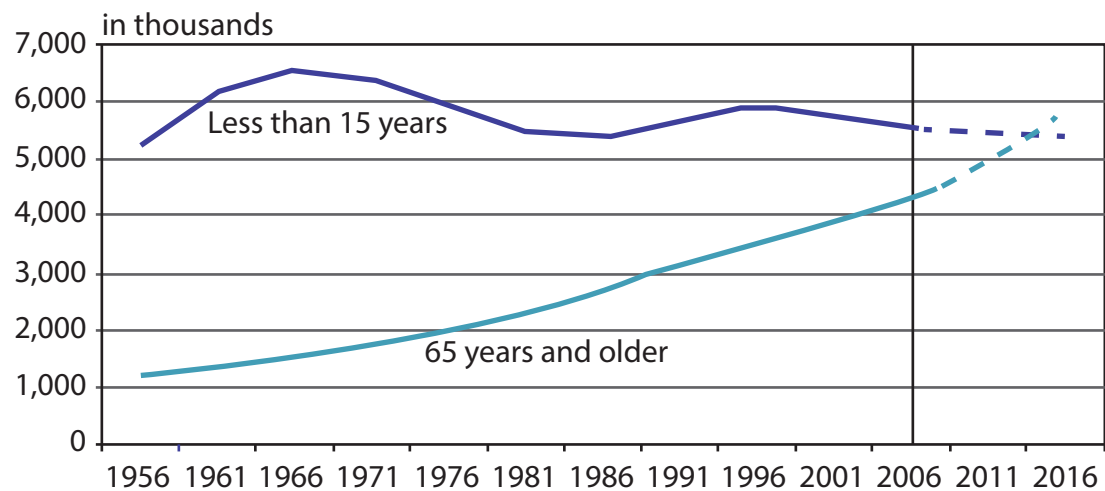## Unit 3: Logic and Reasoning

Final Review Assignment

③   1.   The graph below was produced by Statistics Canada using the 2006 census.

Number of persons aged 65 and older and number of children aged less than 15 years in the Canadian population

in thousands

Sources: Statistics Canada, censuses of population, 1956 to 2006; and Alain Bélanger, Laurent Martel and Éric Caron-Malenfant. 2005. ***Population Projections for Canada, Provinces and Territories 2005-2031***, Statistics Canada Catalogue no. 91-520, scenario 3.

a.   Explain what has happened to each age group between 1956 and 2006.

_____

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_____

b. There is a conjecture included in the graph. Explain the conjecture. (Hint: The graph was made without data past 2006.)

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c. How could this conjecture be tested?

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②   2. Using an example, explain why inductive reasoning can lead to an incorrect conclusion.

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(2)   3.   Piti is working on a problem:

An undisclosed number of friends meet for dinner. Each person shakes each other person's hand exactly once. How many handshakes occur?

Piti reasons that 2 people will have one handshake. For each person added, everyone in the earlier group will need to shake the new person's hand. So, when a third person is added there will be two new handshakes and therefore $1 + 2 = 3$ handshakes altogether. Similarly, when the fourth person is added there will be $1 + 2 + 3 = 6$ handshakes and when the fifth person is added there will be $1 + 2 + 3 + 4 = 10$ handshakes.

Piti concludes that if n people attend a party, there will be $1 + 2 + 3 + \ldots + (n - 1)$ handshakes altogether.

Piti's argument includes both inductive and deductive reasoning.

a. Explain how Piti's argument is inductive.

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b. Explain how Piti's argument is deductive.

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④   4. Fernando wears three colours of socks: red, blue, and white. He doesn't pair his socks when he washes them, he just throws them into his sock drawer.

   a. What is the fewest number of socks Fernando needs to take out of the drawer to guarantee he has a matching pair? Explain.

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   _____

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   b. Is there a fewest number of socks he could take out to guarantee that he will have a red pair? Explain.

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②   5. Prove the following conjecture.

   Between any two unique Real Numbers, there exists another Real Number.

   The proof may be started with "Let x and y represent two different Real Numbers.

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(2)   6.   Tulia and Ian are debating Albertan culture.

Tulia: All Albertans like to eat beef.

Ian: I have a counterexample. Mike lives in Alberta and he is a vegetarian.

Tulia: He doesn't like beef, so he's not a true Albertan. As such, he cannot be a counterexample.

Whose reasoning is correct? Is Mike a counterexample? Explain.

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(2)   7.   Describe why the following is a paradox.

The following sentence is true.

The previous sentence is false.

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③ 8. Brianna has a pet bunny named Sir Fluffles. Sir Fluffles is capable of hopping up either one step or two steps at a time. How many different ways could Sir Fluffles climb a flight of six stairs? Explain.

(Hint: Let S represent a single step and D represent a double step. SSSSD, SSDSS, and DDD are three different ways of hopping up the six stairs.)

③ 9. Four balances are shown where the two sides of each contain exactly the same amount of weight. Determine how many green circles are required in the fourth balance. Explain/show how this was determined.

How many 🟢?

/23
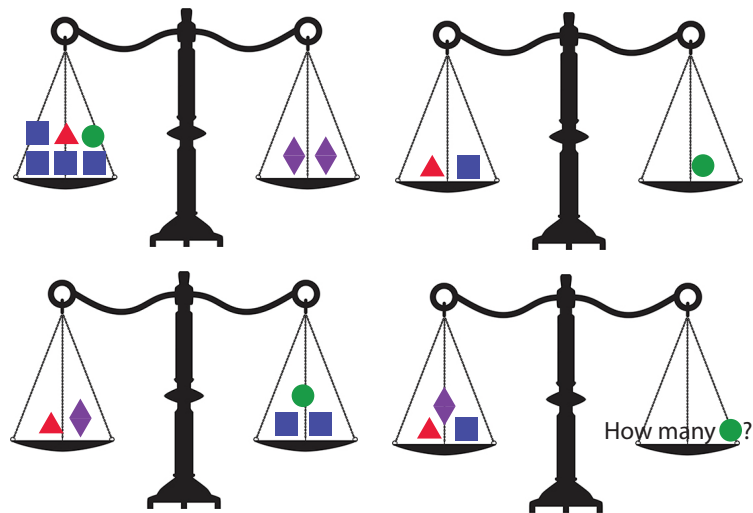
Unit 3: Logic and Reasoning
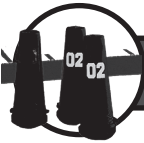
Check Point

Use the *Check Point* to check and reflect before completing the *Big Game!* quiz for *Unit 3: Logic and Reasoning*.

I understand how to:

Unit 3 Concepts	Place a checkmark in the appropriate column		
	Yes	**No**	**Maybe**
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			

If you have any concerns from the *Check Point*, please refer to *Strengthening and Conditioning* in the *Module* for designated practice questions and their solutions, to help you improve your skills.

Contact your teacher for assistance and clarification as needed.

You have completed the *Lessons* and *Workbooks* for *Unit 3: Logic and Reasoning*. Please review all work in *Workbook 3B* to ensure it is your best work. Submit *Workbook 3B* for marking at this time and continue your training with the next unit, *Unit 4: Geometry*.

Complete the *Big Game!* quiz when you have reviewed the feedback provided by your marker for *Workbooks 3A* and *3B*.

End Of Workbook 3B

STOP

After all required components of Units 1 to 3 have been completed, self-assessed, and returned to you with feedback, please review the concepts covered in all **three** units. Contact your teacher to discuss any concepts you are unsure about. When you are ready, contact your exam supervisor or your local ADLC office to schedule an appointment to write the Midterm Exam.

STOP

Your overall mark for this course will be determined based on the following:

Assessments	Weighting
Workbooks A and B	30%
Big Game! unit quizzes	15%
Midterm Exam	20%
Unit 7: Course Project and *Review*	5%
Final Exam	30%
Total Assessment	100%

If you receive less than 40% on either the Midterm or Final Exam, your other assessment marks in this course will not be used when calculating your final mark for Mathematics 20-2. In other words, if you get a mark less than 40% on either the Midterm or Final Exam, your lowest exam mark will be your final mark for the entire course.