Lakehead UNIVERSITY | Faculty of Education

Preparing for the Mathematics Competency Assessment

Welcome to the Faculty of Education and congratulations as you begin this exciting journey. As you prepare for the Mathematics Competency Assessment, please consider this document as a resource to support your learning and preparation. Noted below are suggestions as to how to enhance your understanding of mathematics concepts and skills that will be prepare you for the Assessment.

As you prepare for the competency Assessment:

- Reflect on your understanding of mathematics and concepts and skills using the success criteria on page 2
- Reflect on “Things to Remember” on pages 3 – 4
- Apply your understanding of mathematics concepts and skills to a variety of mathematical situations on pages 5 – 9.
    - You are encouraged to show their thinking in at least two different ways for each question (i.e., two different strategies)
- Compare answers to the answers provided, pages 10 - 11

Things to consider:

- Notes, formula sheets, and calculators are not permitted.
- Thinking tools (e.g., manipulatives, graph paper) will be provided

Looking forward to meeting you and collaborating with you as part of your journey!

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Reflecting on My Understanding of Mathematics Concepts and Skills

I can....

- Make connections between the different operations (e.g., connections between addition and subtraction, addition and multiplication, subtraction and division, multiplication and division)
- Identify the mathematics concept and skills in a mathematical situation
- perform computations with whole numbers, decimals and fractions using mental math strategies (i.e., without the use of a calculator)
- distinguish between fractions as part of a whole and part of set
  - Given a fraction and a part, find the whole
  - Given a fraction and a whole, find the part
- Order, compare and represent numbers (i.e., whole numbers, integers, fractions, decimals, and percents)
- Represent the same number as a fraction, decimal, and percent
- Make connections between fractions, decimals, and percents
- Make conversion between different units (e.g., metres to centimeters, kilograms to grams, litres to millilitres, days to hours, hours to minutes, minutes to seconds)
- Identify directly and inversely proportional relationships
- Solve problems involving unit rates (e.g., if 5 batteries cost $4.75, what is the cost of 1 battery)
- Determine the perimeter and area of regular and irregular shapes
- Use variables is simple algebraic equations
- Solve problems involving area, perimeter, volume and surface area
- Solve simple algebraic equations
- Demonstrate an understanding of the measures of central tendency
- Determine theoretical probability

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Preparing for the MCE…*Things to Remember*

I am going to remember …

- To read the question carefully and determine what is ***explicitly stated*** and what is ***implied***
- ***Identify the mathematics concepts*** and ***skills*** I will be relying on to help me apply my understanding to a mathematical situation
- Reflect on ***strategies*** and ***tools*** I am going to use to help me find a solution
- Check if my answer is reasonable

I am also going to remember…

- Recognize the difference between area and perimeter
- Determine the area and perimeter of simple shapes
- That, sometimes, using '*traditional formulas'* for area, perimeter, volume and surface area don't make sense (i.e., if a rectangular box has no top, then the equation $SA = 2lw + 2lh + 2wh$ will need to be modified)
- To use surface area to help me determine dimensions of a rectangular prism
- To use volume to help me determine dimensions of a rectangular prism
- That a square based prism is not a cube
- To determine the dimensions of a rectangular prism given a net
- Consider the units when making sense of measurement problems
- Convert between different units (i.e., m → cm, km → m)
- How to determine how many smaller rectangles can fit into a bigger rectangle
- How to determine how many cubes fit into a rectangular prism
- How to determine the time in given a decimal (i.e., 6.4 hours is 6 hours and 24 minutes)
- How to represent a number as a decimal, fraction, and percent
- That determining the whole given a fractional part is different than determining how many parts given the whole and the fraction
- That inverse proportional relationships are different than those that are directly proportional
- To recognize the difference between the determining the percent increase and the percent decrease
- To distinguish between mean, median, and mode
- To create algebraic equations that represent mathematical situations
- The connections between probability and fractions and percent

For Example,

In the morning, there were a number of people at the pool. Later in the afternoon, $\frac{2}{7}$ of the people left leaving 30 people left at the pool. How many people were at the pool in the morning?

Read the question carefully and determine what is ***explicitly stated*** and what is ***implied.***

- Explicitly Stated:
  - $\frac{2}{7}$ of the people left
  - 30 people were left

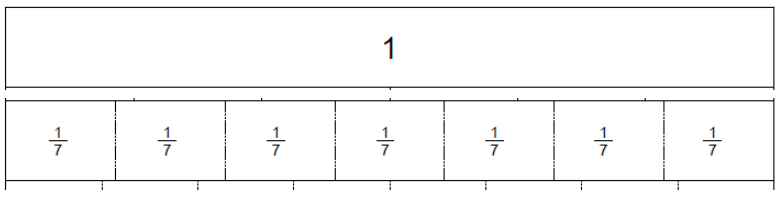
- Implied
  - $\frac{5}{7}$ of the people remain at the pool
  - $\frac{5}{7}$ of the people that were there in the morning represents the 30 people that remain

Identify the mathematics concepts and ***skills***. Apply understanding of the mathematics concepts and skills to a mathematical situation

- Fractions
- Determine the whole given a fractional part

Reflect on ***strategies*** and ***tools*** I am going to use to help me find a solution

- Fraction strips could be used to find the whole



Check if my answer is **reasonable**

Applying my Understanding of Mathematics Concepts and Skills

Part A: Proportional Reasoning

1. Alanna drives 100 km in 2 hours and has 60 km left in her journey. If she continues to drive at the same rate, will it take Alanna more or less than 2 hours to complete her journey? Show how you know you are right

2. A recipe used 6 cups of flours for 18 small pizzas. How many cups of flour are needed for 12 small pizza?

3. Do the following values reflect a direct proportional relationship or inversely proportional relationship. What makes you say that?

x	y
2	12
4	6
6	4
8	3

   What would the value of x be if y is 8? What would the value of y be if x is 12?

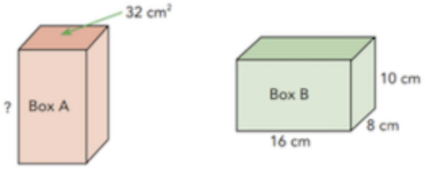
4. A cafeteria has enough food for 125 people for 16 days. How long will the food last if 75 more people join them?

Part B: Volume

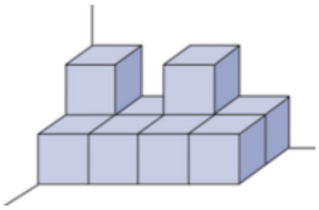
1. A rectangular fish tank has a length, width and height of 120 cm, 30 cm and 36 cm. If it is $\frac{1}{3}$ full of water. Find the volume of water needed to fill the tank.

2. A square prism of height 15 cm has a volume of 735 cm^3. Find the length of each side of the square base.

3. The volume of Box A is $\frac{2}{5}$ of the volume of Box B. What is the height of Box A if it has a base are of 32 cm^2?

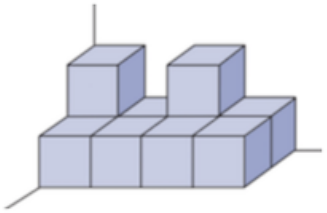


4. The solid below is made up of cubes. Each cube has an edge length of 2 cm. What is the volume of the solid figure?



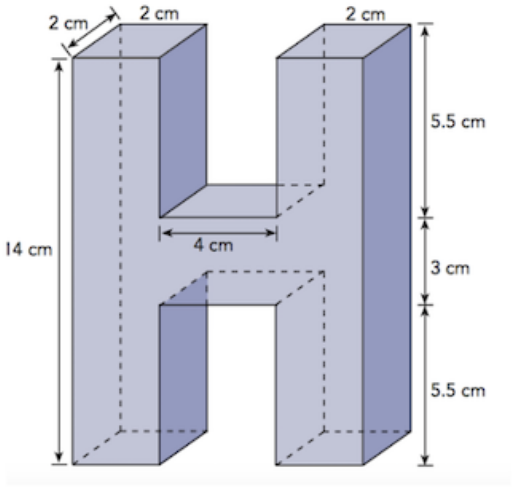
Part C: Surface Area

1. What is the exposed surface area if the following object is sitting on a table. Each cube has an edge length of 2 cm.



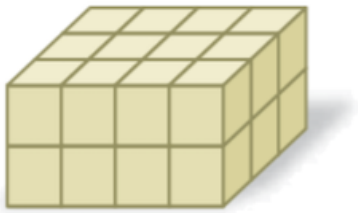
2. A square prism of height 15 cm has a volume of 735 cm^3. What is its surface area?

3. What is the exterior surface area of the following shape?



4. Alanna wants to paint the exterior of her wooden jewelry box blue. The jewelry box is in the shape of a cube and has an edge length of 10 cm. How much blue paint will Alanna need?

5. What is the exterior surface area of this rectangular prism that has a volume of 5184 cm^3?



Part D: Fractions

1. A number is decreased by $\frac{1}{4}$ to 24. What is the number?

2. A number is increased by $\frac{1}{3}$ to 16. What is the number?

3. Emma gave her mom $\frac{3}{5}$ of her flower bouquet. If she gave her mom 12 how many flowers were in the bouquet?

4. $\frac{1}{6}$ of the students in a class wear glasses. If 20 students do not wear glasses, how many students are there in the glass?

5. List 3 fractions between $\frac{2}{5}$ and $\frac{3}{5}$ that have denominators that are not a multiple of 5.

6. Emma has an hour before bedtime to spend on something other than homework. Emma spends $\frac{3}{5}$ of the hour texting a friend and $\frac{3}{8}$ of the remaining time brushing her teeth and putting on her pajamas. She spends the rest of the time reading her book. How long does Emma read?

Part E: Area, Perimeter, Percent, Probability, and Time

1. Alanna used to pay $1.25 for a donut. Now she pays $1.50. What percent increase is that?

2. Jonathan is selling spring break flights to Lakehead students. He has negotiated a price of $456, per person, with the airline. Jonathan wants to make a profit of 25% on each ticket. How much does Jonathan need to sell the ticket for to make a 25% and how much profit is he going to make if he sells 20 tickets?

3. Put the following in order from least to greatest.

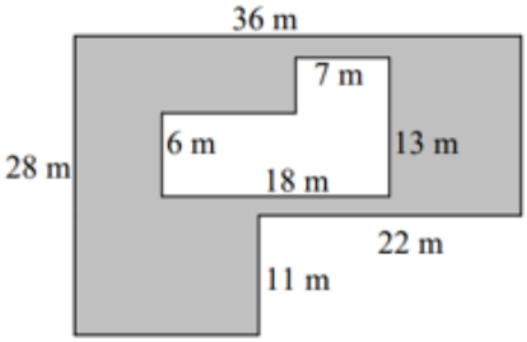
   $\frac{2}{5}$ 0.3 $\frac{3}{9}$ 26% 0.22

4. Emma is four times as old as Carly. Carly is three times as old as Alanna. If the sum of their ages is 64 what are their ages?

5. The length of a rectangle is 6 cm more than its width. If the perimeter is 52 cm. What are the dimensions of the rectangle?

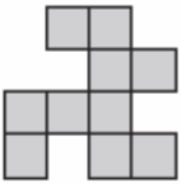
6. Matthews burns 11 calories/min on average. How long would it take him to burn 18 700 calories? Represent your answer in days, hours and minutes.

7. What is the area of the shaded region? *Note: The diagram is not to scale.*



8. What is the area of the shape?

9. What is the perimeter of the shape made up of squares that have a side length of 2 cm.



10. How many 2 cm x 2 cm tiles can fit on area of the floor that is 9 cm x 5 cm?

11. On her first assessment Alanna got 72%. On the second assessment, she got 80% and on the third she got 94%. What does she need to get on her fourth assessment to have an overall average of 86%?

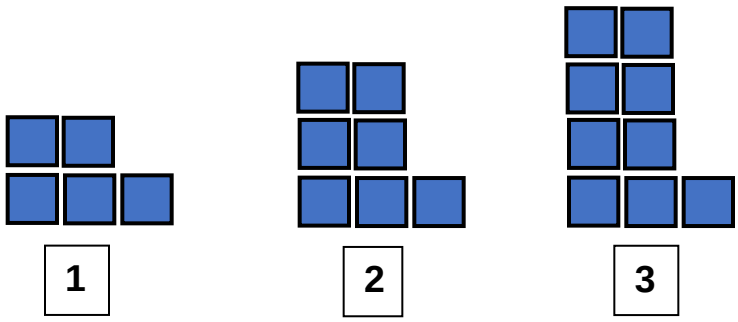
12. A bag contains 3 green marbles, 2 red marbles, and 5 yellow marbles. What is the probably of pulling out a red marble? Express this as a fraction, percent and decimal.

13. A spinner has 15 sections. Some are blue and some are red. The probability of spinning a red is $\frac{2}{5}$. How many sections are blue?

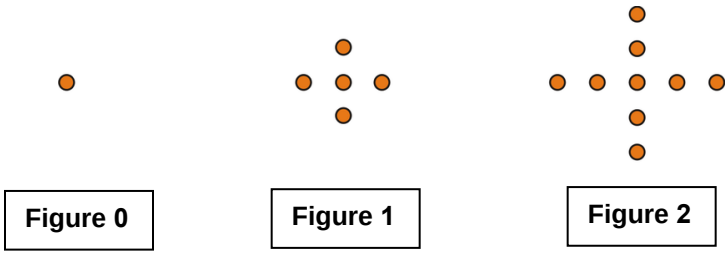
14. Emma is saving coins in her piggy bank. She has $1.80 in nickels, $1.20 in dimes and $3.00 in quarters. When reaching into her piggy bank, what is the probability she will pull out a quarter?

Part F: Patterning and Algebraic Reasoning

1. How many square tiles will there be in the 5th term if the pattern continues? How many square tiles will there be in the 50th term? When will there be 27 squares?

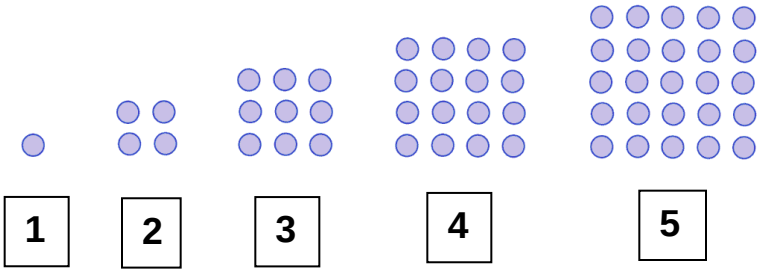


2. How many dots will there be in the 10th term? When will there be 49 dots? Will there ever be only 88 dots in one term and what makes you say that?

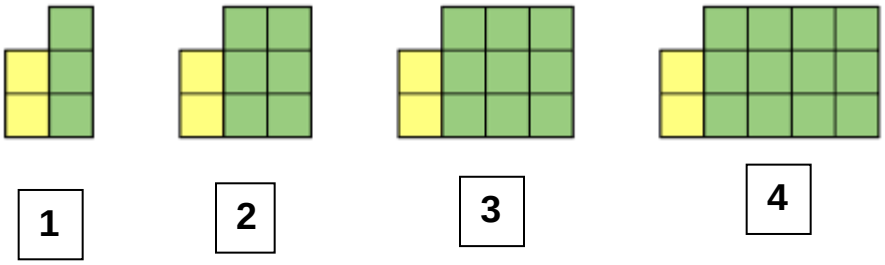


3. If the general rule is $3n + 4$, create a representation for the first five terms? When will the value of the term be 118? What is the value of the 23rd term?

4. How many dots would there be in the 100th term?



5. Consider the following pattern.

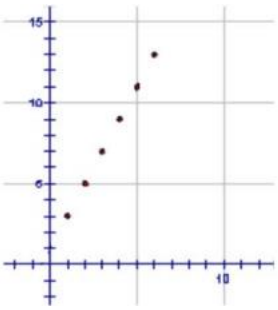


   a. Represent the pattern in 3 different ways (i.e. graph, number, table of values, algebraically).

   b. What is the 'general rule' that reflects the relationship between the position number (or term number) and the value of the term (or the number of tiles).

   c. Find the 15th term and the 75th term.

6. Consider the following graph. What might the pattern look like?



Answers

Part A: Proportional Reasoning	
1.	It will take less than two hours to complete the trip, as it takes only 72 minutes to complete the complete the trip.
2.	4 cups of flour
3.	When y = 8, x = 3 When x = 12, y = 2
4.	10 days

Part B: Volume	
1.	86.4 L or 86 400 cm^3
2.	7 cm
3.	16 cm
4.	80 cm^3

Part C: Surface Area	
1.	112 cm^2 or 76 cm^2
2.	518 cm^2
3.	268 cm^2
4.	600 cm^3 or 0.6 L
5.	1872 cm^2

Part D: Fractions	
1.	32
2.	12
3.	20 flowers
4.	24 students
5.	$\frac{3}{6}$, $\frac{3}{7}$, $\frac{4}{9}$ (answers will vary)
6.	15 minutes is spent on reading

Part E: Percent, Probability, Time, Area and Perimeter	
1	20%
2	$570, profit =$2280
3	$\frac{2}{5}$ 0.3 $\frac{3}{9}$ 26% 0.22 5^{th} 3^{rd} 4^{th} 2^{nd} 1^{st}
4	Alanna is 4 years old, Carly is 12 years old , Emma is 48 years old
5	Width = 10 cm, Length = 16 cm
6	1 day, 4 hours, 20 minutes
7	609 m^2
8	13 square units
9	44 cm
10	8 tiles
11	98%
12	$\frac{1}{5}$, 20%, 0.2
13	9
14	$\frac{1}{5}$

Part F: Patterning and Algebraic Reasoning	
1	13 square tiles, 103 square tiles, 12^{th} term
2	41 dots, 12^{th} term, no (reasoning will vary)
3	(answers will vary, e.g., 7, 10, 13, 16, 19,…), 38^{th} term, 73
4	10 000 dots
5	(answers will vary), 3n + 2, 47 and 227
6	(answers will vary, e.g.,