Self-Assessment for Grade 9 Academic Math (MFM1D)

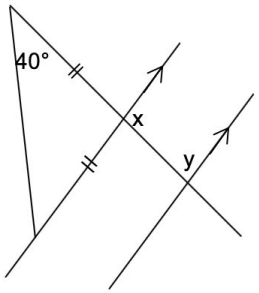
Students who are registered for Grade 9 Academic Math (MPM1D) may benefit from a self evaluation and review of the following expectations from Grade 8 Math.

The questions in this self-assessment reflect some of the key ideas learned in prerequisite courses. They do not represent the problem solving approach or the rich experience that students would be exposed to in a classroom. The intention is for students to revisit some key concepts and, if needed, access review materials in an informal environment at a pace that is comfortable for the student.

Concept(s)	Sample Question	How comfortable do you feel with this concept?	Link(s) to explore concept further
I can express repeated multiplication using exponential notation	1. Write as a single power $7\times 7\times 7\times 7\times 7$	 ☐ **Very comfortable**  ☐ **Somewhat comfortable**  ☐ **Not at all comfortable**	Exponents
I can order rational numbers	2. Write the following numbers in order from least to greatest $3.25 \quad -4.75 \quad -\frac{3}{4} \quad \frac{15}{4} \quad -\frac{11}{4} \quad 3.5$	 ☐ **Very comfortable**  ☐ **Somewhat comfortable**  ☐ **Not at all comfortable**	Comparing Rational Numbers

I can solve problems involving percents	3. A book regularly costs $13.99 but is on sale. The sale price is 20% off the regular price. a) What is the sale price? b) If 13% H.S.T. is applied to the sale price, what is the total cost of the book?	 ☐ **Very comfortable**  ☐ **Somewhat comfortable**  ☐ **Not at all comfortable**	Percentages
I can solve problems involving simple fractions	4. A tank of gas is $\frac{3}{4}$ full. A drive to work and back home uses $\frac{1}{8}$ of a tank. If a person drives to work in the morning and back home in the evening, how many days will the gas last?	 ☐ **Very comfortable**  ☐ **Somewhat comfortable**  ☐ **Not at all comfortable**	Dividing Fractions
I can evaluate expressions that involve integers using the order of operations	5. Evaluate: a) $-3-7+1$ b) $-3-(-5)$ c) $\frac{-20}{5}$ d) $9-8\times 2$ e) $2(1-3^2)+16\div 2$	 ☐ **Very comfortable**  ☐ **Somewhat comfortable**  ☐ **Not at all comfortable**	Adding Integers Subtracting Integers Multiplying Integers Dividing Integers Order of Operations

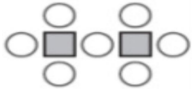
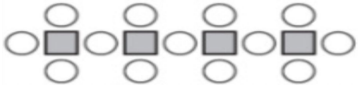
I can solve problems involving proportions	6. To make 100 grams of bronze, you need 92 grams of copper. How much copper would you need to make 250 grams of bronze?	 ☐ **Very comfortable**  ☐ **Somewhat comfortable**  ☐ **Not at all comfortable**	Proportionality
I can solve problems involving rates	7. At one store, A 500 mL bottle of shampoo costs $5.77. A 700 mL bottle of the same shampoo at another store costs $7.99. Which one is the better deal?	 ☐ **Very comfortable**  ☐ **Somewhat comfortable**  ☐ **Not at all comfortable**	Unit Rates
I can solve problems involving the volume of cylinders using a variety of strategies	8. A short cylindrical can has a radius of 10 cm and a height of 5 cm. A tall cylindrical can has a radius of 5 cm and a height of 10 cm. Which can has a greater volume? How much greater?	 ☐ **Very comfortable**  ☐ **Somewhat comfortable**  ☐ **Not at all comfortable**	Volume and Capacity of a Cylinder

I can solve angle relationship problems involving triangles, intersecting lines, parallel lines and transversals	9. Find the two unknown angles.  	 ☐ **Very comfortable**  ☐ **Somewhat comfortable**  ☐ **Not at all comfortable**	Angles and Intersecting Lines Parallel Lines and Transversals

I can model linear relationships using tables of values, graphs and equations

I can determine a term, given its term number in a linear pattern that is represented by a graph or an algebraic equation

10. Consider the following pattern (from visualpatterns.org/)
    a) Describe the pattern between the Number of Circles and the Image Number
    b) Complete the table
    c) Graph the Number of Circles vs. the Image Number
    d) Write an equation that represents the relationship between the Number of Circles (C) and the Image Number (n)
    e) Determine the number of circles in 43 image

Image	Number of Circles
1 	
2 	
3 	
4 	

 ☐ **Very comfortable**

 ☐ **Somewhat comfortable**

 ☐ **Not at all comfortable**

Patterns in Sequences

The General Term

Variables

Graphing Patterns

Bringing it All Together

I can evaluate algebraic expressions with up to three terms by substituting fractions, decimals and integers	11. Evaluate $10a + 3b + 6c$ if $a = \frac{1}{4}$ $b = -2$ $c = 0.75$	 ☐ **Very comfortable**  ☐ **Somewhat comfortable**  ☐ **Not at all comfortable**	Evaluating expressions with two variables: fractions & decimals
I can solve and check linear equations involving a one-variable term, that includes integers	12. Solve $2x + 9 = 7$	 ☐ **Very comfortable**  ☐ **Somewhat comfortable**  ☐ **Not at all comfortable**	Solving Equations using Visual Models and by Inspection Solving Equations by Trial and Error Solving One-Step Equations Using Algebra
I can identify if there is a relationship within the data of a scatter plot	13. Consider the following graph.	 ☐ **Very comfortable**  ☐ **Somewhat comfortable**  ☐ **Not at all comfortable**	Scatter Plots

a) What type of graph is this?
b) Why is this type of graph useful for this data?
c) Does the graph suggest a relationship between the Annual Salary and the Number of Years of Experience? How do you know?

Solutions to Sample Questions

1. Write as a single power $7\times 7\times 7\times 7\times 7$

$7\times 7\times 7\times 7\times 7=7^5$

2. Write the following numbers in order from least to greatest

$3.25 \qquad -4.75 \qquad -\frac{3}{4} \qquad \frac{15}{4} \qquad -\frac{11}{4} \qquad 3.5$

One way to sort them is to first, write them all as decimals by dividing the numerator by the denominator.

$3.25 \qquad -4.75 \qquad -0.75 \qquad 3.75 \qquad -2.75 \qquad 3.5$

Then sort them from least to greatest. One way to represent -4.75 is that you owe $4 dollars and 75 cents. Since you are "richer" if you owe $2.75 than if you owe $4.75, -2.75 is greater than -4.75.

The decimal numbers in order are

$-4.75 \qquad -2.75 \qquad -0.75 \qquad 3.25 \qquad 3.5 \qquad 3.75$

So the original list in order is

$-4.75 \qquad -\frac{11}{4} \qquad -\frac{3}{4} \qquad 3.25 \qquad 3.5 \qquad \frac{15}{4}$

3. A book regularly costs $13.99 but is on sale. The sale price is 20% off the regular price.

a) What is the sale price?

20% of $13.99=$2.80

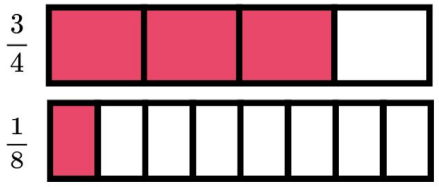
So the sale price is $13.99-$2.80=$11.19

b) If 13% H.S.T. is applied to the sale price, what is the total cost of the book?

13% of $11.19=$1.45

So the cost is $11.19+1.45=$12.64

4. A tank of gas is $\frac{3}{4}$ full. A drive to work and back home uses $\frac{1}{8}$ of a tank. If a person drives to work in the morning and back home in the evening, how many days will the gas last?



We can see that 6 of the $\frac{1}{8}$ pieces are needed to match the $\frac{3}{4}$ bar. So $\frac{3}{4} \div \frac{1}{8} = 6$

Since $\frac{3}{4} \div \frac{1}{8} = 6$, if the car is only used to drive to and from work then the gas should last 6 days

Since $\frac{3}{4} \div \frac{1}{8} = 6$, if the car is only used to drive to and from work then the gas should last 6 days.

5. Evaluate:

a) $-3-7+1=-9$

b) $-3-(-5)=-3+5$
$=2$

c) $\frac{-20}{5}=-4$

d) $9-8\times 2=9-16$
$=-7$

$$2\left(1-3^2\right)+16\div 2=2(1-9)+16\div 2$$
$$=2(-8)+16\div 2$$
$$=-16+16\div 2$$
$$=-16+8$$

e) $$=-8$$

6. To make 100 grams of bronze, you need 92 grams of copper. How much copper would you need to make 250 grams of bronze?

$$\frac{\text{copper}}{\text{bronze}} \qquad \frac{92}{100}=\frac{x}{250}$$

We need to multiply the denominator in the first ratio by 2.5 so we will also multiply the numerator by 2.5.

$92\times 2.5=230$

So you will need 230 grams of copper

7. At one store, A 500 mL bottle of shampoo costs $5.77. A 700 mL bottle of the same shampoo at another store costs $7.99. Which one is the better deal?

577 cents for 500 mL means $577\div 500=1.154$ **cents per mL**
799 cents for 700 mL means $799\div 700\doteq 1.141$ **cents per mL**

The 700 mL bottle is a slightly better deal.

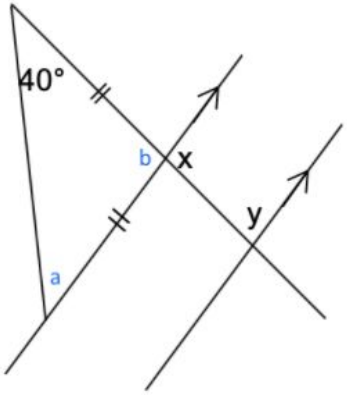
8. A short cylindrical can has a radius of 10 cm and a height of 5 cm. A tall cylindrical can has a radius of 5 cm and a height of 10 cm. Which can has a greater volume? How much greater?

$$V_{\text{cylinder}}=A_{\text{base}}\times h$$
$$=\pi r^2 h$$

$$V_{\text{short cylinder}}=\pi(10)^2\times 5$$
$$\doteq 1570.75\ \text{cm}^3$$
$$V_{\text{tall cylinder}}=\pi\left(5^2\right)\times 10$$
$$\doteq 785.38\ \text{cm}^3$$

The short cylinder has a greater volume. It is $1570.75 - 785.38 = 785.37\ \text{cm}^3$ greater in volume. It is double the volume of the tall cylinder.

9. Find the two unknown angles.



Since the triangle is isosceles, angle a is 40º. Since the sum of the angles in a triangle is 180º, angle b is 100º. Since b and x are vertically opposite angles, angle x is also 100º. As angles x and y are co-interior angles, their sum is 180º so angle y is 80º.

10. Consider the following pattern. (The chart is below)
    a) Describe the pattern between the Number of Circles and the Image Number
    One way to see it is that In each stage, there is one circle on the left. Each time a square is added, three circles (one on top, one below and one to the right) are added. This means that the number of circles is 3 $\times$ the image number plus 1.

    b) Complete the table **(See below)**
    c) Graph the Number of Circles vs. the Image Number
    d) Write an equation that represents the relationship between the Number of Circles (C) and the Image Number (n)
    C=1+3n
    e) Determine the number of circles in image 43
    C=1+3(43)
    C=130
    There would be 130 circles in image 43.

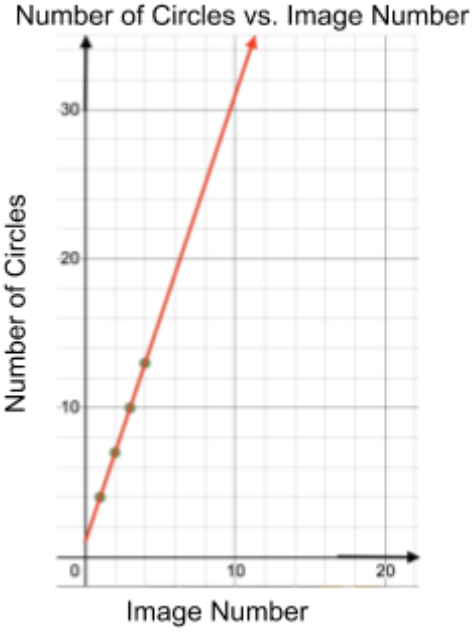
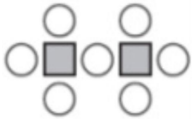


Image	Number of Circles
1 	4
2 	7
3 	10
4 	13

11. Evaluate $10a + 3b + 6c$ if

$a = \frac{1}{4}$

$b = -2$

$c = 0.75$

$10\left(\frac{1}{4}\right) + 3(-2) + 6(0.75)$

$= 2.5 - 6 + 4.5$

$= 1$

12. Solve $2x+9=7$

$$2x+9=7$$

$$2x+9-9=7-9$$

$$2x=-2$$

$$\frac{2x}{2}=-\frac{2}{2}$$

$$x=-1$$

13. Consider the following graph.

a) What type of graph is this? **Scatter Plot**

b) Why is this type of graph useful for this data? S**catter plots are useful in determining if there is a relationship between two variables.**

c) Does the graph suggest a relationship between the Annual Salary and the Number of Years of Experience? How do you know? **Yes, you can sketch in a line of best fit.**