

**This will be
the FIRST page
of your exam**

VILLANOVA COLLEGE

DEPARTMENT OF MATHEMATICS

Grade 9 Math (MPM 1D)

FINAL EXAMINATION

Tuesday June 4th, 2012



TEACHERS:

MS. BELLO

MR. MASCARENHAS

CIRCLE YOUR SECTION:

A

B

C

D

E

Length of Exam: 8:30am – 10:30am

Total Number of Pages (including cover): 11

<u>Section</u>	<u>Mark Breakdown</u>	<u>Time Allotment</u>
KNOWLEDGE:	/50 marks	60 min
COMMUNICATION:	/15 marks	25 min
APPLICATION:	/20 marks	30 min
INQUIRY/THINKING:	/15 marks	25 min
Total Marks:	/100 Marks	

STUDENT NAME _____

SPECIAL INSTRUCTIONS:

1. Check to see that you have a complete exam booklet; there should be no duplicate pages or missing pages.
2. Be prepared with pens, pencils, erasers, a ruler and a calculator. There will not be an opportunity to borrow or share materials.
3. Read all instructions carefully.
4. All questions are to be done in the space provided. Show all your work for full marks. Extra paper will be provided if needed.
5. Reduce fractions to lowest terms. Round answers to one decimal place.
6. Marks will be given for good mathematical form and for clear presentation of solutions.
7. Monitor your time. Make sure you do not spend too much time on any particular question.
8. All formulas are provided on the back page.

FORMULAE:

**This will be
the LAST page
of your exam**

Exponent Laws:

$$x^{-a} = \frac{1}{x^a}$$

$$\left(\frac{x}{y}\right)^{-a} \left(\frac{y}{x}\right)^a$$

$$(x^n)^m = x^{nm}$$

$$(x^n)(x^m) = x^{n+m}$$

$$\frac{x^n}{x^m} = x^{n-m}$$

$$x^0 = 1$$

Equations of a Line:

$$Ax + By + C = 0$$

$$y = mx + b$$

Slope:

$$m \frac{y_2 - y_1}{x_2 - x_1}$$

Interior Angles:

$$S = 180(n - 2)$$

Exam Outline and Breakdown

Here will be the main concepts tested in each section:

Knowledge

This section includes 16 questions testing your knowledge of the following concepts. There will be minimal word problems, and no questions requiring you to give an explanation or justification.

- Exponent Laws
- Simplifying
- Expanding and Simplifying
- Solving
- Factoring
- Rearranging
- Finding slope from 2 points
- Graphing lines
- Finding y-intercept from a graph
- Identifying direct and partial variation
- Finding an equation from a graph
- Rearranging from slope y-intercept form to standard form
- Rearranging from standard form to slope y-intercept form
- Graphing from x and y intercepts
- Finding angles using angle properties
- Finding the sum of interior angles, given the number of sides
- Finding the number of sides, given the sum of the interior angles

Communication

There will be 2 questions, primarily testing your ability to communicate mathematical information. You will be required to draw one or more graphs. You will be required to explain at least one solution using words. The following topics are covered in this section:

- Creating a scatter plot
- Drawing a line of best fit
- Describing a correlation
- Interpolating and extrapolating
- Creating an equation from a word problem
- Graphing
- Using an equation to solve word problems
- Finding point of intersection graphically
- Explaining the meaning of a point of intersection

Application

You will be asked to apply your math knowledge through solving word problems. You will be asked to explain one or more solutions. You will be given a question where you are being asked to spot an error and explain.

- Calculating first differences
- Determining if a relationship is linear or non-linear
- Finding the equation of a line given 2 points
- Creating an equation from 2 points in a word problem
- Using an equation to solve word problems
- Interpreting a distance-time graph

Inquiry/Thinking

You will be asked to show your understanding of concepts though problem solving in new situations. The following topics will be covered:

- Drawing distance-time graphs
- Finding equations of parallel lines
- Finding equations of perpendicular lines
- Using knowledge of parallel and perpendicular lines to solve geometry problems

Exam Review Questions

Additional Review : Re-do all questions from past tests and test reviews

Chapter 2 Review	Pg. 95 #6, 7, 10, 12, 13
Chapter 2 Practice Test	Pg. 99 #8, 10
Chapter 3 Review	Pg. 174 #8, 15 – 20
Chapter 3 Practice Test	Pg. 176 #11, 13
Chapter 4 Review	Pg. 230 #5-8, 9-12, 15
Chapter 4 Practice Test	Pg. 232 #5, 6, 8-10
Chapter 5 Review	Pg. 288 #6, 8, 13, 15
Chapter 5 Practice Test	Pg. 290 #6, 8 – 10
Chapter 6 Review	Pg. 352 #2, 4, 5, 7, 9 – 18
Chapter 6 Practice Test	Pg. 354 #6, 7, 9, 10, 12, 13
Chapter 7 Review	Pg. 408 #1, 2, 4, 6, 7, 8
Chapter 7 Practice Test	Pg. 410 #1-3, 6, 9, 10

Pre-Midterm Topics

1. Simplify using exponent laws

$$a) \frac{(x^3)(x^{10})}{(x^2)^3} \quad b) \frac{(2x^3)(3x^5)}{(x^2)^4} \quad c) \frac{(4x^3)^2(-5x)}{8x^5} \quad d) \frac{(2x^3)^3(-3x)^2}{-4x^5}$$

2. Simplify

$$a) -3x^2 - 5x + 3x - 4x^2 \quad b) 7x + 6x^2 - 2x - x^2$$

3. Expand and Simplify

$$\begin{array}{ll} a) 5x(x^2 - 2x - 4) & b) (2x^2 + 5x) + (2 - x) \\ c) 5(2x^2 - 3x) + 6x(2 + x) & d) 3x(4x + 2) - 2x - 5x(2x - 1) \\ e) 3x(4x^2 - y) - 5x - 4x(2x - 3y) & f) -2x(x + 5y) - 4xy + 3x(x - y) \end{array}$$

4. Solve for the unknown variable.

$$\begin{array}{ll} a) \frac{g}{4} - 4 = 3 & b) 12d + 4 = -8 \\ c) 2(n - 8) = -4(2n - 1) & d) 4(r - 3) = 2(5 - r) \\ e) 3(4 + 2x) = (11x + 3) - (4x - 7) & f) 3(x + 7) - (4x - 1) = -5(2x - 3) + 1 \\ g) \frac{2x - 1}{2} = \frac{4x + 2}{3} & h) \frac{3x - 7}{4} = \frac{4x + 5}{3} \end{array}$$

5. Factor completely.

$$a) 24x^3 - 12x + 4 \quad b) 16x^2y^3 + 18x^4y^5 - 9x^2y^3 \quad c) 15xy^2 - 25x^2y^2 + 5xy$$

6. Rearrange to isolate the indicated variable.

$$a) d = mt + b \text{ for } m \quad b) C = 2\pi r \text{ for } r \quad c) P = I^2R \text{ for } I$$

Scatter Plots

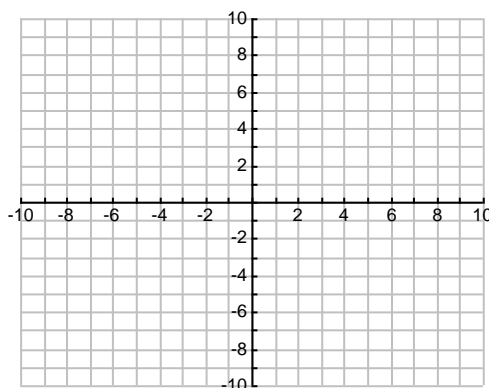
7. The table shows the lengths of the tails and the shoulder heights for a group of dogs.

Shoulder Height (cm)	Length of Tail (cm)
66	32
42	15
33	5
30	8
41	14
62	26
65	34
39	12

- Draw a scatter plot of the data.
- Draw a line of best fit
- Describe the relationship between the shoulder height of a dog and the length of its tail.
- Describe the correlation between the shoulder height and the length of the tail. Be sure to include the direction and strength of the correlation.
- Predict the height of a dog that has a tail length of 40 cm. Is this an interpolation or an extrapolation? Explain.
- Predict the tail length of a dog that is 20 cm tall. Is this an interpolation or an extrapolation? Explain.

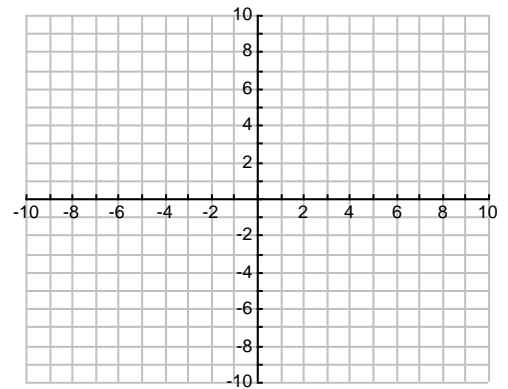
Linear Equations and Linear Relationships

8. For each of the following pairs of points, find the slope of the line that passes through them.
- (3, -4) and (2, 8)
 - (-1, -5) and (-3, -11)
 - (9, 6) and (12, -4)
 - (14, -1) and (-3, -5)
9. Graph: $y = -3x + 4$ and $y = \frac{1}{2}x - 5$ on the same coordinate grid.



10. Graph the following lines on the grid below, and state the y-intercept for each.

- a) A line that passes through (4,7) and has a slope of $\frac{3}{2}$
y-intercept:
- b) A line that passes through (-8, 9) and has a slope of -2
y-intercept:
- c) A line that passes through (2, -3) and has a slope of $\frac{5}{2}$
y-intercept:



11. For each of the following, identify whether the relationship is a direct variation or a partial variation.

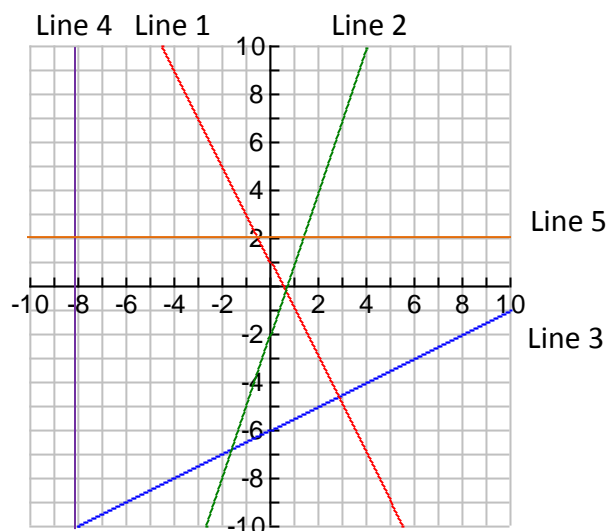
<p>a.</p>	<p>b.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">x</th> <th style="padding: 5px;">y</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">-2</td> <td style="padding: 5px;">-10</td> </tr> <tr> <td style="padding: 5px;">-1</td> <td style="padding: 5px;">-5</td> </tr> <tr> <td style="padding: 5px;">0</td> <td style="padding: 5px;">0</td> </tr> <tr> <td style="padding: 5px;">1</td> <td style="padding: 5px;">5</td> </tr> <tr> <td style="padding: 5px;">2</td> <td style="padding: 5px;">10</td> </tr> </tbody> </table>	x	y	-2	-10	-1	-5	0	0	1	5	2	10
x	y												
-2	-10												
-1	-5												
0	0												
1	5												
2	10												
<p>c.</p> <p>Jen's kiddie pool begins with 500L of water, and is emptying at a rate of 3.25L each minute.</p>	<p>d.</p> $y = -x + 2$												

12. Identify the slope and y-intercept for:

- a) $y = -3x + 5$
- b) $y = \frac{1}{4}x - \frac{4}{5}$

13. State the equation of each line.

- a) Line 1: _____
- b) Line 2: _____
- c) Line 3: _____
- d) Line 4: _____
- e) Line 5: _____



14. Rearrange the equations to slope y-intercept form.

a) $4x - 5y - 20 = 0$

b) $2x - y + 10 = 0$

c) $-4x = 3y - 24$

15. Rearrange the equations to standard form.

a) $y = -x + 2$

b) $y = \frac{1}{2}x - 5$

c) $y = \frac{-2}{3}x + 1$

16. State the equation of the line that:

a) has a slope of -4 and a y-intercept of 2

b) has a slope of 3 and passes through the point (-5, 7)

c) is parallel to $y = -x + 4$ and has an x-intercept of 2.

d) is perpendicular to $y = \frac{2}{3}x - 5$ and passes through the point (4, -1)

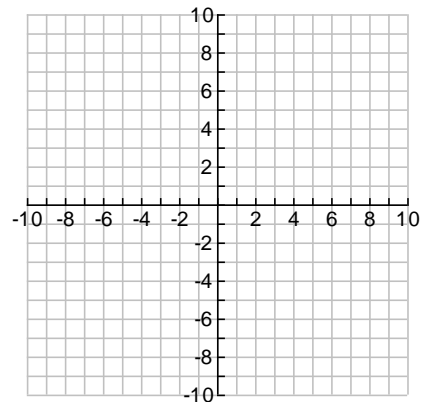
e) passes through the points (-3, 8) and (-2, 12)

17. Andrew claims that line AB forms a right angle with line AC. The points are A(3, 4), B(4, -1), and C(-3, 3). Is he correct? Prove your answer algebraically.

18. Determine the **x and y intercepts** in co-ordinate form for the following equations. Then graph the intercepts on the Cartesian plane. Don't forget to label each line!

a) $-5x + 2y = 10$

b) $4x - 5y = -20$



19. A fitness club offers two types of monthly memberships:

Membership A: \$4 per visit

Membership B: a flat fee of \$12 plus \$2 per visit

a) Write an equation representing to cost of each membership. Define your variables.

b) Calculate the cost for each membership if you made 5 visits to the club.

c) Graph both equations on the same grid to find the point of intersection.

d) What does the point of intersection mean?

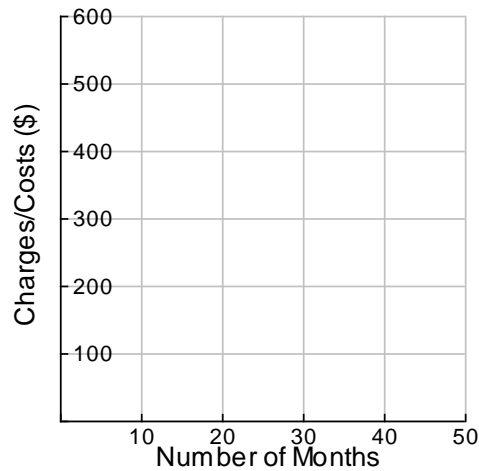
e) Verify the point of intersection.

20. Phoenix Health Club charges a \$200 initiation fee, plus \$15 a month. Champion Health Club charges a \$100 initiation fee, plus \$20 a month. Find the equation that represents the cost/charges for each health club.

*Let x represent the number of months
Let y represent the total charges/costs*

Phoenix Health Club _____ Champion Health Club _____

- a) Calculate the cost if you attended Phoenix Health club for 9 months.
b) Graph both equations on the same grid to find the point of intersection.



- c) Explain the meaning of the point of intersection in relation to the situation.
d) Verify your point of intersection by doing a $LS=RS$ check.

21.

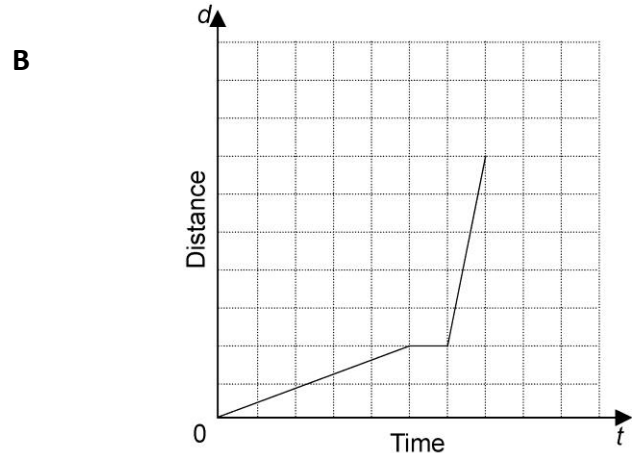
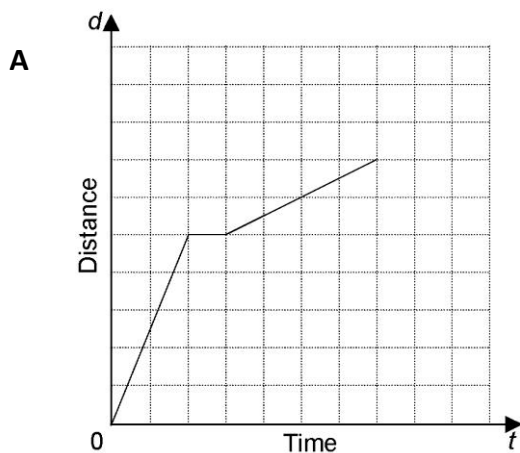
Number of fitness classes	Charges	First Differences
0	200	XXXXXXXXXXXX
100	300	
200	400	
300	500	
500	700	XXXXXXXXXXXX

- a) Complete the **first differences** column in the table of values above.
b) Is the relationship between the number of fitness classes and charges/total costs **linear** or **non-linear**? Explain your choice.

22. For each of the following pairs of points, find the equation of the line that passes through them:
- $(3, 18)$ and $(-4, 7)$
 - $(-5, 0)$ and $(-13, 11)$
 - $(-16, 5)$ and $(-3, -4)$
23. Determine the **equation of the line** represented by each situation, and answer any secondary questions. DEFINE YOUR VARIABLES.
- Melissa is tracking the money in her spending account. After 3 days, she has \$1315 left in her account. After 10 days, she has \$1210 left. Write an equation relating the amount of money and time. How much money was in Melissa's account when she started tracking her money?
 - A plane is descending to land. It begins at 28 670 feet. It hits the ground after 12.2 minutes. Create an equation to model this situation. How high will the plane be after 5 minutes?
 - Sarah is performing an experiment where she measures the temperature of a cup of water while it heats up. After 5 minutes, it is 52°C . After 10 minutes, it is 71°C . Write an equation to model the temperature of the water. When will it be 100°C ?
 - Ingrid is walking in front of a motion sensor. After 1s, she is 3.9 m from the sensor. After 3s, she is 1.7 m from the sensor. What does the slope of this equation represent with respect to Ingrid's walking? After how many seconds will Ingrid's distance from the motion sensor be 0?

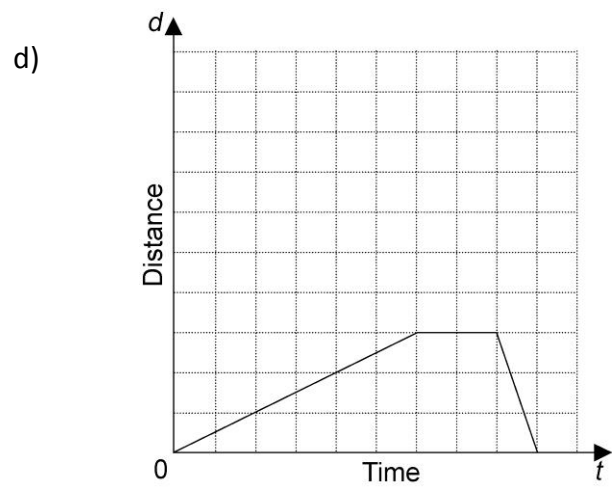
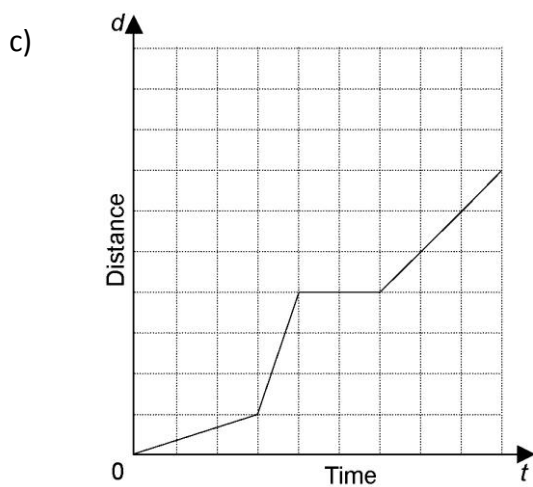
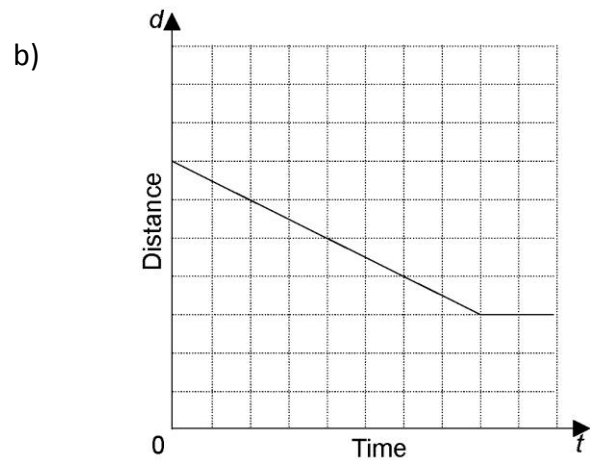
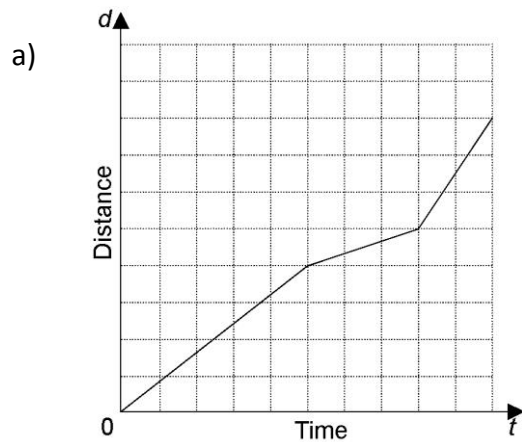
Distance – Time Graphs

24. Michelle is late for school. She runs halfway to school, then gets tired and stops for a short rest. Then, she walks the rest of the way. Which graph best matches the story?



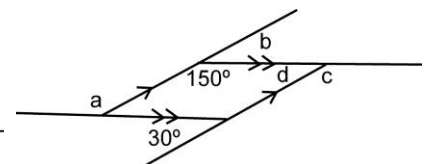
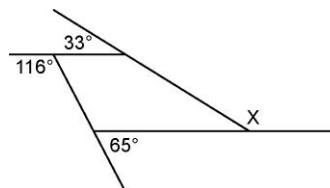
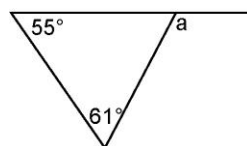
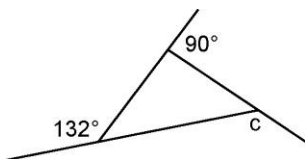
25. Draw a distance-time graph for the following situations:
- A student leaves home, walking at a steady pace. He slows down, then stops for a few seconds to mail a letter. He turns around and runs home at a constant speed.
 - Mark walks to his friend's house. Partway there, he realizes he forgot a CD at home. He runs back home to pick up the CD, then walks back to his friend's house. Construct a distance-time graph to represent this situation.

26. Describe the motion represented by each graph. Include specific speeds.



Geometry

27. Find the measures of the unknown angles for each of the following:



28. Find the sum of the interior angles of a polygon with each number of sides.

- a) 15 sides b) 24 sides

29. Find the measure of each interior angle of a regular polygon with each number of sides.

- a) 9 sides b) 20 sides

30. Find the number of sides each polygon has given the sum of its interior angles.

- a) 1980° b) 4140°