Name: _____

Due Date: June 18, 2013

Kim/VanderHeide

Grade Nine Math: Semester Two Review

Section A: Square Roots, Powers, Equations & Word Problems...../_____23K _____25T

Page 1 ...../_____23K

Page 2 ..... _____25T

Section B: Factoring ...../_____24T

Page 1...../_____20T

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Section C: Perimeter, Volume & Surface Area...../_____40A

Page 1...../_____14A

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Section D: Coordinate Geometry & Graphing...../_____12A /_____38T

Page 1...../_____6A /_____4T

Page 2...../ _____ 6A/_____8T

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Section E: Analytic Geometry...../_____ **42 T** _____**10A**

Page 1...../_____15 T

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Section F: Example Questions...../ _____**43T/I** ____**15K** ____**18A**

Page 1...../ _____30T

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Page 3...../ _____18A

Page 4...../ _____13T

Overall organization and layout...../_____**20C**

Final Percentage: _____/ 100

Section A: Square Roots, Powers, Equations and Word Problems

Name:_____

Simplify. (1K each)

1. $-9 + 3a - 2b - c - 4a + 5c - 3b$

2. $x^2 + 3x - 7 - 2x^2 - 5x + 8$

Expand and simplify. (2K each)

3. $-3(4x + 5) + 5(x + 8)$

4. $3(2x - 5) - 3(3x - 1)$

5. $3(x^2 - 4x - 7) - 2(x^2 + x + 7)$

6. $-2(y^2 - y - 3) + 4(2y^2 - 3y + 1)$

Solve (1K each)

7. $x + 9 = 13$

8. $8x = 36$

9. $3x = -21$

Solve and check (2K each)

10. $7x - 3x + x = 11 - 15 - 1$

11. $4x - 3x - 5x = 13 - 17 - 4$

Solve and check (3K each)

12. $3x + 10 = 5x - 12$

13. $4x + 9 + 2x = 7x - 2 - 12x$

____/23 K

Solve and check (3T/I each)

14. $3(x - 5) = 5(x + 1) + 4$

15. $2(x + 3) - (2x - 5) = 2(x + 1) + 1$

16. $0.2x - 0.7 = 0.8x + 1.7$

17. $1.2x + 2.3 = 3.6 - 2.4x - 8.5$

18. $\frac{x}{3} + \frac{1}{3} = -\frac{2}{3}$

19. $\frac{x - 1}{2} = \frac{x + 3}{3}$

20. Car rally Heidi and Kelly drove in an antique car rally. Kelly left a checkpoint at 09:00 travelling at 45km/h. One hour later, Heidi left the same checkpoint travelling at 50km/h. At what time did Heidi overtake Kelly? (4T/I)

21. All that Katelyn has in her wallet are loonies and quarters, there are 15 more quarters than loonies and the total amount is $21.25. How many quarters are there? (3T/I)

____25 T/

Factoring Overview

Factoring is a method of breaking up an expression into different parts, or 'factor'. Expanding occurs when all of the factors are multiplied to make up the original expression.

The following is a set of questions you can ask yourself when factoring. There is room left for you to put in examples.

1) Is there a **common factor?**
- If so, 'factor out' the common term and multiply it by the remaining expression.

2) Is there a **difference in squares?**
- Both of the terms must be perfect squares; one term is positive; one is negative.

3) Is it a **trinomial?** Does the first term have a coefficient of 1?
- In this case you ask the question: What two numbers multiply & add to give me..?
- Handy Trick 'A' comes before 'M' alphabetically. Find two numbers that Add to give you the coefficient in the 2nd term, and Multiply to give you the constant (3rd term).

4) Is it a **decomposition trinomial?** 1st term's coefficient is not 1?
- In this case you ask the question: What two numbers multiply & add to give me..?
- To find out "M:__?", (what you multiply to) multiply the coefficients in the 1st & last term.
- The middle term is re-written as two terms, using the two numbers from your M & A to ?

5) Special Case: Is it a **perfect square trinomial?**
- The first and last terms must be perfect squares; the middle term must be the same as the expanded form of the perfect square. I.e. The middle term of $(x + 5)^2$ is 10x.

Section B: Factoring Name: _____

Factor and check. (Remember to check for GCF!) (1T each)

1. $6y + 18y^2$

2. $5a^2 - 25a^3$

3. $x^2 - 6x + 9$

4. $y^2 - y - 72$

5. $8 + 7x - x^2$

6. $2x^2 - 12x - 72$

7. $y^3 + 2y^2 - 3y$

8. $3a^3 + 4a^2 - 7a$

9. $6x^2y - 3xy + 9xy^2$

10. $3a - 12a^3$

Find each product. (2 T each)

11. $4(x - 5)(x - 6)$

12. $-3y(1-y)(7 +y)$

13. $(x+ 3)^2$

14. $(y - 5)^2$

15. $3(x - 6)(x + 6)$

____/20 T

CHECKLIST FOR DECOMPOSITION

_____CHECK FOR GREATEST COMMON FACTOR

_____MULTIPLY FIRST TIMES LAST
ADD TO THE MIDDLE

_____FIND THE NUMBERS

_____BREAK APART THE MIDDLE TERM

_____PUT IN THE BRACKETS (& PLUS SIGN)

_____DIVIDE BY THE GCF OF EACH SET OF BRACKETS

_____CLICK & DRAG THE GCFs AND MAKE SURE THERE ARE
TWINS IN BRACKETS

_____(ONE TWIN) (GCF 1 +/- GCF 2)

_____FOIL TO CHECK

Factor. (1 T each)

1) $6x^2 - 14x + 8$

2) $15x^2 - x - 2$

3) $12y^2 - 5y - 2$

4) $4z^2 + 21z - 18$

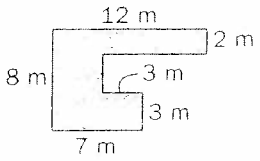
_____4T

Section C: Perimeter, Volume & Surface Area
(See last page of booklet for formula sheet.)

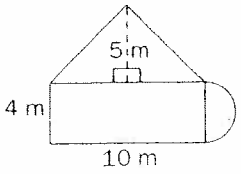
Name: _____

Calculate the area or surface area. Round to the nearest square unit, if necessary. (2A each)

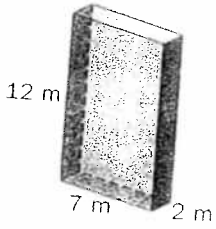
1.



2.



3.



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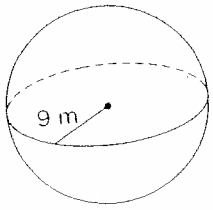
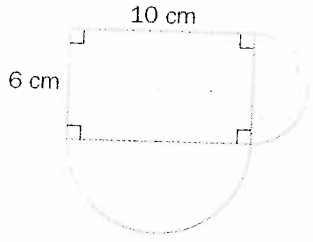


Calculate the area of each composite figure. Round to the nearest square unit. (3A each)

5.



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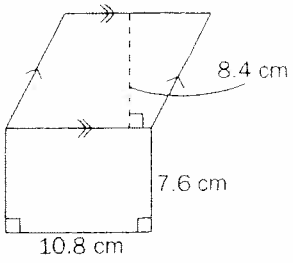
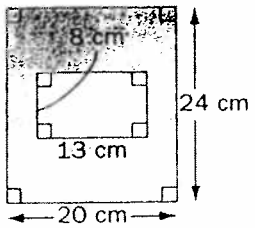


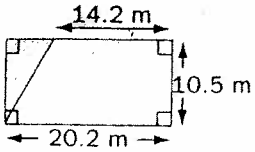
_____/14A

Calculate the area of each shaded region. (3A each)

7.

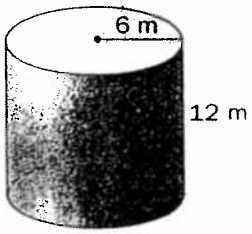


8.



Calculate the volume and surface area. Round to the nearest cubic or square centimetre. (Remember to draw nets). (4A each)

9.



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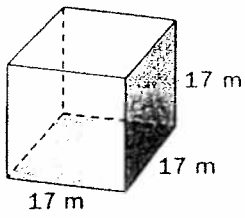

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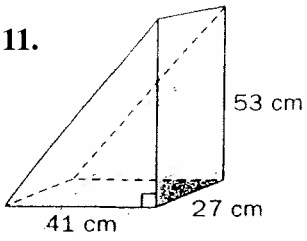

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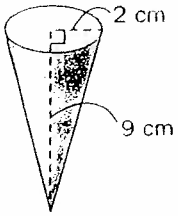


13. Soup can A soup can is a cylinder with a diameter of 6.5 cm and a height of 9.5 cm.
a) Find the surface area. Include the net. (1A)

b) Calculate the volume, to the nearest cubic centimetre. (3A)

____/18A

Section D: Coordinate Geometry & Graphing Name: _____

Find 5 ordered pairs for each relation. (2T)

1. $x + y = 6$

2. $y = 3 - x$

Write an equation that describes each relation. (2T)

3.

x	y
-1	3
0	2
1	1
2	0

4.

x	y
-2	-8
-1	-4
0	0
1	4

5. a) Plot the points A (-3, 6), B (2,6) and C (-3, -2) on a grid. (4A)

b) Write the coordinates of the fourth point needed to form a rectangle. (1A)

c) What are the dimensions of this rectangle? (1A)

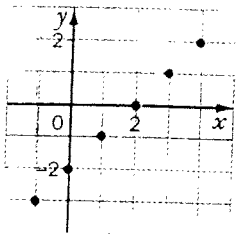
___/4T ___/ 6A

For each graph,

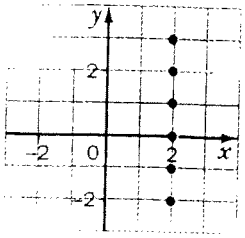
a) express the relation as a set of ordered pairs. (1T each)

b) write the domain and range. (2T each)

6.



7.



8. Grizzly bear Over short distances, a grizzly bear has a top speed of about 13 m/s.

a) Complete the table of values for a grizzly bear at top speed. (2T)

Time (s)	Distance
0	
1	
2	
3	
4	

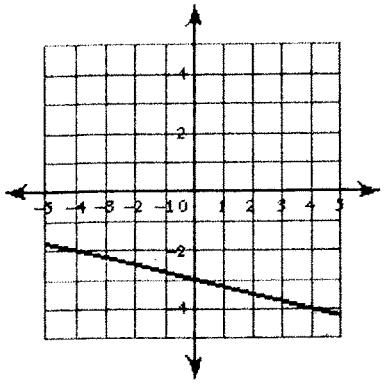
b) Use the ordered pairs to plot a graph of distance versus time. (4A)

c) Use the graph to estimate the distances a grizzly bear can cover in 2.6 s; in 4.8 s. (2A)

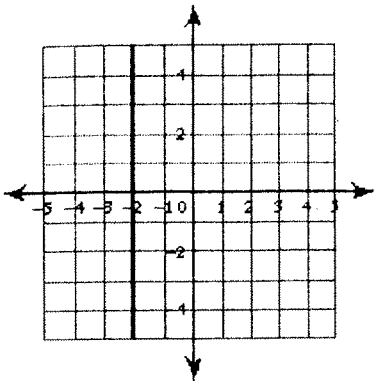
____/8 T ___/6 A

Given the points on the grid, write an equation to represent each relation. (3T/I each)

9.



10.



Determine the slope of the line passing through each pair of points. (2T/I each)

11. (5,3) (1,7)

12. (4,0) (0,0)

13. (0,4) (0,-5)

14. Graph the equation $5x - 3y = -15$ by finding the points where the line crosses the x- and y-intercepts. Clearly communicate your steps. (5T/I)

To find the x-intercept, _____ Therefore: To find the y-intercept, _____ Therefore:	

__/16 T

15. Graph the lines $x + y = 5$ and $x - y = 3$ on the same set of axes. What is the point of intersection? (5T)

Show and explain your method:

16. Make a table of values for each of the lines. Find the point of intersection. (5T)

$y = 2x - 2$ and $y = -2x$

x	y

x	y

____/10 T

Section E: Analytic Geometry Name: _____

Find the slope of the line passing through the points. (2T/I each)

1. A(1,4) and B(3,8)

2. C(-3,8) and D(-8,-7)

Write an equation in ***y=mx + b*** *form for the line that passes through the given pints.* (4T/I each)

3. A(3,-2) and B(4,5)

4. C(1,7) and D(-3,5)

5. Write an equation in slope-intercept form (y=mx + b) for the line that passes through (-4,2) and (2,0). Use the equation to find two other points on the line. (5T/)

___/15 T

Graph each equation on the same set of axes. Use the method of your choice. (3T each)

6. $y = 4x - 5$

7. $3x - 2y - 6 = 0$

Find the slope and y-intercept of each line. (2T each)

8. $y = 3x + 7$

9. $3x - 4y - 12 = 0$

10. Write an equation of the line parallel to $3x + y - 5 = 0$ and passing through the point $(1, -1)$. (4T)

____/14 T

11. Write an equation of the line perpendicular to $y = -2x - 4$ and passing through the point(-6, 4). (4T)

12. Write an equation of the line parallel to $2x - 3y - 3 = 0$ and having the same y-intercept as the line $4x - 7y - 14 = 0$. (4T)

13. Commission Bianca is paid a base salary plus commission for selling clothes. One week, her sales totalled $10,000 and she earned $900. The next week her sales totalled $14,000 and she earned $1100.

a) Plot these on a graph and draw a line through the points. (Use a good scale!) (3T)

b) What rate of commission is Bianca paid? (1T)

c) What is her weekly base salary?(1T)

___/13 T

14. Passenger cars The table shows the numbers of sales of new passenger cars in Canada in different years.

Year	New Passenger Cars (thousands)
1989	985
1990	885
1991	873
1992	798
1993	739
1994	749
1995	670
1996	661
1997	739

a) Display the data on a scatter plot of new passenger cars versus year. (5A)
b) Draw a line of best fit. (1A)
c) Determine the line's equation. Show your work! (4A)

Section F: Example Questions Name: _____

1)Solve each of the following equations for 'x'. (2T each)

a) $y = mx + b$ b) $-(x + 5) - 13 = -2(x + 4)$ c) $\frac{x}{6} + \frac{1}{4}(x + 5) = \frac{1}{3}(x + 8)$

2) Factor completely.(3T each)

a) $7xy - 14x + 21xy^3$ b) $x^2 + 5x - 6$ c) $-3x^2 + 108$ d) $4x^2 + 5x - 6$

3) Expand.(3T each) a) $-3(2x + 5)^2$ b) $(4x - 1)(3 - 2x + 5x^2)$

4) A cylinder has a volume of 942 cm^3. The diameter of the cylinder is 10 cm.

a) What is the cylinder's height? (2T)

b) What is the volume of a cone that exactly fits inside the cylinder? (2T)

5) Simplify. Your final answer should be written as a power, with positive exponents. (1T each)

a) $(10)^6(10)^{-4}(10)$ b) $(2^6)^{-2}$ c) $-(7^2)^4(7^2)^5$ d) $2^{-1} \times 2^5 / 2^{-6}$

[2]Example Questions: Knowledge Section - Analytic Geometry

1) Calculate the slope of the line passing through the points A(1,3) & B(3, -7), using two different methods. (2)

2) Fill out the following chart by writing the equations in point – slope form and then re-writing it in slope-intercept form. (8)

Given Information	**Point-Slope Form** $y - y_1 = m(x-x_1)$	**Slope-Intercept Form** $y = mx + b$
A line that passes through the point P(8, -3), with $m = -\frac{1}{4}$.		
A line that is parallel to $y = \frac{-2}{3}x - 11$ and passes through the point P(9, -4).		
A line that is perpendicular to $y = 5x - 7$ and passes through the point P(4, 0).		
A line that passes through the points P(-1, 3) & Q(5,7)		

3) Write equations for all five lines below, in slope-intercept form. (5)

A: _____

B: _____

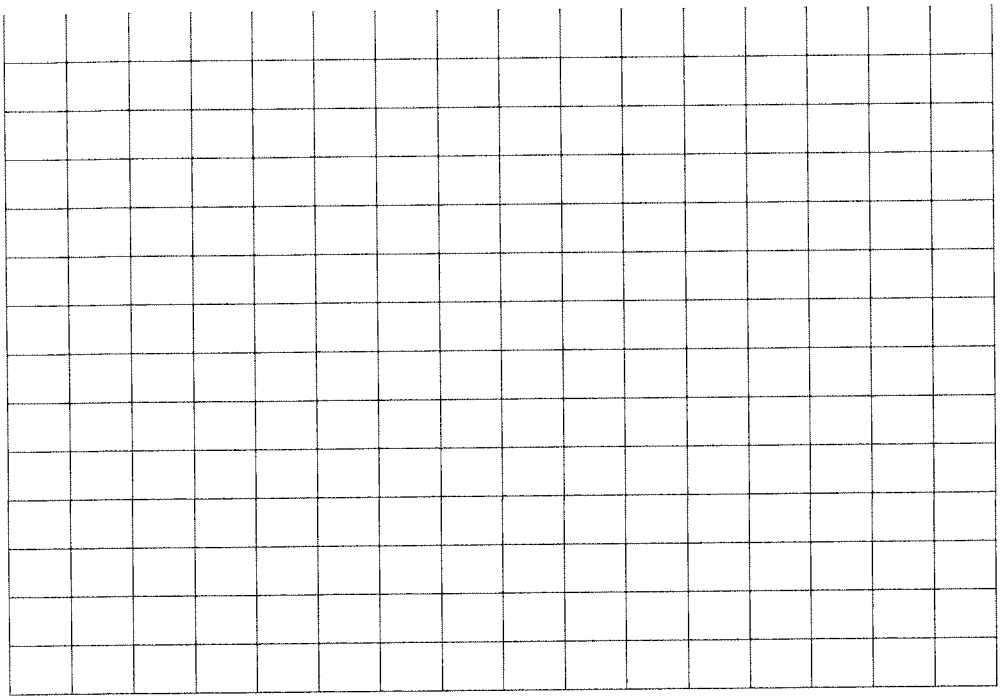
C: _____

D: _____

E: _____

[3]Example Questions: Application Section

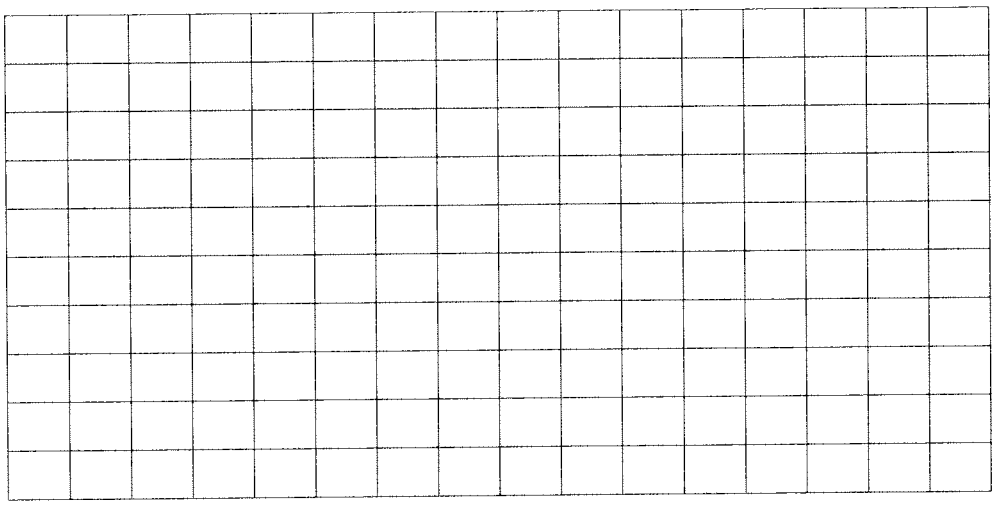
1) a) Graph the lines $-3x + 4y + 12 = 0$ and $y = -x + 11$. **Label the Point of Intersection & the Origin.** (8)



b) What are the x- and y-intercepts for each line? (2)

Line 1: _____, and _____. Line 2: _____, and _____.

2) a) Graph the equation $y = \frac{-2}{5}x - 4$, without using a table of values. **Label both the x- and y- intercepts.**(8)



b) What is the equation of the line parallel to the one above? _____.

c) Draw a line that is perpendicular to $y = \frac{-2}{5}x - 4$.

d) The slope of the new line is m = _____. The equation of your line is_____.

e) Re-write the equation $2x + 5y + 4 = 0$ in slope-intercept form. _____

[4]Example Questions: Thinking Section

1) Marie measures the temperature of a glass of water to be 20°C. She places the glass in a freezer and measures the temperature every 2 min., finding that the temperature decreases 1°C each time. (5)

a) The independent variable (x) is _____. The dependent variable (y) is _____.

b) What is the y-intercept for this problem? Explain why.

c) What is the slope for this problem? Explain why.

d) What is the x-intercept for this problem? What happens at that point?

e) Write an equation for the temperature of the water: y = _____.

2) Find the equation of the line in slope-intercept form for each situation: (5)

a) Slope = ½ and P(9,0) is a point on the line. _____

b) Horizontal line with b = -12. _____

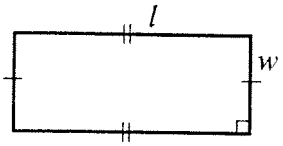
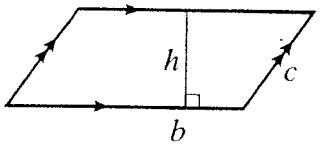
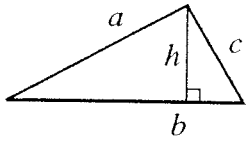
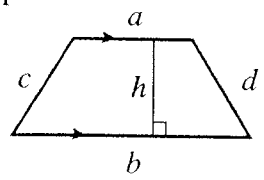
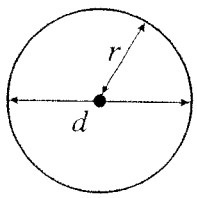
c) Parallel to y = 7x + 1 and with y-intercept is at the point (3,0). _____

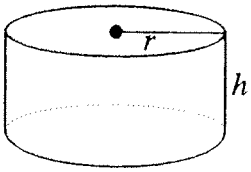
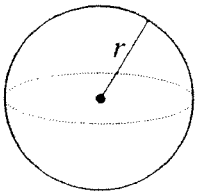
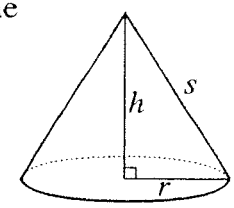
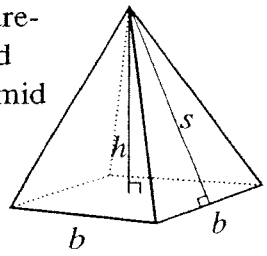
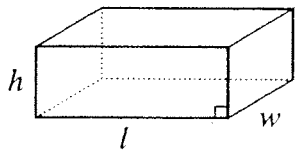
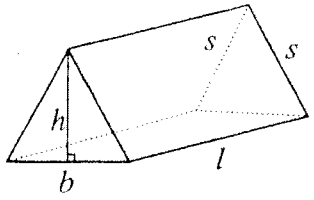
d) Slope = ∞ (undefined) and the x-intercept is at the point (3,0). _____

e) Perpendicular to the line y = -3x + 4, that goes through the point (1,1). _____

3) Purolator charges a base fee and a charge per kilogram to deliver packages. A package that weighs 6kg. costs $11.00 to ship and a package that weighs 10 kg. Costs $16.00 to ship. Determine the cost of shipping a package that weighs 16 kg. (Use the ideas of this graphing unit to solve this question – you cannot simply add the two costs together to determine the answer). (3)

Formula Sheet

Geometric Figure	Perimeter	Area/Surface Area
Rectangle 	$P = 2l + 2w$ $P = 2(l + w)$	$A = lw$
Parallelogram 	$P = b + b + c + c$ $P = 2b + 2c$	$A = bh$
Triangle 	$P = a + b + c$	$A = \frac{bh}{2}$ **or** $A = \frac{1}{2}bh$
Trapezoid 	$P = a + b + c + d$	$A = \frac{(a + b)h}{2}$ **or** $A = \frac{1}{2}(a + b)h$
Circle 	$C = \pi d$ **or** $C = 2\pi r$	$A = \pi r^2$

Geometric Figure	Area/Surface Area	Volume
Cylinder 	$A_{top} = \pi r^2$ $A_{base} = \pi r^2$ $A_{side} = 2\pi rh$ $A_{total} = 2\pi r^2 + 2\pi rh$	$V = \pi r^2 h$
Sphere 	$A = 4\pi r^2$	$V = \frac{4}{3}\pi r^3$
Cone 	$A_{cone} = \pi rs$ $A_{base} = \pi r^2$ $A_{total} = A_{cone} + A_{base}$	$V = \frac{1}{3}\pi r^2 h$
Square-based pyramid 	$A_{triangle} = \frac{1}{2} bs$ *(for each triangle)* $A_{base} = b^2$ $A_{total} = A_{4\ triangles} + A_{base}$	$V = \frac{1}{3} b^2 h$
Rectangular prism 	$A_{total} = wh + wh + lw + lw + lh + lh$ $A = 2(wh + lw + lh)$	$V = lwh$
Isosceles triangular prism 	$A_{triangle} = \frac{1}{2} bh$ *(for each triangle)* $A_{rectangles} = ls + lb + ls$ $A_{total} = A_{rectangles} + A_{2\ triangles}$	$V = \frac{1}{2}(bh)l$

GRADE NINE MATH: SEMESTER TWO REVIEW

Section A: Review from Semester 1

- ✔ Solving equations and checking
- ✔ Solving word problems
- ✔ Working with exponents and powers
- ✔ Simplifying exponent expressions using exponent rules

Section B: Expanding and Factoring

- ✔ Knowing the difference between expanding and factoring
- ✔ Expanding by multiplying:
  - ✔ a monomial by a polynomial
  - ✔ two or three binomials
  - ✔ a binomial by a trinomial
- ✔ Putting polynomials in descending order
- ✔ Factoring polynomials:
  - ✔ by taking out a common factor
  - ✔ of the type x^2+bx+c by finding two numbers that multiply to +c and add to +b
  - ✔ of the type ax^2+bx+c by the method of decomposition
  - ✔ that are the difference of squares e.g. $16x^8-81y^2=(4x^4+9y)(4x^4-9y)$
  - ✔ require using a combination of the above methods
- ✔ Factoring and/or expanding expressions that represent areas of polygons
- ✔ Recognizing when a polynomial cannot be factored
- ✔ Factoring polynomials and checking by expanding

Section C: Perimeter, Volume and Surface Area

- ✔ Knowing what perimeter, circumference, area, volume and surface area mean
- ✔ Knowing and being able to use formulas for perimeter and area of a square, rectangle, and triangle
- ✔ Knowing and being able to use the formulas for the circumference and area of a circle
- ✔ Calculating the perimeter and area for a trapezoid and parallelogram given formulas
- ✔ Drawing the net, and calculating the surface area and volume of a prism without being given the formula
- ✔ Drawing the net, and calculating the surface area and volume of a cone or cylinder given formulas
- ✔ Finding missing dimensions of polygons given its perimeter or area

Section D: Coordinate Geometry and Graphing Lines

- ✔ Knowing and identifying parts of the Cartesian Plane (also known as the xy-plane): x-axis, y-axis, origin, quadrants, ordered pairs, x-coordinate, y-coordinate, scale, intercepts
- ✔ Graphing and identifying points
- ✔ Graphing relations (especially lines) using a table of values
- ✔ Graphing lines and finding their point of intersection
- ✔ Rearranging equations into the form $y=mx+b$ and then graphing them
- ✔ Plotting and connecting points, and then determining the enclosed area
- ✔ Calculating slopes of lines or line segments using a graph or by the formula

- ✔ Knowing that vertical lines have undefined slopes and horizontal lines have zero slopes

Section E: Analytic Geometry

- ✔ Calculating rate of change using slope
- ✔ Finding the equation of the line given a point and the slope
- ✔ Finding an equation given two points
- ✔ Knowing that the equation of a horizontal line is written in terms of the y-value and that the equation of a vertical line is written in terms of the x-value
- ✔ Finding the equation of the line of best fit
- ✔ Determining the equation of the line given the graph
- ✔ Knowing that a family of lines share a common characteristic
- ✔ Graphing an equation given the slope and the y-intercept
- ✔ Graphing horizontal and vertical lines
- ✔ Finding the slope and y-intercept of a line
- ✔ Finding the slope and y-intercept of a line given two points
- ✔ Finding the x- and y-intercepts of a line
- ✔ Graphing a line using the x- and y-intercepts
- ✔ Being able to graph lines using table of values, slope and y-intercept and x-and y-intercepts methods
- ✔ Knowing that parallel lines have the same slope
- ✔ Knowing that the slope of perpendicular lines are neagative reciprocals; their product is -1
- ✔ Knowing that a vertical line (m = undefined) is perpendicular to a horizontal line (m = 0)
- ✔ Finding the equation of a line parallel to a given line and through a given point
- ✔ Finding the equation of a line perpendicular to a given line and through a given point
- ✔ Finding the equation of a line parallel or perpendicular to a given line and having the same x- or y-intercept as another given line
- ✔ Applying the skills of analytic geometry to problem solving