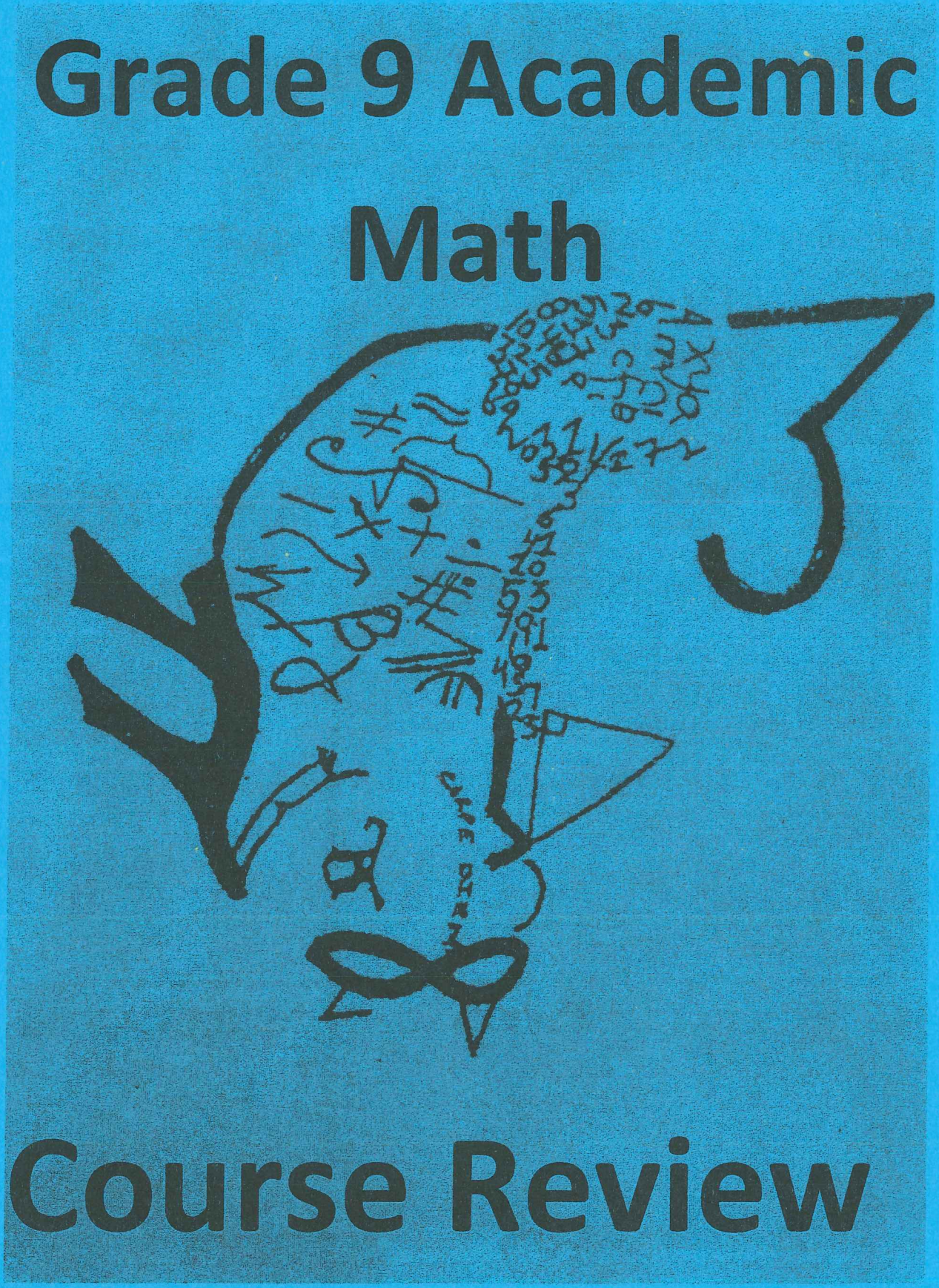
Grade 9 Academic Math



Course Review

Chapter #1-Number Sense

Order of Operations:

Brackets
Exponents
Division
Multiplication
Addition
Subtraction

Remember to watch your negative sign when dealing with exponents.

$$(3)^2 = 3 \times 3 = 9$$

$$(-3)^2 = (-3) \times (-3) = 9$$

$$-3^2 = -(3) \times (3) = -9$$

Rational Numbers (fractions)

$\frac{a \rightarrow numerator}{b \rightarrow denominator}$

Mixed Fraction	Converted to	Improper Fraction
$A\frac{b}{c}$	To determine your new numerator: Multiply the whole number by the denominator and add the numerator. To determine your new denominator: Denominator stays the same as it was in the Mixed fraction.	$\frac{(A \times c) + b}{c}$
$2\frac{7}{3}$	$\frac{(2 \times 3) + 7}{3}$	$\frac{13}{3}$
$-4\frac{2}{5}$	$\frac{-(4 \times 5) + 2}{5}$	$\frac{-22}{5}$

Adding and Subtracting Rational Numbers:

- Write any mixed fractions as improper fractions.
- Make sure all denominators are the same.
- If the denominators are not the same, proportionally increase/decrease each fraction until they are.
- Add or subtract the values in the numerator of each fraction together. Keep the denominator the same.
- Reduce to lowest terms.

Multiplying Rational Numbers:

- Write any mixed fractions as improper fractions.
- Note: your denominators do not need to all be the same value.
- Multiply the numbers in your numerators together to form your new numerator and multiply the numbers in your denominator together to create your new denominator.
- Reduce to lowest terms.

Dividing Rational Numbers:

- Write any mixed fractions as improper fractions.
- Note: your denominators do not need to all be the same value.
- Keep your first fraction exactly the same as in the question, change the division sign to a multiplication sign and flip the second fraction so that whatever value was on top is now the denominator and whatever value was on the bottom is your numerator.
- Finish the question like you would any other multiplication question.

Percents

Always start a percent question by writing/completing this sentence:

_____ of _____
Percent *Total*

Remember "of" means to multiply in math
A percent is always out of 100

Example: A pair of jeans regularly costs $80 and are on sale for 20% off. What is the sale price of the jeans?

Start by calculating your Discount.

20% of 80

$= \frac{20}{100} \times 80$
$= 0.20 \times 80$
$= \$16$

Then, calculate your Sale Price.

Sale price = regular price – discount
= 80-16
=$64

Ratios

Example: If every class has to have 3 girls for every 2 boys, how many girls does a class of 40 students have to have?

1. Always start by writing your ratio (what you are comparing) in words.	In this case we are comparing three things; number of girls, number of boys and total number of students. **girls:boys:total** OR **G:B:T**
2. Write a proportional statement. By replacing your words with numbers and setting one ratio equal to what you are trying to solve for.	**3:2:5 = G:B:40**
3. Identify what the question is asking you to solve for and rewrite your ratio using only that pair and the pair that you have both values for. (This is only necessary if you are dealing with a three part ratio)	We need to find the number of girls. We know both the total (5) and the total for our class (40) We can ignore the "boys" **3:5 = G:40**
4. Rewrite your ratios as fractions. Put the left value over the right value in your ratio.	$\frac{3}{5} = \frac{G}{40}$
5. Cross multiply and divide.	$3(40) = 5G$ $120 = 5G$ $\frac{120}{5} = G$ $24 = G$
6. Write a concluding statement	**A class of 40 students must have 24 girls.**

EQAO Preparation: Chapter 1 – *Number Sense*

1.
What is the value of the expression $\frac{5(-18 + 12)}{-4 + 1}$?

a 10

b 6

c −6

d −10

2.
Mario is making fruit punch by mixing orange juice and pineapple juice in a ratio of 1:3.

How much pineapple juice should he use to make 3 L of fruit punch?

a 0.75 L

b 2 L

c 2.25 L

d 4 L

3.
A cellphone company offers four choices for purchasing talk time.

Which of the following has the lowest cost per minute?

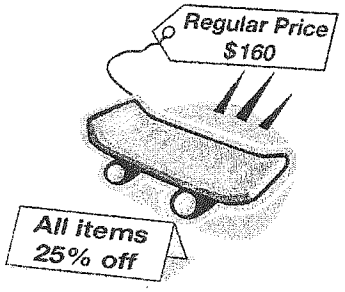
a 200 minutes for $24.50

b 550 minutes for $68.00

c 700 minutes for $80.25

d 850 minutes for $99.50

4.
What is the sale price of the skateboard?



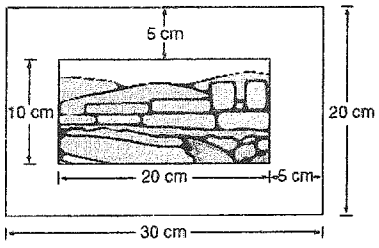
a $40.00

b $64.00

c $120.00

d $135.00

5.
A frame around a photograph is 5 cm wide.



What percentage of the entire area is the frame?

a 25%

b 33%

c 50%

d 67%

6.
A basketball player scores 28 points in a game. She scores 35% of the total team points.

How many points does her team score in total?

a 63

b 65

c 72

d 80

7.
Share the Profits

Three partners, Luc, Deborah and Melanie, share the profits of a business in the ratio 2:3:7 respectively.

The profit for this year is $176 496.

Determine the share of the profit for each partner.

Show your work.

8.
What a Bargain!

Susan buys a tennis racket from a store.

- The tennis racket's original price is $75.
- All tennis rackets are on sale for 25% off the original price.
- The tennis racket has a scratch, so she receives an additional 10% off the sale price.

How much does Susan pay for her tennis racket, including 13% tax?

Show your work.

Exam Preparation: Chapter 1 – *Number Sense*

1. Evaluate: $4(-16) \div (2)(8)$

2. Write the following mixed fractions as improper fractions:

   a) $4\frac{1}{7}$ b) $-2\frac{3}{4}$

3. Evaluate each of the following:

   a) $3\frac{1}{3} + 2\frac{2}{3} - 6\frac{3}{6}$ b) $\frac{4}{-7} \times \left(-3\frac{1}{2}\right) \div \left(\frac{-4}{-5}\right)$ c) $3(2^2 - 4(-5)) + 10$

4. If every box of smarties has to have 2 blue smarties for every 3 red smarties, how many blue smarties should there be if your box has 21 red smarties?

5. What is 32% of 435?

Chapter #2 – Exponents and Algebra

Exponent Law	Example
$x^m \times x^n = x^{m+n}$	$2^3 \times 2^2 = 2^{3+2}$ $= 2^5$ $= 32$
$x^m \div x^n = x^{m-n}$	$2^3 \div 2^2 = 2^{3-2}$ $= 2^1$ $= 2$
$(x^m)^n = x^{mn}$	$(2^3)^2 = 2^{3\times 2}$ $= 2^6$ $= 64$
$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$	$\left(\frac{2}{3}\right)^2 = \frac{(2)^2}{(3)^2}$ $= \frac{4}{9}$

Polynomials

- Like terms have the same variable (letter) and the same exponent.

Adding Polynomials	
• Remove the brackets. • Collect like terms. • Combine (add or subtract) like terms.	$(2x + 3) + (5x - 10)$ $2x + 3 + 5x - 10$ $2x + 5x + 3 - 10$ $= 7x - 7$

Subtracting Polynomials	
• Remove the brackets from the first polynomial • Remove the brackets on the second polynomial by multiplying each term in the second bracket by -1. (Or just change the sign of every term in the second polynomial.) • Collect like terms. • Combine like terms.	$(2x + 3) - (5x - 10)$ $2x + 3 - (5x - 10)$ $2x + 3 - 5x + 10$ $2x - 5x + 3 + 10$ $= -3x + 13$

Multiplying Polynomials	
• Multiply the term stuck to the left of your bracket with every term inside your bracket. • Remember numbers times numbers and letters times letters.	$4x(-2x + 5)$ $(4)(-2)(x)(x) + (4)(5)(x)$ $= -8x^2 + 20x$

EQAO Preparation: Chapter 2 – *Exponent Laws and Polynomials*

1.
What exponent goes in the box to make the following equation true?

$$\frac{x\square x^6}{x^2} = x^{12}$$

a 9

b 8

c 4

d 3

2.
What goes in the ☐ to complete the equation below?

$$(8x^3)(\square) = 24x^{12}$$

a $3x^9$

b $3x^4$

c $16x^9$

d $16x^4$

3.
What is the value of $(x^2)^3$ when $x = \frac{1}{2}$?

a $\frac{1}{4}$

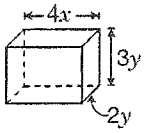
b $\frac{1}{12}$

c $\frac{1}{32}$

d $\frac{1}{64}$

4.
Which of the following fish tanks would contain an amount of water represented by the expression $V = 24x^2y$ when completely full?

A



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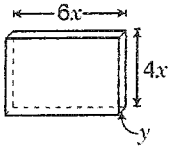

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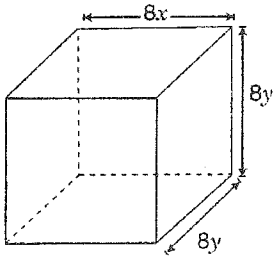

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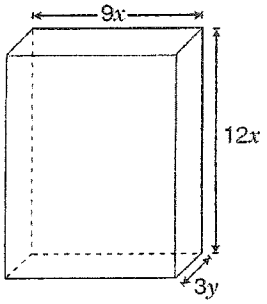
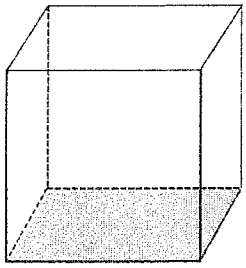


5.
Expressions for the base area and volume of a prism are given below.

Volume = $64a^3b^6$



Base area = $16ab^3$

Which expression represents the height of the prism?

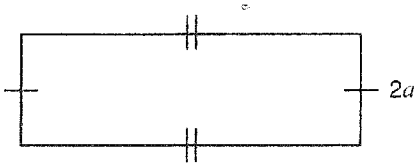
F $4a^2b^3$

G $4a^3b^3$

H $1024a^3b^9$

J $1024a^4b^9$

6.
A rectangular field has a **perimeter** of $(10a - 6)$ metres and a width of $2a$ metres.



Which expression represents the **length** of this field?

A $8a - 6$

B $12a - 6$

C $3a - 3$

D $3a^2 - 3$

7.
Consider the expression below.

$3x^2(5x^2 - 2x + 1)$

Which of the following is equivalent to this expression?

a $8x^2 - 2x + 1$

b $8x^2 + x + 4$

c $15x^4 - 2x + 1$

d $15x^4 - 6x^3 + 3x^2$

8.
Which of the expressions below is equivalent to $3(4x - 5) - 7(9x - 2)$?

a $-51x - 1$

b $-51x - 3$

c $-51x - 7$

d $-51x - 29$

9.
Simplify the following expression:

$$3x(2x + 3) - 5x$$

a $6x^2 - 5x + 3$

b $6x^2 - 6x$

c $15x^2 - 5x$

d $6x^2 + 4x$

Exam Preparation: Chapter 2 – *Exponent Laws and Polynomials*

1. Evaluate:

a) 3^2 b) $(-6)^2$ c) $(-3)^3$

d) (-2^2) e) $\left(\frac{1}{2}\right)^3$ f) $\left(\frac{1}{2}\right)^2 - (-3)^2 + \left(\frac{-2}{3}\right)^3$

2. Use your exponent laws to simplify the following:

a) $(5x^3y^7)(-2xy^2)$ b) $\frac{(4x^3y^2)^2}{2x^5y}$

3. Expand and simplify the following polynomial expressions.

a) $(6x^2 + 2x - 10) + (2x^2 + x - 5) - (4x^2 - 5x - 2)$

b) $3x - 2x(-x - 7) + 8x^2$

Chapter #3 – Solving Equations

ey Points:

- Use inverse (opposite) operations
- Reverse BEDMAS

Inverse Operations:
$+ \leftrightarrow -$
$\times \leftrightarrow \div$
$\square^2 \leftrightarrow \sqrt{\ }$

Solving One-Step Equations:

Original Question	*Read as:*	*Do the opposite*	*Solution*
$2x = 28$	2 times x equals 28	Divide by 2	$x = \frac{28}{2}$ $x = 14$
$x - 3 = 11$	x minus 3 equals 11	Add 3	$x = 11 + 3$ $x = 14$
$\frac{x}{3} = 4$	x divided by 3 equals 4	Times by 3	$x = 4(3)$ $x = 12$

Solving Multi-Step Equations:

Original Question	*Read as:*	*Do the opposite*	*Solution*
$120 = 10r^2 3$	**You can clean this question up first to make it easier to solve:* $120 = 30r^2$ 120 equals 30 times r squared	*Reverse BEDMAS by doing addition/subtraction first, followed by multiplication/division, then exponents and lastly anything in your bracket.* So, Divide by 30 and take the square root of your answer.	$\frac{120}{30} = r^2$ $4 = r^2$ $\sqrt{4} = r$ $2 = r$

Verifying your answer:

- Once you have solved for your variable substitute your answer back into the original equation.
- Do the math on the left side of the equal sign separately from the math on the right side of the equals sign.
- If your answer was correct the number on the left side will end up equaling the number you get on the right side.

Verify that $r = 2$ in the equation $120 = 10r^2 3$

$$120 = 10(2)^2(3)$$
$$120 = 10(4)(3)$$
$$120 = 40(3)$$
$$120 = 120$$

Left side = right side

EQAO Preparation: Chapter 3 – *Solving Equations*

1.
Which value of x satisfies the equation $5 - 2x = 9$?

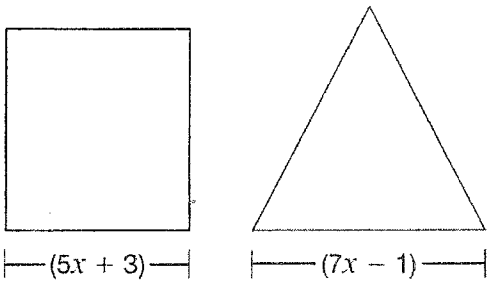
F $x = -7$

G $x = -2$

H $x = 2$

J $x = 3$

2.
A square and an equilateral triangle are pictured below.



If the square and the triangle have the same perimeter, what is the value of x?

a 2

b 4

c 9

d 15

3.
A cylinder has a volume of 400π cm^3 and a diameter of 20 cm.

Which of the following is closest to the height of the cylinder?

a 1 cm

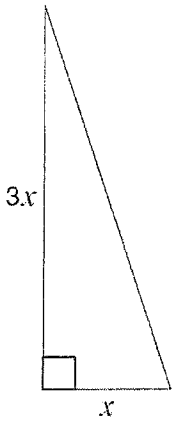
b 4 cm

c 20 cm

d 40 cm

4.

Luke designs a garden in the shape of a right triangle as shown below.



The total area of the garden is 96 m^2.

Hint:
$A = \frac{1}{2}bh$

Which is closest to the value of x in the diagram?

a 6 m

b 8 m

c 32 m

d 64 m

5.

Disc-ussion

Tyler, Raven and Deb are discussing the number of CDs they each own. They find that the following statements are true:

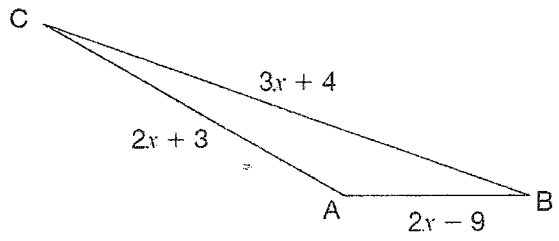
- Tyler owns five more than twice the number of CDs Raven owns.
- Deb owns three times as many CDs as Tyler.

Using x to represent the number of CDs Raven owns, write an expression for the total number of CDs the three friends own. Show your work and simplify your answer.

6.

What Side?

The perimeter of the triangle below is 75 m.



Determine the measure of each side of the triangle.

Show your work.

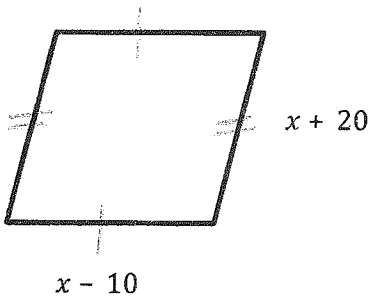
Exam Preparation: Chapter 3 – *Solving Equations*

1. Solve and verify the following equations:

   a) $72 - 3x = 12 + x$

   b) $11 - 2(x + 6) = 4x + 3(2x - 4) - 13$

2. Pauline builds a fence around her garden, which is shaped like a parallelogram, as shown below. Pauline uses 100 meters of fencing along the perimeter of the garden. Find the dimensions of her garden.



3. A package deal for skis and boots costs $225. The skis cost $60 more than the boots. How much do the skis cost?

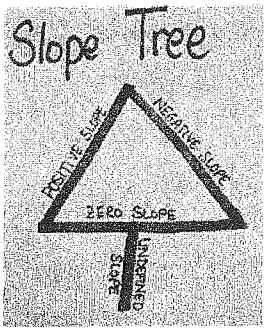
4. Donna is three times as old as her daughter, Sophie. The sum of their ages is 52. How old are Donna and Sophie?

Chapter #4&5 -Analytic Geometry

Slope is the same as: Steepness of a line, m, rate of change, speed, rise over run	
Calculating Slope: From a Graph	• Pick two easy to read points on your line. • Count how much you rise (up or down) and run (left or right) to get from one point to the other point you chose on your line. • Write your answer as: $m = \frac{rise}{run}$
Calculating Slope: Given the coordinates of two points that lie on your line	• Use the formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$

Key Points:

- If your line is going **up and to the right** your slope will be **positive**. (As your x values get bigger your y values also get bigger)
- If your line is going **down and to the right** your slope will be **negative**. (As your x values get bigger your y values get smaller)



A Relation is Linear if:

- The graph is a straight line
- The first differences are constant (all equal)
- The degree of its equation is 1

Equation of a line: $y = mx + b$
m is the slope of your line
b is the y-intercept

Direct Variation		**Partial Variation**	
Straight line		Straight line	
Passes through the origin (0,0)		The point (0,0) does not exists on the line	
x	y	x	y
-1	-4	-1	-4
0	0	0	-2
1	4	1	0
$y = mx$		$y = mx + b$	
Ex: $y = 3x$ or $y = -\frac{5}{3}x$		Ex: $y = 3x - 10$ or $y = -\frac{5}{3}x + 2$	

Graphing a Line	
Given the equation of your line in slope/y-intercept form. ($y = mx + b$)	• Put a point at your y-intercept. (0,b) • From that point rise and run the value of "m" and put a new point there. • Connect your points using a ruler and extend your line
Using your x & y intercepts	Remember that for your x-intercept y = 0 (it's where your line crosses the x-axis) Remember that for your y-intercept x = 0 (it's where your line crosses the y-axis) • Solve for your x-intercept by replacing y with 0 in your equation and solving for x. (x,0) • Solve for your y-intercept by replacing x with 0 in your equation and solving for y. (0,y) • Plot your x-intercept (x,0) • Plot your y-intercept (0,y) • Connect your points using a ruler and extend your line

Equations of a Line

Standard Form of a Line: $Ax + By + C = 0$	Rearrange to slope/intercept form by isolating for y using your inverse operations: $y = \frac{-Ax}{B} - \frac{C}{B}$	***Slope/y-intercept Form*** of a Line: $y = mx + b$ *This form is most useful because you know the slope as well as the y-intercept just by looking at it.

Note:

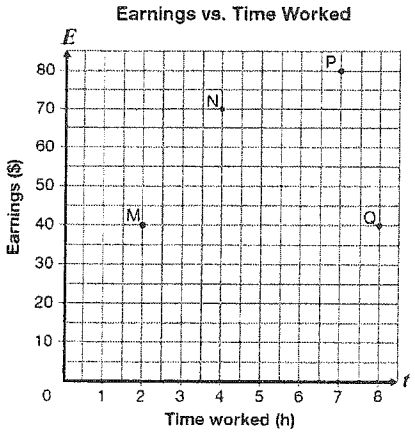
- Lines that are parallel have the exact same slope
- Lines that are perpendicular have slopes that are negative reciprocals of each other. (flip the fraction so that the numerator becomes the denominator and the denominator becomes the numerator, don't forget to change the sign)

Writing the equation of a line	
1. Given 2 points	• Use your formula $m = \frac{y_2 - y_1}{x_2 - x_1}$ to determine the slope. • Write your equation in slope/intercept form ($y = mx + b$) replacing "m" with the value you just calculated. • Choose either point given in the question (it doesn't matter which one) and substitute the x and y value from your coordinate into the equation. • Now you should have numbers for all variables in your equation except for "b". • Solve for b using inverse operations. • Rewrite your equation $y = mx + b$ keeping x and y as variables but replacing m and b.
2. Given two equations and a set of situations. **a) A slope parallel to or perpendicular to a given equation** **b) The same y-intercept as a given equation** **c) The same x-intercept as a given equation.**	a) If the given equation is in slope/intercept form just identify the slope (m) and if your line is **parallel to this line keep the slope the same.** If your line is **perpendicular to this line take the negative reciprocal** of m and you have your new slope. If the given equation is in Standard form, rearrange it to be in slope/intercept form, then, do as above. b) If the given equation is in slope/intercept form just identify the y-intercept (b) and write your new equation using the slope from part a and the y-intercept from part b. If the given equation is in Standard form either rearrange the equation to be in slope intercept form and do as above **or** remember that your y-intercept occurs when x = 0, so replace x with 0 and solve for y. Write your new equation using the slope from part a and the y-intercept from part b. c) Regardless of whether the given equation is in slope/intercept form or standard form, remember that your x-intercept occurs when y = 0. So, replace y with 0 and solve for x. Once you have done this you have found a second point that lies on your line (x,0). Write your equation in slope/intercept form using the slope you found in part "a" and replace x and y with the coordinate you just found (your x-intercept) and solve for b. Now rewrite your equation $y = mx + b$ keeping x and y as variables but replacing m and b.

EQAO Preparation: Chapter 4&5 – *Analytic Geometry*

1.

The graph below represents the relationship between earnings and time worked.



Which of the following points represents the highest rate of pay?

a M

b N

c P

d Q

2.

Luisa chooses a cellphone plan that charges a flat fee of $20 per month and $0.25 for each text message sent.

Which equation best represents the cost of Luisa's cellphone plan, C, in dollars, where n is the number of text messages sent?

a $C = 20.25n$

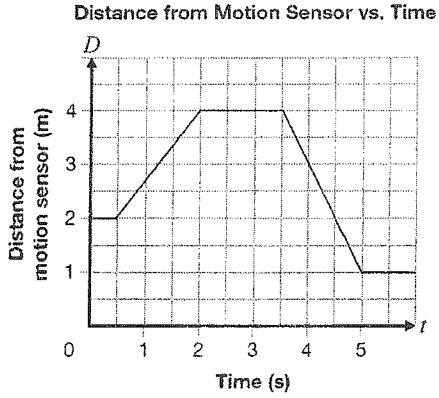
b $C = 20(0.25n)$

c $C = 20n + 0.25$

d $C = 0.25n + 20$

3.

Tyler walks along a line leading from a motion sensor. The graph below shows information about Tyler's walk.



Which of the following is closest to Tyler's speed in metres per second as he walks toward the motion sensor?

a 2.0

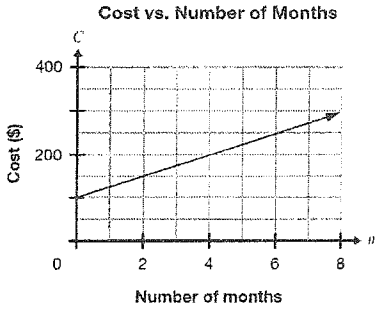
b 1.3

c 0.8

d 0.5

4.

The graph below represents the cost to belong to a local gym.



Which equation represents the graph?

a $C = \frac{1}{25}n + 100$

b $C = \frac{1}{2}n + 100$

c $C = 2n + 100$

d $C = 25n + 100$

5.
The table below shows information about the linear relationship between Ben's total savings and the number of months he saves money.

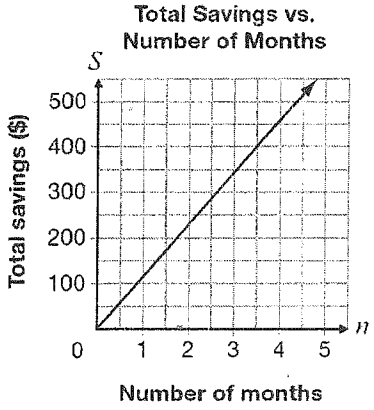
Number of months, n	Total savings, S ($)
3	345
6	540
9	735
12	930

Which of the following represents this relationship?

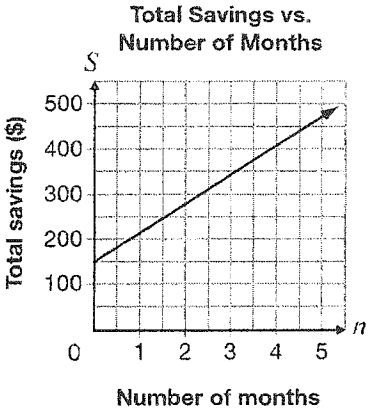
a $S = 65n + 345$

b $S = 195n + 150$

c



d



6.
There is a linear relationship between the total cost of renting a costume and the number of hours the costume is rented.

- For 3 hours, the total cost is $60.
- For 5 hours, the total cost is $80.

What type of variation is this relationship, and what is its initial value?

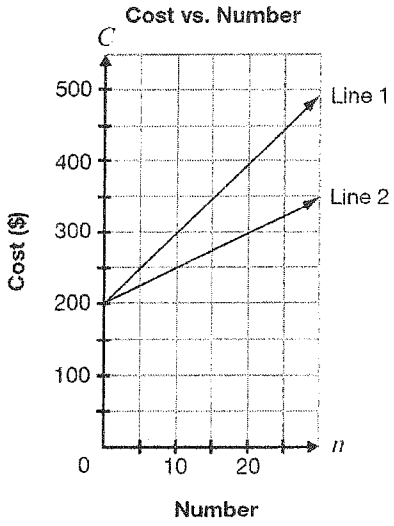
a a partial variation with an initial value of $30

b a partial variation with an initial value of $20

c a direct variation with an initial value of $30

d a direct variation with an initial value of $20

7.
Two lines are shown below.



Which of the following describes a difference between Line 1 and Line 2?

a Line 2 has a larger initial cost.

b Line 1 has a larger initial cost.

c Line 2 has a greater rate of change.

d Line 1 has a greater rate of change.

8.

Which table of values shows a linear relation between C and n?

a

n	C
0	0
1	2
2	4
3	8

b

n	C
0	0
1	1
2	4
3	9

c

n	C
0	0
1	4
2	11
3	15

d

n	C
0	0
1	3
2	6
3	9

9.

Which of the following equations is **not** represented by a straight line on a graph?

A $x = 3y - 4$

B $y = -2x$

C $x = 4$

D $y = 2x^2 - 2$

10.

What is the equation of the line that passes through the points (2, 4) and (4, 0)?

a $y = -\frac{1}{2}x + 2$

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

c $y = -2x + 4$

d $y = -2x + 8$

11.

What's the Charge?

The table below represents the linear relationship between cost and repair time at an appliance store.

Repair time, t (h)	Cost, C ($)
3	205
5	365
8	605

Determine the initial value of this relationship. Show your work.

Initial value: _____

Is this relationship a direct or a partial variation?

Circle one Direct variation Partial variation

Justify your answer.

12.

Excellent Equations

A line is perpendicular to the line $y = 2x + 3$ and has the same ***x*-intercept** as $x + 3y + 10 = 0$.

Find the equation of this line. Express your answer in the form $y = mx + b$.

Justify your answer.

13.
Salazar is asked to graph the linear relation represented by $2x - 3y + 6 = 0$. What is the y-intercept of this line?

A -6

B -2

C 2

D 6

14.
Which of the following equations is equivalent to $3x - 5y = 45$?

a $y = \frac{3}{5}x - 9$

b $y = -\frac{3}{5}x + 9$

c $y = 3x - 45$

d $y = -3x + 45$

15.
Which equation below represents a line that is perpendicular to the line represented by $y = 3x - 5$?

a $y = 3x + \frac{1}{5}$

b $y = -3x - \frac{1}{5}$

c $y = -\frac{1}{3}x + 7$

d $y = \frac{1}{3}x - 7$

16.
What is the equation of the line that passes through the point $(2, 0)$ and is parallel to the line $y = -3x + 4$?

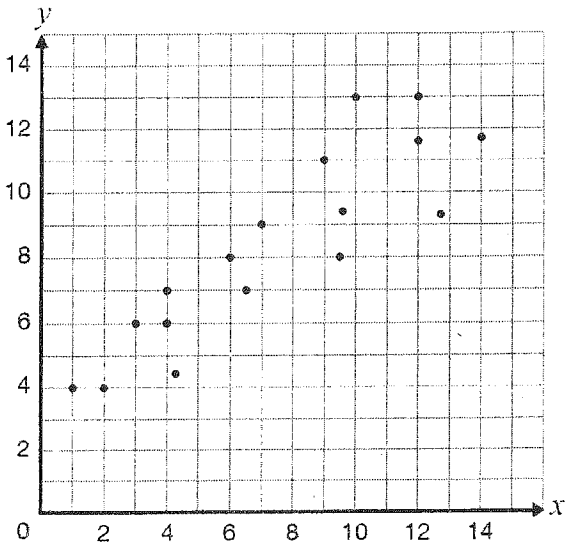
a $y = 3x + 2$

b $y = 3x + 6$

c $y = -3x + 2$

d $y = -3x + 6$

17.
Which of the following could be the slope of a line of best fit for the data shown in the scatter plot below?



a -2

b -1

c 1

d 2

Exam Preparation: Chapter 4&5 – *Analytic Geometry*

1. Determine if the following relation is linear or non-linear.

x	y
-2	7
-1	4
0	1
1	-2
2	-5
3	-8

2. State the slope and the y-intercept in the equation: $y = \frac{-1}{5}x + 7$

3. Determine the slope of: $4x - 3y + 18 = 0$

4. A line has the points A(1,27) and B(-3, 42). Determine the slope of the line.

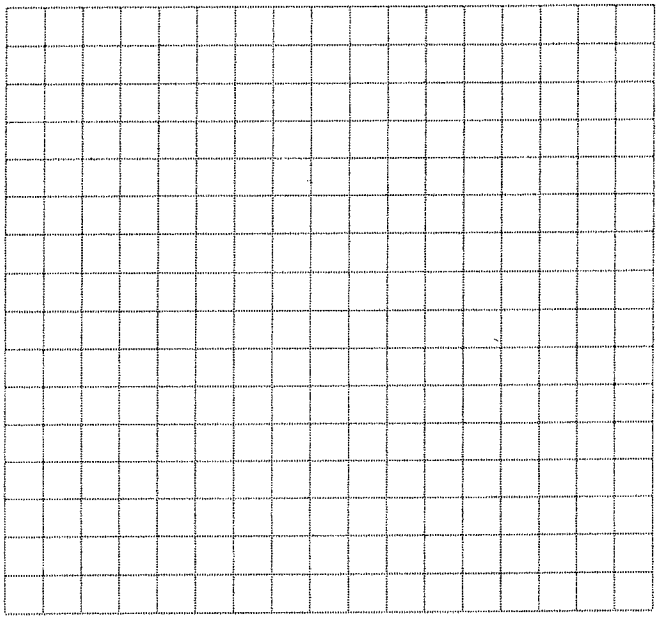
5. Write the equation of a line in slope/intercept form which passes through the points A(5,16) and B(7, 22).

6. Write the equation of a line which has the same x-intercept as $10x + 3y - 8 = 0$ and is perpendicular to the line $y = \frac{1}{5}x - 14$.

7. Solve the following linear system graphically.

$y = \frac{-3}{2}x + 9$

$3x + 4y - 12 = 0$



8. Janet chooses a cellphone plan that charges a flat fee of $20 per month and $0.25 for each text message sent.
   a) Is this an example of direct or partial variation? Justify your answer.

   b) Write an equation to represent the cost of Janet's cellphone plan, C, in dollars, where n is the number of text messages sent.

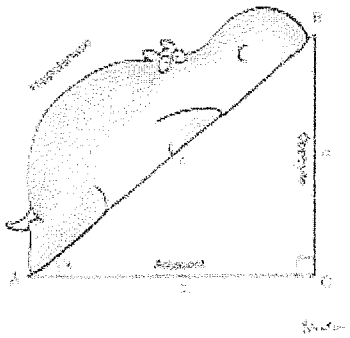
Chapter #6 – Measurement

Pythagorean Theorem

You can only use Pythagorean Theorem to solve for a missing side of a right angle triangle.

The hypotenuse is:

- ✓ The longest side in your triangle
- ✓ The diagonal line
- ✓ The side of the triangle that is opposite the 90° angle
- ✓ The slant height



The legs are:

- ✓ The two shorter sides in your right angle triangle
- ✓ The two sides that meet at (touch) the 90° angle

To solve for the hypotenuse (c) use:

$c^2 = a^2 + b^2$

To solve for one of the legs rearrange the Pythagorean Theorem to isolate for the missing leg and use:

$a^2 = c^2 - b^2$

Area, Perimeter, Volume and Surface Area

a) Identify what shape you are given
b) Match the shape to one on your formula sheet
c) Select the right formula
d) Replace all symbols and letters with the numbers you are given in the question
e) Solve for any missing values

Composite Figures

a) Identify what familiar shapes make up the figure you have (use as few shapes as possible).
b) Determine any missing lengths that you may need. Remember that sometimes you will have to use Pythagorean Theorem to find a missing side.
c) Find the area or volume of each shape and either add or subtract them, depending on the figure.
d) For perimeter add all of the lengths on the outside of your figure only.

Maximum Area / Minimum Perimeter

- ✓ You are always looking for the dimension that will give you a square or as close to a square as possible.
- ✓ Dimensions are written as: $length\ by\ width$
- ✓ Use your dimensions to calculate the maximum area ($length \times width$) or minimum perimeter ($length + width + length + width$)

To calculate the dimensions that gives you the maximum area use:

$$side = \frac{Perimeter}{4}$$

To calculate the dimensions that gives you the minimum perimeter use:

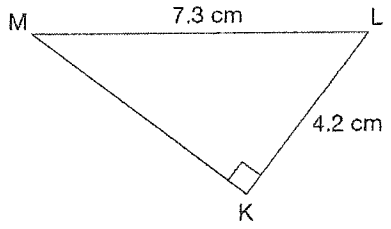
$$side = \sqrt{Area}$$

To calculate the dimensions that gives you the maximum area if you only need to enclose 3 sides use:

$$length = \frac{Perimeter}{2} \qquad width = \frac{length}{2}$$

EQAO Preparation: Chapter 6 – *Measurement*

1.
Triangle KLM is shown below.



Which of the following is closest to the perimeter of triangle KLM?

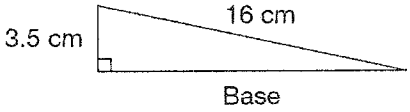
a 12.6 cm

b 16.3 cm

c 17.5 cm

d 21.0 cm

2.
Consider the following triangle.



Which expression can be used in the process of determining the length of the base?

a $16^2 - 3.5^2$

b $16^2 + 3.5^2$

c $\sqrt{16 + 3.5}$

d $\sqrt{16 - 3.5}$

3.
Ella wants a rectangle with

- a perimeter of 100 cm and
- the largest possible area.

What are the dimensions of the rectangle that satisfies her conditions?

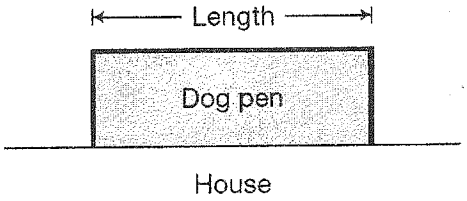
a 10 cm × 10 cm

b 20 cm × 30 cm

c 25 cm × 25 cm

d 40 cm × 60 cm

4.
Marcus is building a rectangular dog pen along the side of his house as shown below.



Marcus has 20 m of fencing for the 3 sides of the dog pen.

What is the length of the dog pen with the maximum area?

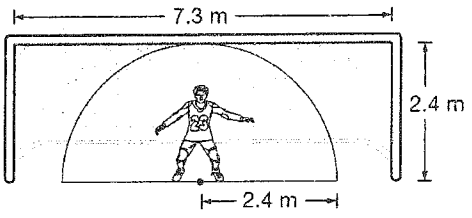
a 4 m

b 5 m

c 10 m

d 12 m

5.
A soccer goalie is standing in a goal opening. From this position, she can guard the area represented by the semicircle below.



How much of the goal opening is she not guarding?

a 0.6 m^2

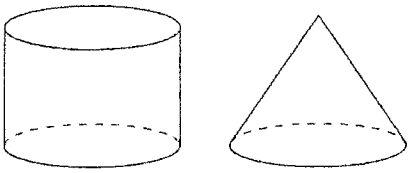
b 8.5 m^2

c 9.0 m^2

d 26.6 m^2

6.

The cylinder and the cone shown below have the same height and radius.



Volume of cylinder = ? × Volume of cone

What number completes this equation?

a 3

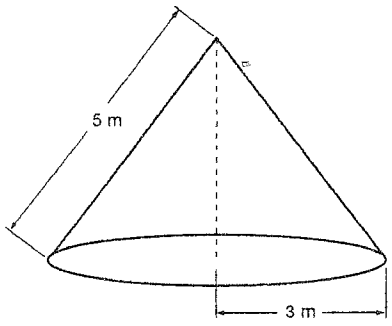
b 2

c $\frac{1}{2}$

d $\frac{1}{3}$

7.

A tent has the shape of a cone. The radius of the base is 3 m, and the slant height is 5 m.



What is the approximate surface area of the tent, including the floor?

a 38 m^2

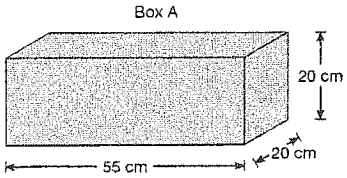
b 48 m^2

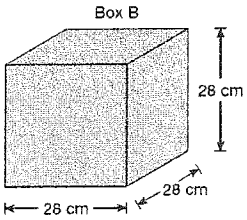
c 75 m^2

d 95 m^2

8.

Box A and Box B have about the same volume. The cost to make a box depends on the amount of cardboard used.





Which of the following statements is correct?

F Box B costs less; it uses 48 cm^3 less cardboard to make.

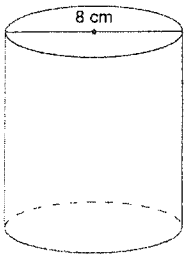
G Box A costs less; it uses 290 cm^3 less cardboard to make.

H Box B costs less; it uses 496 cm^2 less cardboard to make.

J Box A costs less; it uses 496 cm^2 less cardboard to make.

9.

The cylinder below has a volume of 150 cm^3.



Which of the following is closest to the area of the lateral surface of the cylinder?

Hint:
$V_{cylinder} = \pi r^2 h$
$A_{lateral\ surface} = 2\pi rh$

a 38 cm^2

b 75 cm^2

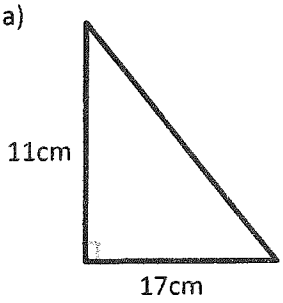
c 150 cm^2

d 300 cm^2

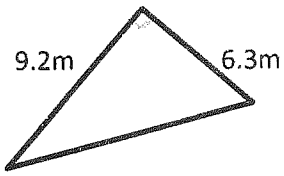
Exam Preparation: Chapter 6 – *Measurement*

1. Determine the missing side of the following right angle triangles.

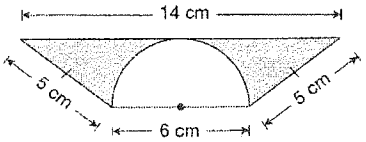
a)



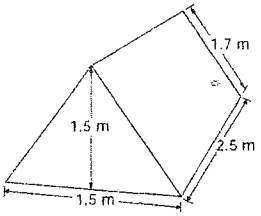
b)



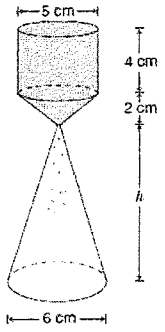
2. The diagram below is made of a trapezoid and a semicircle. Determine the area of the shaded part of the diagram.



3. What is the surface area of the tent, including the ends and the floor?

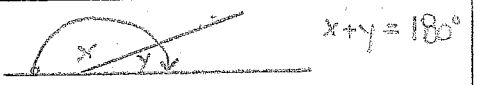
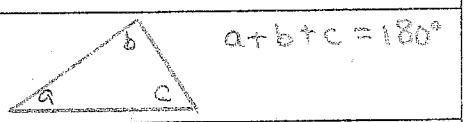
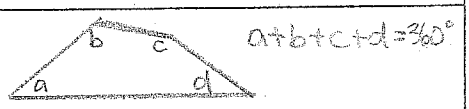
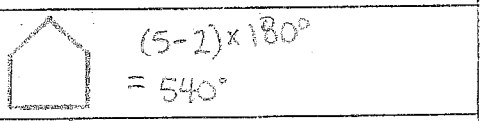
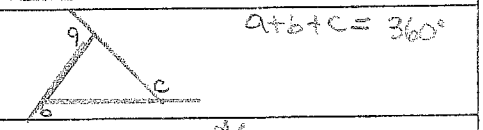
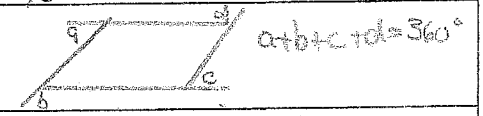
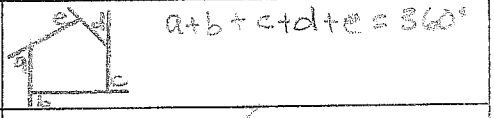
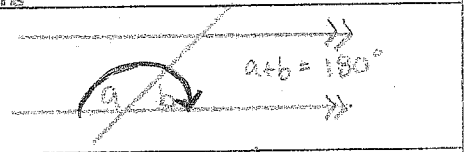
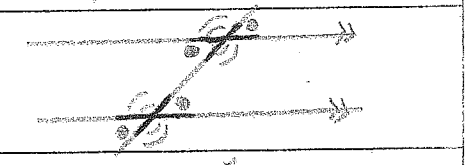
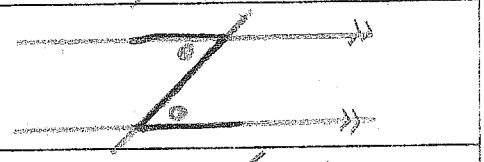
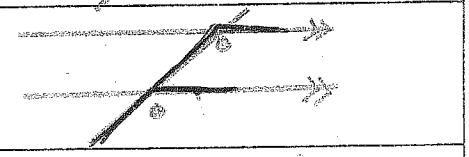
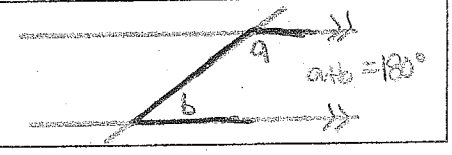


4. Sand is being poured from one container to another, as shown below. The sand flows from the shaded part to the unshaded cone. The shaded part starts full of sand. The sand empties into the unshaded cone and fills it to the top. What is the height of the unshaded cone?



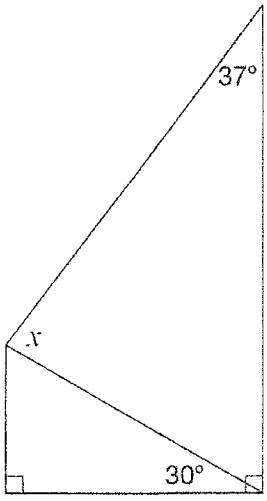
Chapter #7 – Geometry

- A polygon is a closed figure that consists of line segments that only intersect at their endpoints.
- Parallel lines are lines that never touch and are usually identified with arrows on the lines that are parallel.
- Transversals are lines that touch/cross both parallel lines.

Concept	Explanation	Illustration
Opposite Angles	Are equal	
Straight Angles	Add to 180°	
Interior Angles of a Triangle	Add to 180°	
Interior Angles of a Quadrilateral	Add to 360°	
Interior Angles of any polygon "n-gon" Where n is the number of sides	$(n-2) \times 180°$	
Exterior Angles of a Triangle	Add to 360°	
Exterior Angles of a Quadrilateral	Add to 360°	
Exterior Angles of a "n-gon"	Add to 360°	
Supplementary Angles **(straight lines)**	Add to 180°	
Opposite Angles **(X pattern)**	Are equal	
Alternate Angles **(Z pattern)**	Are equal	
Corresponding Angles **(F pattern)**	Are equal	
Interior Angles **(C pattern)**	Add to 180°	

EQAO Preparation: Chapter 7 – *Geometry*

1.
Consider the diagram below.



What is the value of x in the diagram?

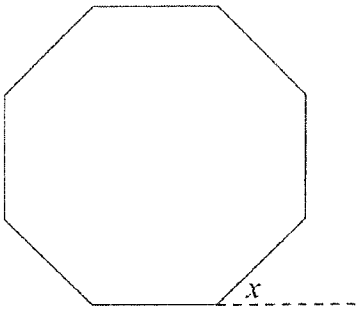
a 30°

b 53°

c 60°

d 83°

2.
Consider the regular octagon below.



What is the value of x?

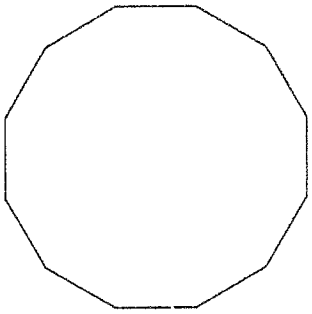
a 15°

b 30°

c 45°

d 60°

3.
What is the measure, in degrees, of the sum of the interior angles of a 12-sided regular polygon?



a 2160°

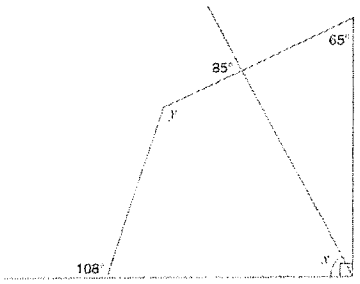
b 1800°

c 1500°

d 1080°

4.
What's Missing?

Consider the diagram below.



Complete the table below.

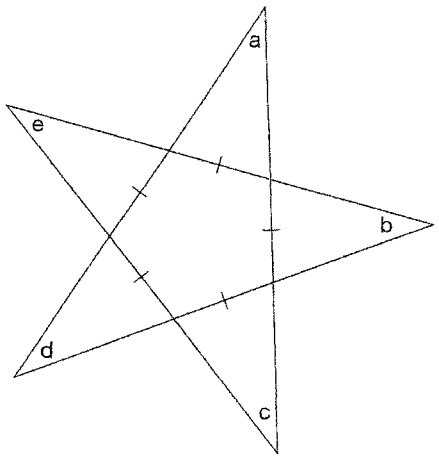
Justify your answers using geometric properties.

Angle measure	Justification
$x =$ _____	
$y =$ _____	

5.

Twinkle Twinkle

Nicole notices the star design shown below on the pavement outside a movie theatre.

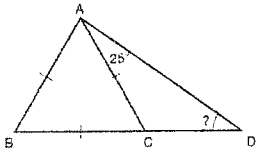


Determine the sum of the angle measures in the corners of this star: a + b + c + d + e.

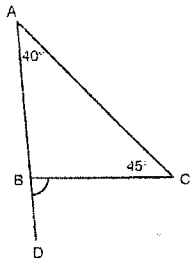
Justify your answer using geometric properties.

Exam Preparation: Chapter 7 – *Geometry*

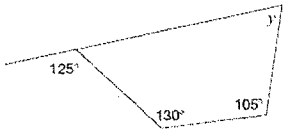
1. Determine the measure of angle D.



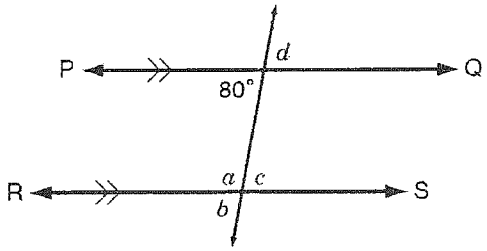
2. Determine the measure of angle CBD



3. Determine the value of y.



4. Determine the value of each missing angle (a,b,c,d).



Answers

Chp#1-EQAO	Chp#2-EQAO	Chp#3-EQAO	Chp#4/5-EQAO	Chp#6-EQAO	Chp#7-EQAO
1. a	1. b	1. G	1. a	1. c	1.d
2. c	2. a	2.d	2. d	2. a	2.c
3. c	4. d	3. b	3.a	3. c	3.b
5. c	6. b	4. b	4.d	4. c	4. $y = 133°$ $x = 60°$
7. d	8. f	5. $9x + 20$	5.b	5. b	5. 180°
9. d	10. c	6. 37m, 25m, 13m	6.a	6. a	**Chp#7 - Exam**
11. Luc = $29416 Deb = $44124 Mel = $102956	12. d	**Chp#3-Exam**	7.d	7. c	1. 35°
13. $57.21	14. a	1a) x = 15	8.d	8. H	2. 85°
Chp#1-Exam	15. d	1b) x = 2	9.d	9. b	3. 70°
1. -4	**Chp#2-Exam**	2. 10m by 40m	10.d	**Chp#6 - Exam**	4. $a = 100°$ $b = 80°$ $c = 80°$ $d = 80°$
2a) $\frac{29}{7}$	1a) 9	3.Boots = $82.5 Skis = $142.5	11. Partial Initial value (0,25)	1a) 20.0cm	
b) $\frac{-11}{4}$	1b) 36	4. Sophie = 13yrs Donna = 39yrs	12. $y = \frac{-1}{2}x - 5$	1b) 11.15m	
3a) $\frac{-1}{2}$	1c) -27		13. c	2. $45.87cm^2$	
b) $\frac{5}{2}$	1d) -4		14. a	3. $14.5m^2$	
c) 82	1e) $\frac{1}{8}$		15. c	4. 3.24cm	
4) 14 blue smarties	1f) $\frac{-977}{108}$		16. d		
5) 139.2	2a) $-10x^4y^9$		17. d		
	2b) $8xy^3$		**Chp#4/5-Exam**		
	3a) $4x^2 + 8x - 13$		1. Yes 1^{st} diff = -3		
	3b) $10x^2 + 17x$		2. Slope = $\frac{-1}{5}$ y-int = 7		
			3. $m = \frac{4}{3}$		
			4. $m = \frac{-15}{4}$		
			5. $y = 3x + 1$		
			6. $y = -5x + 4$		
			7. (8,-3)		
			8. Partial $C = 0.25n + 20$		