Grade 9 Academic Math Diagnostic Test
Question 1: NO CALCULATORS ALLOWED

***Victim*:** Mr. Solutions

You will receive questions 2 to 14 once you hand in this sheet.

G → gain, L → loss

1. Evaluate each expression without using a calculator. You ***do not*** need to show your work. (15 /15)

(a) $7(-4) =$ -28 ✓	**(b)** $7+(-4) =$ 3 ✓ G:7 L:3 7-4 4	**(c)** $-7+4 =$ -3 ✓ G:4 L:7 -3
(d) $-7+10 =$ 3 ✓ G:10 L:7 3	**(e)** $-7+(-10) =$ -17 ✓ G:0 L:7,10 -7-10 -17	**(f)** $-7-(-10) =$ 3 ✓ G:10 L:7 -7+10 3
(g) $-5(-7) =$ 35 ✓	**(h)** $-5-7 =$ -12 ✓ G:0 L:5,7 -12	**(i)** $-5(-4)(-3) =$ -60 ✓
(j) $-5-4-3 =$ -12 ✓ G:0 L:5,4,3 -12	**(k)** $0-19 =$ -19 ✓ G:0 L:19 -19	**(l)** $0(-19) =$ 0 ✓
(m) $-19 \div 0$ ~~is~~ undefined ✓	**(n)** $(-2)^4 =$ 16 ✓ (-2)(-2)(-2)(-2)	**(o)** $-2^4 =$ -16 ✓ -2(2)(2)(2)

Use this space for rough work

MPM 1D0 Stupendous work Mr. S.!! **Grade 9 Academic Math** **Semester 2, 2012-2013**

Diagnostic Test

Mr. Nolfi, Mr. Hamilton

Victim: Mr. Solutions

Integers	Rational Numbers	Algebra	Geometry & Measurement	Problem Solving
29 /29	18 /18	8 /8	28 /28	8 /8

Part One – Integers 29 /29

Total: 91/91

1. This question is given on a separate sheet. (15 /15)

2. Evaluate each expression. You ***must*** show your work. (14 /14)

(a) $-5-2(3-13)$ 3/3

$= -5 - 2(-10)$ ✓

$= -5 - (-20)$ ✓

$= -5 + 20$

$= 15$ ✓

(b) $-8(4)-2\left[1+27\div(-3)\right]^2$ 5/5

$= -32 - 2[1+(-9)]^2$ ✓

$= -32 - 2(-8)^2$ ✓

$= -32 - 2(64)$ ✓

$= -32 - 128$ ✓

$= -160$ ✓

(c) $-21-24\div(-4)-5(-2)$ 2/2

$= -21 - (-6) - (-10)$ ✓

$= -21 + 6 + 10$

$= -5$ ✓

(d) $\dfrac{-14-(13+9)\div 2}{(4-9)(-4-1)}$ 4/4

$= \dfrac{-14 - 22\div 2}{(-5)(-5)}$ ✓

$= \dfrac{-14-11}{25}$ ✓

$= \dfrac{-25}{25}$

$= -1$ ✓

Part Two – Rational Numbers 18 /18

3. Evaluate each expression. You ***must*** show your work. (11 /11)

(a) $\dfrac{-2}{7}+\left(\dfrac{-3}{7}\right)$

$= \dfrac{-2}{7} - \dfrac{3}{7}$

$= \dfrac{-2-3}{7}$

$= -\dfrac{5}{7}$ ✓

add a negative value ↓ LOSS

(b) $\dfrac{-2}{5}\left(\dfrac{-3}{5}\right)$

$= \dfrac{(-2)(-3)}{(5)(5)}$

$= \dfrac{6}{25}$ ✓

negative times negative is positive

(c) $-\dfrac{\cancel{11}^{1}}{\cancel{3}_{1}}\left(\dfrac{-\cancel{9}^{3}}{\cancel{44}_{4}}\right)$ ✓

$= \dfrac{1\times 3}{1\times 4}$

$= \dfrac{3}{4}$ ✓

negative times negative is positive

(d) $\frac{21}{15} \div \frac{14}{5}$

$= \frac{\cancel{21}^{3}}{\cancel{15}_{3}} \times \frac{\cancel{5}^{1}}{\cancel{14}_{2}}$ ✓✓

$= \frac{3}{6}$

$= \frac{1}{2}$ ✓

(e) $\frac{1}{6} \overset{\times 2}{} + \frac{3}{4} \overset{\times 3}{}$

$= \frac{2}{12} + \frac{9}{12}$ ✓

$= \frac{2+9}{12}$

$= \frac{11}{12}$ ✓

(f) $\frac{-5}{9} - \left(-\frac{1}{12}\right)$

$= -\frac{5}{9}\overset{\times 4}{} + \frac{1}{12}\overset{\times 3}{}$ ✓

$= \frac{-20}{36} + \frac{3}{36}$

$= \frac{-20+3}{36}$

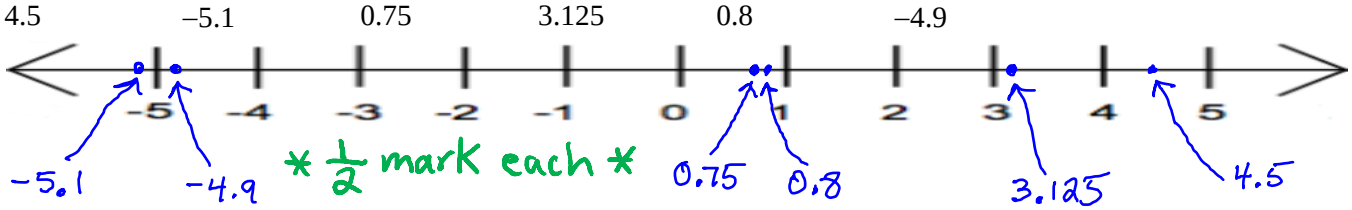
$= -\frac{17}{36}$ ✓

Subtract a negative value ↓ GAIN

4. This question deals with number sense. (7 /7)

(a) Place each of the given numbers on the number line.

4.5 −5.1 0.75 3.125 0.8 −4.9



3/3 * ½ mark each *

(b) Arrange the given numbers from ***largest*** to ***smallest***. * ½ mark each

4/4

$\frac{1}{4}$	0.31	0.1	−0.98	−1.08	−1.9	0.04	$\frac{1}{3}$
$\frac{1}{3}$	0.31	$\frac{1}{4}$	0.1	0.04	−0.98	−1.08	−1.9

Part Three – Algebra 8 /8

5. Substitute and evaluate. (3 /3)

$-8s^2 + 20 \quad (s = 4)$

$= -8(4)^2 + 20$ ✓

$= -8(16) + 20$

$= -128 + 20$ ✓

$= -108$ ✓

6. Solve the following equation. (1 /1)

$w + 7 = -51$

$\therefore w + 7 - 7 = -51 - 7$

$\therefore w = -58$ ✓

7. Write an algebraic expression that means "the quotient of a number and 10." (2 /2)

↓ ÷ $\frac{x}{10}$

8. Translate the algebraic expression $15 - y$ into words. (2 /2)

15 decreased by a number

Part Four – Geometry and Measurement 28 /28

9. Determine the value of c that would make the given triangle a ***right*** triangle. (4 /4)

By the Pythagorean Theorem,

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

$= 7^2 + 15^2$ ✓

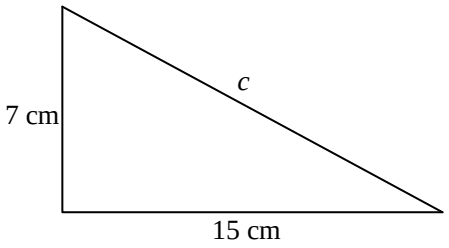
$= 49 + 225$

$= 274$ ✓

$\therefore c^2 = 274$

$\therefore c = \sqrt{274}$ ✓

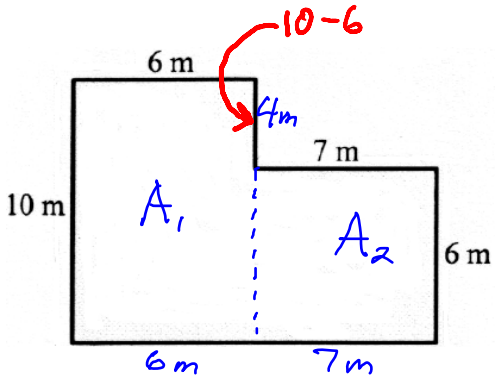
$\therefore c \doteq 16.6$ ✓



P A

10. Calculate the ***perimeter*** and ***area*** of the given shape. (5 /5)

10-6



$P = 10+6+7+6+7+4+6$ ✓

$= 46$ m ✓

$A = A_1 + A_2$ ✓

$= 10(6) + 7(6)$ ✓

$= 60 + 42$

$= 102\ m^2$ ✓

11. Calculate the surface area and volume of the given hemisphere (i.e. "half sphere"). (7 /7)

$A = \frac{A_{sphere}}{2} + A_{circle\ at\ bottom}$ ✓

$= \frac{4\pi r^2}{2} + \pi r^2$

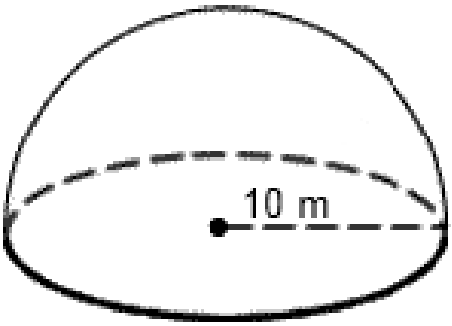
$\doteq \frac{4(3.14)(10)^2}{2} + 3.14(10)^2$ ✓

$= 942\ m^2$ ✓

$V = \frac{\frac{4}{3}\pi r^3}{2}$ ✓

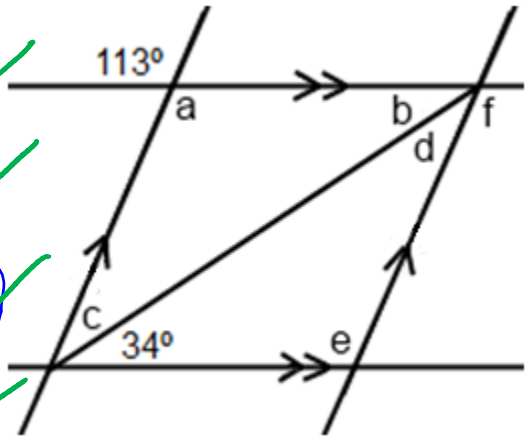
$\doteq \frac{\frac{4}{3}(3.14)(10)^3}{2}$ ✓

$\doteq 2093.3\ m^3$ ✓



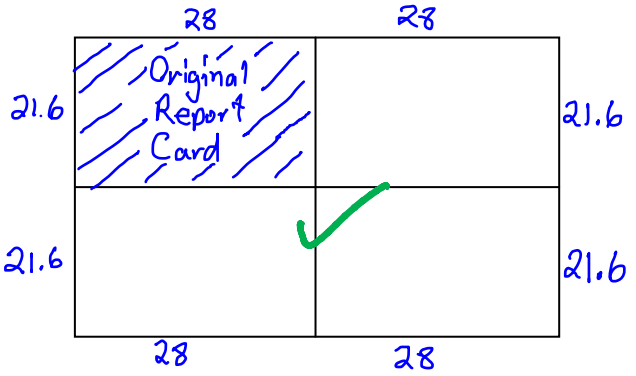
12. Find the measures of each angle labelled with a letter. In each case, state your ***reasoning***. (12 /12)

Measure of Angle	***Reasoning (State Why)***
$a =$ 113° ✓	X Pattern (Opposite angles are equal) ✓
$b =$ 34° ✓	Z Pattern (Alternate angles are equal) ✓
$c =$ 33° ✓	$a+b+c = 180°$ (Sum of interior angles of a triangle must be 180°) $\therefore 113°+34°+c = 180°$ ✓
$d =$ 33° ✓	$c = d$ Pattern (Alternate angles are equal) ✓
$e =$ 113° ✓	$d+e+34° = 180°$ (Sum of interior angles of a triangle must be 180°) $\therefore 33°+e+34° = 180°$ ✓
$f =$ 113° ✓	$b+d+f = 180°$ (supplementary angles / straight angle) $\therefore 34°+33°+f = 180°$ ✓



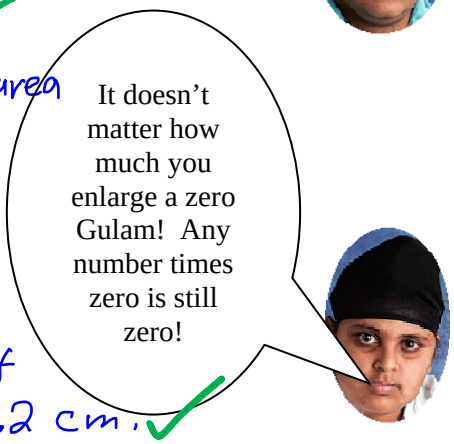
Part Five – Problem Solving **8 /8**

13. Gulam was so proud of his report card that he decided to frame it and hang it on his bedroom wall. Once he framed it, Gulam realized that his report card would be too hard to read from a distance. After giving some thought to his problem, he decided to get the report card enlarged to ***four times*** its original area. If the original report card measured 21.6 cm by 28 cm, what are the dimensions of the enlarged report card? (**4** /4)



A = Area of original report card
= 28(21.6)
= 604.8 cm^2 ✓

Four times original area
= 4A
= 4(604.8) ✓
= 2419.2 cm^2

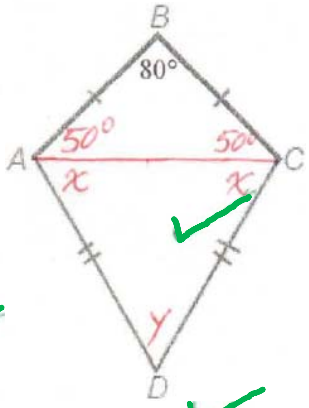


As can be seen from the diagram, the area can be made four times larger by doubling the length and width. Therefore, the dimensions of the enlarged report card should be 56 cm x 43.2 cm. ✓

Check: 56(43.2) = 2419.2

14. In kite *ABCD*, angle *B* is at the top of the kite and measures 80° degrees. Angles *A* and *C* are on the sides and angle *D* is at the bottom of the kite. What is the ***largest*** possible measure of angle *A* or *C*? (**4** /4)

Since ΔABC is isosceles and ΔADC is isosceles,
$\angle BAD = \angle BCA$ and $\angle DAC = \angle DCA$
Also, $\angle BAD = \angle BCA = 50°$ since the sum of the interior angles of a triangle must be 180°.



Now $x + x + y = 180°$ ✓
$\therefore 2x + y = 180°$
$\therefore y = 180° - 2x$

→ Since $y > 0°$,
$180 - 2x > 0°$
$\therefore x < 90°$ ✓

$\therefore \angle A$ and $\angle C$ can have any measure greater than 50° but less than 140° ✓

Another Approach

Imagine "pulling" the point D down the page. This would make line segments AD and CD longer, $\angle CAD$ and $\angle ACD$ larger, while $\angle ADC$ would get smaller. There is no limit to how far point D can be pulled down BUT there is a limit to how large $\angle CAD$ and $\angle ACD$ can be. Clearly, the measures of these angles can be as close to 90° as we like but can neither equal nor exceed 90°.