The Association of Mathematics Teachers of New Jersey's 2nd Annual Middle School Math Contest
December 4, 2013

Directions:

➢➢Most answers have more than one blank or box to answer correctly. All answers on the Student Response Sheet must be in the correct order of the blanks, except for problems #4, 8 and 10.

➢➢Problems with more that one blank or boxes must have all parts correct to receive credit for the problem to be marked correctly.

➢➢Individual problems state how to express their answers.

➢➢You may only use calculators on the calculator section only.

➢➢ Your answers must be clearly written. Illegible answers will be marked incorrect.

➢➢You will have exactly two 25 minutes sections and 1-minute stretch break between the two sections to complete this contest. Work quickly, work accurately, and good luck.

➢➢You may write on this test paper or on any scrap paper provided by your teacher, but your answers must be written on the Student Response Sheet, to be official.

➢➢No other form will be accepted in those cases.

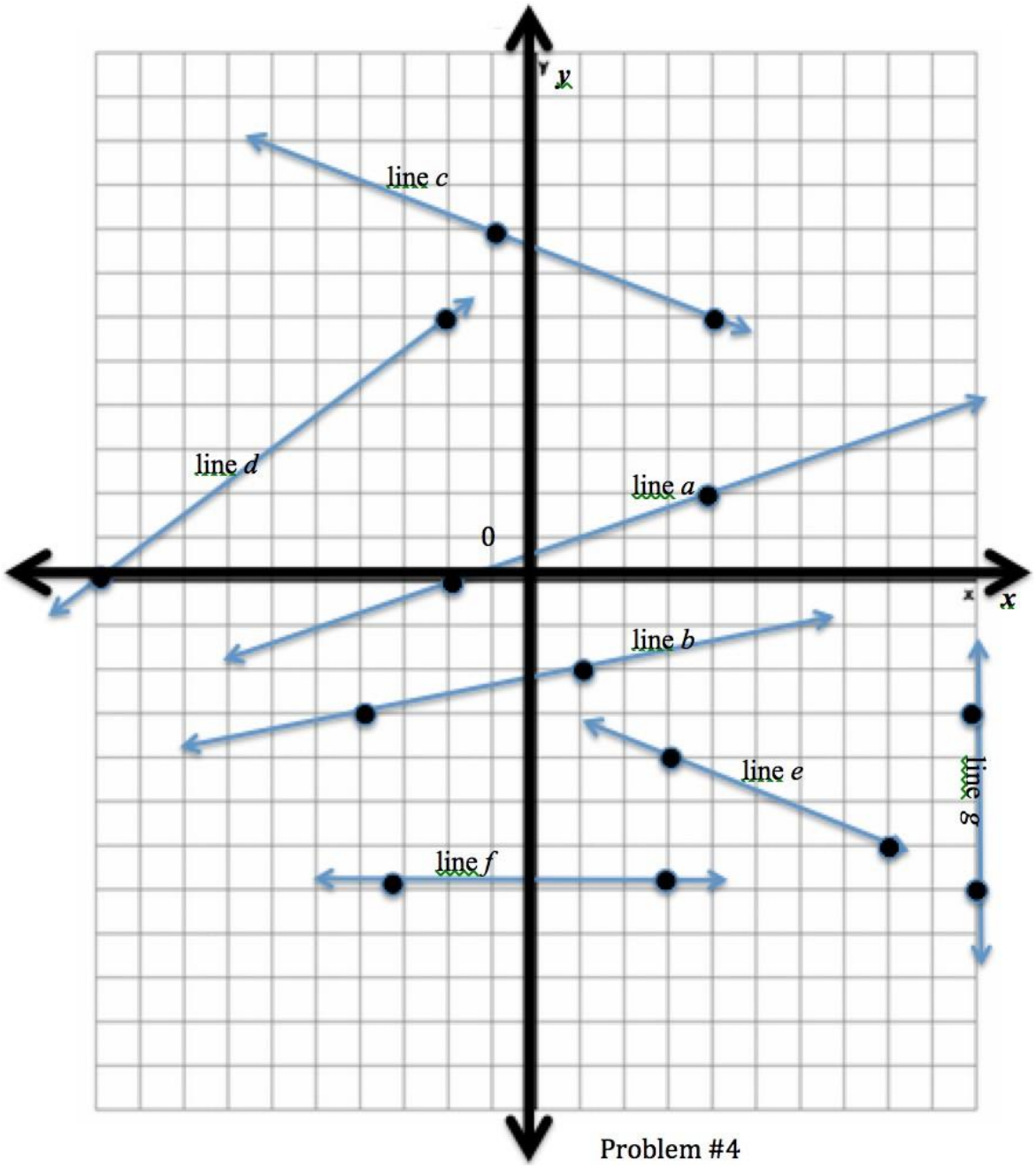
Non-Calculator Section – Student may NOT use a calculator.

1.) The New York Road Runners report the results for the New York Marathon in terms of minutes per mile. If a runner ran 11.5 minutes per mile, then the runner's rate in miles per hour is ? . Express your answer in decimal form and round to the nearest tenths place.

2.) A circus act is practicing a trick with three people on a trampoline. If the maximum weight the trampoline can hold is 350 lbs. Each person has to hold 12 lbs of equipment. An inequality can be written to restrict the weight of the two people on the trampoline.
Fill---in the boxes to complete the inequality. [?] w + [?] ≤ [?] where w is the weight of each person on the trampoline.

3.) A recipe calls for $\frac{!}{!}$ cups of chicken per serving, but Kristie only has 3 cups of chicken. Kristie can make [?] servings of the recipe. Round to the nearest whole number.

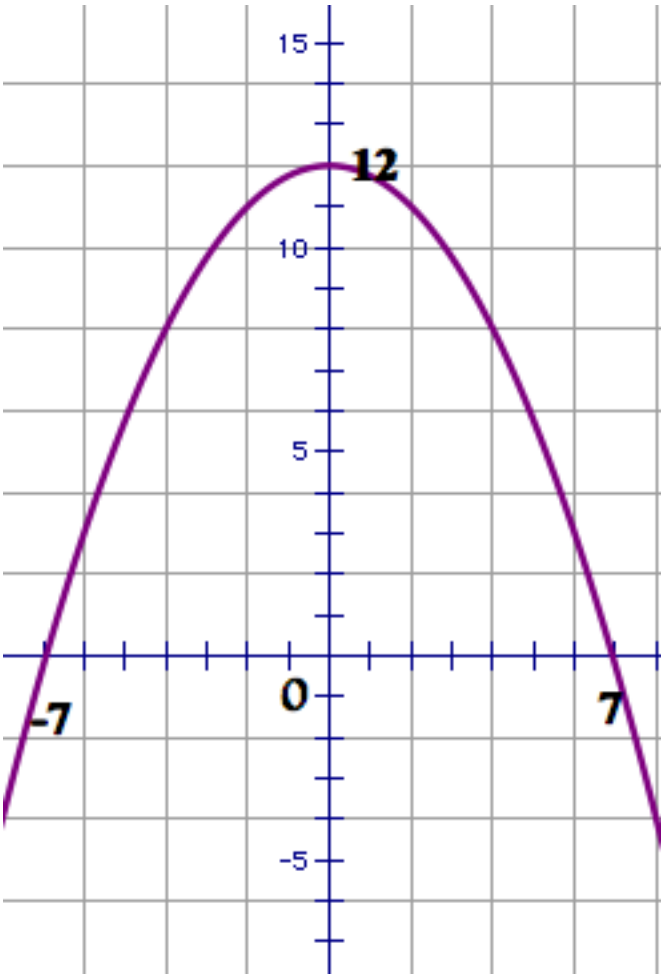
4.) The two lines that have the same rate of change are line [?] and line [?] with a slope of [?].



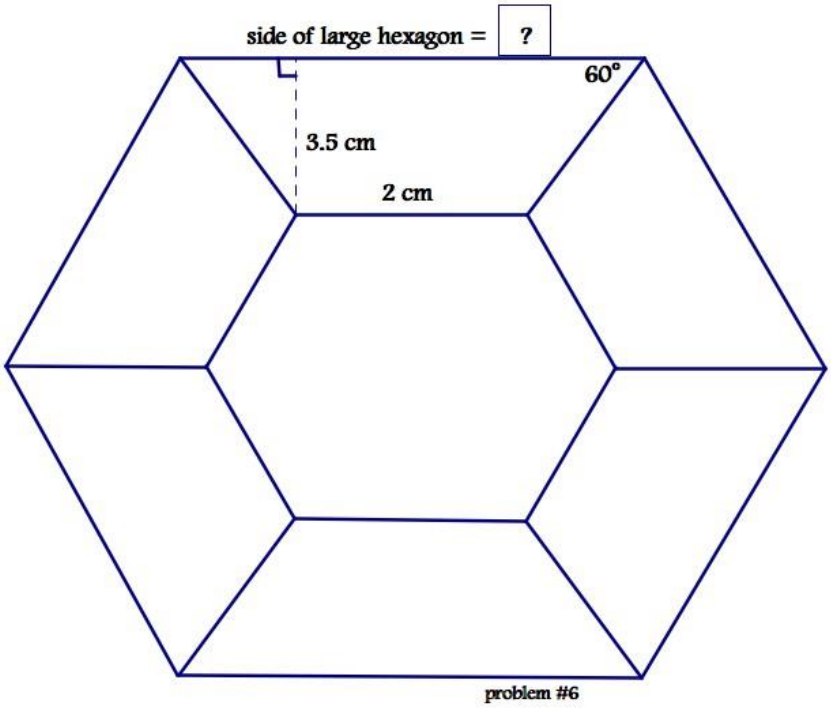
Problem #4

5.) If Einstein's formula, $E = mc^2$, in which E is the energy in ergs, m the mass of the matter in grams, and c the speed of light in centimeters per second, then m can be expressed in terms of E and c^2 as [?].

6.) The [?] axis is the axis of symmetry, and [(?, ?)] is the maximum point in the graph below. Express as an ordered pair.



7.) The area between the two regular hexagons is 48 cm^2. The length of the side of the small hexagon is 2 cm. The length of the side of large hexagon is ? centimeters. Express you answer as a whole number. [ ]



problem #6

8.) An equivalent expression of $35x + 28y = 8\ 4x + 3y\ + 5x + 3y +$ [?] + [?]

9.) A poster is $\frac{11}{!}$ feet by $\frac{!}{!}$ feet. The area of the poster is ( ) [?] square feet. Express your answer as an improper fraction.

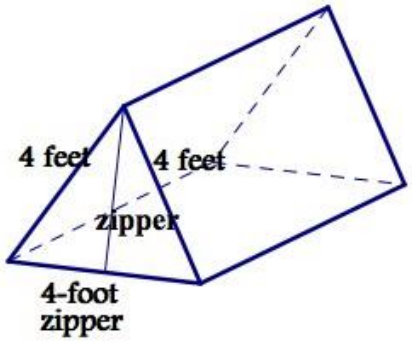
10.) Given the equation $12x - 3 = (4x - 1)^!$ can be written as [?] V = V^2 and x = [?] or x = [?]. Express the value of x as a fraction in reduced form.

*****The teacher will collect the non-calculator section of the test. Now, students will take a 1-minute sketch break. *****

<u>Calculator Section</u> – The students may use the approved calculator as outlined in the rules section.

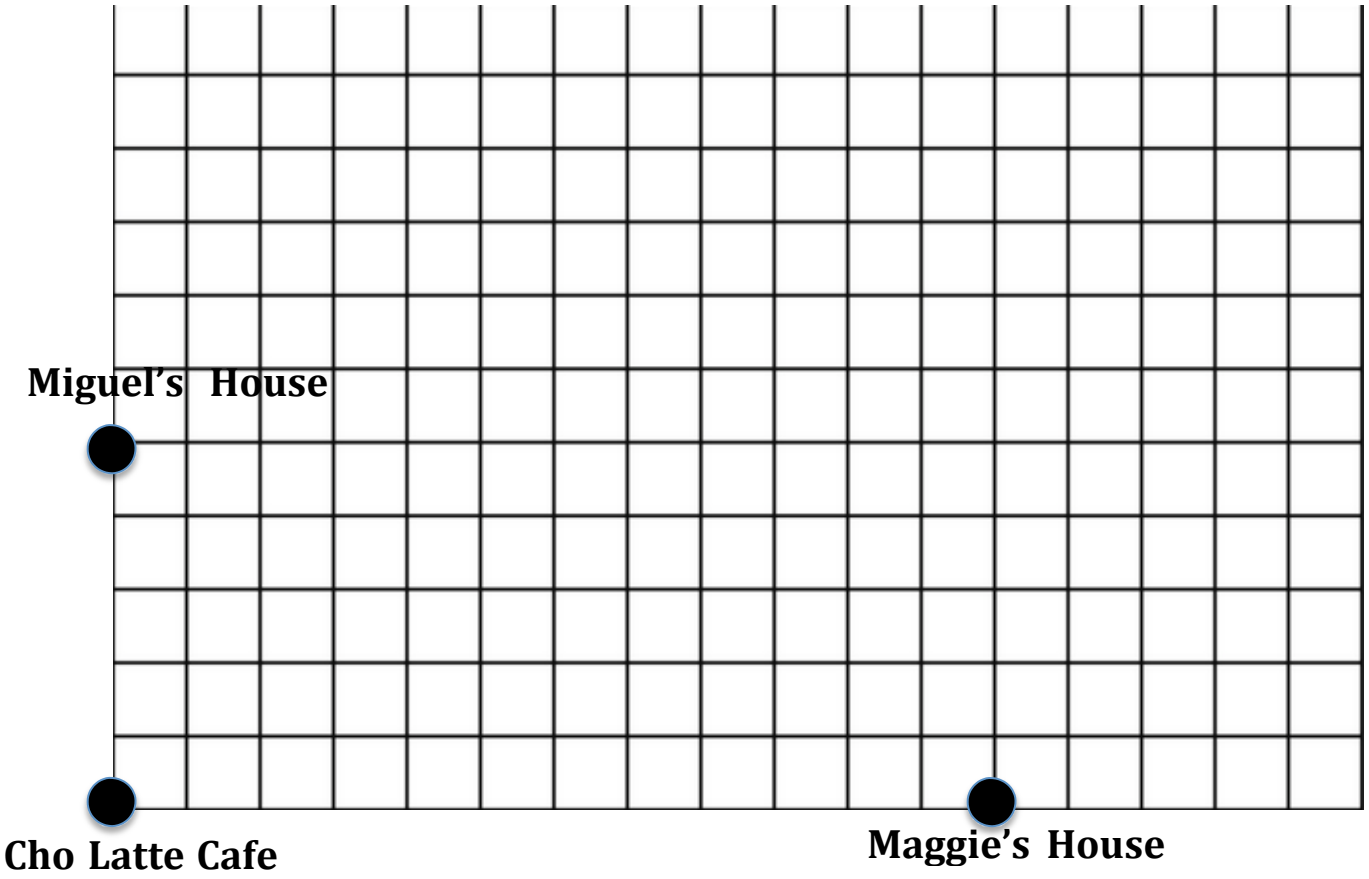
11.) A store has scratch off coupons that range from 20% to 30% off. Gabriella wants to purchase a tablet whose original price is $169. If she has to pay a 7% sales tax and $30 for the insurance (no tax on the insurance), the Gabriella will pay at least, [?] but no more than [?] . Express your answer in dollars and cents. Round to the nearest cent.

12.) AMTNJ Tent Company is making tents that sleep for one person. Neil, an employee, knows he has to create two zippers, one 4 feet long at the bottom and another zipper along the altitude or height of the triangle. The zipper along the altitude must [?] feet and [?] inches. Round your answer to the nearest inch.



13.) Saturn's mass is $5.6846 \times 10^{!"}$ kg., and Jupiter's mass is $1.8986 \times 10^{!"}$ kg. The difference between Saturn's mass and Jupiter's mass is ? kg. Express your answer in scientific notation. [ ]

14.) Miguel wants to have hot chocolate with Maggie at Cho Latte Cafe. He will pick up Maggie and then take her to the café. Miguel lives 5 blocks from Cho Latte Café, and Maggie lives 12 blocks from Cho Latte Café. Miguel will travel a total of [?] blocks before he finally arrives at the café by taking the shortest route.



15.) The mean weight of a professional baseball team is [?] times the mean weight of the middle school baseball team. The charts below show the weights of each team.

Professional Baseball Players	Weight
A	180
B	215
C	210
D	210
E	188
F	176
G	209
H	200
I	231
J	180
K	185
L	197
M	230
N	189
O	185
P	219

Middle School Baseball Players	Weight
AA	70
BB	77
CC	85
DD	62
EE	74
FF	60
GG	64
HH	62
II	63
JJ	60
KK	60
LL	60
MM	68
NN	69
OO	72
PP	62

16.) A beginner skier is 2,400 feet up on a mountain. If it took 8 minutes for the skier to ski to the bottom, then $f(t) = \square\, t + 2{,}400$, where $f(t)$ is the height and t is time in minutes.

17.) Class A and Class B have the same median score on the first test. One of the student's test is missing. The score of the missing test is [?]. The scores are listed in the table.

Class A	Class B
88	55
39	92
58	68
72	68
77	72
79	?
86	88
88	62
24	94
96	100

18.) A computer was stolen from AMTNJ Middle School's computer room. The surveillance camera was able to capture an image. The image shows the thief walking out the computer room door. The door measures 80 inches, but is only 22.4 cm in the picture. If the thief is 19.6 cm in the picture, then the thief 's actual height is [?] inches.

19.) Convert 18 centimeters per sec to [?] meters per hour.

20.) The students at Math Middle School join clubs. The chart below shows the number of students in each club:

Students	Math Club	Computer Club	Chess Club
Boys	78	54	20
Girls	62	48	8

For every student in the chess club there are [?] students in the math club. If some students drop out of the computer club, now the ratio of students in the computer club to the math club is 7:10, then the number of students that dropped out of the computer club is [?].

AMTNJ's 2nd Annual Middle School Math Contest
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1.) 5.2 ; $\frac{!\,!"\#\$}{!!.!\,!"\#\$\%\&'} \cdot \frac{!"\,!"\#\$\%\&'}{!\,!!.} = \frac{!"\,!"\#\$\%}{!!.!\,!!.} \approx 5.2$

2.) 3, 36, 350; 3 for the number of people; 3*12 = 36; 350 lbs was the maximum weight

3.) 5; $3 \div \frac{!}{!}$

4.) $c, e, -\frac{2}{5}$ **or** $e, c, -\frac{!}{5}$**;** Slopes for other lines are line a: $\frac{!}{!}$; line b: $\frac{!}{!}$; line d: $\frac{!}{!}$; line f: zero; line g: undefined

5.) $m = \frac{E}{c^2}$ **or** $\frac{E}{c^2} = m$**;** Divide both sides by c^2

6.) *y*-axis, (0, 12) or vertical axis, (0, 12); y---axis cuts parabola in half; highest point is (0, 12)

7.) 6; 48 divided by 6 trapezoids ➔➔ Using 30---60---90 ⊗, base of triangle =2. There are two triangles which = 4 cm and add 2 cm from rectangle. The sum then is 6 cm.

8.) $y, -2x$ **or** $-2x, y$; $8(4x + 3y) = 32x + 24y + 5x + 3y = 37x + 27y$; add y and subtract 2x

9.) $\frac{77}{18}$**;** 11*7 = 77 and 6*3 = 18

10.) 3, $-\frac{1}{4}$**, 1 or 3, 1,** $-\frac{1}{4}$**;** Factor out a 3 to get 3(4x---1); so, $3V = V^2$; $V^2 - 3V = 0$; $V(V - 3) = 0$; V = 0, 3; V = 4x---1; 4x---1 =0; x = ¼. 4x---1=3; 4x=4; x=1

11.) $156.58, $174.66; 169 *.8 = 135.2; 135.2 * 1.07=144.66+30 and 169*.7 = 118.3*1.07=126.58+30

12.) 3 ft. 6 in.; $2^2 + h^2 = 4^2$; $h = 2\sqrt{3} \approx 3.46$

13.) 1.33014×10^{27}; $56.846 * 10^{26} - 10.243 * 10^{26} = 13.3014 * 10^{26} = 1.33014 * 10^{27}$

14.) 25 blocks; $5^2 + 12^2 = d^2$; d = 13 to Maggie's house 13 + 12 = 25 blocks

15.) 3; mean weight of professional baseball team = 200.25; mean weight of middle school team = 66.75; $\frac{!""\,.!"}{!!.!"} = 3$

16.) ---300; **(**0, 2400) & (8, 0); $\frac{!"\#\#!!}{} = \frac{!"\#\#}{} = -300$

17.) 84; The median score for Class A is 78. So, $\frac{!"!!}{!} = 78$. Then x = 84.

18.) 70; $\frac{80\ in}{22.4\ cm} = \frac{x\ in}{19.6\ cm}$; 1568=22.4x; x = 70

19.) 648; $\frac{18cm}{1\,sec} \cdot \frac{3600\,sec}{1\,hr} \cdot \frac{1\,m}{100\,cm}$

20.) 5, 4; $\frac{28\ chess\ club}{140\ math\ club} = \frac{1}{5}$; $\frac{102!x}{140} = \frac{7}{10}$ x = 4

* There are many ways to do these problems. The above is just one solution.