The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

INTEGRATED ALGEBRA

Thursday, August 14, 2014 — 8:30 to 11:30 a.m., only

Student Name: Mr Sibol

School Name: JMAP

The possession or use of any communications device is strictly prohibited when taking this examination. If you have or use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.

Print your name and the name of your school on the lines above.

A separate answer sheet for Part I has been provided to you. Follow the instructions from the proctor for completing the student information on your answer sheet.

This examination has four parts, with a total of 39 questions. You must answer all questions in this examination. Record your answers to the Part I multiple-choice questions on the separate answer sheet. Write your answers to the questions in Parts II, III, and IV directly in this booklet. All work should be written in pen, except graphs and drawings, which should be done in pencil. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. The formulas that you may need to answer some questions in this examination are found at the end of the examination. This sheet is perforated so you may remove it from this booklet.

Scrap paper is not permitted for any part of this examination, but you may use the blank spaces in this booklet as scrap paper. A perforated sheet of scrap graph paper is provided at the end of this booklet for any question for which graphing may be helpful but is not required. You may remove this sheet from this booklet. Any work done on this sheet of scrap graph paper will *not* be scored.

When you have completed the examination, you must sign the statement printed at the end of the answer sheet, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer sheet cannot be accepted if you fail to sign this declaration.

Notice...

A graphing calculator and a straightedge (ruler) must be available for you to use while taking this examination.

DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

INTEGRATED ALGEBRA

Part I

Answer all 30 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. For each question, write on the separate answer sheet the numeral preceding the word or expression that best completes the statement or answers the question. [60]

Use this space for computations.

1 What is the product of $3a^2b$ and $-2ab^3$?

(1) a^2b^3
(2) a^3b^4
(3) $-6a^2b^3$
(4) $-6a^3b^4$

$20 - 6 = 14$

2 The value of the expression $|-20| - |6|$ is

(1) 26
(2) 14
(3) -14
(4) -26

3 When $9x^2 - 100$ is factored, it is equivalent to $(3x - b)(3x + b)$. What is a value for b?

(1) 50
(2) 10
(3) 3
(4) 100

4 Which equation represents the line that passes through the points (1,1) and (−2,7)?

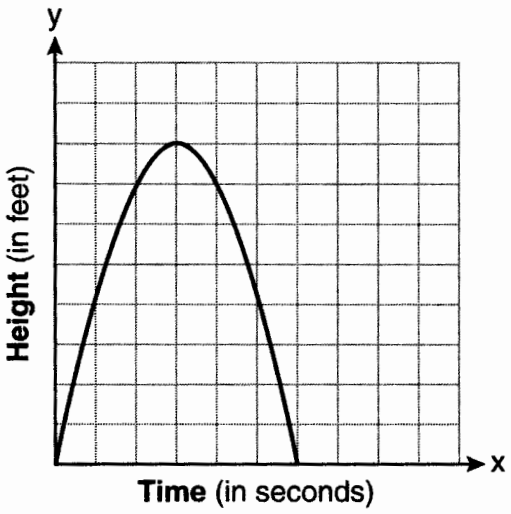
(1) $y = -2x + 9$
(2) $y = -2x + 3$
(3) $y = -\frac{1}{2}x + 8$
(4) $y = -\frac{1}{2}x + 6$

$m = \frac{1-7}{1-(-2)} = \frac{-6}{3} = -2$

$y = mx + b$
$1 = -2(1) + b$
$3 = b$

Use this space for computations.

5 The graph below represents the parabolic path of a ball kicked by a young child. What are the vertex and the axis of symmetry for the parabola?



(1) vertex: (3,8); axis of symmetry: $x = 3$

(2) vertex: (3,8); axis of symmetry: $y = 3$

(3) vertex: (8,3); axis of symmetry: $x = 3$

(4) vertex: (8,3); axis of symmetry: $y = 3$

6 Which relationship can best be described as causal?

(1) The alarm goes off and the sun rises.

(2) The car is moving slowly and the driver is singing.

(3) The snow is falling and the stores run out of snow shovels.

(4) The birds are chirping and the rain is coming down.

7 In a class, which data can be classified as qualitative?

(1) age of students

(2) weight of students

(3) shoe size of students

(4) hair color of students

Use this space for computations.

8 Given the following:

A = {Charles, Kyle, Nakim, Jade}
B = {Charles, Jade, Alicia, Kyle}
C = {Kyle, Nakim, Jade, Dylan}

What is the intersection of sets A, B, and C?

(1) {Kyle, Nakim}
(2) {Charles, Kyle}
(3) {Jade, Nakim}
(4) {Jade, Kyle}

9 The sum of $\frac{3x-4}{x+3}$ and $\frac{2x-5}{x+3}$ is

(1) $\frac{5x-9}{x+3}$
(2) $\frac{5x+1}{2x+6}$
(3) $\frac{5x-9}{x+6}$
(4) $\frac{5x+1}{x+3}$

10 If Rosa's age is represented by R, which inequality represents the statement "Rosa is at most 29 years old"?

(1) $R < 29$
(2) $R > 29$
(3) $R \leq 29$
(4) $R \geq 29$

11 What is the slope of a line passing through points $(-7,5)$ and $(5,-3)$?

(1) $-\frac{3}{2}$
(2) $-\frac{2}{3}$
(3) $\frac{2}{3}$
(4) $\frac{3}{2}$

$\frac{5-3}{-7-5} = \frac{8}{-12} = -\frac{2}{3}$

12 A positive correlation always exists on a scatter plot when

(1) y remains unchanged as x increases
(2) y changes randomly as x increases
(3) y decreases as x increases
(4) y increases as x increases

Use this space for computations.

13 A sandwich consists of one type of meat, one type of condiment, and one type of cheese. The possible choices are listed below:

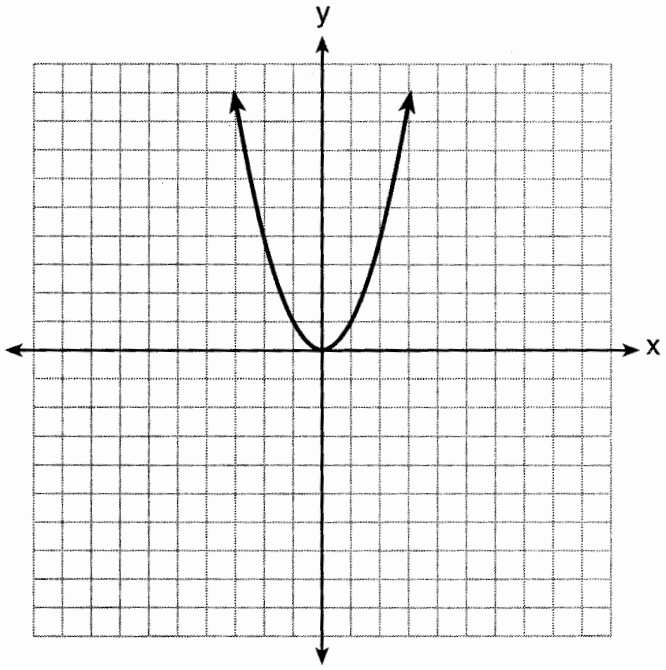
Meat: beef, chicken, turkey
Condiment: ketchup, mustard, mayonnaise
Cheese: American, cheddar, ~~provolone~~, mozzarella

3 x 3 x 3 = 27

In the sample space of all the possible different sandwiches consisting of one type of meat, one type of condiment, and one type of cheese, how many sandwiches do *not* include provolone cheese?

(1) 27
(2) 9
(3) 3
(4) 36

14 The graph of the equation $y = x^2$ is shown below.



Which statement best describes the change in this graph when the coefficient of x^2 is multiplied by 4?

(1) The parabola becomes wider.
(2) The parabola becomes narrower.
(3) The parabola will shift up four units.
(4) The parabola will shift right four units.

Use this space for computations.

15 A parking lot is 100 yards long. What is the length of $\frac{3}{4}$ of the parking lot, in feet?

1 yard = 3 feet

$100\text{ yd} \cdot \frac{3\text{ ft}}{1\text{ yd}} \times \frac{3}{4} = 225$

(1) 300
(2) 225
(3) 75
(4) 25

16 What is the solution of the equation $\frac{12}{7x} + \frac{3}{2x} = \frac{15}{14}$?

(1) 1
(3) 3
(2) 5
(4) 14

$\frac{24}{14x} + \frac{21}{14x} = \frac{15x}{14x}$

$45 = 15x$

$3 = x$

17 The expression $\frac{2x^2 + 10x - 28}{4x + 28}$ is undefined when x is

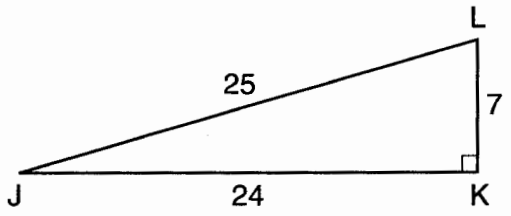
(1) 7, only
(2) -7, only
(3) 7 or -2
(4) -7 or 2

$4x + 28 = 0$

$4x = -28$

$x = -7$

18 In right triangle JKL in the diagram below, $KL = 7$, $JK = 24$, $JL = 25$, and $\angle K = 90°$.



Which statement is *not* true?

(1) $\tan L = \frac{24}{7}$
(2) $\cos L = \frac{24}{25}$
(3) $\tan J = \frac{7}{24}$
(4) $\sin J = \frac{7}{25}$

Use this space for computations.

19 A teacher asked the class to solve the equation $3(x + 2) = 21$. Robert wrote $3x + 6 = 21$ as his first step. Which property did he use?

(1) associative property
(2) commutative property
(3) distributive property
(4) zero property of addition

20 If the roots of a quadratic equation are -4 and 2, the equation is equivalent to

(1) $(x + 4)(x - 2) = 0$
(2) $(x - 4)(x + 2) = 0$
(3) $(x + 4)(x + 2) = 0$
(4) $(x - 4)(x - 2) = 0$

21 Kelsey scored the following points in her first six basketball games: 22, 14, 19, 22, 8, and 17. What is the relationship between the measures of central tendency of these data?

(1) mode > median > mean
(2) median > mode > mean
(3) mean > median > mode
(4) mode > mean > median

8 14 17 19 22 22

mean = $\frac{102}{6}$ = 17

median = $\frac{17+19}{2}$ = 18

mode = 22

22 Sheba opened a retirement account with \$36,500. Her account grew at a rate of 7% per year compounded annually. She made no deposits or withdrawals on the account. At the end of 20 years, what was the account worth, to the *nearest dollar*?

(1) \$87,600
(2) \$130,786
(3) \$141,243
(4) \$1,483,444,463

$36{,}500(1.07)^{20} \approx 141{,}243$

23 Which equation represents a vertical line?

(1) $y = -x$
(2) $y = 12$
(3) $x = y$
(4) $x = 12$

Use this space for computations.

24 Byron has 72 coins in his piggy bank. The piggy bank contains only dimes and quarters. If he has \$14.70 in his piggy bank, which equation can be used to determine q, the number of quarters he has?

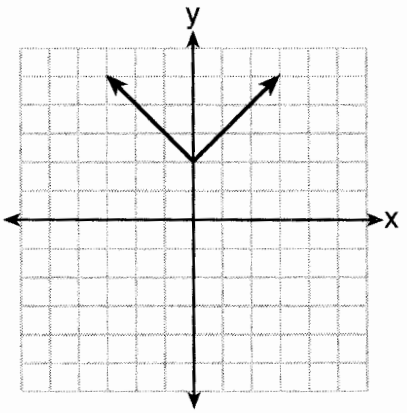
(1) $14.70 + 0.25q = 72$

(2) $0.10(q - 72) + 0.25q = 14.70$

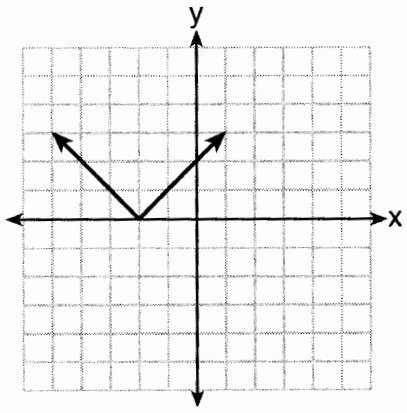
(3) $0.10(72 - q) + 0.25q = 14.70$

(4) $0.10q + 0.25(72 - q) = 14.70$

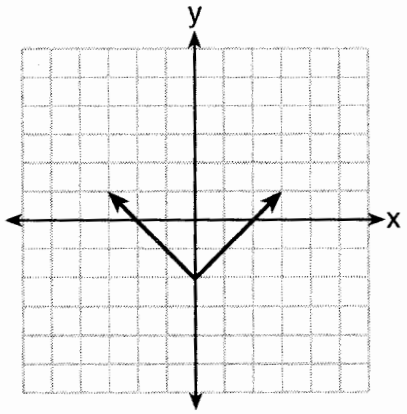
25 Which graph represents the equation $y = |x - 2|$?



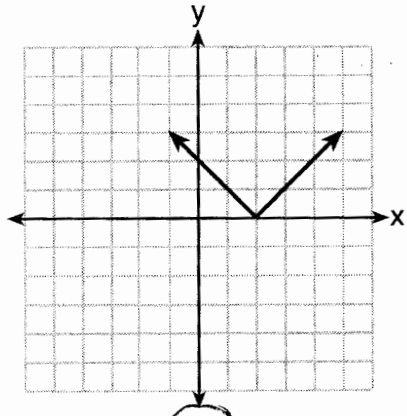
(1)



(3)



(2)



(4)

Use this space for computations.

26 If $ax + 3 = 7 - bx$, what is x expressed in terms of a and b?

(1) $\frac{4}{ab}$

(3) $\frac{4}{a+b}$

(2) $-\frac{4}{ab}$

(4) $-\frac{4}{a+b}$

$ax + bx = 4$
$x(a+b) = 4$
$x = \frac{4}{a+b}$

27 Which equation represents a line that is parallel to the line whose equation is $y = -3x$?

$m = -3$

(1) $\frac{1}{3}x + y = 4$

(3) $6x + 2y = 4$

$m = -\frac{A}{B} = -\frac{6}{2} = -3$

(2) $-\frac{1}{3}x + y = 4$

(4) $-6x + 2y = 4$

28 What is the result when $6x^2 - 13x + 12$ is subtracted from $-3x^2 + 6x + 7$?

(1) $3x^2 - 7x + 19$

(3) $9x^2 - 7x + 19$

(2) $9x^2 - 19x + 5$

(4) $-9x^2 + 19x - 5$

29 What is the solution set of the equation $\frac{x}{3} = \frac{8}{x+2}$?

(1) $\{-6,-4\}$

(3) $\{6,-4\}$

(2) $\{-6,4\}$

(4) $\{6,4\}$

$x^2 + 2x = 24$
$x^2 + 2x - 24 = 0$
$(x+6)(x-4) = 0$
$x = -6, 4$

30 Which set of integers is included in $(-1,3]$?

(1) $\{0,1,2,3\}$

(3) $\{-1,0,1,2,3,4\}$

(2) $\{-1,0,1,2\}$

(4) $\{-2,-1,0,1,2,3\}$

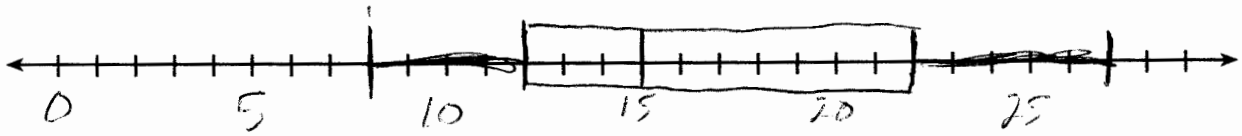
Part II

Answer all 3 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [6]

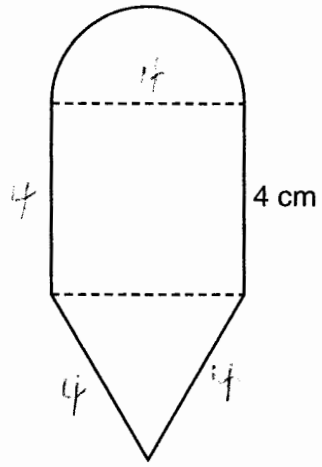
31 Using his data on annual deer population in a forest, Noj found the following information:

25th percentile: 12
50th percentile: 15
75th percentile: 22
Minimum population: 8
Maximum population: 27

Using the number line below, construct a box-and-whisker plot to display these data.



32 The diagram below consists of a square with a side of 4 cm, a semicircle on the top, and an equilateral triangle on the bottom. Find the perimeter of the figure to the *nearest tenth of a centimeter.*



33 A thermos in the shape of a cylinder is filled to 1 inch from the top of the cylinder with coffee. The height of the cylinder is 12 inches and its radius is 2.5 inches. State, to the *nearest hundredth of a cubic inch*, the volume of coffee in the thermos.

$V = \pi r^2 h$

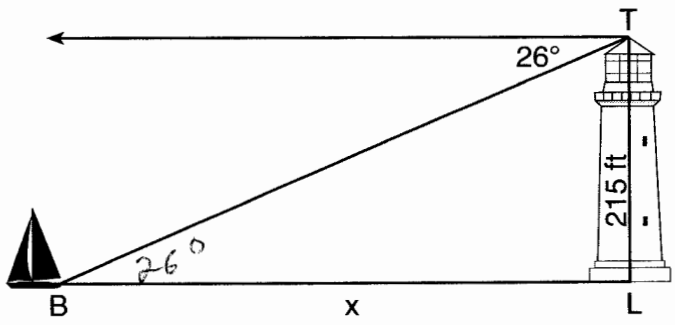
$= \pi \cdot 2.5^2 \cdot 11$

≈ 215.98

Part III

Answer all 3 questions in this part. Each correct answer will receive 3 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [9]

34 The top of a lighthouse, T, is 215 feet above sea level, L, as shown in the diagram below. The angle of depression from the top of the lighthouse to a boat, B, at sea is 26°. Determine, to the *nearest foot*, the horizontal distance, x, from the boat to the base of the lighthouse.



$\tan 26 = \frac{215}{x}$

$x = \frac{215}{\tan 26}$

$x \approx 441$

35 There are six apples, five oranges, and one pear in John's basket. His friend takes three pieces of fruit at random without replacement. Determine the probability that *all three* fruits taken are apples.

$\frac{6}{12} \cdot \frac{5}{11} \cdot \frac{4}{10} = \frac{1}{11}$

36 Express $y\sqrt{3} - \left(\sqrt{32} + y\sqrt{27}\right)$ in simplest radical form.

$y\sqrt{3} - 4\sqrt{2} - 3y\sqrt{3}$

$-2y\sqrt{3} - 4\sqrt{2}$

Part IV

Answer all 3 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [12]

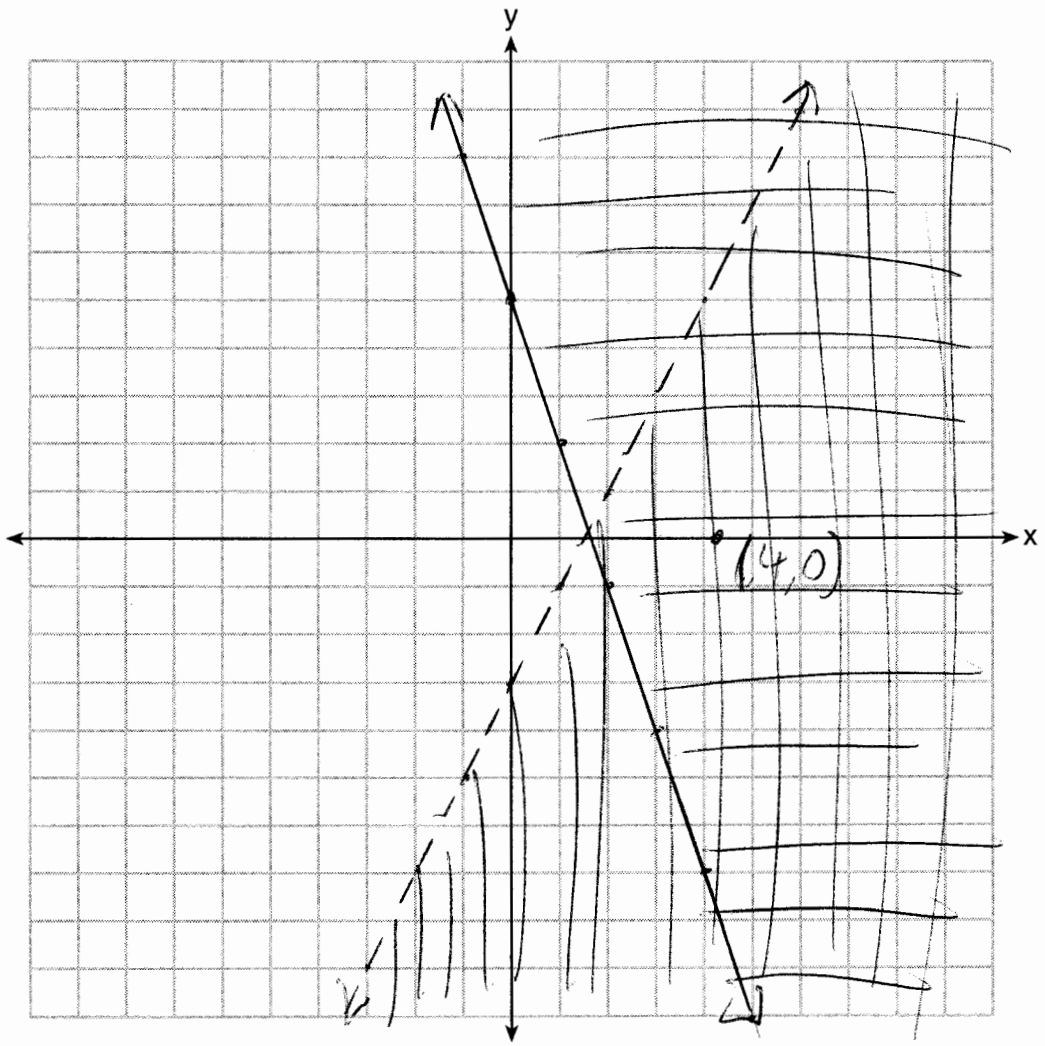
37 On the set of axes below, solve the following system of inequalities graphically.

$$y + 3 < 2x$$
$$-2y \leq 6x - 10$$

$y < 2x - 3$

$y \geq -3x + 5$

State the coordinates of a point in the solution set.



38 The actual side of a square tile is 4 inches. The manufacturers allow a relative error of 0.025 in the area of a tile. Two machines are used to cut the tiles. Machine *A* produces a square tile with a length of 3.97 inches. Machine *B* produces a square tile with a length of 4.12 inches. Determine which machine produces a tile whose area falls within the allowed relative error.

[A] $\frac{4^2 - 3.97^2}{4^2} = .0149$

B $\frac{4.12^2 - 4^2}{4^2} = .0609$

39 Solve the following system of equations algebraically:

$$y = x^2 - 6x + 9$$
$$y = -9x + 19$$

$x^2 - 6x + 9 = -9x + 19$

$x^2 + 3x - 10 = 0$

$(x+5)(x-2) = 0$

$x = -5, 2$

$y = -9(-5) + 19$ $\quad$ $y = -9(2) + 19$

$y = 64$ $\quad$ $y = 1$

$(-5, 64)$ $\quad$ $(2, 1)$