The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

INTEGRATED ALGEBRA

Tuesday, August 13, 2013 — 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. Record your answers on your separate answer sheet. [60]

Use this space for computations.

1 Which situation describes a negative correlation?

(1) the amount of gas left in a car's tank and the amount of gas used from it

(2) the number of gallons of gas purchased and the amount paid for the gas

(3) the size of a car's gas tank and the number of gallons it holds

(4) the number of miles driven and the amount of gas used

2 The sum of $8n^2 - 3n + 10$ and $-3n^2 - 6n - 7$ is

(1) $5n^2 - 9n + 3$

(2) $5n^2 - 3n - 17$

(3) $-11n^2 - 9n - 17$

(4) $-11n^2 - 3n + 3$

3 Which event is certain to happen?

(1) Everyone walking into a room will have red hair.

(2) All babies born in June will be males.

(3) The Yankees baseball team will win the World Series.

(4) The Sun will rise in the east.

$N = 5 + J$ $J = N - 5$ $NJ = 84$

4 Noj is 5 years older than Jacob. The product of their ages is 84. How old is Noj?

(1) 6

(2) 7

(3) 12

(4) 14

$N(N-5) = 84$

$N^2 - 5N - 84 = 0$

$(N-12)(N+7) = 0$

$N = 12, -7$

Use this space for computations.

5 Marie currently has a collection of 58 stamps. If she buys s stamps each week for w weeks, which expression represents the total number of stamps she will have?

(1) $58sw$
(2) $58 + sw$
(3) $58s + w$
(4) $58 + s + w$

6 Given: {1, 3, 5, 7, 9, 11, 13, 15, 17, 19}

A = {all odd integers from 1 through 19, inclusive}

B = {9, 11, 13, 15, 17}

What is the complement of set B within set A?

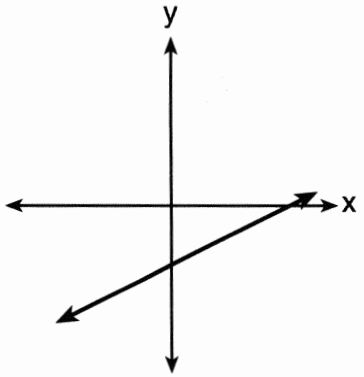
(1) {3, 5, 7}
(2) {3, 5, 7, 19}
(3) {1, 3, 5, 7}
(4) {1, 3, 5, 7, 19}

7 Which equation represents a line that is parallel to the line whose equation is $y = -3x - 7$?

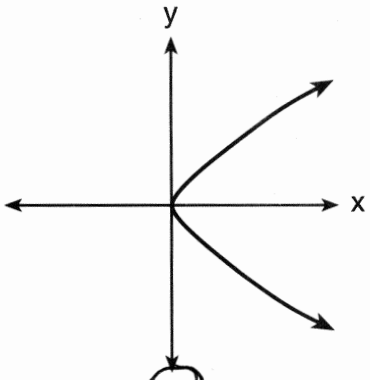
(1) $y = -3x + 4$
(2) $y = -\frac{1}{3}x - 7$
(3) $y = \frac{1}{3}x + 5$
(4) $y = 3x - 2$

Use this space for computations.

8 Which graph does *not* represent the graph of a function?



(1)



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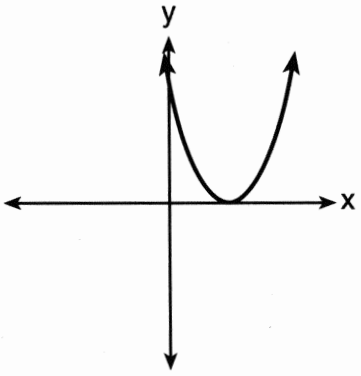
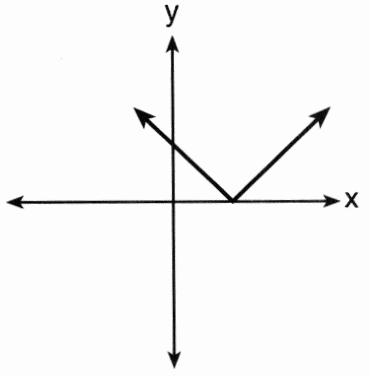


(2)



(4)

9 Which value of x is in the solution set of $-3x + 8 \geq 14$?

(1) -3

(2) -1

(3) 0

(4) 3

$-8 \quad -8$

$\frac{-3x \geq 6}{-3 \quad -3}$

$x \leq -2$

10 What is the slope of the line that passes through the points $(4,-7)$ and $(9,1)$?

(1) $\frac{5}{8}$

(2) $\frac{8}{5}$

(3) $-\frac{6}{12}$

(4) $-\frac{13}{6}$

$\frac{-7-1}{4-9} = \frac{-8}{-5} = \frac{8}{5}$

Use this space for computations.

11 The product of $\frac{4x^2}{7y^2}$ and $\frac{21y^3}{20x^4}$, expressed in simplest form, is

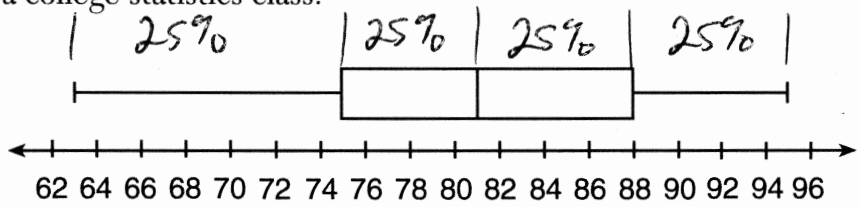
(1) $0.6x^2y$

(2) $\frac{3y}{5x^2}$

(3) $\frac{12x^2y^3}{20x^4y^2}$

(4) $\frac{84x^2y^3}{140x^4y^2}$

12 The box-and-whisker plot below represents a set of grades in a college statistics class.



Which interval contains exactly 50% of the grades?

(1) 63–88

(2) 63–95

(3) 75–81

(4) 75–88

13 An art studio has a list of information posted with each sculpture that is for sale. Each entry in the list could be classified as quantitative *except* for the

(1) cost

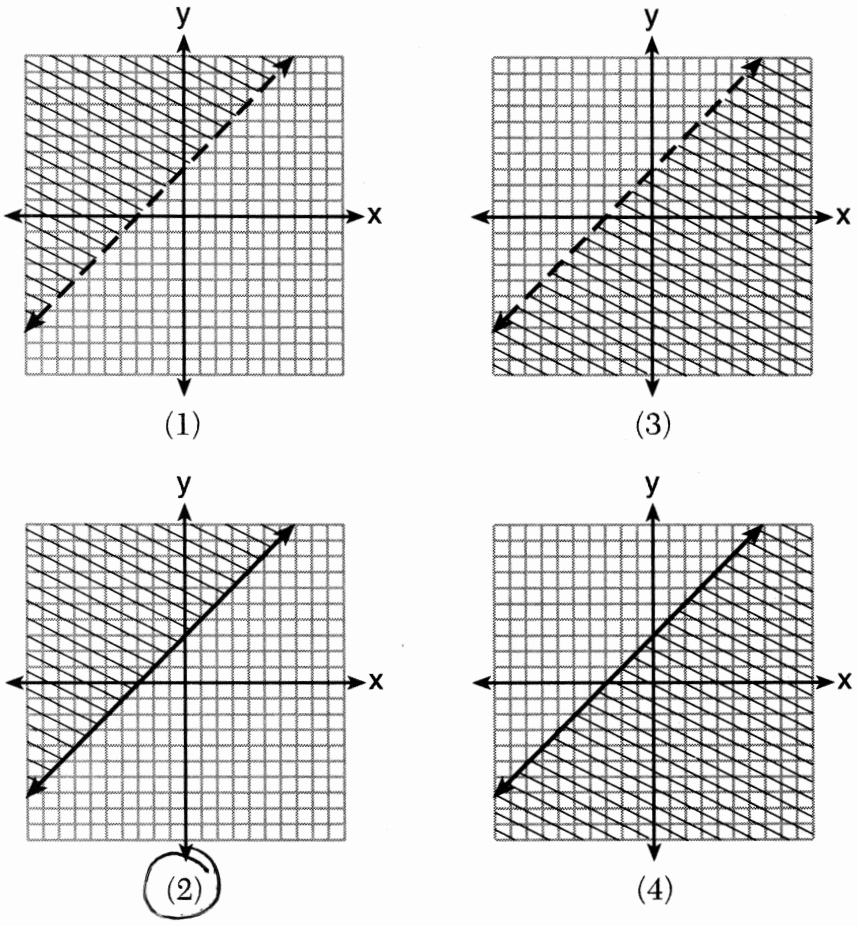
(2) height

(3) artist

(4) weight

Use this space for computations.

14 Which graph represents the inequality $y \geq x + 3$?



15 Using the substitution method, Ken solves the following system of equations algebraically.

$y = 2x - 5$

$$2x - y = 5$$
$$3x + 2y = -3$$

Which equivalent equation could Ken use?

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

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

(3) $3\left(y + \frac{5}{2}\right) + 2y = -3$

(4) $3\left(\frac{5}{2} - y\right) + 2y = -3$

Use this space for computations.

16 A value of x that makes the expression $\frac{x^2 + 4x - 12}{x^2 - 2x - 15}$ undefined is

(1) -6
(2) -2
(3) 3
(4) 5

$(x-5)(x+3)=0$
$x=5,-3$

17 The statement $|-15| < x < |-20|$ is true when x is equal to

(1) -16
(2) -14
(3) 17
(4) 21

18 Which equation is true?

(1) $\frac{c^5}{d^7} \div \frac{d^3}{c} = \frac{c^4}{d^4}$
(2) $(-2m^2p)^3 = -8m^6p^3$
(3) $\left(\frac{s^3t^8}{s^4t^5}\right)^2 = \frac{t^5}{s^2}$
(4) $(-2a^2b^3)(3ab^2) = a^3b^5$

19 The equation $3(4x) = (4x)3$ illustrates which property?

(1) commutative
(2) associative
(3) distributive
(4) multiplicative inverse

20 Monique has three sons who play football, two sons who play baseball, and one son who plays both sports. If all of her sons play baseball or football, how many sons does she have?

(1) 5
(2) 6
(3) 3
(4) 4

$3+2-1=4$

Use this space for computations.

21 Written in set-builder notation, $S = \{1, 3, 5, 7, 9\}$ is

(1) $\{x|1 < x < 9$, where x is a prime number$\}$

(2) $\{x|1 \leq x \leq 9$, where x is a prime number$\}$

(3) $\{x|1 < x < 9$, where x is an odd integer$\}$

(4) $\{x|1 \leq x \leq 9$, where x is an odd integer$\}$

22 Which is the equation of a parabola that has the same vertex as the parabola represented by $y = x^2$, but is wider?

(1) $y = x^2 + 2$

(2) $y = x^2 - 2$

(3) $y = 2x^2$

(4) $y = \frac{1}{2}x^2$

23 In right triangle ABC, $m\angle C = 90$, $AC = 7$, and $AB = 13$. What is the length of $\overline{BC}$?

(1) 6

(2) 20

(3) $\sqrt{120}$

(4) $\sqrt{218}$

$\sqrt{13^2 - 7^2} = \sqrt{120}$

24 A cube, with faces numbered 1 to 6, is rolled, and a penny is tossed at the same time. How many elements in the sample space consist of an even number and a tail?

(1) 12

(2) 2

(3) 3

(4) 4

(2,T), (4,T), (6,T)

25 If the volume of a cube is 8 cubic centimeters, what is its surface area, in square centimeters?

(1) 32

(2) 24

(3) 12

(4) 4

$V = s^3$

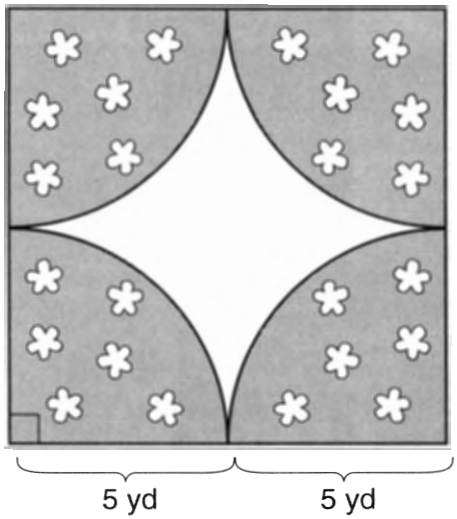
$8 = s^3$

$2 = s$

$6 \times (2 \times 2) = 24$

Use this space for computations.

26 A designer created a garden, as shown in the diagram below. The garden consists of four quarter-circles of equal size inside a square. The designer put a fence around both the inside and the outside of the garden.



□ + ○
4(5+5) + 10π
40 + 10π

Which expression represents the amount of fencing, in yards, that the designer used for the fence?

(1) $40 + 10\pi$
(2) $40 + 25\pi$
(3) $100 + 10\pi$
(4) $100 + 25\pi$

27 Mr. Taylor raised all his students' scores on a recent test by five points. How were the mean and the range of the scores affected?

(1) The mean increased by five and the range increased by five.
(2) The mean increased by five and the range remained the same.
(3) The mean remained the same and the range increased by five.
(4) The mean remained the same and the range remained the same.

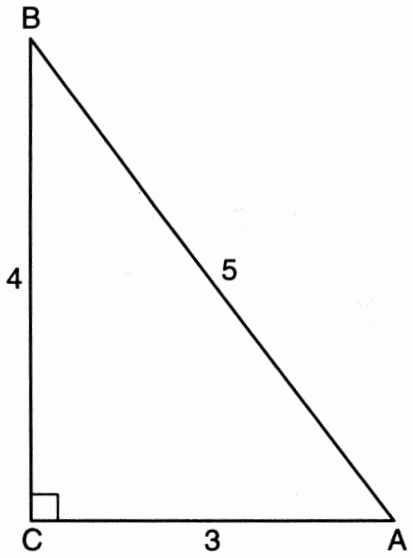
28 Which fraction is equivalent to $\frac{4}{3a} - \frac{5}{2a}$?

$\frac{8}{6a} - \frac{15}{6a} = -\frac{7}{6a}$

(1) $-\frac{1}{a}$
(2) $-\frac{1}{5a}$
(3) $-\frac{7}{6a}$
(4) $-\frac{7}{6a^2}$

Use this space for computations.

29 Which ratio represents the cosine of angle A in the right triangle below?



$\cos A = \frac{ADJ}{HYP} = \frac{3}{5}$

(1) $\frac{3}{5}$

(2) $\frac{5}{3}$

(3) $\frac{4}{5}$

(4) $\frac{4}{3}$

30 If $2y + 2w = x$, then w, in terms of x and y, is equal to

(1) $x - y$

(2) $\frac{x - 2y}{2}$

(3) $x + y$

(4) $\frac{x + 2y}{2}$

$\frac{2w}{2} = \frac{x - 2y}{2}$

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 A jogger ran at a rate of 5.4 miles per hour. Find the jogger's *exact* rate, in feet per minute.

1 mile = 5,280 feet

$\frac{5.4 \text{ mi}}{\text{hr}} \cdot \frac{5280 \text{ ft}}{\text{mile}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} = \frac{475.2 \text{ ft}}{\text{min}}$

32 Express $2\sqrt{108}$ in simplest radical form.

$2\sqrt{36}\sqrt{3}$

$12\sqrt{3}$

33 Adrianne invested $2000 in an account at a 3.5% interest rate compounded annually. She made no deposits or withdrawals on the account for 4 years. Determine, to the *nearest dollar*, the balance in the account after the 4 years.

$2000(1.035)^4 \approx 2295$

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 Miller's Department Store is having a sale with a 25% discount on mattresses. If the sales tax rate is 8%, how much change will Frank receive from $800 if he purchases a mattress regularly priced at $895 during this sale?

$800 - (895)(.75)(1.08) = 75.05$

35 The difference between two numbers is 28. The larger number is 8 less than twice the smaller number. Find *both* numbers.

[Only an algebraic solution can receive full credit.]

$L - S = 28$

$L = 2S - 8$

$L = S + 28$

$2S - 8 = S + 28$

$S = 36$

$L = 36 + 28$

$= 64$

36 Janis measures the dimensions of the floor in her rectangular classroom for a rug. Her measurements are 10.50 feet by 12.25 feet. The actual measurements of the floor are 10.75 feet by 12.50 feet. Determine the relative error in calculating the area, to the *nearest thousandth*.

$$\frac{(10.75)(12.5)-(10.5)(12.25)}{(10.75)(12.5)} \approx .043$$

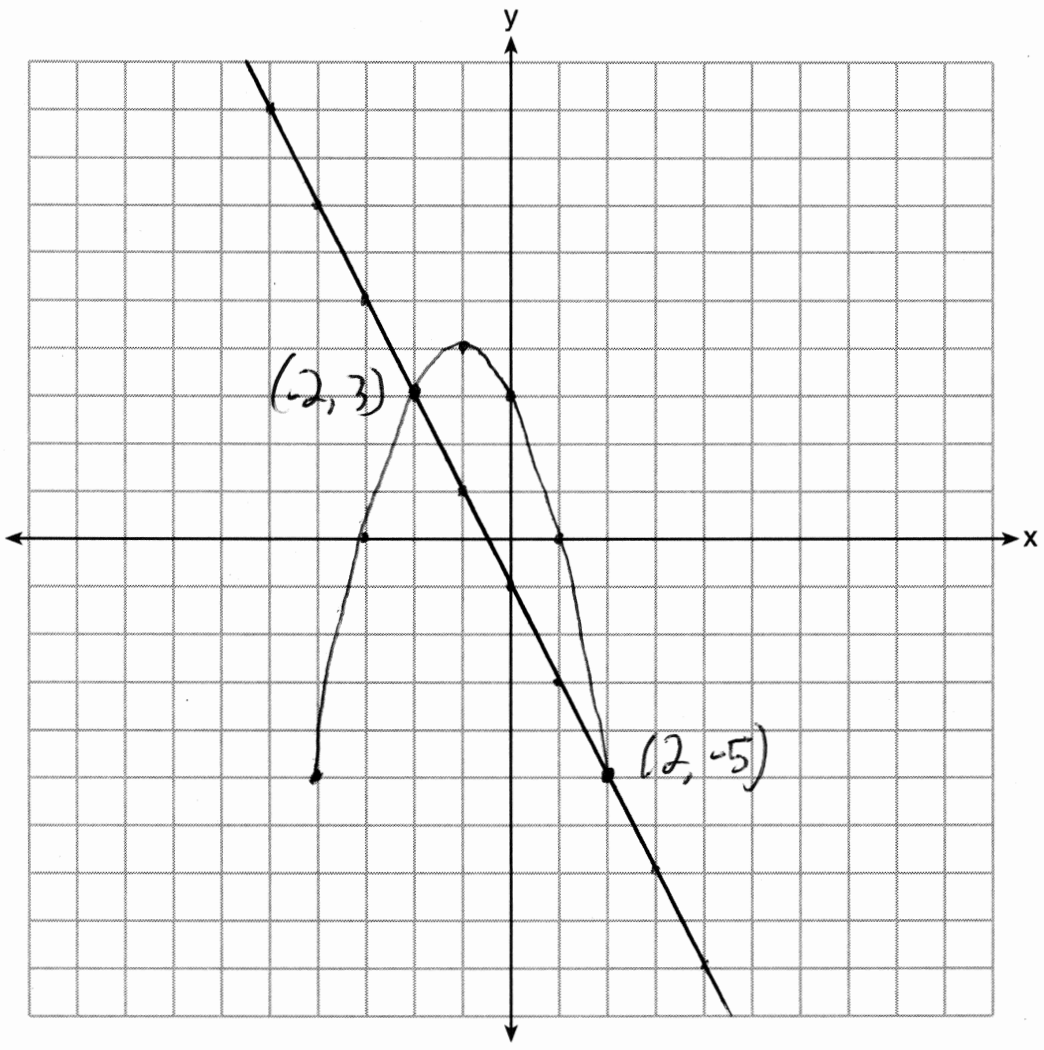
Part IV

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, graph the following system of equations. Using the graph, determine and state *all* solutions of the system of equations.

$$y = -x^2 - 2x + 3$$
$$y + 1 = -2x$$

$y = -2x - 1$



38 Express $\frac{3x^2 + 9x}{x^2 + 5x + 6} \div \frac{x^2 - 9}{x^2 - x - 6}$ in simplest form.

$$\frac{3x(x+3)}{(x+3)(x+2)} \cdot \frac{(x-3)(x+2)}{(x+3)(x-3)} = \frac{3x}{x+3}$$

39 A bottle contains 12 red marbles and 8 blue marbles. A marble is chosen at random and not replaced. Then, a second marble is chosen at random.

Determine the probability that the two marbles are *not* the same color.

$\frac{12}{20} \cdot \frac{8}{19} + \frac{8}{20} \cdot \frac{12}{19} = \frac{192}{380}$

Determine the probability that *at least* one of the marbles is red.

$1 - P(BB)$

$1 - \frac{8}{20} \cdot \frac{7}{19}$

$\frac{380}{380} - \frac{56}{380} = \frac{324}{380}$