

INTEGRATED ALGEBRA

The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

INTEGRATED ALGEBRA

Friday, June 18, 2010—1:15 to 4:15 p.m., only

Student Name: _____

School Name: _____

Print your name and the name of your school on the lines above. Then turn to the last page of this booklet, which is the answer sheet for Part I. Fold the last page along the perforations and, slowly and carefully, tear off the answer sheet. Then fill in the heading of your answer sheet.

This examination has four parts, with a total of 39 questions. You must answer all questions in this examination. Write 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.

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

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

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 Given:

$$\text{Set } U = \{S, O, P, H, I, A\}$$

$$\text{Set } B = \{A, I, O\}$$

If set B is a subset of set U , what is the complement of set B ?

(1) $\{O, P, S\}$

(3) $\{A, H, P\}$

(2) $\{I, P, S\}$

(4) $\{H, P, S\}$

2 How many different sandwiches consisting of one type of cheese, one condiment, and one bread choice can be prepared from five types of cheese, two condiments, and three bread choices?

(1) 10

(3) 15

(2) 13

(4) 30

3 The sum of $4x^3 + 6x^2 + 2x - 3$ and $3x^3 + 3x^2 - 5x - 5$ is

(1) $7x^3 + 3x^2 - 3x - 8$

(3) $7x^3 + 9x^2 - 3x - 8$

(2) $7x^3 + 3x^2 + 7x + 2$

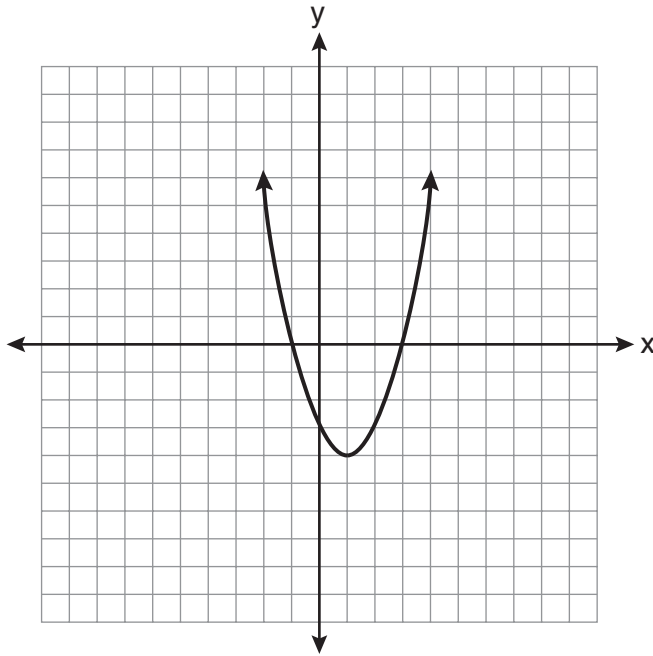
(4) $7x^6 + 9x^4 - 3x^2 - 8$

Use this space for computations.

4 What is the slope of the line that passes through the points $(3,5)$ and $(-2,2)$?

- (1) $\frac{1}{5}$
- (2) $\frac{3}{5}$
- (3) $\frac{5}{3}$
- (4) 5

5 What are the vertex and axis of symmetry of the parabola shown in the diagram below?



- (1) vertex: $(1, -4)$; axis of symmetry: $x = 1$
- (2) vertex: $(1, -4)$; axis of symmetry: $x = -4$
- (3) vertex: $(-4, 1)$; axis of symmetry: $x = 1$
- (4) vertex: $(-4, 1)$; axis of symmetry: $x = -4$

Use this space for computations.

- 6 Three high school juniors, Reese, Matthew, and Chris, are running for student council president. A survey is taken a week before the election asking 40 students which candidate they will vote for in the election. The results are shown in the table below.

Candidate's Name	Number of Students Supporting Candidate
Reese	15
Matthew	13
Chris	12

Based on the table, what is the probability that a student will vote for Reese?

- (1) $\frac{1}{3}$ (3) $\frac{3}{8}$
(2) $\frac{3}{5}$ (4) $\frac{5}{8}$
- 7 Which linear equation represents a line containing the point (1,3)?
(1) $x + 2y = 5$ (3) $2x + y = 5$
(2) $x - 2y = 5$ (4) $2x - y = 5$
- 8 The expression $\sqrt{72} - 3\sqrt{2}$ written in simplest radical form is
(1) $5\sqrt{2}$ (3) $3\sqrt{2}$
(2) $3\sqrt{6}$ (4) $\sqrt{6}$

Use this space for
computations.

9 In $\triangle ABC$, the measure of $\angle B = 90^\circ$, $AC = 50$, $AB = 48$, and $BC = 14$. Which ratio represents the tangent of $\angle A$?

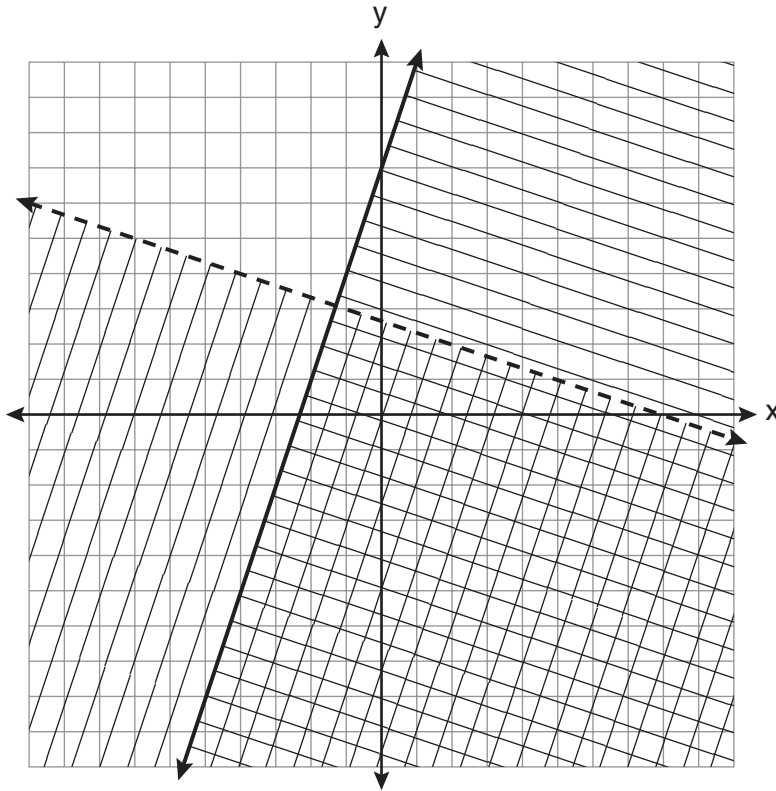
(1) $\frac{14}{50}$

(3) $\frac{48}{50}$

(2) $\frac{14}{48}$

(4) $\frac{48}{14}$

10 Which ordered pair is in the solution set of the system of linear inequalities graphed below?



(1) $(1, -4)$

(3) $(5, 3)$

(2) $(-5, 7)$

(4) $(-7, -2)$

Use this space for computations.

11 Which table does *not* show bivariate data?

(1)

Height (inches)	Weight (pounds)
39	50
48	70
60	90

(2)

Gallons	Miles Driven
15	300
20	400
25	500

(3)

Quiz Average	Frequency
70	12
80	15
90	6

(4)

Speed (mph)	Distance (miles)
40	80
50	120
55	150

12 What is the solution of the system of equations $c + 3d = 8$ and $c = 4d - 6$?

(1) $c = -14, d = -2$

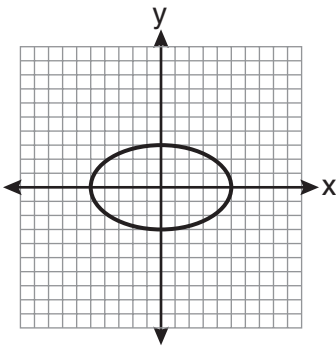
(3) $c = 2, d = 2$

(2) $c = -2, d = 2$

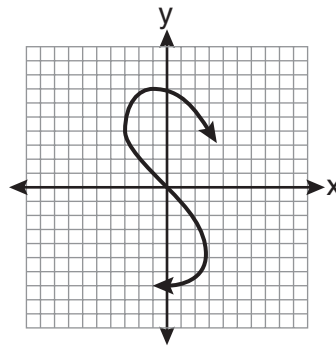
(4) $c = 14, d = -2$

Use this space for computations.

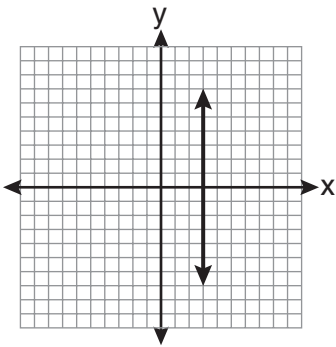
13 Which graph represents a function?



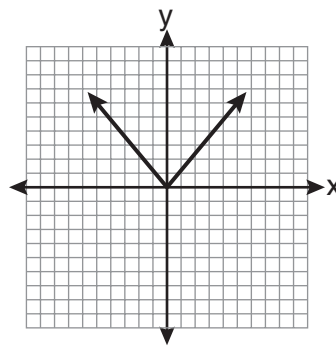
(1)



(3)



(2)



(4)

14 The algebraic expression $\frac{x-2}{x^2-9}$ is undefined when x is

(1) 0

(3) 3

(2) 2

(4) 9

**Use this space for
computations.**

15 The graphs of the equations $y = 2x - 7$ and $y - kx = 7$ are parallel when k equals

- (1) -2
- (2) 2
- (3) -7
- (4) 7

16 Which verbal expression is represented by $\frac{1}{2}(n - 3)$?

- (1) one-half n decreased by 3
- (2) one-half n subtracted from 3
- (3) the difference of one-half n and 3
- (4) one-half the difference of n and 3

17 The freshman class held a canned food drive for 12 weeks. The results are summarized in the table below.

Canned Food Drive Results

Week	1	2	3	4	5	6	7	8	9	10	11	12
Number of Cans	20	35	32	45	58	46	28	23	31	79	65	62

Which number represents the second quartile of the number of cans of food collected?

- (1) 29.5
- (2) 30.5
- (3) 40
- (4) 60

Use this space for
computations.

18 Which expression represents $\frac{-14a^2c^8}{7a^3c^2}$ in simplest form?

(1) $-2ac^4$

(3) $\frac{-2c^4}{a}$

(2) $-2ac^6$

(4) $\frac{-2c^6}{a}$

19 Which value of x is the solution of $\frac{x}{3} + \frac{x+1}{2} = x$?

(1) 1

(3) 3

(2) -1

(4) -3

20 When 36 is subtracted from the square of a number, the result is five times the number. What is the positive solution?

(1) 9

(3) 3

(2) 6

(4) 4

21 Which interval notation represents the set of all numbers greater than or equal to 5 and less than 12?

(1) $[5, 12)$

(3) $(5, 12)$

(2) $(5, 12]$

(4) $[5, 12]$

Use this space for
computations.

- 22 Four hundred licensed drivers participated in the math club's survey on driving habits. The table below shows the number of drivers surveyed in each age group.

**Ages of People in Survey on
Driving Habits**

Age Group	Number of Drivers
16–25	150
26–35	129
36–45	33
46–55	57
56–65	31

Which statement best describes a conclusion based on the data in the table?

- (1) It may be biased because no one younger than 16 was surveyed.
 - (2) It would be fair because many different age groups were surveyed.
 - (3) It would be fair because the survey was conducted by the math club students.
 - (4) It may be biased because the majority of drivers surveyed were in the younger age intervals.
- 23 A formula used for calculating velocity is $v = \frac{1}{2}at^2$. What is a expressed in terms of v and t ?

- (1) $a = \frac{2v}{t}$
- (2) $a = \frac{2v}{t^2}$
- (3) $a = \frac{v}{t}$
- (4) $a = \frac{v}{2t^2}$

Use this space for
computations.

24 What is the sum of $\frac{-x + 7}{2x + 4}$ and $\frac{2x + 5}{2x + 4}$?

(1) $\frac{x + 12}{2x + 4}$

(3) $\frac{x + 12}{4x + 8}$

(2) $\frac{3x + 12}{2x + 4}$

(4) $\frac{3x + 12}{4x + 8}$

25 Steve ran a distance of 150 meters in $1\frac{1}{2}$ minutes. What is his speed in meters per hour?

(1) 6

(3) 100

(2) 60

(4) 6,000

26 How many different three-letter arrangements can be formed using the letters in the word *ABSOLUTE* if each letter is used only once?

(1) 56

(3) 168

(2) 112

(4) 336

27 Factored completely, the expression $3x^2 - 3x - 18$ is equivalent to

(1) $3(x^2 - x - 6)$

(3) $(3x - 9)(x + 2)$

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

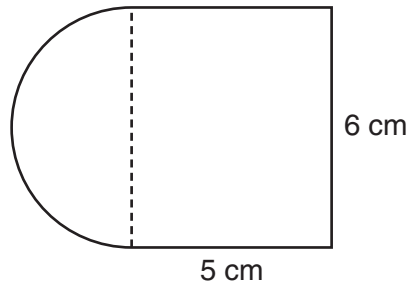
(4) $(3x + 6)(x - 3)$

Use this space for computations.

28 Which quadrant will be completely shaded in the graph of the inequality $y \leq 2x$?

- (1) Quadrant I (3) Quadrant III
(2) Quadrant II (4) Quadrant IV

29 A figure is made up of a rectangle and a semicircle as shown in the diagram below.



What is the area of the figure, to the *nearest tenth of a square centimeter*?

- (1) 39.4 (3) 48.8
(2) 44.1 (4) 58.3

30 The value, y , of a \$15,000 investment over x years is represented by the equation $y = 15000(1.2)^{\frac{x}{3}}$. What is the profit (interest) on a 6-year investment?

- (1) \$6,600 (3) \$21,600
(2) \$10,799 (4) \$25,799
-

Part II

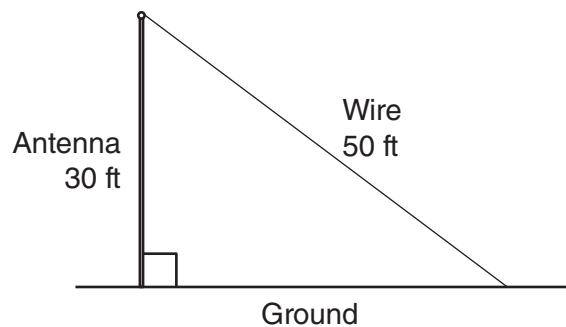
Answer all 3 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [6]

- 31 Alexis calculates the surface area of a gift box as 600 square inches. The actual surface area of the gift box is 592 square inches. Find the relative error of Alexis' calculation expressed as a decimal to the *nearest thousandth*.

32 Perform the indicated operation: $-6(a - 7)$

State the name of the property used.

- 33** A communications company is building a 30-foot antenna to carry cell phone transmissions. As shown in the diagram below, a 50-foot wire from the top of the antenna to the ground is used to stabilize the antenna.



Find, to the *nearest degree*, the measure of the angle that the wire makes with the ground.

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. [9]

34 Given: $A = \{18, 6, -3, -12\}$

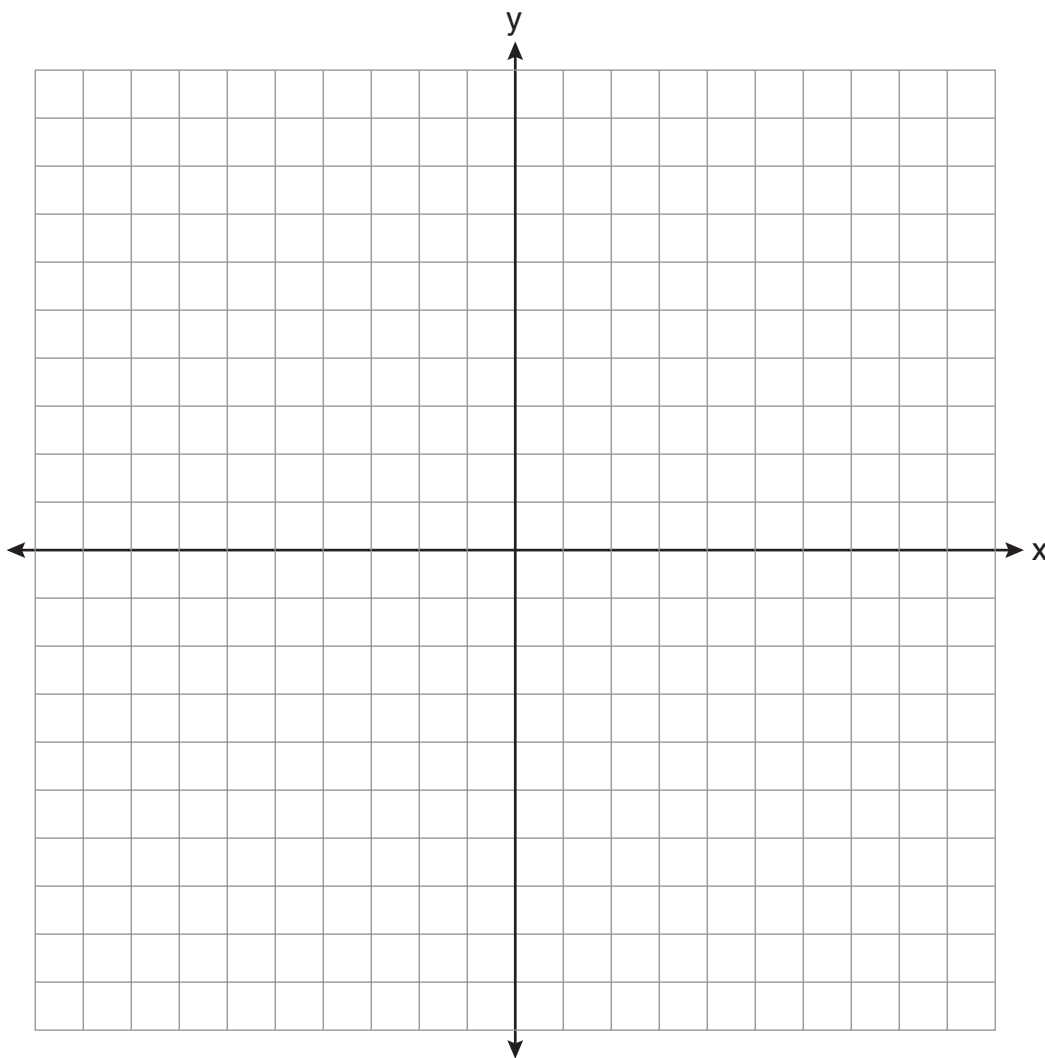
Determine all elements of set A that are in the solution of the inequality $\frac{2}{3}x + 3 < -2x - 7$.

35 Graph and label the following equations on the set of axes below.

$$y = |x|$$

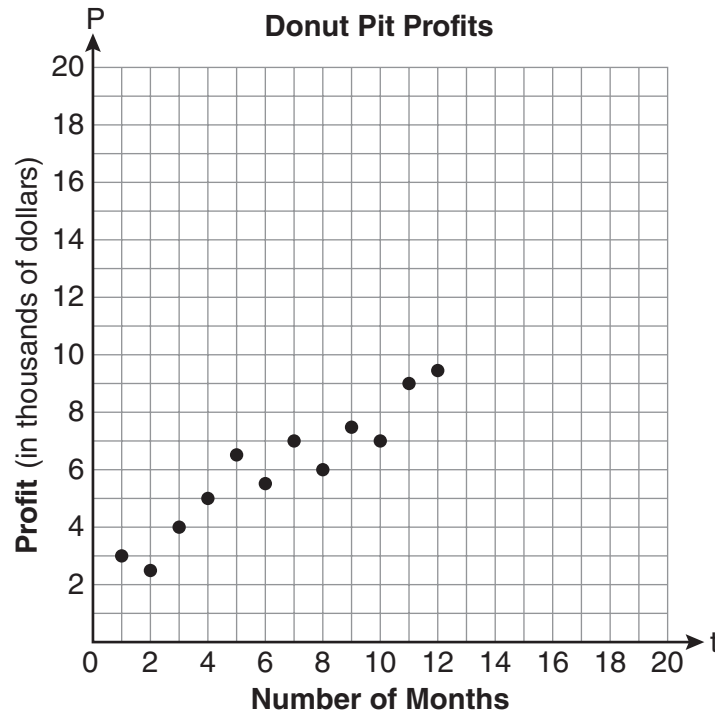
$$y = \left|\frac{1}{2}x\right|$$

Explain how *decreasing* the coefficient of x affects the graph of the equation $y = |x|$.



36 Megan and Bryce opened a new store called the Donut Pit. Their goal is to reach a profit of \$20,000 in their 18th month of business. The table and scatter plot below represent the profit, P , in thousands of dollars, that they made during the first 12 months.

t (months)	1	2	3	4	5	6	7	8	9	10	11	12
P (profit, in thousands of dollars)	3.0	2.5	4.0	5.0	6.5	5.5	7.0	6.0	7.5	7.0	9.0	9.5



Draw a reasonable line of best fit.

Using the line of best fit, predict whether Megan and Bryce will reach their goal in the 18th month of their business.

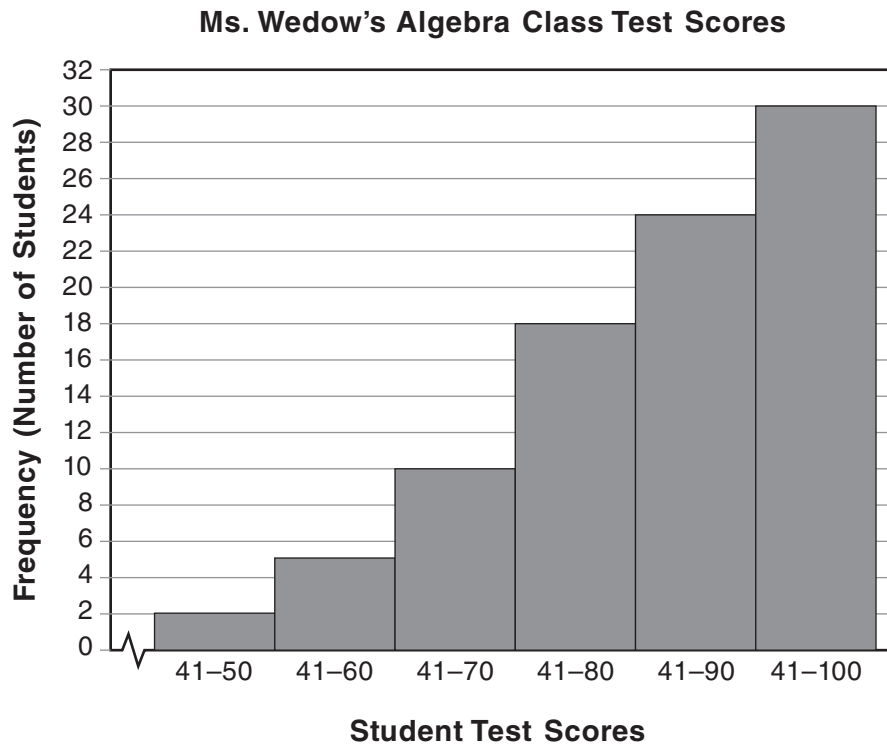
Justify your answer.

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. [12]

37 Express in simplest form: $\frac{x^2 + 9x + 14}{x^2 - 49} \div \frac{3x + 6}{x^2 + x - 56}$

38 The diagram below shows a cumulative frequency histogram of the students' test scores in Ms. Wedow's algebra class.



Determine the total number of students in the class.

Determine how many students scored higher than 70.

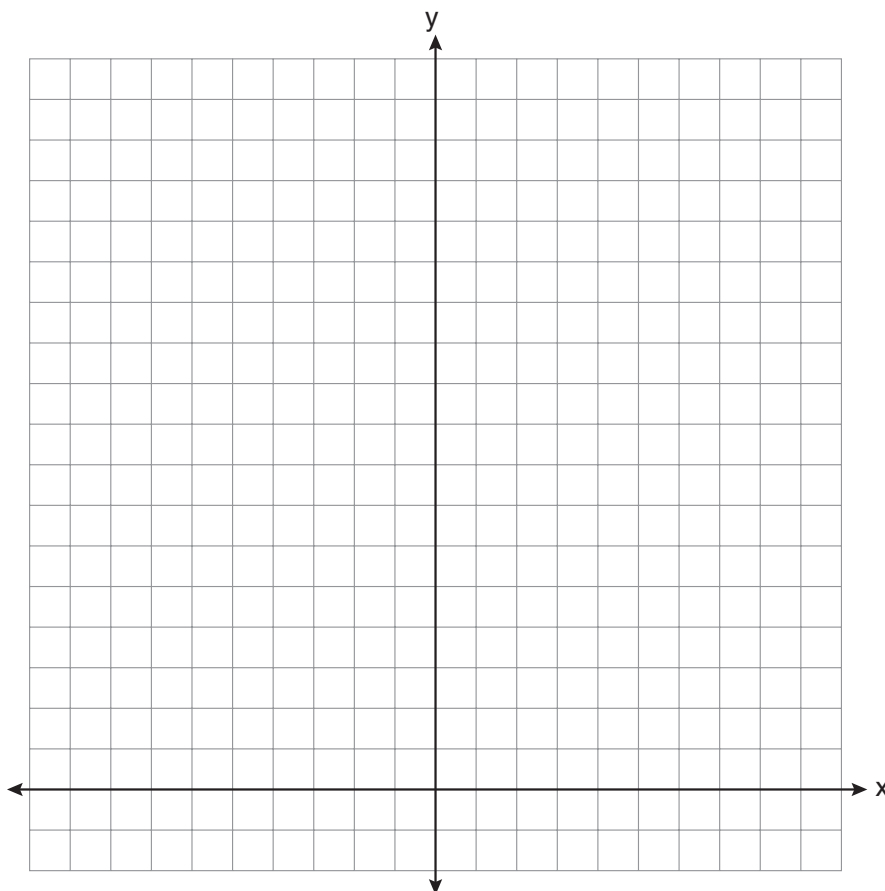
State which *ten-point* interval contains the median.

State which *two ten-point* intervals contain the same frequency.

39 On the set of axes below, solve the following system of equations graphically for all values of x and y .

$$y = -x^2 - 4x + 12$$

$$y = -2x + 4$$



Reference Sheet

Trigonometric Ratios

$$\sin A = \frac{\textit{opposite}}{\textit{hypotenuse}}$$

$$\cos A = \frac{\textit{adjacent}}{\textit{hypotenuse}}$$

$$\tan A = \frac{\textit{opposite}}{\textit{adjacent}}$$

Area

trapezoid $A = \frac{1}{2}h(b_1 + b_2)$

Volume

cylinder $V = \pi r^2 h$

Surface Area

rectangular prism $SA = 2lw + 2hw + 2lh$

cylinder $SA = 2\pi r^2 + 2\pi rh$

Coordinate Geometry

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

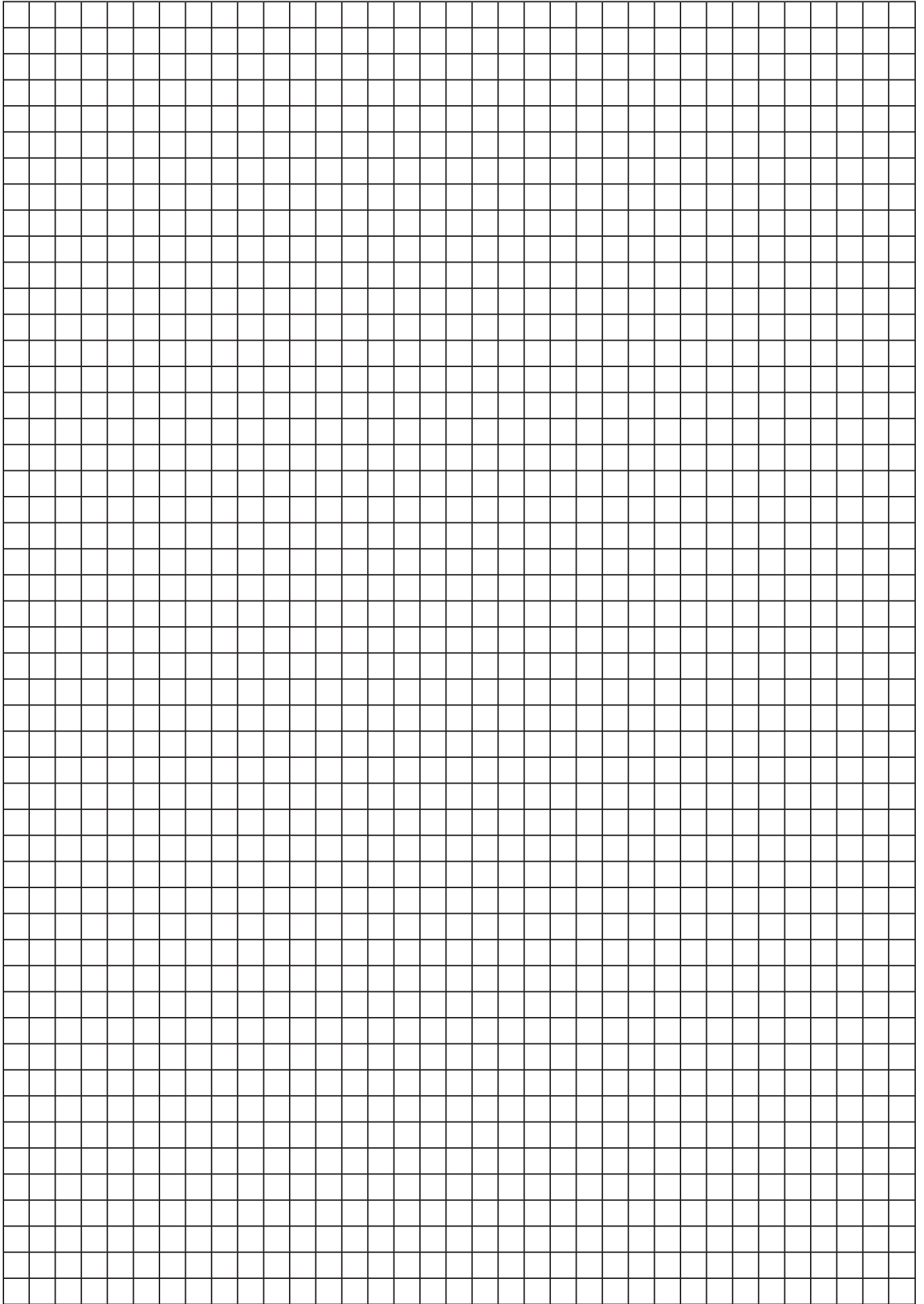
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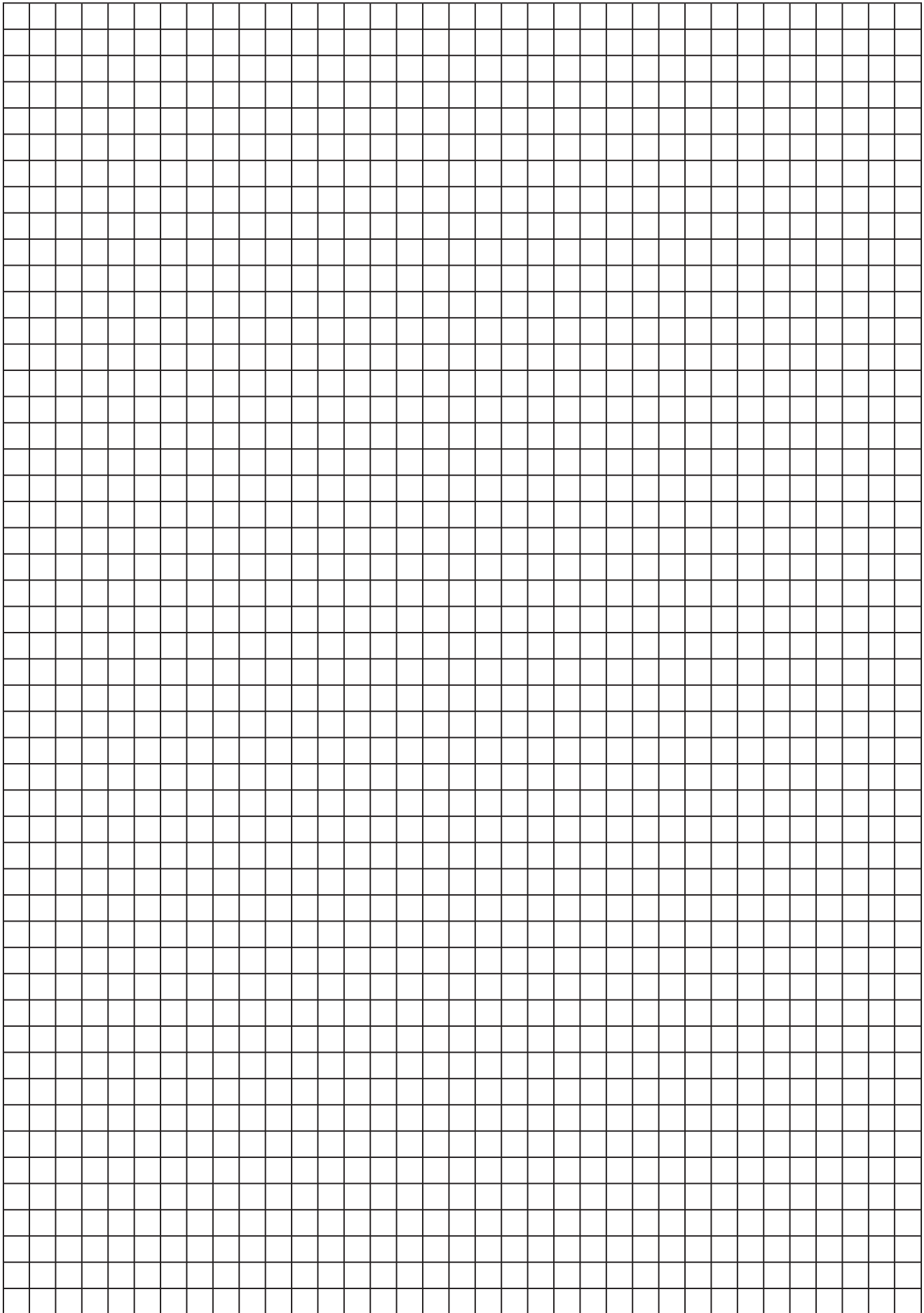
Scrap Graph Paper — This sheet will *not* be scored.

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INTEGRATED ALGEBRA

Friday, June 18, 2010—1:15 to 4:15 p.m., only

ANSWER SHEET

Student Sex: Male Female Grade

Teacher School

Your answers to Part I should be recorded on this answer sheet.

Part I

Answer all 30 questions in this part.

- 1 9 17 25
2 10 18 26
3 11 19 27
4 12 20 28
5 13 21 29
6 14 22 30
7 15 23
8 16 24

Your answers for Parts II, III, and IV should be written in the test booklet.

The declaration below must be signed when you have completed the examination.

I do hereby affirm, at the close of this examination, that I had no unlawful knowledge of the questions or answers prior to the examination and that I have neither given nor received assistance in answering any of the questions during the examination.

Signature

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INTEGRATED ALGEBRA

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Question	Maximum Credit	Credits Earned	Rater's/Scorer's Initials
Part I 1–30	60		
Part II 31	2		
32	2		
33	2		
Part III 34	3		
35	3		
36	3		
Part IV 37	4		
38	4		
39	4		
Maximum Total	87		

Rater's/Scorer's Name (minimum of three)

Total Raw Score

Checked by

Scale Score
(from conversion chart)

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