The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

INTEGRATED ALGEBRA

Tuesday, January 27, 2015 — 1:15 to 4:15 p.m., only

Student Name:_____

School Name: _____

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…

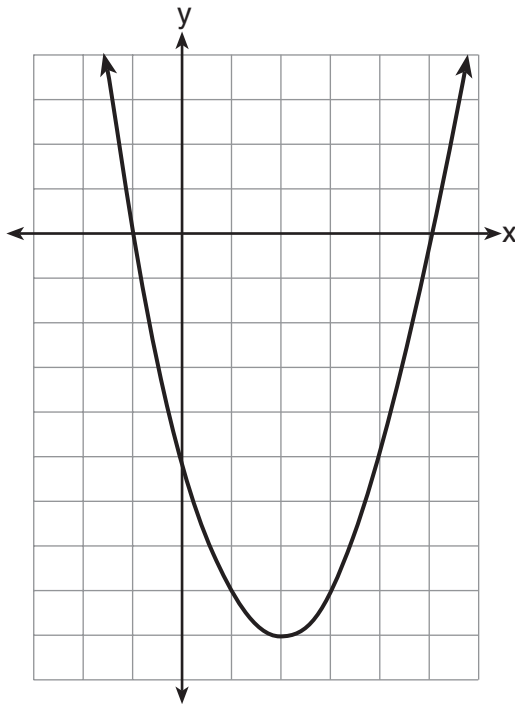A graphing calculator and a straightedge (ruler) must be available for you to use while taking this examination.

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

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]

1 If $A = \{1, 2, 3, 4, 5, 6, 7, 8\}$ and $B = \{2, 4, 6, 8, 10, 12\}$, the intersection of sets A and B is

(1) $\{10, 12\}$ (3) $\{1, 3, 5, 7\}$

(2) $\{2, 4, 6, 8\}$ (4) $\{1, 2, 3, 4, 5, 6, 7, 8, 10, 12\}$

2 What is the value of n in the equation $0.2(n - 6) = 2.8$?

(1) 8   (3) 20

(2) 2   (4) 44

3 The expression $\dfrac{24x^6y^3}{-6x^3y}$ is equivalent to

(1) $-4x^2y^3$ (3) $-4x^9y^4$

(2) $-4x^3y^3$ (4) $-4x^3y^2$

4 Which situation is represented by bivariate data?

(1) A student lists her algebra quiz grades for one month.

(2) A wrestler records his weight before each match.

(3) A musician writes down how many minutes she practices her instrument each day.

(4) An ice cream vendor tracks the daily high temperature and how many ice cream bars he sells each day.

5 A cylinder has a circular base with a radius of 3 units and a height of 7 units. What is the volume of the cylinder in cubic units?

(1) 2π (3) 63π

(2) 42π (4) 147π

6 The graph of $f(x)$ is shown below.

Based on this graph, what are the roots of the equation $f(x) = 0$?

(1) 1 and -5 (3) 2 and -9

(2) -1 and 5   (4) -1 and -5 and 5

7 Jose wants to ride his bike a total of 50 miles this weekend. If he rides m miles on Saturday, which expression represents the number of miles he must ride on Sunday?

(1) $m - 50$ (3) $50 - m$

(2) $m + 50$ (4) $50m$

8 Four students are playing a math game at home. One of the math game questions asked them to write an algebraic equation.

$$\text{Brandon wrote: } 3(5x - 0)$$
$$\text{William wrote: } 7 < 2(6 + x)$$
$$\text{Alice wrote: } 15x$$
$$\text{Kayla wrote: } 11 = 2x + 3$$

Which student wrote an algebraic equation?

(1) Brandon   (3) Alice

(2) William   (4) Kayla

9 A student spent 15 minutes painting a 2-foot by 3-foot bulletin board. To the *nearest tenth of a minute*, how long did it take the student to paint 1 square foot?

(1) 0.4   (3) 2.5

(2) 1.5   (4) 3.5

10 What is an equation of the line that passes through the points $(2,1)$ and $(6,-5)$?

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

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

11 What is $\frac{10}{7x} - \frac{3}{5x}$ expressed in simplest form?

(1) $\frac{7}{2x}$ (3) $\frac{29}{35x}$

(2) $\frac{29}{2x}$ (4) $\frac{55}{35x}$

12 In the box-and-whisker plot below, what is the 2nd quartile?

(1) 25   (3) 45

(2) 30   (4) 50

13 The length of a rectangle is three feet less than twice its width. If x represents the width of the rectangle, in feet, which inequality represents the area of the rectangle that is *at most* 30 square feet?

(1) $x(2x - 3) \leq 30$ (3) $x(3 - 2x) \leq 30$

(2) $x(2x - 3) \geq 30$ (4) $x(3 - 2x) \geq 30$

14 Which set is a function?

(1) {(3,4), (3,5), (3,6), (3,7)}   (3) {(6,7), (7,8), (8,9), (6,5)}

(2) {(1,2), (3,4), (4,3), (2,1)}   (4) {(0,2), (3,4), (0,8), (5,6)}

15 The weights of 40 students were recorded. If the 75th percentile of their weights was 140 pounds, what is the total number of students who weighed *more than* 140 pounds?

(1) 10   (3) 30

(2) 20   (4) 4

16 What is the slope of the line represented by the equation $4x + 3y = 7$?

(1) $\dfrac{7}{4}$ (3) $-\dfrac{3}{4}$

(2) $\dfrac{7}{3}$ (4) $-\dfrac{4}{3}$

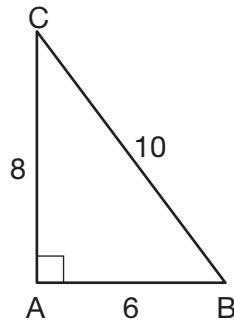**17** What is $\sqrt{150} + \sqrt{24}$ expressed in simplest radical form?

(1) $7\sqrt{6}$ (3) $\sqrt{87}$

(2) $7\sqrt{12}$ (4) $\sqrt{174}$

18 In $\triangle ABC$ below, the measure of $\angle A = 90°$, $AB = 6$, $AC = 8$, and $BC = 10$.

Which ratio represents the sine of $\angle B$?

(1) $\dfrac{10}{8}$ (3) $\dfrac{6}{10}$

(2) $\dfrac{8}{6}$ (4) $\dfrac{8}{10}$

19 The equations $6x + 5y = 300$ and $3x + 7y = 285$ represent the money collected from selling gift baskets in a school fundraising event. If x represents the cost for each snack gift basket and y represents the cost for each chocolate gift basket, what is the cost for each chocolate gift basket?

(1) $20   (3) $30

(2) $25   (4) $54

20 Which equation represents the axis of symmetry of the graph of the equation $y = x^2 + 4x - 5$?

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

(2) $x = 4$ (4) $y = 4$

21 For which value of x is the expression $\dfrac{x+2}{2x-1}$ undefined?

(1) 0   (3) $-\dfrac{1}{2}$

(2) -2 (4) $\dfrac{1}{2}$

22 Last year, Nick rode his bicycle a total of 8000 miles. To the *nearest yard,* Nick rode an average of how many yards per day?

| 1 mile = 1760 yards |
| 1 year = 365 days |

(1) 22   (3) 1659

(2) 236   (4) 38,575

23 The set of integers is *not* closed for

(1) division   (3) addition

(2) multiplication   (4) subtraction

24 A model rocket is launched into the air from ground level. The height, in feet, is modeled by $p(x) = -16x^2 + 32x$, where x is the number of elapsed seconds. What is the total number of seconds the model rocket will be in the air?
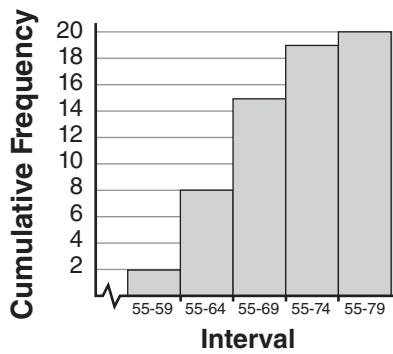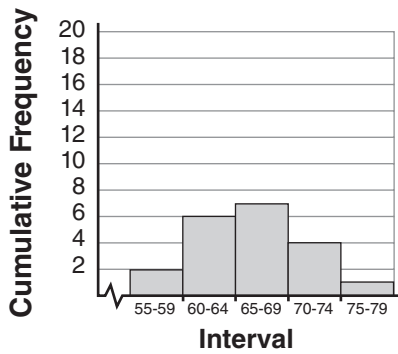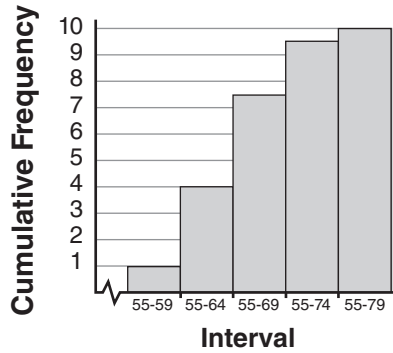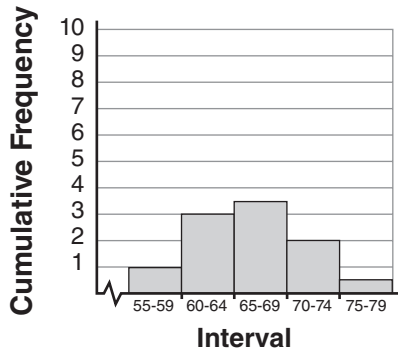
(1) 1   (3) 0

(2) 2   (4) 16

25 The diagram below shows the path a bird flies from the top of a 9.5-foot-tall sunflower to a point on the ground 5 feet from the base of the sunflower.

To the *nearest tenth of a degree*, what is the measure of angle x?

(1) 27.8   (3) 58.2

(2) 31.8   (4) 62.2

26 Which set of numbers represents the lengths of the sides of a right triangle?

(1) {7, 24, 25}   (3) {10, 12, 14}

(2) {9, 16, 23}   (4) {14, 16, 18}

27 How many different seven-letter arrangements of the letters in the word *HEXAGON* can be made if each letter is used only once?

(1) 28   (3) 720

(2) 49   (4) 5040

28 Three students each rolled a wooden cube with faces painted red, white, and blue. The color of the top face is recorded each time the cube is rolled. The table below shows the results.

Student	Number of Rolls	Red	White	Blue
1	30	11	7	12
2	50	19	11	20
3	20	8	4	8

If a fourth student rolled the cube 75 times, based on these experimental data, approximately how many times can the cube be expected to land with blue on top?

(1) 25   (3) 35

(2) 30   (4) 40

29 Dominick graphs the equation $y = a|x|$ where a is a positive integer. If Gina multiplies a by -3, the new graph will become

(1) narrower and open downward

(2) narrower and open upward

(3) wider and open downward

(4) wider and open upward

30 Mr. Suppe recorded the height, in inches, of each student in his class. The results are recorded in the table below.

60	59	70	65	64
61	58	72	75	66
65	67	63	62	68
68	69	74	61	70

Which cumulative frequency histogram represents the data?

(1)

(3)

(2)

(4)

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]
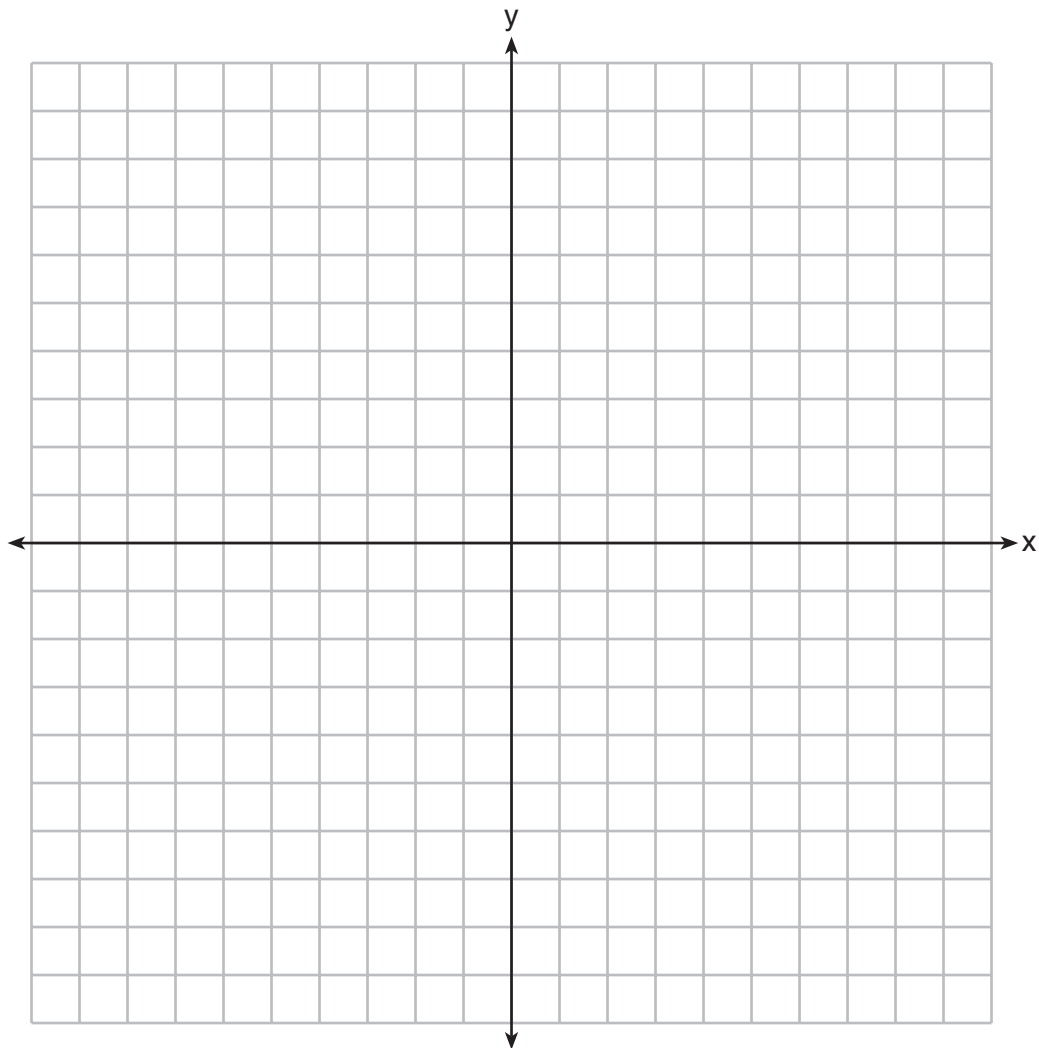
31 As shown in the diagram below, a ladder 12 feet long leans against a wall and makes an angle of 72° with the ground.

Find, to the *nearest tenth of a foot,* the distance from the wall to the base of the ladder.

32 Carla bought a dress at a sale for 20% off the original price. The sale price of the dress was $28.80. Find the original price of the dress, in dollars.

33 The probability that a student owns a dog is $\frac{1}{3}$. The probability that the same student owns a dog and a cat is $\frac{2}{15}$. Determine the probability that the student owns a cat.

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 A DVD costs twice as much as a music CD. Jack buys 2 DVDs and 2 CDs and spends $45. Determine how much one CD costs, in dollars. [Only an algebraic solution can receive full credit.]

35 Noj has the following test scores:

$$76, 84, 69, 74, 91$$

His teacher will allow him to retake the test on which he scored lowest. Noj wants an average of *at least* 82. Determine the *least* number of additional points Noj must score on the retest.

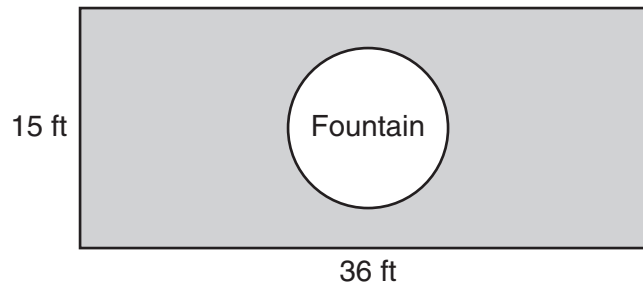**36** Graph $y < x$ and $x > 5$ on the axes below.

State the coordinates of a point in the solution set.

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 The Rock Solid Concrete Company has been asked to pave a rectangular area surrounding a circular fountain with a diameter of 8 feet, as shown in the diagram.

15 ft

Fountain

36 ft

Find the area, to the *nearest square foot*, that must be paved.

Find the cost, *in dollars*, of paving the area if the Rock Solid Concrete Company charges $8.95 per square foot.

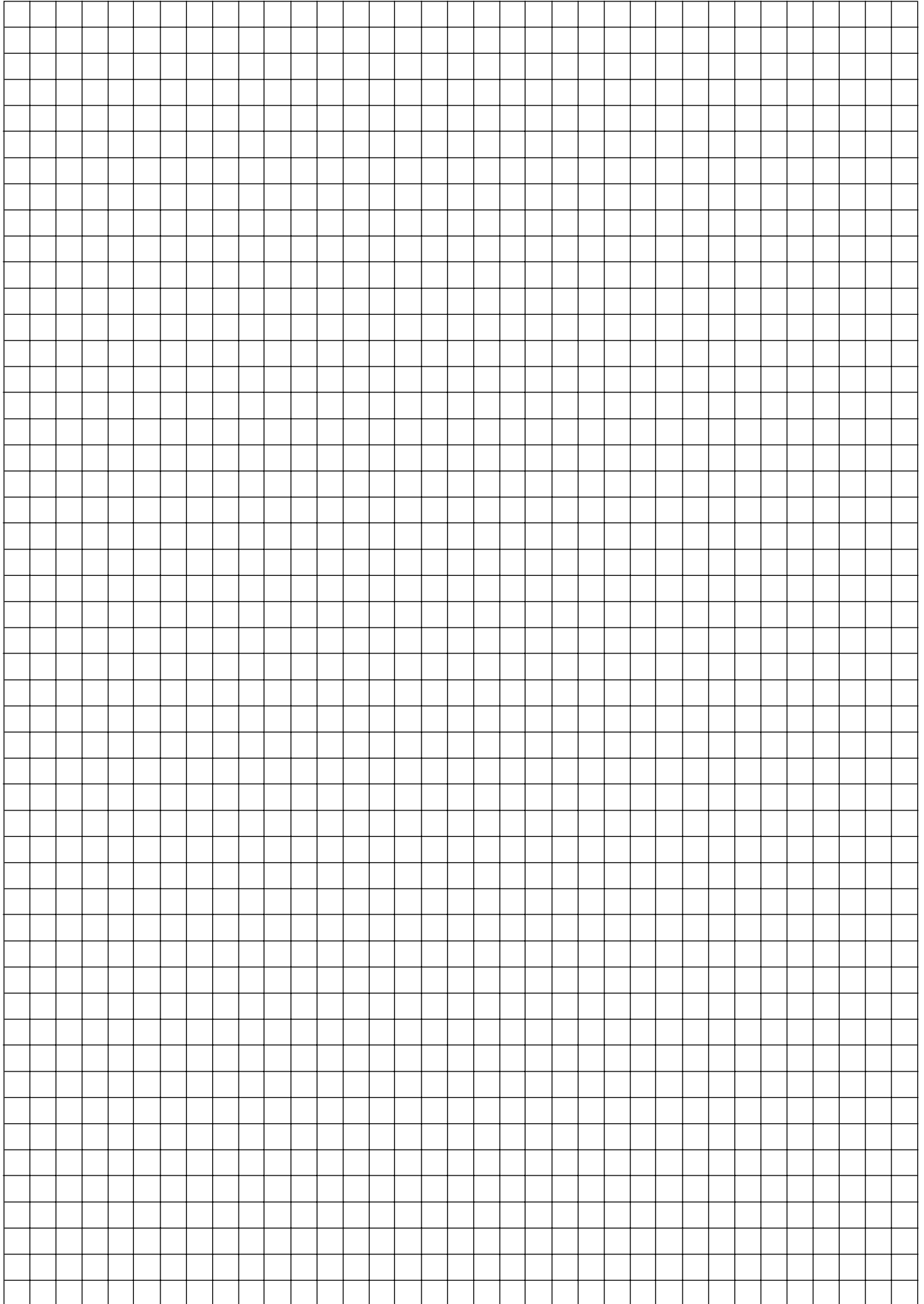**38** Solve the following system of equations algebraically:

$$y = x^2 + 5x - 17$$
$$y = x - 5$$

39 Perform the indicated operations and express the result in simplest form:

$$\left(\frac{10x^2y}{x^2 + xy} \right) \bullet \left(\frac{\left(x + y\right)^2}{2x} \right) \div \left(\frac{x^2 - y^2}{5y^2} \right)$$
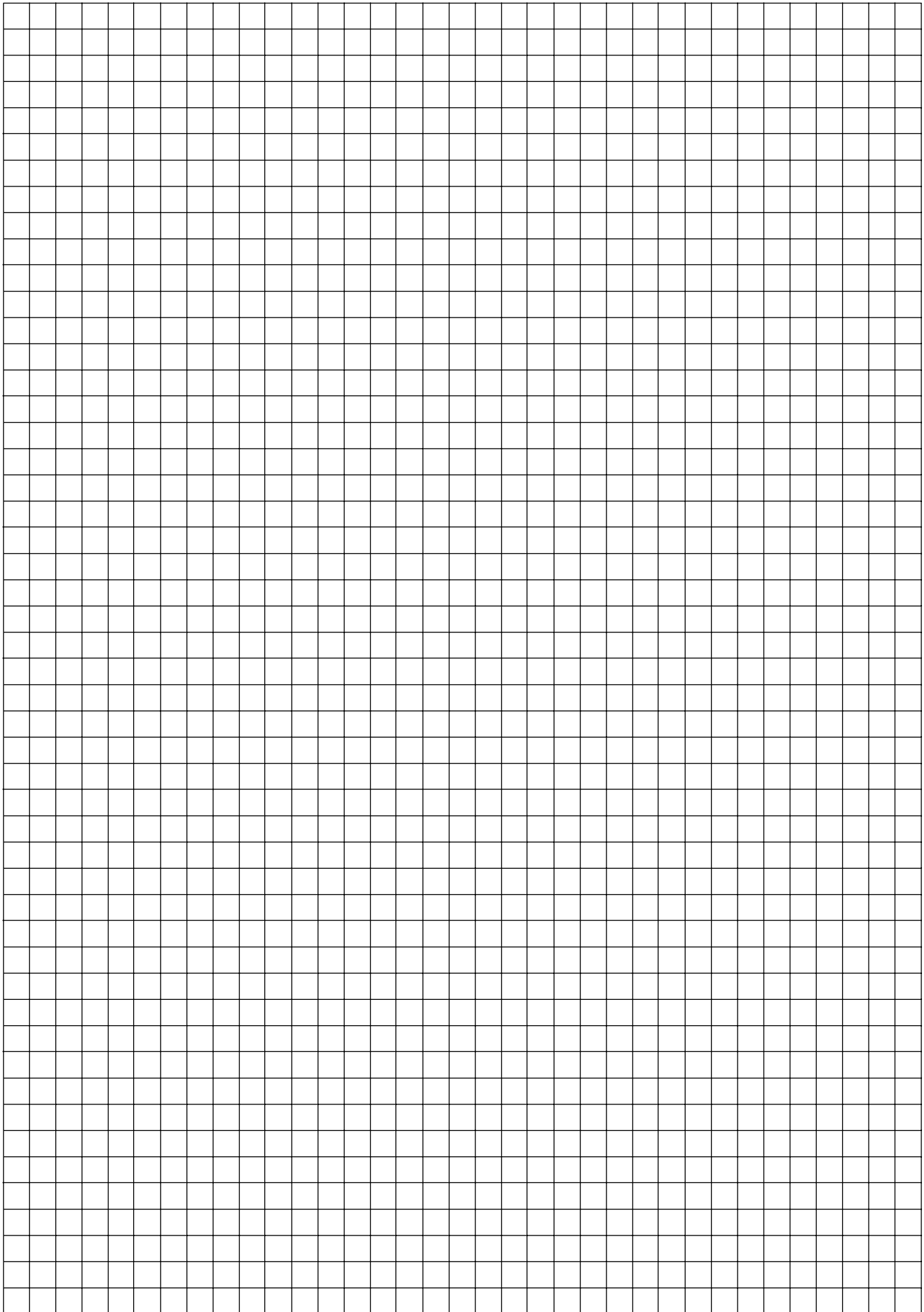
Reference Sheet

Trigonometric Ratios	$\sin A = \dfrac{opposite}{hypotenuse}$
	$\cos A = \dfrac{adjacent}{hypotenuse}$
	$\tan A = \dfrac{opposite}{adjacent}$

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

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