

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

# INTEGRATED ALGEBRA

Friday, June 20, 2014 — 9:15 a.m. to 12:15 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]

Use this space for computations.

1 The product of  $6x^3y^3$  and  $2x^2y$  is

(1)  $3xy^2$

(3)  $12x^5y^4$

(2)  $8x^5y^4$

(4)  $12x^6y^3$

2 Which set of data is qualitative?

(1) laps swum in a race

(2) number of swimmers on the team

(3) swimmers' favorite swimsuit colors

(4) temperature in Fahrenheit of the water in a pool

3 It takes a snail 500 hours to travel 15 miles. At this rate, how many hours will it take the snail to travel 6 miles?

(1) 0.18

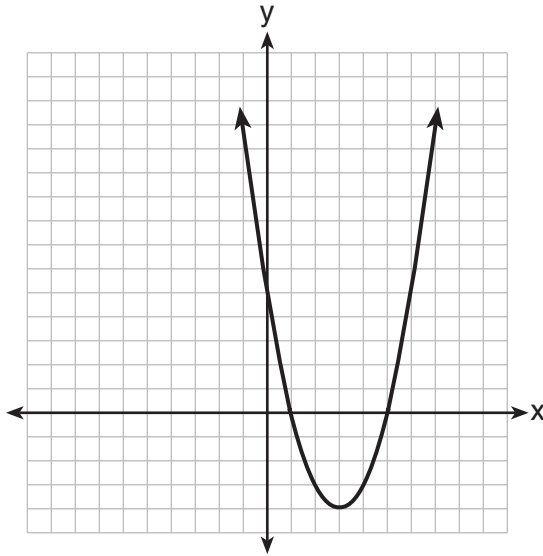
(3) 150

(2) 5.56

(4) 200

Use this space for computations.

4 The equation  $y = ax^2 + bx + c$  is graphed on the set of axes below.



Based on the graph, what are the roots of the equation  $ax^2 + bx + c = 0$ ?

- (1) 0 and 5
- (2) 1 and 0
- (3) 1 and 5
- (4) 3 and -4

5 When solving for the value of  $x$  in the equation  $4(x - 1) + 3 = 18$ , Aaron wrote the following lines on the board.

- [line 1]  $4(x - 1) + 3 = 18$
- [line 2]  $4(x - 1) = 15$
- [line 3]  $4x - 1 = 15$
- [line 4]  $4x = 16$
- [line 5]  $x = 4$

Which property was used *incorrectly* when going from line 2 to line 3?

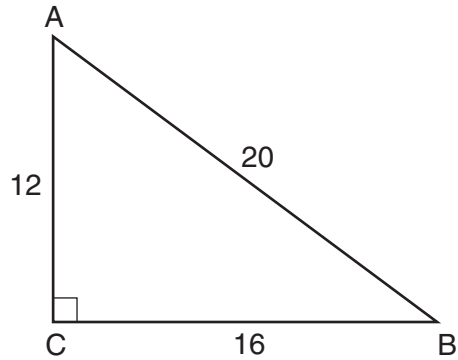
- (1) distributive
- (2) commutative
- (3) associative
- (4) multiplicative inverse





**Use this space for  
computations.**

- 17** In right triangle  $ABC$  shown below,  $AC = 12$ ,  $BC = 16$ , and  $AB = 20$ .



Which equation is *not* correct?

(1)  $\cos A = \frac{12}{20}$

(3)  $\sin B = \frac{12}{20}$

(2)  $\tan A = \frac{16}{12}$

(4)  $\tan B = \frac{16}{20}$

- 18** Three times the sum of a number and four is equal to five times the number, decreased by two. If  $x$  represents the number, which equation is a correct translation of the statement?

(1)  $3(x + 4) = 5x - 2$

(3)  $3x + 4 = 5x - 2$

(2)  $3(x + 4) = 5(x - 2)$

(4)  $3x + 4 = 5(x - 2)$

- 19** What is the equation of the line that passes through the point  $(3, -7)$  and has a slope of  $-\frac{4}{3}$ ?

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

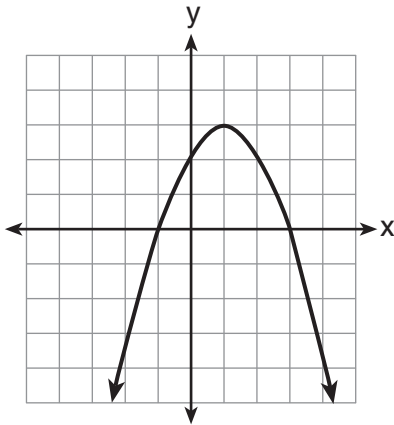
(3)  $y = \frac{37}{3}x - \frac{4}{3}$

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

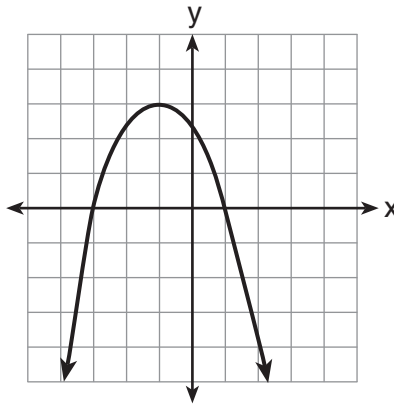
(4)  $y = -\frac{59}{9}x - \frac{4}{3}$

Use this space for computations.

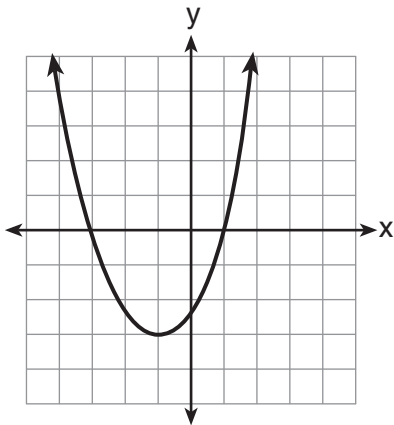
20 Which parabola has an axis of symmetry of  $x = 1$ ?



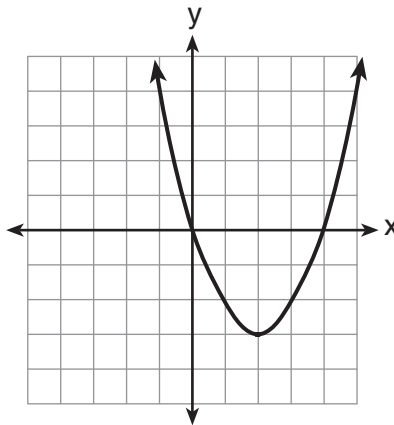
(1)



(3)



(2)



(4)

21 When factored completely, the expression  $3x^2 - 9x + 6$  is equivalent to

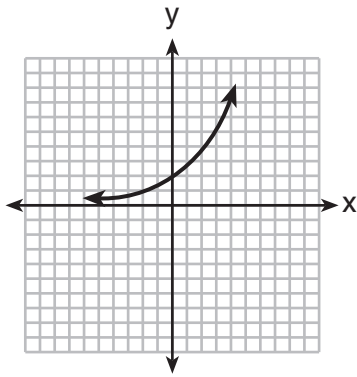
- (1)  $(3x - 3)(x - 2)$                       (3)  $3(x + 1)(x - 2)$   
(2)  $(3x + 3)(x - 2)$                       (4)  $3(x - 1)(x - 2)$

22 The equation  $P = 0.0089t^2 + 1.1149t + 78.4491$  models the United States population,  $P$ , in millions since 1900. If  $t$  represents the number of years after 1900, then what is the estimated population in 2025 to the nearest tenth of a million?

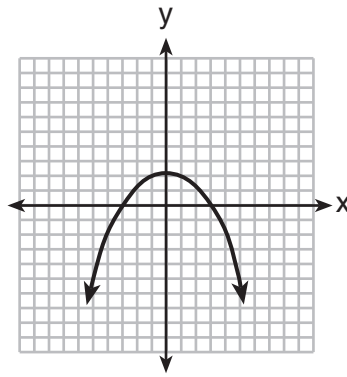
- (1) 217.8                                      (3) 343.9  
(2) 219.0                                      (4) 356.9

Use this space for computations.

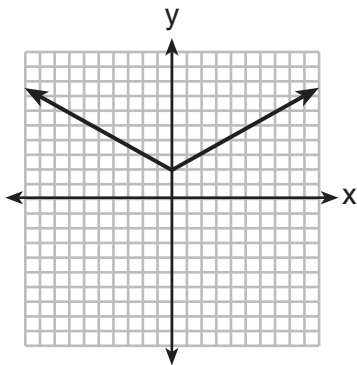
23 Which graph represents an absolute value equation?



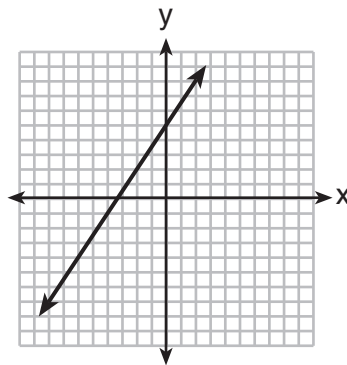
(1)



(3)



(2)



(4)

24 The expression  $\frac{a}{b} - \frac{1}{3}$  is equivalent to

(1)  $\frac{a-1}{b-3}$

(3)  $\frac{3a-b}{3b}$

(2)  $\frac{a-1}{3b}$

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

25 Which value of  $x$  is the solution of the equation  $2(x - 4) + 7 = 3$ ?

(1) 1

(3) 6

(2) 2

(4) 0

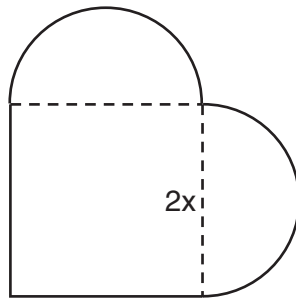




## Part II

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]

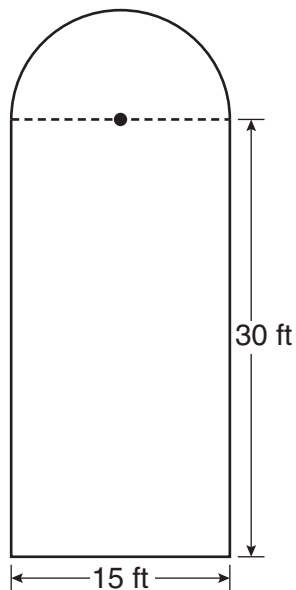
- 31 A patio consisting of two semicircles and a square is shown in the diagram below. The length of each side of the square region is represented by  $2x$ . Write an expression for the area of the entire patio, in terms of  $x$  and  $\pi$ .



**32** Clayton is performing some probability experiments consisting of flipping three fair coins.

What is the probability that when Clayton flips the three coins, he gets two tails and one head?

**33** Ross is installing edging around his pool, which consists of a rectangle and a semicircle, as shown in the diagram below.



Determine the length of edging, to the *nearest tenth of a foot*, that Ross will need to go completely around the pool.

### 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 Solve the following system of equations algebraically for all values of  $x$  and  $y$ .

$$y = x^2 + 2x - 8$$

$$y = 2x + 1$$

**35** A storage container in the form of a rectangular prism is measured to be 12 inches by 8 inches by 4 inches. Its actual measurements are 11.75 inches by 7.75 inches by 4 inches. Find the relative error in calculating the volume of the container, to the *nearest thousandth*.

**36** Perform the indicated operations and express the answer in simplest radical form.

$$3\sqrt{7}(\sqrt{14} + 4\sqrt{56})$$

#### 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** During its first week of business, a market sold a total of 108 apples and oranges. The second week, five times the number of apples and three times the number of oranges were sold. A total of 452 apples and oranges were sold during the second week. Determine how many apples and how many oranges were sold the *first* week. [Only an algebraic solution can receive full credit.]

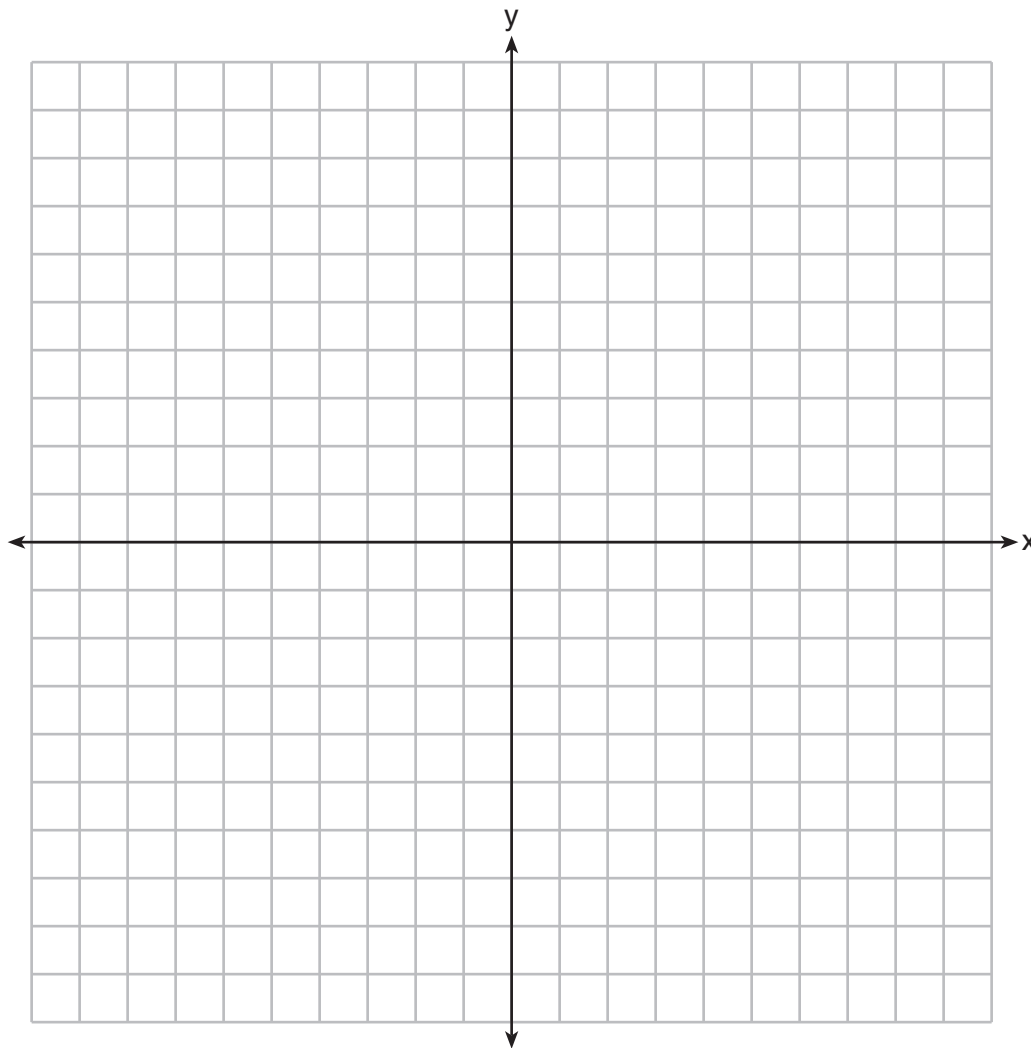


38 On the set of axes below, solve the following system of inequalities graphically.

Label the solution set  $S$ .

$$2x + 3y < -3$$

$$y - 4x \geq 2$$



**39** During the last 15 years of his baseball career, Andrew hit the following number of home runs each season.

35, 24, 32, 36, 40, 32, 40, 38, 36, 33, 11, 20, 19, 22, 8

State and label the values of the minimum, 1st quartile, median, 3rd quartile, and maximum.

Using the line below, construct a box-and-whisker plot for this set of data.

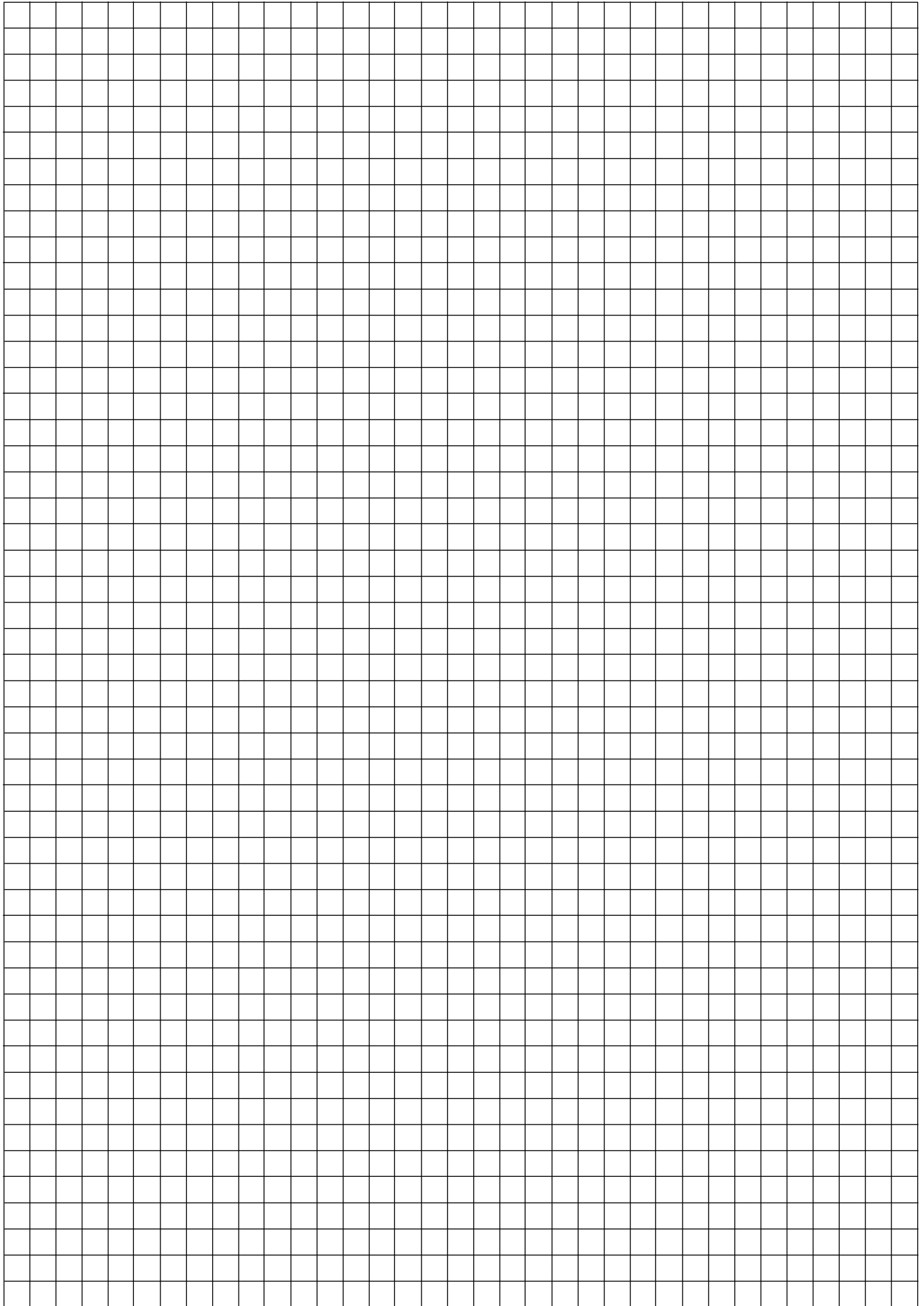






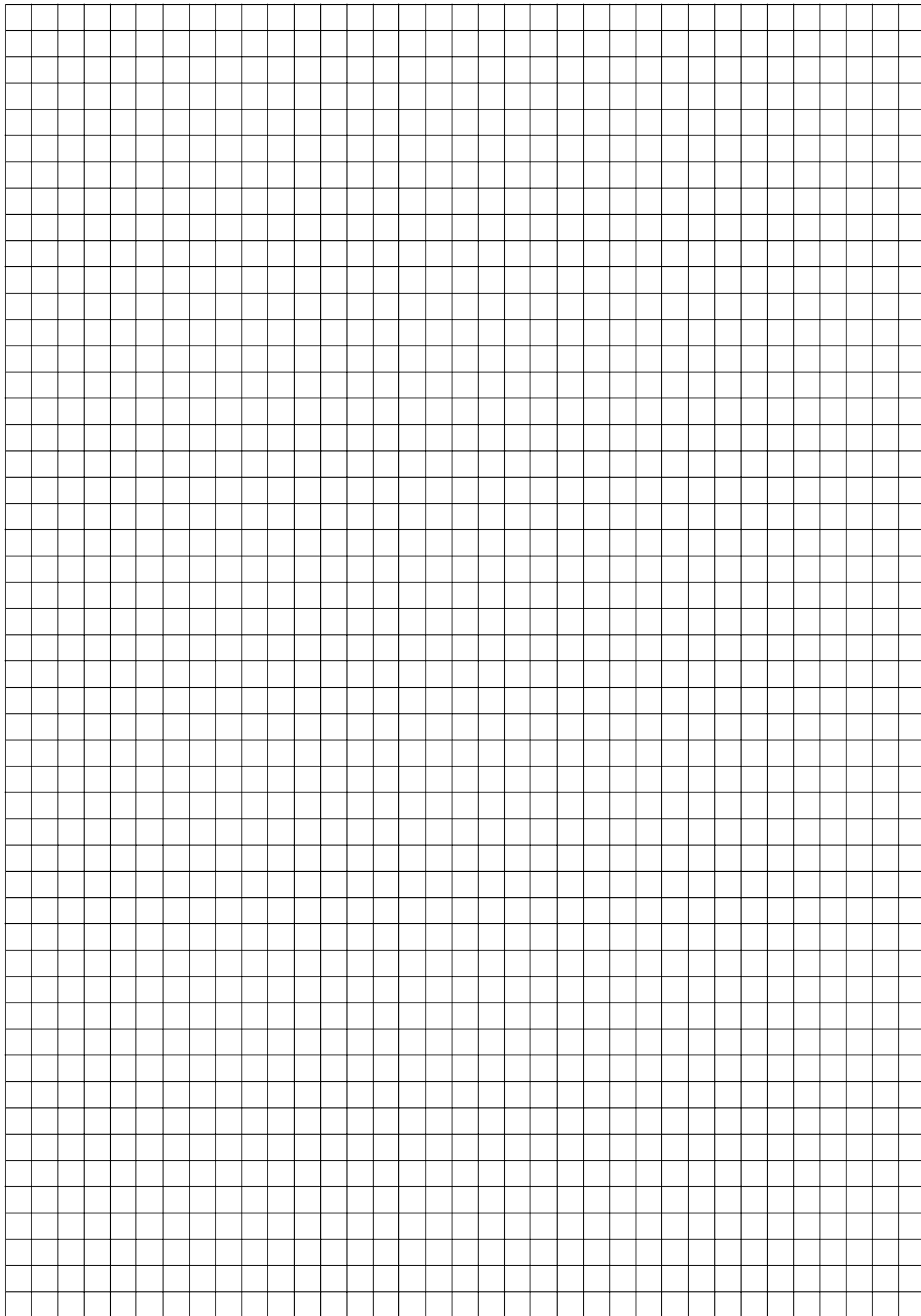
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## Reference Sheet

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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