

# INTEGRATED ALGEBRA

Thursday, June 14, 2012 — 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.

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.

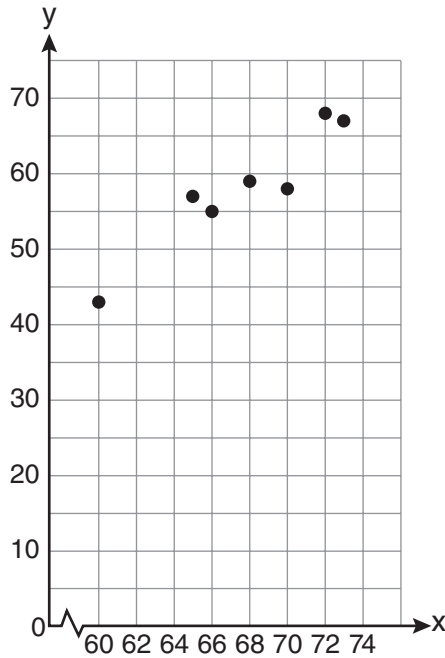
The use of any communications device is strictly prohibited when taking this examination. If you use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.

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



**Use this space for  
computations.**

**5** A set of data is graphed on the scatter plot below.



This scatter plot shows

- (1) no correlation
- (2) positive correlation
- (3) negative correlation
- (4) undefined correlation

**6** Which situation is an example of bivariate data?

- (1) the number of pizzas Tanya eats during her years in high school
- (2) the number of times Ezra puts air in his bicycle tires during the summer
- (3) the number of home runs Elias hits per game and the number of hours he practices baseball
- (4) the number of hours Nellie studies for her mathematics tests during the first half of the school year

Use this space for computations.

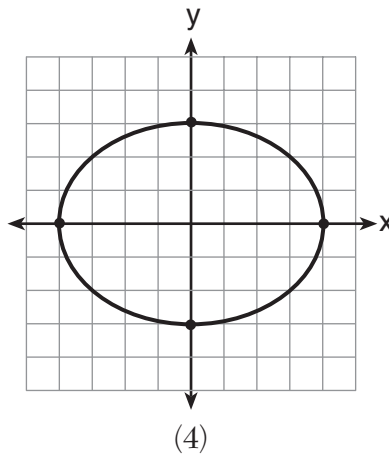
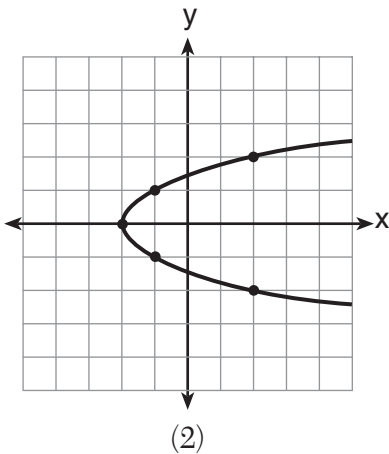
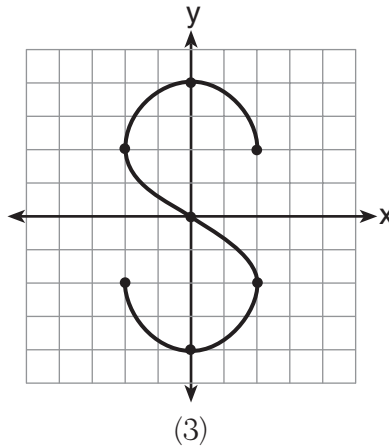
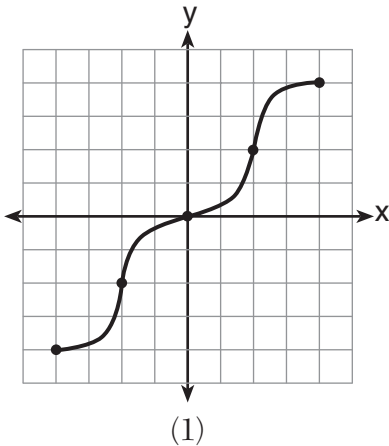
7 Brianna's score on a national math assessment exceeded the scores of 95,000 of the 125,000 students who took the assessment. What was her percentile rank?

- (1) 6
- (2) 24
- (3) 31
- (4) 76

8 If  $A = \{0, 1, 3, 4, 6, 7\}$ ,  $B = \{0, 2, 3, 5, 6\}$ , and  $C = \{0, 1, 4, 6, 7\}$ , then  $A \cap B \cap C$  is

- (1)  $\{0, 1, 2, 3, 4, 5, 6, 7\}$
- (2)  $\{0, 3, 6\}$
- (3)  $\{0, 6\}$
- (4)  $\{0\}$

9 Which graph represents a function?



**Use this space for  
computations.**

**10** What is the product of  $(3x + 2)$  and  $(x - 7)$ ?

(1)  $3x^2 - 14$

(3)  $3x^2 - 19x - 14$

(2)  $3x^2 - 5x - 14$

(4)  $3x^2 - 23x - 14$

**11** If five times a number is less than 55, what is the greatest possible integer value of the number?

(1) 12

(3) 10

(2) 11

(4) 9

**12** The line represented by the equation  $2y - 3x = 4$  has a slope of

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

(3) 3

(2) 2

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

**13** What is the solution set of the system of equations  $x + y = 5$  and  $y = x^2 - 25$ ?

(1)  $\{(0,5), (11,-6)\}$

(3)  $\{(-5,0), (6,11)\}$

(2)  $\{(5,0), (-6,11)\}$

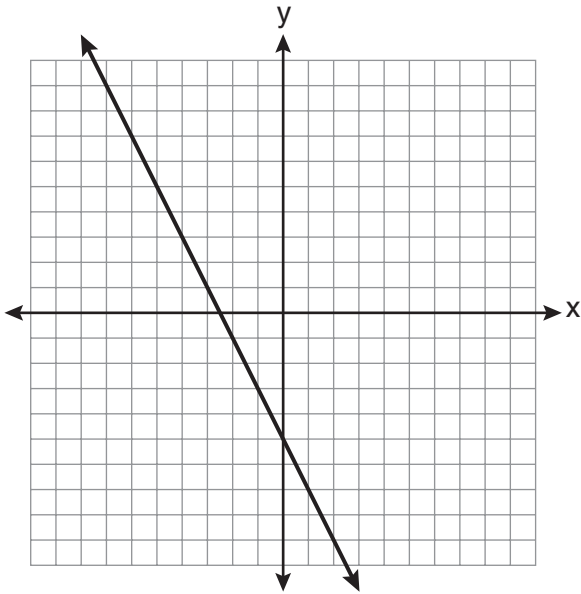
(4)  $\{(-5,10), (6,-1)\}$





Use this space for  
computations.

21 Which equation is represented by the graph below?



(1)  $2y + x = 10$

(3)  $-2y = 10x - 4$

(2)  $y - 2x = -5$

(4)  $2y = -4x - 10$

22 Which coordinates represent a point in the solution set of the system of inequalities shown below?

$$y \leq \frac{1}{2}x + 13$$

$$4x + 2y > 3$$

(1)  $(-4, 1)$

(3)  $(1, -4)$

(2)  $(-2, 2)$

(4)  $(2, -2)$





**Use this space for  
computations.**

**27** Factored completely, the expression  $3x^3 - 33x^2 + 90x$  is equivalent to

- (1)  $3x(x^2 - 33x + 90)$                       (3)  $3x(x + 5)(x + 6)$   
(2)  $3x(x^2 - 11x + 30)$                       (4)  $3x(x - 5)(x - 6)$

**28** Elizabeth is baking chocolate chip cookies. A single batch uses  $\frac{3}{4}$  teaspoon of vanilla. If Elizabeth is mixing the ingredients for five batches at the same time, how many tablespoons of vanilla will she use?

$3 \text{ teaspoons} = 1 \text{ tablespoon}$
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- (1)  $1\frac{1}{4}$     (3)  $3\frac{3}{4}$   
(2)  $1\frac{3}{4}$     (4)  $5\frac{3}{4}$

**29** A car depreciates (loses value) at a rate of 4.5% annually. Greg purchased a car for \$12,500. Which equation can be used to determine the value of the car,  $V$ , after 5 years?

- (1)  $V = 12,500(0.55)^5$                       (3)  $V = 12,500(1.045)^5$   
(2)  $V = 12,500(0.955)^5$                       (4)  $V = 12,500(1.45)^5$

**Use this space for  
computations.**

**30** The cumulative frequency table below shows the length of time that 30 students spent text messaging on a weekend.

<b>Minutes Used</b>	<b>Cumulative Frequency</b>
31–40	2
31–50	5
31–60	10
31–70	19
31–80	30

Which 10-minute interval contains the first quartile?

- (1) 31–40                      (3) 51–60  
(2) 41–50                      (4) 61–70
-

## 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 Solve the following system of equations algebraically for  $y$ :

$$2x + 2y = 9$$

$$2x - y = 3$$

**32** Three storage bins contain colored blocks. Bin 1 contains 15 red and 14 blue blocks. Bin 2 contains 16 white and 15 blue blocks. Bin 3 contains 15 red and 15 white blocks. All of the blocks from the three bins are placed into one box.

If one block is randomly selected from the box, which color block would most likely be picked? Justify your answer.

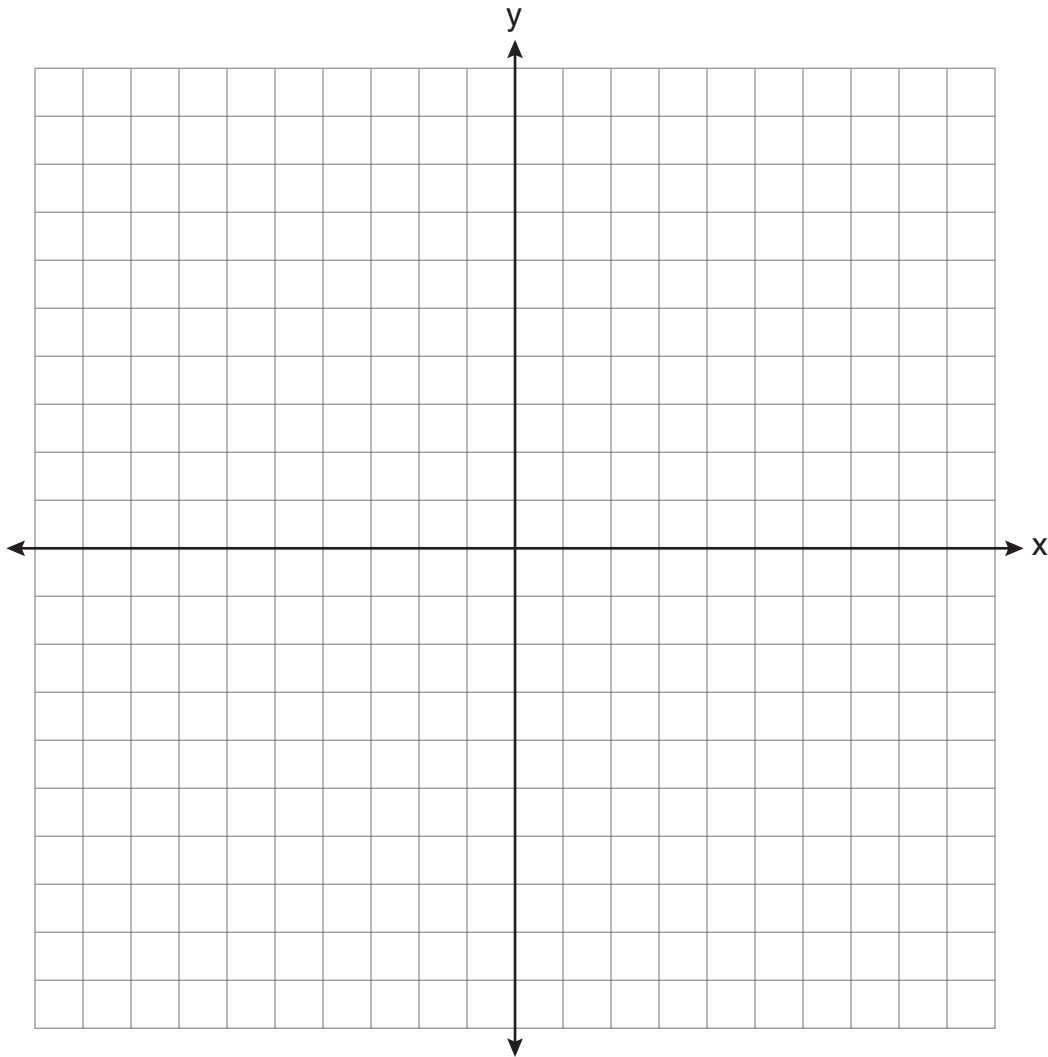
**33** Students calculated the area of a playing field to be 8,100 square feet. The actual area of the field is 7,678.5 square feet. Find the relative error in the area, to the *nearest thousandth*.

### 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 On the set of axes below, graph the equation  $y = x^2 + 2x - 8$ .

Using the graph, determine and state the roots of the equation  $x^2 + 2x - 8 = 0$ .



**35** A 28-foot ladder is leaning against a house. The bottom of the ladder is 6 feet from the base of the house. Find the measure of the angle formed by the ladder and the ground, to the *nearest degree*.



**36** Express  $\frac{3\sqrt{75} + \sqrt{27}}{3}$  in simplest radical form.

#### 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 Mike buys his ice cream packed in a rectangular prism-shaped carton, while Carol buys hers in a cylindrical-shaped carton. The dimensions of the prism are 5 inches by 3.5 inches by 7 inches. The cylinder has a diameter of 5 inches and a height of 7 inches.

Which container holds more ice cream? Justify your answer.

Determine, to the *nearest tenth of a cubic inch*, how much *more* ice cream the larger container holds.

**38** Solve algebraically for  $x$ :  $3(x + 1) - 5x = 12 - (6x - 7)$

**39** A large company must chose between two types of passwords to log on to a computer. The first type is a four-letter password using any of the 26 letters of the alphabet, without repetition of letters. The second type is a six-digit password using the digits 0 through 9, with repetition of digits allowed.

Determine the number of possible four-letter passwords.

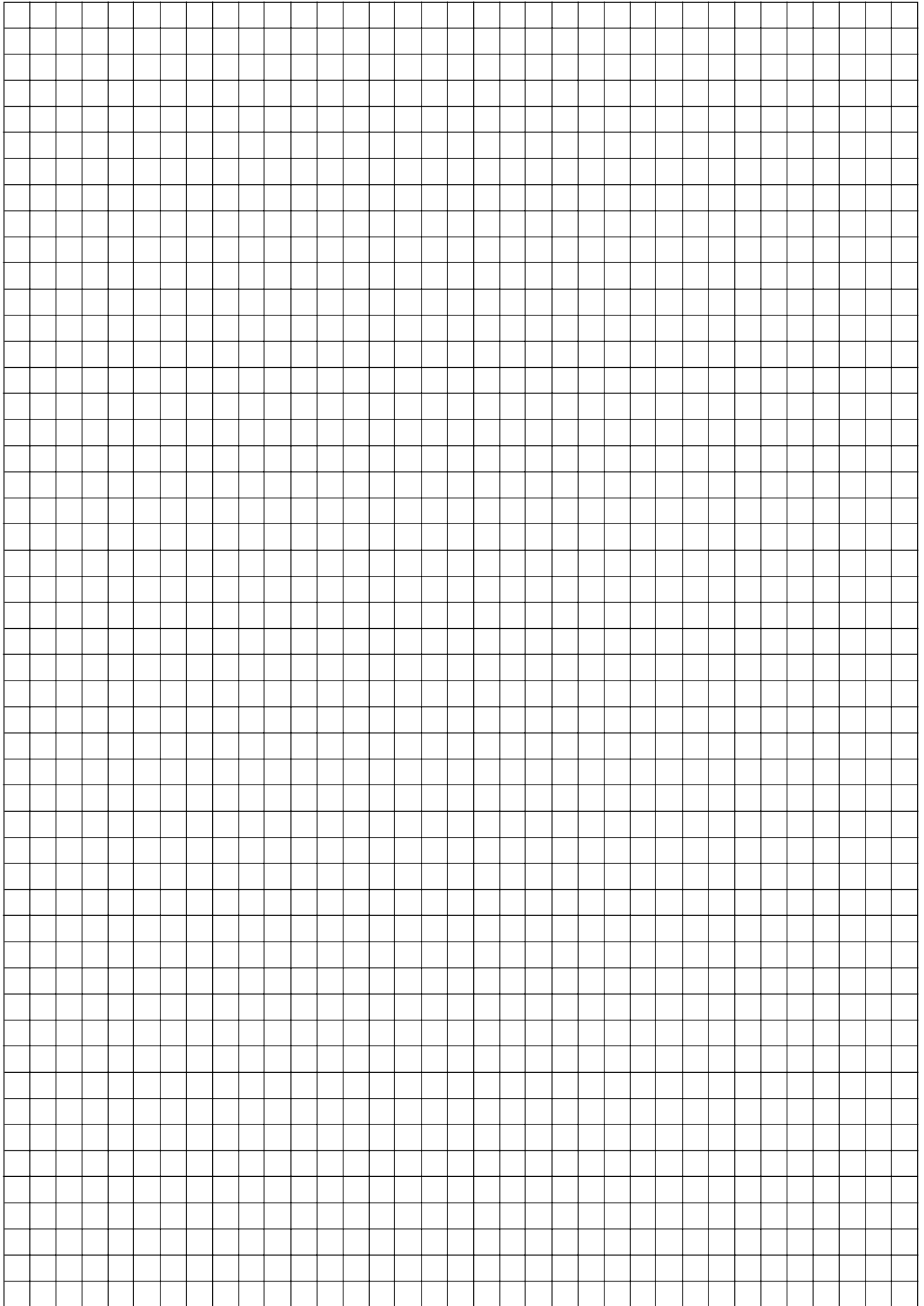
Determine the number of possible six-digit passwords.

The company has 500,000 employees and needs a different password for each employee. State which type of password the company should choose. Explain your answer.

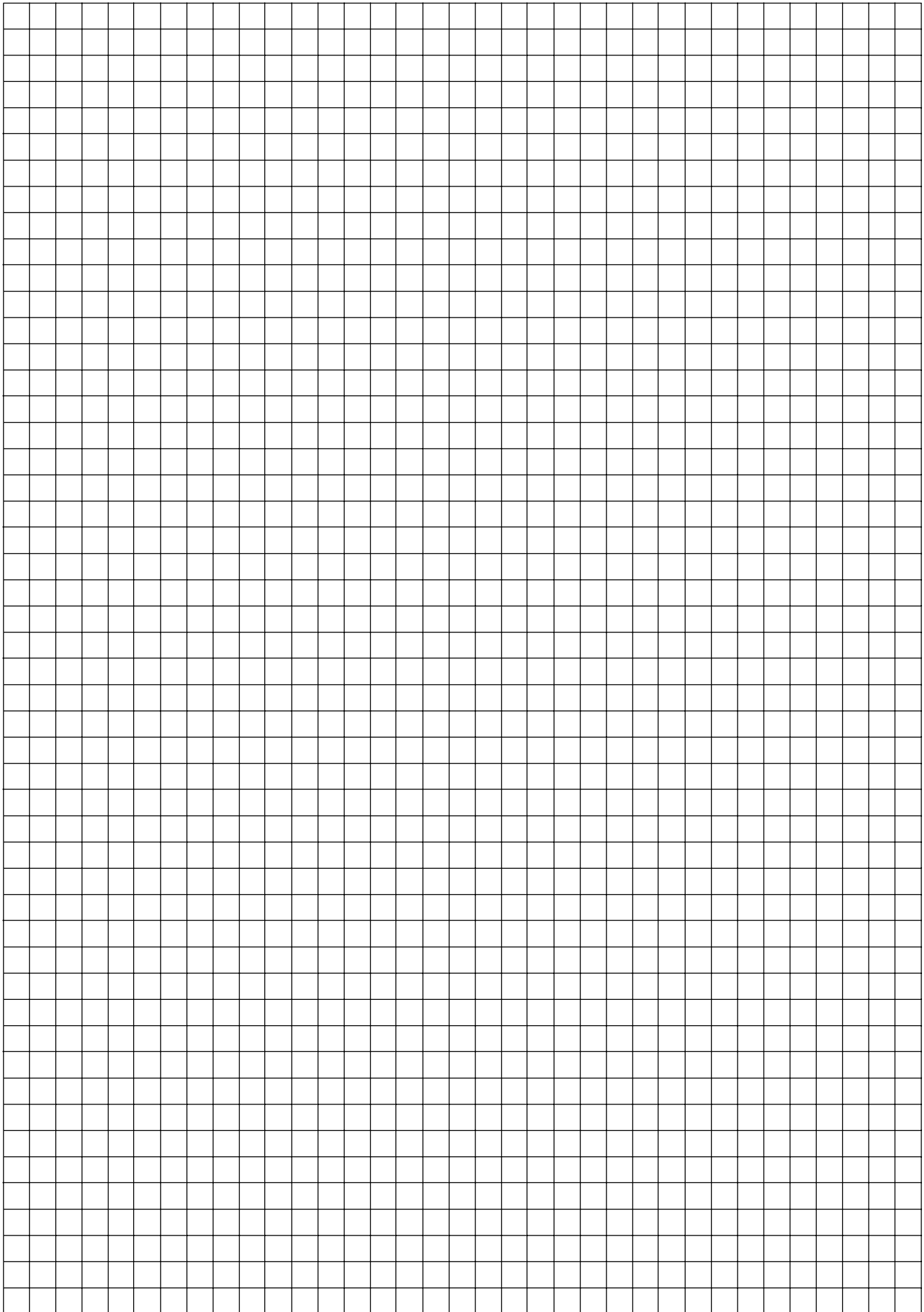
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## Reference Sheet

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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