

**ALGEBRA I****Tuesday, August 18, 2026 — 8:30 to 11:30 a.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 35 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 for graphs and drawings, which should be done in pencil. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale.

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 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Record your answers on your separate answer sheet. [48]

Use this space for
computations.

- 1 The monarch butterfly population doubled every day during the month of June. Which kind of function best describes this situation?

(1) linear (3) exponential growth
(2) quadratic (4) exponential decay

- 2 The solution to $3x - 4 = 2.6x + 8.2$ is

(1) 30.5 (3) 21.5
(2) 10.5 (4) 3.05

- 3 Given: $2x + y = 6$
 $x = 4y + 12$

When solving by substitution, which equation could be a step in solving this system?

(1) $2(4y + 12) + y = 6$ (3) $x = 4(-6 + 2x) + 12$
(2) $2(-4y - 12) + y = 6$ (4) $x = 4(6 + 2x) + 12$

- 4 Which inequality represents 80 *decreased* by a number is *less* than 100?

(1) $80 - n > 100$ (3) $n - 80 < 100$
(2) $80 - n < 100$ (4) $n - 80 > 100$

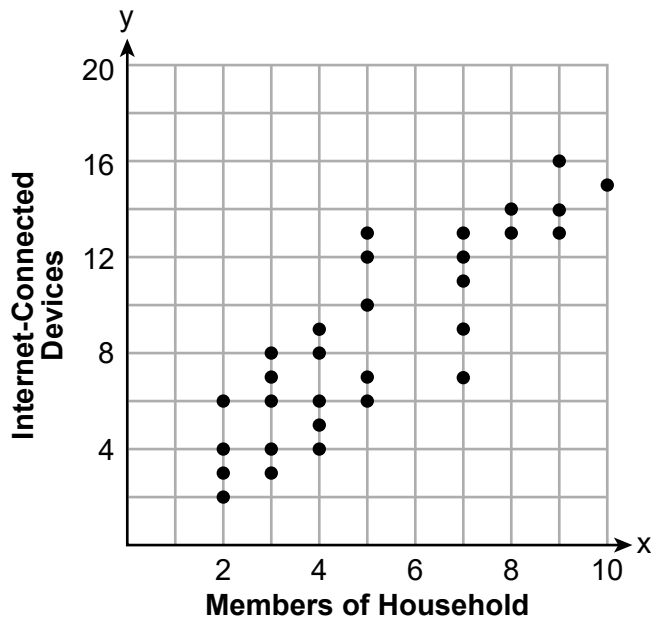
Use this space for
computations.

- 5 Dave bought a new car for \$29,500. As soon as he drove it off the car lot, it began to depreciate in value. He was told that the car's value would continue to decline at an average yearly rate of 17.5% for the first 5 years.

The function $V(t)$ represents the value of Dave's car in t years, where $t \leq 5$. Which function correctly models this situation?

- (1) $V(t) = 29,500(1 + 1.75)^t$ (3) $V(t) = 29,500(1 + 0.175)^t$
(2) $V(t) = 29,500(1 - 1.75)^t$ (4) $V(t) = 29,500(1 - 0.175)^t$
- 6 Which expression is equivalent to $400 - x^2$?
- (1) $(200 - x)(200 + x)$ (3) $(20 - x)(20 + x)$
(2) $(x - 200)(x + 200)$ (4) $(x - 20)(x + 20)$

- 7 The scatter plot below shows the relationship between the number of internet-connected devices and the number of members in a household.



For a household that has six members, what would be the best estimate for the number of internet-connected devices?

- (1) 6 (3) 14
(2) 10 (4) 18

**Use this space for
computations.**

8 What is the equation of the axis of symmetry for $y = -x^2 + 6x$?

(1) $y = 9$

(3) $y = 3$

(2) $x = 9$

(4) $x = 3$

9 The first step in solving a quadratic equation is shown below.

$$x^2 - 2x + 3 = -12$$

$$x^2 - 2x + 15 = 0$$

Which property was used?

(1) additive identity

(2) addition property of equality

(3) commutative property of addition

(4) associative property of addition

10 A fourth-degree polynomial with a leading coefficient of eight and a constant term of twelve written in standard form is

(1) $12 + 5x^2 + 8x^4$

(3) $12 + 6x + 5x^2 + 8x^3$

(2) $8x^4 + 5x^2 + 12$

(4) $8x^3 + 5x^2 + 6x + 12$

11 If $g(x) = x^2 - x$, then what is the value of $g(-4)$?

(1) -20

(3) 12

(2) -12

(4) 20

12 A cookie recipe requires $1\frac{3}{4}$ cups of flour to make 25 cookies. Using the same recipe, how many ounces of flour are needed to make 75 cookies?

[1 cup = 8 ounces]

(1) 10.72

(3) 32.16

(2) 14

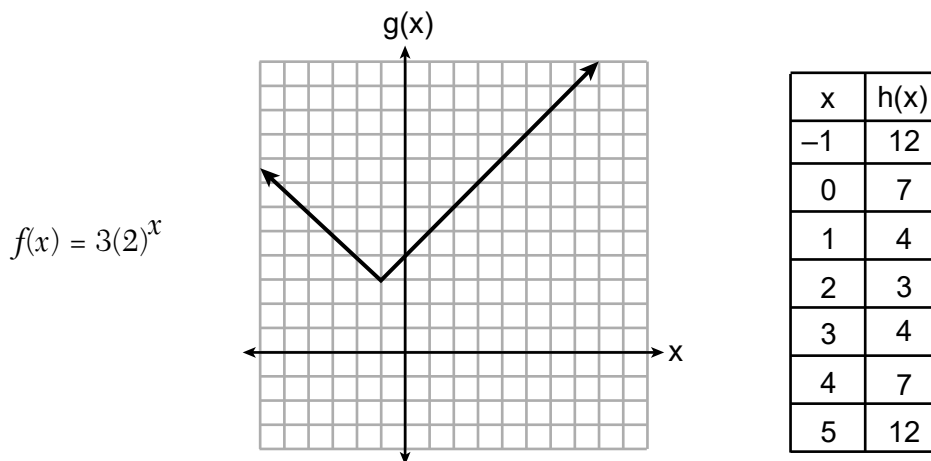
(4) 42

Use this space for
computations.

13 The product of $3\sqrt{7}$ and $\sqrt{7}$ is

- (1) rational, because the product is 21
- (2) rational, because the product of two irrational numbers is always rational
- (3) irrational, because the product of two irrational numbers is always irrational
- (4) irrational, because $\sqrt{7}$ is a nonrepeating, nonterminating decimal

14 Three functions $f(x)$, $g(x)$, and $h(x)$ are shown below.



Which function or functions will always increase over the interval $1 \leq x \leq 4$?

- (1) $g(x)$, only
- (2) $h(x)$, only
- (3) $f(x)$ and $g(x)$
- (4) $f(x)$ and $h(x)$

15 The zeros of $f(x) = x(x + 2)(x - 4)$ are

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

16 Three expressions are shown below.

- I. 2^{x+6}
 II. 4^{x+3}
 III. $16 \cdot 2^{x+2}$

Which of these expressions are equivalent for all values of x ?

- (1) I and II, only (3) II and III, only
 (2) I and III, only (4) I, II, and III

17 When using the method of completing the square to solve $x^2 + 4x - 11 = 0$, which equation is a correct step in the process?

- (1) $(x + 2)^2 = -7$ (3) $(x + 2)^2 = 15$
 (2) $(x - 2)^2 = -7$ (4) $(x - 2)^2 = 15$

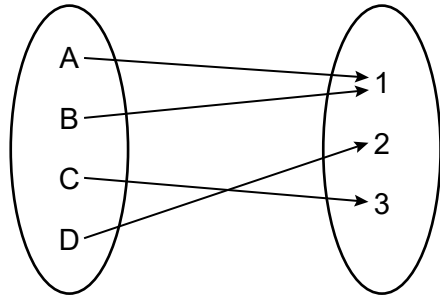
18 George and Henry are in a bowling league. Their top scores from each of the last nine weeks are listed below:

George	198	101	167	202	185	103	192	200	198
Henry	210	126	194	200	172	98	215	114	202

Which statement correctly describes the relationship between George and Henry's bowling scores?

- (1) The standard deviation for George's bowling scores is less than Henry's, but the mean for George's bowling scores is greater than Henry's.
 (2) The standard deviation for George's bowling scores is greater than Henry's, but the mean for George's bowling scores is less than Henry's.
 (3) The standard deviation and mean for George's bowling scores are both less than Henry's.
 (4) The standard deviation and mean for George's bowling scores are both greater than Henry's.

19 The mapping shown below demonstrates a relation.



Which statement about this relation is true?

- (1) It is a function because each element of the domain maps onto only one element of the range.
 - (2) It is a function because each element of the range maps onto only one element of the domain.
 - (3) It is not a function because each element of the domain maps onto only one element of the range.
 - (4) It is not a function because each element of the range maps onto only one element of the domain.
- 20 The function $f(x) = |x + 6| - 5$ is shifted to the right 2 units to make the function $g(x)$. Which function represents $g(x)$?
- (1) $g(x) = |x + 4| - 5$
 - (2) $g(x) = |x + 8| - 5$
 - (3) $g(x) = |x + 6| - 3$
 - (4) $g(x) = |x + 6| - 7$

21 The table below shows the average cost for one dozen large eggs over a period of years.

Year	2009	2010	2011	2012	2013	2014	2015	2016
Cost (\$)	1.34	2.65	2.65	2.68	2.68	2.00	2.11	2.08

What is the average rate of change of the cost, in dollars per year, from 2009 to 2016 rounded to the *nearest hundredth*?

- (1) -0.11
- (2) -0.10
- (3) 0.10
- (4) 0.11

**Use this space for
computations.**

22 Which ordered pair represents a point on the graph of $y = x^2 - 7x - 10$?

- | | |
|----------------|---------------------|
| (1) $(-10, 0)$ | (3) $(3.5, -22.5)$ |
| (2) $(10, 0)$ | (4) $(3.5, -22.25)$ |

23 When factored completely, $x^4 - 5x^3 - 36x^2$ is

- | | |
|---------------------------|--------------------------|
| (1) $x(x^3 - 5x^2 - 36x)$ | (3) $x^2(x - 9)(x + 4)$ |
| (2) $x^2(x^2 - 5x - 36)$ | (4) $(x^2 - 9)(x^2 + 4)$ |

24 When $3x^2 - 2x + 1$ is subtracted from $4x^2 + 5x - 6$, the result is

- | | |
|---------------------|--------------------|
| (1) $-x^2 + 3x - 5$ | (3) $x^2 + 3x - 5$ |
| (2) $-x^2 - 7x + 7$ | (4) $x^2 + 7x - 7$ |
-

Part II

Answer all 6 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. 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]

25 A survey of 200 students was taken.

It was found that 140 students play sports and 50 of the students that play sports buy their lunch.

One-third of students who do *not* play sports bring their lunch.

Complete the two-way frequency table below.

	Buy Lunch	Bring Lunch	Total
Play Sports			
Don't Play Sports			
Total			

26 Solve the formula $y = mx + b$ for x in terms of y , m , and b .

27 Solve $\frac{3}{4}x + \frac{2}{5} < \frac{1}{4}x - \frac{2}{5}$ for x .

28 Given the sequence: $-5, -2, 1, 4, \dots$

Write an equation for the n th term of this sequence.

State the tenth term of this sequence.

29 Use the quadratic formula to solve $2x^2 + 3x - 1 = 0$ for the exact values of x .

30 Perform the indicated operation and express your answer in simplest radical form.

$$5\sqrt{32} + 10\sqrt{2}$$

Part III

Answer all 4 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. 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. [16]

31 The following table shows the average length of a baby girl from birth to 24 months.

Age (months), x	0	3	6	9	12	15	18	21	24
Length (cm), y	53	64	70	75	79	83	86	90	93

Write a linear regression equation for this set of data. Round all values to the *nearest hundredth*.

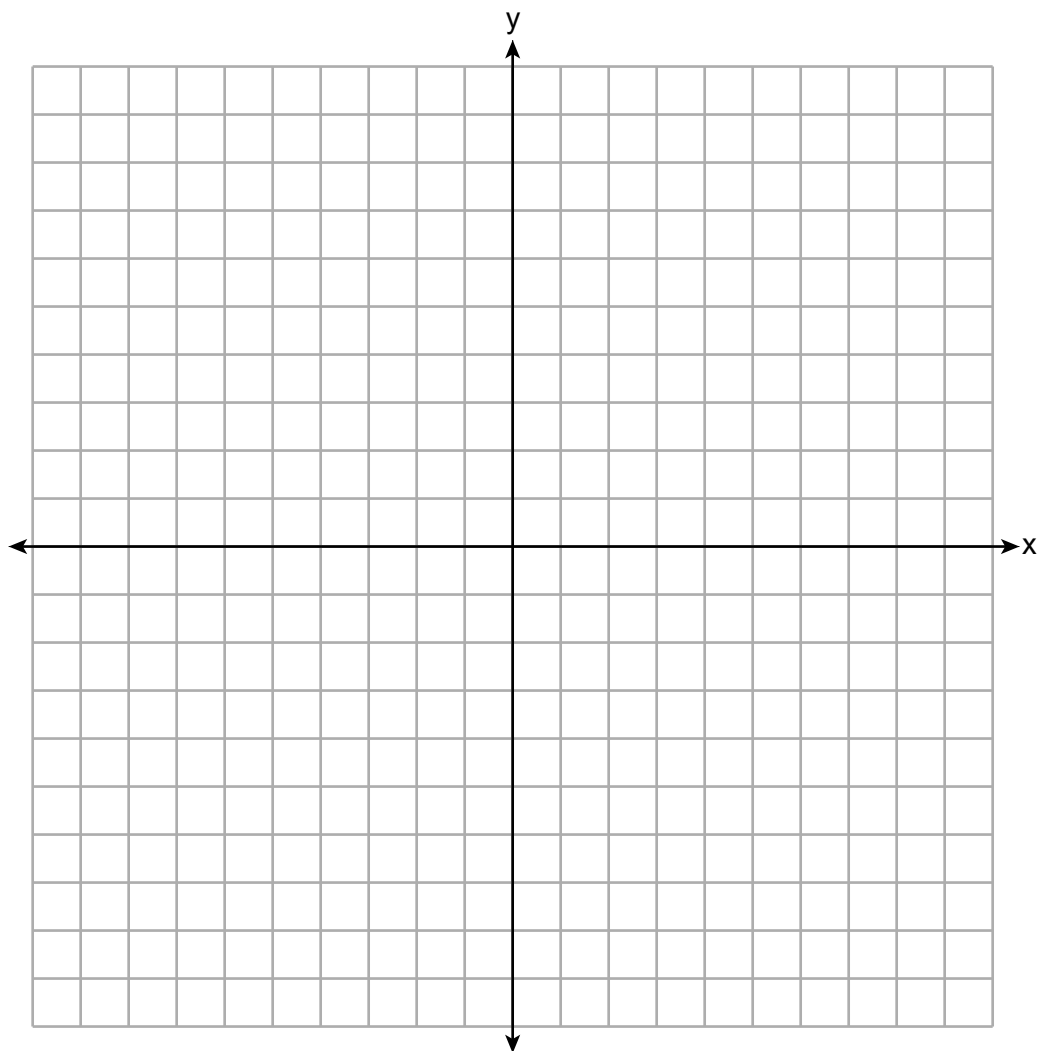
State the correlation coefficient for this data set, rounded to the *nearest hundredth*.

State what the correlation coefficient indicates about the linear fit of the data.

32 Solve this system of inequalities graphically, on the set of axes below.

Label the solution set S .

$$y + 5 > 2x$$
$$3y \leq 2x + 6$$

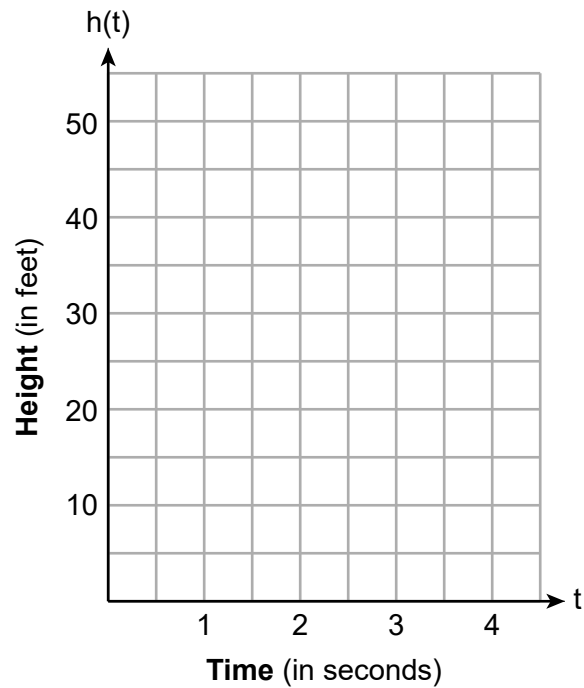


Is the point $(2, -1)$ a solution for this system of inequalities?

Justify your answer.

- 33** Joey threw a basketball into the air. The height of the basketball can be represented by the equation $h(t) = -16t^2 + 48t + 5$, where h is the height of the ball, in feet, and t is the time, in seconds, after the ball was thrown.

Sketch the graph of the equation on the set of axes below.



State the number of seconds it takes for the ball to reach its maximum height.

State the maximum height, in feet, the ball reaches.

34 Solve the following system of equations algebraically for all values of x and y :

$$y = x^2 + 4x - 3$$

$$y = 2x + 5$$

Part IV

Answer the question in this part. A correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided to determine your answer. Note that diagrams are not necessarily drawn to scale. 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]

35 Miguel is in charge of buying snacks for his office's morning meetings. On Monday, he buys six muffins and four doughnuts for \$20.70. On Tuesday, at the same store, he buys three muffins and six doughnuts for \$21.51. There is no sales tax.

If m represents the cost of one muffin and d represents the cost of one doughnut, write a system of equations to represent this situation.

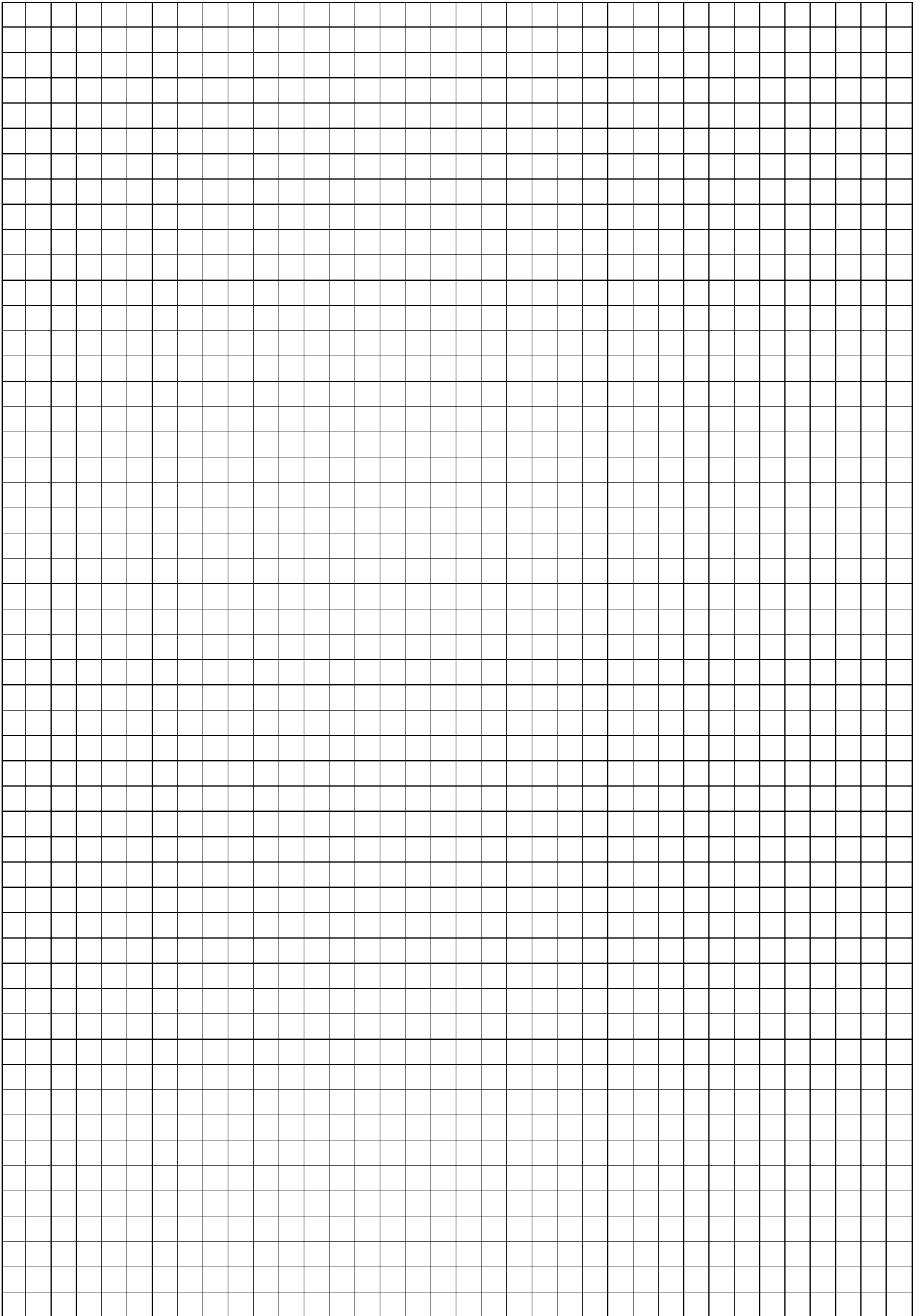
Miguel thinks one muffin costs \$2.07 and one doughnut also costs \$2.07. Is Miguel correct? Justify your answer.

Use your system of equations to algebraically determine the exact price of one muffin and the exact price of one doughnut.

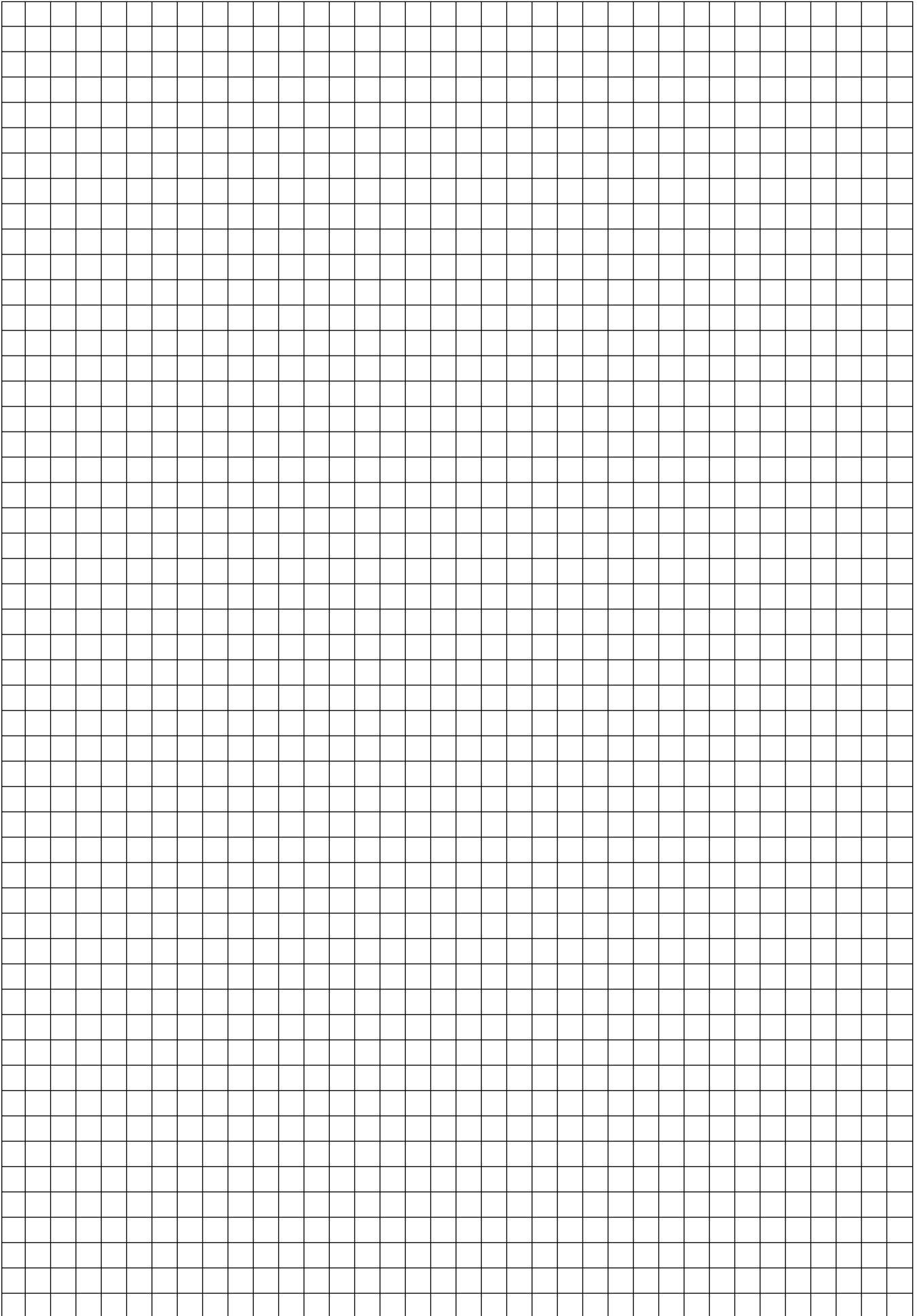
Scrap Graph Paper — this sheet will *not* be scored.

Tear Here

Tear Here



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



Tear Here

Tear Here

Tear Here

Tear Here

Reference Sheet for Algebra I

Conversions

1 mile = 5280 feet
1 mile = 1760 yards
1 pound = 16 ounces
1 ton = 2000 pounds

Conversions Across Measurement Systems

1 inch = 2.54 centimeters
1 meter = 39.37 inches
1 mile = 1.609 kilometers
1 kilometer = 0.6214 mile
1 pound = 0.454 kilogram
1 kilogram = 2.2 pounds

Quadratic Equation	$y = ax^2 + bx + c$
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Equation of the Axis of Symmetry	$x = -\frac{b}{2a}$
Slope	$m = \frac{y_2 - y_1}{x_2 - x_1}$
Linear Equation Slope Intercept	$y = mx + b$
Linear Equation Point Slope	$y - y_1 = m(x - x_1)$

Exponential Equation	$y = ab^x$
Annual Compound Interest	$A = P(1 + r)^n$
Arithmetic Sequence	$a_n = a_1 + d(n - 1)$
Geometric Sequence	$a_n = a_1 r^{n - 1}$
Interquartile Range (IQR)	$IQR = Q_3 - Q_1$
Outlier	Lower Outlier Boundary = $Q_1 - 1.5(IQR)$
	Upper Outlier Boundary = $Q_3 + 1.5(IQR)$

Tear Here

Tear Here