

ALGEBRA

I

Large-Type Edition

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

ALGEBRA I

Wednesday, January 21, 2026 — 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 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.

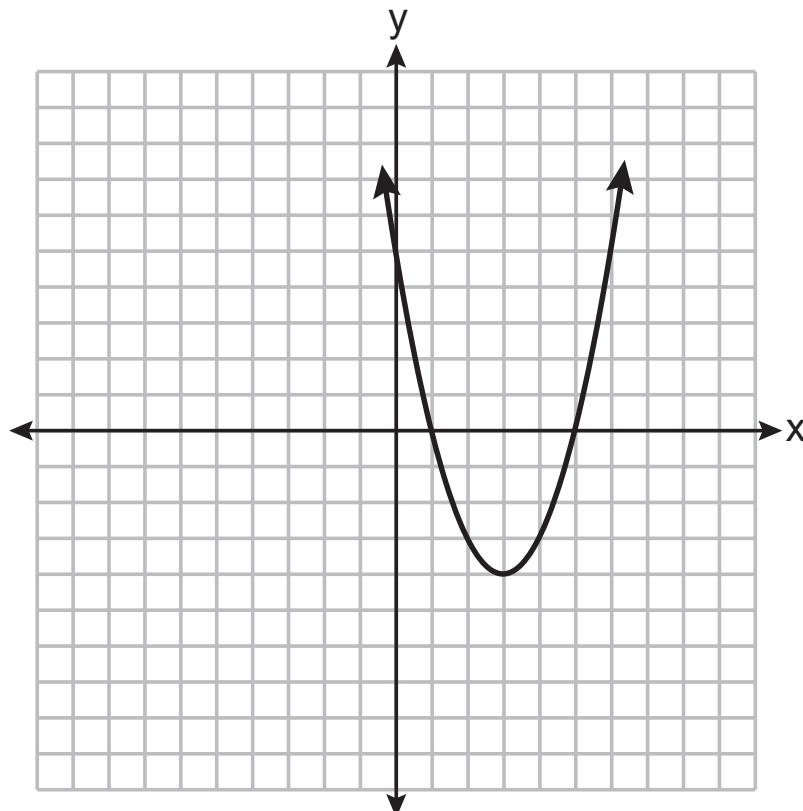
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

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]

- 1 A parabola is graphed on the set of axes below.

Use this space for computations.



Question 1 is continued below.

Question 1 continued

Use this space for computations.

What are the equation of the axis of symmetry and the coordinates of the vertex of this parabola?

- (1) $x = 3$ and $(3, -4)$ (3) $x = -4$ and $(-4, 3)$
(2) $y = 3$ and $(3, -4)$ (4) $y = -4$ and $(-4, 3)$

2 The product of $\sqrt{25}$ and $\sqrt{2}$ will result in

- (1) an irrational number (3) a natural number
(2) a rational number (4) an integer

3 When $f(x) = |4x + 2|$ and $g(x) = 3x + 5$ are graphed on the same set of axes, for which value of x is $f(x) = g(x)$?

- (1) 1 (3) 3
(2) 2 (4) 14

Use this space for computations.

4 The expression $x^2 - 26x - 120$ is equivalent to

- | | |
|-----------------------|-----------------------|
| (1) $(x + 4)(x - 30)$ | (3) $(x - 20)(x + 6)$ |
| (2) $(x - 4)(x + 30)$ | (4) $(x + 20)(x - 6)$ |

5 The expression $3 - 2\sqrt{5} + 6\sqrt{5}$ is equivalent to

- | | |
|------------------|----------------------|
| (1) $7\sqrt{5}$ | (3) $3 + 4\sqrt{5}$ |
| (2) $7\sqrt{10}$ | (4) $3 + 4\sqrt{10}$ |

6 Students were asked to write a polynomial given the following conditions:

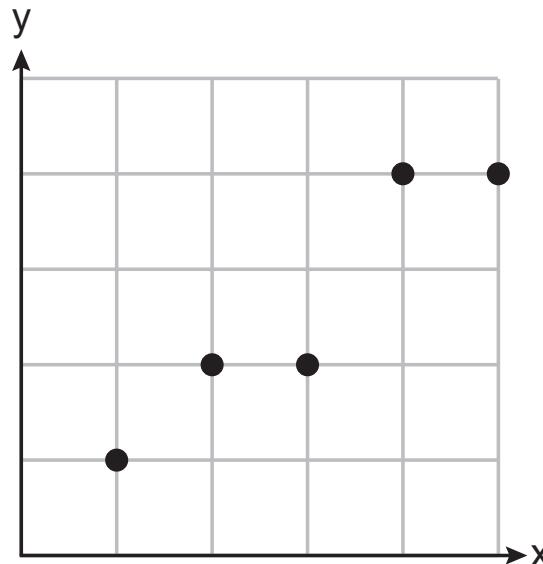
- the degree of the expression is 3
- the leading coefficient is 2
- the constant term is -6

Which expression satisfies all three conditions?

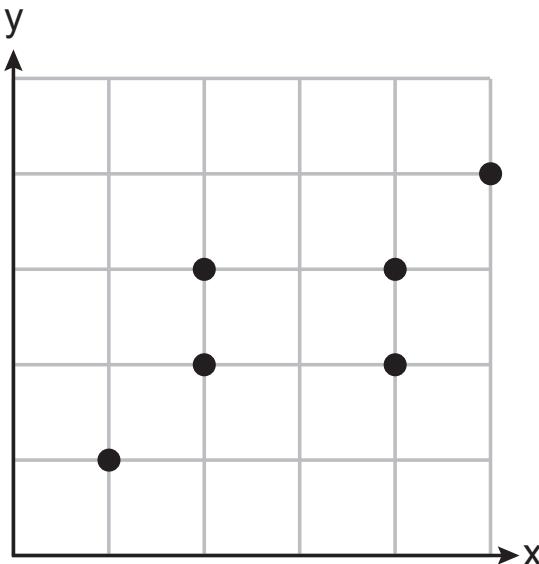
- | | |
|---------------------|-----------------------|
| (1) $4x - 6 + 3x^2$ | (3) $4 - 6x + 2x^3$ |
| (2) $3x^2 - 6x + 4$ | (4) $4x^2 + 2x^3 - 6$ |

7 Which graph below represents a function?

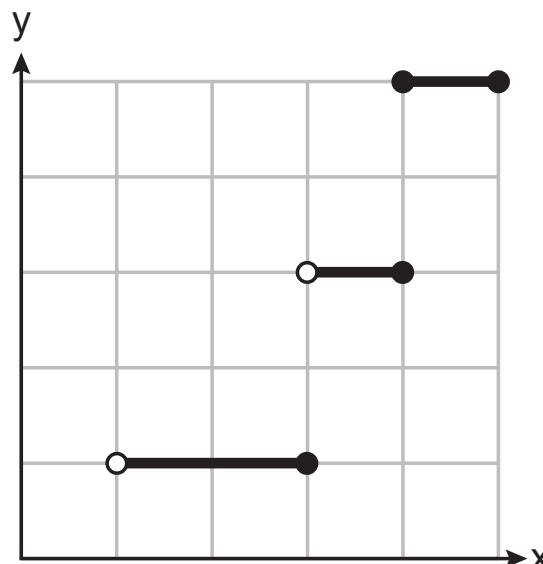
Use this space for computations.



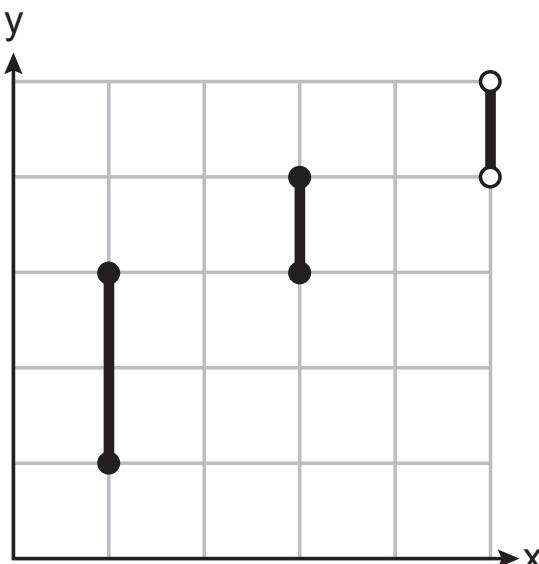
(1)



(3)



(2)



(4)

8 The following function models the value of a diamond ring, in dollars, t years after it is purchased:

Use this space for computations.

$$v(t) = 500(1.08)^t$$

What was the original price of the ring, in dollars?

9 The formula for the surface area of a cylinder can be expressed as $S = 2\pi r^2 + 2\pi r h$, where r is the radius and h is the height of the cylinder. What is the height, h , expressed in terms of S , π , and r ?

- $$\begin{array}{ll}
 (1) \ h = \frac{S - 2\pi r^2}{2\pi r} & (3) \ h = \frac{2\pi r^2 - S}{2\pi r} \\
 (2) \ h = S - r & (4) \ h = r - S
 \end{array}$$

Use this space for computations.

- 10 When solving the following system of equations algebraically, Mason used the substitution method.

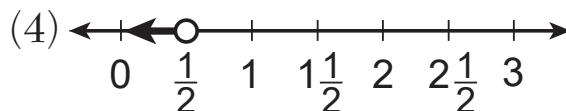
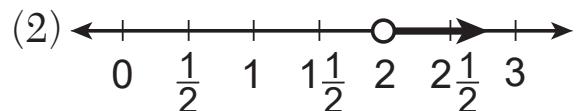
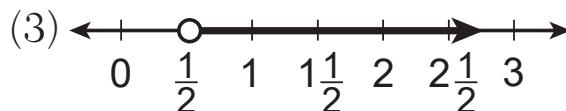
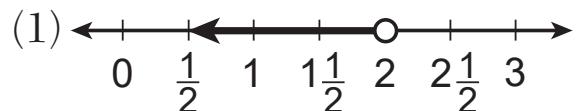
$$3x - y = 10$$

$$2x + 5y = 1$$

Which equation could he have used?

- (1) $2(3x - 10) + 5x = 1$ (3) $2x + 5(3x - 10) = 1$
(2) $2(-3x + 10) + 5x = 1$ (4) $2x + 5(-3x + 10) = 1$

- 11 Which graph represents the solution to the inequality $4 + 3x > 9 - 7x$?



Use this space for computations.

12 When solving the equation $3(2x + 5) - 8 = 7x + 10$, the first step could be $3(2x + 5) = 7x + 18$. Which property justifies this step?

- (1) addition property of equality
- (2) commutative property of addition
- (3) multiplication property of equality
- (4) distributive property of multiplication over addition

13 Which table of values best models an exponential decay function?

x	f(x)
-2	7
-1	4
0	1
1	-2
2	-5
3	-8

(1)

m	f(m)
0	200
1	180
2	162
3	146
4	131
5	118

(2)

n	f(n)
0	200
0.5	210
1	220
1.5	231
2	242
2.5	254

(3)

p	f(p)
-3	-2
-2	-5
-1	-6
0	-5
1	-2
2	3

(4)

14 If $f(x) = \sqrt{x + 1} + 5$, then what is the value of $f(3)$?

Use this space for computations.

15 Isabella wants to shift the graph of the function $f(x) = (x + 5)^2 - 2$ left 3 units. Which function represents the shifted graph?

- | | |
|----------------------------|----------------------------|
| (1) $g(x) = (x + 2)^2 - 2$ | (3) $g(x) = (x + 5)^2 - 5$ |
| (2) $g(x) = (x + 8)^2 - 2$ | (4) $g(x) = (x + 5)^2 + 1$ |

16 What are the zeros of $f(x) = x(x^2 - 36)$?

Use this space for computations.

- 18 The two-way frequency table below is a summary of concession stand sales for a football game.

Concession Stand Sales

	Soda	Water	Coffee	Total
Hot Dogs	50	62	46	158
Pizza	120	58	4	182
No Food	30	20	10	60
Total	200	140	60	400

Of the people making a purchase at the concession stand, what is the relative frequency of them buying pizza and a water?

Use this space for computations.

- 19** When Theodore was driving in Canada, his speed was 104 kilometers per hour. Theodore was asked to convert his metric speed to a different rate, using the following conversion:

$$\frac{104 \text{ km}}{1 \text{ hr}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \cdot \frac{0.6214 \text{ mi}}{1 \text{ km}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}}$$

Assuming he did all the work correctly, what would the units be for Theodore's rate?

- | | |
|---------------------|----------------------|
| (1) feet per second | (3) seconds per foot |
| (2) feet per minute | (4) minutes per foot |
- 20** Which expression is equivalent to $(-2x^2)^3$?
- | | |
|-------------|-------------|
| (1) $-2x^5$ | (3) $-8x^5$ |
| (2) $-2x^6$ | (4) $-8x^6$ |

21 The table below shows the amount of a radioactive substance that remained for selected years.

Use this space for computations.

Year	2000	2001	2005	2010	2014	2017	2019
Amount Remaining (grams)	750	450	219	85	25	12	8

To the *nearest tenth*, the average rate of change, in grams per year, from 2000 to 2014 is

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

Use this space for computations.

23 Which equation has the same solution as $x^2 - 6x = 24$?

- (1) $(x - 3)^2 = 24$ (3) $(x - 3)^2 = 33$
(2) $(x - 6)^2 = 24$ (4) $(x - 6)^2 = 60$

24 In a sequence, the first term is -2 and the common ratio is -3 .
The fourth term in this sequence is

- (1) -162 (3) 24
(2) -11 (4) 54
-

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 Solve the equation for x :

$$14x = 3(1 + 2x) - 4x$$

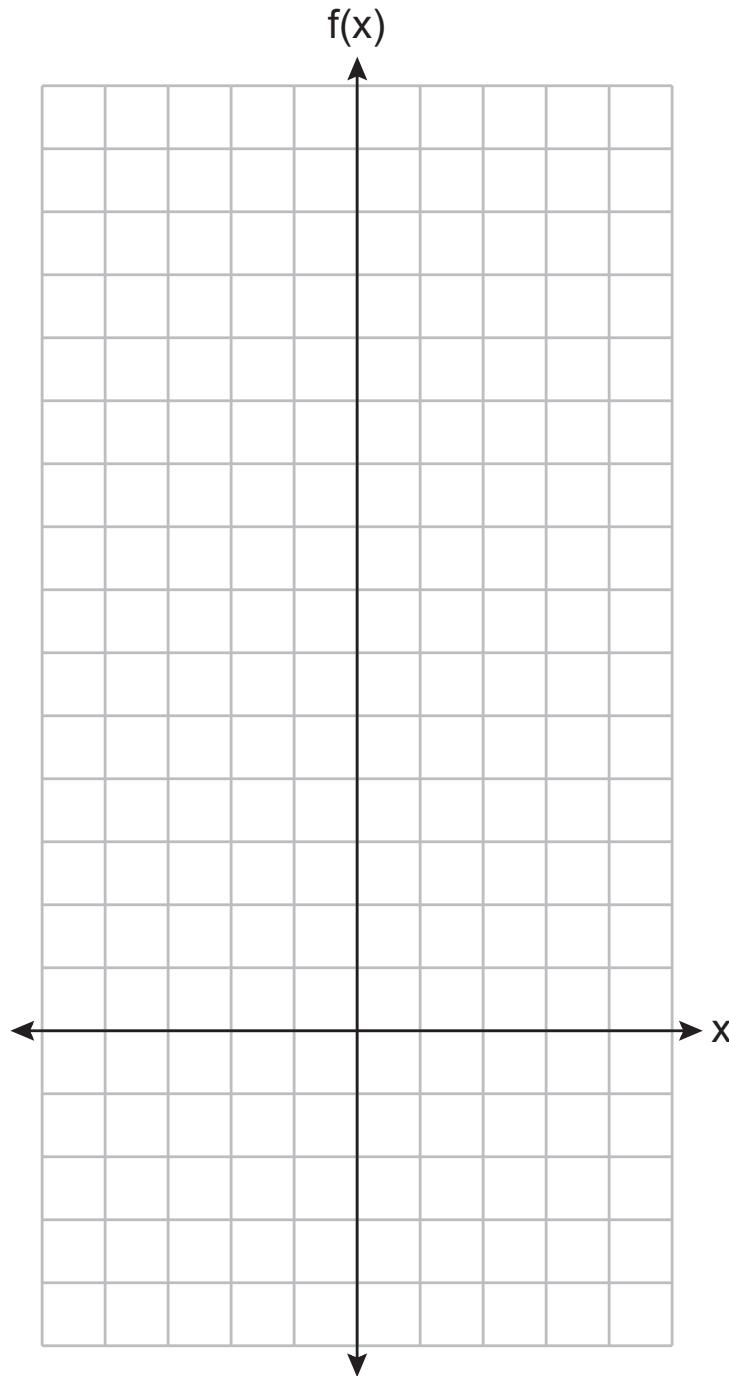
Work space for question 25 is continued below.

Question 25 continued

26 Graph $f(x) = 3(2)^x$ over the interval $-1 \leq x \leq 2$.

The set of axes for question 26 is continued below.

Question 26 continued



27 Determine the product of $(2x + 3)$ and $(-6x^2 + 5x - 1)$.

Express the product in standard form.

Work space for question 27 is continued below.

Question 27 continued

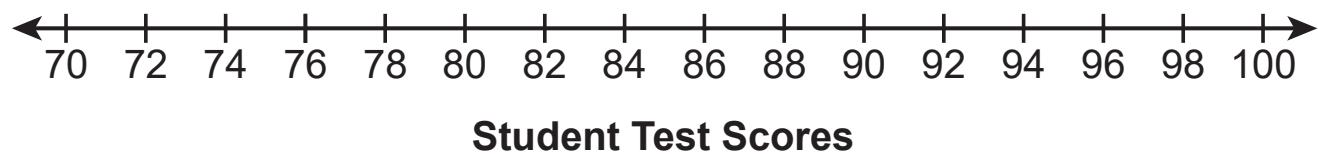
28 A student's test scores for the semester are listed below.

83, 87, 90, 94, 94, 93, 95, 70, 72, 83, 85, 88, 98

Construct a box plot for this data set, using the number line below.

Question 28 is continued below.

Question 28 continued



29 Write an equation, in slope-intercept form, of a line that passes through the point $(6, 3)$ and has a slope of $\frac{2}{3}$.

Work space for question 29 is continued below.

Question 29 continued

30 Abby has \$20 to spend at a community festival. She uses \$8.50 to purchase food coupons for popcorn, a hot dog, and a soda.

She can buy individual ride tickets for \$2.25 each. Determine algebraically the maximum number of ride tickets Abby can buy.

Work space for question 30 is continued below.

Question 30 continued

Part III

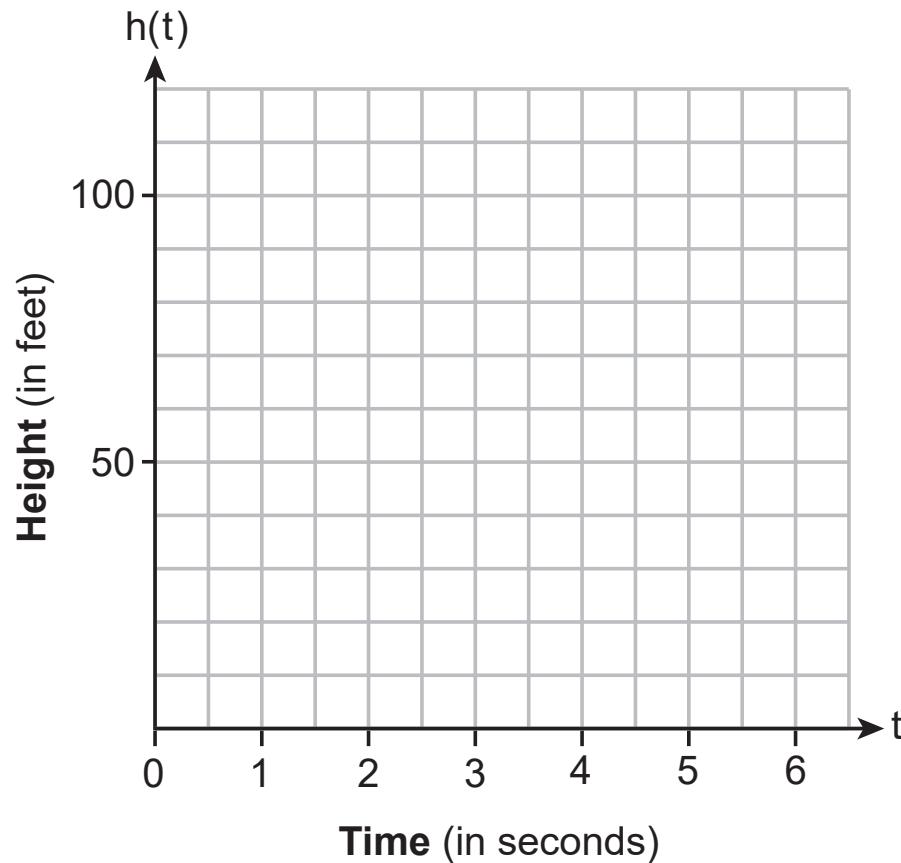
Answer all 4 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily 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** A rocket was launched from the ground into the air at an initial velocity of 80 feet per second. The path of the rocket can be modeled by $h(t) = -16t^2 + 80t$, where t represents the time after the rocket has been launched, and $h(t)$ represents the height of the rocket.

Question 31 is continued below.

Question 31 continued

Sketch the function on the set of axes below.



Question 31 is continued on the next page.

Question 31 continued

State how many seconds it will take for the rocket to reach its maximum height.

State the maximum height, in feet, of the rocket.

GO RIGHT ON TO THE NEXT PAGE ➔

32 Use the quadratic formula to solve $2x^2 - 4x - 3 = 0$, and express the answer in simplest radical form.

Work space for question 32 is continued below.

Question 32 continued

33 The table below shows the ages of drivers and the annual cost of their car insurance.

Age (x) (in years)	16	17	18	18	21	22	30
Annual Cost of Car Insurance (y) (in dollars)	1452	1332	1284	1320	1200	1188	600

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

Question 33 is continued below.

Question 33 continued

State the correlation coefficient of this line of best fit, to the *nearest hundredth*.

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

34 Solve the following system of inequalities graphically.

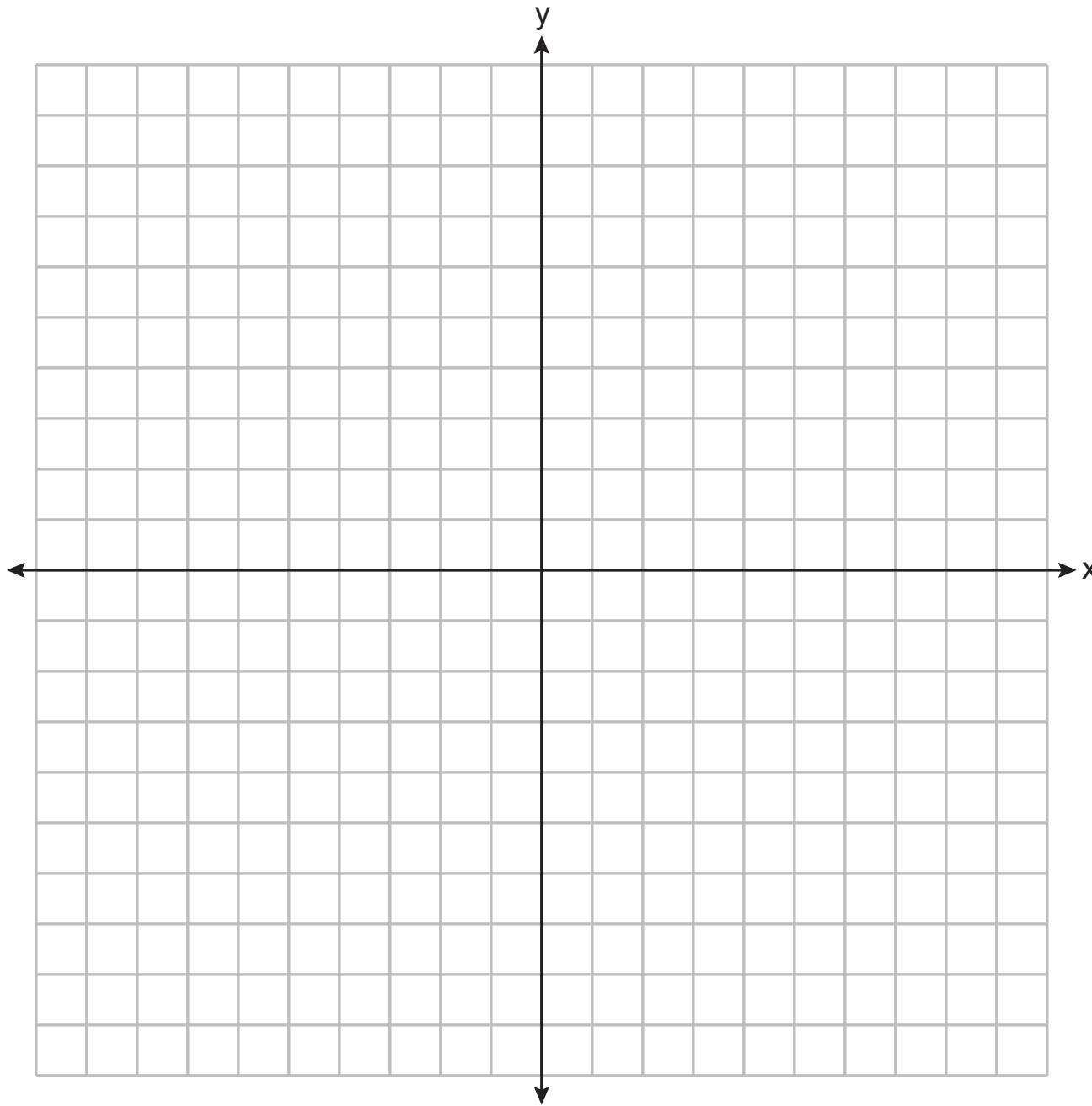
Label the solution set S .

$$2y \leq x + 6$$

$$2x + y > 3$$

The set of axes for question 34 is continued below.

Question 34 continued



Question 34 is continued on the next page.

Question 34 continued

Is the point $(0, 3)$ in the solution set? Explain your answer.

GO RIGHT ON TO THE NEXT PAGE ➔

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 Acme Athletics purchases shoes from a supply company. In January the store bought 30 pairs of running shoes and 10 pairs of basketball shoes for \$3700. In March they bought 15 pairs of running shoes and 20 pairs of basketball shoes for \$3575. The supply company kept their prices constant.

If x represents the cost of one pair of running shoes and y represents the cost of one pair of basketball shoes, write a system of equations that models this situation.

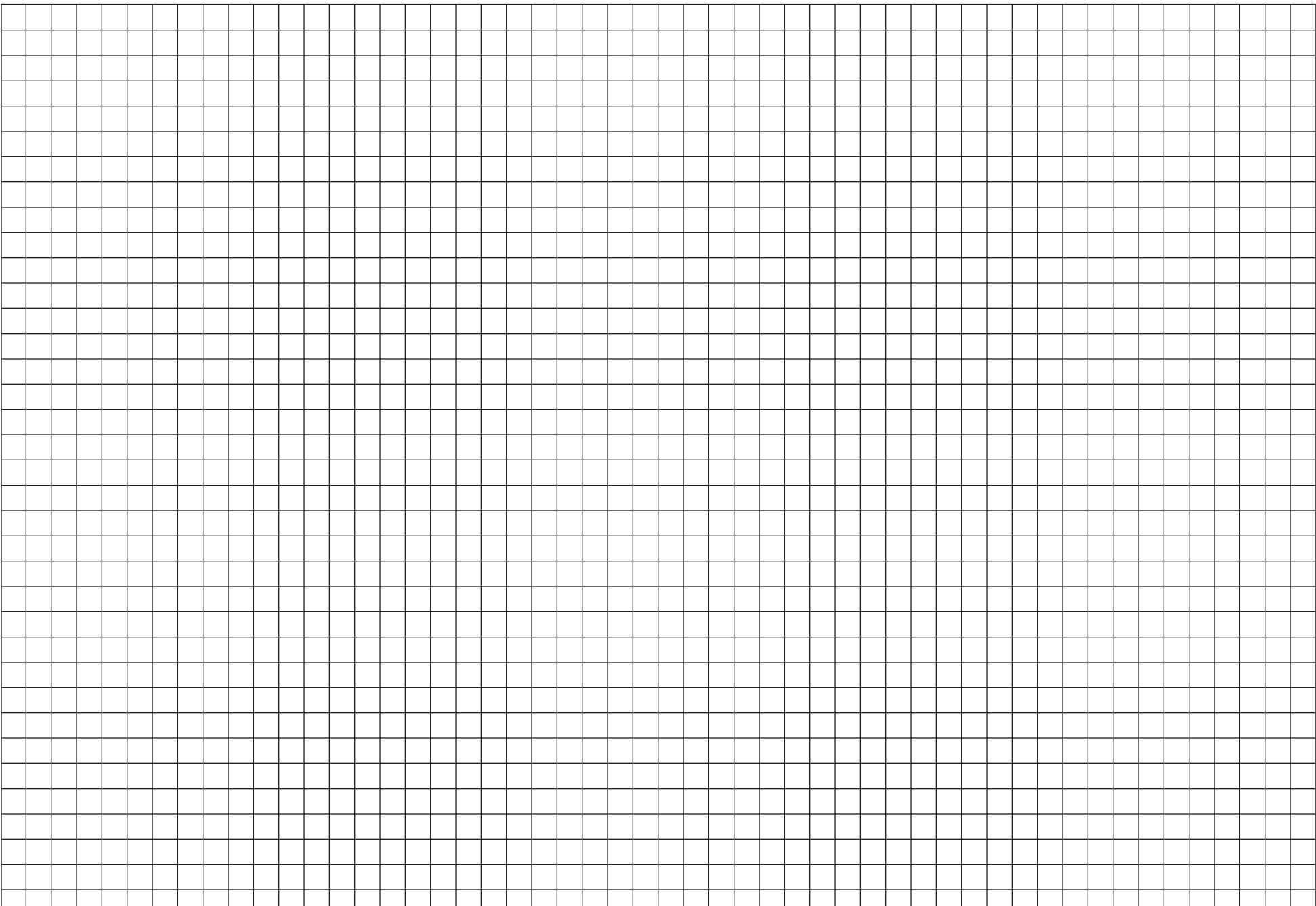
Question 35 is continued below.

Question 35 continued

Jacob says that a pair of running shoes costs the store \$80 each, and a pair of basketball shoes costs the store \$130 each. Is he correct? Justify your answer.

Solve your system of equations algebraically to find the exact cost, in dollars, of one pair of running shoes and the exact cost, in dollars, of one pair of basketball shoes.

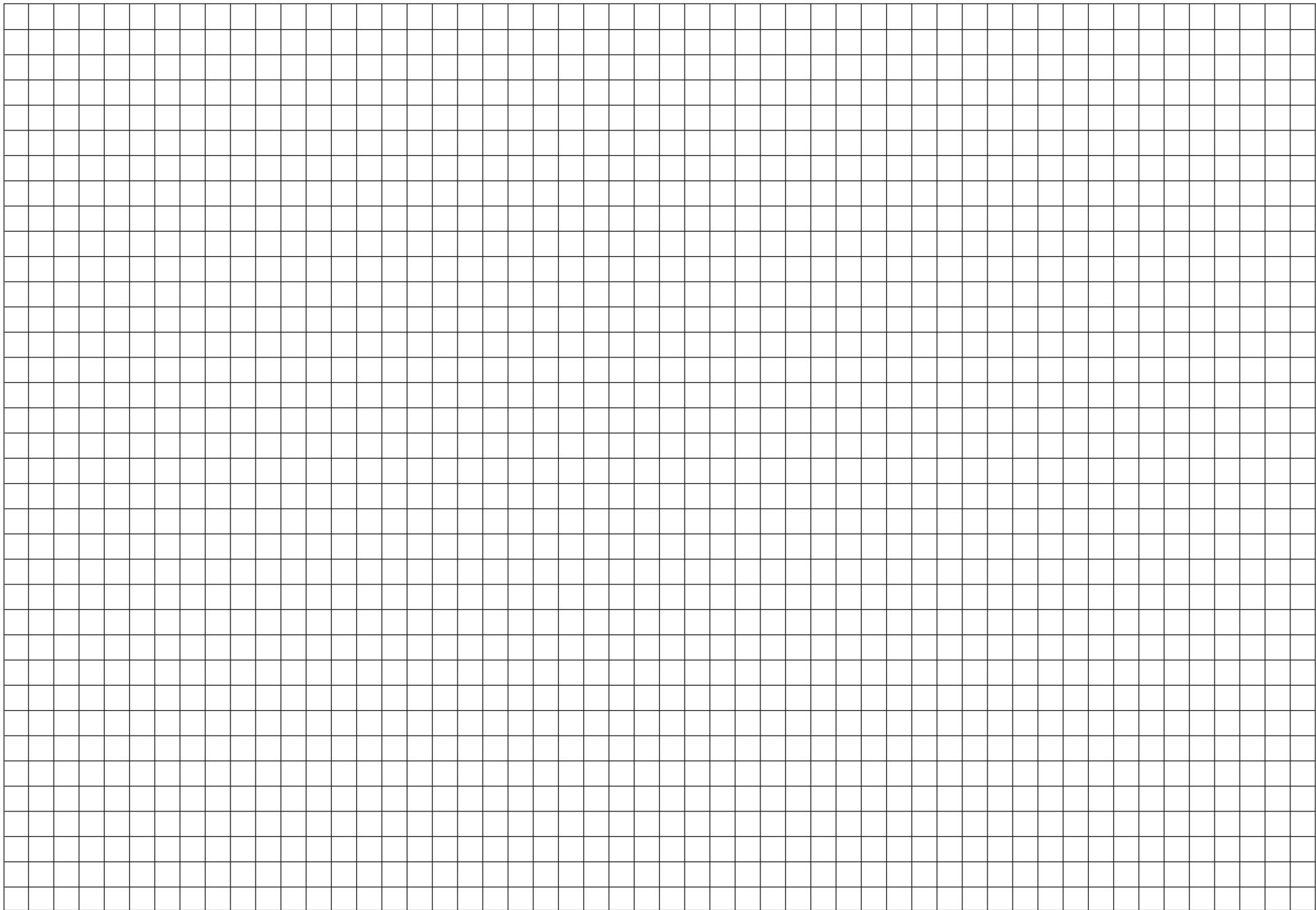
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Scrap Graph Paper — this sheet will *not* be scored.



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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	$y = ax^2 + bx + c$	Exponential Equation	$y = ab^x$
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	Annual Compound Interest	$A = P(1 + r)^n$
Equation of the Axis of Symmetry	$x = -\frac{b}{2a}$	Arithmetic Sequence	$a_n = a_1 + d(n - 1)$
Slope	$m = \frac{y_2 - y_1}{x_2 - x_1}$	Geometric Sequence	$a_n = a_1 r^{n-1}$

The Reference Sheet is continued on the next page.

Reference Sheet — concluded

Linear Equation Slope Intercept	$y = mx + b$	Interquartile Range (IQR)	$IQR = Q_3 - Q_1$
Linear Equation Point Slope	$y - y_1 = m(x - x_1)$	Outlier	Lower Outlier Boundary = $Q_1 - 1.5(IQR)$
			Upper Outlier Boundary = $Q_3 + 1.5(IQR)$