# ALGEBRA 1
# PRACTICE TESTS
## Based on
## Next Generation Learning Standards

# Reference Sheet for Algebra I (NGLS)

## 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 | $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ | Annual Compound Interest | | $A = P(1 + r)^n$ |
| Equation of the Axis of Symmetry | $x = -\dfrac{b}{2a}$ | Arithmetic Sequence | | $a_n = a_1 + d(n - 1)$ |
| Slope | $m = \dfrac{y_2 - y_1}{x_2 - x_1}$ | Geometric Sequence | | $a_n = a_1 r^{n-1}$ |
| Linear Equation Slope Intercept | $y = mx + b$ | Interquartile Range (IQR) | | $IQR = Q_3 - Q_1$ |
| Linear Equation Point Slope | $y - y_1 = m\left(x - x_1\right)$ | Outlier | | Lower Outlier Boundary $= Q_1 - 1.5\left(IQR\right)$ |
| | | | | Upper Outlier Boundary $= Q_3 + 1.5\left(IQR\right)$ |

# June 2024
## 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 in the space provided. [48]

1. A ball was launched into the air, and its height above the ground was recorded each second, as shown in the table below.

| Time (sec) | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Height (ft) | 11 | 59 | 75 | 59 | 11 |

Based on these data, which statement is a valid conclusion?
(1) The ball lands on the ground at 4 seconds.
(2) The ball reaches a maximum height of 11 feet.
(3) The ball was launched from a height of 0 feet.
(4) The ball reaches its maximum height at 2 seconds.          1 _____

2. A tour bus can seat, at most, 48 passengers. An adult ticket costs $18 and a child ticket costs $12. The bus company must collect at least $650 to make a profit. If $a$ represents the number of adult tickets sold and $c$ represents the number of child tickets sold, which system of inequalities models this situation if they make a profit?
(1) $a + c < 48$
    $18a + 12c > 650$
(2) $a + c \le 48$
    $18a + 12c \ge 650$
(3) $a + c < 48$
    $18a + 12c < 650$
(4) $a + c \le 48$
    $18a + 12c \le 650$          2 _____

3. Which equation is always true?
(1) $x^2 \cdot x^3 = x^5$
(2) $3^x \cdot 3^2 = 9^{2x}$
(3) $-z^2 = z^2$
(4) $7^a \cdot 7^b = 7^{ab}$          3 _____

4. The expression $-2(x^2 - 2x + 1) + (3x^2 + 3x - 5)$ is equivalent to
(1) $x^2 + x - 4$
(2) $x^2 - x - 7$
(3) $x^2 + 7x - 4$
(4) $x^2 + 7x - 7$          4 _____

5. Which sum is irrational?
(1) $-2\sqrt{12} + \sqrt{100}$
(2) $-\sqrt{4} + \frac{1}{3}\sqrt{900}$
(3) $\frac{1}{2}\sqrt{25} + \sqrt{64}$
(4) $\sqrt{49} + 3\sqrt{121}$          5 _____

6. The solution to $\frac{4(x-5)}{3} + 2 = 14$ is
(1) 15          (2) 14          (3) 6          (4) 4          6 _____

7.   On an island, a rare breed of rabbit doubled its population each month for two years. Which type of function best models the increase in population at the end of two years?

(1) linear growth                  (3) exponential growth

(2) linear decay                    (4) exponential decay       7 _____

8.   What is the degree of the polynomial $2x - x^2 + 4x^3$?

(1) 1          (2) 2          (3) 3          (4) 4       8 _____

9.   The zeros of the function $f(x) = x(x - 5)(3x + 6)$ are

(1) 0, –5, and 2                 (3) –5 and 2, only

(2) 0, 5, and –2                 (4) 5 and –2, only       9 _____

10. What is the $y$-intercept of the line that passes through the points (–1, 5) and (2, –1)?

(1) –1         (2) –2         (3) 3         (4) 5       10 ____

11.  Nancy has just been hired for her first job. Her company gives her four choices for how she can collect her annual salary over the first eight years of employment.

Each function below represents the four choices she has for her annual salary in thousands of dollars, where $t$ represents the number of years after she is hired.

$$a(t) = 2^t + 25$$
$$b(t) = 10t + 75$$
$$c(t) = \sqrt{400t} + 80$$
$$d(t) = 2(t + 1)^2 - 10t + 50$$

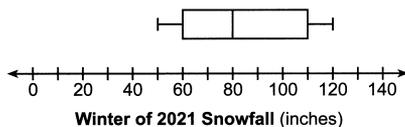Which pay plan should Nancy choose in order to have the highest salary in her eighth year?

(1) $a(t)$       (2) $b(t)$       (3) $c(t)$       (4) $d(t)$       11 ____

12. The third term in a sequence is 25 and the fifth term is 625. Which number could be the common ratio of the sequence?

(1) $\frac{1}{5}$       (2) 5       (3) $\frac{1}{25}$       (4) 25       12 ____

13. The box plot below summarizes the data for the amount of snowfall, in inches, during the winter of 2021 for 12 locations in western New York.



**Winter of 2021 Snowfall** (inches)

What is the interquartile range?

(1) 30         (2) 50         (3) 80         (4) 110       13 ____

14. Four quadratic functions are represented below.

b(x)

| x | d(x) |
|----|----|
| –4 | –1 |
| –3 | –4 |
| –2 | –5 |
| –1 | –4 |
| 0 | –1 |

$a(x) = (x - 3)^2 - 7$                    $c(x) = x^2 + 6x + 3$

      I                    II                    III                    IV

Which function has the *smallest* minimum value?

(1) I                (2) II                (3) III                (4) IV                14 ____

15. The equation that represents the sequence –2, –5, –8, –11, –14, ... is

(1) $a_n = -3 + (-2)(n - 1)$            (3) $a_n = 3 + (-2)(n - 1)$
(2) $a_n = -2 + (-3)(n - 1)$            (4) $a_n = -2 + (3)(n - 1)$                15 ____

16. The dot plot shows the number of goals Jessica scored in each lacrosse game last season.

Which statement about the dot plot is correct?

Goals Scored per Game

(1) mean > mode                (3) mode = median
(2) mean = median              (4) median > mean                16 ____

17. The students in Mrs. Smith's algebra class were asked to describe the graph of $g(x) = 2(x - 3)^2$ compared to the graph of $f(x) = x^2$. Which student response is correct?

(1) Ashley said that the graph of $g(x)$ is wider and shifted left 3 units.
(2) Beth said that the graph of $g(x)$ is narrower and shifted left 3 units.
(3) Carl said that the graph of $g(x)$ is wider and shifted right 3 units.
(4) Don said that the graph of $g(x)$ is narrower and shifted right 3 units.                17 ____

18. One Saturday, Dave took a long bike ride. The graph models his trip.

What was Dave's average rate of change, in miles per hour, on this trip?

(1) 10                (3) 11.6
(2) 11                (4) 14.5                18 ____

19. Which expression is equivalent to $(x - 5)(2x + 7) - (x + 5)$?

(1) $2x^2 - 2x - 30$             (3) $2x^2 - 4x - 30$

(2) $2x^2 - 2x - 40$             (4) $2x^2 - 4x - 40$        19 ____

20. The functions $f(x)$ and $g(x)$ are graphed on the set of axes.
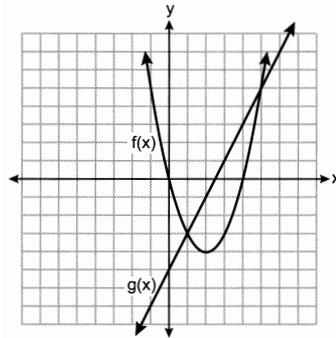


What is the solution to the equation $f(x) = g(x)$?

(1) 1 and 5

(2) –5 and 0

(3) –3 and 5

(4) 0 and 4        20 ____

21. When babysitting, Nicole charges an hourly rate and an additional charge for gas. She uses the function $C(h) = 6h + 5$ to determine how much to charge for babysitting. The constant term of this function represents

(1) the additional charge for gas

(2) the hourly rate Nicole charges

(3) the number of hours Nicole babysits

(4) the total Nicole earns from babysitting        21 ____

22. When solved for $x$ in terms of $a$, the solution to the equation $3x - 7 = ax + 5$ is

(1) $\dfrac{12}{3a}$       (2) $\dfrac{12}{3 - a}$       (3) $\dfrac{3a}{12}$       (4) $\dfrac{3 - a}{12}$       22 ____

23. Wayde van Niekerk, a runner from South Africa, ran 400 meters in 43.03 seconds to set a world record. Which calculation would determine his average speed, in miles per hour?

(1) $\dfrac{400\,\text{m}}{43.03\,\text{sec}} \cdot \dfrac{1000\,\text{m}}{0.62\,\text{mi}} \cdot \dfrac{1\,\text{hr}}{3600\,\text{sec}}$       (3) $\dfrac{400\,\text{m}}{43.03\,\text{sec}} \cdot \dfrac{0.62\,\text{mi}}{1000\,\text{m}} \cdot \dfrac{3600\,\text{sec}}{1\,\text{hr}}$

(2) $\dfrac{400\,\text{m}}{43.03\,\text{sec}} \cdot \dfrac{0.62\,\text{mi}}{1000\,\text{m}} \cdot \dfrac{1\,\text{hr}}{3600\,\text{sec}}$       (4) $\dfrac{400\,\text{m}}{43.03\,\text{sec}} \cdot \dfrac{1000\,\text{m}}{0.62\,\text{mi}} \cdot \dfrac{3600\,\text{sec}}{1\,\text{hr}}$

       23 ____

24. Which function has a domain of all real numbers and a range greater than or equal to three?

(1) $f(x) = -x + 3$             (3) $h(x) = 3^x$

(2) $g(x) = x^2 + 3$             (4) $m(x) = |x + 3|$        24 ____

### 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. [16]**

25. Solve $5(x - 2) \leq 3x + 20$ algebraically.

26. Given $g(x) = x^3 + 2x^2 - x$, evaluate $g(-3)$.

# ALGEBRA 1 (NGLS)
## January 2026
### 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 in the space provided. [48]

1. A parabola is graphed on the accompanying set of axes.



What are the equation of the axis of symmetry and the coordinates of the vertex of this parabola?
(1) $x = 3$ and $(3, -4)$
(2) $y = 3$ and $(3, -4)$
(3) $x = -4$ and $(-4, 3)$
(4) $y = -4$ and $(-4, 3)$
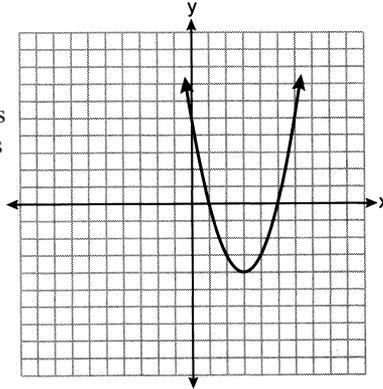
1 _____

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

2 _____

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          (2) 2          (3) 3          (4) 14

3 _____

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) $(x + 20)(x - 6)$

4 _____

5. The expression $3 - 2\sqrt{5} + 6\sqrt{5}$ is equivalent to
(1) $7\sqrt{5}$          (2) $7\sqrt{10}$          (3) $3 + 4\sqrt{5}$          (4) $3 + 4\sqrt{10}$

5 _____

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

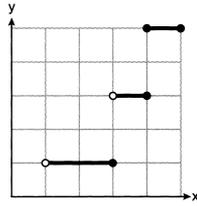Which expression satisfies all three conditions?
(1) $4x - 6 + 3x^2$          (3) $4 - 6x + 2x^3$
(2) $3x^2 - 6x + 4$          (4) $4x^2 + 2x^3 - 6$

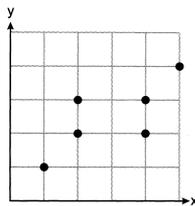6 _____

7.  Which graph below represents a function?
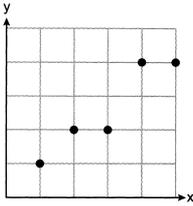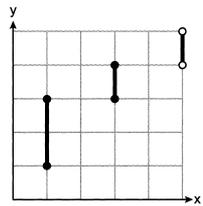


     (1)              (2)              (3)              (4)

7 _____

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

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

What was the original price of the ring, in dollars?
(1) \$108         (2) \$460         (3) \$500         (4) \$540      8 _____

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

(1) $h = \dfrac{S - 2\pi r^2}{2\pi r}$    (2) $h = S - r$    (3) $h = \dfrac{2\pi r^2 - S}{2\pi r}$    (4) $h = r - S$    9 _____

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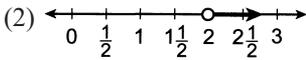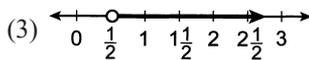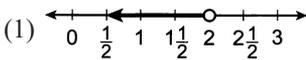(1) $2(3x - 10) + 5x = 1$         (3) $2x + 5(3x - 10) = 1$
(2) $2(-3x + 10) + 5x = 1$       (4) $2x + 5(-3x + 10) = 1$      10 _____

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

(1) 

(3) 

(2) 

(4) 
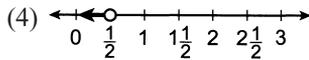
11 _____

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      12 _____

**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.
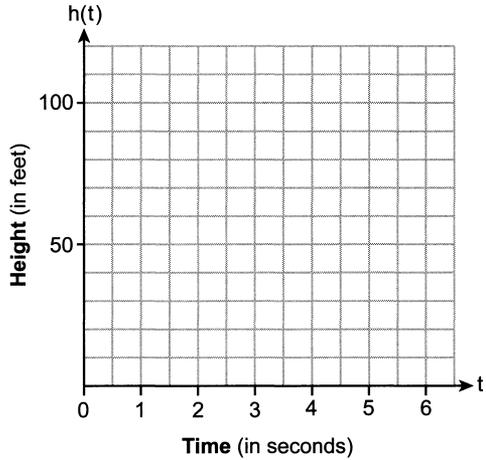
Sketch the function on the set of axes.

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

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

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

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*.

State the correlation coefficient of this line of best fit, to the *nearest hundredth*.
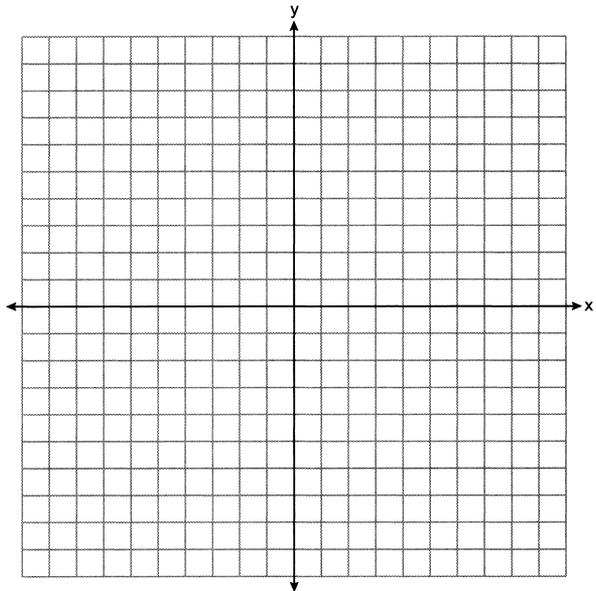
State what this correlation coefficient indicates about the linear fit of the data set.

34. Solve the following system of inequalities graphically.

Label the solution set *S*.

$2y \le x + 6$
$2x + y > 3$

Is the point (0, 3) in the solution set?

Explain your answer.

**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.

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.