General Directions

Today you will be taking a Washington State Algebra I End-of-Course Practice Test. To complete this test, you will need to use the answer document provided with this practice test on Page 26. This practice test is designed to simulate the Washington State Algebra I testing experience.

Three different types of questions appear on this test:

### Multiple-Choice Items
- Each Multiple-Choice item has four answer choices, the correct answer and three distractors.
- Multiple choice items are worth one point each.
- There will be 29 Multiple-Choice items assessing PEs common to Algebra 1/Integrated Mathematics 1.
- There will be 3-5 Multiple-Choice items assessing PEs common to Algebra 1/Integrated Mathematics 2.

**NOTE:** Enhanced Multiple-Choice items are scored as Short-Answer items.

### Completion Items
- Each Completion item requires the student to enter a numerical answer, an expression with variables, or an equation with variables.
- Completion items are worth one point each.
- There will be 5 Completion items assessing PEs common to Algebra 1/Integrated Mathematics 1.
- There will be 1-3 Completion items assessing PEs common to Algebra 1/Integrated Mathematics 2.

### Short-Answer Items
- Each Short-Answer item requires a constructed response.
- A Short-Answer item may ask the student to write a sentence or equation; complete a table, graph, or chart; draw a picture; construct a diagram; or perform a calculation.
- An Enhanced Multiple-Choice item will ask the student to select from a list of four answer choices and then show work to support or explain the reason(s) for choosing that answer or to solve a problem. No more than two items on a test will be Enhanced Multiple-Choice items.
- Short-Answer items are worth two points each.
- There will be 3 Short-Answer items assessing PEs common to Algebra 1/Integrated Mathematics 1.
- Short-Answer items will not assess PEs common to Algebra 1/Integrated Mathematics 2.
While taking this test, remember:

1. Read each question carefully, including diagrams and graphs.

2. For multiple-choice questions, choose the best answer from the four choices given. Mark only one response for each multiple-choice question.

3. For short-answer questions, write your answers in the box provided. You do not have to use all of the space provided. Answers may be graphs, text, or calculations.

4. If a short-answer question asks you to show your work, you must do so to receive full credit. If you are using a calculator, describe the calculation process you used in enough detail to be duplicated, including the numbers you entered and the function keys you pressed to find the answer. If a short-answer item has multiple parts, label each section of work and clearly identify your answer for each part.

5. Record all multiple-choice and completion answers on the answer key located on page 26.

A formula sheet is provided for the Algebra I End-of-Course Exam, and is provided on Page 24 and 25 of this Practice Test.

The Practice Test will be broken up into 4 different sections and will be completed in one sitting that will last approximately 150 minutes (there is no time limit):

Section 1: Questions 1-6
   * **Number, operations, expression and variables**

Section 2: Questions 7-19
   * **Linear equations and inequalities**

Section 3: Questions 20-31
   * **Characteristics and behaviors of linear and non-linear functions**

Section 4: Questions 32-37
   * **Data and statistics**

* Be sure to answer all questions before you end the test session. However, do not spend too much time on any one question.

* If you do not know the answer to a question, make your best guess and go on to the next question.

* You will **not** be penalized for guessing.
ALGEBRA I END-OF-COURSE EXAM: PRACTICE TEST

1. Which numbers are both less than \( \frac{5}{6} \)?
   - A. -2.1 and \( \frac{6}{5} \)
   - B. \( \frac{2}{3} \) and \( \frac{3}{4} \)
   - C. -0.65 and -1.2
   - D. \( \frac{2}{3} \) and -0.8

2. What is the value of the expression \( 3x|x| \cdot x^2 \) when \( x = -2 \)?
   - A. -8
   - B. -6
   - C. 0
   - D. 8

3. Simplify \( \frac{(x^2 y^{10})^2}{x^5 y^3} \) to an expression with only positive exponents.
   - A. \( \frac{y^{17}}{x} \)
   - B. \( \frac{y^{15}}{x^5} \)
   - C. \( \frac{y^{23}}{x^9} \)
   - D. \( \frac{y^{26}}{x^7} \)
4. The kinetic energy (K) of a moving object can be found using the equation below, where m is the object’s mass and v is the object’s speed.

\[ K = \frac{mv^2}{2} \]

Which shows this equation solved for m in terms of K and v?

- **A.** \( m = \frac{K}{2v^2} \)
- **B.** \( m = \frac{v^2}{2K} \)
- **C.** \( m = \frac{2K}{v^2} \)
- **D.** \( m = \frac{2v^2}{K} \)

5. For what values of \( a \) is \( \frac{1}{a} \) an integer?

- **A.** When \( a \) is an integer
- **B.** When \( a \) is a positive number
- **C.** When \( a \) is greater than 0 and less than 1
- **D.** When \( a \) is greater than 0

6. Write the expression in simplest radical form.

\[ \sqrt{\frac{18}{24}} \]

Write your answer on the line.

**What is the simplest radical form of the expression?** _______________
7. Which graph represents the solution set for $15 \leq 7n - 2(n - 10) < 35$?

A. 

B. 

C. 

D. 

8. Which equation represents the line that passes through the points (2, 2) and (4, 1)?

A. $y = 2x + 6$

B. $y = \frac{1}{2}x + 3$

C. $y = \frac{1}{2}x + 1$

D. $y = 2x + 2$
9. Empire Disposal has three salary options for its part-time summer employees. The total money earned is related to the amount of cans recycled and an optional hourly wage.

- **Option 1**: $0.25 a can plus $1.00 an hour
- **Option 2**: $0.05 a can plus $5.00 an hour
- **Option 3**: $0.40 a can and no hourly wage

Jamal estimates that he can recycle a minimum of 20 cans per hour.

- Based on Jamal’s estimation, which option will allow Jamal to make the most money?
- Show your work to support your answer using words, numbers, and/or diagrams.

Which option allows Jamal to make the most money? __________________________
10. Two-hundred items were sold during the High School Math Competition Finals in Wenatchee for a total of $130.00. The only items sold were cans of pop for $0.50 and bags of popcorn for $0.75.

How many of each item was sold?

☐ A. 120 cans of pop, 80 bags of popcorn
☐ B. 80 cans of pop, 120 bags of popcorn
☐ C. 160 cans of pop, 40 bags of popcorn
☐ D. 40 cans of pop, 160 bags of popcorn

11. Determine the solution to the equation

\[ 3 \cdot \frac{1}{4} x \cdot \frac{1}{4} \div 4x = 1 \]

Write your answer on the line.

**The solution to** \[ 3 \cdot \frac{1}{4} x \cdot \frac{1}{4} \div 4x = 1 \]** is ____________**

12. Solve \[ 2|3x + 2| - 5 = 7 \].

☐ A. \( x = -1 \) only
☐ B. \( x = 1 \) only
☐ C. \( x = -1 \) or \( x = \frac{1}{3} \)
☐ D. no solution
13. Describe what the graph of the equation \( y = 6 = 3(x + 1) \) looks like.

- **A.** The line has a slope of 3 and goes through the point (1, -6).
- **B.** The line has a slope of 3 and goes through the point (-1, 6).
- **C.** The line has a slope of 3 and goes through the point (-6, 1).
- **D.** The line has a slope of 3 and goes through the point (6, -1).

14. The solution set of which system of inequalities is graphed?

- **A.** \( y < 3x - 1 \)
  \( y < x + 2 \)
- **B.** \( y < 3x - 1 \)
  \( y > x + 2 \)
- **C.** \( y > 3x - 1 \)
  \( y < x + 2 \)
- **D.** \( y > 3x - 1 \)
  \( y > x + 2 \)

15. Mary is going to deposit an equal amount of money into a checking account each month until she has saved $500. The amount of money, \( y \), in the account after \( x \) months can be modeled by the equation \( y = 25x + 100 \).

What does the slope of the graph of the equation represent?

- **A.** The amount of money deposited monthly
- **B.** The amount of money originally in the account
- **C.** The number of months it would take to earn $100
- **D.** The number of months it would take to reach $500
16. A line has an x-intercept of (2, 0) and a y-intercept of (0, -4).

Determine the equation of the line in Standard Form.

Write your solution on the line below.

**Equation of the line in Standard Form**

17. Which ordered pair is the solution to the system of equations below?

\[
\begin{align*}
3x - 7y &= -10 \\
5x - y &= -6
\end{align*}
\]

- A. -1, -13
- B. 0, 10
- C. -1, 1
- D. 1, -1

18. Consider the two equations below.

\[
\begin{align*}
x + y &= 6 \\
y &= x + 2
\end{align*}
\]

Which statement correctly describes the graphs of these equations?

- A. The lines are parallel
- B. The lines are perpendicular
- C. The lines coincide
- D. The lines intersect at (2, 4)
19. Sally works as a car salesperson and earns a monthly salary of $2,000. She also earns $500 for each car (C) she sells. Which equation represents her total monthly income (I) in dollars?

   A. \[I = 12(2,000 + 500C)\]
   B. \[I = 2,000 + 500C\]
   C. \[I = (2,000 + 500)C\]
   D. \[I = 2,000C + 500\]

20. The town of Colville had a population of 27,500 until the town’s largest employer went bankrupt. Which function model’s the population \(t\) years after the bankruptcy if it decreased by 3% each year.

   A. \[p(t) = 27,500(.03)^t\]
   B. \[p(t) = 27,500(1.03)^t\]
   C. \[p(t) = 27,500(.97)^t\]
   D. \[p(t) = 27,500(1.97)^t\]
21. The out-of-pocket costs to an employee for health insurance and medical expenses for one year are shown in the table below.

According to the plan outline in the table, total annual health care costs, C, depend on the employee’s medical expenses for that year. If x represents the total medical expenses of an employee on this plan and \( x \geq 500 \), which of the following equations can be used to determine this employee’s total health care costs for that year?

- O A. \( C = 3,626 - 500 + 0.20(x - 500) \)
- O B. \( C = 3,626 - 500 + 0.20x \)
- O C. \( C = 3,626 + 500 + 0.20(x - 500) \)
- O D. \( C = 3,626 + 500 + 0.20x \)

Justify your selection in the box below using words, numbers, and/or diagrams.

<table>
<thead>
<tr>
<th>Type of Cost</th>
<th>Definition</th>
<th>Cost to Employee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premium</td>
<td>Total amount employee pays insurance company for the policy</td>
<td>$3,626</td>
</tr>
<tr>
<td>Deductible</td>
<td>Amount of medical expenses employee pays before insurance company pays for anything</td>
<td>$500</td>
</tr>
<tr>
<td>Co-payment</td>
<td>Percentage of medical expenses after the first $500 that employee has to pay</td>
<td>20%</td>
</tr>
</tbody>
</table>
22. The Walla Walla High School baseball team is doing a fundraiser selling pizzas at a basketball game. The total amount $y$ in their account after the fundraiser is a function of the number of pizzas $x$ they sell and can be modeled by the function $y = 200 + 10x$.

- State the domain and range in the context of the problem if they have 25 pizzas to sell.
- Write your answer on the line.

**Domain:** ____________________  **Range:** ____________________

23. Which family of functions best represents the values in the table below?

<table>
<thead>
<tr>
<th>$x$</th>
<th>$f(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>$\frac{2}{3}$</td>
</tr>
<tr>
<td>4</td>
<td>$\frac{1}{2}$</td>
</tr>
<tr>
<td>5</td>
<td>$\frac{2}{5}$</td>
</tr>
</tbody>
</table>

- A. Linear
- B. Exponential
- C. Inverse Variation
- D. Absolute Value
24. Use the following function:

\[ f(x) = \frac{2 + x}{3} \]

- Evaluate \( f(x) \) at \( f(6) \).
- Determine \( x \) when \( f(x) = 4 \)

Write your answer on the line.

\[ f(6) = \underline{\phantom{000}} \]

\[ x = \underline{\phantom{000}} \]

25. Which statement best describes the transformation of the graph of \( y = |x| \) to the graph of \( y = |x + 2| + 4 \)?

- OA. The graph shifts up 2 units and left 4 units.
- OB. The graph shifts down 2 units and right 4 units.
- OC. The graph shifts right 2 units and up 4 units.
- OD. The graph shifts left 2 units and down 4 units.
26. Consider the graph below.

Which function is best represented by this graph?

- **A.** \( f(x) = 2^x \)
- **B.** \( f(x) = -2^x \)
- **C.** \( f(x) = \frac{1}{2^x} \)
- **D.** \( f(x) = 2 \frac{1}{2^x} \)

27. When \( 2^x = 16^5 \), what is the value of \( x \)?

- **A.** 4
- **B.** 9
- **C.** 20
- **D.** 32
28. John is selling pizzas to earn money to go on a band trip. Each pizza costs $10. He sold pizzas to 5 of his friends. The table below shows his sales.

<table>
<thead>
<tr>
<th>Friend</th>
<th>Number of Pizzas Sold</th>
<th>Cost of Pizzas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>$10</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>$20</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>$30</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>$40</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>$50</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>$150</td>
</tr>
</tbody>
</table>

Which would be the recursive formula for the cost of the pizza?

○ A. \( a_k = a_{k-1} + 10 \)
○ B. \( a_k = a_{k-1} - 10 \)
○ C. \( a_k = a_{k-1} + 1 \)
○ D. \( a_k = a_{k-1} - 1 \)
29. Which of the following represents $y$ as a function of $x$?
30. Jessica is making beaded bracelets to give to her friends. She is able to make 3 bracelets per hour. What are the independent and dependent variables in this situation?

   ○ A. The independent variable is the number of bracelets made and the dependent variable is the time.

   ○ B. The independent variable is the time and the dependent variable is the number of beads on each bracelet.

   ○ C. The independent variable is the time and the dependent variable is the number of bracelets made.

   ○ D. The independent variable is the number of bracelets made and the dependent variable is the rate at which she can make the bracelets.
31. The table below shows the average life expectancy (in years) of a person based on various years of birth.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Expectancy (years)</td>
<td>50</td>
<td>54.1</td>
<td>59.7</td>
<td>62.9</td>
<td>68.2</td>
<td>69.7</td>
<td>70.8</td>
<td>73.7</td>
<td>75.4</td>
</tr>
</tbody>
</table>

- Use the table to generate a scatterplot where x represents the number of years since 1900 and y represents life expectancy.
- Draw a line of best fit for the data points and write an equation to represent your line of best fit.
- Use your equation for the line of best fit to predict the life expectancy of someone born in 2012.
32. Mr. William’s decided to display the scores from his chemistry test graphically by a box and whisker plot. If the average on the test was an 80%, which of the following shows that 50% of the students got at least an 80% on the test?

- [ ] A. 
- [ ] B. 
- [ ] C. 
- [ ] D. 

33. A college professor at the University of Washington surveyed 150 students at the university. The students were asked if they prefer in class or take home tests. The professor drew the conclusion: “One out of four college students prefer take home tests.” Explain why this conclusion is misleading.

- [ ] A. The professor surveyed a small sample of the population at one university but made the conclusion about the entire population of college students.
- [ ] B. The survey question was biased toward in class tests.
- [ ] C. The students were not selected randomly.
- [ ] D. The sample size was too small.

34. Two different surveys were taken and included the age of each person. The first survey was a group of students at Lake Washington High School and was 10, 11, 12, 13, 14, and 15 years old. The other was a group of adults that were twice their age. What happens to the mean and range in comparing the children and adult ages?

- [ ] A. The mean doubles and the range stay the same.
- [ ] B. The mean doubles and the range doubles.
- [ ] C. The mean increases and the range decreases.
- [ ] D. The mean doubles and the range increases by an unknown amount.
35. A movie theater sells tickets and refreshments as a fundraiser. The data points below show the amount of money collected after every five customers completed all of their purchases.

What does the slope of the line of best fit represent?

- O A. The cost of one ticket.
- O B. The exact amount of money spent by each customer.
- O C. The average amount of money spent by each customer.
- O D. The difference between the amounts spent by any group of two customers.
36. The line graph represents the price of a Macbook Pro laptop over a five-year period. Explain why the graph is misleading. What might someone believe because of the graph?

[Diagram of a line graph showing computer price from 2002 to 2006 with points at $2000, $1600, $1300, $1900, and $800 on the vertical axis and years 2002 to 2006 on the horizontal axis.]

Options:
A. The graph is misleading because the vertical axis does not start at zero. Someone might believe that the price change from 2004 to 2005 was the same as the price change from 2005-2006. In fact, the price change was much different.
B. The graph is misleading because not enough years are shown. Someone might believe that the price of the computers has decreased over time. In fact, if the graph had included years before 2002, it would show an increase, then a decrease.
C. The graph is misleading because a line graph is not a good way to show trends. Someone might believe that the computer price has declined significantly over the past 5 years. In fact, the price has stayed almost the same.
D. The graph is misleading because the intervals on the vertical axis are not equal. Someone might believe that the price declined quickly from 2002 to 2004, then more slowly. In fact, the price declined $200 each year.
37. Which term best describes the scatterplot below?

- A. Strong Positive correlation
- B. Weak Positive correlation
- C. Strong Negative correlation
- D. Weak Negative correlation
# Mathematics Formula Sheets for End-of-Course Exams

Use at least two decimal place values when approximating square roots or trigonometric ratios.

<table>
<thead>
<tr>
<th>Description</th>
<th>Formula</th>
<th>Variables</th>
</tr>
</thead>
</table>
| Arc Length        | \( L = \frac{mBC}{360} \pi d \)      | \( L: \text{Arc Length} \)  
|                   |                                        | \( B, C: \text{endpoints of arc} \)  
|                   |                                        | \( d: \text{diameter of the circle} \)  
|                   |                                        | \( m: \text{the measure of} \)  |
| Area of Sector    | \( A = \frac{mBC}{360} \pi r^2 \)    | \( A: \text{Area of Sector} \)  
|                   |                                        | \( B, C: \text{endpoints of intercepted arc} \)  
|                   |                                        | \( r: \text{radius of the circle} \)  
|                   |                                        | \( m: \text{the measure of} \)  |
| Cylinder          | \( SA = 2\pi r^2 + 2\pi rh \)        | \( SA: \text{Surface Area} \)  
|                   |                                        | \( r: \text{radius of the base} \)  
|                   |                                        | \( h: \text{height} \)  |
|                   | \( V = \pi r^2 h \)                   | \( V: \text{Volume} \)  
|                   |                                        | \( r: \text{radius of the base} \)  
|                   |                                        | \( h: \text{height} \)  |
| Cone              | \( SA = \pi r^2 + \pi rl \)          | \( SA: \text{Surface Area} \)  
|                   |                                        | \( r: \text{radius of the base} \)  
|                   |                                        | \( l: \text{slant height} \)  |
|                   | \( V = \frac{1}{3} Bh \) or \( V = \frac{1}{3} \pi r^2 h \) | \( V: \text{Volume} \)  
|                   |                                        | \( r: \text{radius of the base} \)  
|                   |                                        | \( h: \text{height} \)  
|                   |                                        | \( B: \text{area of the base} \)  |
| Prism             | \( V = Bh \)                          | \( V: \text{Volume} \)  
|                   |                                        | \( B: \text{area of the base} \)  
|                   |                                        | \( H: \text{height} \)  |
|                   | \( SA = 2B + Ph \) or \( SA = 2B + L \) | \( SA: \text{Surface Area} \)  
|                   |                                        | \( B: \text{area of the base} \)  
|                   |                                        | \( P: \text{Perimeter of the base} \)  
|                   |                                        | \( h: \text{height} \)  
|                   |                                        | \( L: \text{lateral surface area} \)  |
| Pyramid           | \( V = \frac{1}{3} Bh \)             | \( V: \text{Volume} \)  
|                   |                                        | \( B: \text{area of the base} \)  
|                   |                                        | \( h: \text{height} \)  |
| Quadratic Formula | \( x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \) | \( x: \text{solution} \)  
|                   |                                        | \( a, b, c: \text{coefficients} \)  |
| Sphere            | \( V = \frac{4}{3} \pi r^3 \)        | \( V: \text{Volume} \)  
|                   |                                        | \( r: \text{radius} \)  |
|                   | \( SA = 4\pi r^2 \)                   | \( SA: \text{Surface Area} \)  
|                   |                                        | \( r: \text{radius} \)  |
Mathematics Formula Sheets for End-of-Course Exams

Use at least two decimal place values when approximating square roots or trigonometric ratios.

**Special Right Triangles**

![Diagram](30° - 60°)

- \( x \sqrt{3} \)
- \( x \)
- \( 30° \)

\[ x = \frac{2}{\sqrt{3}} \]

**45° - 45° - 90°**

![Diagram](45° - 45°)

- \( s \)
- \( s \sqrt{2} \)
- \( 45° \)

\[ s = \frac{s \sqrt{2}}{2} \]

**Trigonometric Ratios**

- \( \sin B = \frac{b}{c} \)
- \( \cos B = \frac{a}{c} \)
- \( \tan B = \frac{b}{a} \)
<table>
<thead>
<tr>
<th>Problem Number</th>
<th>Answer</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A1.2.A</td>
<td>A1.2.B</td>
</tr>
<tr>
<td>2</td>
<td>A1.2.C</td>
<td>A1.2.B</td>
</tr>
<tr>
<td>3</td>
<td>A1.2.C</td>
<td>A1.2.C</td>
</tr>
<tr>
<td>4</td>
<td>A1.7.D</td>
<td>A1.7.D</td>
</tr>
<tr>
<td>5</td>
<td>A1.2.B</td>
<td>A1.2.B</td>
</tr>
<tr>
<td>6</td>
<td>A1.2.C</td>
<td>A1.2.C</td>
</tr>
<tr>
<td>7</td>
<td>A1.4.A</td>
<td>A1.4.A</td>
</tr>
<tr>
<td>9</td>
<td>Short Answer</td>
<td>A1.1.B</td>
</tr>
<tr>
<td>11</td>
<td>A1.4.A</td>
<td>A1.4.A</td>
</tr>
<tr>
<td>12</td>
<td>A1.4.A</td>
<td>A1.4.A</td>
</tr>
<tr>
<td>14</td>
<td>A1.4.D</td>
<td>A1.4.D</td>
</tr>
<tr>
<td>17</td>
<td>A1.4.D</td>
<td>A1.4.D</td>
</tr>
<tr>
<td>19</td>
<td>A1.1.A</td>
<td>A1.1.A</td>
</tr>
</tbody>
</table>

**Scale Score:** / 40