



# Unit 1

## Directions:

Today, you will be taking Unit 1 of the Algebra I Practice Test.

Read each question carefully. Some questions will ask you to choose one correct answer, while others will ask you to choose more than one correct answer. Mark your answers by filling in the circles in your Test Booklet for the answers you choose.

If a question asks you to show or explain your work, you must do so to receive full credit. Be sure to:

- Write your response in the box provided in your Test Booklet.
- Label each part of your work if a question has multiple parts, and clearly identify your answer for each part.
- Respond in the box provided. Crossed-out work, writing that falls outside of the box, or work on scratch paper will not be scored.

Do not make any stray marks on the Test Booklet. If you need to change an answer, be sure to erase your first answer completely.

## Calculator Directions:

In the first section of this unit, you may not use a calculator. You will not be allowed to return to the non-calculator section of the test after you have started the calculator section of the test.

If you do not know the answer to a question, skip it and go on. If you finish the non-calculator section of Unit 1 early, you may review your answers and any questions you may have skipped in the non-calculator section ONLY.

**Do NOT go on to the calculator section in Unit 1 until directed to do so.**

**Directions for Completing the Answer Grids**

1. Work the problem and find an answer.
2. Write your answer in the boxes at the top of the grid.
  - Print only one digit or symbol in each box. You may not need all the boxes to enter an answer, but do not leave a blank box in the middle of an answer.
3. Under each box in which you wrote your answer, fill in the bubble that matches the number or symbol you wrote above.
  - Fill in one and ONLY one bubble for each box. Do not fill in a bubble under an unused box.
  - Fill in each bubble by making a solid mark that completely fills the circle.
  - Fractions cannot be entered into an answer grid and will not be scored. Enter fractions as decimals.
4. See below for examples on how to correctly complete an answer grid.

To answer  $-3$  in a question, fill in the answer grid as follows:

-	3				
●					
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
●	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○

To answer  $.75$  in a question, fill in the answer grid as follows:

.	7	5			
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○

**GO ON TO NEXT PAGE**

# Unit 1 - Section 1 (Non-Calculator)

This unit has two sections: a non-calculator and a calculator section.

You will now take the first section of this unit in which you may not use a calculator. You will not be allowed to return to the non-calculator section of the test after you have started the calculator section. You will need to finish both sections within the allotted testing time.

**Once you finish the non-calculator section, read the directions in your Test Booklet on how to continue.**

1. Which expression is equivalent to  $(3x^5 + 8x^3) - (7x^2 - 6x^3)$ ?

Ⓐ  $-4x^3 + 14$

Ⓑ  $-4x^5 + 14x^3$

Ⓒ  $3x^5 + 14x^3 - 7x^2$

Ⓓ  $3x^5 + 2x^3 - 7x^2$

2. Which points are on the graph of the equation  $-3x + 6y + 5 = -7$ ?

Select **all** that apply.

Ⓐ  $(-3, 6)$

Ⓑ  $(-2, 0)$

Ⓒ  $(0, -2)$

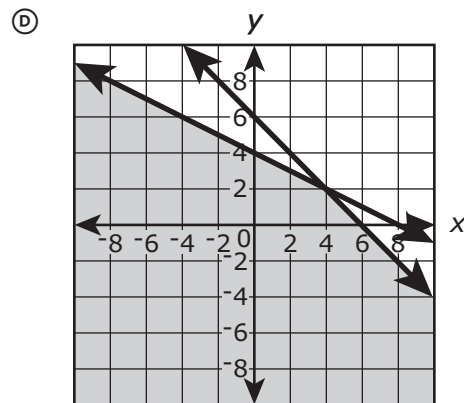
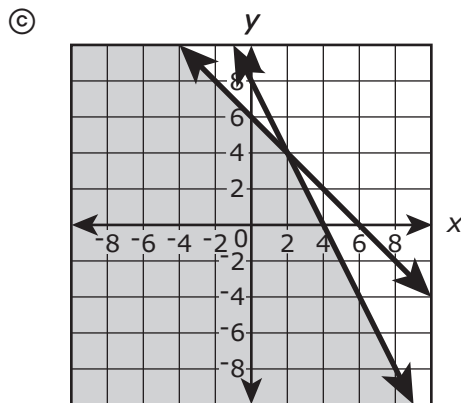
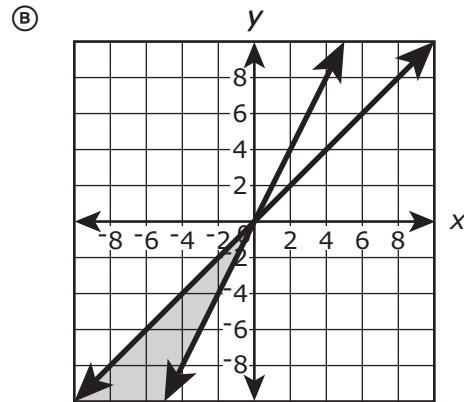
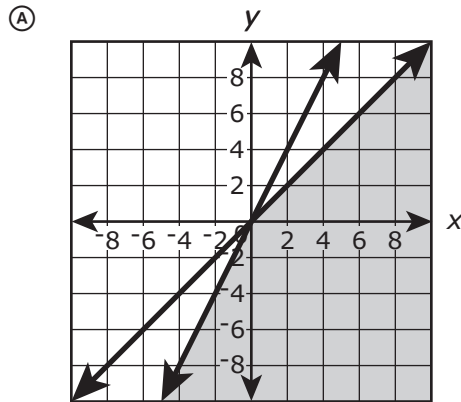
Ⓓ  $(6, -3)$

Ⓔ  $(8, 2)$

3. Which graph **best** represents the solution to this system of inequalities?

$$x + y \leq 6$$

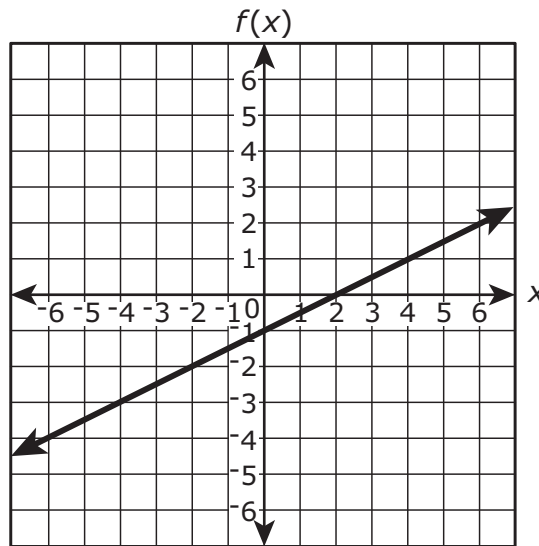
$$x + 2y \leq 8$$



4. Which factorization can be used to reveal the zeros of the function  $f(n) = -12n^2 - 11n + 15$ ?

- (A)  $f(n) = -n(12n + 11) + 15$
- (B)  $f(n) = (-4n + 3)(3n + 5)$
- (C)  $f(n) = -(4n + 3)(3n + 5)$
- (D)  $f(n) = (4n + 3)(-3n + 5)$

5. The graph of the function  $f(x) = -1 + 0.5x$  is shown on the coordinate plane. For what value of  $x$  does  $f(x) = 0$ ?

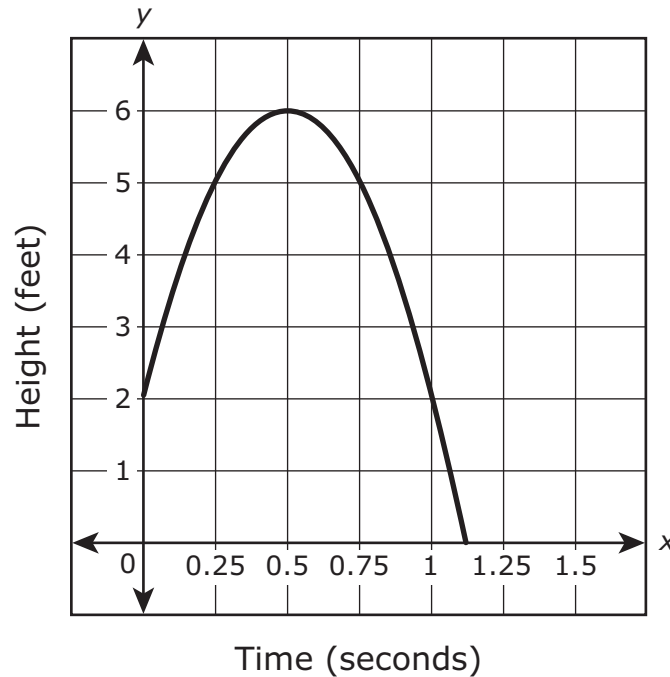


Enter your answer in the box.

⊖					
•	•	•	•	•	•
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9



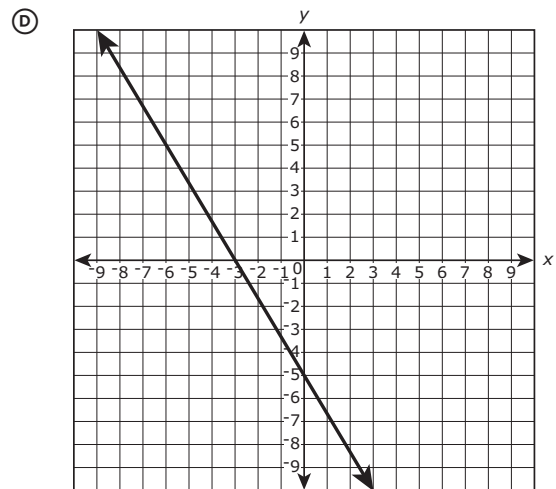
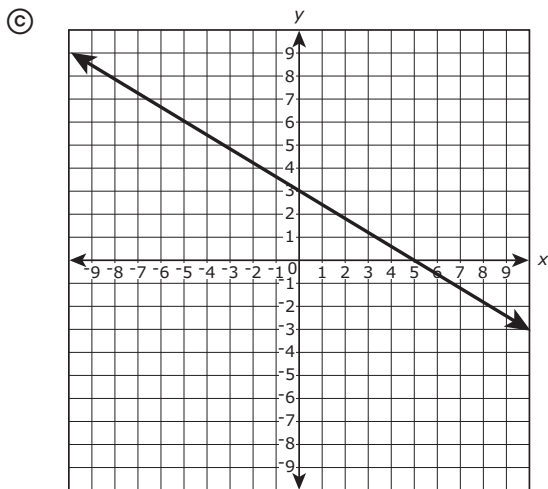
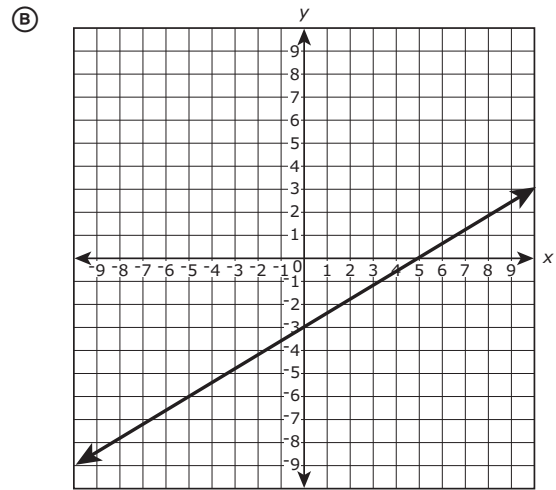
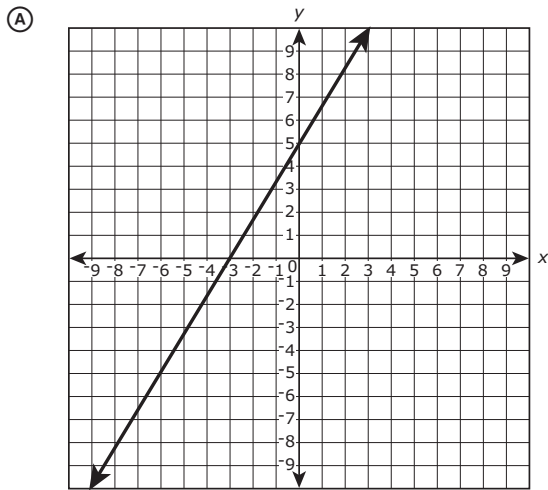
6. A tennis ball was 2 feet off the ground when a tennis player hit it so that the ball traveled up in the air before coming back to the ground. The height of the tennis ball is described by the graph shown. Numbers along the  $x$ -axis represent the time, in seconds, after the ball was hit, and the numbers along the  $y$ -axis represent the height, in feet, of the ball at time  $x$ .



Use the graph to estimate the average rate of change of the height of the ball for the first 0.25 second after being hit.

- Ⓐ 0.75 feet per second
- Ⓑ 3.0 feet per second
- Ⓒ 12 feet per second
- Ⓓ 20 feet per second

7. Which graph represents the equation  $5y - 3x = -15$ ?





**You have come to the end of the non-calculator section in Unit 1 of the test.**

- **If you have time, review your answers in the non-calculator section ONLY. You will not be allowed to return to the non-calculator section once you have received your calculator.**
- **Then, raise your hand to receive your calculator before going on to the calculator section.**







# Unit 1 - Section 2 (Calculator)

Once you have received your calculator, continue with the calculator section.



8. The formula for finding the perimeter,  $P$ , of a rectangle with length  $l$  and width  $w$  is given.

$$P = 2l + 2w$$

Which formula shows how the length of a rectangle can be determined from the perimeter and the width?

- (A)  $l = \frac{P}{2} - 2w$
- (B)  $l = \frac{P-2w}{2}$
- (C)  $l = \frac{P}{2} + w$
- (D)  $l = \frac{P-2}{2w}$
9. At the beginning of an experiment, the number of bacteria in a colony was counted at time  $t = 0$ . The number of bacteria in the colony  $t$  minutes after the initial count is modeled by the function  $b(t) = 4(2)^t$ . Which value and unit represent the average rate of change in the number of bacteria for the first 5 minutes of the experiment?

Select **all** that apply.

- (A) 24.0
- (B) 24.8
- (C) 25.4
- (D) 25.6
- (E) bacteria
- (F) minutes
- (G) bacteria per minute
- (H) minutes per bacteria



Use the information provided to answer Part A through Part C for question 10.

Consider the three points  $(-4, -3)$ ,  $(20, 15)$ , and  $(48, 36)$ .

**10. Part A**

Which points are on the same line that passes through  $(-4, -3)$ ,  $(20, 15)$ , and  $(48, 36)$ ?

Select **all** that apply.

- Ⓐ  $(-8, -6)$
- Ⓑ  $(-2, -1)$
- Ⓒ  $(0, 0)$
- Ⓓ  $(4, 3)$
- Ⓔ  $(6, 8)$



**Part B**

Use the information from Part A to explain why the ratio of the  $y$ -coordinate to the  $x$ -coordinate is the same for any point on the line except the  $y$ -intercept.

Explain why this is not true for the  $y$ -intercept.

Enter your explanations in the space provided.



**Part C**

Do the points on the line  $y = 3x - 2$  have a constant ratio of the  $y$ -coordinate to the  $x$ -coordinate for any point on the line except the  $y$ -intercept? Explain your answer.

Enter your answer and your explanation in the space provided.



Use the information provided to answer Part A through Part C for question 11.

Phil and Matt made cookies for a fundraiser at their high school.

- Phil made 25% more cookies than Matt.
- The cookies sold for \$0.25 each.
- After the sale, 20% of the combined total of their cookies remained.

**11. Part A**

Create an equation to represent the total amount of money Matt and Phil earned at the fundraiser based on the number of cookies Matt made. Explain how you determined your equation.

Enter your equation and your explanation in the space provided.

**Part B**

Phil and Matt made a total of \$72.00 selling the cookies. How many cookies did Phil make and how many cookies did Matt make? Show your work.

Enter your answers and your work in the space provided.

**Part C**

Next year Phil and Matt may sell the cookies for \$.50 each. They plan to make the same total number of cookies, but they predict that they will only sell 70% of them given the price increase. Based on their prediction, should Phil and Matt raise the price of the cookies? Justify your answer.

Enter your answer and your justification in the space provided.



12. Let  $|x| + |y| = c$ , where  $c$  is a real number.

Determine the number of points that would be on the graph of the equation for **each** given case:

Case 1:  $c < 0$

Case 2:  $c = 0$

Case 3:  $c > 0$

Justify your answers.

Enter your answers and justifications in the space provided.



13. What is one solution of the equation  $x^2 - 21.75x = -15.75$ ?

Enter your answer in the box.

⊖					
⊙	⊙	⊙	⊙	⊙	⊙
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

14. If  $a$  is a non-zero, real number and  $a(x - 3)^2 - b = c$ ,

- Prove that  $x = 3 \pm \sqrt{\frac{b+c}{a}}$ . Show your work.
- If  $a = 2$  and  $b = 5$ , determine what condition(s) on  $c$  will restrict the solutions for  $x$  to real numbers.

Explain your reasoning.

Enter your proof, your answer, and your explanation in the space provided.



**15.** Consider the following claim: If the point  $(2 + d, y)$  is on the graph of the function  $f(x) = x(x - 4)$ , then the point  $(2 - d, y)$  is also on the graph.

- Use algebra to show that the claim is true.
- What is the relationship between the line  $x = 2$  and the graph of  $f(x)$ ? Justify your reasoning.

Enter your work, your answer, and your justification in the space provided.



Use the information provided to answer Part A and Part B for question 16.

The Water Watch program is encouraging customers to reduce the amount of water they use each day. The program is selling low-flow showerheads, which use 2 gallons of water per minute, for \$54.00 each.

A family currently has a showerhead that uses 5 gallons of water per minute and is considering replacing it with one of the low-flow showerheads. The family uses the shower an average of 20 minutes per day and pays \$0.002 per gallon of water.

**16. Part A**

Create a model that can be used to determine the cost savings, in dollars, for the family to purchase and use a low-flow showerhead in terms of the number of days.

Then determine the number of days at which the family will start saving money. Justify your answer in terms of the context.

Enter your model, answer, and justification in the space provided.



**Part B**

One year after the low-flow showerhead is purchased, the cost of water increases by 5%. Create a new model to determine the cost savings, in dollars, with the increase in the cost of water.

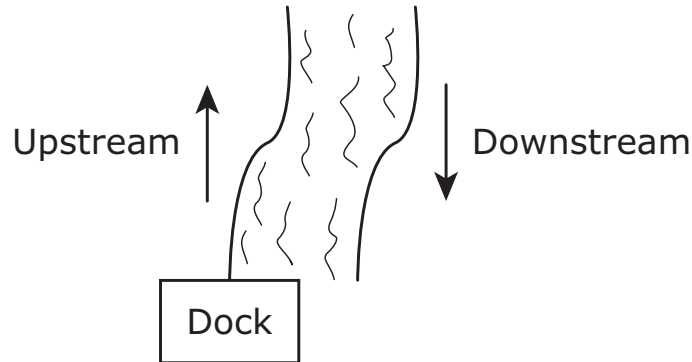
Use your model to determine the number of days at which the family will start saving money after the increase in the cost of water. Justify your answer.

Enter your model, answer, and justification in the space provided.





17. Gabriel operates a riverboat and frequently offers tours of the river. Typically, a tour lasts for 3.25 hours. The riverboat usually takes 2.00 hours to make the 25-mile trip upstream from the dock and 1.25 hours to make the 25-mile return trip downstream.



Gabriel is considering offering a shorter tour that will last 2.50 hours and travel only 20 miles upstream before returning. Will the shorter tour be possible if the riverboat travels at the same speed as it does in the 3.25-hour tour? Show your steps and justify your answer.

Enter your answer, your work, and your justification in the space provided.



Use the information provided to answer Part A and Part B for question 18.

A high school is having a talent contest and will give different prizes for the best 5 acts in the show. First place wins the most money, and each place after that wins \$50 less than the previous place.

**18. Part A**

Create a model that can be used to determine the total amount of prize money based on the value of the first place prize.

Enter your model in the space provided.

**Part B**

The talent contest has a total of \$1,000 in prize money. What is the amount of money for **each** of the five prizes? Show your work.

Enter your answers and your work in the space provided.





**You have come to the end of the calculator section in Unit 1 of the test.**

- **Review your answers in the calculator section of Unit 1 only.**
- **Then, close your test booklet and raise your hand to turn in your test materials.**





# ALG-1

