Algebra

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.

Alg "PBA"
Practice Test
Solutions #1

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

Ⓐ $-4x^3 + 14$

Ⓑ $-4x^5 + 14x^3$

Ⓒ $3x^5 + 14x^3 - 7x^2$

Ⓓ $3x^5 + 2x^3 - 7x^2$

$8x^3 - (-6x^3)$

$= 14x^3$

only like terms

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

Select **all** that apply.

Ⓐ $(-3, 6)$

Ⓑ $(-2, 0)$

Ⓒ $(0, -2)$ → $-3(0) + 6(-2) + 5 = -7$

Ⓓ $(6, -3)$

Ⓔ $(8, 2)$

$0 - 12 + 5 = -7$

$-7 = -7$ ✓

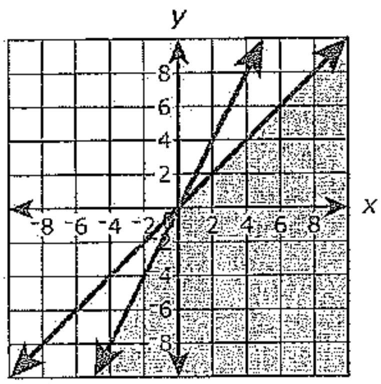
(x,y) plug in all to check

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

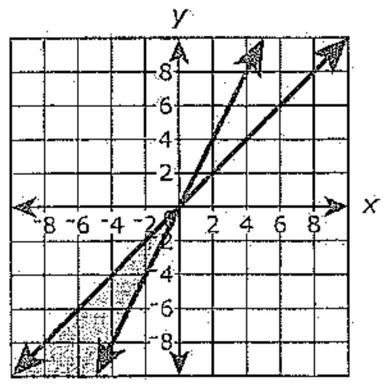
always solve for y first

$$x + y \le 6 \qquad y \le -x + 6$$
$$x + 2y \le 8 \qquad y \le -\frac{x}{2} + 4$$

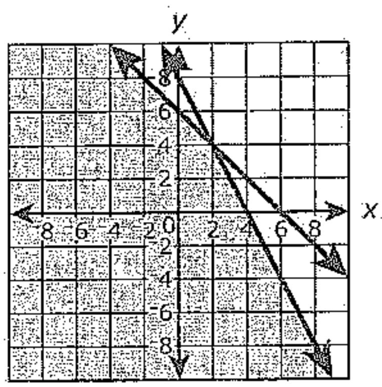
Ⓐ



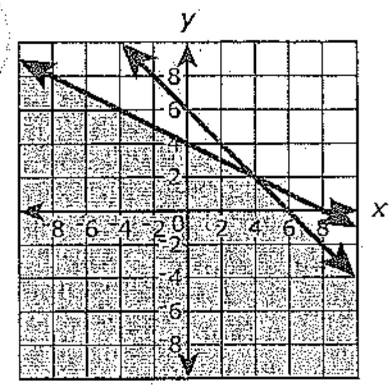
Ⓑ



Ⓒ



Ⓓ



Shaded below both

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

easiest way is to think backwards when you do FOIL, this equals what you are given

Ⓐ $f(n) = -n(12n + 11) + 15$

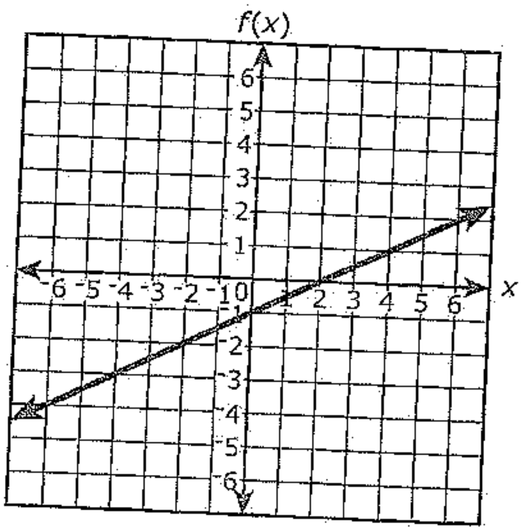
Ⓑ $f(n) = (-4n + 3)(3n + 5)$

Ⓒ $f(n) = -(4n + 3)(3n + 5)$

Ⓓ $f(n) = (4n + 3)(-3n + 5)$

GO ON ▶

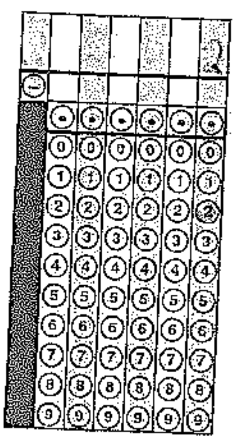
5. The graph of the function $f(x) = -1 + 0.5x$ is shown on the coordinate plane. For what value of x does $f(x) = 0$?



When $f(x) = \#$

x y

Enter your answer in the box.



$0 = -1 + 0.5x$

$1 = 0.5x$

$2 = x$

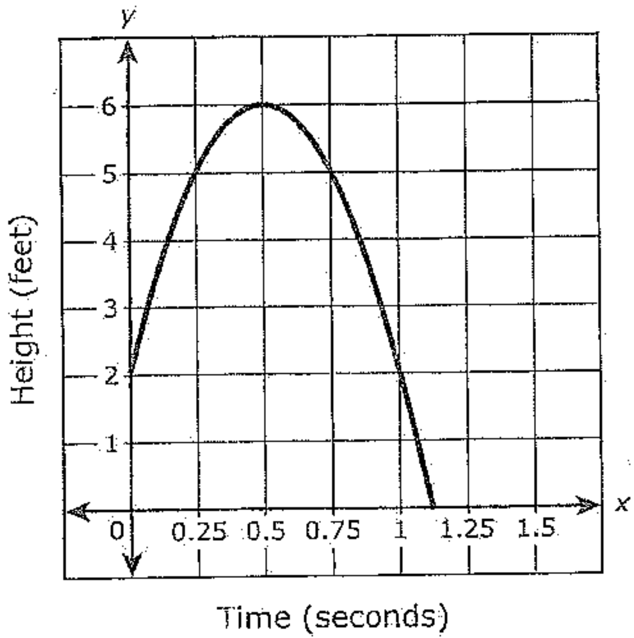
\# or look @ graph

when $y = 0$

$x = 2$

GO ON ▶

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

$\frac{\Delta y}{\Delta x} = \frac{5-2}{.25-0} = 12$

$\frac{y_2 - y_1}{x_2 - x_1}$

2 points on graph

(.25, 5)

(0, 2)

GO ON ▶

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?

Ⓐ $l = \frac{P}{2} - 2w$

Ⓑ $l = \frac{P-2w}{2}$

Ⓒ $l = \frac{P}{2} + w$

Ⓓ $l = \frac{P-2}{2w}$

$P = 2l + 2w$
$-2w \qquad -2w$

$\frac{P-2w}{2} = \frac{2l}{2}$

$\frac{P-2w}{2} = l$

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.

Ⓐ 24.0

Ⓑ 24.8

Ⓒ 25.4

Ⓓ 25.6

Ⓔ bacteria

Ⓕ minutes

Ⓖ bacteria per minute

Ⓗ minutes per bacteria

$4(2)^5 = 128$

$4(2)^0 = 4$

$\frac{128-4}{5-0} = 24.8$

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.

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

Choose any two given and find equation by

$y_2 - y_1 = m(x_2 - x_1)$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{15 - (-3)}{20 - (-4)} = \frac{18}{24} = \frac{3}{4}$

$y - y_1 = m(x - x_1)$

$y - 36 = \frac{3}{4}(x - 48)$

Now plug in points to check.

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.

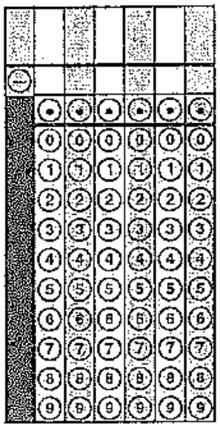
|x| and |y| are each nonegative for all numbers x and y (because this is absolute value). So the sum must be nonnegative. Therefore, the sum cannot equal a negative #. There are no solutions when $c<0$

If $c=0$, there is only one solution $(0,0)$.

If $c>0$, there are infinitely many solutions.

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

Enter your answer in the box.



$x^2 - 21.75x + 15.75 = 0$

$a = 1$

$b = -21.75$

$c = 15.75$

$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = 0.75$ or $x = 21$

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.

$a(x-3)^2 - b = c$

$+b \quad +b$

$\frac{a(x-3)^2}{a} = \frac{c+b}{a}$

$\sqrt{(x-3)^2} = \sqrt{\frac{c+b}{a}}$

$x = 3 \pm \sqrt{\frac{c+b}{a}} = 3 \pm \sqrt{\frac{c+5}{2}}$

For x to be a real number, $\frac{5+c}{2}$ must be greater to or equal to 0.

So $\frac{5+c}{2} \geq 0$

$5 + c \geq 0$

$c \geq -5$