LHS Algebra Pre-Test Solutions

Instructions

- The purpose of this test is to see whether you know Algebra 1 well enough to be prepared for Algebra 2.
- For fairness, since some students may not have calculators yet, this is a no-calculator test.
- Make sure that you show your work where requested.
- This test has a 55-minute time limit. Do the best you can in the allowed time.

Test format and scoring

		Your scores
Part A. Multiple choice questions	7 questions, 2 points each	_____ out of 14
Part B. Writing points, equations, etc.	4 problems, 4 points each	_____ out of 16
Part C. Real world problems	2 problems, 5 points each	_____ out of 10
Part D. Solving and simplifying	5 problems, 4 points each	_____ out of 20
		TOTAL: _____ **out of 60**

Part A. Multiple choice questions

Directions: Circle the letter (A, B, C, or D) next to the correct answer.

1. Which of these lines **<u>does not intersect</u>** the line $y = -x + 3$?

(A) $y = x - 3$
(B) $y = x + 3$
(C) $\underline{y = -x - 3}$ *Slopes are the same (-1) so the lines are parallel*
(D) $y = -3x$

2. Which of the following is equal to $(x^2y)^3$?

(A) x^2y^3
(B) x^5y^3
(C) x^5y^4
(D) $\underline{x^6y^3}$ *Law of Exponents:* $(x^2)^3 = x^{2*3} = x^6$

3. Suppose that $f(x)$ is a linear function with the values $f(-2) = 4$ and $f(3) = -6$. The graph of $f(x)$ is a line. What is the slope of the line?

(A) 2

(B) –2

(C) $\frac{1}{2}$

(D) $-\frac{1}{2}$

x	$f(x)$
-2	4
3	-6

$$\frac{-6 - 4}{3 - (-2)} = \frac{-10}{5} = -2$$

4. What are the solutions to $x^2 + 6 = -5x$?

(A) 2 and 3

(B) 2 and –3

(C) –2 and 3

(D) –2 and –3 $\quad x^2 + 5x + 6 = 0 \Rightarrow (x + 2)(x + 3) = 0$

5. Which of the following is a factorization of $6x^3 - 39x^2 - 21x$?

(A) $(3x^2 - 7)(2x + 3)$

(B) $3x(x - 7)(2x + 1)$ $\quad 6x^3 - 39x^2 - 21x = 3x(2x^2 - 13x - 7)$

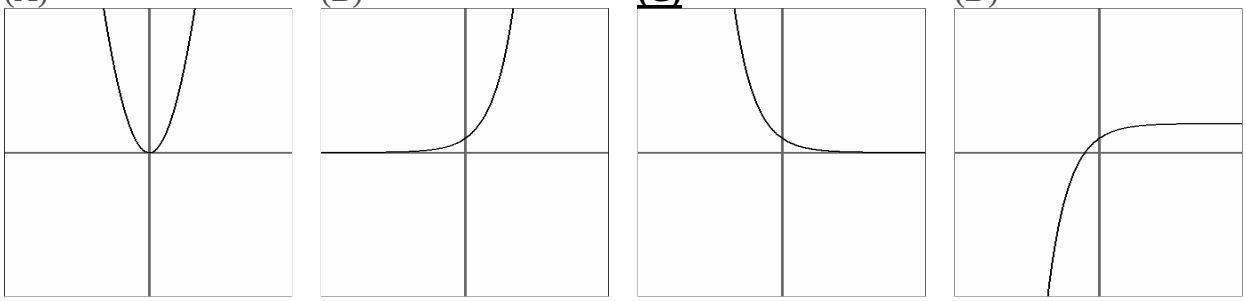
(C) $3x(2x - 1)(x + 7)$

(D) $3x(2x - 7)(x + 1)$

6. Which one of the following graphs could be the graph of $y = \left(\frac{1}{2}\right)^x$?

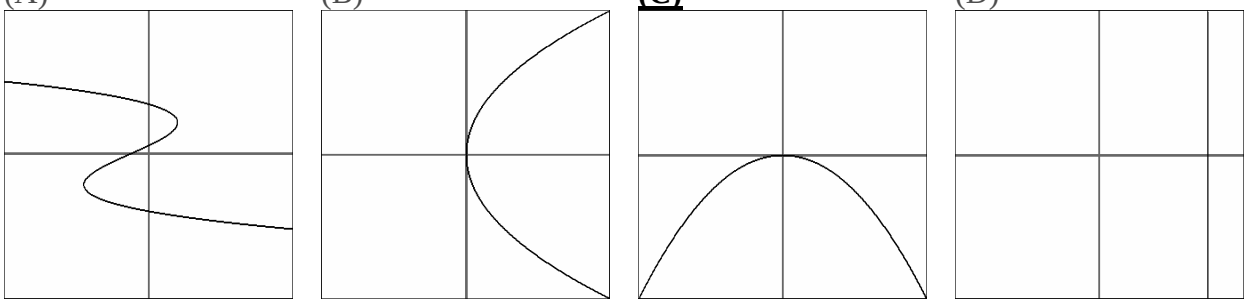
$\left(\frac{1}{2}\right)^x$ *gets smaller as x gets bigger (not A or B), never negative (not D)*

(A) (B) **(C)** (D)



7. Which one of the following graphs could be the graph of a **function** ? *Vertical Line Test (only one y-value for each x-value)*

(A) (B) **(C)** (D)



Part B. Writing points, equations, tables, and graphs

Directions: These problems ask you to write points, equations, tables, and graphs that meet certain requirements.

1. Here is a function whose graph is a line: $f(x) = -3x + 5$. *Below are examples.*

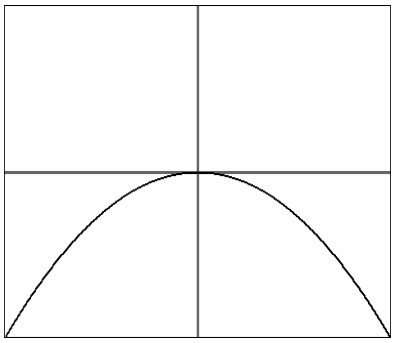
a. Write the coordinates of a point that **is** on this line. (1 , 2)

b. Write the coordinates of a point that **isn't** on this line. (1 , 3)

2. Write an equation whose graph is **a parabola** (also known as **quadratic**), then draw a rough sketch of its graph.

Equation: $y = -x^2$

Sketch of graph:



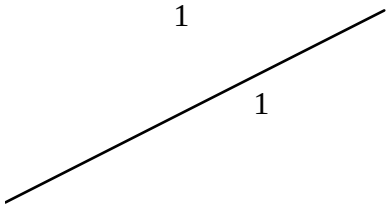
3. Make an input-output table for a line that has a slope of –4.
Hint: You might want to write an equation first. *Example: y = -4x + 2*

input (x)	output (y)
-2	10
-1	6
0	2
1	-2
2	-6

4. Here is a word description of a function: "Subtract 1, then multiply by $\frac{1}{2}$."

a. Write an equation for this function. Call the input x and the output y. $y = \frac{1}{2}(x - 1)$

b. On the grid, make a graph for this function.



Part C. Real world problems

1. A stamp collector adds 80 stamps to her collection every year. Right now, she has 400 stamps.

a. How many stamps will she have in her collection, 7 years from now?

7(80) + 400 = 560 + 400 = 960 stamps

b. How many stamps will she have in her collection, *n* years from now?
(Your answer should be a formula involving *n*.)

 # stamps = 80n + 400

where 400 is how many stamps she has now and she will add 80 more for each of n years

c. How many years will it take for the collection to reach 2000 stamps?
Find the answer by writing an equation, then solving the equation.
You must show your work.

$2000 = 80n + 400$

$1600 = 80n$

$\frac{1600}{80} = \frac{80n}{80}$

20 = n, therefore it will take her 20 years to have 2000 stamps

d. Suppose you made a graph of the relationship between the number of years and the number of stamps. What numbers would be the slope and the intercept?
(In this problem, intercept refers to the intercept on the "stamps" axis.)

slope = 80 intercept = 400

e. "When $n = -5$, the number of stamps equals 0."
What is the meaning of this observation in the context of the stamp collection?

Five years ago, she had no stamps.

2. Annie is 4 years younger than her brother Bill.

a. Fill in this table with some possible pairs of ages for Annie and Bill. *Examples below.*

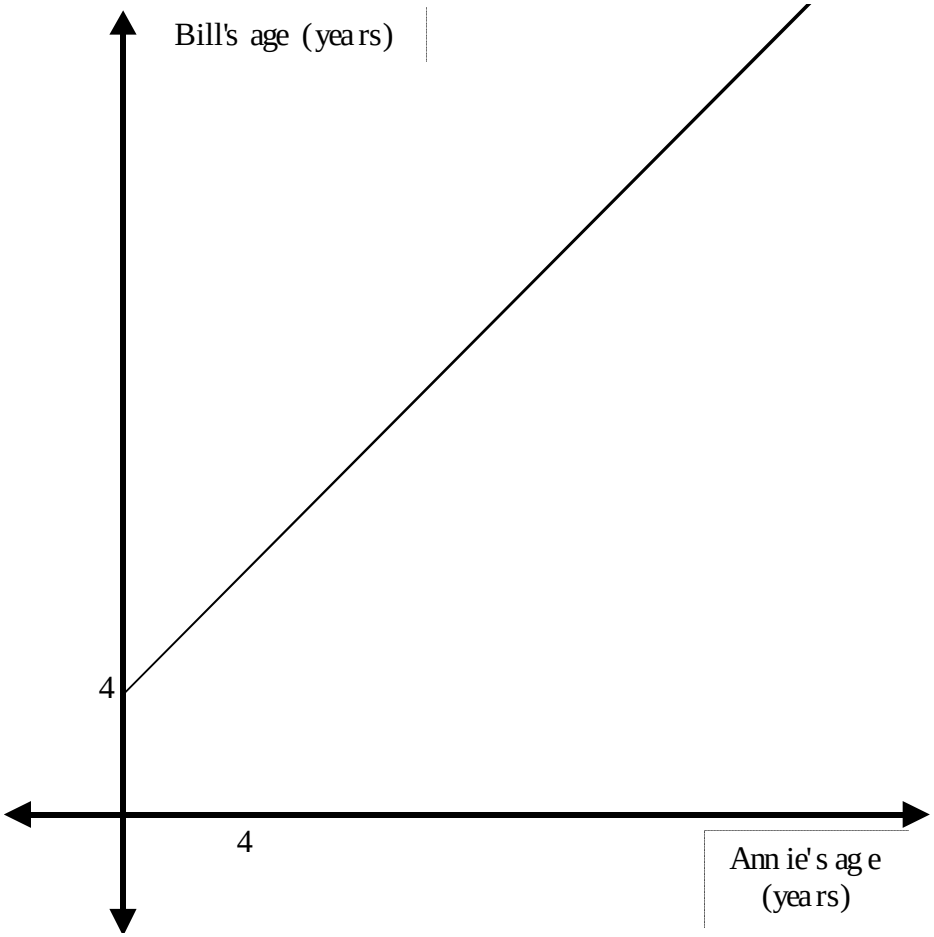
Annie's age	Bill's age
0	4
3	7
12	16
25	29
41	45
89	93

b. Write an equation that expresses Bill's age as a function of Annie's age.

Let B = Bill's age and A = Annie's age

B = A + 4

c. Draw a graph of Bill's age as a function of Annie's age.
(Begin by making axes and writing units and number labels on the axes.)



d. Find the slope of this line.

B = 1A + 4 so the slope is 1.

Part D. Solving and simplifying

Directions: Each problem asks you to solve or simplify something. Show your work in the spaces provided.

1. Solve this equation.

$-2(3x + 4) = -8x + 4$

Show your solving steps here:

$-2(3x + 4) = -8x + 4$	*Distribute the -2 on the left side of the equation*
$-6x + 8 = -8x + 4$	*Add 8x + 8 to both sides of the equation*
$2x = 12$	*Divide both sides by 2*
$x = 6$	

Write your solution here: $x = 6$

2. Simplify this number as much as possible.

$(\sqrt{5}) \cdot (2\sqrt{5}) \cdot (3\sqrt{5}) \cdot (4\sqrt{5})$

Show your simplifying steps here:

$(\sqrt{5}) \cdot (2\sqrt{5}) \cdot (3\sqrt{5}) \cdot (4\sqrt{5})$	*Use the associatve and commutative properties to rearrange*
$(2 \cdot 3 \cdot 4) \cdot (\sqrt{5} \cdot \sqrt{5}) \cdot (\sqrt{5} \cdot \sqrt{5})$	*Simplify the expression within each set of parentheses*
$(24) \cdot (5) \cdot (5)$	*Finish simplifying*

Write your simplified answer here: 600

3. Solve this system of equations.

$3x - 2y = 14$
$2x + y = 7$

Show your solving steps here: [Two of the possible methods are shown]

y = 7 - 2x

3x –2(7 - 2x) = 14

3x - 14 + 4x = 14

7x - 14 = 14

7x = 28

x = 4

y = 7 - 2(4) = 7 - 8 = -1

3x – 2y = 14 => 3x – 2y = 14

2x + y = 7 => 4x + 2y = 14

7x + 0y = 28

x = 4

2(4) + y = 7

8 + y = 7

y = -1

Write your solution here: (x, y) = (4, -1)

4. Simplify this expression as much as possible.

$$\frac{A^3B}{AB^4} \cdot \frac{A^{-2}}{B^{-1}}$$

Show your simplifying steps here:

$$\frac{A^3B}{AB^4} \cdot \frac{A^{-2}}{B^{-1}} = \frac{A^{3-2}B^1}{A^1B^{4-1}} = \frac{A^1B^1}{A^1B^3} = \frac{B^1}{B^3} = B^{1-3} = B^{-2}\left(= \frac{1}{B^2}\right)$$

Write your simplified answer here: B^{-2} *or* $\frac{1}{B^2}$

5. Solve this inequality, then make a number line graph of the solution.

$-6 < -2x + 4 \leq 2$

Show your solving steps here:

$-6 < -2x + 4$ *Subtract 4 from both sides* $-2x + 4 \leq 2$

$-10 < -2x$ *Divide both sides by -2 (flip the signs)* $-2x \leq -2$

$5 > x$ $x \geq 1$

Write your solution: $1 \leq x < 5$

Graph your solution:

≤ includes this point *< does not include this point*