Name _____

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Lexington High School
Mathematics Department
Algebra 1B
Final Exam 2006

Format and scoring

- This exam has two parts. Each part counts for half of your exam grade.
- Part A: 15 short questions, 2 points each, generally graded right-or-wrong.
- Part B: 5 long questions, 6 points each; partial credit will be given.
- A letter grade scale will be set by the course faculty after the tests have been graded.

Rules

- This is a 90-minute exam, but you are allowed to work for up to 120 minutes.
- In Part A, show your work where directed. In Part B, show complete work on all problems.
- All work to be graded must be written in this test packet. You may request extra paper for scratch work if needed.
- Graphing calculators are permitted, but may not be shared between students.

Advice

- Remember to show work. The more you write, the more opportunities you will have for partial credit.
- On many questions, there are ways to check your answers. Make sure you do this.
- Many calculator difficulties can be fixed by typing this reset sequence: [2nd][+][7][1][2].
- Spend half of your time on Part A, half of your time on Part B.
- Don't give up early — work for the full time that you are allowed.
- Your teachers all say: We know you can do it!

Do not write in these boxes:

Q 1–3 /6	Q 4–7 /8	Q 8–11 /8	Q 12–15 /8	PART A SUBTOTAL /30
Q 16 /6	Q 17–18 /12	Q 19 /6	Q 20 /6	PART B SUBTOTAL /30
				TOTAL /60

Part A. Short questions

15 questions, 2 points each, 30 points total

Generally these questions will be graded right-or-wrong.
In questions with part **a** and part **b**, each part is worth 1 point.

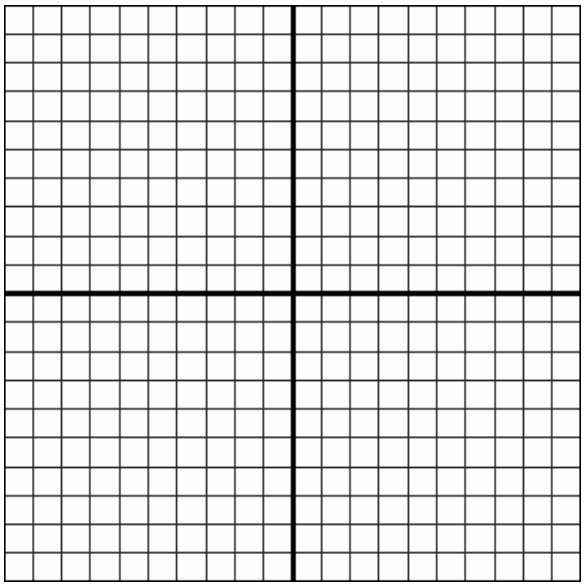
1. You are given this information about a linear function $f(x)$:

- $f(-3) = 1$.
- The y-intercept of the graph of $f(x)$ is -1.

Answer these questions about function $f(x)$:

a. On the grid, draw the graph of $f(x)$.

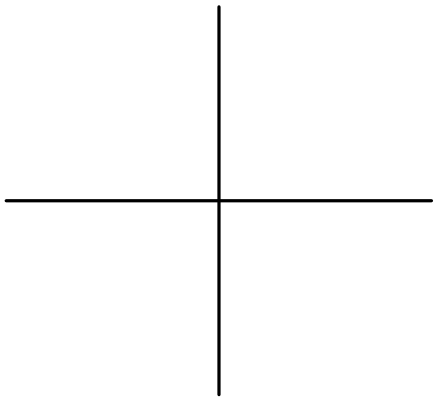
b. Write a function formula for $f(x)$.



2. A table of values for a linear function $g(x)$ is given. Write a function formula equation for $g(x)$.

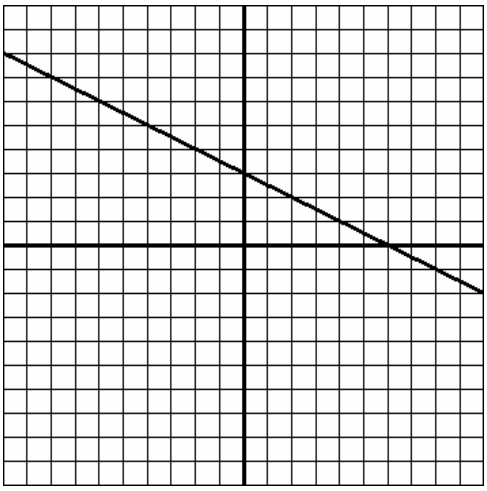
x	$g(x)$
–8	10
–6	7
–4	4
–2	1
0	–2
2	–5
4	–8
6	–11
8	–14

3. a. On the axes given below, sketch the graph of the equation $x = 3$.



b. Is the graph from part **a** the graph of a *function*? Tell why or why not.

4. The graph of line L is shown on the grid.

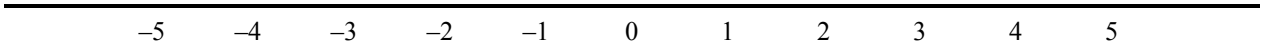


a. Write an equation for another line that would be *parallel* to the graph of L.

b. Write an equation for another line that would be *perpendicular* to the graph of L.

5. **a.** Solve the inequality $|2x - 5| < 3$.

b. Graph the solution on the number line below.



6. Evaluate and simplify as much as possible, without using your calculator.
You must show your steps.

$\sqrt{18} \cdot \sqrt{\frac{2}{49}} =$

7. Find the solution to the equation $2^x = \frac{1}{16}$.

8. Simplify these expressions as much as possible.

a. $\dfrac{x^3}{x^{-2}}$

b. $\dfrac{x^3}{x^{-2}} \cdot \dfrac{x^5 y}{xy^4}$

9. Multiply $(x^4 + 5x^3 - 3x^2) \cdot (x^6 + 2x)$. Then, simplify your answer as much as possible.

10. a. Factor $x^2 + x - 72$.

b. Find the solution(s) to the equation $x^2 + x = 72$.

11. Simplify this expression as much as possible.

$$\frac{x^2 - 100}{2x + 20}$$

12. a. Factor $4x^2 - 8x - 5$.

b. Using the factors you found in part **a**, find the zeroes of $f(x) = 4x^2 - 8x - 5$.
Show how you get your answers.

13. On a quiz, a class had a mean score of 80 points.

Here are the quiz scores for all except one student in the class:

74, 87, 96, 71, 62, 93, 68, 79, 75, 59, 100, 91, 78, 81

What was the score of the one other student?

14. Suppose you are ordering a cell phone, and you must make the following choices.

- One of these colors must be chosen: fire-engine red, sky blue, wedding white, or goopy green.
- One of these sizes must be chosen: small, medium, or large.
- One of these types of cases must be chosen: leather, silk, denim, or cotton.

How many different possibilities are there when you order your phone?

15. On a survey, 10 movies are listed, and you are asked to choose your 1st favorite, your 2nd favorite, and your 3rd favorite. How many different ways could you answer the survey?

Part B. Long questions

5 questions, 6 points each, 30 points total

In this part of the test, you must show all of the work needed to solve the problems.
Partial credit will be given.

16. Read this problem situation:

> A restaurant sells burgers and hotdogs for lunch.
> The people at one table buy 3 burgers and 1 hotdogs, and pay $8.25.
> The people at another table buy 1 burger and 2 hotdogs, and pay $5.25.
> What are the selling prices for burgers and hotdogs?

a. Identify the two variables needed to answer the question. Make up a letter name for each variable.

b. Write two equations that represent the given information.

c. Using a method of your choice, solve the system of equations. Show your steps.

d. Write a sentence that answers the question, "What are the selling prices for burgers and hotdogs?"

17. a. The French Club currently has 58 members. Suppose that the membership grows by 10 people each month. Let $f(x)$ stand for what the membership will be after x months. Write a function formula for $f(x)$.

b. The German Club currently has 40 members. Suppose that the membership grows by 20% each month. Let $g(x)$ stand for what the membership will be after x months. Write a function formula for $g(x)$.

c. Which club, the French Club or the German Club, will have more members 6 months from now? Show calculations supporting your answer.

18. Suppose that if a store sells x pieces of a clothing item, the profit in dollars will be given by the function formula $P(x) = -x^2 + 8x$.

a. Evaluate $P(3)$, and explain the meaning of the answer in terms of the clothing store.

b. If the store makes a profit of 12 dollars, how many pieces of clothing were sold? Show or explain how you get your answer.

c. What is the maximum possible profit, and how many pieces of clothing would need to be sold? Show or explain how you get your answer.

19. Here are the weights in pounds of the students in a fourth grade class.

62, 65, 68, 70, 72, 75, 75, 76, 77, 78, 80, 81, 82, 84, 87, 87, 90

a. Represent the students' weights as a stem-and-leaf plot (stemplot).

b. Draw a histogram (bar graph) representing the students' weights.
(Group the weights into the intervals 60-to-69, 70-to-79, etc.)

c. Find the five numbers needed to draw a box-and-whisker plot (boxplot).
Then, draw the box-and-whisker plot on the given number line.

60 65 70 75 80 85 90 95

20. Dr. Dull gave a 90-minute lecture in the assembly hall last week.

When his lecture began, there were 100 people in the hall.
After 10 minutes, there were 87 people left in the hall.
After 20 minutes, there were 72 people left in the hall.
After 30 minutes, there were 58 people left in the hall.
After 40 minutes, there were 45 people left in the hall.

Let x = the number of minutes that have passed; $P(x)$ = the number of people left in the hall. The relationship between these variables is approximately linear.

a. Using your calculator, find the equation for the *best fit line* (*linear regression line*) that approximately fits the given data.

$P(x) \approx$ _____

b. Estimate using your best fit line: How many people will be left in the hall after one hour?

c. Estimate using your best fit line: After how many minutes will the room be empty?

d. What value does your best fit line give for $P(-20)$? Does this gives a good estimate of the number of people in the hall 20 minutes before the lecture? Explain why or why not.