This practice final exam has a similar format and expectations to this year's actual final exam for Algebra 1B.

The exam has two parts. Part A contains 15 short questions; Part B contains 5 long questions. Part A counts as half of the exam (30 points); Part B counts as half of the exam (30 points).

You can find an outline of all the topics covered on the exam linked from the course web page:
`http://lhs.lexingtonma.org/Dept/Math/222/`

Part A. Short questions

15 questions, 2 points each, 30 points total

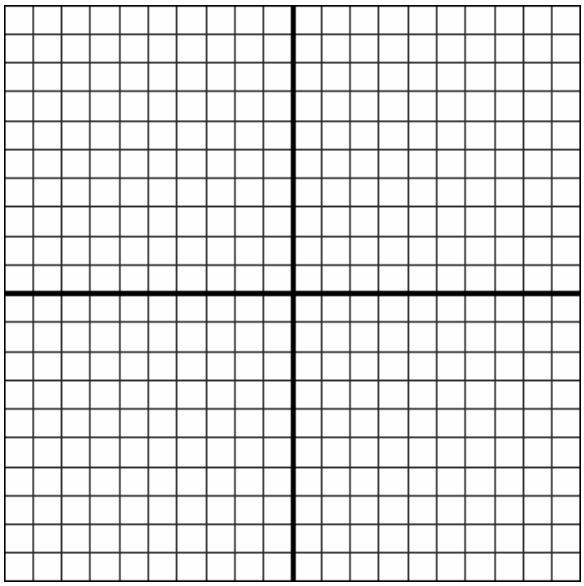
1. You are given this information about a linear function $f(x)$:

- $f(1) = -3$.
- The slope of the graph of $f(x)$ is $\frac{-1}{2}$.

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 $f(x)$ is given.

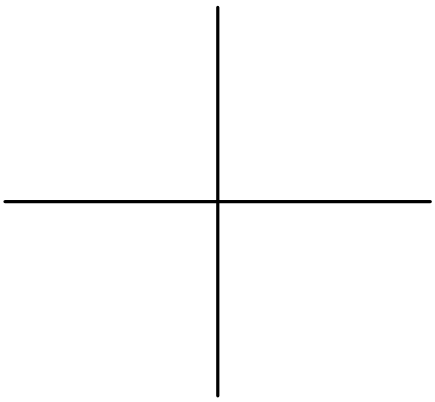
a. Write a function formula equation for $f(x)$.

b. What is the slope of the graph of $f(x)$?

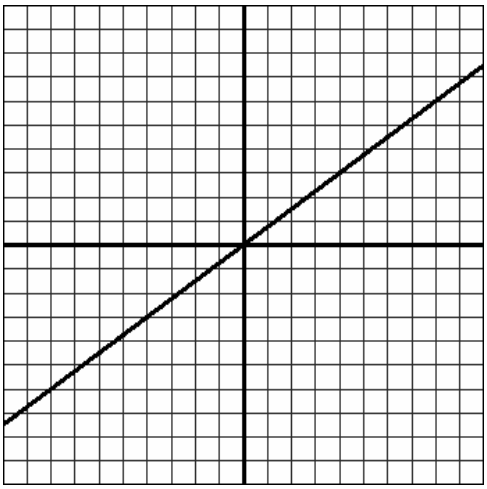
x	$f(x)$
–7	–6
–5	–3
–3	0
–1	3
1	6
3	9
5	12
7	15
9	18

3. a. On the axes at the right, sketch the graph of the equation $y = -2$.

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 line L.

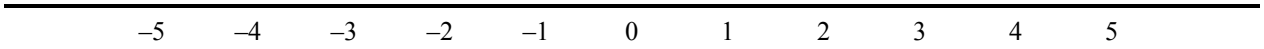
b. Write an equation for a line that would be *perpendicular* to the graph of L.

5. Solve this linear system algebraically. Show your steps.

$$\begin{aligned} 2x + 7y &= -1 \\ -4x + 3y &= -15 \end{aligned}$$

6. a. Solve the inequality $|3x + 6| \geq 1$.

b. Graph the solution on a number line.



7. Simplify this expression as much as possible, without using your calculator. Show your steps.

$\sqrt{3x} \cdot \sqrt{6x} \cdot \sqrt{\frac{1}{2}}$

8. Simplify this expression as much as possible. Show your steps.

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

9. Multiply $(x^3 + 4x) \cdot (x^5 - 6x^3 + 7)$. Then, simplify your answer as much as possible.

10. Simplify this expression as much as possible.

$$\frac{x^2 - 4}{x^2 + 5x + 6}$$

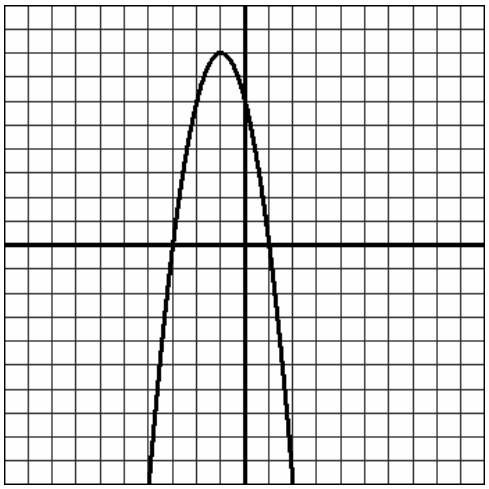
11. a. Factor $6x^2 - 5x - 4$.

b. Using the factors you found in part **a**, find the zeroes of $f(x) = 6x^2 - 5x - 4$.
Show your work.

12. The graph of a quadratic function $f(x)$ is given on the grid.

a. What are the zeroes of $f(x)$?

b. At what x does $f(x)$ have its maximum value?



13. Here is a data set presented as a stem-and-leaf display. (For example, 6 | 3 represents 63.)

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

a. Find the five numbers needed to draw a box-and-whisker plot.

b. Draw the box-and-whisker plot on the number line below.

60 65 70 75 80 85 90 95

14. a. In how many different orders can the letters ABCDE be rearranged?

b. Someone chooses 3 out of the 5 letters (ABCDE). How many different ways can this decision be made?

15. Two dice (each numbered 1 to 6) are rolled, and the numbers are added. What is the probability that the sum of the dice is <u>greater than 8</u> ?

Part B. Long questions

5 questions, 6 points each, 30 points total

16. The formula to convert Celsius temperature to Fahrenheit temperature is $F = \frac{9}{5}C + 32$.

a. On a cold day, the temperature is 5° Fahrenheit. What is the Celsius temperature on this day?

b. Take the equation $F = \frac{9}{5}C + 32$ and solve it for C. Show your steps.

c. Which temperature is warmer: 40° Celsius or 105° Fahrenheit?
Show work that supports your answer.

17. A ball is thrown in the air. After t seconds, its height in feet is given by $h(t) = -16t^2 + 40t + 4$.

a. Evaluate $h(2)$, and explain the meaning of the answer in terms of the problem situation.

b. What is the greatest height reached by the ball? Tell or show how you get your answer.

c. About what time does the ball hit the ground? Tell or show how you get your answer.

18. a. The current population of Frankfurt is 5,000. Suppose that the population is growing by 125 people each year. Let $f(x)$ stand for what the population will be after x years. Write a function formula for $f(x)$.

b. The current population of Georgetown is 5,000. Suppose that the population is growing by 2.5% per year. Let $g(x)$ stand for what the population will be after x years. Write a function formula for $g(x)$.

c. Which town, Frankfurt or Georgetown, will have a greater population 6 years from now? Show work supporting your answer.

19. Read this problem situation:

A supermarket sells bottles of Coke and Pepsi. One shopper buys 2 Cokes and 1 Pepsi, and pays \$3.25. Another shopper buys 4 Cokes and 3 Pepsis, and pays \$7.50. What are the selling prices for Coke and Pepsi?

a. Write two equations that represent the given information.

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

c. Answer the question, "What are the selling prices for Coke and Pepsi?"

20. The table gives the ages and heights of several pear trees.

age x (in years)	height $h(x)$ (in feet)
2	4
5	6
7	8
10	9
10	11
20	15
20	16
25	20
30	22

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

$h(x) \approx$ _____

b. Using your equation from part **a**: Estimate the height of a 15-year-old tree.

c. Using your equation from part **a**: Estimate the number of years for a tree to reach a height of 30 feet.

d. What value does your equation from part **a** give for $h(0)$? Explain the meaning of this value in the context of the problem.

e. What value does your equation from part **a** give for $h(-1)$? Does this value have meaning in the context of the problem? Explain why or why not.