

Exam 2 Review

Math 1175, Fundamentals of Mathematics, Fall 2011: Mathematics and the Brooklyn Bridge

Draw pictures and show all calculations. Answers without work will earn no credit. Answer any word problem with complete sentence.

1. From what we have done, geometry and trigonometry is the study of figures, in particular the relation of angles in a triangle to their sides. Likewise, algebra is the simplification of expressions and the solution of equations. Think of 2 ways that the subjects have been connected.
 2. Explain how you calculated the length of the planked portion of the bridge. Give 3 possible sources of error in your calculation.
 3. Explain how you would calculate the height of a tower from the pedestrian walkway legally, e.g., don't climb the tower and drop a rope. If you use trigonometry, explain how the curvature of the walkway would affect your calculation. Draw a picture to explain.
 4. Explain the math and/or science portion of your project in 2 sentences or less.
 5. Simplify by converting each factor to scientific notation, combining the number parts and the exponent parts separately and then converting the answer to scientific notation. Round to 2 significant digits.
- a. 0.00016×3300 b. The Brooklyn Bridge is 24,000 inches long and 1400 inches wide. 43 inches of rain fall on the city each year. How many cubic inches of rain fall on the bridge over the course of a year (hint: multiply the 3 quantities)? c. $\frac{0.00016 \times 3300}{0.064 \times 110000}$

6. Simplify and Write Answer Using Positive Exponents:

a. $(a^{-4}b^3)^{-2} (a^5b^{-3})^3$

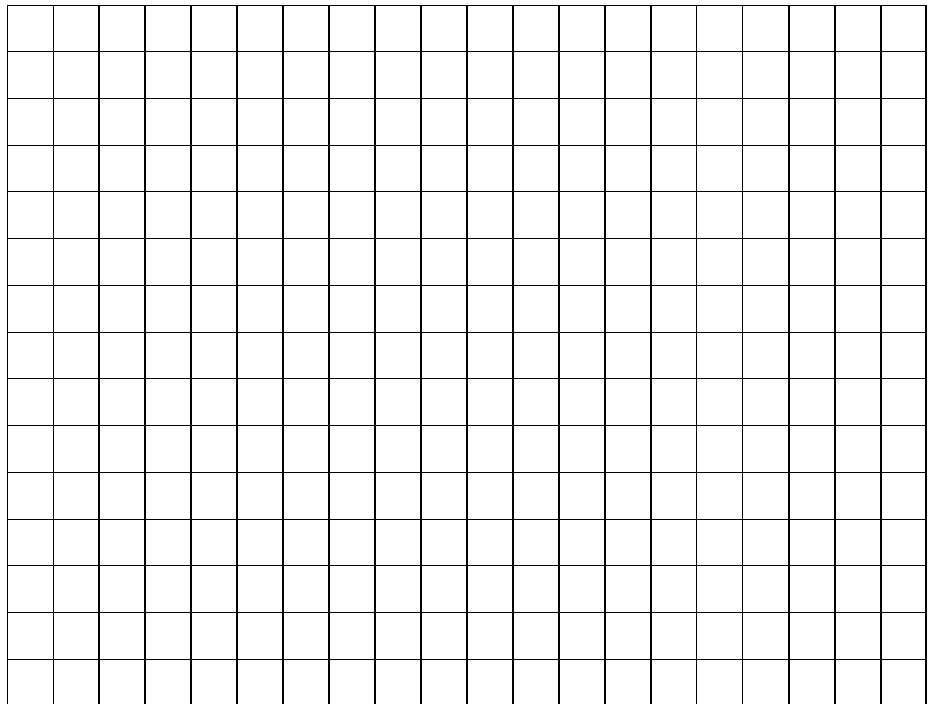
b. $(2x^4y^{-2})^2 (4x^{-3}y^5)^{-3}$

c. $\left(\frac{-15x^{-6}y^{-1}z^0}{3x^{-9}y^3z^{-2}}\right)^{-3}$

7. Solve graphically:

$2x - 3y = 6$

$x + 2y = 10$



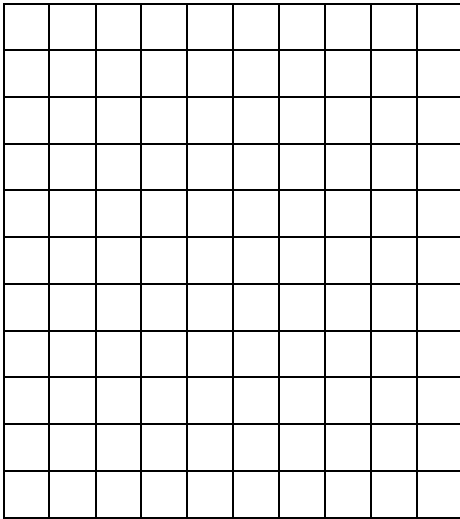
8. Fill in the chart:

# of solutions	graphically	algebraically	technical name
	lines intersect in 1 point	a single coordinate	
infinitely many			consistent, dependent
	parallel lines	False statement	

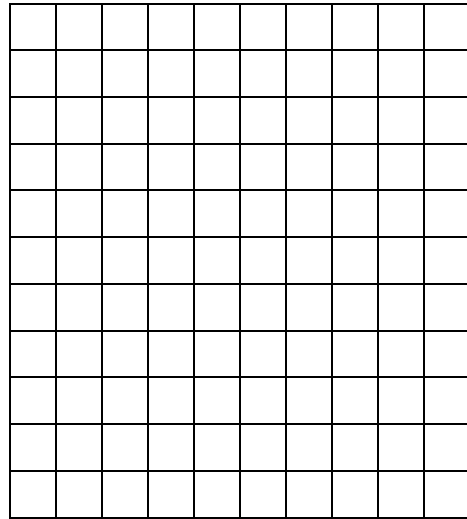
9. Solve using the substitution method: $4x - y = 9$
 $2x + 3y = -27$
10. Solve using the addition method: $7x + 6y = -2$
 $-2x + 5y = 14$

11. Give an example of the equation(s) and graph of:

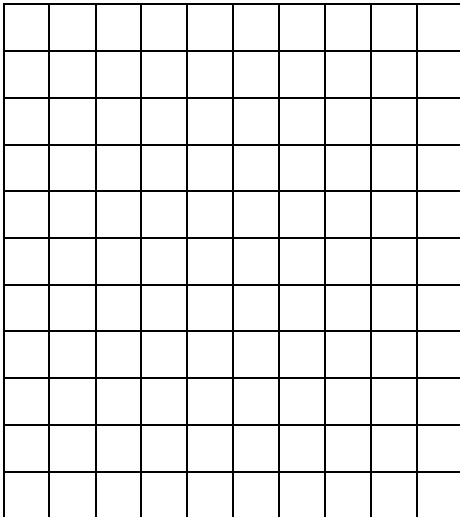
a. vertical line



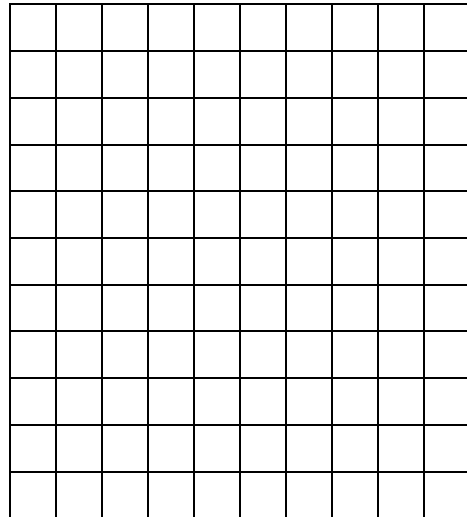
b. horizontal line



c. parallel lines



d. perpendicular lines



12. Solve using any method (if there are an infinite number of solutions, give 2 sample solutions):

a. $2x - 3y = 6$ b. $8x + 2y = 18$
 $-4x + 6y = -2$ $y = -4x + 9$

Solve the following word problems by using 2 variables and forming a system of equations.

13. The salary for each sandblaster is \$2000/week, and for each painter is \$1700/week. There are 8 more painters than blasters and the employee cost/week is \$39,500. Find the number of sandblasters and painters employed on bridge.
14. The bridge painters have 300 gallons of paint which is 20% sealer. They will mix it with additional paint that is 35% sealer. How much paint with 35% sealer should they use to bring the sealer level up to 25%?
15. To pay for a major repair on the bridge, the city issues two bonds, one at 3% interest and the other at 5% interest. If the total interest per year is \$352,000 and if the bond at 3% is twice as large as that at 5%, find the amounts of the two bonds.
16. Val rides her bike on the bridge (1 mile) during the buildup to a tropical storm and finds that it takes her only 2 minutes to ride to Manhattan (with the wind), but 10 minutes to ride back to Brooklyn (into the wind). Find what Val's speed would be without any wind (give your answer in miles per hour). Hint: start by converting the times to hours.

Answer Key:

1-4. Answers will vary.

5. a) $5.28 \times 10^{-1} \approx 5.3 \times 10^{-1}$ b) $1.4448 \times 10^9 \approx 1.4 \times 10^9$ c) 7.5×10^{-5}

6. a) $\frac{a^{23}}{b^{15}}$ b) $\frac{x^{17}}{16y^{19}}$ c) $\frac{y^{12}}{-125x^9z^6}$

7. (6,2)

8.

# of solutions	graphically	algebraically	technical name
1	lines intersect in 1 point	a single coordinate	consistent, independent
infinitely many	lines overlap	True statement	consistent, dependent
0	parallel lines	False statement	inconsistent

9. (0,-9)

10. (-2,2)

11. answers will vary, some examples: a) $x=2$ b) $y=3$ c) $x=2, x=5$ d) $x=3, y=4$

12. a) inconsistent (no solutions) b) infinitely many solutions, for example (2,1) and (1, 5)

13. There are 7 sandblasters and 15 painters.

14. The painters should use 150 gallons of paint with 35% sealer.

15. The bond at 3% is \$6,400,000=\$6.4 million and the bond at 5% is \$3,200,000= \$3.2 million.

16. Val's speed in no wind would be 18 mi/hr.