

# Math 122 and 123: Final Exam Study Guide

## Objectives in studying for a final (besides getting an A!):

- I. **Organize** the HUGE amount of knowledge and skill you've acquired in this course.
- II. Work to **identify** the type of problem and the technique to apply to it.
- III. **Practice** enough with specific problems that you refresh your memory on how to solve them.

## Steps in studying for a final exam:

1. Go to the Table of Contents in your textbook. Identify the chapters and the sections you've studied throughout the course.
2. As you read the title of each section, mentally try to recall the concepts and the types of problems you did in that section. Use your old guidelines and old homework to refresh your memory. You're not solving problems at this point, just trying to recall the general ideas.
3. Find problems to redo from each chapter. Make sure there are problems from each of the sections studied. A list of problems is given below, but if your instructor in future classes doesn't provide specific review problems, find some of your own from the reviews at the end of each chapter.
4. Try to solve the problems without looking at your notes or your old homework. If you can't, then solve the problem with help from notes/teacher/friends then **MENTALLY** review the steps you went through until you can picture how to solve the problem without peeking at notes or getting help.
5. After doing the review problems, take the **Sample Final**. Check your answers on the key!!!

## Review Problems (hand in as part of your homework grade):

page 296: 1, 2, 3, 7a, 10, 12, 27, 29, 31, 39, 40, 51, 54

page 393: 1 - 11 ALL, 13, 14, 15, 24, 25

page 460: 1, 4, 5, 7, 10, 11, 12, 15, 17, 18, 19, 20

page 541: 1 - 25 ALL; 27, 29

page 615: 1, 5 - 16 ALL

page 615: 19, 21, 22, 23, 25

page 766: 3- 25 all, 31 - 34 all

page 827: 3, 7, 8, 9, 13, 14, 16, 17, 18, 23ac

**Note:** Plan to study over at least two or three days.  
Preparing for the final should take you several hours of study.  
Take breaks when your brain gets fatigued then get back at it.

**Math 123 and Math 122  
Sample Final**

Name \_\_\_\_\_

INSTRUCTIONS: Show all of your work in the space provided. Incorrect answers may receive partial credit only if work is shown. Circle your final answers. Scientific calculators may be used only to check answers (no graphing calculators).

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1. Perform the indicated operation. **Show all work.**

a)  $|-10| - |-40|$

b)  $\frac{5}{6} \div \frac{9}{14}$

c)  $\frac{5}{21} - \frac{4}{15}$

d)  $25 - (-17) + (-3)$

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2a. Reduce the fraction to lowest terms. **Show all work.**

$$\frac{48}{64}$$

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2b. Write the following in scientific notation.

0.000000000349

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3. Simplify each of the following.

a)  $14 + 21 \div (-7) + 3^2 - 4 \cdot 2^3$

b)  $13 + 5(t^2 - 4t) - 5 + 11(3 - t)$

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4. Evaluate  $-10x^2 + 3xy - 7y$  when  $x = 4$  and  $y = -2$

5. Solve the following equations.

a)  $5 - 10z - 2 = 7z + 16$

b)  $-5(b - 2) = 2(17 - b)$

c)  $7x - 1 = \frac{1}{3}(x + 6)$

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6. Solve the following inequality and represent your solution on a number line.

$$20 - 8y \leq 15$$

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7. Solve the compound inequality and represent your solution on a number line.

$$-3 < 5 - 2x \leq 14$$

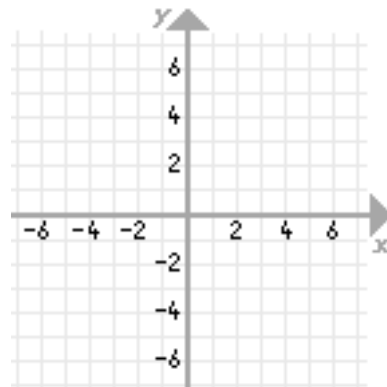
8. Solve the following word problems. Show the following steps: 1) Clearly identify your variable. 2) Set up an equation. 3) Solve the equation. 4) State your answer.

a) The sum of two consecutive even integers is 222. Find the smaller integer.

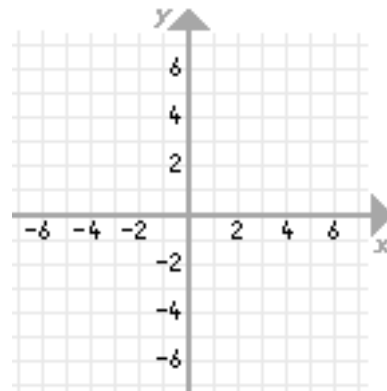
b) The length of a rectangle is 5 inches more than its width. If the perimeter of the rectangle is 250 inches, what are its dimensions?

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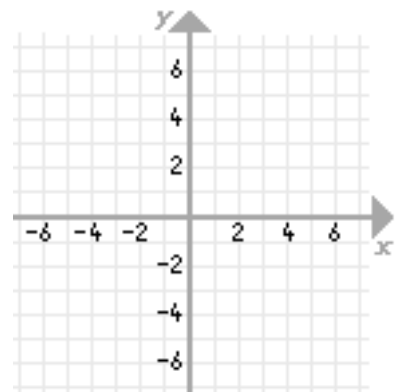
9. On the grid below, plot the points  $(5,-2)$  and  $(-1,6)$ . Then use the Pythagorean theorem to find the distance between the points.



10. Find the x and y-intercepts, then graph the equation  $7x + 3y = -21$ .



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11. Graph the equation of the line that passes through the point  $(-5, 4)$  and has slope  $m = -1/2$ . Clearly label TWO points on the graph.



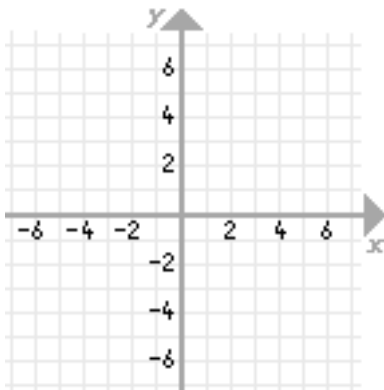
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12. Find the equation of the line in slope-intercept form that passes through the point  $(9, -2)$  and is parallel to the line  $y = \frac{1}{3}x + 4$ .

13. Find an equation of the line that passes through the points (4,-1) and (-2, 7). Write your answer in **slope-intercept form**.

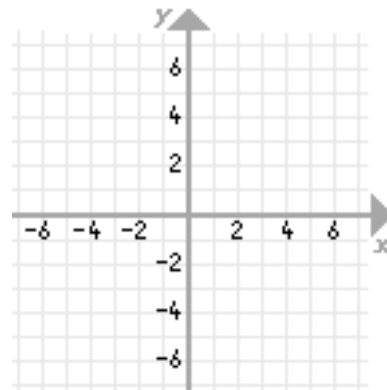
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14. Graph the following:

a)  $y = -4$



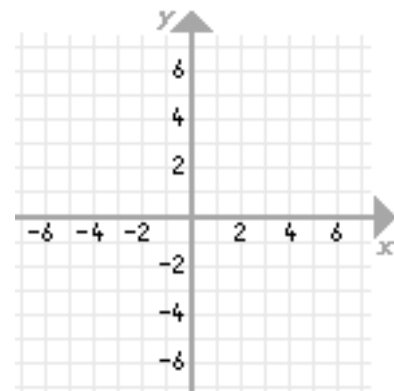
b)  $x = 3$



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15. Graph the inequality:

$x - 3y > 6$



16. Solve the following system with substitution:

$$5x - y = 2$$

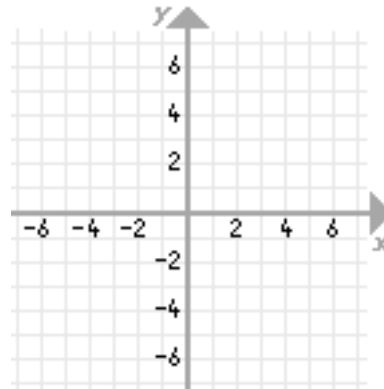
$$10x - 2y = 4$$

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17. Solve the following system graphically:

$$x + y = 4$$

$$2x - y = -1$$



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18. Solve the following word problem. Show the following steps: 1) Clearly identify your variable. 2) Set up an equation. 3) Solve the equation. 4) State your answer

- How much of a 45% sulfur solution should be mixed with a 33% sulfur solution to produce 120 ounces of a 40% sulfur solution?
- Gregorio plans to mix almonds costing \$4.75 per pound with raisins costing \$2.50 per pound to make 30 pounds of a mixture that he can sell for \$4.00 per pound. How much of each should he use?
- Two planes leave the San Luis Obispo airport at the same time. One plane flies north at 367 miles/hour while the second plane flies south at 450 miles/hour. How long will it be until the planes are 540 miles apart? Round to the nearest minute.
- A rectangle has a perimeter of 72 meters and its length is three meters less than twice the width. Find the length and the width of the rectangle.

19. Simplify using laws of exponents. Your answer should have positive exponents only.

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

b)  $\left(\frac{5b^2n}{2bn^3}\right)^3$

c)  $(2p^{-7}q^2)^{-3}$

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20. Perform the indicated operation:

a)  $(-2x^4 + 3x^3 - x + 1) - (x^4 - 9x^2 + 5x + 1)$

b)  $2x^5y(x^{10} + 6x^5y - y^3)$

c)  $\frac{8x^4 - 28x^3 + 4x^2}{4x^2}$

d)  $(5v - 2)(v - 6)$

e)  $(5y - 2)^2$

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21. Use long division to divide the polynomial (**5 pts**):

$(8v^3 + 6v^2 - 2v + 10) \div (4v - 1)$



22. Factor the following completely:

a)  $x^2 - x - 12$

b)  $5x^2 - 3xy + 10x - 6y$

c)  $2x^2 + 7x + 5$

d)  $v^2 - 16w^2$

e)  $4x^4 - 12x^3 + 8x^2$

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23. Simplify:

$$\sqrt{12x^{23}y^5}$$

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24. Perform the indicated operation and simplify.

a)  $5\sqrt{32} - 3\sqrt{8} + \sqrt{12}$

b)  $2\sqrt{5y}(3\sqrt{y} - 4\sqrt{5})$

25. Solve the following quadratic equation by factoring.

$$x^2 - 4x = 12$$

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26. Solve the following quadratic equation with the quadratic formula.

$$-3x^2 + 10x - 1 = 0$$

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Solve the following word problem. Show the following steps clearly: 1) Clearly identify your variable. 2) Set up an equation. 3) Solve the equation. 4) State your answer. **(7 pts)**

27. A right triangle's hypotenuse is twice as long as the shortest leg, and the triangle's longer leg is 5 inches longer than the shortest leg. Find the length of the shortest leg. Round to

**Math 123****Sample Final Key**

1a. -30

1b.  $35/27$

1c.  $-1/35$

1d. 39

2a.  $3/4$

2b.  $3.49 \times 10^{-10}$

3a. -12

3b.  $5t^2 - 31t + 41$

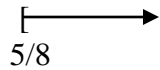
4. -170

5a.  $\{-13/17\}$

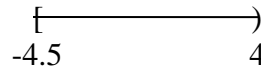
5b.  $\{-8\}$

5c.  $\{9/20\}$

6.  $y \geq 5/8$



7.  $-4.5 \leq x < 4$

8a.  $x$  is the smaller integer ;  $x+2$  is the larger integer

$x + (x+2) = 222 \rightarrow x = 110$

The smaller integer is 110.

8b.  $w$  inches is the width ;  $(w+5)$  inches is the length

$2w + 2(w+5) = 250 \rightarrow w = 60$

The rectangle is 60 inches by 65 inches.

9.  $d = \sqrt{(1 - (-5))^2 + (6 - (-2))^2} = 10$

10.  $x$ -intercept  $(-3,0)$        $y$ -intercept  $(0,-7)$ 

11. For every unit the graph goes down, it should go right two units.

12.  $m = 1/3$       point slope form:  $y - (-2) = \frac{1}{3}(x - 9)$       slope intercept form:  $y = \frac{1}{3}x - 5$

13.  $m = -4/3$        $y = -\frac{4}{3}x + \frac{13}{3}$

14a. Graph is a horizontal line through  $(0,-4)$ 14b. Graph is a vertical line through  $(3,0)$ 15. Graph the line  $x - 3y = 6$  and shade down and to the right

16. Dependent system ; Infinite number of solutions

17.  $(1,3)$ 18a.  $x$  = amount of 45% sulfur solution ,  $y$  = amount of 33% sulfur solution

$x + y = 120$        $0.45x + 0.33y = 0.40(120)$

You need 70 gallons of the 45% solution and 50 gallons of the 33% solution.

18b.  $a =$  weight of the almonds ;  $r =$  weight of the raisins  
 $a + r = 30$  and  $4.75a + 2.50r = 4(30) \rightarrow$  solving, we get  $a = 20$  and  $r = 10$   
 Gregorio should use 20 pounds of almonds and 10 pounds of raisins.

18c.  $x =$  speed of first plane ,  $y =$  speed of second plane  
 $x = y$  ;  $367x + 450y = 540$ . It will take 0.66 hours, or 40 minutes.

18d.  $L =$  length  $W =$  width  $L = 2W - 3$  ;  $2L + 2W = 72$   
 The width is 13 meters and the length is 23 meters.

19a.  $\frac{100}{x}$

19b.  $\frac{125b^3}{8n^6}$

19c.  $\frac{p^{21}}{8q^6}$

20a.  $-3x^4 + 3x^3 + 9x^2 - 6x$

20b.  $2x^{15}y + 12x^{10}y^2 - 2x^5y^4$

20c.  $2x^2 - 7x + 1$

20d.  $5v^2 - 32v + 12$

20e.  $25y^2 - 20y + 4$

21.  $2v^2 + 2v + \frac{10}{4v-1}$

22a.  $(x-4)(x+3)$

22b.  $(5x-3y)(x+2)$

22c.  $(2x+5)(x+1)$

22d.  $(v+4w)(v-4w)$

22e.  $4x^2(x-2)(x-1)$

23.  $2x^{11}y^2\sqrt{3xy}$

24a.  $14\sqrt{2} + 2\sqrt{3}$

24b.  $6y\sqrt{5} - 40\sqrt{y}$

25.  $x^2 - 4x - 12 = 0 \rightarrow (x-6)(x+2) = 0 \rightarrow x = 6$  or  $x = -2$   $\{-2,6\}$

26.  $a = -3, b = 10, c = -1$   $x = \frac{5 \pm \sqrt{22}}{3}$

27.  $x$  is the length of the shorter side ;  $x+5$  is the length of the longer side ;  $2x$  is the hypotenuse  
 $x^2 + (x+5)^2 = (2x)^2 \rightarrow 2x^2 - 10x - 25 = 0$   
 Using the quadratic formula, we get  $x \approx 6.83$  inches; The shorter leg is 6.83 inches.