Name: _____

- **READ THE FOLLOWING DIRECTIONS!**
- **Do NOT open the exam until instructed to do so.**
- You have until 12:45pm to complete this exam. When you are told to stop writing, do it or you will lose all points on the page(s) you write on.
- You may not communicate with other students during this test.
- Keep your eyes on your own paper.
- No written materials of any kind are allowed. No scratch paper is allowed except as given by the proctor.
- No phones, calculators, or any other electronic devices are allowed for any reason, including checking the time (a simple wristwatch is fine).
- Any case of cheating will be taken extremely seriously.
- Show all your work and explain your answers when appropriate.
- Before turning in your exam, check to make certain you've answered all the questions.

Question	Points	Score
1	13	
2	8	
3	4	
4	4	
5	12	
6	3	
7	6	
8	12	
9	8	
10	8	
11	12	
12	12	
13	0	
Total:	102	

1. (13 points) Simplify each of the following. Do not leave negative exponents in your answer.

   (a) $(-2x)^{-2}$

   (b) $-(2x)^{-2}$

   (c) $-2x^{-2}$

   (d) $(4x^6)^{3/2}$

2. (8 points) Simplify each of the following. Do not leave negative exponents in your answer.

   (a) $(x^3y^{1/2})(3xy^{3/2})$

   (b) $\left(\dfrac{8xy^{-2}}{18x^3y^{-5}}\right)^{3/2}$

3. (4 points) Rewrite the following in radical form.

   (a) $2x^{1/2}$ (b) $y^{7/3}$

4. (4 points) Rewrite the following in exponential form.

   (a) $3\sqrt{5x^7}$ (b) $\sqrt[5]{x^3}$

5. (12 points) Simplify the following.

(a) $\sqrt[4]{16x^{21}}$

(b) $\sqrt{\dfrac{27y^{14}}{12x^4}}$

(c) $\sqrt{27} + 3\sqrt{6} - \sqrt{24} + 2\sqrt{75}$

6. (3 points) What does it mean for a number to be a *solution* to an equation (with one variable)?

7. (6 points) Find all solutions to the following equations.

   (a) $3x + 5 = 11$

   (b) $6x + 7 = 12$

8. (12 points) Find all solutions to the following equations.

(a) $2(5x+3)-3(3x-1)=x+7$

(b) $2(5x+3)-3(3x-1)=2x+7$

(c) $2(5x+3)-3(3x-1)=x+9$

9. (8 points) Find all solutions to the following equations.

(a) $\frac{1}{2}x + \frac{4}{3} = \frac{1}{3}x - \frac{1}{6}$

(b) $2x - 3 = \frac{7x + 2}{6}$

10. (8 points) Solve the following equations for the variable indicated.

(a) $ax + by = c$, for y

(b) $\dfrac{1}{a} + \dfrac{1}{b} = \dfrac{1}{c}$, for a

11. (12 points) Find expressions that represent the following.

(a) The value, measured in dollars, of a collection of n nickels and q quarters.

(b) The thickness of an iceberg after y years if it starts 325 meters thick and loses 0.5 meters of thickness per year.

(c) The perimeter of a rectangle whose width is 7 inches less than five times its length. Your expression should be in terms of only its length ℓ.

12. (12 points) Write an appropriate equation (or system of equations) to represent the following scenarios. Then solve those equations to answer the questions.

    (a) When 100 is added to a number, the result is 32 less than 3 times the number. Find the number.

    (b) A car and a truck leave two towns 900 miles apart and head toward each other. The car travels 65mph and the truck 55mph. How long will it take the two to meet?

13. (Bonus). A car and a motorcycle leave Champaign at noon heading north on I-57. The car drives 8mph faster than the motorcycle. At what time are the vehicles 20 miles apart?

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