

DIRECTIONS: No calculators may be used. Be sure to *show ALL of your work*. Depending on the problem, you may receive **NO CREDIT** if no work is shown even if the answer is correct. Don't take that chance. If your answer is a fraction, reduce it to lowest terms. If there is a blank, write your answer in the blank, otherwise **circle your answer**.

SIMPLIFY the following expressions involving exponents. Write your answer with no negative exponents

1. Given that $x = -1$ and $y = 2$, evaluate the following expression:

$$-2x^2 - xy - 3x$$

2. Given that $f(x) = 3x^3 + 2x + 10$ find $f(-2)$.

SIMPLIFY each expression as far as possible. Do not leave negative exponents in your answer.

3. $\frac{-2x^{-3}}{4x^5}$

4. $\frac{12w^{-5}z^{-10}}{30w^5z^{-5}}$

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

Add, subtract, multiply or divide the following polynomials as indicated.

6. $(2x - 3)^2$

7. $(3x - 5)(2x - 1)$

8. $(x^2 - 5x + 10) - (4x^2 + 6x - 10)$

9. $\frac{25x^5 + 15x^3 + 5x^2}{5x^2}$

10. $(x^3 - 25) \div (x - 3)$

EVALUATE the following expressions involving exponents. Your answer should not include an exponent.

11. $125^{-\frac{2}{3}}$

12. $\frac{2^{\frac{1}{2}}2^{-\frac{3}{2}}}{2^{-\frac{6}{2}}}$

FACTOR each of the following polynomials completely.

13. $4x^2 + 2x - 30$

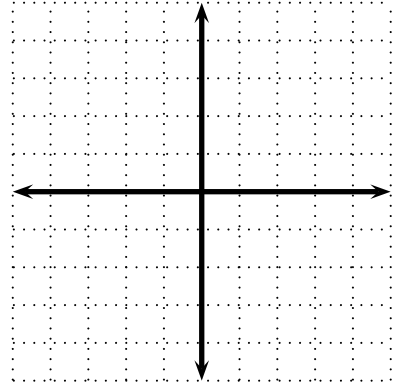
14. $x^5 - 16x$

Find the equation that goes through the points given below.

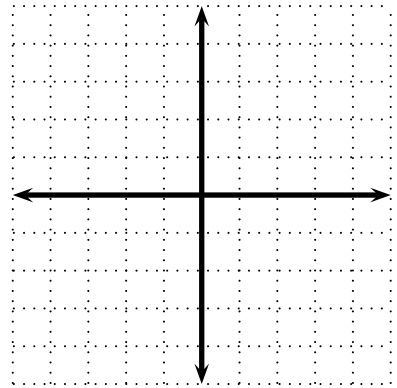
15. $(3, -4)$ and $(-2, 1)$

Graphing

16. Graph $2y + 3x = 6$



17. Graph $y = x^2 - 4x$



18. Using the equation and graph from problem number 17, identify each of the following for that graph:

Axis of symmetry: _____

Vertex: _____

Roots: _____

SOLVE each of the following equations or systems of equations. You may solve quadratic equations using any of the methods covered in class. If there is no solution or if there are infinitely many solutions, so state.

19. $\frac{2}{a-1} + \frac{3}{a+1} = \frac{-6}{a^2-1}$

20. $3x + 5 = 6 - 4x$

21. $3x^2 + 5x = x - 1$

22. $\sqrt{4x+1} = x - 1$

22. $(x+3)^2 = 1$

23. $\frac{2x+7}{3} = \frac{x-1}{4}$

$$\begin{array}{r} 25. \quad 2x + 3y = -15 \\ \quad \quad 5x + 2y = 1 \end{array}$$

Radicals and Complex Numbers: Write each in proper form.

$$26. \quad 5\sqrt[3]{x^5} + 3\sqrt[3]{81x^5}$$

$$27. \quad \frac{2 + 3i}{4 - i}$$

Applications

28. A boat can go 20 miles against a current in the same time that it can go 60 miles with the current. The current is 4 miles per hour. Find the speed of the boat in still water.

29. Mr. Banks is flying a kite on 100 feet of string. How high is it above his hand (vertically) if the horizontal distance between him and the kite is 80 feet?

30. Three more than twice a number is the same as five less than 3 times that number. Find the number.

31. How many liters of a 12% acid solution must be mixed with a 20% acid solution to get 10 liters of a 14% solution?

32. At Vern's Grill, hamburgers cost 90 cents each, and a bag of french fries costs 40 cents. How many hamburgers and how many bags of french fries can a customer buy with \$8.80 if he wants twice as many hamburgers as bags of french fries?

33. One roofer can put a new roof on a house three times faster than another. Working together they can roof a house in 4 days. How long would it take the faster roofer working alone?