

Show all your work to receive full credit.

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Problems 1-5 are worth 6 points each.

1. Factor  $-21m^2n - 9mn^4$
  2. Find any restricted values for the rational expression  $\frac{2x + 1}{7x(x^2 + 20)}$
  3. Simplify:  $\frac{\frac{x + 5}{8}}{\frac{4x - 1}{15}}$
  4. Solve the equation  $4(2x + 7)(5x - 6) = 0$  for  $x$ .
  5. Solve the equation  $G = \frac{a}{nv}$  for the variable  $n$ .
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Problems 6-20 are worth 8 points each.

Factor each of the following polynomials completely:

6.  $2x^2 - 3y + 2xy - 3x$
  7.  $3x^2 + x - 10$
  8.  $x^2y^2 - 144$
  9.  $5x^4 + 5x^3 - x^2 - x$
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Perform the indicated operations and simplify. Write your answers with positive exponents only:

10.  $\frac{x^2 - 5x}{x^2 + 3x} \cdot \frac{x^2 + 6x + 8}{x^2 - x - 20}$
  11.  $\frac{5x}{x + 2} + \frac{3}{2x + 1}$
  12.  $\frac{5}{2x + 2} - \frac{2}{5x + 5}$
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Solve the following equations. If there is no solution, state this as your answer:

13.  $x^2 - 10x + 24 = 0$

14.  $4x(x + 2) = 4x - 1$

15.  $(x^2 - 9)(x^2 - 10x + 25) = 0$

16.  $\frac{1}{y} + \frac{1}{16} = \frac{1}{12}$

17.  $\frac{4}{t+2} = \frac{6}{t+9}$

18.  $\frac{x-1}{x} = \frac{11}{12} - \frac{5}{4x}$

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Define a variable and use it in an equation to answer each of the following questions. Show all steps in the solutions and label your answers.

19. A portrait has dimensions of 10 inches by 50 inches and is surrounded by a frame of uniform width. If the total area (portrait plus frame) is 1200 square inches, find the width of the frame.

20. Olivia works at a craft store and can make 4 stone crafts in 40 minutes. If she has been working for 25 minutes on an order for 8 stone crafts, how much longer does she need to work to complete the order?

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**EXTRA CREDIT. Each problem is worth 5 points.**

1. Factor completely :

$$16 - b^4$$

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2. It takes Shawn 3 more hours to stain a deck than Michelle. Together it takes them 3.6 hours to complete the work. How long would it take Shawn to stain the deck by himself?

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## Answers

1.  $-3mn(7m + 3n^3)$

2.  $x = 0$

3.  $\frac{15(x + 5)}{20(4x - 1)}$

4.  $x = -\frac{7}{2}, x = \frac{6}{5}$

5.  $n = \frac{a}{Gv}$

6.  $(x + y)(2x - 3)$

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

8.  $(xy - 12)(xy + 12)$

9.  $x(x + 1)(5x^2 - 1)$

10.  $\frac{x + 2}{x + 3}$

11.  $\frac{2(5x^2 + 4x + 3)}{(x + 2)(2x + 1)}$

12.  $\frac{21}{10(x + 1)}$

13.  $x = 4, x = 6$

14.  $x = -\frac{1}{2}$

15.  $x = 3, x = -3, x = 5$

16.  $y = 48$

17.  $t = 12$

18.  $x = 27$

19. 5 inches

20. 55 minutes

EC1.  $(2 - b)(2 + b)(4 + b^2)$

EC2. 9 hours