

Show all your work to receive full credit.

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Problems 1-5 are worth 6 points each.

1. Write 2.5% as a simplified fraction.
  2. Simplify the expression  $2y^2 - 5y + 13 - 13y^2 + 4y - 3$
  3. Evaluate the rational expression  $\frac{2t^3 - 8}{t^2 + 5}$  for  $t = -1$ .
  4. Write the number 127,000 in scientific notation.
  5. Translate the following into an algebraic expression:  
The sum of a number and 16, divided by 4, yields the quotient of the number and 9.
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Problems 6-35 are worth 9 points each.

6. Find the restricted value(s) for

$$\frac{x^2 - 9}{x^2 - 2x - 15}$$

7. 31.5 is what percent of 63?
  8. Simplify and write your answer in **scientific notation**:  
$$(8 \times 10^4) \cdot (2.5 \times 10^{-9})$$
  9. If -24 is added to a number, the sum will be 6 times the number. Find the number.
  10. Write the slope-intercept form of the line passing through the points (2, 3) and (6, 4).
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Solve the following equations:

11.  $5x + 4 = 2(x + 8)$
  12.  $5.14x + 1.32 = 4.7x$
  13.  $x^2 - 13x + 40 = 0$
  14.  $(x - 2)(x + 1) = 28$
  15.  $\frac{3}{t + 2} = \frac{6}{t + 16}$
  16.  $\frac{7}{3x} - \frac{x + 2}{x} = \frac{3}{7}$
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Solve each system of linear equations. If a system has no solution or infinitely many solutions, state so.

17.  $x + 4y = 18$   
 $3x - y = -24$

18.  $y = 3 - 2x$   
 $10x + 5y = 11$

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Factor each of the following polynomials **completely**:

19.  $3x^2 + 13x + 14$

20.  $8x^2 - 3y + 8xy - 3x$

21.  $4m^3 - 12m^2 - 40m$

22.  $x^2 - \frac{4}{9}$

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Perform the indicated operations and simplify. Express your answers using positive exponents only. **Do NOT use a calculator** to approximate roots:

23.  $(4 \cdot 5)^2 + 4 \cdot 5^2$

24.  $\frac{18x^{24}(y^3)^2}{6x^3y^0z^2}$

25.  $\frac{x^2 - 7x}{x^2 + 2x} \cdot \frac{x^2 + 7x + 12}{x^2 - 4x - 21}$

26.  $(2x - 3)^2$

27.  $\frac{a^2 + 5a - 14}{a + 3} \div \frac{a - 2}{a^2 + 2a - 3}$

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28.  $4\sqrt{18} - \sqrt{72} + 3\sqrt{63}$

29.  $-2y^2(4xy + 15y^3)$

30.  $\frac{3(2x + 7)}{2x^2 + 9x - 18} + \frac{x + 5}{x + 6}$

31.  $\frac{6a^3 - 10a^2 - 16a}{2a^2}$

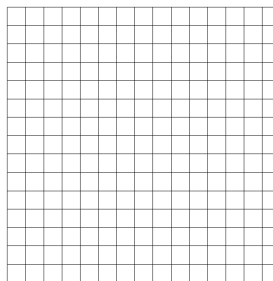
32.  $\frac{\left(\frac{k + 1}{28k}\right)}{\left(\frac{5k - 2}{21k}\right)}$

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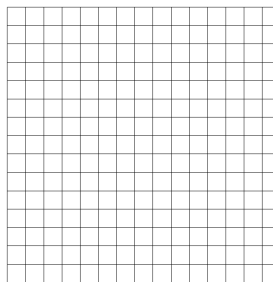
33. Graph  $4x + 3y = 12$  by first finding the  $x$ - and  $y$ -intercepts of the equation. Label points.

$x$ -intercept: (        ,        )  
 $y$ -intercept: (        ,        )



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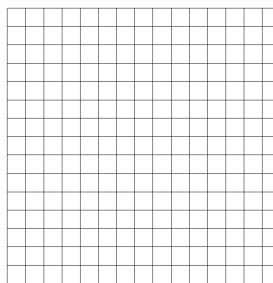
34. Graph  $x - 2y = 4$  by first writing the equation in slope-intercept form. Label points.



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35. Find the solution to the system of linear equations by graphing. If there is no solution or infinitely many solutions state so.

$$\begin{aligned} 2x - 14y &= -14 \\ 2x + 7y &= 28 \end{aligned}$$



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

1. Factor completely:

$$-22p^2 + 33pq + 22q^2$$

2. Rationalize the denominator

$$\frac{\sqrt{m} - 4}{\sqrt{m} - 6}$$

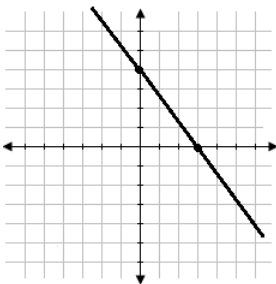
3. By himself, a person can mow his lawn in 60 minutes. If his daughter helps, they can mow the lawn together in 48 minutes. How long would it take his daughter to mow the lawn by herself?

4. A chemist needs 4 liters of a 12% acid solution. He has a 10% solution and a 20% solution available to form the mixture. How much of each should be used to form the 12% solution?

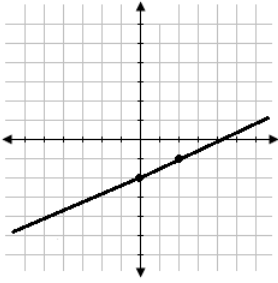
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## Answer Key

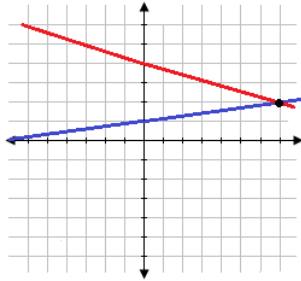
- $\frac{1}{40}$
- $-11y^2 - y + 10$
- $-\frac{5}{3}$
- $1.27 \times 10^5$
- $\frac{(x+16)}{4} = \frac{9}{x}$
- $x = -3$  and  $x = 5$
- 50%
- $2.0 \times 10^{-4}$
- $-\frac{24}{5}$
- $y = \frac{1}{4}x + \frac{5}{2}$
- $x = 4$
- $x = -3$
- $x = 8, x = 5$
- $x = 6, x = -5$
- $t = 12$
- $x = \frac{7}{30}$
- $y = 6$
- no solution
- $(3x + 7)(x + 2)$
- $(8x - 3)(x + y)$
- $4m(m - 5)(m + 2)$
- $(x - \frac{2}{3})(x + \frac{2}{3})$
- 500
- $\frac{3y^6x^{21}}{z^2}$
- $\frac{(x+4)}{(x+2)}$
- $4x^2 - 12x + 9$
- $(a + 7)(a - 1)$
- $6\sqrt{2} + 9\sqrt{7}$
- $-8xy^3 - 30y^5$
- $\frac{(2x+1)}{(2x-3)}$
- $3a - 5 - \frac{8}{a}$
- $\frac{3(k+1)}{4(5k-2)}$
- x-intercept: (3,0), y-intercept: (0,4)



34. slope-intercept form  $y = \frac{1}{2}x - 2$ , slope:  $\frac{1}{2}$ , y-intercept:  $(0, -2)$



35. The slope-intercept form of the two lines:  $y = \frac{1}{7}x + 1$ ,  $y = -\frac{2}{7}x + 4$ ,



intersection point:  $(7, 2)$

ex1.  $-11(2p + q)(p - 2q)$

ex2  $\frac{m+2\sqrt{m}-24}{m-36}$

ex3. 240 min

ex4. .8 liters of 20% solution, 3.2 liters of 10% solution