Solve the equation.

1) \((y - 4) - (y + 5) = 5y\)

2) \(13(8c - 7) = 8c - 9\)

3) \(3(2z - 4) = 5(z + 5)\)

4) \(2x + 3(-2x - 5) = -16 - 3x\)

5) \(\frac{2x}{5} - \frac{x}{3} = 2\)

6) \(\frac{17}{14} x + \frac{2}{7} = \frac{8}{7} x\)

7) \(\frac{4(7 - x)}{3} = x\)

8) \(\frac{3(y - 2)}{5} = 1 - 3y\)

Solve the inequality. Graph the solution set and write it in interval notation.

9) \(-24x + 8 \leq -4(5x - 11)\)

10) \(25x + 5 \leq 5(4x + 5)\)

11) \(-32 \leq -5x + 3 \leq -12\)

12) \(4 \leq 2(x - 5) \leq 8\)

Solve.

13) The owners of a candy store want to sell, for $6 per pound, a mixture of chocolate-covered raisins, which usually sells for $3 per pound, and chocolate-covered macadamia nuts, which usually sells for $8 per pound. They have a 40-pound barrel of the raisins. How many pounds of the nuts should they mix with the barrel of raisins so that they hit their target value of $6 per pound for the mixture?
14) A chemist needs 100 milliliters of a 67% solution but has only 55% and 85% solutions available. Find how many milliliters of each that should be mixed to get the desired solution.

15) How can $56,000 be invested, part at 4% annual simple interest and the remainder at 10% annual simple interest, so that the interest earned by the two accounts is equal at the end of the year?

16) Melissa invested a sum of money at 3% annual simple interest. She invested three times that sum at 5% annual simple interest. If her total yearly interest from both investments was $3600, how much was invested at 3%?

17) Linda and Dave leave simultaneously from the same starting point biking in opposite directions. Linda bikes at 5 miles per hour and Dave bikes at 9 miles per hour. How long will it be until they are 23 miles apart from each other?

18) Jeff starts driving at 55 miles per hour from the same point that Lauren starts driving at 50 miles per hour. They drive in opposite directions, and Lauren has a half-hour head start. How long will they be able to talk on their cell phones that have a 400–mile range?

19) Eight less than three times a number is less than ten. Find all such numbers.

20) Three–fourths a number decreased by one is between negative five and sixteen. Find all such numbers.

**Determine whether the equation is a linear equation in two variables.**

21) $x = 3$

22) $3x^2 = 7y - 6$

**Complete the ordered pair so that it is a solution of the given linear equation.**

23) $8x + y = -52; \quad (-7, \quad), (0, \quad), (1, \quad)$

**Complete the table of ordered pairs for the given linear equation; then plot the solution.**

24) $5x + 2y = 10$

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>-5</td>
</tr>
</tbody>
</table>
Identify the intercepts.

25)

Graph the linear equation by finding x- and y- intercepts.

27) \(15y - 5x = -10\)
28) $y = 5x$

Graph the linear equation.

29) $x = -4$

30) $y - 2 = 0$
Use the slope-intercept form to graph the equation.

31) \(6x + y = 0\)

32) \(2x + 5y = 10\)

Evaluate the expression with the given replacement values.

33) \(-3x^3y; x = 2\) and \(y = -5\)

34) \(\frac{8}{3x^2}; x = -3\)

Use the product rule to simplify. Write the results using exponents.

35) \(g^9 \cdot g^5 \cdot g^8\)

36) \((7x)(4x^5)(x^3)\)

Use the quotient rule to simplify the expression.

37) \(\frac{40m^{16}n^9}{5m^{15}n^7}\)

Simplify the following.

38) \(-8y^0\)

Simplify the expression. Write the result using positive exponents only.

39) \(\frac{(4x^2)^3}{x^{15}}\)
40) \((-5x^3y^{-4})(3x^{-1}y)\)  

Find the perimeter.  

41)  
\[
\begin{array}{c}
\text{\(2\times(3x + 3)\) units} \\
\text{\((x^2 - x + 12)\) units}
\end{array}
\]

42)  
\[
\begin{array}{c}
\text{\((4x + 36)\) units} \\
\text{\((x^2 - x + 9)\) units} \\
\text{\((x^2 + 3)\) units} \\
\text{\((5x + 1)\) units}
\end{array}
\]

Perform the indicated operations.  

43) \((6x^5 + 2x^4 - 7x^3 + 6) - (4x^5 - 4x^4 - 5x^3 - 5)\)  

44) \((-7x^4 + 9x^6 - 8 + 9x^5) - (-5 + 5x^5 + 2x^6 + 9x^4)\)  

Find the following product.  

45) \((3z + 11)^2\)  

46) \((x + 1)(x^2 - x + 1)\)  

Perform the division.  

47) \(\frac{x^2 + 7x + 3}{x + 5}\)  

48) \(\frac{8x^3 - 28x^2 + 14x + 19}{2x - 5}\)  

Factor out the GCF from the polynomial.  

49) \(48x - 8\)  

50) \(21x^3y + 15xy^6\)  

Factor by grouping.  

51) \(xy + 11x - 5y - 55\)  

52) \(4xy - 16x + 7y - 28\)  

Factor the polynomial completely. If the polynomial cannot be factored, write prime.  

53) \(x^3 - x^2 - 30x\)
54) \(5x^6 + 60x^5 + 175x^4\) 
55) \(x^2 - 16xy + 64y^2\) 
56) \(64x^2 + 80xy + 25y^2\) 
57) \(r^{20} - a^2\) 
58) \(x^4 - 625\) 
59) \(t^3 + 1000\) 
60) \(750x^3 - 162x^6\)

**Solve the equation.**

61) \((5y + 29)(2y + 11) = 0\)
62) \(b(b + 18) = 0\)
63) \(49x^2 - 3 = 14x\)
64) \((x + 8)(x + 1) = 44\)

Without graphing, determine whether the system has one solution, no solution, or an infinite number of solutions.

65) \[
\begin{align*}
2x + y &= 2 \\
2x + y &= 4
\end{align*}
\]
66) \[
\begin{align*}
x + 6y &= 24 \\
y &= -\frac{1}{6}x + 4
\end{align*}
\]

Solve the system of equations by graphing the equations on the same set of axes.

67) \[
\begin{align*}
x + y &= 1 \\
x - y &= 5
\end{align*}
\]
68) \[ \begin{align*}
3x + 2y &= 5 \\
3x - 2y &= -9
\end{align*} \]

Solve the system of equations by the substitution method.

69) \[ \begin{align*}
3x + y &= 15 \\
12x + 4y &= 60
\end{align*} \]

70) \[ \begin{align*}
-5x - 20y &= 10 \\
6x + 24y &= 0
\end{align*} \]

Solve the system of equations by the addition method.

71) \[ \begin{align*}
3x - 5y &= 7 \\
6x - 10y &= 28
\end{align*} \]

72) \[ \begin{align*}
-6x - 6y &= -4 \\
12x + 12y &= 8
\end{align*} \]

Simplify the rational expression.

73) \[ \frac{2x - 8}{12 - 3x} \]

74) \[ \frac{4 - x}{6x - 24} \]

Perform the indicated operation. Simplify if possible.

75) \[ \frac{2x}{x^2 - 7x + 12} - \frac{8}{x^2 - 7x + 12} \]

76) \[ \frac{10x + 3}{x^2 + 10x + 16} - \frac{9x - 5}{x^2 + 10x + 16} \]

Divide. Simplify if possible.

77) \[ \frac{x - 1}{-7 - x} + \frac{x^2 - 4x - 5}{x^2 + 8x + 7} \]
78) \((x + 2) \div \frac{x^2 - 10x + 16}{8 - x}\)

Find all numbers for which the rational function is defined.

79) \(f(w) = \frac{w^2 - 25w}{5w}\)

80) \(f(x) = \frac{2x}{-3 + x}\)
Answer Key
Testname: DEPARTMENTAL FINAL REVIEW 0308

1) \(-\frac{9}{5}\)

2) \(\frac{41}{48}\)

3) 37

4) 1

5) 30

6) -4

7) 4

8) \(\frac{11}{18}\)

9) \([-9, \infty)\)

10) \((-\infty, 4]\)

11) [3, 7]

12) [7, 9]

13) 60 lbs

14) 60 ml of 55%; 40 ml of 85%

15) $40,000 invested at 4%; $16,000 invested at 10%

16) $20,000

17) 1 \(\frac{9}{14}\) hrs

18) 3 \(\frac{4}{7}\) hrs

19) \(x < 6\)

20) \(-\frac{16}{3} < x < \frac{68}{3}\)

21) yes

22) no

23) (-7, 4) (0, -52) (1, -60)
24) 

<table>
<thead>
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<tbody>
<tr>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>4</td>
<td>- 5</td>
</tr>
</tbody>
</table>

25) (6, 0), (-6, 0), (0, 4), (0, -4)  
26) (4, 0), (-4, 0), (0, -4)  
27) (0, -2/3), (2, 0)  
28) (0, 0)
Answer Key
Testname: DEPARTMENTAL FINAL REVIEW 0308

29)

30)

31)
32)

33) 120
34) \( \frac{8}{27} \)
35) g
36) 28\(x^9 \)
37) 8mn
38) -8
39) \( \frac{64}{x^9} \)
40) \( \frac{-15x^2}{y^3} \)
41) \((2x^2 + 4x + 30)\) units
42) \((2x^2 + 8x + 49)\) units
43) \(2x^5 + 6x^4 - 2x^3 + 11\)
44) \(7x^6 + 4x^5 - 16x^4 - 3\)
45) \(9z^2 + 66z + 121\)
46) \(x^3 + 1\)
47) \(x + 2 - \frac{7}{x + 5}\)
48) \(4x^2 - 4x - 3 + \frac{4}{2x - 5}\)
49) \(8(6x - 1)\)
50) \(3xy(7x^2 + 5y^5)\)
51) \((y + 11)(x - 5)\)
52) \((4x + 7)(y - 4)\)
53) \(x(x + 5)(x - 6)\)
54) \(5x^4(x + 7)(x + 5)\)
55) \((x - 8y)^2\)
56) \((8x + 5y)^2\)
57) \((r^{10} + a)(r^{10} - a)\)
58) \((x^2 + 25)(x + 5)(x - 5)\)
59) \((t + 10)(t^2 - 10t + 100)\)
60) \(6x^3(5 - 3x)(25 + 15x + 9x^2)\)

61) \(y = -\frac{29}{5}, y = \frac{11}{2}\)

62) \(b = -18, b = 0\)

63) \(x = \frac{3}{7}, x = -\frac{1}{7}\)

64) \(x = -12, x = 3\)

65) no solution

66) infinite number of solutions

67) (3, -2)

68) (-1, 3)

69) infinite number of solutions

70) no solution

71) no solution

72) infinite number of solutions

73) \(-\frac{2}{3}\)

74) \(-\frac{1}{6}\)

75) \(\frac{2}{x - 3}\)

76) \(\frac{1}{x + 2}\)

77) \(-\frac{x - 1}{x - 5}\)

78) \(-\frac{x + 2}{x - 2}\)

79) \(\{w \mid w \text{ is a real number and } w \neq 0\}\)

80) \(\{x \mid x \text{ is a real number and } x \neq 3\}\)