

Algebra 1 SEMESTER 2 Final Review

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Find the sum.

1. $(-p^2 - 7p + 13) + (3p^2 + 4p + 15)$

$$\begin{array}{r} -p^2 - 7p + 13 \\ 3p^2 + 4p + 15 \\ \hline 2p^2 - 3p + 28 \end{array}$$

2. $(-7p^2 + 5p - 3) + (-3p^2 + p - 12)$

$$\begin{array}{r} -7p^2 + 5p - 3 \\ -3p^2 + p - 12 \\ \hline -10p^2 + 6p - 15 \end{array}$$

Find the difference.

3. $(5x^2 + 8x + 9) + (2x^2 + 7x + 4)$

$$\begin{array}{r} 5x^2 + 8x + 9 \\ 2x^2 + 7x + 4 \\ \hline 7x^2 + 15x + 13 \end{array}$$

4. $(5x^2 - 6x + 5) + (2x^2 - 8x + 3)$

$$\begin{array}{r} 5x^2 - 6x + 5 \\ 2x^2 - 8x + 3 \\ \hline 3x^2 - 14x + 8 \end{array}$$

Find the product.

5. $(t+3)(2t+4)$

$$2t^2 + 4t + 6t + 12 = 2t^2 + 10t + 12$$

6. $(2t-2)(t+7)$

$2t$	-2
t	$2t^2 - 2t$
7	$14t - 14$

$$2t^2 + 12t - 14$$

Solve each equation.

7. $n^2 + 121 = -22n$
 $+22n + 22n$
 $n^2 + 22n + 121 = 0$

$$\begin{array}{r} 121 \\ 11 \times 11 \\ \hline 22 \end{array}$$

$$(n^2 + 11n) + (11n + 121)$$

$$n(n+11) + 11(n+11)$$

$$(n+11)^2 = 0$$

$$\boxed{n = -11}$$

8. $25p^2 - 5p = 0$
 $5p(5p-1) = 0$

$$\boxed{5p=0} \quad \boxed{5p-1=0}$$

$$\boxed{p=0} \quad \boxed{p=1/5}$$

9. $n^2 + 49 = 14n$
 $-14n -14n$
 $n^2 - 14n + 49 = 0$

$$\begin{array}{r} 49 \\ -7 \times -7 \\ \hline -14 \end{array}$$

$$(n^2 - 7n) - 7n + 49 = 0$$

$$n(n-7) - 7(n-7)$$

$$(n-7)^2 = 0$$

$$\boxed{n=7}$$

10. $4p^2 - p = 0$
 $p(4p-1) = 0$

$$\boxed{p=0} \quad \boxed{4p-1=0}$$

$$\boxed{p=1/4}$$

Factor each polynomial.

11. $2x^2 + 19x + 9$

$$\begin{array}{r} 2 \cdot 9 \\ 18 \\ 19 \\ 1 \times 1 \end{array}$$

$$2x(x+9)(x+9)$$

$$\boxed{(x+9)(2x+1)}$$

12. $3p^2 - 14p + 8$

$$\begin{array}{r} 3 \cdot 8 \\ 24 \\ -12 \times -2 \\ -14 \end{array}$$

$$(3p^2 - 12p) - 2p + 8$$

$$3p(p-4) - 2(p-4)$$

$$\boxed{(p-4)(3p-2)}$$

13. $z^2 + 6z - 27$

$$\begin{array}{r} -27 \\ 9 \times -3 \\ 6 \end{array}$$

$$(z^2 + 9z) - 3z - 27$$

$$z(z+9) - 3(z+9)$$

$$\boxed{(z+9)(z-3)}$$

14. $4r^2 - 12r - 72$

$$4(r^2 - 3r - 18)$$

$$\begin{array}{r} -18 \\ -6 \times 3 \\ -3 \end{array}$$

$$(r^2 - 6r) - 3r - 18$$

$$r(r-6) - 3(r-6)$$

$$\boxed{4(r-6)(r+3)}$$

Factor each polynomial.

15. $4y^2 - 12y + 9$

~~$\begin{array}{r} 4 \cdot 9 \\ \hline 36 \\ -6 \cdot -6 \\ \hline -12 \end{array}$~~

$(4y^2 - 6y)(-6y + 9)$
 $2y(2y - 3) - 3(2y - 3)$

$(2y - 3)^2$

16. $z^2 + z - 42$

~~$\begin{array}{r} -42 \\ \hline 7 \cdot -6 \\ \hline -42 \end{array}$~~

$(z^2 + 7z)(-6z - 42)$
 $z(z + 7) - 6(z + 7)$

$(z + 7)(z - 6)$

Find the zeros of each function.

17. $y = x^2 - 81$

$0 = (x + 9)(x - 9)$
 $x = -9, 9$

18. $y = -x^2 + 25$

$0 = -(x^2 - 25)$
 $0 = -(x + 5)(x - 5)$

$x = 5, -5$

19. $y = x^2 - 64$

$0 = (x + 8)(x - 8)$
 $x = 8, -8$

20. $y = -x^2 + 9$

$0 = -(x^2 - 9)$
 $0 = -(x + 3)(x - 3)$

$x = -3, 3$

21. The graph of $y = x^2$ is translated 1 unit right and 7 units down. Write an equation for the function in vertex form and in standard form.

vertex $y = (x - 1)^2 - 7$

$(x - 1)(x - 1) - 7$

standard $x^2 - x - x + 1 - 7$
 $y = x^2 - 2x - 6$

22. The graph of $y = x^2$ is translated 1 unit right and 5 units down. Write an equation for the function in vertex form and in standard form.

vertex $y = (x - 1)^2 - 5$

$(x - 1)(x - 1) - 5$

$x^2 - x - x + 1 - 5$

Solve each equation by factoring/finding the zeros.

standard $y = x^2 - 2x - 5$

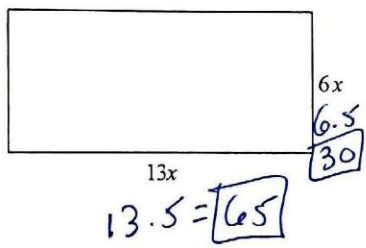
23. $-x^2 - 3x + 18 = 0$
 $-(x^2 + 3x - 18)$
 $(x^2 + 6x)(3x - 18)$
 $x(x+6) - 3(x+6)$
 $0 = -(x+6)(x-3)$
 $x = 3, -6$

24. $-x^2 - 2x + 8 = 0$
 $-(x^2 + 2x - 8) = 0$
 $(x^2 + 4x)(-2x - 8)$
 $x(x+4) - 2(x+4)$
 $0 = -(x+4)(x-2)$
 $x = -4, 2$

25. The height (in feet) of an overhand volleyball serve can be modeled by $h = -16t^2 + 22t + 7$, where t is the time in seconds. After how many seconds is the ball 13 feet above the ground?

$13 = -16t^2 + 22t + 7$
 -13
 $0 = -16t^2 + 22t - 6$
 on calc
 $x = 0.375 \text{ seconds}$
 $x = 1 \text{ second}$

Use the given area A to find the dimensions of the figure.

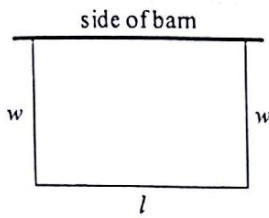
26. $A = 1950 \text{ cm}^2$
 $A = l \cdot w$
 $1950 = 6x \cdot 13x$
 $1950 = 78x^2$
 $\frac{1950}{78} = \frac{78x^2}{78}$
 $25 = x^2$
 $5 = x$


Find the value of c that would complete the square.

27. $x^2 - 16x + c$
 1) $-\frac{16}{2} = -8$
 2) $(-8)^2 = 64$
 1) $\frac{2}{2} = 1$
 2) $(1)^2 = 1$
 3) $x^2 + 2x + 1 = 35 + 1$
 4) $\sqrt{(x+1)^2} = \sqrt{36}$

Solve the equation by completing the square.

28. $x^2 + 2x = 35$
 29. A farmer built a rectangular pigpen on the side of his barn. He enclosed 3 sides of the pigpen with 54 feet of fencing. The total area of the pigpen was 364 square feet.
 $l + 2w = 54$
 $l = 54 - 2w$
 $364 = l \cdot w$
 $364 = (54 - 2w)w$
 $364 = 54w - 2w^2$
 $2w^2 - 54w + 364 = 0$
 $2(w^2 - 27w + 182) = 0$
 $(w^2 - 13w)(14w + 14)$
 $w(w-13) \cdot 14(w-13)$
 $(w-13)(w-14) \rightarrow$



$$w = 13 \text{ or } 14$$

$$l = 54 - 2w$$

$$l = 54 - 2(13)$$

$$l = 28 \text{ or}$$

$$l = 54 - 2(14)$$

$$l = 26$$

Find the possible dimensions of the pigpen.

Solve each equation using the quadratic formula.

30. $x^2 - 12x - 13 = 0$

$$\frac{12 \pm \sqrt{(-12)^2 - 4(1)(-13)}}{2(1)} = \frac{12 \pm \sqrt{146}}{2}$$

$$\frac{12+14}{2} = 13$$

$$\frac{12-14}{2} = -1$$

31. $x^2 - 4x - 5 = 0$

$$\frac{4 \pm \sqrt{(-4)^2 - 4(1)(-5)}}{2(1)} = \frac{4 \pm \sqrt{36}}{2}$$

$$\frac{4+6}{2} = 5$$

$$\frac{4-6}{2} = -1$$

Solve each system by substitution.

32. $y = 2x^2 + 3x - 4$

$y - 4x = 2$

$y = 4x + 2$

$2x^2 + 3x - 4 = 4x + 2$

$2x^2 - 1x - 6 = 0$

$$\frac{1 \pm \sqrt{(-1)^2 - 4(2)(-6)}}{2(2)} = \frac{1 \pm \sqrt{25}}{4}$$

$$\frac{1+5}{4} = \frac{3}{2}$$

$$\frac{1-5}{4} = -1$$

33. $y = 2x^2 + 2x - 27$

$y - 3x = 1$

$y = 3x + 1$

$2x^2 + 2x - 27 = 3x + 1$

$2x^2 - x - 28 = 0$

$$\frac{1 \pm \sqrt{(-1)^2 - 4(2)(-28)}}{2(2)} = \frac{1 \pm \sqrt{205}}{4}$$

Simplify the expression.

$$\frac{1+5}{4} = \frac{6}{4} = \frac{3}{2}$$

$$\frac{1-5}{4} = \frac{-4}{4} = -1$$

$$34. \sqrt{\frac{19}{23}} = \frac{\sqrt{19}}{\sqrt{23}} \cdot \frac{\sqrt{23}}{\sqrt{23}} = \frac{\sqrt{437}}{23}$$

$$35. \sqrt{\frac{15}{34}} \cdot \frac{\sqrt{34}}{\sqrt{34}} \cdot \frac{\sqrt{34}}{\sqrt{34}} = \frac{\sqrt{510}}{34}$$

Find the domain of each function.

$$36. y = \sqrt{x-12}$$

$$\begin{array}{l} x-12 \geq 0 \\ \boxed{x \geq 12} \end{array}$$

$$37. y = \sqrt{x-7}$$

$$\begin{array}{l} x-7 \geq 0 \\ \boxed{x \geq 7} \end{array}$$

Solve each equation.

$$38. \frac{9\sqrt{x+40}}{9} = \frac{99}{9}$$

$$(\sqrt{x+40})^2 = (11)^2$$

$$\begin{array}{r} x+40 = 121 \\ -40 \quad -40 \\ \hline x = \end{array}$$

$$39. \sqrt{5x} - \sqrt{9x-6} = 0$$

$$(\sqrt{5x})^2 = (\sqrt{9x-6})^2$$

$$\begin{array}{r} 5x = 9x-6 \\ -9x \quad +9x \\ \hline -4x = -6 \\ \frac{-4x}{-4} = \frac{-6}{-4} \\ \boxed{x = \frac{3}{2}} \end{array}$$

Solve each equation.

$$40. (x)^2 = (\sqrt{5x-4})^2$$

$$\begin{array}{r} x^2 = 5x-4 \\ -5x \quad -5x \\ \hline -x^2 + 5x - 4 \end{array}$$

$$x^2 - 5x + 4 = 0$$

$$\begin{array}{r} 4 \quad -1 \\ -4 \quad -5 \\ \hline (x^2 - 4x) - (x + 4) \\ x(x-4) - 1(x-4) \end{array}$$

$$(x-1)(x-4) = 0$$

$$\boxed{x = 1, 4}$$

41. $\frac{2\sqrt{x+12}}{2} = 16$
 $(\sqrt{x+12})^2 = (8)^2$

$x+12 = 64$
 $-12 \quad -12$
 $x = 52$

42. $\sqrt{3x} - \sqrt{6x-5} = 0$
 $(\sqrt{3x})^2 = (\sqrt{6x-5})^2$

$3x = 6x - 5$
 $-6x \quad -6x$
 $-3x = -5$
 $\frac{-3x}{-3} = \frac{-5}{-3}$
 $x = 5/3$

43. $(x)^2 = (\sqrt{3x-2})^2$
 $x^2 = 3x - 2$
 $-3x \quad -3x$
 $+2 \quad +2$

$x^2 - 3x + 2 = 0$
 $(x-2)(x-1) = 0$
 $x(x-2) - 1(x-2)$

$0 = (x-1)(x-2)$
 $x = 1, 2$

Find the inverse of each relation using a table.

44.

Input	-8	-1	0	1	8
Output	6	2	0	2	6

I	6	2	0	2	6
O	-8	-1	0	1	8

45.

Input	-3	-2	0	2	3
Output	6	2	0	2	6

I	6	2	0	2	6
O	-3	-2	0	0	3

46. Suppose f and f^{-1} are inverse functions and $f(-2) = 9$. What is the value of $f^{-1}(9)$?

$f^{-1}(9) = -2$

47. Suppose f and f^{-1} are inverse functions and $f(-9) = 8$. What is the value of $f^{-1}(8)$?

$f^{-1}(8) = -9$

Find the missing value of x for each data set

(Note: The Mean or the Median is given for each data set as well)

48. 9, 7, 6, 3, 9, x The Mean is 7.

$$\frac{9+7+6+3+9+x}{6} = 7 \cdot 6$$
$$4+x = 42$$
$$-34 \quad -34$$
$$\boxed{x = 8}$$

49. 14, 15, x , 19, 22, 29 The Median is 18.

$$\frac{x+19}{2} = 18 \cdot 2$$
$$x+19 = 36$$
$$-19 \quad -19$$
$$\boxed{x = 17}$$

50. 8, 9, 2, 3, 3, x The Mean is 5.

$$\frac{8+9+2+3+3+x}{6} = 5 \cdot 6$$
$$25+x = 30$$
$$\boxed{x = 5}$$

51. 11, 13, x , 18, 19, 30 The Median is 17.

$$\frac{x+18}{2} = 17 \cdot 2$$
$$x+18 = 34$$
$$\boxed{x = 16}$$

Find the mean and the standard deviation for each set of data.

52. 7, 3, 5, 7, 4, 6, 4, 4

$$\bar{x} = 5$$
$$\sigma_x = 1.41$$

All on calc!

53. 2, 8, 3, 6, 8, 2, 5, 6

$$\bar{x} = 5$$
$$\sigma_x = 2.29$$

54. Use the data below from a survey of students.

	Eat Breakfast	Skip Breakfast	Totals
Students: ages 10-13	40	14	54
Students: ages 14-17	12	24	36
Totals	47	43	90

a. What percentage of the total students surveyed eat breakfast?

$$\frac{47}{90} = 52.2\%$$

b. What percentage of students age 14-17 skip breakfast?

$$\frac{24}{36} = 66.7\%$$

c. What percentage of students who ate breakfast were of age 10-13?

$$\frac{40}{47} = 85.1\%$$

55. A group of students were surveyed about what foreign language class they were enrolled in. The table below shows the results.

	Spanish	French	German	Total
Boys	10	2	8	20
Girls	15	12	3	30
Total	25	14	11	50

a. What percentage of the total students surveyed were enrolled in French?

$$\frac{14}{50} = 28\%$$

b. What percentage of boys were enrolled in German?

$$\frac{8}{20} = 40\%$$

c. What percentage of students enrolled in French were girls?

$$\frac{12}{14} = 85.7\%$$