

REVIEW FOR ELEMENTARY ALGEBRA FINAL EXAM

In order to be prepared for the final exam, students should be able to do all of the following problems and related problems as well. Students are expected to know the sum of the angles in a triangle, the Pythagorean Theorem, and formulas for area and perimeter of triangles, rectangles, and squares, as well as the relationship between diameter and radius of a circle. Other geometry formulas and the Quadratic Formula will be provided.

- Translate to an algebraic expression: seven less than twice a number
- Translate to an algebraic expression: three-fifths of a number
- Use the commutative law of multiplication to write an expression equivalent to: $wd + s$
- Use the associative law of addition to write an expression equivalent to: $(wd + s) + 3$
- Use the distributive law to write an expression equivalent to: $3(wd + s)$

6. Simplify:

- $12 - 3(10 - 4)$
- $|-3 \cdot 4 - 12 \cdot 2| - 8(-7)$
- $(12 - 8)^2$
- $\frac{4(18 - 8) + 7 \cdot 21}{8^2 - 9^2}$
- $6[11m - 3(4m - 1)] - (7 - 6m)$

7. Evaluate: $\frac{2xy}{x - y}$, for $x = 6$ and $y = -3$

8. Simplify and write the final answers with positive exponents only:

- | | |
|---------------------------------------|--|
| (a.) $5x^0$ | |
| (b.) $(5x)^0$ | (j.) $\frac{-14w^{-2}x^4y^{-6}z^0}{21w^{-8}x^4yz^5}$ |
| (c.) 8^{-1} | |
| (d.) $(-2)^{-4}$ | (k.) $\left(\frac{2ab^2}{-5c^4d^5}\right)^3$ |
| (e.) $5^7 \cdot 5^2$ | |
| (f.) $(6ab^5c^3)(-a^2c^5)$ | (l.) $\left(\frac{3x^2y^{-3}}{4w^{-4}z}\right)^{-2}$ |
| (g.) $(-2n^2v^5)^3$ | |
| (h.) $(4xy^4)^{-2}$ | |
| (i.) $(5v^{-5}w^{-3})(-2v^2w^{-5})^4$ | |

9. Identify each polynomial as a monomial, a binomial, or a trinomial, and indicate its degree:

- $10 + 3z^4 - 9z^3$
- $19x^{15}$
- $100 - 5y$

10. Add: $(11x^3 + 4x^2 - 3x - 5) + (2x^3 - 4x^2 - 6)$

11. Subtract: $(y - 2y^3 + 7y^2) - (4y^2 - 3y + 2y^3)$

12. Multiply:

(a.) $-3x^3(5x^3 - 2x^2 + x - 7)$

(b.) $(8y + 1)(2y - 7)$

(c.) $(6x - 7)^2$

(d.) $(4a^2 + 5)(a^3 - 5a + 1)$

13. Divide: $\frac{12xy^6 + 24x^5y^9 - 4xy^3}{4xy^3}$

14. Divide: $(x^2 - 7x - 6) \div (x - 4)$

15. Divide: $(8x^3 + 8x + 11) \div (2x + 1)$

16. Convert to decimal notation: 7.6×10^3

17. Convert to scientific notation: 0.0596

18. Simplify and write your answer in scientific notation: $(1.75 \times 10^{-3})(4.20 \times 10^{-5})$

19. Simplify and write your answer in scientific notation: $\frac{1.6 \times 10^{-2}}{6.4 \times 10^{-7}}$

20. Factor completely:

(a.) $42x^{10} - 28x^6 + 7x^2$

(g.) $5x^2 - 23x - 10$

(b.) $x^2 + 49$

(h.) $x^3 + 27$

(c.) $4a^4 - 64a^2$

(i.) $8y^3 - 1$

(d.) $20x^3 - 12x^2 - 45x + 27$

(j.) $64 - x^3$

(e.) $w^5 - 10w^4 + 25w^3$

(f.) $2y^2 + 4y - 48$

21. Solve for the indicated variable:

(a.) $A = \frac{1}{2}bh$, for b

(b.) $Q = \frac{p-q}{2}$, for p

(c.) $Ax + By = C$, for y

22. Solve the equations for x and simplify, if possible:

(a.) $0.7(3x + 6) = 1.55 - (x + 2)$

(b.) $7(x - 3) - 4(x - 1) = -23$

(c.) $-2(x - 4) = 6(x + 2) + 3x$

(d.) $5x^2 + 12x - 20 = -3x$

(e.) $\frac{-5}{9} = \frac{16}{x}$

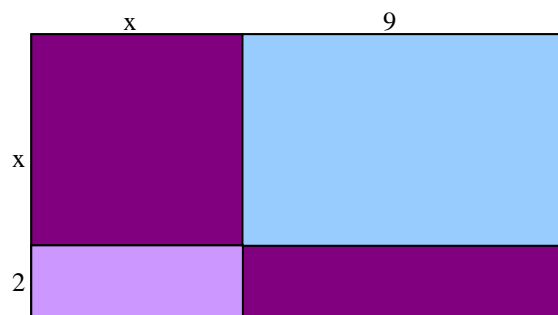
(f.) $x(x + 3) = 10$

(g.) $x^2 = 36$

(h.) $x^2 - 7x - 2 = 0$

23. Find the slope and y-intercept of the following linear equation: $5x + 3y = -6$
24. Find an equation for the vertical line containing the point $(-4, 5)$, and find its slope.
25. Find the slope of the following linear equation, and graph the line: $y = 3$
26. Find the intercepts of the following linear equation, and graph the line: $7x - 2y = -12$
27. Find an equation for the line containing the point $(-1, -3)$ and having slope $m = -4$.
28. Find an equation for the line containing the points $(4, 2)$ and $(-2, -7)$.
29. Solve the following system by graphing:
 $y = -2x + 5$
 $x - 3y = 6$
30. Solve the following systems of linear equations:
- (a.) $x = 3y + 5$
 $4x - 12y = 20$
- (b.) $4x - y = 27$
 $7x + 2y = 21$
- (c.) $2x - 10y = 1$
 $3x - 15y = 4$
31. Simplify each of the following square roots.
- (a.) $\sqrt{529}$
- (b.) $-\sqrt{900}$
- (c.) $5\sqrt{90}$
- (d.) $\sqrt{175}$
32. Economy Rent-A-Car rents compact cars at a rate of \$35 plus 15 cents per mile. Draw a graph that can be used to predict the cost of renting a car. Let the horizontal axis represent the number of miles driven and the vertical axis the total cost. Then use the graph to predict the number of miles that can be driven for a total cost of \$100.
33. At a restaurant, Jessica wants to leave at least a 15% tip for the waitress that served her. If the bill was \$13, what is the minimum amount Jessica should leave for the tip?
34. On a test of 64 items, a student got 56 correct. What percent were correct?
35. A tax-exempt charity received a bill of \$197.39 for a printer. The bill incorrectly included sales tax of 5%. How much should the charity pay?
36. The price of a computer was reduced to a sale price of \$1572.50. This was a 15% reduction. What was the original price?
37. The sum of three consecutive odd integers is -87 . What are the integers?
38. The second angle of a triangle is 4 times as large as the first. The third angle is 45 degrees less than the sum of the other two angles. Find the measure of each angle.

39. The length of a rectangle is 3 ft less than 4 times its width. If the perimeter of the rectangle is 64 ft, find the dimensions of the rectangle.
40. While traveling, you notice that you traveled 65 miles in 55 minutes. If your speed does not change, how long will it take you to travel 250 miles?
41. Two angles are complementary if the sum of their angles is 90 degrees. One of two complementary angles is 12 degrees more than twice the other. Find the measure of each angle.
42. There were 200 tickets sold for a volleyball game. Tickets for students were \$2 each and for adults were \$3 each. The total amount collected was \$530. How many of each type of ticket were sold?
43. Clear Shine window cleaner is 12% alcohol and Sunstream window cleaner is 30% alcohol. How much of each should be used to make 90 ounces of a cleaner that is 20% alcohol?
44. Emilio wishes to mix peanuts worth \$2.52 per pound with almonds worth \$3.80 per pound to make 480 lb of a mixture worth \$3.44 per pound. How much of each should be used?
45. The height of a triangle is 4 cm less than the length of the base. If the area of the triangle is 30 square cm, find the height and the length of the base.
46. A water pipe runs diagonally under a rectangular garden that is 7 feet longer than it is wide. If the pipe is 13 feet long, determine the dimensions of the garden.
47. The length of one leg of a right triangle is 12 meters. The length of the hypotenuse is 8 meters longer than the other leg. Find the length of the hypotenuse and the length of the other leg.
48. The diameter of a ball is 6 inches. Find the volume of the ball. (Hint: $V = \frac{4}{3}\pi r^3$) Use $\pi \approx 3.14$.
49. A coffee can has a diameter of 10 cm and a height of 22 cm. Find the volume of the can. (Hint: $V = \pi r^2 h$) Use $\pi \approx 3.14$.
50. Two cars leave Houston at the same time. One traveling North and the other South. If the one traveling North is traveling 15 miles per hour faster than the one traveling South and they are 345 miles apart after 3 hours, how fast is each car traveling?
51. Find the total area of all shaded rectangles:



ANSWERS:

1. $2n - 7$
2. $\frac{3}{5}n$
3. $dw + s$
4. $wd + (s + 3)$
5. $3wd + 3s$
6. (a.) -6
 (b.) 92
 (c.) 16
 (d.) -11
 (e.) 11
7. -4
8. (a.) 5
 (b.) 1
 (c.) $\frac{1}{8}$
 (d.) $\frac{1}{16}$
 (e.) 5^9
 (f.) $-6a^3b^5c^8$
 (g.) $-8n^6v^{15}$
 (h.) $\frac{1}{16x^2y^8}$
 (i.) $\frac{80v^3}{w^{23}}$
 (j.) $\frac{-2w^6}{3y^7z^5}$
 (k.) $-\frac{8a^3b^6}{125c^{12}d^{15}}$
 (l.) $\frac{16y^6z^2}{9w^8x^4}$
9. (a.) trinomial; degree = 4
 (b.) monomial; degree = 15
 (c.) binomial; degree = 1
10. $13x^3 - 3x - 11$
11. $-4y^3 + 3y^2 + 4y$
12. (a.) $-15x^6 + 6x^5 - 3x^4 + 21x^3$
 (b.) $16y^2 - 54y - 7$
 (c.) $36x^2 - 84x + 49$
 (d.) $4a^5 - 15a^3 + 4a^2 - 25a + 5$
13. $3y^3 + 6x^4y^6 - 1$
14. $x - 3 + \frac{-18}{x - 4}$
15. $4x^2 - 2x + 5 + \frac{6}{2x + 1}$
16. 7600
17. 5.96×10^{-2}
18. 7.35×10^{-8}
19. 2.5×10^4
20. (a.) $7x^2(6x^8 - 4x^4 + 1)$
 (b.) prime (sum of squares)
 (c.) $4a^2(a - 4)(a + 4)$
 (d.) $(5x - 3)(2x - 3)(2x + 3)$
 (e.) $w^3(w - 5)^2$
 (f.) $2(y + 6)(y - 4)$
 (g.) $(5x + 2)(x - 5)$
 (h.) $(x + 3)(x^2 - 3x + 9)$
 (i.) $(2y - 1)(4y^2 + 2y + 1)$
 (j.) $(4 - x)(16 + 4x + x^2)$

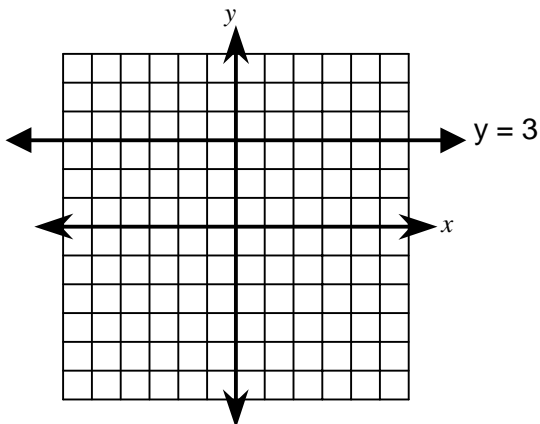
21. (a.) $b = \frac{2A}{h}$
 (b.) $p = 2Q + q$
 (c.) $y = \frac{C - Ax}{B}$ or
 $y = -\frac{A}{B}x + \frac{C}{B}$

22. (a.) -1.5
 (b.) -2
 (c.) $-\frac{4}{11}$
 (d.) -4, 1
 (e.) $-\frac{144}{5}$ or $-28\frac{4}{5}$
 (f.) -5, 2
 (g.) -6, 6
 (h.) $\frac{7 \pm \sqrt{57}}{2}$

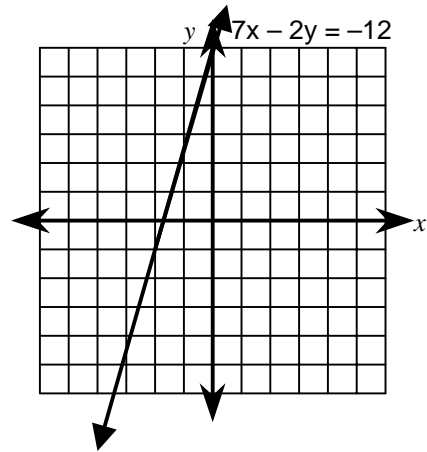
23. slope: $-\frac{5}{3}$
 y-intercept: (0, -2)

24. equation of vertical line: $x = -4$
 slope of vertical line: undefined

25. slope of horizontal line: 0

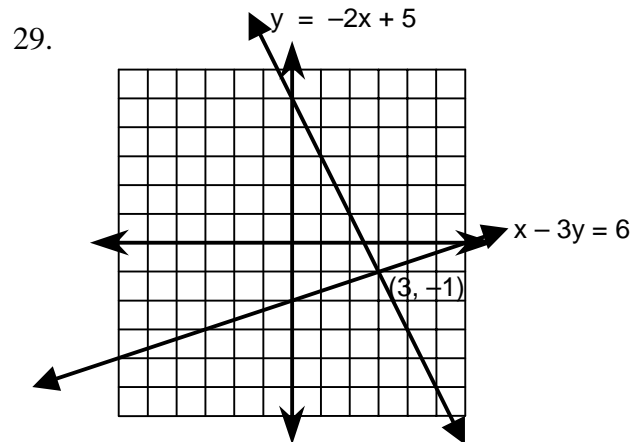


26. x-intercept: $\left(-\frac{12}{7}, 0\right)$ or $\left(-1\frac{5}{7}, 0\right)$
 y-intercept: (0, 6)



27. $y + 3 = -4(x + 1)$ or
 $y = -4x - 7$ or
 $4x + y = -7$

28. $y - 2 = \frac{3}{2}(x - 4)$ or
 $y = \frac{3}{2}x - 4$ or
 $3x - 2y = 8$



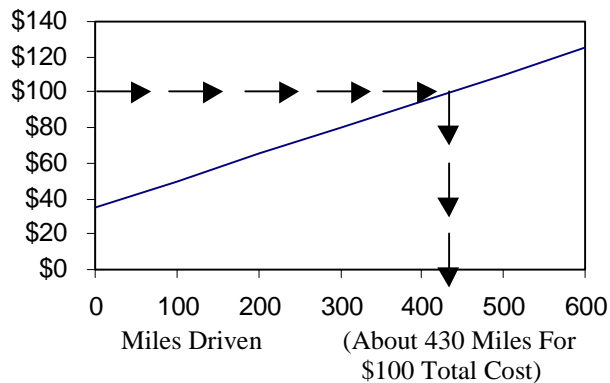
The solution is the point at which the two lines intersect: (3, -1).

30. (a.) Infinite Number of Solutions:
The equations represent the same line.
Every point on the line is a solution.
(b.) $(5, -7)$
(c.) No Solution: Parallel Lines

31. (a.) 23
(b.) -30
(c.) $15\sqrt{10}$
(d.) $5\sqrt{7}$

32.

Total Cost



33. \$1.95
34. 87.5%
35. \$187.99
36. \$1850
37. $-31, -29,$ and -27
38. $22.5^\circ, 90^\circ,$ and 67.5°
39. width: 7 ft
length: 25 ft
40. $211\frac{7}{13}$ minutes
41. 26° and 64°
42. 70 student tickets and
130 adult tickets

43. 50 oz of Clear Shine (12%) and
40 oz of Sunstream (30%)
44. 135 lb peanuts and 345 lb almonds
45. base: 10 cm
height: 6 cm
46. width: 5 ft
length: 12 ft
47. hypotenuse: 13 m
other leg: 5 m
48. 113.04 cubic inches (or in^3)
49. 1727 cubic cm (or cm^3)
50. South 50 mph and North 65 mph
51. $x^2 + 11x + 18$