

Review for Elementary Algebra Final Exam

Students are expected to know the following formulas:

- Sum of the angles in a triangle
- Pythagorean Theorem
- Area and perimeter of triangles, rectangles, and squares
- Relationship between diameter and radius of a circle
- All formulas for linear equations (slope formula, slope-intercept and point-slope forms)

The following formulas will be provided

- Geometry formulas other than those specified above (volume of cone, etc.)
- Quadratic formula
- Sum and difference of cubes (factoring)

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.

Practice problems

1. Translate to an algebraic expression: seven less than twice a number
2. Translate to an algebraic expression: three-fifths of a number
3. Use the commutative property of multiplication to write an expression equivalent to: $wd + s$
4. Use the associative property of addition to write an expression equivalent to: $(wd + s) + 3$
5. Use the distributive property to write an expression equivalent to $3(wd + s)$
6. Simplify.

a. $12 - 3(10 - 4)$

d. $\frac{4(18 - 8) + 7 \cdot 21}{8^2 - 9^2}$

b. $|-3 \cdot 4 - 12 \cdot 2| - 8(-7)$

e. $2 - (x - 1) + 3x$

c. $(12 - 8)^2$

f. $6[11m - 3(4m - 1)] - (7 - 6m)$

7. Evaluate $\frac{2xy}{x - y^2}$ for $x = 4$ and $y = -3$

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

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

10. Simplify and write the final answers with positive exponents only.

a. $5x^0$

g. $(4xy^4)^{-2}$

b. $(5x)^0$

h. $(3x^{-3}y)^{-2}$

c. $(-2)^{-4}$

i. $(5v^{-5}w^{-3})(-2v^2w^{-5})^4$

d. $\frac{z^{-7}}{z^{-4}}$

j. $\left(\frac{2ab^2}{-5b^3c^4}\right)^3$

e. $(6a^3b^2c)(-a^2c^5)$

k. $\left(\frac{3x^2y^{-3}}{4y^{-4}z}\right)^{-2}$

f. $(-2n^2v^5)^3$

11. Multiply

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

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

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

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

12. Divide:

a. $(12xy^6 + 24x^5y^9 - 4xy^3) \div (4xy^3)$

b. $(x^2 - 7x - 6) \div (x - 4)$

c. $(8x^3 + 8x + 11) \div (2x + 1)$

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

14. Convert to scientific notation: 0.0596

15. Simplify and write your answer in scientific notation: $(2.75 \times 10^3)(4.20 \times 10^{-5})$

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

17. Factor completely:

a. $3x^2 + 24x + 48$

f. $4x^2 + 23x - 6$

b. $x^2 - 2xy + x - 2y$

g. $9x^2 + 16$

c. $2x^3 + x^2 - 8x - 4$

h. $2x^3 - 12x^2 + 16x$

d. $8x^3 + 27y^3$

i. $3x^2 - 11x - 20$

e. $3x^3 - 12x$

18. Solve for the indicated variable

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

c. $Q = \frac{p-q}{2}$, for q

b. $rx - y = t$, for x

19. Simplify the following radicals

a. $\sqrt{80}$

b. $\sqrt{162}$

c. $\sqrt{121}$

20. Solve the equations for x and simplify your answer if possible:

a. $0.7(2-x) = 1.25 - .5x$

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

b. $7 - 4(x-1) = 9 - 5x$

f. $x^2 - 7x + 6 = 0$

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

g. $x^2 - 7x - 2 = 0$

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

h. $2x(x+2) = x+3$

21. Find an equation of the vertical line containing the point $(-4, 5)$ and state its slope.

22. For the linear equation $y = 3$, state the slope and graph the line.

23. For the linear equation $5x + 3y = -6$:

a. Find the x and y intercepts

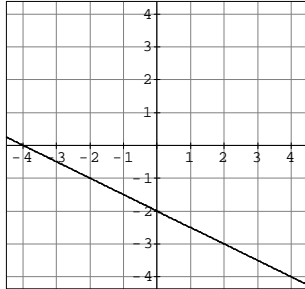
b. Find the slope

c. Graph the line

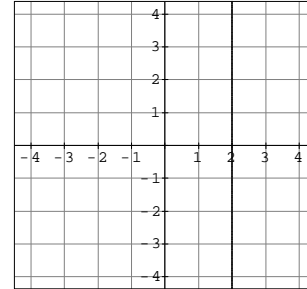
24. Find the slope of the linear equation $y = 3x - 6$

25. Find an equation of the line containing the point $(-1, -3)$ with slope $m = -4$
26. Find the slope of the line from the graph:

a.



b.



27.

- a. Find the slope of the line passing through the points $(4, 2)$ and $(-2, -7)$
- b. Find an equation of the line described in part (a).

28. Solve the system of equations by graphing:
$$\begin{cases} y = -2x + 5 \\ x - 3y = 6 \end{cases}$$

29. Solve the systems of linear equations by any method:

a.
$$\begin{cases} x = 3y + 5 \\ 4x - 12y = 20 \end{cases}$$

b.
$$\begin{cases} 4x - y = 27 \\ 7x + 2y = 21 \end{cases}$$

c.
$$\begin{cases} 2x - 10y = 1 \\ 3x - 15y = 4 \end{cases}$$

30. In a class of 40 students, 35% work full time. How many students in that class work full time?
31. On a test of 64 items, a student got 56 correct. What percent were correct?
32. A computer is on sale for a 15% reduction. If the sale price is \$1572.50, what was the original price?
33. Rent in Austin has increased by 55% since 1990. If monthly rent for a 2 bedroom apartment is now \$850, what would rent have been for the same apartment in 1990?
34. The sum of three consecutive odd integers is -87. What are the integers?
35. 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.

36. The length of a rectangle is 3 feet less than 4 times its width. If the perimeter of the rectangle is 64 feet, what are the dimensions of the rectangle?
37. Eight euros can be exchanged for \$9.12 U.S. How many U.S. dollars can 5,000 euros be exchanged for?
38. 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.
39. 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?
40. 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?
41. In a canoe race, Harold is allowed to start 20 seconds before Brian. If Harold's boat moves at a rate of 8 feet per second and Brian's boat moves at a rate of 10 feet per second, how much time will pass after Brian leaves before he catches up with Harold?
42. Emilio wishes to mix peanuts worth \$2.52 per pound with almonds worth \$3.80 per pound to make 480 pounds of a mixture worth \$3.44 per pound. How much of each should he use?
43. The length of a rectangle is one foot less than three times the width. Find the length and width if the area is 30 square feet.
44. 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, what are the dimensions of the garden?
45. 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 lengths of all sides of the triangle.
46. The diameter of a ball is 6 inches. Find the volume of the ball. (hint: $V = \frac{4}{3}\pi r^3$)
47. In a survey, 2 out of 5 respondents said that they do not eat breakfast. If 240 people said they do not eat breakfast, how many people were surveyed?
48. A coffee can has a diameter of 10 cm and a height of 22 cm. Find the volume of the can (hint: $V = \pi r^2 h$)
49. Two cars leave Houston at the same time, one traveling north and the other south. If the one traveling north is moving 15 miles per hour faster than the one traveling south, and they are 345 miles apart after 3 hours, how fast is each moving?

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. $2x + 3$

f. 11

7. $\frac{24}{5}$

8. $13x^3 - 3x - 11$

9. $-4y^3 + 3y^2 + 4y$

10.

a. 5

b. 1

c. $\frac{1}{16}$

d. $\frac{1}{z^3}$

e. $-6a^5b^2c^6$

f. $-8n^6v^{15}$

g. $\frac{1}{16x^2y^8}$

h. $\frac{x^6}{9y^2}$

i. $\frac{80v^3}{w^{23}}$

j. $-\frac{8a^3}{125b^3c^{12}}$

k. $\frac{16z^2}{9x^4y^2}$

11.

a. $-15x^6 + 6x^5 - 3x^4 + 21x^3$

b. $16y^2 - 54y - 7$

c. $36x^2 - 84xy + 49y^2$

d. $4a^3 - 15a^2 - 21a + 5$

12.

a. $3y^3 + 6x^4y^6 - 1$

b. $x - 3 - \frac{18}{x - 4}$

c. $4x^2 - 2x + 5 + \frac{6}{2x + 1}$

13. 7600

14. 5.96×10^{-2}

15. 1.16×10^{-1}

16. 2.5×10^4

17.

a. $3(x+4)^2$

b. $(x-2y)(x+1)$

c. $(x+2)(x-2)(2x+1)$

d. $(2x+3y)(4x^2-6xy+9y^2)$

e. $3x(x+2)(x-2)$

f. $(4x-1)(x+6)$

g. cannot be factored

h. $2x(x-4)(x-2)$

i. $(3x+4)(x-5)$

18.

a. $b = \frac{2A}{h}$

b. $x = \frac{y+t}{r}$

c. $p = 2Q + q$

19.

a. $4\sqrt{5}$

b. $9\sqrt{2}$

c. 11

20.

a. 0.75

b. -2

c. $-\frac{4}{11}$

d. -4, 1

e. -5, 2

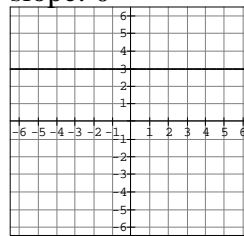
f. 6, 1

g. $\frac{7 \pm \sqrt{57}}{2}$

h. $\frac{-3 \pm \sqrt{33}}{4}$

21. equation: $x = -4$
slope: undefined

22. slope: 0



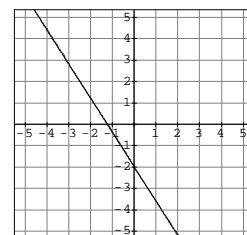
23.

a. x-intercept = $\left(-\frac{6}{5}, 0\right)$

y-intercept = $(0, -2)$

b. slope = $-\frac{5}{3}$

c.



24. 3

25. $y = -4x - 7$

26.

a. $-\frac{1}{2}$

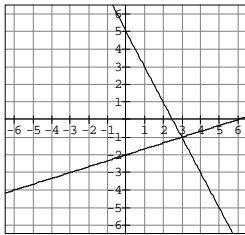
b. undefined

27.

a. $m = \frac{3}{2}$

b. $y = \frac{3}{2}x - 4$

28.

solution: $(3, -1)$

29.

a. Dependent
(infinitely many solutions)

b. $(5, -7)$

c. Inconsistent (no solution)

30. 14 students work full time

31. 87.5%

32. \$1850

33. \$548.39

34. -31, -29, and -27

35. 22.5, 90, and 67.5 degrees

36. width: 7 feet
length: 25 feet

37. \$5700 U.S.

38. 26 and 64 degrees

39. 70 student tickets and 130 adult tickets

40. 50 oz. of Clear Shine (12%) and
40 oz. of Sunstream (30%)

41. 80 seconds

42. 135 pounds of peanuts and
345 pounds of almonds43. length: 9 feet
width: $\frac{10}{3}$ or $3\frac{1}{3}$ feet44. width: 5 feet
length: 12 feet45. hypoteneuse: 13 m
other leg: 5 m

46. 113.04 cubic inches

47. 600 people were surveyed

48. 1727 cubic cm

49. South 50 mph
North 65 mph