

Review for Elementary Algebra Final Exam

Starting FALL 2018

The quadratic formula will be provided on the final exam.

Students are expected to know from memory all other relevant formulas, including:

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

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

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

5. Add: $(11a^3b + 4a^2b - 3ab - 5) + (2a^3b - 4a^2b - 6)$

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

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

a. $5x^0$

b. $(5x)^0$

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

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

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

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

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

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

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

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

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

8. Multiply:

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

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

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

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

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

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

11. Convert to scientific notation: 0.0596

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

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

14. Factor completely:

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

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

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

d. $5x^3 - 45x$

e. $4x^3 + 23x^2 - 6x$

f. $9x^2 + 16$

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

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

15. Solve for the indicated variable:

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

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

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

16. Simplify:

a. $-\sqrt{121}$

b. $\sqrt{0}$

c. $\sqrt{45}$

d. $\sqrt{300}$

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

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

b. $\frac{1}{6}\left(\frac{3}{4}x - 2\right) = -\frac{1}{5}$

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

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

e. $x^2 = 25$

f. $\frac{3}{4x} + \frac{6}{x} = 1$

g. $2x^2 + 1 = 19$

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

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

j. $x^2 = 7x - 6$

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

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

m. $3x^2 - 4x - 2 = 0$

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

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

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

21. For the linear equation $x = -2$, state the slope and graph the line.

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

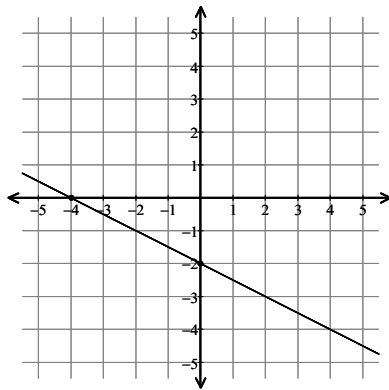
- a. Find the x and y intercepts
- b. Find the slope
- c. Graph the line

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

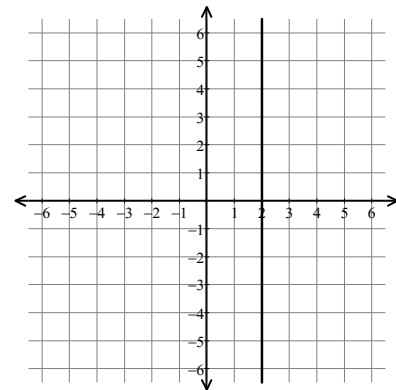
24. Find an equation of the line containing the point $(-1, -3)$ with slope $m = -4$

25. Find the slope of the line from the graph:

a.



b.



26.

- 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).

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

28. 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.
$$\begin{cases} 2x - 10y = 1 \\ 3x - 15y = 4 \end{cases}$$

29. In a class of 40 students, 35% work full time. How many students in that class work full time?

30. On a test of 64 items, a student got 56 correct. What percent were correct?

31. A computer is on sale for a 15% reduction. If the sale price is \$1572.50, what was the original price?
32. 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? Round your answer to the nearest cent.
33. The sum of three consecutive odd integers is -87 . What are the integers?
34. 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.
35. 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?
36. 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.
37. 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?
38. A test has twenty-four questions worth 100 points. The test consists of True/False questions worth 2 points each and multiple choice questions worth 6 points each. How many of each type of question are on the test?
39. Mike has \$90,000 to invest and can invest in two different funds. He invests some of the money at 5% per year and the rest at 8% per year. How much should Mike invest in each fund in order to earn \$5220 from both funds per year?
40. 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.
41. 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?
42. 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 the hypotenuse and the other leg of the triangle.
43. Two angles are supplementary if the sum of their angles is 180 degrees. One of two supplementary angles is 8 degrees less than three times the other. Find the measure of each angle.
44. A sample of 125 light bulbs contained 3 defective bulbs. How many defective bulbs would you expect in a batch of 3000 light bulbs?

45. Solve and graph the solution on a number line:

a. $x - 3 > 1$

b. $2 - 4w \geq 7$

c. $9 + 2y \leq 4y + 5$

46. List all value(s) of x for which each rational expression is undefined:

a. $\frac{12}{-3x}$

b. $\frac{x+2}{x-5}$

c. $\frac{x^2 - 9}{x^2 - 3x - 10}$

47. Simplify (reduce), if possible:

a. $\frac{42x^4}{35x^6}$

c. $\frac{a^2 + a - 20}{2a^2 + 4a - 30}$

b. $\frac{y-5}{5-y}$

48. Perform the indicated operation. If possible, simplify (reduce) your answer:

a. $\frac{7a}{4} + \frac{a-3}{4}$

f. $\frac{10x}{9x^4y^7} \cdot \frac{3y^2}{25y}$

b. $\frac{4}{y+5} + \frac{1}{y+5}$

g. $\frac{5a+5}{4a-8} \cdot \frac{2a^2-8a+8}{a^2-1}$

c. $\frac{5+3x}{4x} - \frac{2x+1}{4x}$

h. $\frac{x^2+5x+4}{x^2-4} \div \frac{x^2+8x+7}{x^2+5x-14}$

d. $\frac{a^2}{a+3} - \frac{2a+15}{a+3}$

i. $(2y-1) \div \frac{2y^2-11y+5}{4y^2-1}$

e. $\frac{2}{3x} + \frac{5}{x+1}$

Answers

1. $2n - 7$

2. $\frac{3}{5}n$

3.

a. -6

b. 92

c. 16

d. -11

e. $2x + 3$

f. 11

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

5. $13a^3b - 3ab - 11$

6. $-4y^3 + 3y^2 + 4y$

7.

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

8.

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

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

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

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

9. $3y^3 + 6x^4y^6 - 1$

10. 7600

11. 5.96×10^{-2}

12. 1.16×10^{-1}

13. 2.5×10^4

- a. $3(x+4)^2$
- b. $(x-2y)(x+1)$
- c. $(x+2)(x-2)(2x+1)$
- d. $5x(x+3)(x-3)$
- e. $x(4x-1)(x+6)$
- f. cannot be factored
- g. $2x(x-4)(x-2)$
- h. $(3x+4)(x-5)$

15.

- a. $b = \frac{2A}{h}$
- b. $x = \frac{y+t}{r}$
- c. $q = p - 2Q$

16.

- a. -11
- b. 0
- c. $3\sqrt{5}$
- d. $10\sqrt{3}$

17.

- a. 0.75
- b. $\frac{16}{15}$ or $1\frac{1}{15}$
- c. -2
- d. $-\frac{4}{11}$
- e. $-5, 5$
- f. $\frac{27}{4}$ or $6\frac{3}{4}$
- g. $-3, 3$

- h. $-4, 1$
- i. $-5, 2$
- j. $6, 1$

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

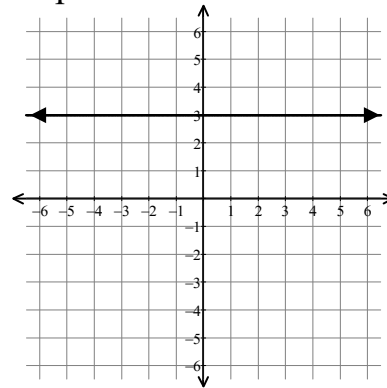
l. $\frac{-3 \pm \sqrt{33}}{4}$

m. $\frac{2 \pm \sqrt{10}}{3}$

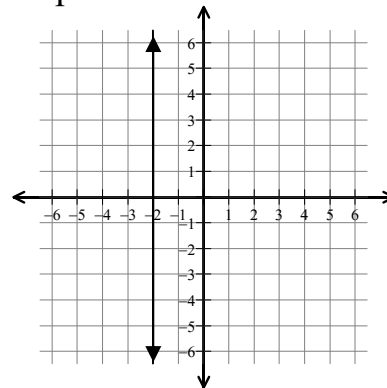
18. equation: $x = -4$
slope: undefined

19. equation: $y = 5$
slope: 0

20. slope: 0



21. slope: undefined

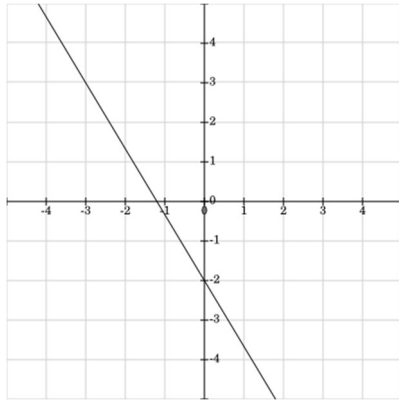


a. x-intercept = $\left(-\frac{6}{5}, 0\right)$

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

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

c.



23. 3

24. $y = -4x - 7$

25.

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

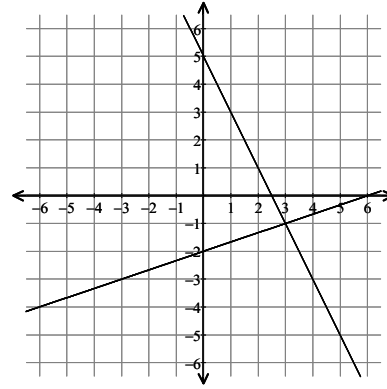
b. undefined

26.

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

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

27.



solution: $(3, -1)$

28.

a. Dependent
(infinitely many solutions)

b. $(5, -7)$

c. Inconsistent (no solution)

29. 14 students work full time

30. 87.5%

31. \$1850

32. \$548.39

33. -31 , -29 , and -27

34. 22.5 , 90 , and 67.5 degrees

35. width: 7 feet
length: 25 feet

36. 26 and 64 degrees

37. 70 student tickets and 130 adult tickets

38. 11 T/F (2pts each)
13 multiple choice (6pts each)

39. \$66,000 at 5%
\$24,000 at 8%

40. length: 9 feet
width: $\frac{10}{3}$ or $3\frac{1}{3}$ feet

41. width: 5 feet
length: 12 feet

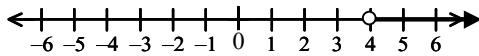
42. hypotenuse: 13 m
other leg: 5 m

43. 47 and 133 degrees

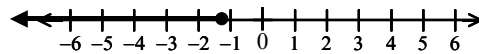
44. 72 defective light bulbs

45.

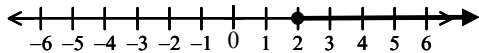
a. $x > 4$ or $\{x \mid x > 4\}$



b. $w \leq -\frac{5}{4}$ or $\left\{w \mid w \leq -\frac{5}{4}\right\}$



c. $y \geq 2$ or $\{y \mid y \geq 2\}$



46.

a. 0

b. 5

c. -2,5

47.

a. $\frac{6}{5x^2}$

b. -1

c. $\frac{a-4}{2a-6}$ or $\frac{a-4}{2(a-3)}$

48.

a. $\frac{8a-3}{4}$

b. $\frac{5}{y+5}$

c. $\frac{x+4}{4x}$

d. $a-5$

e. $\frac{17x+2}{3x(x+1)}$ or $\frac{17x+2}{3x^2+3x}$

f. $\frac{2}{15x^3y^6}$

g. $\frac{5a-10}{2a-2}$ or $\frac{5(a-2)}{2(a-1)}$

h. $\frac{x+4}{x+2}$

i. $\frac{4y^2-1}{y-5}$ or $\frac{(2y+1)(2y-1)}{y-5}$