Math Placement Test Practice: Elementary Algebra

Operations with Integers (Evaluate each expression.)

1. $|-7|$
2. $|7|$
3. $-|-7|$
4. $2^5 + 1^6$
5. $-(-3) - 6(-2) - 4 - (-8)$
6. $32 \div (5-3)^2 \cdot (-2)$
7. $3 - 12 \div 3 \cdot 2 + 2 \cdot 15 \div 3$

Operations with Fractions (Evaluate each expression.)

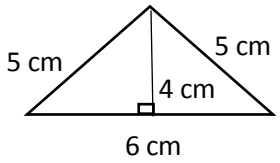
8. $\frac{4(6-1)}{3^2-9}$
9. $\frac{2^3-8}{2^2-3^2}$
10. $\frac{4}{5} + \frac{3}{10} + \frac{2}{3}$
11. $\frac{2}{5} \div \frac{5}{3} \cdot \frac{1}{3} \cdot 2$
12. $\frac{1}{2} + \left(\frac{2}{5} \div \frac{8}{5}\right) - \left(\frac{1}{2} \cdot 3\right)$
13. $3 + 6 \cdot \left(\frac{2}{4} - 7\right)$
14. $(2 - 5^2) \div 4$
15. $\left(\frac{1}{2} - \frac{3}{5}\right)^2 + 3$
16. $\left(\frac{1}{3} - 2\right) \div \left(-\frac{4}{9} + \frac{3}{2}\right)$

Percentages, Decimals, and Fractions

17. Order from least to greatest: $\frac{1}{3}, \frac{1}{4}, \frac{3}{4}, \frac{3}{5}, \frac{4}{6}, \frac{8}{10}$
18. Write $\frac{3}{8}$ as a decimal.
19. Write 120% as a simplified fraction.
20. 4 is 25% of what number?
21. 15 is what percent of 40?
22. What is 84% of 600?

Geometric Computations

23. Find the area and perimeter of a rectangle that is $6\ ft$ by $9\ ft$.
24. Find the exact area and circumference of a circle with a diameter of $8\ cm$. Also compute the approximate values to the nearest thousandth.
25. Find the area of the triangle shown



Operations with Algebraic Expressions

Simplify each expression

26. $(4x^3 + 6x^2 + 9x - 8) - (6x^4 - 9x^2 - 7x + 3)$
27. $5(a^2 + 3) - (a^2 + a) + 8(6 - a)$
28. $-6(13c + f)$
29. $4x - (11x - 6) + 25$
30. $(3x^2 + 7x - 2)(x + 6)$
31. $(9a + 3)(9a - 3)$
32. $(a + 3b)^2$
33. Evaluate $2x^2 - y$ for $x = -3$ and $y = -4$

Operations with Exponents and Roots

34. Write $54{,}900{,}000$ in scientific notation?
35. What is $1{,}200{,}000 \div 3{,}000 \cdot 0.0000002$ in scientific notation?
36. If $\sqrt{x} = 3$, then what is x?
37. If $\sqrt[3]{x} = 2$, then what is x?
38. Simplify $\sqrt{3} + \sqrt{3}$
39. Simplify $4\sqrt{7} + 3\sqrt{7}$
40. Simplify $2\sqrt{11} - 7\sqrt{11}$
41. Simplify $\sqrt{13} \cdot \sqrt{2}$
42. Simplify using only positive exponents $(xy^4)^{-3}(x^2y^2)^2(x^5y)^0$

43. Simplify using only positive exponents $\left(\frac{9x^3y}{4x^2y^{-1}z^2}\right)^{-2}$

44. Perform the division; write the product as a sum of terms: $\frac{15x^3+6x^2-9x}{-3x^2}$

Factoring

45. $50x^3 - 18x$

46. $x^4 - 16$

47. $6x^3 - 15x^2 + 8x - 20$

48. $x^2 + 5x + 6$

49. $-x^2 + 3x + 18$

50. $4x^2 - 20x + 25$

51. $6x^2 + 7x + 2$

52. $x^2 + xy - 12y^2$

Operations with Rational Expressions

53. $\frac{x^2-5x+4}{9} \cdot \frac{-18x}{x^2-8x+16}$

54. $\frac{x^2-16}{x+2} \div \frac{x+4}{6x+12}$

55. $\frac{x^2-8x}{x-1} \div \frac{x^2-16x+64}{x^2-1}$

56. $\frac{y}{x} + \frac{3y}{5x} - \frac{7}{5}$

57. $\frac{4x}{x-1} - \frac{3}{1-x}$

58. $\frac{1}{x+4} - \frac{x-1}{x^2+4x+4}$

59. $2 - \frac{1}{x} + \frac{4}{x-3}$

60. $\frac{6x^2+7x+2}{1+2x}$

61. $\frac{\frac{x^2+x}{x^2+x-12}}{\frac{4x+4}{x^2-6x+9}}$

Solving Equations and Inequalities

62. $12 + x = 4x - 6$
63. $2(x + 5) + 3x = 20 - 5x$
64. $\frac{x}{-6} + 4 > 7$
65. $2x + 9 \leq 5x$
66. $\frac{2}{3} - \left(\frac{1}{3}x + \frac{1}{3}\right) = \frac{1}{6} + \frac{1}{2}x$
67. $2x + \frac{1}{3}x - \frac{2}{5} = x + \frac{5}{2}$
68. $\frac{3}{2x-10} - \frac{4}{3x-15} = \frac{1}{10}$
69. $\frac{4}{x+3} + \frac{2}{x+1} = \frac{3x+12}{x^2+4x+3}$
70. $x^2 + 7x = 18$
71. $(x - 3)^2$=25
72. $\frac{4}{x} - 5 = \frac{3}{x-3}$
73. $\frac{x}{x+11} + \frac{1}{x+5} = \frac{1}{x+11}$

Solving Systems of Equations

Solve each system. Tell the number of solutions. Also, describe the lines as intersection, parallel or same line.

74. $\begin{cases} x - 3y = 12 \\ -2x + 6y = -18 \end{cases}$
75. $\begin{cases} 5y - x = 6 \\ 4x - 3y = 10 \end{cases}$
76. $\begin{cases} -2x + 3y = 9 \\ 6x - 9y = -27 \end{cases}$
77. $\begin{cases} 2v + 3w = 8 \\ 3v + 4w = 13 \end{cases}$

Linear Functions and Their Graphs

78. On the line $2y + 3x = 10$, find the missing coordinates for the points $(3, \_)$ and $(\_, -2)$.
79. Find the x-intercept and y-intercept of $3x - 6y = 12$. Use the intercepts to graph the line.
80. Write the line $3x + 5y + 10 = 0$ in slope intercept form. Identify the slope and y-intercept and use them to graph the line.
81. Graph the solution to the linear inequality $4x - 2y > -6$

82. Find the equation of the line in slope-intercept form through the points $(3, -2)$ and $(9,2)$.
83. Find the equation of a line perpendicular to $4x + y = 3$ through the point $(8,6)$

Applications

84. Write the algebraic expression for this phrase: The quotient of 9 and the quantity of a number increased by three.
85. Write the algebraic expression for this phrase: Three times the quantity 8 less than a number.

For each problem write and solve an algebraic equation or system of equations.

86. One less than the product of negative seven and a number is equal to twenty-seven. Find the number.
87. You buy two pairs of shoes for $145. One pairs costs four times the other pair. Find the price of each pair of shoes.
88. The length of a rectangle is 5 less than twice its width. The perimeter is 26 cm. What are the dimensions of the rectangle?
89. If it takes Roadrunner 5 minutes to mow a lawn and it takes Wily Coyote 30 minutes, how long does it take the two of them to mow the lawn if they work together?
90. A dark chocolate of 55% is made by mixing an 85% dark chocolate and a 47.5% dark chocolate. If ten pounds of the 55% mixture is desired, how many pounds of 85% and 47.5% must be mixed.
91. A truck travels 150 miles on 12 gallons of gasoline. How many gallons of gasoline are needed to travel 500 miles?
92. A school has a policy that two adults must accompany every 15 students on school trips. Not counting the bus drivers, how many seats are needed for a school trip with 180 students?

Solve the following

93. Find the diagonal length of an eight-inch by ten-inch piece of paper.
94. The number of math students is currently 4235. A year ago there were 4380. Find the percent change in the number of math students.
95. Four people are in line to purchase concert tickets which cost $12.50 each. While in line, they discover that they can purchase 5 tickets for $55. How much could each person save if the group found a fifth person to share the cost?

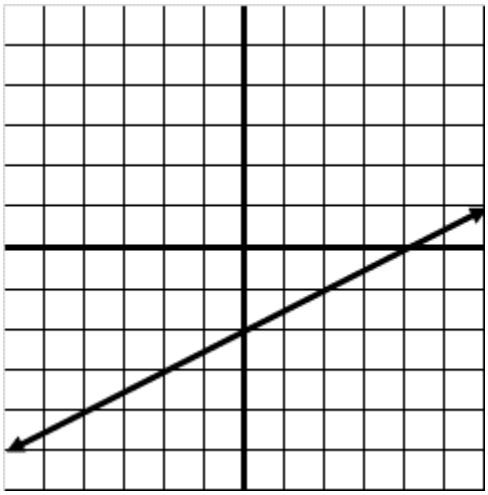
96. John went to the store and bought $3\frac{1}{2}$ pounds of pork, 2.75 pounds of chicken, $\frac{7}{12}$ pounds of cheese and 3 pounds of beef. How many total pounds did John buy at the store? (Write your answer as a mixed number.)
97. The sales tax rate in Denver is 7%. A new laptop is sold for $505.00? What will the total cost of the purchase be?
98. Justin's math class has four 100-point chapter tests and a 200-point final exam. On the four class tests he got 90, 77, 65 and 72. What must he score on the final exam to earn a final grade of 80% Report your answer as both points and percent?
99. There are 32 students in a classroom. 37.5% of the class earned a B or better on the last exam. How many students did NOT earn a B or better?
100. Joe earned an average of 84 in his math class. All his test scores combined added up to 588 total points. How many tests were given in his math class?
101. A family spent $208 one month on food. This was 26% of its income. What was its income?
102. On a test with 88 questions, a student got 77 correct. What percent of the items were correct?
103. Tim missed 12 questions on his biology test and his score was 84%. How many questions were on the test?

Answers

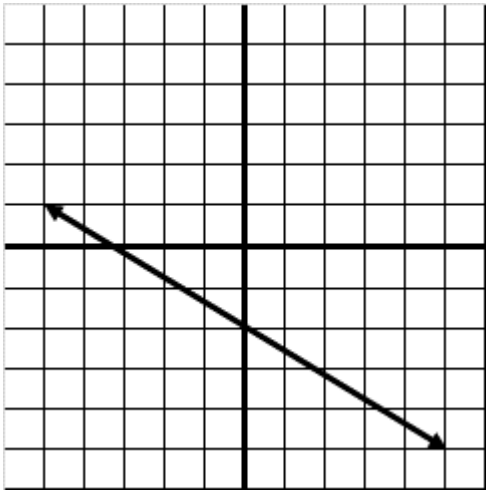
1. 7
2. 7
3. -7
4. 33
5. 19
6. -16
7. 5
8. Undefined
9. 0
10. $\frac{53}{30}$
11. $\frac{4}{25}$
12. $-\frac{3}{4}$
13. -36
14. $-\frac{23}{4}$
15. $\frac{301}{100}$
16. $-\frac{30}{19}$
17. $\frac{1}{4}, \frac{1}{3}, \frac{3}{5}, \frac{4}{6}, \frac{3}{4}, \frac{4}{5}$
18. 0.375
19. $\frac{6}{5}$
20. 16
21. 37.5%
22. 504
23. $A = 54\ ft^2; P = 30\ ft$
24. $A = 16\pi\ cm^2 \approx 50.265\ cm^2; C = 8\pi\ cm\ \approx 25.133\ cm$
25. $12\ cm^2$
26. $-6x^4 + 4x^3 + 15x^2 + 16x - 11$
27. $4a^2 - 9a + 63$
28. $-78c - 6f$
29. $-7x + 31$
30. $3x^3 + 25x^2 + 40x - 12$
31. $81a^2 - 9$
32. $a^2 + 6ab + 9b^2$
33. 22
34. $5.49\ x\ 10^7$
35. $8.0\ x\ 10^{-5}$
36. $x = 9$
37. $x = 8$
38. $2\sqrt{3}$

39. $7\sqrt{7}$
40. $-5\sqrt{11}$
41. $\sqrt{26}$
42. $\frac{x}{y^8}$
43. $\frac{16z^4}{81x^2y^4}$
44. $-5x - 2 + \frac{3}{x}$
45. $2x(5x - 3)(5x + 3)$
46. $(x^2 + 4)(x + 2)(x - 2)$
47. $(3x^2 + 4)(2x - 5)$
48. $(x + 2)(x + 3)$
49. $-(x - 6)(x + 3)$
50. $(2x - 5)^2$
51. $(2x + 1)(3x + 2)$
52. $(x + 4y)(x - 3y)$
53. $-\frac{2x(x-1)}{x-4}$
54. $6(x - 4)$
55. $\frac{x(x+1)}{x-8}$
56. $\frac{8y-7x}{5x}$
57. $\frac{4x+3}{x-1}$
58. $\frac{x+8}{(x+4)(x+2)^2}$
59. $\frac{2x^2-3x+3}{x(x-3)}$
60. $3x + 2$
61. $\frac{x(x-3)}{4(x+4)}$
62. $x = 6$
63. $x = 1$
64. $x < -18$
65. $x \geq 3$
66. $x = \frac{1}{5}$
67. $x = \frac{87}{40}$
68. $x = \frac{20}{3}$
69. $x = \frac{2}{3}$
70. $x = -9, 2$
71. $x = -2,8$
72. $x = \frac{6}{5}, 2$
73. $x = -3, -2$
74. *No solution, parallel lines*

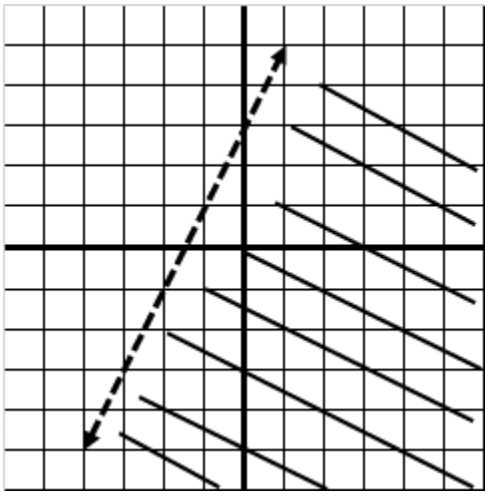
75. $(4,2), interesecting\ lines$
76. $infintely\ solutions, same\ line$
77. $v = 7, w = -2, interescting\ lines$
78. $\left(3, \frac{1}{2}\right) and\ \left(\frac{14}{3}, -2\right)$
79. x-intercept: $(4,0)$; y-intercept: $(0, -2)$



80. $y = -\frac{3}{5}x - 2,\ m = -\frac{3}{5}, b = -2$



81. Graph of the linear inequality



82. $y = \frac{2}{3}x - 4$
83. $y = \frac{1}{4}x + 4$
84. $9 \div (x + 3)$
85. $3 \cdot (x - 8)$
86. $-7x - 1 = 27; x = -4$
87. $x + y = 145; x = 4y; y = 29; x = 116$
88. $2L + 2W = 26; L = 2W - 5; W = 6\ cm; L = 7\ cm$
89. $\frac{1}{5} + \frac{1}{30} = \frac{1}{x}; x = \frac{30}{7}\text{min} \approx 4.29\ min$
90. $x + y = 10; 0.85x + 0.475y = 0.55(10); x = 2\ lbs\ of\ 85\%; y = 8\ lbs\ of\ 47.5\%$
91. $\frac{12}{150} = \frac{x}{500}; x = 40\ gal$
92. $\frac{2}{15} = \frac{x}{18}; x = 24\ adults; seats = 204$
93. $\sqrt{164}\ in = 2\sqrt{41}\ in \approx 12.81\ in$
94. $\approx -3.31\%$
95. \$1.50/ticket
96. $9\frac{5}{6}\ lb$
97. \$540.35
98. 176 points, which is 88%
99. $20\ students$
100. $7\ tests$
101. \$800
102. 87.5%
103. $75\ questions$