

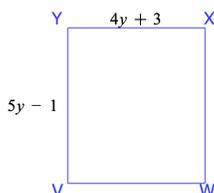
Practice Math Placement Assessment questions

Whole Numbers, Fractions, and Decimals

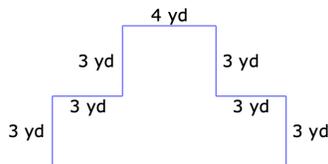
1. Compute $8.3 - 11.2 - 2$.
2. Multiply $\frac{5}{2} \times \frac{3}{10}$. Write your answer as a fraction in simplest form.
3. Divide. Write your answer as a fraction in the simplest form. $\frac{11}{14} \div \frac{5}{6}$

Percents, Proportions, and Geometry

4. Write $\frac{20}{50}$ as a percentage.
5. What is 90% of 89?
6. For a moving object, the force acting on the object varies directly with the object's acceleration. When a force of 6 N acts on a certain object, the acceleration of the object is 3 m/s^2 . If the force is changed to 20 N, what will be the acceleration of the object?
7. An item is regularly priced at \$90. It is now priced at a discount of 60% off the regular price. What is the price now?
8. The perimeter of the rectangle below is 166 units. Find the length of side WX . Write your answer without variables.



9. Find the area of the figure (sides meet at right angles).



10. Find the circumference and the area of a circle with radius 3 yd. Use 3.14 for π , and do not round your answers. Be sure to include the correct units in your answers.
11. A circle has radius of 8 in. Find the length s of the arc intercepted by a central angle of 0.9 radians. Do not round any intermediate computations, but round your answer to the nearest tenth.
12. Write an equation that expresses the following relationship: u varies jointly with p and d and inversely with w . In your equation use k as the constant of proportionality.

Signed Numbers, Linear Equations and Inequalities

13. Evaluate
 - (a) $|14|$
 - (b) $|-8|$
14. Solve for u : $9.6 = 6u$
15. Solve for w : $8 = -\frac{4}{w}$. Simplify your answer as much as possible.
16. Solve the equation $A = \frac{1}{2}h(c + d)$ for d .
17. Kira, Chang, and Henry have a total of \$70 in their wallets. Chang has 3 times what Henry has. Henry has \$5 more than Kira. How much do they each have in their wallets?
18. Rita, Frank, and Justin sent a total of 106 text messages over their cell phones during the weekend. Just sent 10 fewer messages than Rita. Frank sent 4 times as many messages as Justin. How many messages did each send?
19. For each equation, give the solution or determine that there are no solutions.
 - (a) $5(2 + w) - w = 10 + 4(w + 1)$
 - (b) $2(x - 1) + 8 = 6(2x - 4)$
20. Solve $-29 < -9 + 4v$ for v . Simplify your answer as much as possible.
21. Solve the inequality $|w - 2| \geq 8$.
22. Graph the set $\{x \mid -7 < x \leq -2\}$ on the number line and write the set using interval notation.
23. Graph the solution to $|w + 9| < 2$ on the number line.
24. Graph the solution to the inequality $(x - 6)(x - 1) < 0$ on the number line.

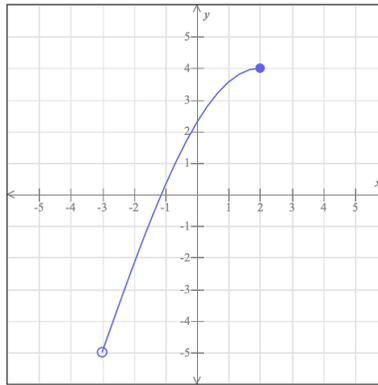
Lines and Systems of Linear Equations

25. A line passes through the point $(-2, 6)$ and has a slope of 4. Write an equation of that line.
26. Consider the line $-8x - 4y = -8$.
 - (a) What is the slope of a line perpendicular to this line?
 - (b) What is the slope of a line parallel to this line?
27. Consider the line $8x - 7y = 1$.
 - (a) What is the slope of a line perpendicular to this line?
 - (b) What is the slope of a line parallel to this line?
28. For each system, determine if there is no solution, if there is a unique solution, or if there are infinitely many solutions. If there is a unique solution, find it.
 - (a) $-x - 3y = 3, x + 3y = 3$

- (b) $x + 5y = 5, -x - 5y = -5$
29. Flying against the wind, an airplane travels 3480 kilometers in 4 hours. Flying with the wind, the same plane travels 3930 kilometers in 3 hours. What is the rate of the plane in still air and what is the rate of the wind?

Relations and Functions

30. The set $J = \{a, f, j\}$ and $L = \{a, b, j\}$.
- (a) Find the union of J and L .
- (b) Find the intersection of J and L .
31. The entire graph of the function f is shown in the figure below. Write the domain and range of f using interval notation.



32. Describe how the graph of $y = f(x) - 2$ is translated from $y = f(x)$.
33. Suppose that q and r are defined as follows:

$$q(x) = -x - 1 \quad r(x) = 2x^2 + 2$$

Find $(q \circ r)(5)$ and $(r \circ q)(5)$.

34. Suppose that g and h are defined for all real numbers as follows:

$$g(x) = x - 1 \quad h(x) = 4x + 4$$

Find $(g + h)(x)$, $(g \cdot h)(x)$, and $(g - h)(2)$.

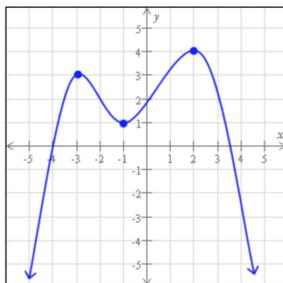
35. Let $g = \{(-5, -1), (2, 0), (6, 2), (8, 1)\}$ and $h(x) = 3x - 8$. Find $g^{-1}(2)$, $h^{-1}(x)$, and $(h \circ h^{-1})(7)$

Integer Exponents and Factoring

36. Multiply $(x + 2)(x - 5)$. Simplify your answer.
37. Factor the expression $12vw^4y^3 - 18v^5w^9$
38. Find the least common multiple of $10w^8v^6u$ and $4u^5w^4v^7$.

Quadratic and Polynomial Functions

39. Solve for u : $u^2 + u - 6 = 0$.
40. Find all x -intercepts and y -intercepts of the graph of the function $f(x) = 2x^3 - 2x^2 - 84x$.
41. Compute the value of the discriminant and give the number of real solutions of the quadratic equation $3x^2 - 6x + 2 = 0$.
42. Graph the parabola $y = -\frac{x^2}{2}$ by plotting the vertex and two additional points on each side of the vertex.
43. Graph the parabola $y = (x - 3)^2 + 4$ by plotting the vertex and two additional points on each side of the vertex.
44. Graph the parabola $y = 3x^2 + 24x + 44$ by plotting the vertex and two additional points on each side of the vertex.
45. Solve the equation $(y - 1)^2 = 2y^2 - 12y + 22$ for y .
46. Graph the circle given by $(x + 4)^2 + (y - 3)^2 = 25$.
47. Below is the graph of a function f . Use the graph to find the following values:
- (a) All values at which f has a local maximum
 - (b) All local maximum values of f



48. A ball is thrown upward with an initial height of 3 feet with a initial upward velocity 37 ft/s. The ball's height (in feet) after t seconds is given by

$$h = 3 + 37t - 16t^2.$$

Find all values of t for which the ball's height is 23 feet. Round your answer(s) to the nearest hundredth.

49. Find the x -intercept(s) and the coordinates of the vertex for the parabola $y = x^2 - 2x - 35$.

Rational Expressions and Functions

50. Add $-\frac{8}{x-1} + \frac{3-2x}{x}$. Simplify your answer as much as possible.

51. Subtract $-\frac{5a-3b}{7a} - \frac{8a+10b}{7a}$. Simplify your answer as much as possible.
52. Write $-\frac{6a+5x}{6a} + \frac{9a-2x}{4a} + 1$ as a single fraction. Simplify your answer as much as possible.
53. Simplify $\frac{8v^5y^4}{8v^4-12v^3x}$.
54. Solve $\frac{x-5}{x-1} + 1 = \frac{x+6}{x+4}$ for x .
55. Simplify the expression $(y^{-1/3}x^2)^{2/3}$. Write your answer without using negative exponents. Assume that all variables are positive real numbers.
56. Graph the rational function $y = \frac{2}{x-2}$.
57. Multiply $\frac{x^2-2x-3}{x+3} \cdot \frac{x-2}{3x-9}$. Simplify your answer.
58. Simplify $\frac{5v^2+10v-40}{v^2-v-2}$.
59. The function h is defined by $h(x) = \frac{x^2-8x+15}{x^2-64}$. Find all values of x that are not in the domain of h .

Radicals and Rational Exponents

60. Rationalize the denominator and simplify: $\sqrt{\frac{7}{2}}$
61. Write $\sqrt[3]{16}$ in simplified radical form.
62. Simplify the following expressions. Write your answers without exponents.
- (a) $4^{-3/2}$
- (b) $(\frac{1}{16})^{5/4}$
63. Simplify $(b^{1/5}c^4)^{-3/2}$. Write your answer without using negative exponents. Assume that all variables are positive real numbers.
64. Simplify as much as possible, assuming all variables are positive real numbers.
- (a) $7w\sqrt{50u^3} + u\sqrt{2uw^2}$
- (b) $6x\sqrt{45u^5} + u^2\sqrt{80ux^2}$
- (c) $y\sqrt{32yv^2} - 8v\sqrt{18y^3}$
65. Graph the function $f(x) = 3\sqrt{x+1}$, including the leftmost point and three additional points.
66. Graph the rational function $f(x) = \frac{-3x+4}{-x+3}$.
67. Solve $y-3 = \sqrt{-3y+63}$, where y is a real number.

68. Simplify $\frac{z^{1/3}}{z^{1/4}z^{-3/4}}$.

69. Rationalize the denominator and simplify $\frac{\sqrt{5} + \sqrt{2}}{\sqrt{5} - \sqrt{2}}$.

Exponentials and Logarithms

70. Use the properties of logarithms to expand $\log(yx^3)$. Each logarithm should involve only one variable and should not have any exponents. Assume that all variables are positive.

71. Rewrite $x = e^9$ as a logarithmic equation.

72. Solve $\ln(x - 7) + \ln 2 = \ln x$ for x .

73. Solve $5 + \ln(x + 4) = 3$ for x . Do not round any intermediate computations, and round your answer to the nearest hundredth.

74. Solve $\log_7 x = -2$ for x . Simplify your answer as much as possible.

75. Solve $\log_5(-1 - 4x) = 1$ for x .

76. Solve $27^{-x+1} = 81$ for x .

77. Solve for the variables. Round your answer to the nearest hundredth. You may use a calculator.

$$e^x = 8, \quad 7^{-7y} = 9$$

78. Solve for x : $4 \ln(x + 2) = 8$. Do not round any intermediate computations. Round your answer to the nearest hundredth.

79. Use the change of base formula to compute $\log_7(6)$. You may use a calculator. Round your answer to the nearest thousandth.

80. $\log_2 \left(\frac{1}{16} \right)$

Trigonometry

81. Find the exact value of $\sin \left(\arctan \left(-\frac{12}{5} \right) \right)$

82. Find the terminal point on the unit circle determined by $\frac{7\pi}{6}$ radians.

83. (a) Find an angle between 0° and 360° that is coterminal with -315° .

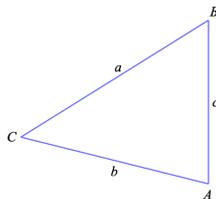
(b) Find an angle between 0 and 2π that is coterminal with $\frac{9\pi}{4}$

84. (a) Find an angle between 0° and 360° that is coterminal with 835° .

(b) Find an angle between 0 and 2π that is coterminal with $\frac{33\pi}{10}$

85. Simplify $\tan x \cos x$ using algebra and the fundamental trigonometric identities. Your answer should be a number or use a single trigonometric function.

86. Find all solutions of the equation $2 \cos \theta + \sqrt{2} = 0$ in the interval $[0, 2\pi)$. Write your answer in radians in terms of π .
87. Let $(-3, 7)$ be a point on the terminal side of θ . Find the exact values of $\sin \theta$, $\sec \theta$, $\tan \theta$.
88. Convert $\frac{5\pi}{3}$ radians to degree measure.
89. Find all solutions of the equation $2 \sin \theta - \sqrt{3} = 0$ in the interval $[0, 2\pi)$.
90. Find the exact value of $\arctan(-1)$.
91. Simplify the expression $\cos^2 4\theta - \sin^2 4\theta$ by using the double-angle formula.
92. Find the exact value for
- $\csc \frac{5\pi}{4}$
 - $\cot \frac{5\pi}{4}$
93. Use a sum or difference formula to find the exact value of $\cos \frac{3\pi}{7} \cos \frac{5\pi}{28} + \sin \frac{3\pi}{7} \sin \frac{5\pi}{28}$.
94. Consider a triangle ABC like the one below. Suppose that $A = 60^\circ$, $C = 84^\circ$, and $a = 3$ (the figure is not drawn to scale). Find B , b , and c . Round your answers to the nearest tenth.



95. Simplify $\frac{\cot x}{\csc x}$
96. Find all solutions of the equation in the interval $[0, 2\pi)$.
- $$-4 \sin x = -\cos^2 x + 4$$
97. Find the exact value of $\tan^{-1}\left(\frac{-\sqrt{3}}{3}\right)$. Write your answer in terms of π .