Temple University

Math Placement Assessment Information and Practice Questions

The Math Placement Assessment is delivered online using ALEKS, a web-based learning platform. ALEKS assess the student's current course knowledge by asking you a number of questions (usually 20-30). ALEKS chooses questions based on your answers to all previous questions. Therefore, each set of assessment questions is unique. It is impossible to predict the questions that will be asked. Some questions may require the use of a calculator, which is provided on screen.

To help you prepare for the Math Placement Assessment, we have included in this document practice questions as well as additional websites students may access prior to taking the ALEKS Math Placement Assessment. Additionally, once you take an initial assessment in ALEKS, you are able to complete ALEKS Learning Modules to help improve your skills.

The following websites offer additional practice information:

Paul's Online Notes:		http://tutorial.math.lamar.edu/Classes/Alg/Alg.aspx
Khan Academy:		https://www.khanacademy.org/
School Yourself:		https://schoolyourself.org/

Practice Math Placement Exam 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.
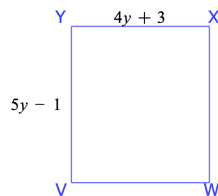
9. Find the area of the figure (sides meet at right angles).
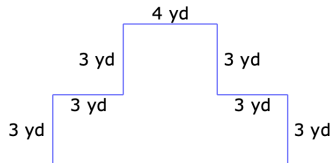
10. Find the circumference and the area of a circle with radius 3 yd. Use 3.14 for π, and do not round your answers. Be sure to include the correct units in your answers.

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: $8 = -\dfrac{4}{w}$. 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.
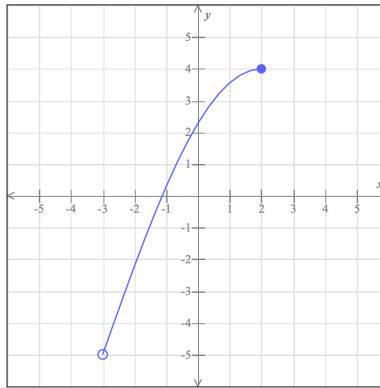
32. Describe how the graph of $y = f(x) - 2$ is translated from $y = f(x)$.

33. Suppose that q and r are defined as follows:

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

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

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

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

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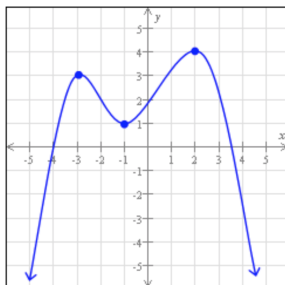
48. A ball is thrown upward with an initial height of 3 feet with a initial upward velocity 37 ft/s. The ball's height (in feet) after t seconds is given by

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

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

51. Subtract $-\dfrac{5a-3b}{7a} - \dfrac{8a+10b}{7a}$. Simplify your answer as much as possible.

52. Write $-\dfrac{6a+5x}{6a} + \dfrac{9a-2x}{4a} + 1$ as a single fraction. Simplify your answer as much as possible.

53. Simplify $\dfrac{8v^5 y^4}{8v^4 - 12v^3 x}$.

54. Solve $\dfrac{x-5}{x-1} + 1 = \dfrac{x+6}{x+4}$ for x.

55. Simplify the expression $\left(y^{-1/3} x^2\right)^{2/3}$. 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 $\dfrac{x^2 - 2x - 3}{x+3} \cdot \dfrac{x-2}{3x-9}$. Simplify your answer.

58. Simplify $\dfrac{5v^2 + 10v - 40}{v^2 - v - 2}$.

59. The function h is defined by $h(x) = \dfrac{x^2 - 8x + 15}{x^2 - 64}$. 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) $\left(\frac{1}{16}\right)^{5/4}$

63. Simplify $\left(b^{1/5} c^4\right)^{-3/2}$. 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) $y\sqrt{32\,y\,v^2} - 8v\sqrt{18y^3}$

65. Graph the function $f(x) = 3\sqrt{x+1}$, including the leftmost point and three additional points.

66. Graph the rational function $f(x) = \dfrac{-3x+4}{-x+3}$.

67. Solve $y - 3 = \sqrt{-3y + 63}$, where y is a real number.

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

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

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.

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

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

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

(a) $\csc\frac{5\pi}{4}$

(b) $\cot\frac{5\pi}{4}$

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 $A = 60°, C = 84°$, and $a = 3$ (the figure is not drawn to scale). Find B, b, and c. Round your answers to the nearest tenth.
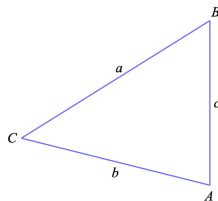
95. Simplify $\dfrac{\cot x}{\csc x}$

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 $\tan^{-1}(\frac{-\sqrt{3}}{3})$. Write your answer in terms of π.

Practice Math Placement Exam Answer Key

Whole Numbers, Fractions, and Decimals
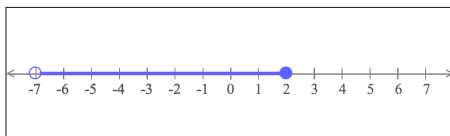
1. -4.9
2. $\frac{3}{4}$
3. $\frac{33}{35}$

Percents, Proportions, and Geometry

4. 40%
5. 80.1
6. 10 m/s^2
7. $\$36$
8. 44 units
9. 42 yds^2
10. Circumference: 18.84 yd, Area: 28.26 yd^2
11. 7.2 in
12. $u = \dfrac{kpd}{w}$

Signed Numbers, Linear Equations and Inequalities

13. (a) 14
    (b) 8
14. $u = 1.6$
15. $w = -\frac{1}{2}$
16. $d = 2\frac{A}{h} - c$
17. Kira: $\$10$, Henry: $\$15$, Chang: $\$45$
18. Rita: 26, Frank 64, Justin 16
19. (a) No solution
    (b) $x = 3$
20. $v > -5$
21. $w \leq -6$ or $w \geq 10$

22. Interval notation: $(-7, 2]$

23.
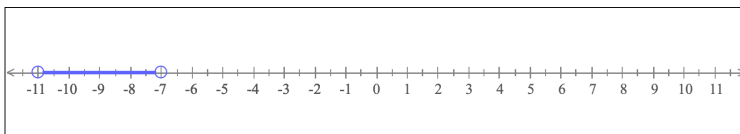
24.
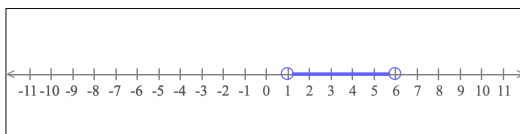
Lines and Systems of Linear Equations

25. $y - 6 = 4(x + 2)$

26. (a) $\frac{1}{2}$

    (b) -2

27. (a) $-\frac{7}{8}$

    (b) $\frac{8}{7}$

28. (a) No solution

    (b) Infinitely many solutions satisfying $y = 1 - \frac{x}{5}$

29. Rate of the plane in still air: 1090 km/hr, rate of the wind: 220 km/hr

Relations and Functions

30. (a) $J \cup L = \{a, b, f, j\}$

    (b) $J \cap L = \{a, j\}$

31. Domain: $(-3, 2]$; Range: $(-5, 4]$

32. Vertical shift downward two units

33. $(q \circ r)(5) = -53$ and $(r \circ q)(5) = 74$

34. $(g + h)(x) = 5x + 3$, $(g \cdot h)(x) = 4x^2 - 4$, and $(g - h)(2) = -11$

35. $g^{-1}(2) = 6$, $h^{-1}(x) = \dfrac{x + 8}{3}$, $(h \circ h^{-1})(7) = 7$

Integer Exponents and Factoring

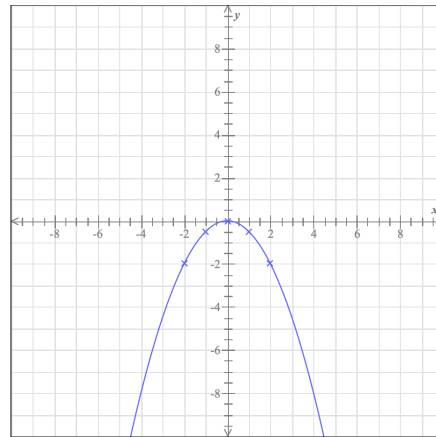36. $x^2 - 3x - 10$

37. $6vw^4(2y^3 - 3v^4w^5)$

38. $20u^5w^8v^7$

Quadratic and Polynomial Functions
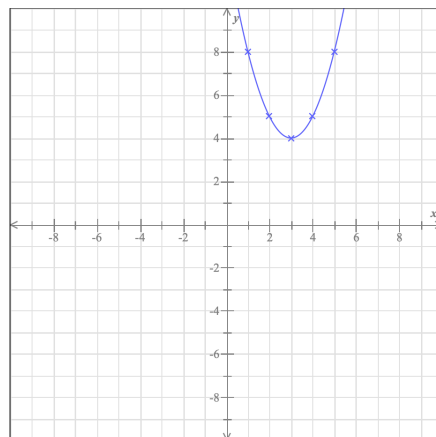
39. $u = -3$, $u = 2$.

40. x-intercepts: $x = -6, 0, 7$; y-intercepts: $y = 0$
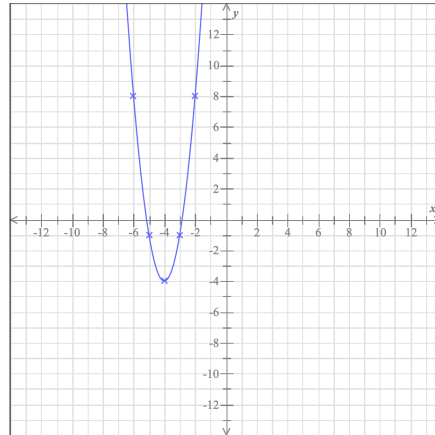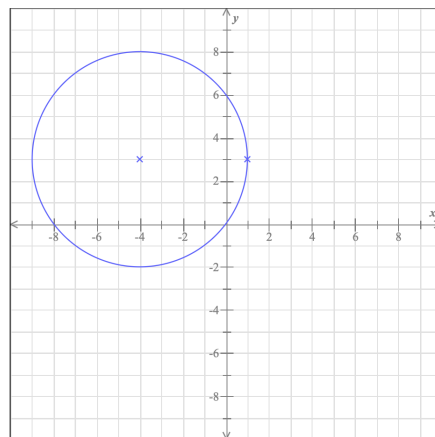
41. 12; two real solutions

42.

43.

44.

45. $y = 3, 7$

46.

47. (a) -3, 2

    (b) 3, 4

48. $t = 0.86$ seconds or $t = 1.45$ seconds

49. x-intercepts: $x = -5$ and $x = 7$; vertex: $(1, -36)$

Rational Expressions and Functions

50. $-\dfrac{2x^2 + 3x + 3}{x^2 - x}$
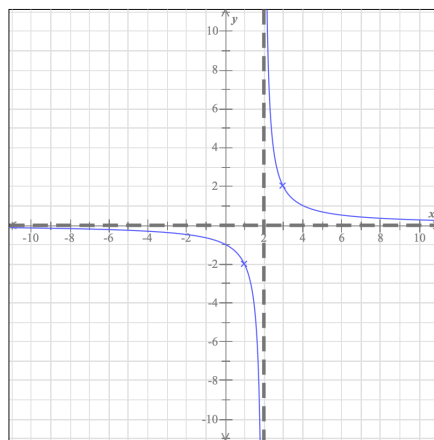
51. $-\dfrac{13a + 7b}{7a}$

52. $\dfrac{27a - 16x}{12a}$

53. $\dfrac{2v^2y^4}{2v - 3x}$

54. $x = -3, 6$

55. $\dfrac{x^{4/3}}{y^{2/9}}$

56.

57. $\dfrac{x^2 - x - 2}{3x + 9}$

58. $\dfrac{5(v + 4)}{v + 1}$

59. $x = -8, 8$

Radicals and Rational Exponents

60. $\frac{\sqrt{14}}{2}$

61. $2\sqrt[3]{2}$

62.   (a) $\frac{1}{8}$
     (b) $\frac{1}{32}$

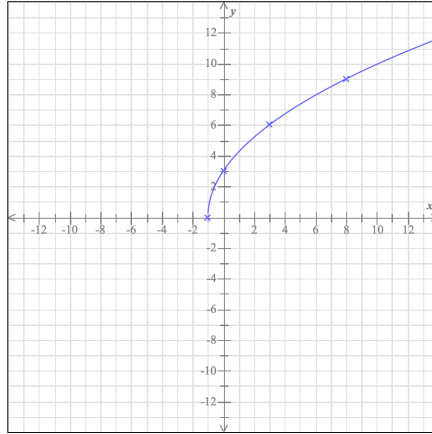63. $\frac{1}{b^{3/10}c^6}$

64.   (a) $36\sqrt{2}u^{3/2}w$
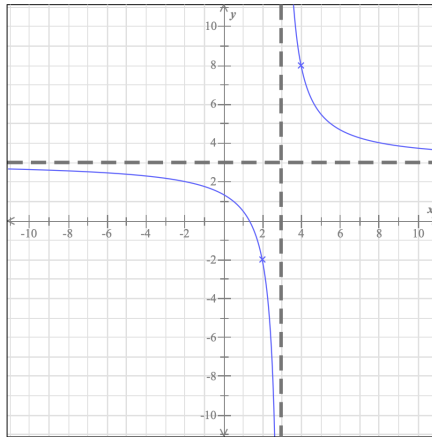   (b) $22xu^2\sqrt{5u}$
     (c) $-20\sqrt{2}v\sqrt{y^3}$

65.

66.

67. $y = 9$

68. $z^{5/6}$

69. $\dfrac{7 + 2\sqrt{10}}{3}$

Exponentials and Logarithms

70. $\log y + 3 \log x$

71. $\ln x = 9$

72. $x = 14$

73. -3.86

74. $\frac{1}{49}$

75. $x = -\frac{3}{2}$

76. $x = -\frac{1}{3}$

77. $x \approx 2.08$, $y \approx -0.16$

78. 5.39

79. 0.921

80. -4

Trigonometry

81. $-\frac{12}{13}$

82. $\left(-\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

83. (a) $45°$

    (b) $\frac{\pi}{4}$

84. (a) $115°$

    (b) $\frac{13\pi}{10}$

85. $\sin x$

86. $\frac{3\pi}{4}, \frac{5\pi}{4}$

87. $\sin \theta = \frac{7}{\sqrt{58}}$, $\sec \theta = \frac{-\sqrt{58}}{3}$, $\tan \theta = -\frac{7}{3}$

88. $300°$

89. $\frac{\pi}{3}, \frac{2\pi}{3}$

90. $-\frac{\pi}{4}$

91. $\cos 8\theta$

92. (a) $-\sqrt{2}$

    (b) 1

93. $\frac{\sqrt{2}}{2}$

94. $B = 36°$, $b = 2.0$, $c = 3.4$

95. $\cos x$

96. $x = \frac{3\pi}{2}$

97. $-\frac{\pi}{6}$