

Math Placement Test Practice Problems

The following problems cover material that is used on the math placement test to place students into Math 1111 College Algebra, Math 1113 Precalculus, and Math 2211 Calculus I. The problems grouped into sections by the level of the courses they are drawn from, with the lower level problems first and the higher level problems last.

Answers are provided for all problems and detailed solutions are provided for half the problems. However it is strongly recommended that you fully work a problem before looking at the answer.

First Part

1. Simplify $(2a^3b)^{-3}$.
2. Simplify $(-4x^2y^{-3})^{-2}$.
3. Simplify $\sqrt{\frac{1}{64}}$.
4. Simplify $\sqrt{3}-27$.
5. Complex numbers: Find x and y such that the following is correct:

$$3x + 5yi = 15 + 5i$$

6. Find x and y such that the following is correct:

$$10x - 4yi = 20 + \frac{1}{2}i.$$

7. Simplify $\sqrt{27-18}$.
8. Simplify $\sqrt{\frac{-1}{25}}$.
9. Simplify i^{15} .
10. Simplify i^{47} .
11. Solve for x in $3x^2 + 8x + 4 = 0$.
12. Solve for x in $x^2 + 4 = 0$.
13. Solve for x in $x^2 + 7x + 3 = 0$.
14. Solve for x in $2x^2 + 10x - 1 = 0$.
15. Solve for x and graph the solution on a number line for $2 - 4x > 0$.

16. Solve for x and graph the solution on a number line for $x^2 - 2 \geq 1$.

17. Solve the following equations for x and y :

$$\begin{cases} 3x + 2y = 5 \\ 7x - y = 1 \end{cases}.$$

18. Solve the following equations for w and z :

$$\begin{cases} w + 2z = 10 \\ 4w + z = 5 \end{cases}$$

19. Graph the function $f(x) = x^2 + 2$ and identify x and y intercepts.

20. Graph the function $f(x) = 3x - 9$ and identify x and y intercepts.

21. Solve for x in $0.3x + 0.2 = 0.5$.

22. Solve for x in $0.5x + 0.4 = 1.2$.

23. Solve for x in $\frac{x+3}{x-9} = 0$.

24. Solve for x in $\frac{x-2}{2x+1} = 3$.

25. Let $f(x) = 10x - 5$ and find a value x^* such that $f(x^*) = 0$.

26. Let $f(x) = \alpha x + 2\beta$ where α and β are constants. Find x^* such that $f(x^*) = 0$.

27. Find an equation of a line passing through the points

$$(x_0, y_0) = (1, 4), \quad (x_1, y_1) = (2, 6).$$

28. Is $y = \sin x$ one-to-one?

29. Is $y = x + 2$ onto.

30. For a right triangle ABC with $a = 3$ and $c = 5$, where c is the hypotenuse, find b .

31. For a right triangle ABC with $a = 13$ and $b = 14$ find the hypotenuse c .

32. Write in interval notation $\{x \in \mathbb{R} : 10 < x < 20\}$ where \mathbb{R} denotes the set of all real numbers.

33. Write $x \in (-\infty, 0]$ as an inequality.

Second Part

34. Simplify $(\sqrt{x} - 3\sqrt{y}) \cdot (\sqrt{x} + \sqrt{9y})$.

35. Multiply out the product $(\sqrt[3]{x} + 2)(x^2 - 4)$.

36. Simplify by placing over a common denominator

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

37. Simplify

$$\frac{2}{x-2} + \frac{x}{x+3}.$$

38. Convert 320 yards per hour into feet per minute.

39. Convert r feet per second into inches per minute.

40. Convert $\frac{5}{12}$ into a percentage.

41. Convert $\frac{9}{13}$ into a percentage.

42. Solve for x and y in

$$\begin{aligned} y &= x + 4 \\ y &= 3x + 1 \end{aligned}.$$

43. Solve for x and y in

$$\begin{aligned} x + y &= 12 \\ y - x &= 4 \end{aligned}.$$

44. Let $f(x) = 12x + 3$. Find $f(2)$.

45. Let $g(x) = 10x - 30$. Find $g(3)$.

46. Solve for x in $\sqrt{x+11} + 2 = 0$.

47. Solve for x in $x^3 + 27 = 0$.

48. Find the slope of a line perpendicular to $y = \frac{4}{3}x + 2$.

49. Find the slope of a line parallel to $2x + 3y = 11$.

50. Expand $(x + 2)^3$.

51. Expand $\frac{a}{2}(6a + 4b - 3)$.

52. Solve for x in $|x + 1| = 2$.

53. Solve for x in $|x - 4| = 1$.

54. Write 0.0000045 in scientific notation.

55. Write 4,500,000 in scientific notation.

56. Perform the polynomial division

$$(x - 1) \overline{)x^3 - 3x^2 + x + 1.}$$

57. Perform the polynomial division

$$(x - 1) \overline{)x^3 + 3x^2 - 4.}$$

58. Solve for j in $7i + 2k - 3j = 0$.

59. Solve for σ in $8\rho + 2\theta - 3\sigma = 0$.

60. Simplify $\frac{x-2}{2-x}$.

61. Simplify $\frac{-x+8}{x-8}$.

62. Evaluate $(\frac{5}{2})^2 + (\frac{36}{9})^{1/2}$.

63. Evaluate $(\frac{3}{4})^3 + (\frac{27}{8})^{1/3}$.

64. Simplify $x^{-2} \cdot x^3$.

65. Simplify $x^{-4} \cdot x^6$.

Third Part

66. Find the domain for

(a) $f(x) = \sqrt{10 - 2x}$.

(b) $g(x) = \frac{1}{3x+2}$.

67. Find the general solution to $\sin x = 1$.

68. Find the general solution to $\cos x = \sqrt{3}/2$.

69. Solve for θ in $\sin^2 \theta - \cos^2 \theta = 1$.

70. Solve for θ in $\sin^2 \theta - \cos^2 \theta = -1$.

71. Solve for θ in $2 \sec^2 \theta - 4 = 0$.

72. Solve for θ in $\sqrt{3} \csc \theta = 2$.

73. Solve for x in $\sin^2 x + 4 \sin x + 4 = 0$.

74. Solve for x in $\cos^2 x - \cos x - 1 = 0$.

75. Find the coordinate points of intersection for the curves in the interval $[0, 2\pi]$ for

$$\begin{aligned}y &= \sin x \\y &= \cos x\end{aligned}$$

76. Find the coordinate points of intersection for the curves in the interval $[0, 2\pi]$ for

$$\begin{aligned}y &= \csc x \\y &= \sec x\end{aligned}$$

77. Graph $f(x) = \csc x$ on the interval $[0, 2\pi]$.

78. Graph $f(x) = \tan x$ on the interval $[0, 2\pi]$.

79. Convert $\frac{2\pi}{9}$ radians into degrees.

80. Convert 540° into radians.

81. How is the graph of $y = (x - 4)^2$ related to the graph of $y = x^2$.

82. How is the graph of $y = (x - 3)^2 + 2$ related to the graph of $y = (x - 2)^2$.

83. Convert $\sin 2\theta$ using trig identities.

84. Convert $\sin \frac{\theta}{2}$ using trig identities.

85. Given a point P on the unit circle at an angle of $\frac{3\pi}{4}$ radians, find the coordinates of P .
Graph the unit circle, marking the position of the point on the graph.

86. Given a point P on the unit circle at an angle of $\frac{4\pi}{3}$ radians, find the coordinates of P .
Graph the unit circle, marking the position of the point on the graph.

87. Find $\sin 315^\circ$ exactly.

88. Find $\cos 540^\circ$ exactly.

89. In which quadrants are the signs of cosine and cosecant the same?

90. In which quadrants are the signs of cotangent and cotangent the same?

91. Vectors: If $\mathbf{u} = (3, 2)$ and $\mathbf{v} = (1, 6)$ find $|2\mathbf{u} - \mathbf{v}|$.

92. If $\mathbf{u} = (1, 3)$ and $\mathbf{v} = (3, 0)$ find $|\mathbf{u} + \mathbf{v}|$.

93. Graph $y^2 + x^2 = 1$.

94. Graph $(y - 3)^2 + (x - 2)^2 = 1$.

95. What is the range of the cosine function.

96. What is the domain of the sine function.
97. Use trig identities to simplify $\frac{\sin 2x}{1 - \sin^2 x}$.
98. Evaluate $\cot 45^\circ$.
99. What is the period of $\sin x$.
100. Given $f(x) = 3x + 2$, $g(x) = 7x$, and $k(x) = x^2$ find $f(2) + g(1) - k(3)$.