

SELF-GRADING MATHEMATICS PLACEMENT TEST

This test is designed to help you determine which Mathematics course you should take: Math 101 Algebra, Math 113 Precalculus Mathematics, or Math 220 Differential Calculus of One-Variable Functions. Evaluation of mathematical skills is not easily accomplished. Factors influencing the correct placement include your high school background, your affinity for mathematical thinking, and how recent your exposure to mathematics has been.

In general, if you have had two years of high school Mathematics and score 10 or better on Section I of the Test, you probably should enroll in Mathematics 101. If you did not score 10 but think that you could do better with a little review, enroll in 101 but review your high school Algebra immediately.

If you have had two years of high school Mathematics, and you score better than 10 on Sections I and II and 10 or better on Section III, choose Precalculus Mathematics 113. Again, if you feel that you could do better with a little brush-up, review your high school Algebra and try 113.

If you have had three years of high school Mathematics and score 10 or better on Section I, and at least 15 on Sections II and III, you may enroll for Math 220 Differential Calculus of One-Variable Functions. The same thing applies as to your ability to catch up with some review.

The problems on the test are all multiple choice. You are to indicate the answer to each problem on the test. For example, if Problem I were $2 + 2 = \underline{\hspace{2cm}}$.

- a. 1
- b. 2
- c. 3
- d. 4
- e. None of these

You would circle the "d". An answer key is provided so that you may check your answers. You do not need to return the test as it is to be used by you as an aid in course selection.

SECTION I

1. $(-2)(-9) =$ _____
(a) 18 (b) -18 (c) 9 (d) 27 (e) none of these
2. $(-3)(8) =$ _____
(a) 24 (b) -24 (c) 3 (d) 11 (e) none of these
3. $\frac{3}{5} - \frac{1}{3} =$ _____
(a) 4/15 (b) 13/15 (c) 1 (d) 3 (e) none of these
4. $\frac{\frac{6}{4}}{\frac{3}{8}} =$ _____
(a) 9/16 (b) 2 (c) 3 (d) 1 (e) none of these
5. $\left(\frac{3}{4} + \frac{2}{3}\right)\left(\frac{4}{3}\right) =$ _____
(a) 4/3 (b) 3/4 (c) 17/9 (d) 9/17 (e) none of these
6. $2^3 =$ _____
(a) 4 (b) 2 (c) 6 (d) 8 (e) none of these
7. $(.03)^2 =$ _____
(a) .09 (b) .009 (c) .0009 (d) .9 (e) none of these
8. $.03/.04 =$ _____
(a) 7.5 (b) .75 (c) .075 (d) .0075 (e) none of these
9. $\sqrt{16} =$ _____
(a) 2 (b) 4 (c) 6 (d) 8 (e) none of these

10. $\sqrt[3]{27} =$ _____
 (a) 3 (b) 4 (c) -3 (d) 5 (e) none of these
11. $(2)^3 \left(\frac{1}{2}\right)^2 (3) =$ _____
 (a) 12 (b) 18/4 (c) 6 (d) 4 (e) none of these
12. If $1 + 3x = 5x + 7$, then $x =$
 (a) 3 (b) 5 (c) -3 (d) 7 (e) none of these
13. If $3(4x-6) = 2(5x + 8)$, then $x =$
 (a) 16 (b) 17 (c) 18 (d) 19 (e) none of the above
14. If $x = 2$, what is the value of y if $y = (x + 2) / (x + 2)^2$
 (a) 1/3 (b) 3/7 (c) 1/4 (d) 4 (e) none of the above
15. $(2x + 3)(x - 1) =$ _____
 (a) $2x^2 - x - 3$ (b) $2x^2 + 4x + 3$ (c) $2x^2 + x - 3$ (d) $2x^2 + 3x - 3$ (e) none of the above
16. $\frac{(x^2 - 1)}{(x + 1)} =$ _____
 (a) x (b) $x - 1$ (c) $x + 1$ (d) x^2 (e) none of the above
17. $\frac{5w}{4k} + \frac{2w}{3k} + \frac{w}{8k} =$ _____
 (a) $8w/15k$ (b) w/k (c) $49w/24k$ (d) $24w/17k$ (e) none of the above
18. $(2x^2 - 5x - 3) = () ()$
 (a) $(x+1)(2x-3)$ (b) $(2x+1)(x-3)$ (c) $(x-3)(2x-1)$ (d) $(2x-3)(x-1)$
 (e) none of the above

19. A boy can do a job in 5 days and a man can do it in 3 days. How long does it take the two of them to get the job done if they work together?
- (a) $7/8$ days (b) $8/15$ days (c) $15/8$ days (d) 4 days (e) none of the above
20. A ladder 5 feet long is placed against a wall with the bottom of the ladder 3 feet from the wall. How high on the wall does the top of the ladder reach?
- (a) 1' (b) 2' (c) 3' (d) 4' (e) none of the above
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Answer key- Section I

1.	a	6.d	11.c	16.b
2.	b	7.c	12.c	17.c
3.	a	8.b	13.b	18.b
4.	e	9.b	14.c	19.c
5.	c	10.a	15.c	20.d

SECTION II

1. $\frac{\frac{2}{3} - \frac{2}{5}}{\frac{3}{5}} = \underline{\hspace{2cm}}$

- (a) 6/75 (b) 1/9 (c) 2/9 (d) 8/9 (e) none of the above

2. $\frac{1}{x^2+1} + \frac{1}{(-x^2+1)} = \underline{\hspace{2cm}}$

- (a) $\frac{-x^2}{x^4-1}$ (b) $\frac{-x^2}{x^2-1}$ (c) $\frac{-2}{x^3-1}$ (d) $\frac{-2}{x^4-1}$

3. $\frac{y}{x} - \frac{x}{y} = \underline{\hspace{2cm}}$

- (a) $\frac{1}{x-y}$ (b) $\frac{xy}{y-x}$ (c) $\frac{0}{xy}$ (d) $x-y$ (e) $\frac{y^2-x^2}{xy}$

4. $\frac{6+a}{3a+18} = \underline{\hspace{2cm}}$

- (a) $\frac{2+a}{a+6}$ (b) $\frac{2}{a+6} + \frac{1}{6}$ (c) 1/3 (d) $\frac{2}{a+6} + \frac{a}{a+6}$ (e) none of the above

5. $((x+a)^{-1} + (x-a)^{-1})^{-1} = \underline{\hspace{2cm}}$

- (a) $\frac{(x-a)^2}{2a}$ (b) $\frac{x^2-a^2}{2x}$ (c) x (d) $x^2 - a^2$ (e) 2x

6. $(x^2)^{1/4} = \underline{\hspace{2cm}}$

- (a) \sqrt{x} (b) $\frac{1}{\sqrt{x}}$ (c) $\frac{-x}{2}$ (d) $\frac{1}{x^2}$ (e) none of the above

7. $8^{-2/3} =$ _____
 (a) $-16/3$ (b) $\frac{1}{8}$ (c) $\frac{1}{4}$ (d) $\sqrt{2}$ (e) none of the above
8. $(x^{1/2} - y^{1/2})(x^{1/2} + y^{1/2}) =$ _____
 (a) xy (b) $x + y$ (c) $x - y$ (d) x (e) none of the above
9. If $a = 2$ and $b = -2$, then $(a^2)(-b^2) =$ _____
 (a) -16 (b) 16 (c) $(16)^2$ (d) 32 (e) none of the above
10. $(a^3 b^{-5})^{-2} =$ _____
 (a) b^{10}/a^6 (b) $a^6 b$ (c) $-2a^2 b^{-2}/a^{-4} b^3$ (d) $\frac{b^{10}}{a^{12}}$ (e) none of the above
11. If $\frac{12}{x} - 2 = 8$, then $x =$ _____
 (a) $1/72$ (b) $1/3$ (c) $5/24$ (d) $5/48$ (e) $x = 6/5$
12. If $x + y = 1$ and $x - 2y = 0$, then,
 (a) $x = 5/3$ (b) $x = 2/3$ (c) $x = 7/3$ (d) $x = 1$ (e) none of the above
13. If $x + y = -4$ and $x^2 + y^2 = 8$, then
 (a) x cannot be any number (b) $x = 2$ (c) $x = -2$ (d) $x = 2 + \sqrt{3}$ (e) none of the above
14. If x is a positive number and $x^2 + 2x - 2 = 0$, then
 (a) $x = \sqrt{3} - 1$ (b) $x = \sqrt{3} + 1$ (c) $x = 2\sqrt{3} - 2$ (d) $x = 1/2 \sqrt{6} - 1$ (e) none of the above
15. If $x = 1$ is one solution of the equation $x^2 + bx - 2 = 0$, then the other solution is
 (a) $x = 1$ (b) $x = 2$ (c) $x = b - 1$ (d) $x = -2$ (e) none of the above
16. Remove all signs of grouping and combine similar terms:
 $2x - [(2 - x) + 3(1 - x)] =$ _____
 (a) $-2x$ (b) $4 - x$ (c) $6x - 5$ (d) $5x - 6$ (e) none of the above

17. $x^2 - 4x - 5 =$ _____
 (a) $(x - 5)(x + 1)$ (b) $(x + 5)(x - 1)$ (c) $(x - 4)(x + 1)$ (d) $(x + 4)(x - 1)$
 (e) none of the above
18. If $x = 1.414$, then $\frac{8x + 4}{x + 3} \div \frac{2x + 1}{x + 3} =$ _____
 (a) 2.828 (b) 8.0 (c) 7.07 (d) $(1.414)(3.828)$ (e) none of the above
19. $\frac{x^3 + 3x^2 + 3x + 1}{x + 1} =$ _____
 (a) $x^2 + x + \frac{1}{x + 1}$ (b) $x^2 + 3x + \frac{1}{x + 1}$ (c) $(x + 1)^2$ (d) $x^2 + 3x + 1$
 (e) none of the above
20. If a line segment 25 inches long is divided into two segments in the ratio 2 to 3, how long is the shortest segment?
 (a) 5 (b) 10 (c) 15 (d) 8 (e) none of the above

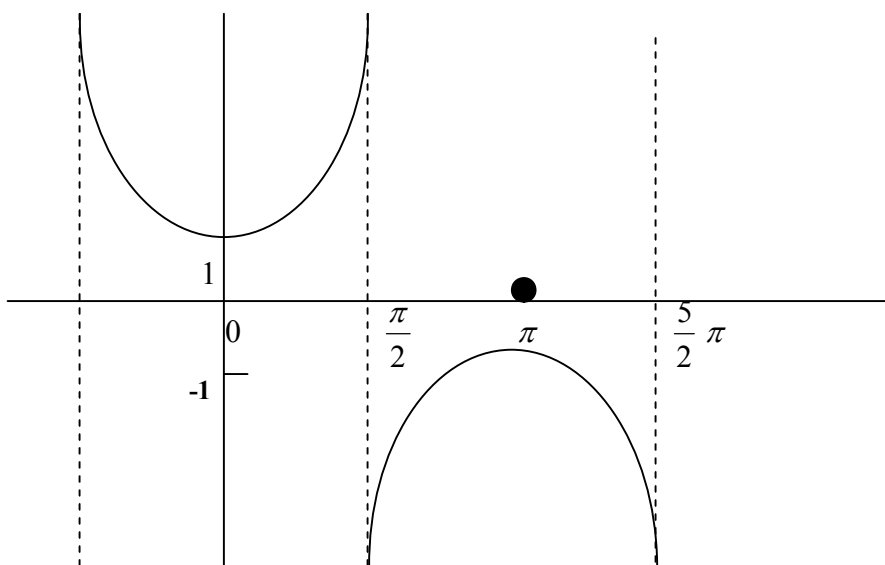
Answer key- Section II

1.e	6.a	11.e	16.c
2.d	7.c	12.b	17.a
3.e	8.c	13.c	18.e
4.c	9.a	14.a	19.c
5.b	10.a	15.d	20.b

SECTION III

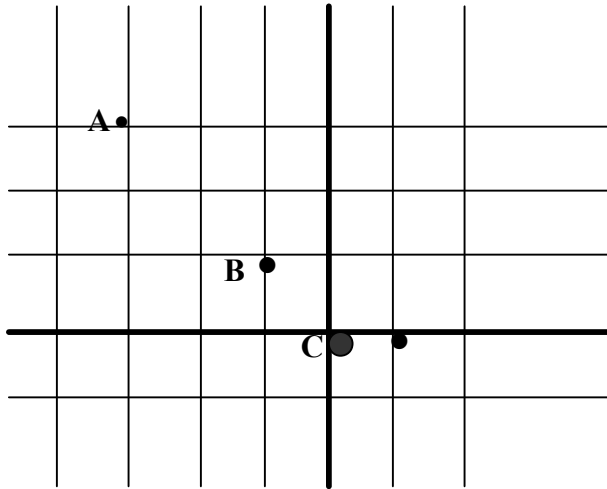
1. $\sin\left(-\frac{\pi}{2}\right)$ is
 (a) Zero (b) undefined (c) non-negative (d) negative (e) positive
2. If θ is an acute angle and $\cos \theta = \frac{1}{2}$, then $\tan \theta =$
 (a) $\sqrt{3}$ (b) $2\sqrt{3}$ (c) 2.0 (d) $1\sqrt{3}$ (e) $\sqrt{3/2}$
3. $\sin 160^\circ =$ _____
 (a) $\cos 160^\circ$ (b) $\sin 20^\circ$ (c) $\tan 20^\circ$ (d) $\cos 20^\circ$ (e) none of the above
4. If an arc of 6 feet subtends an angle of 3 radians at the center of the circle, then the radius of the circle is
 (a) 2 ft (b) 3 ft (c) 6 ft (d) 18 ft (e) none of the above
5. If $\theta = 9.1^\circ$, which of the following is the largest number?
 (a) $(1 - \sin \theta)^{10}$ (b) $(1 - \sin \theta)^{100}$ (c) $\left|\frac{1}{\sin \theta}\right|$ (d) $|\cos \theta|$ (e) $|\tan \theta|$
6. Given the right triangle
- The diagram shows a right-angled triangle. The vertical leg is labeled 'x'. The hypotenuse is labeled '5'. The angle at the bottom-left vertex is labeled '90°'. The angle at the bottom-right vertex is labeled 'θ'.
- where $\sin \theta = \frac{1}{2}$; $\cos \theta = \frac{\sqrt{3}}{2}$; $\tan \theta = 1/\sqrt{3}$, find the length of x .
 (a) 3.0 (b) 4.0 (c) $\sqrt{3}$ (d) $1\sqrt{3}$ (e) none of the above
7. Which of the following is true when $x = -30^\circ$?
 (a) $\sin x + \cos x = 1$ (b) $\sin x = 1/\cos x$ (c) $\sin x = \cos x$ (d) $\sin^2 x = 1 - \cos^2 x$
 (e) $\sin^2 x - \cos^2 x = 1$
8. $\sin(x + 180^\circ) =$ _____
 (a) $-\sin x$ (b) $\cos x$ (c) $\tan x$ (d) $\cot x$ (e) none of the above

9. The equation of the graph in the accompanying figure is



- (a) $y = 1/\sin x$ (b) $y = \cot \frac{x}{2}$ (c) $y = \csc x$ (d) $y = \sec x$ (e) $y = \cot x$
10. One solution of the equation $\tan \frac{x}{3} = -1$ is
 (a) $x = -45^\circ$ (b) -135° (c) -15° (d) -405° (e) none of the above
11. $y \log x =$ _____
 (a) $\log(x y)$ (b) $x \log y$ (c) $\log \frac{x}{y}$ (d) $\log x + \log y$ (e) $\log x^y$
12. $\log \frac{x}{y} =$ _____
 (a) $\log x - \log y$ (b) $\frac{1}{y} \log x$ (c) $(\log x) \log \frac{1}{y}$ (d) $x \log \frac{1}{y}$ (e) none of these
13. $\log(x - y) =$ _____
 (a) $(\log x)(\log y)$ (b) $(\log x)/(\log y)$ (c) $\log x - \log y$ (d) $-y \log x$ (e) none of these
14. If $\log x = 0$, then
 (a) $x = 0$ (b) $x = 1.0$ (c) $x = 2.0$ (d) $x = .10$ (e) none of these

15. The coordinates of the point A in the accompanying figure are:



- (a) $(-4, -3)$ (b) $(-4, 3)$ (c) $(4, -3)$ (d) $(-3, -4)$ (e) none of these
16. Which of the following equations has a graph that passes through both points B and C in the figure accompanying problem 15?
- (a) $y = x^2 - 1$ (b) $y = x^2$ (c) $x + y = 0$ (d) $x + 2y = 1$ (e) none of these
17. What is the equation of the straight line which passes through $(1,2)$ and $(3,4)$?
- (a) $2y + x = 3$ (b) $x^2 + y = 3$ (c) $y - x = 1$ (d) $y + 2x = 5$ (e) none of these
18. What are the coordinates of the points where the straight line $x - y = 0$ intersects the parabola $y = x^2$?
- (a) $(1,1); (-1, 1)$ (b) $(0,0); (-1, 1)$ (c) $(0,0); (2,1)$ (d) $(0,0); (1, 1)$ (e) none of these
19. What is the distance between the points $(2,3)$ and $(5,7)$?
- (a) 3 (b) 4 (c) 5 (d) 6 (e) none of these
20. What is the equation for the circle whose center is at $(0,0)$ and whose radius is 2?
- (a) $x^2 + y^2 = 2$ (b) $x + y = 2$ (c) $x^2 + y^2 = 4$ (d) $x^2 + y = 4$ (e) none of these

Answer key- Section III

1.d	6.e	11.e	16.d
2.a	7.d	12.a	17.c
3.b	8.a	13.e	18.d
4.a	9.d	14.b	19.c
5.e	10.b or d	15.e	20.c