AP® Calculus AB Readiness Test

This placement test can help you determine if your student is ready for HSLDA Online Academy's AP® Calculus AB course. If you find that your student needs improvement, we recommend our Pre-Calculus and Trigonometry course instead.

All of HSLDA Online Academy's courses have live, weekly class sessions taught by qualified instructors. View our full list of courses here.

This test covers (1) basic algebraic skills, (2) basic skills involving functions, and (3) basic trigonometric skills. A student should be able to effectively use mathematical skills in all three of these areas before taking AP® Calculus AB.

Directions:

Separate the answer key from the rest of the pages (the answer key is on the last page). Your student should work independently and without using a calculator. Once your student is finished, grade the test using the answer key. If your student answers at least 80% of the questions correctly, then he/she is likely ready for AP® Calculus AB. The ultimate decision rests with you as the parent.

Test

Problems 1–10 test basic algebraic skills:

1. If n and m are integers and a and b are real numbers, which of the following statements is incorrect?

   A. $a^n \cdot a^m = a^{n+m}$

   B. $a^n \cdot b^{-m} = a^n \div b^m$

   C. $a^{nm} = (a^m)^n$

   D. $a^n \div a^{-m} = a^{n-m}$

   E. $(ab)^{nm} = a^{nm} \cdot b^{nm}$

2. The expression $\frac{1-x-12x^2}{1-9x^2}$ can be simplified to which of the following choices?

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

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

   C. $\frac{4x-1}{2x-1}$

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

   E. $\frac{1-x}{1+6x}$

3. $\frac{a+2}{2a-6} - \frac{a-2}{2a+6}$ = which of the following choices?

   A. $\frac{9a}{2(a^2-9)}$

   B. $\frac{1}{a}$

   C. $\frac{a^2+6}{a^2-9}$

   D. $\frac{5a}{a^2-9}$

   E. $\frac{a+2}{4a}$

4. Which of the following is a correct factoring of the expression $x^4 + 24x^2y^2 - 25y^4$?

   A. $(x-5y)(x+5y)(x^2+y^2)$

   B. $(x-y)(x+y)(x^2+25y^2)$

   C. $(x-4y)(x+6y)(x^2+5y^2)$

   D. $(x-6y)(x+4y)(x^2-y^2)$

   E. $(x-y)(x+5y)(x^2+5y^2)$

5. If $y = 4x^2 - 5x + 4$, what is the value of y when $x = 2$?

   A. 2

   B. 5

   C. 12

   D. 3

   E. 10

6. If $y = \frac{x-2}{(x-3)(x+4)}$, y cannot be evaluated for what value of x?

   A. 2

   B. -3

   C. 4

   D. -4

   E. 0

7. What are the values of x for which the following is it true: $(x + 2)(x^2 - 1) = 0$?

   A. $x = 2, -1,$ and 1

   B. $x = -2, 1,$ an $- 1$

   C. $x = -1$ and 2

   D. $x = 1$ and 2

   E. $x = 0, 1,$ and 2

8. The solution of the equation $\frac{3x-2}{5} = 4 - \frac{x}{2}$ is which of the following?

   A. $x = 2$

   B. $x = \frac{1}{2}$

   C. $x = 1$

   D. $x = -1$

   E. $x = 4$

9. One number is 5 more than another and the sum of the two numbers is 25. What is the smaller of the two numbers?

   A. 5

   B. 10

   C. 15

   D. 8

   E. 12

10. Let $w = -2x + 4$. For what value or values of x is $w > 0$?

    A. $x = 4$

    B. $x > 2$

    C. $x < 2$

    D. $x > 0$

    E. $x < 0$

Problems 11–20 test basic skills involving the concept of functions:

11. Suppose $h(x) = x + 1$ and $g(h) = h^2 - 3$. What is g as a function of x?

    A. $g(x) = 2x - 1$

    B. $g(x) = x - 2$

    C. $g(x) = x^2 - 3$

    D. $g(x) = x^2 + 2x - 2$

    E. $g(x) = x^2 + 2x + 1$

12. Suppose $f(x) = x^2$ and $h(x) = x$. Which of the following is <u>not</u> true?

    A. $f(x) > h(x)$ when $x > 1$

    B. $f(x) > h(x)$ when $x \geq 0$

    C. $f(x) > h(x)$ when $x < 0$

    D. $f(x) = h^2(x)$

    E. $h(x) > \sqrt{f(x)}$ when $x > 1$

13. Suppose $f(x) = x^{-1}$ and $h(x) = x$. Which of the following is <u>not</u> true?

    A. $f(x)$ is not defined at $x = 0$.

    B. $f(x) > h(x)$ when $x < -1$

    C. $f(x) < h(x)$ when $x > 1$

    D. $f(0) = h(0)$

    E. $h(x) > \sqrt{f(x)}$ when $x > 1$

14. Suppose $f(x) = 2x$ and $h(x) = 1$. For what x value is it true that $f(x) - h(x) = 0$?

    A. $x = 2$

    B. $x = 0.5$

    C. $x = -1$

    D. $x = 1$

    E. $x = -0.5$

15. Suppose $f(x) = x^3$ and $h(x) = x$. For what x values is it true that $f(x) = h(x)$?

    A. $x > 0$

    B. $x < 0$

    C. $x = 0$ and $x = \pm 1$

    D. $x = 3$ and $x = \pm 1$

    E. no x values satisfy the condition

16. Consider the function $f(x) = x^2 - 4$. For what x is it true that $f(x) \geq 0$?

    A. $x \leq -2$ and $x \geq 2$

    B. $x \geq -2$ and $x \leq 2$

    C. all values of x

    D. no values of x

    E. $x = \pm 2$

17. Let $(x) = \frac{x-2}{(x-3)(x+4)}$; $f(x)$ is not defined for which of the following values of x?

    A. 2

    B. 3

    C. 4

    D. -3

    E. 0

18. Suppose $f(x) = (x + 2)(x^2 - 1)$. For which of the following x values is it true that $f(x) < 0$?

    A. $x < -1$

    B. $x > 1$

    C. $x > -1$ and $x < -1$

    D. $x > -1$ and $x < 1$

    E. no values of x

19. Suppose $f(x) = \frac{3x-2}{5}$ and $g(x) = 4 - \frac{x}{2}$. For what x value do these functions map into the same value?

    A. $x = 2$

    B. $x = \frac{1}{2}$

    C. $x = 1$

    D. $x = -1$

    E. $x = 4$

20. A rectangle has a height h, width w, and a perimeter of length 30. Express h as a function of w.

    A. $h(w) = \frac{30}{w}$

    B. $h(w) = 15 - w$

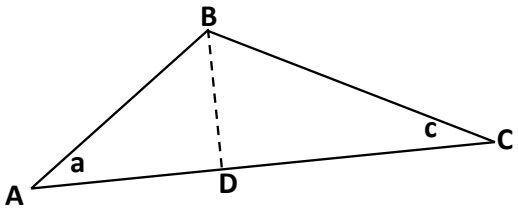
    C. $h(w) = 30 - 2w$

    D. $h(w) = 30 - w$

    E. $h(w) = \sqrt{30 - w^2}$

Problems 21–30 test basic skills involving trigonometry:

Problems 21, 22, and 23 refer to the following figure showing triangle ABC with angles a, b, and c; sides AB, BC, and AC; and the line BD which is perpendicular to side AC. We will indicate length of lines with a pair of vertical lines. Thus, $|AB|$ is the length of side AB.



21. Which of the following is $\sin(a)$?

    A. $\sin(a) = |BC| \div |AC|$

    B. $\sin(a) = |BC| \div |AB|$

    C. $\sin(a) = |BD| \div |AB|$

    D. $\sin(a) = |BC| \cdot |AC|$

    E. $\sin(a) = |BD| \cdot |AC|$

22. Which of the following is $\cos(c)$?

    A. $\cos(c) = |CD| \div |BC|$

    B. $\cos(c) = |BC| \div |AB|$

    C. $\cos(c) = |BD| \div |BC|$

    D. $\cos(c) = |BC| \cdot |AC|$

    E. $\cos(c) = |BD| \cdot |AC|$

23. Which of the following is $\tan(a)$?

    A. $\tan(a) = |BC| \div |AC|$

    B. $\tan(a) = |BC| \div |AB|$

    C. $\tan(a) = |BD| \div |AB|$

    D. $\tan(a) = |BD| \div |AD|$

    E. $\tan(a) = |BD| \cdot |AC|$

24. For which angle θ is $\tan(\theta)$ not defined?

    A. $\theta = 0°$

    B. $\theta = 180°$

    C. $\theta = 90°$

    D. $\theta = 360°$

    E. $\tan(\theta)$ is defined for all θ.

25. Let θ be some angle for which $\cos(\theta) = \sin(45°)$. For which of the following θ values is this true?

    A. $\theta = 0°$

    B. $\theta = 135°$

    C. $\theta = -45°$

    D. $\theta = 225°$

    E. none of the above

26. It is known that $\tan(45°) = 1$. For which of the following θ values is it also true that $\tan(\theta) = 1$?

    A. $\theta = 0°$

    B. $\theta = 135°$

    C. $\theta = -45°$

    D. $\theta = 225°$

    E. none of the above

27. What is the minimum value of $\cos(\theta + 45°)$?

    A. 0

    B. $\frac{1}{\sqrt{2}}$

    C. 1

    D. -1

    E. $-\frac{1}{\sqrt{2}}$

28. Which of the following is <u>not</u> true?

A. $\tan(\theta) = \sin(\theta) \div \cos(\theta)$

B. $\sin^2(\theta) + \cos^2(\theta) = 1$

C. $\cos(\theta) = \sin(90° - \theta)$

D. $\cos(\theta + 90°) = -\sin(\theta)$

E. $\cos(-\theta) = -\cos(\theta)$

29. Suppose $f(x) = \cos(x)$ and n is an integer. Which of the following is true?

A. $f(x + n \cdot 90°) = f(x)$

B. $f(x + n \cdot 360°) = f(x)$

C. $f(x + n \cdot 100°) = f(x)$

D. $f(x + n \cdot 180°) = f(x)$

E. $f(x + n \cdot 200°) = f(x)$

30. Consider the function $\cos(3\theta)$. For which of the following θ values is this function equal to 0?

A. $\theta = 0°$

B. $\theta = 60°$

C. $\theta = 30°$

D. $\theta = 45°$

E. none of the above

Answer Key

1. D
2. D
3. D
4. B
5. E
6. D
7. B
8. E
9. B
10. C
11. D
12. B
13. D
14. B
15. C
16. A
17. B
18. D
19. E
20. B
21. C
22. A
23. D
24. C
25. C
26. D
27. D
28. E
29. B
30. C