



# AP Calculus BC (AB Full) 241

## Readiness Assessment Test

Thank you for considering this course for your student. Here are some tips for success in the Readiness Assessment process.

- Please do not provide your student this assessment or its contents until you are ready for him or her to complete it in a single sitting with no books, notes, or outside help. It is intended to be a spot check of retained knowledge and skill.
- Make sure you have the latest version of this assessment. Ideally, please download it and have your student complete it within one week prior to enrollment.
- Completed Readiness Assessment materials for a course should be submitted immediately after you enroll in the course.
- **Readiness Assessment materials must be submitted by uploading from the Family Account in the Enrolled Courses view.** Readiness Assessment materials are not accepted through email.
- Visit Live Chat, or email TPS Support ([support@pottersschool.org](mailto:support@pottersschool.org)) for questions or assistance.

## **Part I: Academic Background** (to be completed by the parent)

### **Age/Grade**

1. How old will your student be as of **October 1<sup>st</sup>** of the academic enrollment year?
2. What grade will your student be in **at the start of this course**?

### **Related Coursework**

1. Please provide the following background information for the student's completed or in progress **Precalculus** course or **equivalent course**:

Course Name:

- a. What is the student's in-progress or final course grade (numeric grade if available)?
- b. What is the name of the course provider (e.g., online provider, taught at home, local college)?
- c. What is the name of the course curriculum (title and name of publisher of primary text if known)?
- d. Is the student on-track to complete the entire course/curriculum by the end of the current year (if in-progress)?
- e. How is the course evaluated? Is the work self-checked, parent-checked, or evaluated outside the home?
- f. What percentage (if any) of the student's grade is based on assessments that are completed without access to notes or outside resources and completed in a single sitting without the opportunity for rework to improve the grade?

## Additional Background

1. Is your student's first language English or a different language? If different, what is his or her language background? (**Note:** Most TPS classes are designed for native English speakers, but we also provide support at several levels for students whose first language is not English.)
2. Is there additional information that might help us better know your student and understand his or her unique abilities and needs for the best course placement and academic outcome?

## Part II: AP Questionnaire (to be completed by the student)

TPS wants to help each AP student achieve his or her individual AP exam goals. The following information allows us to better support you in accomplishing your goals.

1. Are you planning to take the AP exam associated with this course?
2. If you are planning to take the associated AP exam, what is your score goal?

**How do I decide my score goal?** AP exams are scored as 1-5, where scores of 4 or 5 are competitive and a scores of 3, 4, or 5 may receive credit from participating colleges. To see what credit is available from specific colleges for specific exam scores, please go to this site:

<https://apstudents.collegeboard.org/getting-credit-placement/search-policies>

3. If you are planning to take the associated AP exam, have you identified an exam site that offers this exam near you?

### Part III: Readiness Test (to be completed by the student)

- Please answer the following questions without using any resources (no notes, text, google, or other people) other than your knowledge.
- You **may** use a *scientific calculator* but you **may not** use a *graphing calculator*.

**Answer the following questions by highlighting or circling the correct answer choice.**

1. Solve and round answers to the nearest hundredth:  $2x^2 + x - 5 = 0$ 
  - a. 2, 5
  - b. 1.35, -1.85
  - c. 1.87, -1.37
  - d. 2.70, -9.08
2. Let  $f(x) = \sqrt{5 - x}$ . Give the domain.
  - a.  $x \geq 0$
  - b.  $-5 \leq x \leq 5$
  - c.  $x \geq 5$
  - d.  $x \leq 5$
3. Solve the equation with exact answers:  $3x^2 - x - 10 = 0$ 
  - a.  $\{-6, 5\}$
  - b.  $\{3, -10\}$
  - c.  $\{\frac{-5}{3}, 2\}$
  - d.  $\{\frac{-2}{3}, 5\}$
4. Let  $f(x) = \frac{2}{x^2}$  and  $g(x) = 3x - 5$ . Find the function  $f \circ g(x)$ .
  - a.  $\frac{6}{x^2} - 5$
  - b.  $6x - \frac{10}{x^2}$
  - c.  $\frac{2}{3x^2 - 5}$
  - d.  $\frac{2}{9x^2 - 30x + 25}$
5. Describe the graph defined by the parametric equation:  $x = 3 - t^2$ ,  $y = 1 + 2t$ 
  - a. Parabola opening down
  - b. Parabola opening left
  - c. Line with a negative slope
  - d. Parabola opening up

6. Describe the shape of the graph and how the graph of  $y = (3(x - 2))^2 + 1$  can be obtained from the graph of  $y = x^2$ .
- Parabola with a horizontal shift right 2 units and a vertical shift up one
  - Parabola with a horizontal stretch of 3 and a horizontal shift left 2 units and a vertical shift up one
  - Parabola with a horizontal shrink of 3, a horizontal shift right 2 and a vertical shift up one
  - Parabola with a horizontal shift left 2 units and a vertical shift down 1 and vertical stretch of 3
7. Describe the graph  $y = 3^x - 4$  and how the graph can be obtained from the graph of  $y = 3^x$ .
- Parabola with a horizontal stretch of 3 and vertical shift down 4 units
  - Exponential growth with a growth factor of 3 and a vertical shift down 4 units
  - Exponential decay with a horizontal stretch of 3 and a vertical shift up 4
  - Line with a slope of 3 and a y-intercept of -4
8. Find the equation for the line passing through the point  $(-1, 4)$  and parallel to the line  $10x - 6y = 11$ .
- $10x - 6y = 4$
  - $6x - 10y = 5$
  - $3x - 5y = -23$
  - $5x - 3y = -17$
9. A graph of a parabola function has a line of symmetry  $x = 3$  and contains the points  $(1, 0)$  and  $(4, -3)$ . Determine an equation for the parabola.
- $y = \frac{1}{9}(x - 3)^2$
  - $y = 3(x - 4)^2 + 3$
  - $y = (x - 3)^2 - 4$
  - $y = (x - 4)^2 - 9$
10. Write the expression in standard form:  $\frac{8+3i}{3+4i}$
- $\frac{12+41i}{7}$
  - $\frac{8}{3} + \frac{3}{4}i$
  - $\frac{36-23i}{25}$
  - $\frac{24+12i}{29}$
11. Identify all asymptotes and zeros of the function  $g(x) = \frac{x-4}{x^2-x-6}$ .
- $(3, 0), (-2, 0), (4, 0)$
  - $x = 3, x = -2, (4, 0)$
  - $x = 1, x = -6, (4, 0)$
  - $x = -3, x = 2, x = 4$

12. Find the vertex of the parabola  $y = 3x^2 - 12x + 23$ .

- a. (3,12)
- b. (2, 11)
- c. (2, 35)
- d. (6, 23)

13. Solve for x:  $\log_x 3 = \frac{1}{2}$

- a.  $\frac{3}{2}$
- b.  $\sqrt{3}$
- c. 6
- d. 9

14. Find the slope of the line determined by the points (-5, 3) and (4, -7).

- a.  $\frac{1}{10}$
- b.  $\frac{-9}{10}$
- c.  $-\frac{10}{9}$
- d. 4

15. Find the equation of the line passing through the point (3, -2) and perpendicular to the line  $4x + 3y = 5$ .

- a.  $3x - 4y = 5$
- b.  $3x - 4y = 17$
- c.  $2x + 3y = 0$
- d.  $3x - 2y = 13$

16. Which of the following is an odd function?

- a.  $y = x^3 - 5x$
- b.  $y = x^2 + 3x - 5$
- c.  $y = 2x^3 - 7$
- d.  $y = 3$

17. Find the inverse function of  $y = 2x^2 + 3$ .

- a.  $y = 3x^2 + 2$
- b.  $y = \frac{1}{2x^2+3}$
- c.  $y = \sqrt{2x+3}$
- d.  $y = \sqrt{\frac{x-3}{2}}$

18. Given the functions  $f(x) = x^2 + 3$  and  $g(x) = x^2 - 1$ , find  $g(f(x))$ .

- a.  $x^4 + 2x^2 - 3$
- b.  $x^2 + x + 2$
- c.  $x^4 + 6x^2 + 8$
- d.  $x^4 - 2x^2 + 3$

19. Give the domain and range of the graph  $y = 3 \cos(4x) - 2$ .
- $-\infty < x < \infty, -3 < y < 1$
  - $-\infty < x < \infty, -3 \leq y \leq 3$
  - $-4 \leq x \leq 4, -5 \leq y \leq 1$
  - $-\infty < x < \infty, -5 \leq y \leq 1$
20. Identify the period and phase shift for  $f(x) = 3 \sin(2x + \pi/3) + 4$
- $\pi$  and  $-\frac{\pi}{6}$
  - $2\pi$  and 3
  - $\pi$  and  $\frac{\pi}{3}$
  - $\pi$  and 4
21. Find an expression equivalent to  $\frac{\sec^2 x \csc x}{\sec^2 x + \csc^2 x}$ .
- $\frac{1}{1 + \csc x}$
  - $\sin x$
  - $\cos^2 x \sin x$
  - $\cos x$
22. Find an expression equivalent to  $\tan^2 x$  in terms of  $\cos x$ .
- $\frac{1 + \cos x}{\cos x}$
  - $\frac{1 - \cos^2 x}{\cos^2 x}$
  - $\cos x + 1$
  - $\frac{1 + \cos^2 x}{\cos^2 x}$
23. Solve for  $x$  on the interval  $[0, 2\pi]$ :  $2\cos x - \sqrt{3} = 0$
- $\left\{\frac{\pi}{3}, \frac{5\pi}{3}\right\}$
  - $\left\{\frac{\pi}{6}, \frac{\pi}{3}\right\}$
  - $\left\{\frac{\pi}{3}, \frac{2\pi}{3}\right\}$
  - $\left\{\frac{\pi}{6}, \frac{11\pi}{6}\right\}$
24. Evaluate:  $\cos(\tan^{-1}(\sqrt{3}))$
- $\frac{1}{2}$
  - $\frac{\pi}{3}$
  - $\sqrt{3}$
  - $\frac{\sqrt{3}}{2}$

25. Solve for x:  $4^{3x-1} = 16$

- a. 1
- b.  $\frac{2}{3}$
- c.  $\frac{5}{3}$
- d. no solution

26. Solve the equation  $8 - 2 \ln x = 16$ .

- a. -4
- b.  $\frac{1}{e^2}$
- c.  $e^2$
- d.  $\frac{1}{e^4}$

27. Find an equation for the ellipse whose major axis endpoints are (-7, -6) and (-7, 12) and minor axis length is 4.

- a.  $81(x + 7)^2 + 4(y - 3)^2 = 1$
- b.  $4(x - 7)^2 + 81(y + 3)^2 = 324$
- c.  $4(x + 7)^2 + 81(y - 3)^2 = 324$
- d.  $81(x + 7)^2 + 4(y - 3)^2 = 18$

28. Find the sum of the first 10 terms of the sequence: 28, 24, 20, 16, ....

- a. 100
- b. 80
- c. -8
- d. 200

29. Find the remainder when  $x^4 - 2x^2 - 3x + 7$  is divided by  $x - 3$ .

- a. 79
- b. -29
- c. 61
- d. 7

30. Expand the binomial  $(2x + y)^5$

- a.  $2x^5 + 5x^4 + 10x^3 + 10x^2 + 5x + y$
- b.  $2x^5 + 10x^4y + 20x^3y^2 + 20x^2y^3 + 10xy^4 + y^5$
- c.  $32x^5 + 16x^4y + 8x^3y^2 + 4x^2y^3 + 2xy^4 + y^5$
- d.  $32x^5 + 80x^4y + 80x^3y^2 + 40x^2y^3 + 10xy^4 + y^5$

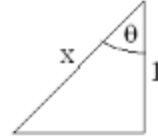
31. Find a Cartesian equation for a curve that contains the parametric curve given by  $x = 5 \cos t$  and  $y = 3 \sin t$

- a.  $5x^2 + 3y^2 = 1$
- b.  $3x + 5y = 1$
- c.  $5x + 3y = 1$
- d.  $9x^2 + 25y^2 = 225$



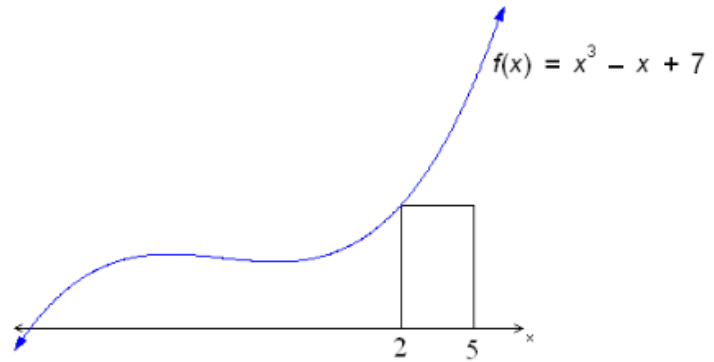
32. In the right triangle shown, find  $\tan \theta$

- a.  $x$
- b.  $x\sqrt{x^2 - 1}$
- c.  $x^2 + 1$
- d.  $\sqrt{x^2 - 1}$



33. What is the area of the rectangle in the figure shown below? (the figure is not drawn to scale)

- a. 3
- b. 39
- c. 31
- d. 27



34. Solve the inequality:  $\frac{(x-5)^3(x+1)^2}{x+3} > 0$

- a.  $x > 1$
- b.  $x < -1$  or  $x > 5$
- c.  $x < -3$  or  $x > 5$
- d.  $x > -1$

35. Solve for  $x$ :  $\log_9 x + \log_9(x - 2) = \frac{1}{2}$

- a. 3
- b. 0
- c. 2
- d. -1

36. If  $\left(\frac{1}{2}\right)^{\frac{x}{15}} = \frac{1}{3}$ , solve for  $x$ .

- a.  $5\ln 2$
- b.  $\frac{15\ln 3}{\ln 2}$
- c.  $\frac{15\ln 2}{\ln 3}$
- d.  $\frac{\ln 3}{\ln 3 - \ln 2}$

37. Solve for  $x$ :  $y = \frac{e^x}{1+e^x}$

- a.  $\ln\left(\frac{y}{1-y}\right)$
- b.  $\frac{\ln y}{2}$
- c.  $\ln(y - 1)$
- d.  $\frac{\ln y}{\ln(1-y)}$

38. Evaluate:  $\lim_{x \rightarrow 4} \frac{x^2 - 5x + 4}{x^2 - 4x}$

- a. 0
- b.  $\infty$
- c. 4
- d.  $\frac{3}{4}$

39. Consider the graph of the function:  $f(x) = \frac{5x^2}{x - x^3}$ , identify the vertical asymptotes and holes in the domain if they exist.

- a.  $x = 1, x = -1, (0,0)$
- b.  $x = 5, x = 0$
- c.  $x = 1, x = -1, x = 0$
- d.  $x = 5, x = -1, x = 1, (0, 0)$

40. Find the rectangular form for:  $x = t + 3$  and  $y = t^2 - 5t$

- a.  $y = x^2 - 5x + 3$
- b.  $y = x^2 - 11x + 24$
- c.  $y = x^2 + x - 15$
- d.  $y = x^2 + 6x - 6$

41. Write the equation for a polynomial of degree 3 whose zeros include  $x = 2$  and  $x = 3 - i$

- a.  $x^3 - 8x^2 + 22x - 20$
- b.  $x^3 - 4x^2 - 2x + 20$
- c.  $x^3 + 4x^2 - 4x - 16$
- d.  $x^3 - 8x^2 + 20x - 16$

42. From a distance of 1000 feet from a spotlight on the ground, the angle of elevation to a cloud base is  $43^\circ$ . Find the height of the cloud base to the nearest foot.

- a. 1467 ft
- b. 47 ft
- c. 682 ft
- d. 933 ft

43. Solve in the interval  $[0, 2\pi)$ :  $2 \cos^2 x + \cos x = 0$

- a.  $0, \pi, \frac{4\pi}{3}, \frac{5\pi}{3}$
- b.  $\frac{\pi}{2}, \frac{3\pi}{2}, \frac{2\pi}{3}, \frac{4\pi}{3}$
- c.  $\frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{3}, \frac{5\pi}{3}$
- d.  $\frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{6}, \frac{7\pi}{6}$

44. Determine whether the infinite series converges and find the limit:

$$36 - 18 + 9 - 4.5 + \dots$$

- a. Converges to 36
- b. Converges to 54
- c. Diverges
- d. Converges to 24

45. Find the exact value of  $y = \sin^{-1}\left(\sin\left(\frac{-\pi}{3}\right)\right)$

- a.  $\pi/3$
- b.  $2\pi/3$
- c.  $4\pi/3$
- d.  $-\pi/3$

**Show your work thoroughly in answering the following questions.**

46. Solve the equation and simplify the answer in exact form:

$$5(e^x)^2 - 13(e^x) - 6 = 0$$

47. Solve in the interval  $[0, 2\pi)$ :  $2\sin^2 x + 3 \sin x - 2 = 0$

48. Solve the equation and simplify the answer in exact form:  
 $\log_2(3x^2 - 2) - \log_2 x = 2$

49. Determine the center of the curve:  $8x^2 - 5y^2 - 48x - 20y + 12 = 0$

50. Simplify the following expression in terms of one function:  
$$\frac{\sin^3 x (\cot x)(\sec x)}{\cos x}$$