



**Test Papers
Hub.**

AP Calculus AB Practice Paper 1

Full Practice Examination

45 multiple-choice (A–D) · 6 free-response questions (54 marks) · 3 hours 15 minutes · 99 marks in all

How to use this booklet

- Section I: 45 multiple-choice questions (Part A: 30 questions, 60 minutes, no calculator; Part B: 15 questions, 45 minutes, graphing calculator). Section II: 6 free-response questions of 9 marks each (Part A: 2 questions, 30 minutes, calculator; Part B: 4 questions, 60 minutes, no calculator).
- Show all work for Section II; a correct answer with no supporting work may not receive full credit. This is an original TPH practice paper written to the College Board course description; it is not a College Board publication.
- Worked solutions follow the paper: every question has step-by-step working and a key takeaway.

SECTION I, PART A — NO CALCULATOR

30 questions · 60 minutes

Choose the best answer for each question. A calculator may not be used in this part.

1. The gradient of the curve $y = (4x + 3)^4$ at $x = 1$ is

- A 10976
- B 1372
- C -5488
- D 5488

2. $\int_0^{\ln(2)} 2e^{(3x)} dx =$

- A 14
- B $\frac{28}{3}$
- C $\frac{14}{3}$
- D $\frac{17}{3}$

3. For $f(x) = x^3 - \frac{15x^2}{2} + 18x$, the graph is concave up for

- A $x > \frac{5}{2}$
- B $x < \frac{5}{2}$
- C $x < \frac{5}{2}$
- D $x > 5$

4. The value of $\int_0^1 (x^2 + 3x + 2) dx$ is

- A 4
- B $\frac{23}{6}$
- C $\frac{29}{6}$
- D $\frac{38}{3}$

5. If $f(x) = \sin(4x) \cdot \cos(3x)$, then $f'(0) =$

- A 8
- B -4
- C 4
- D 0

6. $dy/dx = 2x - 3y$. The slope of the solution curve through the point $(-2, 0)$ is

- A 4
- B 6
- C -3
- D -4

7. If $g(x) = \int \text{from } 1 \text{ to } x \text{ of } (t^2 + 4) dt$, then $g'(2) =$

- A $\frac{19}{3}$
- B 9
- C 4
- D 8

8. The radius of a circular oil slick increases at 3 cm/s. The rate at which its area is increasing when the radius is 12 cm is

- A $24\pi \text{ cm}^2/\text{s}$
- B $72\pi \text{ cm}^2/\text{s}$
- C $432\pi \text{ cm}^2/\text{s}$
- D $36\pi \text{ cm}^2/\text{s}$

9. The equation $x^3 - \frac{159}{2} = 0$ must have a solution on which interval, by the Intermediate Value Theorem?

- A [4, 5]
- B [3, 4]
- C [5, 6]
- D [2, 3]

10. The line tangent to the graph of $f(x) = x^3 - 3x^2 + 1$ at $x = 1$ crosses the y-axis at $y =$

- A 3
- B -1
- C -2
- D 2

WORKED SOLUTIONS

Answers & worked solutions

Multiple-choice answer key

1	D	2	C	3	A	4	B	5	C	6	D
7	D	8	B	9	A	10	D	11	D	12	B
13	D	14	A	15	B	16	D	17	A	18	C
19	A	20	D	21	C	22	A	23	D	24	A
25	B	26	B	27	D	28	B	29	A	30	C
31	A	32	D	33	C	34	B	35	C	36	C
37	B	38	B	39	C	40	A	41	A	42	C
43	C	44	B	45	A						

SECTION I, PART A — NO CALCULATOR

1. The gradient of the curve $y = (4x + 3)^4$ at $x = 1$ is [Chain rule]

Correct answer: D — 5488

- Differentiate with the chain rule: $dy/dx = 16(4x + 3)^3$.
- Substitute $x = 1$: 5488.
- Why the other options are wrong:
 - A (10976): This is the correct answer (5488) doubled: a scaling factor was applied (or a factor missed) that the working above does not use.
 - B (1372): This forgets the chain-rule factor (the derivative of the inside).
 - C (-5488): Check the sign of the derivative.

LOS: Unit 2: Differentiation: definition and fundamental properties

KEY TAKEAWAY

Chain rule: multiply the outer derivative by the derivative of the inside function.

2. $\int$ from 0 to $\ln(2)$ of $2e^{(3x)} dx =$ [Exponential integrals]

Correct answer: C — $\frac{14}{3}$

- Antiderivative: $2e^{(3x)}/3$.
- Evaluate from 0 to $\ln(2)$: $\frac{14}{3}$.
- Why the other options are wrong:
 - A (14): Divide by $k = 3$ when integrating $e^{(kx)}$.
 - B ($\frac{28}{3}$): This is the correct answer ($\frac{14}{3}$) doubled: a scaling factor was applied (or a factor missed) that the working above does not use.