Class XII Mathematics — Practice Paper 1

Practice paper in the CBSE section pattern · Time: 1 hour · Maximum marks: 30

General instructions

1. This is an original practice paper, shorter than a board paper. It is not an official CBSE sample paper; official sample papers are published at cbseacademic.nic.in.
2. All questions are compulsory. Marks are shown in brackets.
3. Section A has 1-mark questions, Section B 2-mark, Section C 3-mark, Section D a 5-mark question and Section E a case-based question.
4. Write neatly, show your working and check your answers in the last five minutes.

Section A (6 marks)

Multiple choice and assertion–reason. 1 mark each.

1. A is a 3 × 3 matrix with $|A| = 4$. Then $|2A|$ is: [1]
   (a) 8
   (b) 16
   (c) 32
   (d) 64

2. $\frac{d}{dx}(\sin x^2)$ is: [1]
   (a) $\cos x^2$
   (b) $2x \cos x^2$
   (c) $2 \sin x$
   (d) $-2x \cos x^2$

3. $\int \frac{1}{x}\,dx$ equals: [1]

4. The order and degree of $\left(\frac{d^2y}{dx^2}\right)^3 + \frac{dy}{dx} = 0$ are: [1]

5. A and B are independent with $P(A) = 0.4$ and $P(B) = 0.5$. $P(A \cap B)$ is: [1]
   (a) 0.9
   (b) 0.2
   (c) 0.1
   (d) 0.45

6. Assertion (A): $f(x) = |x|$ is continuous at $x = 0$. [1]
   Reason (R): $f(x) = |x|$ is differentiable at $x = 0$.
   (a) Both true, R explains A
   (b) Both true, R does not explain A
   (c) A true, R false
   (d) A false, R true

Section B (6 marks)

Very short answers. 2 marks each.

7. Find $\sin^{-1}\left(\frac{1}{2}\right) + \cos^{-1}\left(\frac{1}{2}\right)$. [2]

8. If $x = at^2$ and $y = 2at$, find $\frac{dy}{dx}$. [2]

9. Find the unit vector along $\vec{a} = 2\hat{i} + 3\hat{j} + 6\hat{k}$. [2]

Section C (9 marks)

Short answers. 3 marks each.

10. Evaluate $\int x\, e^x\, dx$. [3]

11. Solve $\frac{dy}{dx} = \frac{(1 + y^2)}{(1 + x^2)}$. [3]

12. Find the intervals in which $f(x) = x^3 - 3x$ is increasing or decreasing. [3]

Section D (5 marks)

Long answer. 5 marks.

13. Find the area of the region enclosed by $y = x^2$ and $y = x$. Draw a rough sketch. [5]

Section E (4 marks)

Case-based question. 4 marks.

14. A workshop has two machines. Machine A makes 60% of the parts and 2% of its parts are faulty; machine B makes 40% and 3% of its parts are faulty. A part is picked at random. [4]
    (i) Find the probability that it is faulty. (2)
    (ii) If it is faulty, find the probability that machine A made it. (2)

Answer key and marking guide

Award marks for each correct step shown in brackets. Accept any correct method or equivalent wording; value points are a guide, not a script.

Section A

Q	Answer	Marking
1	(c) 32	$\|kA\| = k^n\|A\| = 8 \times 4$.
2	(b)	1 mark for the correct answer.
3	$\log\|x\| + C$	1 mark for the correct answer.
4	order 2, degree 3	1 mark for the correct answer.
5	(b) 0.2	1 mark for the correct answer.
6	(c)	$\|x\|$ has a corner at 0.

Section B

Q	Answer	Marking
7	$\pi/2$	$\pi/6$ (½) + $\pi/3$ (½) = $\pi/2$ (1).
8	$1/t$	$dx/dt = 2at$, $dy/dt = 2a$ (1); ratio $1/t$ (1).
9	$(2i + 3j + 6k)/7$	$\|a\| = 7$ (1); unit vector (1).

Section C

Q	Answer	Marking
10	$x\,e^x - e^x + C$	Integration by parts set up (1); working (1); answer (1).
11	$\tan^{-1} y = \tan^{-1} x + C$	Separating variables (1); integrating (1); general solution (1).
12	Increasing on $(-\infty, -1)$ and $(1, \infty)$; decreasing on $(-1, 1)$	$f'(x) = 3x^2 - 3$ (1); critical points ± 1 (1); intervals (1).

Section D

Q	Answer	Marking
13	1/6 square unit	Sketch (1); intersection points 0 and 1 (1); integral $\int_0^1 (x - x^2)\,dx$ (1); evaluation (1); answer (1).

Section E

Q	Answer	Marking
14	(i) 0.024 (ii) 1/2	(i) $0.6\times0.02 + 0.4\times0.03$ (1) = 0.024 (1). (ii) Bayes' theorem $0.012/0.024$ (1) = 1/2 (1).

Marking guide in brief

- Step marks: a correct method with a slip in arithmetic keeps most of the marks.
- Units, labels and a final statement are part of the answer.
- In long answers, marks go to the points made, not the length.
- Time check: about 1 minute per mark leaves time to revise.