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MATHEMATICS · EAPCET (EAMCET)

Mathematical Induction

Previous Year Questions with answers

34 questions · **34** papers · **2011–2026** · newest paper first

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What is in this PDF: every Mathematical Induction question we hold from past AP and TS EAPCET (called EAMCET until 2020 in Andhra Pradesh and 2023 in Telangana) papers, with its options and answer. Where an answer comes from a source other than the official final key, it says so next to the answer.

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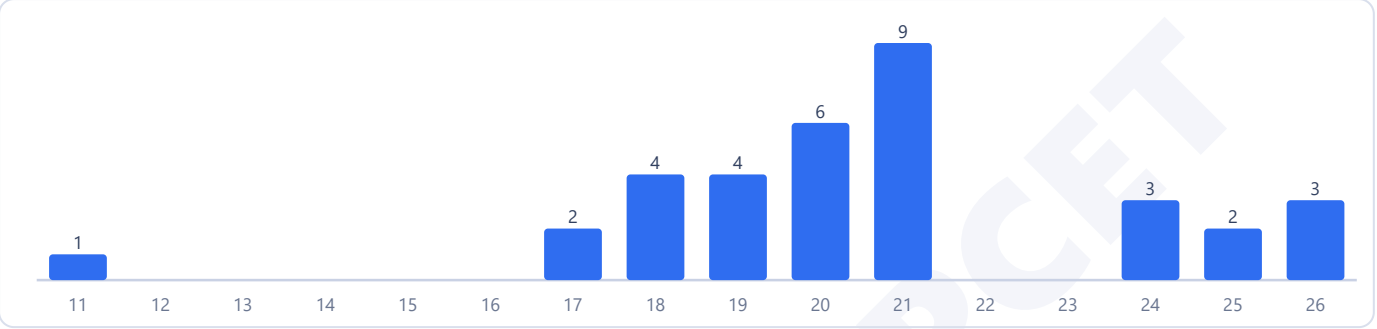
Chapter at a glance

0.1%	34	8 of 77	34 / 0
of Mathematics questions, 2022–2026	questions, 2011–2026	papers asked it, 2022–2026	MCQ / numerical, 2011–2026

Trend. 8 questions in 2024–2026, none in 2022–2023.

Questions per year



Counts are the questions we hold: 34 in 34 papers. No question in this chapter was found repeated across papers.

Most-asked topics in this chapter (2011–2026)

Principle of Mathematical Induction	34

How often it comes up

Mathematical Induction holds the lowest question volume in the syllabus, ranking 29 of 29 mathematics chapters. Over the full examination history from 2010 through 2026, the chapter produced 34 questions across 149 evaluated exam papers (present in 34 papers, averaging 0.2 questions per paper and a 0.3 percent subject share). In contemporary examination cycles between 2022 and 2026, Mathematical Induction appeared in only 8 of 77 sittings, yielding 8 questions (averaging 0.1 questions per paper and a 0.1 percent subject share).

Because it was completely absent in 2022 and 2023, the chapter did not appear every year in modern testing, nor does it appear in every sitting. However, testing resumed between 2024 and 2026, delivering 8 questions across 46 sittings (appearing in 8 papers, averaging 0.2 questions per test and a 0.2 percent share). In the earlier testing era from 2010 to 2021, examiners set 26 questions across 72 sittings (present in 26 papers, 0.4 per test, 0.5 percent share). When examining curriculum trends, comparing early testing with the last three years shows the share is about the same, and comparing recent testing with the last three years also confirms the share is about the same. In state-level totals between 2022 and 2026, Andhra Pradesh papers contained 5 questions across 48 papers (featured in 5 papers, 0.1 per test, 0.1 percent share), while Telangana examinations set 3 questions across 29 papers (present in 3 papers, 0.1 per test, 0.1 percent share).

Most-asked topics

Questions in this chapter focus entirely on a single topic area:

- **Principle of Mathematical Induction**: Comprising all 34 total questions across the database, including 8 in modern testing (examined through 2026). Concepts include verifying base cases for n equals one, two, or three, testing whether the inductive assumption P of k implies P of k plus one, divisibility properties of expressions like a to the power n minus b to the power n, finding the greatest integer dividing algebraic forms for all natural numbers, and checking inequality validity across integers.

What the questions look like

Examiners present divisibility assertions, inequality verification, and inductive step implication questions.

A frequent problem type asks for the largest positive integer that divides an expression such as n times (n squared plus three) for every natural number n. Another common format gives an inequality involving powers or factorials, asking candidates to find the threshold natural number above which the inductive step P of k implies P of k plus one holds. Students also encounter assertion-reason questions evaluating whether a specific divisibility formula holds for all natural numbers or only for odd or even exponents.

How to practise it

Understand the foundational architecture of mathematical induction. A statement P of n is true for all natural numbers n greater than or equal to a base value n zero if two conditions hold: the base case P of n zero is true, and whenever P of k is assumed true for an arbitrary integer k, the truth of P of k plus one necessarily follows. In multiple-choice examinations, testing small integer values like n equals one, two, three, or four often immediately disproves false choices without needing full induction proofs.

For divisibility problems, recall that for any positive integers a and b with a greater than b, the expression a to the power n minus b to the power n is always divisible by a minus b for all natural n. If n is even, it is also divisible by a plus b; if n is odd, a to the power n plus b to the power n is divisible by a plus b. When asked for the largest integer dividing a polynomial expression for all natural n, evaluate the expression at n equals one, two, and three, and compute the greatest common divisor of those resulting values.

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Q1 AP EAPCET 2026 · 18 May · Shift 2 MCQ

$\forall\, n \in N,\ \dfrac{n(n+1)^2(n+2)}{12} >$

(A) $\dfrac{(n+2)^4}{12}$

(B) $\dfrac{n^4}{12}$

(C) $\dfrac{n^4}{2}$

(D) $\dfrac{(2n+1)n}{3}$

Answer: (B) $\dfrac{n^4}{12}$ · The council's preliminary key

Q2 TS EAPCET 2026 · 10 May · Shift 2 MCQ

Consider the following

Assertion (A) : $5^{2n} - 3^{2n-1}$ is divisible by 2 for all $n \in N$

Reason (R) : $5^{2n} + 3^{2n-1}$ is divisible by 7 for all $n \in N$

The correct answer is

(A) Both A and R are correct and R is the correct explanation of A

(B) Both A and R are correct and R is not correct explanation of A

(C) A is correct, but R is not correct

(D) A is not correct, but R is correct

Answer: (C) A is correct, but R is not correct · The council's preliminary key

Q3 TS EAPCET 2026 · 9 May · Shift 1 MCQ

If $\mathrm{S}(n) : 2n < n!,\ n \in \mathrm{N}$, then $\mathrm{S}(n+1)$ is true for all $n \geq$

(A) 1

(B) 2

(C) 3

(D) 4

Answer: (C) 3 · The council's preliminary key

Q4 AP EAPCET 2025 · 24 May · Shift 1 MCQ

For all $n \in N$, if $n(n^2+3)$ is divisible by k, then the maximum value of k is

(A) 4
(B) 6
(C) 8
(D) 2

Answer: (D) 2 · The council's preliminary key

Q5 AP EAPCET 2025 · 22 May · Shift 1 MCQ

For all $n \in N$, $\frac{3^n - 1}{2} \geq$

(A) $n^2\left(2^{n/2}\right)$
(B) $n^2\left(3^{\frac{n-1}{2}}\right)$
(C) $n^3\left(3^{\frac{n-1}{2}}\right)$
(D) $n\left(3^{\frac{n-1}{2}}\right)$

Answer: (D) $n\left(3^{\frac{n-1}{2}}\right)$ · The council's preliminary key

Q6 AP EAPCET 2024 · 20 May · Shift 2 MCQ

If $2.4^{2n+1} + 3^{3n+1}$ is divisible by k for all $n \in N$, then $k =$

(A) 209
(B) 11
(C) 8
(D) 3

Answer: (B) 11 · The council's preliminary key

Q7 AP EAPCET 2024 · 18 May · Shift 1 MCQ

For all positive integers 'n' if $3(5^{2n+1}) + 2^{3n+1}$ is divisible by k, then the number of prime numbers less than or equal to k is

(A) 17
(B) 6
(C) 7
(D) 8

Answer: (C) 7 · The council's preliminary key

Q8 TS EAPCET 2024 · 10 May · Shift 1 MCQ

Among the following four statements, the statement which is not true, for all $n \in N$ is

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(A) $(2n+7) < (n+3)^2$

(B) $1^2 + 2^2 + \ldots + n^2 > \frac{n^3}{3}$

(C) $3.5^{2n+1} + 2^{3n+1}$ is divisible by 23

(D) $2 + 7 + 12 + \ldots + (5n-3) = \frac{n(5n-1)}{2}$

Answer: (C) $3.5^{2n+1} + 2^{3n+1}$ **is divisible by 23** · The council's preliminary key

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Q9 AP EAPCET 2021 · 5 Oct · Shift 1 MCQ

Let $S(k) = 1 + 3 + 5 + \cdots + (2k-1) = 3 + k^2$. Then which of the following is true?

(A) $S(1)$ is correct

(B) $S(k) \Rightarrow S(k+1)$

(C) $S(k) \not\Rightarrow S(k+1)$

(D) PMI can be used to prove the formula

Answer: (B) $S(k) \Rightarrow S(k+1)$ · The council's preliminary key

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Q10 AP EAPCET 2021 · 25 Aug · Shift 1 MCQ

For all $n \in N$, $(n+24)(n+25)(n+26)(n+27)$ is divisible by

(A) 27

(B) 26

(C) 29

(D) 24

Answer: (D) 24 · The council's preliminary key

Q11 AP EAPCET 2021 · 24 Aug · Shift 1 MCQ

For what values of $m \in N$, the following divisibility $x + y / x^m + y^m$ holds?

(A) even numbers

(B) odd numbers

(C) all-natural numbers

(D) only when $m = 1$

Answer: (B) odd numbers · The council's preliminary key

Q12 AP EAPCET 2021 · 23 Aug · Shift 2 MCQ

If 'n' is a positive integer, then $2 \cdot 4^{2n+1} + 3^{3n+1}$ is divisible by

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(A) 2
(B) 9
(C) 11
(D) 27

Answer: (C) 11 · The council's preliminary key

Q13 AP EAPCET 2021 · 19 Aug · Shift 1 MCQ

$n \in N$ then the statement $8n + 16 \leq 2^n$ is true for

(A) $n = 2$
(B) $n = 3$
(C) $n = 6$
(D) $n = 5$

Answer: (C) $n = 6$ · The council's preliminary key

Q14 AP EAPCET 2021 · 19 Aug · Shift 2 MCQ

For what natural numbers $n \in N$, the inequality $2^n > n + 1$ is valid?

(A) $\forall n \in N$
(B) $\forall n \geq 2$
(C) $\forall 1 \leq n \leq 3$
(D) $\forall n \in N - \{2, 3\}$

Answer: (B) $\forall n \geq 2$ · The council's preliminary key

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Q15 TS EAMCET 2021 · 6 Aug · Shift 1 MCQ

For any $n \in \mathbb{N}$, $4^n + 15n - 1$ is divisible by

(A) 2
(B) 9
(C) 5
(D) 6

Answer: (B) 9 · The council's preliminary key

Q16 TS EAMCET 2021 · 6 Aug · Shift 2 MCQ

For all natural numbers n, $3\left(5^{2n+1}\right) + 2^{3n+1}$ is divisible by

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(A) 559
(B) 17
(C) 19
(D) 23

Answer: (B) 17 · The council's preliminary key

Q17 TS EAMCET 2021 · 4 Aug · Shift 2 MCQ

For all $n \in \mathbb{N}$, $2^{2n+1} + 3^{2n+1}$ is divisible by

(A) 7
(B) 5
(C) 11
(D) 8

Answer: (B) 5 · The council's preliminary key

Q18 AP EAMCET 2020 · 7 Oct · Shift 1 MCQ

If $k \in N$, then $3^{3k} - 26^k - 1$ is divisible by _____

(A) 676
(B) 8
(C) 64
(D) 26

Answer: (D) 26 · The council's preliminary key

Q19 AP EAMCET 2020 · 21 Sep · Shift 1 MCQ

Let $P(n)$: $1^2 + 2^2 + 3^2 + \cdots\cdots + n^2 = \frac{6(n-1)(n-2)\cdots\cdots(n-2020)+2n^3+3n^2+n}{6}$, for all $n \in N$. Then which of the following is correct?

(A) $P(n)$ is true for all $n \in N$
(B) $P(n)$ is true for all $n > 2020$
(C) $P(n)$ is true for all $n \leq 2020$
(D) $P(n)$ is not true for any $n \in N$

Answer: (C) $P(n)$ is true for all $n \leq 2020$ · The council's preliminary key

Q20 AP EAMCET 2020 · 21 Sep · Shift 2 MCQ

The sum of the cubes of three consecutive natural numbers is divisible by

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(A) 26
(B) 25
(C) 9
(D) 7

Answer: (C) 9 · The council's preliminary key

Q21 AP EAMCET 2020 · 17 Sep · Shift 1 MCQ

$\frac{k^5}{5}+\frac{k^3}{3}+\frac{7k}{15}$ is _____ if $k \in N$

(A) A natural number
(B) An integer
(C) A positive fraction
(D) Equal to zero

Answer: (A) A natural number · The council's preliminary key

Q22 AP EAMCET 2020 · 17 Sep · Shift 2 MCQ

Let $P(n): 2+2^2+2^3+\cdots+2^n=2^{n+1}$, $n \in N$. Then

(A) $P(m)$ is true $\Rightarrow P(m+1)$ is true
(B) $P(n)$ is true for all $n \in N$
(C) $P(n)$ is true for all $n \geq 20$
(D) $P(n)$ is true for all $n \leq 10$

Answer: (A) $P(m)$ **is true** $\Rightarrow P(m+1)$ **is true** · The council's preliminary key

Q23 TS EAMCET 2020 · 11 Sep · Shift 1 MCQ

n^5-5n^3+4n is divisible by 120 is true for

(A) all positive integers n
(B) all positive integers for $n \geq 3$ only
(C) all positive integers for $n \geq 1$ only
(D) all positive integers for $n \geq 5$ only

Answer: (A) all positive integers n · Official TGCHE final key

Q24 TS EAMCET 2019 · 3 May · Shift 2 MCQ

For all $n \in \mathbb{N}$, if $1^2+2^2+3^2+\cdots+n^2>x$, then $x=$

(A) $\frac{n^3}{3}$
(B) $\frac{n^3}{2}$
(C) n^3
(D) $\frac{n^4}{4}$

Answer: (A) $\frac{n^3}{3}$ · Official TGCHE final key

Q25 AP EAMCET 2019 · 23 Apr · Shift 1 MCQ

If $2 \cdot 4^{2k+1} + 3^{3k+1} = 11t$ and $2 \cdot 4^{2k+3} + 3^{3k+4} = 11(pt + 3^q)$, where $k, t \in Z^+$, then $(p, q) =$

(A) $(16, 3k+1)$
(B) $(16, 3k+4)$
(C) $(32, 3k+1)$
(D) $(32, 3k+4)$

Answer: (A) $(16, 3k+1)$ · Official APSCHE final key

Q26 AP EAMCET 2019 · 22 Apr · Shift 2 MCQ

The statement "$n^5 - 5n^3 + 4n$ is divisible by 120" is true for

(A) $n = 1$ only
(B) $n = 10$ only
(C) $n = 100$ only
(D) All positive integer values of n

Answer: (D) All positive integer values of n · Official APSCHE final key

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Q27 AP EAMCET 2019 · 21 Apr · Shift 2 MCQ

Which of the following is divisible by $x^2 - y^2$, $\forall x \neq y$?

(A) $x^n - y^n \; \forall n \in N$
(B) $x^n + y^n \; \forall n \in N$
(C) $(x^n - y^n)(x^{2n+1} + y^{2n+1}) \; \forall n \in N$
(D) $(x^n - y^n)(x^m + y^m) \; \forall m, n \in N$

Answer: (C) $(x^n - y^n)(x^{2n+1} + y^{2n+1}) \; \forall n \in N$ · Official APSCHE final key

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Q28 TS EAMCET 2018 · 5 May · Shift 2 MCQ

Let $n \in N$ which one of the following is true?

(A) $47^n + 16n - 1$ is divisible by 4

(B) $2\left(4^{2n+1}\right) - 3^{3n+1}$ is divisible by 9

(C) $4^n - 3n - 1$ is divisible by 11

(D) $3\left(5^{2n+1}\right) + 2^{3n+1}$ is divisible by 17

Answer: (D) $3\left(5^{2n+1}\right) + 2^{3n+1}$ **is divisible by 17** · The council's preliminary key

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Q29 TS EAMCET 2018 · 4 May · Shift 2 MCQ

$x^n + y^n$ is divisible by

(A) $x - y$ for all $n \in N$

(B) $x + y$ for all $n \in N$

(C) $x + y$ for all $n = 2m - 1,\ m \in N$

(D) $x + y$ for all $n = 2m,\ m \in N$

Answer: (C) $x + y$ **for all** $n = 2m - 1,\ m \in N$ · The council's preliminary key

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Q30 AP EAMCET 2018 · 23 Apr · Shift 2 MCQ

If $2\left(4^{2n+1}\right) + 3^{3n+1}$ is divisible by k, $k > 1$ for all $n \in \mathbb{N}$ then the value of k is

(A) 19

(B) 17

(C) 11

(D) 13

Answer: (C) 11 · The council's preliminary key

Q31 AP EAMCET 2018 · 22 Apr · Shift 1 MCQ

For any natural number n, $(15 \times 5^{2n}) + (2 \times 2^{3n})$ is divisible by

(A) 7

(B) 11

(C) 13

(D) 17

Answer: (D) 17 · The council's preliminary key

Q32 AP EAMCET 2017 · 25 Apr · Shift 2 MCQ

The least positive integer greater than 1 that divides $49^n + 16n - 1$ for all positive integers n is

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(A) 64
(B) 49
(C) 7
(D) 2

Answer: (D) 2 · The council's preliminary key

Q33 AP EAMCET 2017 · 24 Apr · Shift 2 MCQ

For all $n \in N$, $1 + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \cdots + \frac{1}{\sqrt{n}}$ is

(A) $> n$
(B) $< \sqrt{n}$
(C) $\leq \sqrt{n}$
(D) $\geq \sqrt{n}$

Answer: (D) $\geq \sqrt{n}$ · The council's preliminary key

Q34 AP EAMCET 2011 · 8 May · Offline MCQ

If a, b and n are natural numbers then $a^{2n-1} + b^{2n-1}$ is divisible by :

(A) $a + b$
(B) $a - b$
(C) $a^3 + b^3$
(D) $a^2 + b^2$

Answer: (A) $a + b$ · The council's preliminary key

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