

APPLIED MATHEMATICS (241)

Class XII | Sample / Practice Question Paper

Unit: 1 — Numbers, Quantification & Numerical Applications

Time Allowed: 1½ Hours

Maximum Marks: 40

UNIT – 1 | NUMBERS, QUANTIFICATION AND NUMERICAL APPLICATIONS

- 1 This question paper has 4 Sections: A, B, C and D.
- 2 Section A: 15 MCQs × 1 mark each. Section B: 5 Assertion–Reasoning questions × 1 mark each.
- 3 Section C: 5 Short Answer questions × 2 marks each.
- 4 Section D: 3 Long Answer questions — Q26 (3 marks), Q27 (3 marks), Q28 (4 marks). Internal choice in Q26.
- 5 Questions marked ★ PYQ are from previous CBSE Board / Sample papers.
- 6 Use of calculator is not permitted. All working must be shown.

SECTION A**Multiple Choice Questions**15 × 1 = 15
marks

1. The value of $17 \pmod{5}$ is: ★ PYQ [Modulo Arithmetic] [1]

(a) 1	(b) 2
(c) 3	(d) 4
2. Which of the following congruence relations is correct? ★ PYQ [Congruence] [1]

(a) $38 \equiv 3 \pmod{6}$	(b) $25 \equiv 4 \pmod{7}$
(c) $41 \equiv 4 \pmod{8}$	(d) $33 \equiv 6 \pmod{9}$
3. The decimal number $(13)_{10}$ in binary is: ★ PYQ [Binary Numbers] [1]

(a) 1011	(b) 1101
(c) 1110	(d) 1001
4. A pipe fills a tank in 12 hours and another empties it in 18 hours. Both are opened simultaneously. The tank is filled in: ★ PYQ [Pipes & Cisterns] [1]

(a) 24 hours	(b) 30 hours
(c) 36 hours	(d) 6 hours
5. A boat travels 36 km downstream in 2 hours and 24 km upstream in 3 hours. The speed of the stream is: ★ PYQ [Boats & Streams] [1]

(a) 2 km/h	(b) 3 km/h
(c) 4 km/h	(d) 5 km/h

6. The binary addition $1011 + 1101$ equals: ★ PYQ [Binary Numbers] [1]
- (a) 11000 (b) 11001
(c) 10110 (d) 11010
7. Tea at ₹60/kg is mixed with tea at ₹90/kg to get a mixture at ₹70/kg. The ratio is: ★ PYQ [1]
- [Allegation & Mixture]
- (a) 1 : 2 (b) 2 : 1
(c) 2 : 3 (d) 3 : 1
8. A and B together complete a work in 12 days. A alone takes 20 days. Days for B alone: ★ PYQ [1]
- [Work & Time]
- (a) 25 days (b) 28 days
(c) 30 days (d) 32 days
9. A invests ₹5,000 for 6 months; B invests ₹4,000 for 9 months. Their profit ratio is: [Partnership] [1]
- (a) 5 : 6 (b) 5 : 4
(c) 6 : 5 (d) 4 : 5
10. $(1010)_2 - (0110)_2$ in binary equals: ★ PYQ [Binary Numbers] [1]
- (a) 0100 (b) 0011
(c) 1000 (d) 0101
11. In a 1000 m race, A beats B by 100 m. In an 800 m race, B beats C by 100 m. A beats C in a 1000 m race by: [Races & Games] [1]
- (a) 175.5 m (b) 187.5 m
(c) 212.5 m (d) 200 m
12. The value of x satisfying $3x \equiv 2 \pmod{5}$ is: ★ PYQ [Congruence] [1]
- (a) $x = 1$ (b) $x = 2$
(c) $x = 3$ (d) $x = 4$
13. Two types of milk — 25% pure and 50% pure — are mixed to get 40% pure milk. The ratio is: ★ PYQ [Allegation & Mixture] [1]
- (a) 1 : 3 (b) 2 : 3
(c) 3 : 2 (d) 2 : 1
14. The last digit of 7^{48} is: ★ PYQ [Modulo Arithmetic] [1]
- (a) 1 (b) 3
(c) 7 (d) 9
15. Two numbers are in ratio 3:5. If 9 is subtracted from each, the ratio becomes 12:23. The numbers are: [Quantification] [1]
- (a) 33 and 55 (b) 36 and 60
(c) 15 and 25 (d) 27 and 45

Directions: Each question contains Assertion (**A**) and Reason (**R**). Choose the correct option:

(a) Both A and R are true, and R is the correct explanation of A.

(b) Both A and R are true, but R is NOT the correct explanation of A.

(c) A is true but R is false. (d) A is false but R is true.

16. Read the following and choose the correct option:

A	The remainder when 100 is divided by 7 is 2. ★ PYQ
R	For any integer a and positive integer m , $a \bmod m$ is the remainder when a is divided by m .

- (a) Both A and R are true; R is the correct explanation of A.
(b) Both A and R are true; R is NOT the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

[1]

17. Read the following and choose the correct option:

A	The binary representation of decimal 10 is $(1010)_2$. ★ PYQ
R	In binary, each digit represents a power of 2, starting from 2^0 at the rightmost position.

- (a) Both A and R are true; R is the correct explanation of A.
(b) Both A and R are true; R is NOT the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

[1]

18. Read the following and choose the correct option:

A	If pipe P fills a tank in 10 hours and pipe Q empties it in 10 hours, the tank will never be filled when both are opened simultaneously.
R	When the rate of filling equals the rate of emptying, the net rate is zero.

- (a) Both A and R are true; R is the correct explanation of A.
(b) Both A and R are true; R is NOT the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

[1]

19. Read the following and choose the correct option:

A	If $a \equiv b \pmod{m}$, then m divides $(a - b)$. ★ PYQ
R	$a \equiv b \pmod{m}$ means a and b have the same remainder when divided by m .

- (a) Both A and R are true; R is the correct explanation of A.
(b) Both A and R are true; R is NOT the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

[1]

20. Read the following and choose the correct option:

A	The rule of allegation can only be used when two substances of different prices are mixed to obtain a mixture at a mean price.
R	Rule of allegation gives the inverse ratio of the differences of individual values from the mean value.

- (a) Both A and R are true; R is the correct explanation of A.
- (b) Both A and R are true; R is NOT the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

[1]

SECTION C	Short Answer Questions	5 × 2 = 10 marks
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21. Convert $(101101)_2$ to decimal. Also convert $(47)_{10}$ to binary. ★ PYQ [2]

22. Find the smallest positive integer x such that $x \equiv 3 \pmod{4}$ and $x \equiv 1 \pmod{3}$. ★ PYQ [2]

Hint: List values of x satisfying each condition and find the common smallest value.

23. A vessel contains 60 litres of milk mixed with water in ratio 4 : 1. How many litres of water must be added to make the ratio 4 : 3? ★ PYQ [2]

24. A can run 100 m in 20 seconds and B takes 25 seconds. By how many metres does A beat B in a 100 m race? State who wins and by what time gap. [2]

25. Verify that $2^{20} \equiv 1 \pmod{3}$ using modular arithmetic. Hence find $2^{20} \pmod{3}$. ★ PYQ [2]

Hint: $2 \equiv -1 \pmod{3}$, so $2^2 \equiv (-1)^2 \pmod{3} = ?$

SECTION D

Long Answer Questions

3 + 3 + 4 =
10 marks

26. Three pipes A, B, and C can fill a cistern in 6 hours, 8 hours, and 12 hours respectively. ★ [3]

PYQ

- (i) Find the time to fill the cistern when all three pipes are open and C acts as a filling pipe.
- (ii) If C acts as an outlet (emptying) pipe with rate $1/10$ per hour, and A and B are open, find the time to fill.
- (iii) If only A (filling) and C (outlet at $1/10$ per hour) are open, will the tank ever be filled? Justify with net rate.

— OR —

26(b). A and B start a business investing ₹45,000 and ₹54,000 respectively. After 4 months, C joins with ₹90,000. At year-end total profit is ₹16,500. [3]

- (i) Find the profit-sharing ratio of A, B and C.
- (ii) Calculate the share of each partner.
- (iii) If B withdraws ₹9,000 after 6 months (from start), recompute B's effective capital-months and his revised share.

27. A motorboat travels at 15 km/h in still water. It goes 30 km upstream and returns to the start in a total of $4\frac{1}{2}$ hours. ★ PYQ [3]

Hint: $\text{Time} = \text{distance}/\text{speed}$. $\text{Upstream speed} = (15 - x) \text{ km/h}$; $\text{Downstream speed} = (15 + x) \text{ km/h}$.

(i) Let speed of stream = x km/h. Form the equation for total time.

(ii) Solve the equation to find x (speed of the stream).

(iii) Find the time taken for the upstream journey alone.

28. Answer both parts: ★ PYQ [4]

(a) [2 marks] Perform binary multiplication: 1101×101 . Verify the result by converting both numbers and the product to decimal.

(b) [2 marks] A grocer has two varieties of rice — ₹32/kg and ₹40/kg. In what ratio should they be mixed so that by selling the mixture at ₹42/kg, a profit of 20% is earned?

Chapters: National Income and Related Aggregates, Money and Banking

Section A: Very Short Answer Questions

1. Define National Income.
2. What is GDP?
3. What is Net National Product?
4. Define Money Supply.
5. What is a Commercial Bank?

Section B: Short Answer Questions

1. Explain the difference between GDP and GNP.
2. What are the components of National Income?
3. Explain functions of money.
4. What is credit creation by banks?
5. Define Central Bank and its functions.

Section C: Long Answer Questions

1. Explain the methods of measuring National Income.
2. Describe the role of RBI in controlling credit.
3. Explain quantitative and qualitative tools of monetary policy.

Section D: Numerical Questions

1. Calculate GDP:

Consumption = 500, Investment = 200, Government Expenditure = 150, Net Exports = 50.

2. Calculate National Income using Income Method:

Wages = 400, Rent = 100, Interest = 80, Profit = 120.

3. Calculate NNP at factor cost:

GDP at MP = 1000, Depreciation = 100, Net Indirect Taxes = 50.

4. Calculate Money Multiplier:

Reserve Ratio = 0.2

5. Calculate Credit Creation:

Initial Deposit = 1000, Reserve Ratio = 10%

Instructions:

- Write neatly in a separate notebook.
- Show all steps in numerical questions.
- Use diagrams wherever required.
- Submit after vacation.

PM SHRI KENDRIYA VIDYALAYA SEONI
HOLIDAY HOMEWORK
SUMMER VACATION
CLASS - XII B
CAREER GUIDANCE

Class 12 Commerce Stream – Holiday Homework
Theme: Business, Finance & Entrepreneurship

Tasks:

1. Research **ANY THREE** careers such as: CA, Investment Banker, Entrepreneur, HR Manager, Financial Analyst, Digital Marketer, Economist, Business Consultant, Event Manager, Company Secretary.

Include:

- Qualification pathway
- Skills required
- Salary
- Work pressure
- Future opportunities

2. Observe a local business/shop/startup and write about:

- Marketing strategies
- Customer handling
- Technology used
- Strengths and weaknesses

3. Create your own business idea including:

- Business name
- Logo
- Target audience
- Budget
- Marketing strategy

4. Reflection Writing: “Would I rather work in a job or start my own business? Why?”

Instructions:

- Submit in a neat file/folder.
- Use charts, pictures, diagrams, or Canva designs if possible.
- Creativity and originality will be appreciated.

Submission Date: 17/06/2026

This hand-written English Summer Holiday Homework for Class 12th from PM Shri Kendriya Vidyalaya Seoni consists of seven tasks.

Here is a breakdown of the requirements:

Homework Tasks

- 1. Reading Comprehension:** Solve **two passages** (provide answers only).
- 2. Case-Based Analysis:** Solve **two case-based passages** (provide answers only).
- 3. Writing Skills (Notice):** Draft **one notice** (provide answer only).
- 4. Article Writing:** Write an article on **"Global Warming"** (Word count: 120 –150 words).

3. **Writing Skills (Notice):** Draft **one notice** (provide answer only).
4. **Article Writing:** Write an article on "**Global Warming**" (Word count: 120 –150 words).
5. **Vocabulary:** Write down the **word meanings** for the chapters in your textbooks, *Flamingo* and *Vistas*.
6. **Literary Review:** Complete **one book review** (Word count: approx. 200 words).
7. **Grammar Review:** Study and read the rules for the following topics:
 1. Tenses
 2. Determiners
 3. Subject-Verb Agreement
 4. Modals
 5. Prepositions and Conjunctions