

MH CET LAW Basic Mathematics

Sample Paper – 5

Duration: 8 Minutes | Maximum Marks: 8

Instructions

- This paper contains **8 Multiple Choice Questions** modelled on the Basic Mathematics section of MH CET LAW (5-Year LLB).
- Questions are based on Class 10 level arithmetic: Number System, Percentages, Ratio & Proportion, Profit & Loss, Simple & Compound Interest, Time & Work, Speed & Distance.
- Each correct answer carries +1 **mark**. There is **no negative marking** for incorrect or unattempted answers.
- Only **one option** is correct per question.
- Use of calculators, mobile phones, or electronic gadgets is **strictly prohibited**.

Questions

Q1. How many factors does the number 120 have?

- A. 12
- B. 16
- C. 18
- D. 20

Q2. Ravi's monthly income is Rs. 25,000 and his monthly savings are Rs. 5,000. His income increases by 20% and his expenditure increases by 10%. What are his new monthly savings?

- A. Rs. 6,000
- B. Rs. 7,000
- C. Rs. 8,000
- D. Rs. 9,000



- Q3.** An article is sold for Rs. 1,170 at a profit of 30%. Find its cost price.
- A. Rs. 800
 - B. Rs. 850
 - C. Rs. 870
 - D. Rs. 900
- Q4.** Priya invests Rs. 4,000 at 5% per annum and Rs. 6,000 at 8% per annum, both under simple interest for 3 years. What is the total interest she earns?
- A. Rs. 2,040
 - B. Rs. 1,800
 - C. Rs. 2,100
 - D. Rs. 2,200
- Q5.** The present ages of A and B are in the ratio 4 : 5. After 6 years their ages will be in the ratio 6 : 7. Find A's present age.
- A. 10 years
 - B. 12 years
 - C. 15 years
 - D. 16 years
- Q6.** A can finish a piece of work in 20 days, B in 30 days, and C in 60 days. If all three work together, in how many days will the work be completed?
- A. 8 days
 - B. 9 days
 - C. 10 days
 - D. 12 days



Q7. Two trains of lengths 150 m and 100 m are moving in *opposite* directions at speeds of 60 km/h and 40 km/h respectively. How long will they take to completely cross each other?

- A. 6 seconds
- B. 7.5 seconds
- C. 8 seconds
- D. 9 seconds

Q8. Find the compound interest on Rs. 10,000 at 10% per annum for 3 years, compounded annually.

- A. Rs. 3,310
- B. Rs. 3,000
- C. Rs. 3,200
- D. Rs. 3,600



Detailed Solutions**Solution to Q1***Number System / Factors & Divisibility***Solution**

Concept: The number of factors of $n = p_1^{a_1} \times p_2^{a_2} \times \cdots \times p_k^{a_k}$ is $(a_1 + 1)(a_2 + 1) \cdots (a_k + 1)$.

Step 1 — Prime factorise 120.

$$120 = 2^3 \times 3^1 \times 5^1$$

Step 2 — Count the factors.

$$\text{Number of factors} = (3 + 1)(1 + 1)(1 + 1) = 4 \times 2 \times 2 = \mathbf{16}$$

Verification: The 16 factors of 120 are: 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, 120.

Why the other options are wrong:

- **A – 12:** A common error from using $(3 + 1)(1 + 1)(1) = 8$ or miscounting manually.
- **C – 18:** Arises from treating the exponent of 2 as 4 instead of 3, giving $(4 + 1)(1 + 1)(1 + 1) = 20$, or from a different miscalculation.
- **D – 20:** Results from writing $120 = 2^4 \times 3 \times 5$ (incorrect factorisation) giving $(4 + 1)(1 + 1)(1 + 1) = 20$.

Answer: (B) 16

Answer: (B) [Go Back to Q1](#)

Solution to Q2*Percentage / Income & Expenditure***Solution**

Concept: Savings = Income – Expenditure. Find new income and new expenditure separately, then subtract.

Step 1 — Identify the original figures.

$$\text{Income} = \text{Rs. } 25,000; \quad \text{Savings} = \text{Rs. } 5,000; \quad \text{Expenditure} = 25000 - 5000 = \text{Rs. } 20,000$$

Step 2 — Compute new income and new expenditure.

$$\text{New Income} = 25000 \times 1.20 = \text{Rs. } 30,000$$



$$\text{New Expenditure} = 20000 \times 1.10 = \text{Rs. } 22,000$$

Step 3 — Find new savings.

$$\text{New Savings} = 30000 - 22000 = \text{Rs. } 8,000$$

Why the other options are wrong:

- **A – Rs. 6,000:** Applies only a 20% rise to existing savings ($5000 \times 1.20 = 6000$), ignoring the expenditure increase.
- **B – Rs. 7,000:** A midpoint guess between Rs. 6,000 and Rs. 8,000; does not correspond to any correct calculation.
- **D – Rs. 9,000:** Incorrectly applies the 20% income rise without increasing expenditure at all ($30000 - 21000 \neq 9000$).

Answer: (C) Rs. 8,000

Answer: (C) [Go Back to Q2](#)

Solution to Q3

Profit & Loss / Finding Cost Price

Solution

Concept: $SP = CP \times \left(1 + \frac{\text{Profit}\%}{100}\right)$, so $CP = \frac{SP}{1 + \frac{\text{Profit}\%}{100}}$.

Step 1 — Apply the formula.

$$CP = \frac{1170}{1 + \frac{30}{100}} = \frac{1170}{1.30}$$

Step 2 — Calculate.

$$CP = \frac{1170}{1.30} = \frac{11700}{13} = \text{Rs. } 900$$

Check: Profit = $900 \times 0.30 = 270$; SP = $900 + 270 = 1170$. ✓

Why the other options are wrong:

- **A – Rs. 800:** Arises from subtracting 30% of SP directly: $1170 \times 0.70 = 819 \approx 800$; incorrect method.
- **B – Rs. 850:** No standard calculation with SP = 1170 and profit = 30% yields 850.
- **C – Rs. 870:** Results from computing $1170 - 300 = 870$; subtracts a flat Rs. 300 rather than working back from the percentage.



Answer: (D) Rs. 900**Answer: (D)** [Go Back to Q3](#)**Solution to Q4***Simple Interest / Two Investments***Solution**

Concept: Simple Interest = $\frac{P \times R \times T}{100}$. For multiple investments, compute SI for each and add.

Step 1 — SI on the first investment.

$$SI_1 = \frac{4000 \times 5 \times 3}{100} = \frac{60000}{100} = \text{Rs. } 600$$

Step 2 — SI on the second investment.

$$SI_2 = \frac{6000 \times 8 \times 3}{100} = \frac{144000}{100} = \text{Rs. } 1,440$$

Step 3 — Total interest.

$$\text{Total SI} = 600 + 1440 = \text{Rs. } 2,040$$

Why the other options are wrong:

- **B – Rs. 1,800:** Uses a blended rate of 6.5% on Rs. 10,000 for 3 years: $\frac{10000 \times 6.5 \times 3}{100} = 1950 \neq 1800$; other errors yield 1800.
- **C – Rs. 2,100:** A rounding error or use of $T = 3.5$ years instead of 3.
- **D – Rs. 2,200:** Incorrectly adds an extra year's interest on one of the investments.

Answer: (A) Rs. 2,040**Answer: (A)** [Go Back to Q4](#)**Solution to Q5***Ratio & Proportion / Ages***Solution**

Concept: Express ages as multiples of a variable x using the given ratio, then set up an equation with the future ratio.

Step 1 — Let the present ages be $4x$ and $5x$.



After 6 years the ages will be $(4x + 6)$ and $(5x + 6)$, and their ratio is 6 : 7:

$$\frac{4x + 6}{5x + 6} = \frac{6}{7}$$

Step 2 — Solve for x .

$$7(4x + 6) = 6(5x + 6) \implies 28x + 42 = 30x + 36 \implies 2x = 6 \implies x = 3$$

Step 3 — Find A's present age.

$$A = 4x = 4 \times 3 = 12 \text{ years}$$

Check: $B = 5 \times 3 = 15$. After 6 years: $A = 18$, $B = 21$, ratio = $18 : 21 = 6 : 7$. ✓

Why the other options are wrong:

- **A – 10 years:** Would require $x = 2.5$, giving future ratio $16 : 18.5 = 32 : 37 \neq 6 : 7$.
- **C – 15 years:** This is B's present age, not A's.
- **D – 16 years:** Would require $x = 4$, giving future ratio $22 : 26 = 11 : 13 \neq 6 : 7$.

Answer: (B) 12 years

Answer: (B) [Go Back to Q5](#)

Solution to Q6

Time & Work / Three Workers

Solution

Concept: The combined work rate of several workers is the sum of their individual rates.

$$\text{Days to finish} = \frac{1}{\text{combined rate}}.$$

Step 1 — Find each worker's daily rate.

$$A's \text{ rate} = \frac{1}{20}, \quad B's \text{ rate} = \frac{1}{30}, \quad C's \text{ rate} = \frac{1}{60}$$

Step 2 — Add the rates (LCM of 20, 30, 60 is 60).

$$\text{Combined rate} = \frac{3}{60} + \frac{2}{60} + \frac{1}{60} = \frac{6}{60} = \frac{1}{10}$$



Step 3 — Find the number of days.

$$\text{Days} = \frac{1}{\frac{1}{10}} = 10 \text{ days}$$

Why the other options are wrong:

- **A – 8 days:** Would require a combined rate of $\frac{1}{8}$; the actual rate $\frac{1}{10} < \frac{1}{8}$.
- **B – 9 days:** A common error from using only A and B together ($\frac{1}{20} + \frac{1}{30} = \frac{5}{60} = \frac{1}{12}$; not 9 days either); C's contribution is ignored.
- **D – 12 days:** The result when only A and B work together ($\frac{1}{20} + \frac{1}{30} = \frac{5}{60}$; days = 12); forgets to include C.

Answer: (C) 10 days

Answer: (C) [Go Back to Q6](#)

Solution to Q7

Speed & Distance / Trains Moving in Opposite Directions

Solution

Concept: When two trains move in *opposite* directions, their relative speed is the *sum* of their individual speeds. The total distance to cover equals the sum of their lengths.

Step 1 — Find the relative speed.

$$\text{Relative speed} = 60 + 40 = 100 \text{ km/h}$$

Convert to m/s:

$$100 \text{ km/h} = 100 \times \frac{1000}{3600} = \frac{250}{9} \text{ m/s}$$

Step 2 — Find total distance to be covered.

$$d = 150 + 100 = 250 \text{ m}$$

Step 3 — Calculate time.

$$t = \frac{d}{\text{relative speed}} = \frac{250}{\frac{250}{9}} = 250 \times \frac{9}{250} = 9 \text{ seconds}$$

Why the other options are wrong:

- **A – 6 sec:** Uses only one train's length (150 m) as the distance: $150 \div \frac{250}{9} = 5.4 \approx 6$;



incorrect.

- **B – 7.5 sec:** Uses relative speed as the difference ($60 - 40 = 20$ km/h) while incorrectly halving the distance; not a valid calculation here.
- **C – 8 sec:** Uses only the second train's length (100 m): $100 \div \frac{250}{9} = 3.6$; plainly incorrect.

Answer: (D) 9 seconds

Answer: (D) [Go Back to Q7](#)

Solution to Q8

Compound Interest / 3 Years Compounded Annually

Solution

Concept: Compound Interest formula: $A = P \left(1 + \frac{R}{100} \right)^n$; $CI = A - P$.

Step 1 — Calculate the amount after 3 years.

$$A = 10000 \times \left(1 + \frac{10}{100} \right)^3 = 10000 \times (1.1)^3$$

$$(1.1)^3 = 1.1 \times 1.1 \times 1.1 = 1.21 \times 1.1 = 1.331$$

$$A = 10000 \times 1.331 = \text{Rs. } 13,310$$

Step 2 — Calculate Compound Interest.

$$CI = A - P = 13310 - 10000 = \text{Rs. } 3,310$$

Note: Simple Interest for 3 years would be $\frac{10000 \times 10 \times 3}{100} = \text{Rs. } 3,000$. The extra Rs. 310 is interest earned on previously accumulated interest.

Why the other options are wrong:

- **B – Rs. 3,000:** This is the Simple Interest (not compound) for 3 years; it ignores the compounding effect.
- **C – Rs. 3,200:** A partial compounding error; perhaps only two years of compounding are applied and one year of simple interest is added.
- **D – Rs. 3,600:** Applies 10% of the original principal for each of three years and adds a guessed extra, or mis-computes $(1.1)^3 = 1.36$; neither is correct.

Answer: (A) Rs. 3,310



Answer: (A) [Go Back to Q8](#)

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	C	3	D	4	A	5	B
6	C	7	D	8	A				

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