CUET Mathematics Test - Set 24

Unit I: Numbers and Numerical Applications (Intermediate)

SOLUTIONS

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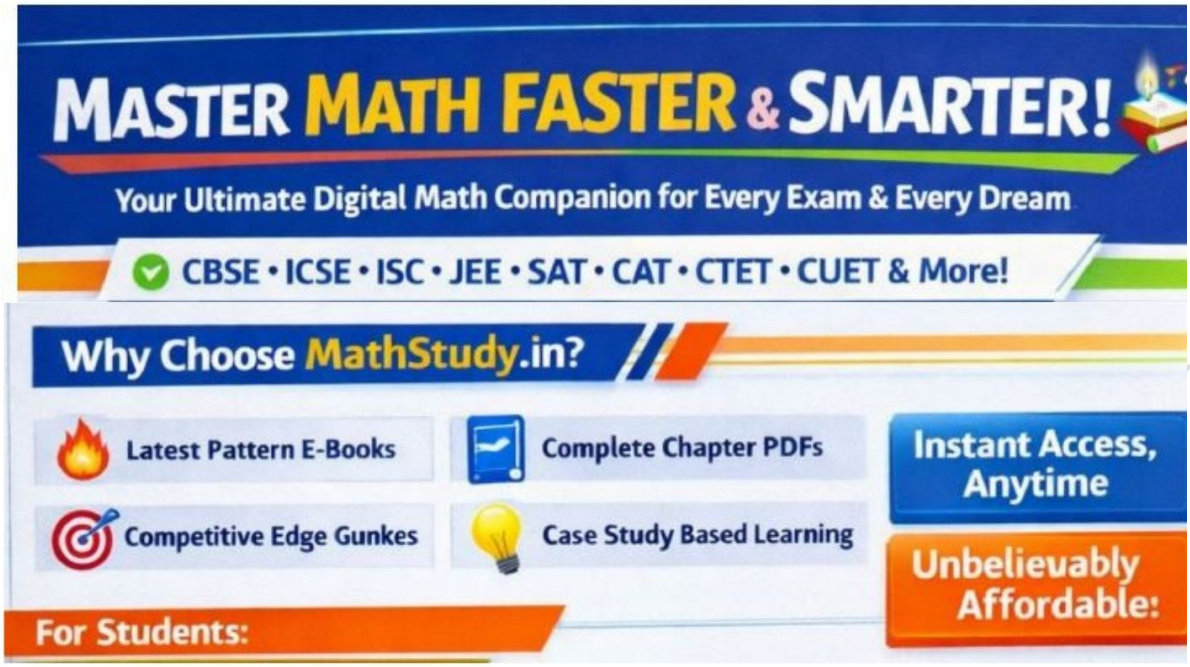

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Solutions

1. **Solution:** $5x \equiv 4 \equiv 15 \pmod{11}$. Dividing by 5 (as $\gcd(5, 11) = 1$), $x \equiv 3 \pmod{11}$. **Correct Option: (A)**

2. **Solution:** Alcohol $= 4k$, Water $= 3k$. $4k/(3k + 5) = 4/5 \implies 20k = 12k + 20 \implies 8k = 20 \implies k = 2.5$. Alcohol $= 4(2.5) = 10$. **Correct Option: (A)**

3. **Solution:** $v = 9, s = 3$. Down speed $= 12$, Up speed $= 6$. $d/6 - d/12 = 3 \implies (2d - d)/12 = 3 \implies d = 36$ km. **Correct Option: (C)**

4. **Solution:** In 2 hours, A, B, C fill $2/6 = 1/3$. Remaining $2/3$ filled by A and B in 7 hours. A and B's 1 hour work $= (2/3)/7 = 2/21$. C's 1 hour work $= 1/6 - 2/21 = (7 - 4)/42 = 3/42 = 1/14$. C fills in 14 hours. **Correct Option: (C)**

5. **Solution:** A's distance $= 500 - 140 = 360$m. When B runs 4m, A runs 3m. When A runs 360m, B runs $(4/3) \times 360 = 480$m. A reaches the finish line when B is at 480m. A wins by $500 - 480 = 20$m. **Correct Option: (B)**

6. **Solution:** $n \equiv 3 \implies n^2 \equiv 9 \equiv 2 \pmod{7}$. $2n \equiv 6 \pmod{7}$. $n^2 + 2n \equiv 2 + 6 = 8 \equiv 1 \pmod{7}$. **Correct Option: (A)**

7. **Solution:** Net rate $= 1/10 + 1/12 - 1/20 = (6 + 5 - 3)/60 = 8/60 = 2/15$. Time $= 15/2 = 7.5$ hours. **Correct Option: (A)**

8. **Solution:** Let total be x. Salt $= 0.05x$. After evaporation: $0.05x/(x - 20) = 0.15 \implies 0.05x = 0.15x - 3 \implies 0.1x = 3 \implies x = 30$. **Correct Option: (A)**

9. **Solution:** Let $1/u = x, 1/d = y$. $24x + 28y = 6$ and $30x + 21y = 6.5$. Solving gives $x = 1/10$ (Up $= 10$) and $y = 1/14$ (Down $= 14$). Speed in still water $= (14 + 10)/2 = 12$ km/h. **Correct Option: (C)**

10. **Solution:** $A : B = 1000 : 900$, $A : C = 1000 : 810$. $B : C = (B/A) \times (A/C) = (900/1000) \times (1000/810) = 900/810 = 1000/900$. B gives C $1000 - 900 = 100$ points. **Correct Option: (B)**

11. **Solution:** Any power of 5 (exponent ≥ 2) ends in 25. **Correct Option: (B)**

12. **Solution:** Final milk $= 40(1 - 4/40)^3 = 40(0.9)^3 = 40 \times 0.729 = 29.16$. **Correct Option: (D)**

13. **Solution:** In 7 mins, A and B fill $7(1/36 + 1/45) = 7(9/180) = 7/20$. Remaining $= 13/20$. Net rate with C $= 1/36 + 1/45 - 1/30 = (5 + 4 - 6)/180 = 3/180 = 1/60$. Time for remaining $= (13/20) \times 60 = 39$ mins. Total time $= 39 + 7 = 46$ mins. **Correct Option: (D)**

14. **Solution:** $2x - 6 < 5x + 9 \implies -15 < 3x \implies x > -5$. Since x is a positive integer, any $x \in \{1, 2, 3, \dots\}$ works. **Correct Option: (C)**

15. **Solution:** $3^1 \equiv 3, 3^2 \equiv 4, 3^3 \equiv 2, 3^4 \equiv 1 \pmod{5}$. $3^{21} = (3^4)^5 \times 3^1 \equiv 1^5 \times 3 \equiv 3 \pmod{5}$. **Correct Option: (C)**