MENTAL ABILITY SOLUTION

1. If 48 men working 7 hours a day can do a work in 24 days, then in how many days will 28 men working 8 hours a day can complete the same work?

   A. 36 days   B. 24 days   C. 12 days   D. 48 days

   Explanation:
   
   \[ \frac{M_1D_1H_1}{M_2D_2H_2} = \frac{48 \times 7 \times 24}{28 \times 8} = 36 \text{ days} \]

2. A is thrice as fast as B. If B can do a piece of work in 24 days, then find the number of days they will take to complete the work together.

   A. 2 days   B. 3 days   C. 4 days   D. 6 days

   Explanation:
   
   \[
   \begin{align*}
   \text{A} & : \text{B} \\
   \text{Work Efficiency} & : 3 : 1 \\
   \text{Time} & : 1 : 3 \\
   \text{A} & = 24 \times \frac{1}{3} = 8 \text{ days} \\
   \text{Work together} & = \frac{8 \times 24}{32} = 6 \text{ days}
   \end{align*}
   \]
3. P and Q can do a piece of work in 12 days and 15 days respectively. P started the work alone and then, after 3 days Q joined him till the work was completed. How long did the work last?

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A. 12 days
B. 8 days
C. 14 days
D. 6 days

Explanation:

P work for 3 days = \[\frac{3}{12} = \frac{1}{4}\]

Remaining work = \[\frac{3}{4}\] part completed by P & Q.

\[\frac{3}{4} \times \left(\frac{12 \times 15}{12 + 15}\right) = \frac{3}{4} \times \frac{12 \times 15}{27} = 5 \text{ days}\]

Total work completed in 5 + 3 = 8 days.

4. A camp had provisions for 490 soldiers for 65 days. After 15 days, more soldiers arrived and the remaining provisions lasted for 35 days. How many soldiers joined the camp?

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A. 700
B. 210
C. 200
d. 500

Explanation:

\[M_1 \times D_1 = M_2 \times D_2\]

\[490 \times (65 - 15) = (490 + x) \times 35\]
\[490 \times 50 = (490 + x) \times 35\]
\[490 + x = 700\]
\[x = 210\text{ Men}\]

5. 2 men and 7 boys can do a piece of work in 14 days, 3 men and 8 boys can do the same in 11 days. 8 men and 6 boys can do 3 times the amount of this work in

A. 21 days
B. 18 days
C. 24 days
D. 36 days

Explanation:

\[(2 \times 14) \text{ men} + (7 \times 14) \text{ boys} = (3 \times 11) \text{ men} + (8 \times 11) \text{ boys} \]
\[ 5 \text{ men} = 10 \text{ boys} \quad \Rightarrow \quad 1 \text{ man} = 2 \text{ boys} \]

Therefore, Eqn (1) \[ (2 \text{ men} + 7 \text{ boys}) = (2 \times 2 + 7) \text{ boys} = 11 \text{ boys in 14 days} \]

Required \[ (8 \text{ men} + 6 \text{ boys}) = (8 \times 2 + 6) \text{ boys} = 22 \text{ boys completed in ? days.} \]

\[ \therefore \frac{11 \times 14}{22} = 7 \text{ days} \]

3 Times of work \[ \Rightarrow 7 \times 3 = 21 \text{ days} \]

6. P alone can do \( \frac{1}{2} \) of a work in 6 days and Q alone can do \( \frac{2}{3} \) of the same work in 4 days. In how many days working together, will they finish \( \frac{3}{4} \) of the work?

A. 2 days \quad B. 8 days \quad C. 4 days \quad D. 3 days

P \quad \text{can complete in } \frac{1}{2} \text{ work in 6 days, } Q \quad \text{can complete } \frac{2}{3} \text{ work in 4 days.} \quad \text{Their together work is } \frac{3}{4} \text{ of the work.}\]

A. 2 \quad B. 8 \quad C. 4 \quad D. 3

Explanation:

\[ P \times \frac{1}{2} = 6 \quad \Rightarrow \quad P = 12 \text{ days} \]

\[ Q \times \frac{2}{3} = 4 \quad \Rightarrow \quad Q = 6 \text{ days} \]

\[ \frac{\frac{3}{4}}{\frac{12 \times 6}{18}} = 3 \text{ days} \]

7. A soap factory produces 9600 soaps in 6 days working 15 hours a day. In how many days will it produce 14400 soaps working 3 hours more a day?

A. 20 days \quad B. 7 \frac{1}{2} \text{ days} \quad C. 40 days \quad D. 30 days

\[ \text{If soap factory produces 9600 soaps in 6 days working 15 hours, it will produce 14400 in } \frac{14400}{9600} \text{ times in } \frac{6 \times 15}{6 \times 18} + 3 \text{ hours a day.}\]

A. 20 \quad B. 7 \frac{1}{2} \quad C. 40 \quad D. 30

Explanation:

\[ \frac{D_1H_1}{W_1} = \frac{M_2H_2}{W_2} \]

\[ \frac{6 \times 15}{9600} = \frac{D_2 \times 18}{14400} \]

\[ \Rightarrow \quad D_2 = \frac{6 \times 15 \times 14400}{9600 \times 18} = 7 \frac{1}{2} \text{ days} \]
8. X alone can do a piece of work in 6 days and Y alone in 8 days. X and Y undertook the work for ₹ 4800. With the help of Z, they completed the work in 3 days. How much is Z’s share?

X can do a work in 6 days and Y in 8 days. X and Y undertook the work for ₹ 4800. With the help of Z, they completed the work in 3 days. How much is Z’s share?

A. ₹ 600  
B. ₹ 800  
C. ₹ 700  
D. ₹ 500

Explanation:

C's 1 day's work = \( \frac{1}{3} - \left( \frac{1}{6} + \frac{1}{8} \right) = \frac{1}{3} - \frac{7}{24} = \frac{1}{24} \)

A's wages : B's wages : C's wages = \( \frac{1}{6} : \frac{1}{8} : \frac{1}{24} = 4 : 3 : 1 \).

\( Z = \frac{4800}{8} \times 1 = 600 \)

9. A and B together can do a work in 10 days. They worked together for 4 days and then B leaves off. A finished the remaining works in 18 days. In how many days, can A alone finish the whole work?

a. 15 days  
b. 20 days  
c. 24 days  
d. 30 days

A B together can do a work in 10 days. They worked together for 4 days and then B leaves off. A finished the remaining works in 18 days. In how many days, can A alone finish the whole work?

a. 15 days  
b. 20 days  
c. 24 days  
d. 30 days

Explanation:

A & B Work for 4 days = \( 4 \times \frac{1}{10} = \frac{2}{5} \)

Remaining Work = \( \frac{3}{5} \times A = 18 \Rightarrow A = 30 \) days

10. Find the greatest number consisting of 6 digits which is exactly divisible by 24,15,36?

24, 15, 36 are exactly divisible by 6. Which is the least number?

A. 999999  
B. 999790  
C. 999720  
d. 999240

Explanation:

L.C.M of 24, 15 and 36 = 360
Now, 999999 divide by 360
Remainder = 279
Therefore, the remainder is 279.
Hence the required number is = 999999 – 279 = 999720
Hence, 999720 is the greatest number of 6 digits exactly divisible by 24, 15 and 36.

11. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is

The least number divisible by all the numbers from 1 to 10 will be the LCM of these numbers.
We have,

1 = 1
2 = 2 × 1
3 = 3 × 1
4 = 2 × 2
5 = 5 × 1
6 = 2 × 3
7 = 7 × 1
8 = 2 × 2 × 2
9 = 3 × 3
10 = 2 × 5

So, LCM of these numbers = 1 × 2 × 2 × 2 × 3 × 3 × 5 × 7 = 2520

Hence, least number divisible by all the numbers from 1 to 10 is 2520

12. The sum of two numbers is 2000 and their LCM is 21879. Find the numbers

a. 1993, 7  
b. 1991, 9  
c. 1989, 11  
d. 1987, 13

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We have,

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2 = 2 × 1
3 = 3 × 1
4 = 2 × 2
5 = 5 × 1
6 = 2 × 3
7 = 7 × 1
8 = 2 × 2 × 2
9 = 3 × 3
10 = 2 × 5

So, LCM of these numbers = 1 × 2 × 2 × 2 × 3 × 3 × 5 × 7 = 2520

Hence, least number divisible by all the numbers from 1 to 10 is 2520

12. The sum of two numbers is 2000 and their LCM is 21879. Find the numbers

a. 1993, 7  
b. 1991, 9  
c. 1989, 11  
d. 1987, 13

Answer: Option C
Explanation:
Let the numbers be x and (2000 - x).
Then, their L.C.M. = x (2000 - x).
So, x (2000 - x) = 21879
<=> x^2 - 2000x + 21879 = 0.
<=> (x - 1989) (x - 11) = 0,
<=> x = 1989 or x = 11.
Hence, the numbers are 1989 and 11.

13. L.C.M. of x^3 - 27, (x - 3)^2 and x^2 - 9 is

a. (x - 3)^2 (x + 3)^2  
b. (x - 3)^2 (x^2 + 6x + 9)

c. (x - 3)^2 (x + 3) (x^2 + 3x + 9)  
d. (x + 3)^2 (x - 3)^2 (x^2 + 3x + 9)
14. L.C.M. of \(\frac{2}{3}, \frac{4}{9}, \frac{5}{6}, \frac{7}{12}\) is

a. \(\frac{1}{18}\)  

b. \(\frac{1}{36}\)  

c. \(\frac{35}{9}\)  

d. \(\frac{140}{3}\)

Explanation:

LCM of fractions = \(\frac{\text{LCM of numerators}}{\text{HCF of denominators}}\)

LCM of numerators = \(\text{LCM of } 2, 4, 5, 7 = 140\)

HCF of denominators = \(\text{HCF of } 3, 6, 9, 27 = 3\)

15. The H.C.F. and L.C.M. of two numbers are 50 and 250 respectively. If the first number is divided by 2, the quotient is 50. The second number is:

a. 50  

b. 100  

c. 125  

d. 250

Answer: Option C

Explanation:

First number = \((50 * 2) = 100\).

Second number = \((\frac{50 * 250}{100}) = 125\).

16. Traffic lights at three different junctions change simultaneously at morning 8.00 am. The first light changes once in 30 seconds, the second once in 72 seconds, the third once in 45 seconds. After 8.00 am which is the next time they change simultaneously?

a. 8.03 am  

b. 8.06 am  

c. 8.10 am  

d. 8.12 am
17. Two numbers are in the ratio 5 : 7 and their LCM is 315, their product is:
   a. 2358  b. 2538  c. 2835  d. 2875

Explanation:
(c) Let the numbers be $5x$ and $7x$.  
   LCM = $35x = 315 \Rightarrow x = 9$
   \[\therefore\] The numbers are $5x$ and $7x = 45$ and $63 \Rightarrow \text{Product} = 45 \times 63 = 2835$

18. If the HCF of two numbers (each greater than 13) be 13 and LCM 273, then the sum of the numbers is:
   A. 130  B. 290  C. 34  D. 286

   Explanation:
   Let the numbers be $13x$ and $13y$ where $x$ and $y$ are coprime. Then,
   \[
   \text{Product of the numbers} = \text{LCM} \times \text{HCF}
   \]
   \[\Rightarrow \ 13x \times 13y = 13 \times 273\]
   \[\Rightarrow \ xy = (273 \times 13)/(13 \times 13)\]
   \[\Rightarrow \ xy = 21 = 3 \times 7\]
   \[\therefore\] The numbers are $3 \times 13 = 39$ and $7 \times 13 = 91$
   \[\therefore\] Required sum = $39 + 91 = 130$
   Hence, the required sum is 130.

19. $\sqrt{\frac{48.4}{0.289}}$ is equal to:
   A. $\frac{7}{17}$  B. $\frac{15}{17}$  C. $\frac{16}{17}$  D. $\frac{11}{17}$
20. If \( x - \frac{1}{x} = 4 \) then \( x^3 - \frac{1}{x^3} \) is

a. 64  
b. 70  
c. 72  
d. 76

\( x - \frac{1}{x} = 4 \) என்று பதிப்பிட்டு \( x^3 - \frac{1}{x^3} \)டை என்றால்?

a. 64  
b. 70  
c. 72  
d. 76

**Explanation:**

**Hint:** \( k^3 + 3k \)

\[ 4^3 + 3 \times 4 \]

\( 64 + 12 = 76 \)

21. If \( P = \frac{x}{x+y}, Q = \frac{y}{x+y} \) then what is the value of \( \frac{1}{P-Q} - \frac{2Q}{P^2-Q^2} \)?

A. \( x + y \)  
B. 1  
C. -1  
D. \( x - y \)

\( P = \frac{x}{x+y}, Q = \frac{y}{x+y} \) என்று பதிப்பிட்டு \( \frac{1}{P-Q} - \frac{2Q}{P^2-Q^2} \) என்ன எண்ணி? 

A. \( x + y \)  
B. 1  
C. -1  
D. \( x - y \)

**Explanation:**

\[ P + Q = \frac{x}{x+y} + \frac{y}{x+y} = \frac{x+y}{x+y} \]

\[ \frac{1}{P-Q} - \frac{2Q}{P^2-Q^2} = \frac{1}{P-Q} - \frac{2Q}{(P+Q)(P-Q)} \]

\[ = \frac{P+Q-2Q}{(P+Q)(P-Q)} = \frac{P-Q}{(P-Q)(P+Q)} = \frac{1}{P+Q} = 1 \]
22. \[ \frac{3 \times 11}{2 \times 5} + \left[ \frac{25 \times 11}{44 \times 5} \right] \div \frac{33}{15} = ? \]

a. \( \frac{1}{5} \)  

b. \( \frac{2}{3} \)  

c. \( \frac{126}{125} \)  

d. \( \frac{101}{125} \)

Explanation:
\[ = \frac{3 \times 11}{2 \times 5} + \frac{25 \times 11}{44 \times 5} \div \frac{33}{15} \]
\[ = \frac{3 \times 11}{2 \times 5} \div \frac{33}{4 \times 15} \]
\[ = \frac{3 \times 11 \times 4}{2 \times 5 \times 33} \]
\[ = \frac{6}{5} \]
\[ = \frac{1}{5} \]

23. \( \left( \frac{1}{1 \times 3} + \frac{1}{3 \times 5} + \frac{1}{5 \times 7} + \ldots + \frac{1}{19 \times 21} \right) \) is equal to
A. \( \frac{20}{21} \)  

B. \( \frac{10}{21} \)  

c. \( \frac{21}{40} \)  

d. \( \frac{21}{20} \)

Explanation:
\[ \frac{1}{1 \times 3} + \frac{1}{3 \times 5} + \frac{1}{5 \times 7} + \ldots + \frac{1}{19 \times 21} \]
\[ = \frac{1}{2} \left[ \left( 1 - \frac{1}{3} \right) + \left( \frac{1}{3} - \frac{1}{5} \right) + \ldots + \left( \frac{1}{19} - \frac{1}{21} \right) \right] \]
\[ = \frac{1}{2} \left[ 1 - \frac{1}{21} \right] \]
\[ = \frac{1}{2} \left( \frac{20}{21} \right) = \frac{10}{21} \]

24. The square root of \( \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}} \) is
A. \( \sqrt{3} + \sqrt{2} \)  

B. \( \sqrt{3} - \sqrt{2} \)  

c. \( -\sqrt{2} - \sqrt{3} \)  

d. \( \sqrt{2} - \sqrt{3} \)

Explanation:
\( \left( \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}} \right) \) तो \( \sqrt{3} \) तथा \( \sqrt{2} \) सही है।
A. $\sqrt{3} + \sqrt{2}$  
B. $\sqrt{3} - \sqrt{2}$  
C. $-\sqrt{2} - \sqrt{3}$  
D. $\sqrt{2} - \sqrt{3}$

**Explanation:**

$$\frac{\sqrt{3} + \sqrt{2} \times \sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2} \div \sqrt{3} + \sqrt{2}} = \frac{(\sqrt{3} + \sqrt{2})^2}{3 - 2} = (\sqrt{3} + \sqrt{2})^2$$

Square root of $(\sqrt{3} + \sqrt{2})^2 = \sqrt{3} + \sqrt{2}$

25. What is the value of $3 + 4 [4 - \{13 - 4 (7 + 2) + 6\} + 9]$?

a. 231  
b. 213  
c. **123**  
d. 132

$3 + 4 [4 - \{13 - 4 (7 + 2) + 6\} + 9]$

$3 + 4 [4 - \{13 - 4 (9) + 6\} + 9]$

$3 + 4 [4 - \{13 - 36 + 6\} + 9]$

$3 + 4 [4 - \{-17\} + 9]$

$3 + 4 [4 + 17 + 9]$

$3 + 4 [30]$

$3 + 120 = 123$