

Bank Math

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|-------------------------------|---------------------------|----------------------------|
| 1.Problems on Trains | 13.Time and Distance | 26.Height and Distance |
| 2.Time and Work | 14.Simple Interest | 27.Compound Interest |
| 3.Profit and Loss | 15.Partnership | 28.Percentage |
| 4.Problems on Ages | 16.Calendar | 29.Clock |
| 5.Average | 17.Area | 30.Volume and Surface Area |
| 6.Permutation and Combination | 18. N/A | 31.Problems on Numbers |
| 7.Problems on H.C.F and L.C.M | 19.Numbers | 32.Simplification |
| 8.Square Root and Cube Root | 20.Decimal Fraction | 33.Ratio and Proportion |
| 9.Chain Rule | 21.Surds and Indices | 34.Boats and Streams |
| 10.Alligation or Mixture | 22.Pipes and Cistern | 35.Races and Games |
| 11.Stocks and Shares | 23.Logarithm | 36.True Discount |
| 12.Banker's Discount | 24.Probability | |
| | 25.Odd Man Out and Series | |

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1. Problems on Trains

1. A train running at the speed of 60 km/hr crosses a pole in 9 seconds. What is the length of the train?

A. 120 metres

B. 180 metres

C. 324 metres

D. 150 metres

Answer & Explanation

Answer: Option D

Explanation:

$$\text{Speed} = \left(60 \times \frac{5}{18} \right) \text{m/sec} = \left(\frac{50}{3} \right) \text{m/sec}.$$

$$\text{Length of the train} = (\text{Speed} \times \text{Time}) = \left(\frac{50}{3} \times 9 \right) \text{m} = 150 \text{ m}.$$

2. A train 125 m long passes a man, running at 5 km/hr in the same direction in which the train is going, in 10 seconds. The speed of the train is:

A. 45 km/hr

B. 50 km/hr

C. 54 km/hr

D. 55 km/hr

Answer & Explanation

Answer: Option B

Explanation:

$$\text{Speed of the train relative to man} = \left(\frac{125}{10} \right) \text{m/sec}$$

$$= \left(\frac{25}{2} \right) \text{m/sec}.$$

$$= \left(\frac{25}{2} \times \frac{18}{5} \right) \text{km/hr}$$

$$= 45 \text{ km/hr}.$$

Let the speed of the train be x km/hr. Then,
relative speed = $(x - 5)$ km/hr.

$$\therefore x - 5 = 45 \Rightarrow x = 50 \text{ km/hr}.$$

3. The length of the bridge, which a train 130 metres long and travelling at 45 km/hr can cross in 30 seconds, is:

A. 200 m

B. 225 m

C. 245 m

D. 250 m

Answer & Explanation

Answer: Option C

Explanation:

$$\text{Speed} = \left(45 \times \frac{5}{18} \right) \text{m/sec} = \left(\frac{25}{2} \right) \text{m/sec}.$$

$$\text{Time} = 30 \text{ sec}.$$

Let the length of bridge be x metres.

$$\text{Then, } \frac{130 + x}{30} = \frac{25}{2}$$

$$\Rightarrow 2(130 + x) = 750$$

$$\Rightarrow x = 245 \text{ m}.$$

4. Two trains running in opposite directions cross a man standing on the platform in 27 seconds and 17 seconds respectively and they cross each other in 23 seconds. The ratio of their speeds is:

A. 1 : 3

B. 3 : 2

C. 3 : 4

D. None of these

Answer & Explanation

Answer: Option B

Explanation:

Let the speeds of the two trains be x m/sec and y m/sec respectively.

Then, length of the first train = $27x$ metres,

and length of the second train = $17y$ metres.

$$\therefore \frac{27x + 17y}{x + y} = 23$$

$$\Rightarrow 27x + 17y = 23x + 23y$$

$$\Rightarrow 4x = 6y$$

$$\Rightarrow \frac{x}{y} = \frac{3}{2}$$

5. A train passes a station platform in 36 seconds and a man standing on the platform in 20 seconds. If

A. 120 m B. 240 m
C. 300 m D. None of these

Answer & Explanation

Answer: Option B

Explanation:

$$\text{Speed} = \left(54 \times \frac{5}{18} \right) \text{m/sec} = 15 \text{ m/sec.}$$

$$\text{Length of the train} = (15 \times 20) \text{m} = 300 \text{ m.}$$

Let the length of the platform be x metres.

$$\text{Then, } \frac{x + 300}{36} = 15$$

$$\Rightarrow x + 300 = 540$$

$$\Rightarrow x = 240 \text{ m.}$$

6. A train 240 m long passes a pole in 24 seconds. How long will it take to pass a platform 650 m long?

A. 65 sec B. 89 sec
C. 100 sec D. 150 sec

Answer & Explanation

Answer: Option B

Explanation:

$$\text{Speed} = \left(\frac{240}{24} \right) \text{m/sec} = 10 \text{ m/sec.}$$

$$\therefore \text{Required time} = \left(\frac{240 + 650}{10} \right)$$

the speed of the train is 54 km/hr, what is the length of the platform?

10

7. Two trains of equal length are running on parallel lines in the same direction at 46 km/hr and 36 km/hr. The faster train passes the slower train in 36 seconds. The length of each train is:

A. 50 m B. 72 m
C. 80 m D. 82 m

Answer & Explanation

Answer: Option A

Explanation:

Let the length of each train be x metres.

Then, distance covered = $2x$ metres.

Relative speed = $(46 - 36)$ km/hr

$$= \left(10 \times \frac{5}{18} \right) \text{m/sec}$$

$$= \left(\frac{25}{9} \right) \text{m/sec}$$

$$\therefore \frac{2x}{\frac{25}{9}} = 36$$

$$\Rightarrow 2x = 100$$

$$\Rightarrow x = 50.$$

8. A train 360 m long is running at a speed of 45 km/hr. In what time will it pass a bridge 140 m long?

A. 40 sec B. 42 sec
C. 45 sec D. 48 sec

Answer & Explanation

Answer: Option A

Explanation:

Formula for converting from $\left(\begin{matrix} X & 5 \\ & \times 18 \end{matrix} \right) \text{m/s.}$
km/hr to m/s: $X \text{ km/hr} = \left(\begin{matrix} X & 5 \\ & \times 18 \end{matrix} \right) \text{m/s.}$

$$\text{Therefore, Speed} = \left(\begin{matrix} 45 & 5 \\ & \times 18 \end{matrix} \right) \text{m/sec} = \frac{25}{2} \text{ m/sec.}$$

Total distance to be covered = (360 + 140) m
= 500 m.

Formula for finding Time = $\left(\begin{matrix} \text{Distance} \\ \text{Speed} \end{matrix} \right)$

$$\therefore \text{Required time} = \left(\begin{matrix} 500 \times 2 \\ 25 \end{matrix} \right) \text{sec} = 40 \text{ sec.}$$

9. Two trains are moving in opposite directions @ 60 km/hr and 90 km/hr. Their lengths are 1.10 km and 0.9 km respectively. The time taken by the slower train to cross the faster train in seconds is:

A.36

B.45

C.48

D.49

Answer & Explanation

Answer: Option C

Explanation:

Relative speed = (60+ 90) km/hr

$$= \left(\begin{matrix} 150 & 5 \\ & \times 18 \end{matrix} \right) \text{m/sec} \\ = \left(\begin{matrix} 125 \\ 3 \end{matrix} \right) \text{m/sec.}$$

Distance covered = (1.10 + 0.9) km = 2 km = 2000 m.

$$\text{Required time} = \left(\begin{matrix} 2000 \times 3 \\ 125 \end{matrix} \right) \text{sec} = 48 \text{ sec.}$$

10. A jogger running at 9 kmph alongside a railway track in 240 metres ahead of the engine of a 120 metres long train running at 45 kmph in the same direction. In how much time will the train pass the jogger?

A.3.6 sec

B.18 sec

C.36 sec

D.72 sec

Answer & Explanation

Answer: Option C

Explanation:

Speed of train relative to jogger = (45 - 9) km/hr = 36 km/hr.

$$= \left(\begin{matrix} 36 & 5 \\ & \times 18 \end{matrix} \right) \text{m/sec}$$

$$= 10 \text{ m/sec.}$$

Distance to be covered = (240 + 120) m = 360 m.

$$\therefore \text{Time taken} = \left(\begin{matrix} 360 \\ 10 \end{matrix} \right) \text{sec} = 36 \text{ sec.}$$

11. A 270 metres long train running at the speed of 120 kmph crosses another train running in opposite direction at the speed of 80 kmph in 9 seconds. What is the length of the other train?

A.230 m

B.240 m

C.260 m

D.320 m

E.None of these

Answer & Explanation

Answer: Option A

Explanation:

Relative speed = (120 + 80) km/hr

$$= \left(\begin{matrix} 200 & 5 \\ & \times 18 \end{matrix} \right) \text{m/sec} \\ = \left(\begin{matrix} 500 \\ 9 \end{matrix} \right) \text{m/sec.}$$

Let the length of the other train be x metres.

$$\text{Then, } \frac{x + 270}{9} = \frac{500}{9}$$

$$\Rightarrow x + 270 = 500$$

$$\Rightarrow x = 230.$$

12. A goods train runs at the speed of 72 kmph and crosses a 250 m long platform in 26 seconds. What is the length of the goods train?

A. 230 m B. 240 m
C. 260 m D. 270 m

Answer & Explanation

Answer: Option D

Explanation:

$$\text{Speed} = \left(72 \times \frac{5}{18} \right) \text{m/sec} = 20 \text{ m/sec.}$$

Time = 26 sec.

Let the length of the train be x metres.

$$\text{Then, } \frac{x + 250}{26} = 20$$

$$\Rightarrow x + 250 = 520$$

$$\Rightarrow x = 270.$$

13. Two trains, each 100 m long, moving in opposite directions, cross each other in 8 seconds. If one is moving twice as fast the other, then the speed of the faster train is:

A. 30 km/hr B. 45 km/hr
C. 60 km/hr D. 75 km/hr

Answer & Explanation

Answer: Option C

Explanation:

Let the speed of the slower train be x m/sec.

Then, speed of the faster train = $2x$ m/sec.

Relative speed = $(x + 2x)$ m/sec = $3x$ m/sec.

$$\therefore \frac{(100 + 100)}{8} = 3x$$

$$\Rightarrow 24x = 200$$

$$\Rightarrow x = \frac{25}{3}.$$

So, speed of the faster train = $\frac{50}{3}$ m/sec

$$= \left(\frac{50}{3} \times \frac{18}{5} \right) \text{km/hr}$$

$$= 60 \text{ km/hr.}$$

14. Two trains 140 m and 160 m long run at the speed of 60 km/hr and 40 km/hr respectively in opposite directions on parallel tracks. The time (in seconds) which they take to cross each other, is:

A. 9 B. 9.6
C. 10 D. 10.8

Answer & Explanation

Answer: Option D

Explanation:

$$\text{Relative speed} = \frac{(60 + 40)}{\text{km/hr}} = \left(\frac{100}{x} \times \frac{5}{18} \right) \text{m/sec} = \left(\frac{250}{9} \right) \text{m/sec.}$$

Distance covered in crossing each other = $(140 + 160) \text{ m} = 300 \text{ m.}$

$$\text{Required time} = \left(\frac{300}{x} \times \frac{9}{250} \right) \text{sec} = \frac{54}{5} \text{sec} = 10.8 \text{ sec.}$$

15. A train 110 metres long is running with a speed of 60 kmph. In what time will it pass a man who is running at 6 kmph in the direction opposite to that in which the train is going?

A. 5 sec B. 6 sec
C. 7 sec D. 10 sec

Answer & Explanation

Answer: Option B

Explanation:

Speed of train relative to man = $(60 + 6)$
km/hr = 66 km/hr.

$$= \left(66 \times \frac{5}{18} \right) \text{m/sec}$$
$$= \left(\frac{55}{3} \right) \text{m/sec.}$$

$$\therefore \text{Time taken to pass the man} = \left(\frac{110 \frac{3}{55}}{x} \right) \text{sec} = 6$$

16. A train travelling at a speed of 75 mph enters a tunnel $3 \frac{1}{2}$ miles long. The train is $\frac{1}{4}$ mile long. How long does it take for the train to pass through the tunnel from the moment the front enters to the moment the rear emerges?
- A. 2.5 min B. 3 min
C. 3.2 min D. 3.5 min

Answer & Explanation

Answer: Option B

Explanation:

$$\text{Total distance covered} = \left(7 \frac{1}{4} \right) \text{miles}$$
$$= \frac{15}{4} \text{miles.}$$

$$\therefore \text{Time taken} = \left(\frac{15}{4 \times 75} \right) \text{hrs}$$
$$= \frac{1}{20} \text{hrs}$$
$$= \left(\frac{1}{20} \times 60 \right) \text{min.}$$
$$= 3 \text{ min.}$$

17. A train 800 metres long is running at a speed of 78 km/hr. If it crosses a tunnel in 1 minute, then the length of the tunnel (in meters) is:
- A. 130 B. 360
C. 500 D. 540

Answer & Explanation

Answer: Option C

Explanation:

$$\text{Speed} = \left(78 \times \frac{5}{18} \right) \text{m/sec} = \left(\frac{65}{3} \right) \text{m/sec.}$$

Time = 1 minute = 60 seconds.

Let the length of the tunnel be x metres.

$$\text{Then, } \left(\frac{800 + x}{60} \right) = \frac{65}{3}$$

$$\Rightarrow 3(800 + x) = 3900$$

$$\Rightarrow x = 500.$$

18. A 300 metre long train crosses a platform in 39 seconds while it crosses a signal pole in 18 seconds. What is the length of the platform?
- A. 320 m B. 350 m
C. 650 m D. Data inadequate

Answer & Explanation

Answer: Option B

Explanation:

$$\text{Speed} = \left(\frac{300}{18} \right) \text{m/sec} = 50 \text{m/sec.}$$

Let the length of the platform be x metres.

$$\text{Then, } \left(\frac{x + 300}{39} \right) = \frac{50}{3}$$

$$\Rightarrow 3(x + 300) = 1950$$

$$\Rightarrow x = 350 \text{ m.}$$

19. A train speeds past a pole in 15 seconds and a platform 100 m long in 25 seconds. Its length is:

A. 50 m B. 150 m
C. 200 m D. Data inadequate

Answer & Explanation

Answer: Option B

Explanation:

Let the length of the train be x metres and its speed by y m/sec.

$$\text{Then, } \frac{x}{y} = 15 \Rightarrow y = \frac{x}{15}$$

$$\therefore \frac{x + 100}{25} = \frac{x}{15}$$

$$\Rightarrow 15(x + 100) = 25x$$

$$\Rightarrow 15x + 1500 = 25x$$

$$\Rightarrow 1500 = 10x$$

$$\Rightarrow x = 150 \text{ m.}$$

20. A train moves past a telegraph post and a bridge 264 m long in 8 seconds and 20 seconds respectively. What is the speed of the train?

A. 69.5 km/hr B. 70 km/hr
C. 79 km/hr D. 79.2 km/hr

Answer & Explanation

Answer: Option D

Explanation:

Let the length of the train be x metres and its speed by y m/sec.

$$\text{Then, } \frac{x}{y} = 8 \Rightarrow x = 8y$$

$$\text{Now, } \frac{x + 264}{20} = y$$

$$\Rightarrow 8y + 264 = 20y$$

$$\Rightarrow y = 22.$$

$$\therefore \text{Speed} = 22 \left(\frac{22}{x} \frac{18}{5} \right) \text{ km/hr} = 79.2 \text{ km/hr.}$$

21. How many seconds will a 500 metre long train take to cross a man walking with a speed of 3 km/hr in the direction of the moving train if the speed of the train is 63 km/hr?

A. 25 B. 30
C. 40 D. 45

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{aligned} \text{Speed of the train relative to man} &= (63 - 3) \text{ km/hr} \\ &= 60 \text{ km/hr} \\ &= \left(\frac{60}{x} \frac{5}{18} \right) \text{ m/sec} \\ &= \left(\frac{50}{3} \right) \text{ m/sec.} \\ \therefore \text{Time taken to pass the man} &= \left(500 \times \frac{3}{50} \right) \text{ sec} \\ &= 30 \text{ sec.} \end{aligned}$$

22. Two goods train each 500 m long, are running in opposite directions on parallel tracks. Their speeds are 45 km/hr and 30 km/hr respectively. Find the time taken by the slower train to pass the driver of the faster one.

A. 12 sec B. 24 sec
C. 48 sec D. 60 sec

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{aligned}\text{Relative speed} &= (45 + 30) \text{ km/hr} \\ &= \left(75 \times \frac{5}{18} \right) \text{ m/sec} \\ &= \left(\frac{125}{6} \right) \text{ m/sec.}\end{aligned}$$

We have to find the time taken by the slower train to pass the DRIVER of the faster train and not the complete train.

So, distance covered = Length of the slower train.

Therefore, Distance covered = 500 m.

$$\therefore \text{Required time} = \left(500 \times \frac{6}{125} \right) = 24 \text{ sec.}$$

23. Two trains are running in opposite directions with the same speed. If the length of each train is 120 metres and they cross each other in 12 seconds, then the speed of each train (in km/hr) is:

A. 10 B. 18
C. 36 D. 72

Answer & Explanation

Answer: Option C

Explanation:

Let the speed of each train be x m/sec.

Then, relative speed of the two trains = $2x$ m/sec.

$$\text{So, } 2x = \frac{(120 + 120)}{12}$$

$$\Rightarrow 2x = 20$$

$$\Rightarrow x = 10.$$

$$\therefore \text{Speed of each train} \left(\frac{10 \times 18}{x \times 5} \right) \text{ km/hr} = 36 \text{ km/hr.}$$

24. Two trains of equal lengths take 10 seconds and 15 seconds respectively to cross a telegraph post. If the length of each train be 120 metres, in what time (in seconds) will they cross each other travelling in opposite direction?

A. 10 B. 12
C. 15 D. 20

Answer & Explanation

Answer: Option B

Explanation:

$$\text{Speed of the first train} = \left(\frac{120}{10} \right) \text{ m/sec} = 12 \text{ m/sec.}$$

$$\text{Speed of the second train} = \left(\frac{120}{15} \right) \text{ m/sec} = 8 \text{ m/sec.}$$

$$\text{Relative speed} = (12 + 8) = 20 \text{ m/sec.}$$

$$\therefore \text{Required time} = \left[\frac{(120 + 120)}{20} \right] \text{ sec} = 12 \text{ sec.}$$

25. A train 108 m long moving at a speed of 50 km/hr crosses a train 112 m long coming from opposite direction in 6 seconds. The speed of the second train is:

A. 48 km/hr B. 54 km/hr
C. 66 km/hr D. 82 km/hr

Answer & Explanation

Answer: Option D

Explanation:

Let the speed of the second train be x km/hr.

$$\begin{aligned}\text{Relative speed} &= (x + 50) \text{ km/hr} \\ &= \left((x + 50) \times \frac{5}{18} \right) \text{ m/sec} \\ &= \left(\frac{250 + 5x}{18} \right) \text{ m/sec.}\end{aligned}$$

$$\text{Distance covered} = (108 + 112) = 220 \text{ m.}$$

$$\therefore \frac{220}{\left(\frac{250 + 5x}{18} \right)} = 6$$

$$\left(\begin{array}{c} 250 + 5x \\ 18 \end{array} \right)$$

$$\Rightarrow 250 + 5x = 660$$

$$\Rightarrow x = 82 \text{ km/hr.}$$

26. Two trains are running at 40 km/hr and 20 km/hr respectively in the same direction. Fast train completely passes a man sitting in the slower train in 5 seconds. What is the length of the fast train?

- A. 23 m B. $23\frac{2}{9}$ m
C. $27\frac{7}{9}$ m D. 29 m

Answer & Explanation

Answer: Option C

Explanation:

$$\text{Relative speed} = \left(\begin{array}{c} 20 \quad 5 \\ x \quad 18 \end{array} \right) \text{ m/sec} = \left(\begin{array}{c} 50 \\ 9 \end{array} \right) \text{ m/sec.}$$

$$\therefore \text{Length of faster train} = \left(\begin{array}{c} 50 \quad x \\ 9 \quad 5 \end{array} \right) \text{ m} = \frac{250}{9} \text{ m} = 27\frac{7}{9} \text{ m.}$$

27. A train overtakes two persons who are walking in the same direction in which the train is going, at the rate of 2 kmph and 4 kmph and passes them completely in 9 and 10 seconds respectively. The length of the train is:

- A. 45 m B. 50 m
C. 54 m D. 72 m

Answer & Explanation

Answer: Option B

Explanation:

$$2 \text{ kmph} = \left(\begin{array}{c} 2 \quad 5 \\ x \quad 18 \end{array} \right) \text{ m/sec} = \frac{5}{9} \text{ m/sec.}$$

$$4 \text{ kmph} = \left(\begin{array}{c} 4 \quad 5 \\ x \quad 18 \end{array} \right) \text{ m/sec} = \frac{10}{9} \text{ m/sec.}$$

Let the length of the train be x metres and its speed by y m/sec.

$$\text{Then, } \left(\begin{array}{c} x \\ y - 5 \end{array} \right) = 9 \text{ and } \left(\begin{array}{c} x \\ y - 10 \end{array} \right) = 10.$$

$$\therefore 9y - 5 = x \text{ and } 10(y - 10) = 9x$$

$$\Rightarrow 9y - x = 5 \text{ and } 90y - 9x = 100.$$

On solving, we get: $x = 50$.

$$\therefore \text{Length of the train is } 50 \text{ m.}$$

28. A train overtakes two persons walking along a railway track. The first one walks at 4.5 km/hr. The other one walks at 5.4 km/hr. The train needs 8.4 and 8.5 seconds respectively to overtake them. What is the speed of the train if both the persons are walking in the same direction as the train?

- A. 66 km/hr B. 72 km/hr
C. 78 km/hr D. 81 km/hr

Answer & Explanation

Answer: Option D

Explanation:

$$\begin{aligned} 4.5 \text{ km/hr} &= \left(\begin{array}{c} 4.5 \quad 5 \\ x \quad 18 \end{array} \right) \text{ m/sec} = \frac{5}{4} \text{ m/sec} = 1.25 \text{ m/sec, and} \\ 5.4 \text{ km/hr} &= \left(\begin{array}{c} 5.4 \quad 5 \\ x \quad 18 \end{array} \right) \text{ m/sec} = \frac{3}{2} \text{ m/sec} = 1.5 \text{ m/sec.} \end{aligned}$$

Let the speed of the train be x m/sec.

$$\text{Then, } (x - 1.25) \times 8.4 = (x - 1.5) \times 8.5$$

$$\Rightarrow 8.4x - 10.5 = 8.5x - 12.75$$

$$\Rightarrow 0.1x = 2.25$$

$$\Rightarrow x = 22.5$$

$$\therefore \text{Speed of the train} = \left(\begin{array}{c} 22.5 \quad 18 \\ x \quad 5 \end{array} \right) \text{ km/hr} = 81 \text{ km/hr.}$$

29. A train travelling at 48 kmph completely crosses another train having half its length and travelling in opposite direction at 42

kmph, in 12 seconds. It also passes a railway platform in 45 seconds. The length of the platform is

- A. 400 m B. 450 m
C. 560 m D. 600 m

Answer & Explanation

Answer: Option A

Explanation:

Let the length of the first train be x metres.

Then, the length of the second train is $\left(\frac{x}{2}\right)$ metres.
 Relative speed = $\left(48 + \frac{90}{2}\right)$ m/sec = 25 m/sec.
 $\therefore \frac{x + (x/2)}{25} = 12$ or $\frac{3x}{2} = 300$ or $x = 200$.

\therefore Length of first train = 200 m.

Let the length of platform be y metres.

Speed of the first train = $\left(\frac{48}{3} + \frac{5}{18}\right)$ m/sec = $\frac{40}{3}$ m/sec.
 $\therefore (200 + y) \times \frac{3}{40} = 45$

$\Rightarrow 600 + 3y = 1800$

$\Rightarrow y = 400$ m.

30. Two stations A and B are 110 km apart on a straight line. One train starts from A at 7 a.m. and travels towards B at 20 kmph. Another train starts from B at 8 a.m. and travels towards A at a speed of 25 kmph. At what time will they meet?

- A. 9 a.m. B. 10 a.m.
C. 10.30 a.m. D. 11 a.m.

Answer & Explanation

Answer: Option B

Explanation:

Suppose they meet x hours after 7 a.m.

Distance covered by A in x hours = $20x$ km.

Distance covered by B in $(x - 1)$ hours = $25(x - 1)$ km.

$\therefore 20x + 25(x - 1) = 110$

$\Rightarrow 45x = 135$

$\Rightarrow x = 3$.

So, they meet at 10 a.m.

Two, trains, one from Howrah to Patna and the other from Patna to Howrah, start simultaneously. After they meet, the trains reach their destinations after 9 hours and 16 hours respectively. The ratio of their speeds is:

- A. 2 : 3 B. 4 : 3
C. 6 : 7 D. 9 : 16

Answer & Explanation

Answer: Option B

Explanation:

Let us name the trains as A and B. Then,
 (A's speed) : (B's speed) = $b : a = 16 : 9 = 4 : 3$.

2) Time and Work

1. A can do a work in 15 days and B in 20 days. If they work on it together for 4 days, then the fraction of the work that is left is :

- A. $\frac{1}{4}$ B. $\frac{1}{10}$
C. $\frac{7}{15}$ D. $\frac{8}{15}$

Answer & Explanation

Answer: Option D

Explanation:

$$\text{A's 1 day's work} = \frac{1}{15};$$

$$\text{B's 1 day's work} = \frac{1}{20};$$

$$(\text{A} + \text{B})\text{'s 1 day's work} = \left(\frac{1}{15} + \frac{1}{20} \right) = \frac{7}{60}.$$

$$(\text{A} + \text{B})\text{'s 4 day's work} = \left(\frac{7}{60} \times 4 \right) = \frac{7}{15}.$$

$$\text{Therefore, Remaining work} = \left(1 - \frac{7}{15} \right) = \frac{8}{15}.$$

2. A can lay railway track between two given stations in 16 days and B can do the same job in 12 days. With help of C, they did the job in 4 days only. Then, C alone can do the job in:

A. $9\frac{1}{5}$ days

B. $9\frac{2}{5}$ days

C. $9\frac{3}{5}$ days

D. 10

Answer & Explanation

Answer: Option C

Explanation:

$$(\text{A} + \text{B} + \text{C})\text{'s 1 day's work} = \frac{1}{4},$$

$$\text{A's 1 day's work} = \frac{1}{16},$$

$$\text{B's 1 day's work} = \frac{1}{12}.$$

$$\therefore \text{C's 1 day's work} = \frac{1}{4} - \left(\frac{1}{16} + \frac{1}{12} \right) = \left(\frac{1}{4} - \frac{7}{48} \right) = \frac{5}{48}.$$

$$\text{So, C alone can do the work in } \frac{48}{5} = 9\frac{3}{5} \text{ days.}$$

3. A, B and C can do a piece of work in 20, 30 and 60 days respectively. In how many days can A do the work if he is assisted by B and C on every third day?

A. 12 days

B. 15 days

C. 16 days

D. 18 days

Answer & Explanation

Answer: Option B

Explanation:

$$\text{A's 2 day's work} = \left(\frac{1}{20} \times 2 \right) = \frac{1}{10}.$$

$$(\text{A} + \text{B} + \text{C})\text{'s 1 day's work} = \left(\frac{1}{20} + \frac{1}{30} + \frac{1}{60} \right) = \frac{6}{60} = \frac{1}{10}.$$

$$\text{Work done in 3 days} = \left(\frac{1}{10} \times 3 \right) = \frac{3}{10}.$$

$$\text{Now, } \frac{1}{10} \text{ work is done in 3 days.}$$

\therefore Whole work will be done in $(3 \times 5) = 15$ days.

4. A is thrice as good as workman as B and therefore is able to finish a job in 60 days less than B. Working together, they can do it in:

A. 20 days

B. $22\frac{1}{2}$ days

C. 25 days

D. 30 days

Answer & Explanation

Answer: Option B

Explanation:

Ratio of times taken by A and B = 1 : 3.

The time difference is $(3 - 1) \times 2$ days while B take 3 days and A takes 1 day.

If difference of time is 2 days, B takes 3 days.

$$\text{If difference of time is 60 days, B takes } \left(\frac{3}{2} \times 60 \right) = 90 \text{ days.}$$

So, A takes 30 days to do the work.

$$\text{A's 1 day's work} = \frac{1}{30}$$

$$\text{B's 1 day's work} = \frac{1}{90}$$

$$(\text{A} + \text{B})\text{'s 1 day's work} = \left(\frac{1}{30} + \frac{1}{90} \right) = \frac{4}{90} = \frac{2}{45}$$

$$\therefore \text{A and B together can do the } \frac{45}{2} = 22\frac{1}{2} \text{ days.}$$

5. A alone can do a piece of work in 6 days and B alone in 8 days. A and B undertook to do it for Rs. 3200. With the help of C, they completed the work in 3 days. How much is to be paid to C?

A.Rs. 375 B.Rs. 400
C.Rs. 600 D.Rs. 800

Answer & Explanation

Answer: Option B

Explanation:

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

$$\text{A's wages : B's wages : C's wages} = \frac{1}{6} : \frac{1}{8} : \frac{1}{24} = 4 : 3 : 1$$

$$\therefore \text{C's share (for 3 days)} = \text{Rs.} \left(\frac{3}{4+3+1} \times 3200 \right) = \text{Rs.} 400$$

6. If 6 men and 8 boys can do a piece of work in 10 days while 26 men and 48 boys can do the same in 2 days, the time taken by 15 men and 20 boys in doing the same type of work will be:

A.4 days B.5 days
C.6 days D.7 days

Answer & Explanation

Answer: Option A

Explanation:

Let 1 man's 1 day's work = x and 1 boy's 1 day's work = y .

$$\text{Then, } 6x + 8y = \frac{1}{10} \text{ and } 26x + 48y = \frac{1}{2}$$

$$\text{Solving these two equations, } x = \frac{1}{100} \text{ and } y = \frac{1}{200}$$

$$(15 \text{ men} + 20 \text{ boy's})'s \text{ 1 day's work} = \left(\frac{15}{100} + \frac{20}{200} \right) = \frac{1}{4}$$

\therefore 15 men and 20 boys can do the work in 4 days.

7. A can do a piece of work in 4 hours; B and C together can do it in 3 hours, while A and C together can do it in 2 hours. How long will B alone take to do it?

A.8 hours B.10 hours
C.12 hours D.24 hours

Answer & Explanation

Answer: Option C

Explanation:

$$\text{A's 1 hour's work} = \frac{1}{4}$$

$$(B + C)'s \text{ 1 hour's work} = \frac{1}{3}$$

$$(A + C)'s \text{ 1 hour's work} = \frac{1}{2}$$

$$(A + B + C)'s \text{ 1 hour's work} = \left(\frac{1}{4} + \frac{1}{3} \right) = \frac{7}{12}$$

$$\text{B's 1 hour's work} = \left(\frac{7}{12} - \frac{1}{2} \right) = \frac{1}{12}$$

\therefore B alone will take 12 hours to do the work.

8. A can do a certain work in the same time in which B and C together can do it. If A and B together could do it in 10 days and C alone in 50 days, then B alone could do it in:

A.15 days B.20 days
C.25 days D.30 days

Answer & Explanation

Answer: Option C

Explanation:

$$(A + B)'s \text{ 1 day's work} = \frac{1}{10}$$

$$\text{C's 1 day's work} = \frac{1}{50}$$

$$(A + B + C)'s \text{ 1 day's work} = \left(\frac{1}{10} + \frac{1}{50} \right) = \frac{6}{50} = \frac{3}{25} \quad \text{(i)}$$

$$\text{A's 1 day's work} = (B + C)'s \text{ 1 day's work} \quad \text{.... (ii)}$$

$$\text{From (i) and (ii), we get: } 2 \times (\text{A's 1 day's work}) = \frac{3}{25}$$

$$\Rightarrow \text{A's 1 day's work} = \frac{3}{50}$$

$$\therefore \text{B's 1 day's work} = \left(\frac{3}{50} - \frac{3}{25} \right) = \frac{2}{50} = \frac{1}{25}$$

So, B alone could do the work in 25 days.

9. A does 80% of a work in 20 days. He then calls in B and they together finish the remaining work in 3 days. How long B alone

would take to do the whole work?

A. 23 days B. 37 days

C. $37\frac{1}{2}$ D. 40 days

Answer & Explanation

Answer: Option C

Explanation:

Whole work is done by A $\left(\frac{20}{5} \times \frac{5}{4} \right) = 25$ days.
Now, $\left(\frac{1}{5} - \frac{4}{5} \right)$ i.e., $\frac{1}{5}$ work is done by A and B in 3 days.

Whole work will be done by A and B in $(3 \times 5) = 15$ days.

A's 1 day's work $\frac{1}{25}$, (A + B)'s 1 day's work $\frac{1}{15}$.

\therefore B's 1 day's work $= \left(\frac{1}{15} - \frac{1}{25} \right) = \frac{4}{150} = \frac{2}{75}$.

So, B alone would do the work $\frac{75}{2} = 37\frac{1}{2}$ days.

10. A machine P can print one lakh books in 8 hours, machine Q can print the same number of books in 10 hours while machine R can print them in 12 hours. All the machines are started at 9 A.M. while machine P is closed at 11 A.M. and the remaining two machines complete work. Approximately at what time will the work (to print one lakh books) be finished ?

A. 11:30 A.M. B. 12 noon
C. 12:30 P.M. D. 1:00 P.M.

Answer & Explanation

Answer: Option D

Explanation:

(P + Q + R)'s 1 hour's work $= \left(\frac{1}{8} + \frac{1}{10} + \frac{1}{12} \right) = \frac{37}{120}$.
Work done by P, Q and R in 2 $\left(\frac{37}{120} \times 2 \right) = \frac{37}{60}$ hours = $\frac{37}{60}$.
Remaining work $= \left(1 - \frac{37}{60} \right) = \frac{23}{60}$.

(Q + R)'s 1 hour's work $= \left(\frac{1}{10} + \frac{1}{12} \right) = \frac{11}{60}$.

Now, $\frac{11}{60}$ work is done by Q and R in 1 hour.

$\frac{23}{60}$ work will be done by Q and R in $\left(\frac{60}{11} \times \frac{23}{60} \right) = \frac{23}{11}$ hours ≈ 2 hours.

So, the work will be finished approximately 2 hours after 11 A.M., i.e., around 1 P.M.

11. A can finish a work in 18 days and B can do the same work in 15 days. B worked for 10 days and left the job. In how many days, A alone can finish the remaining work?

A. 5 B. $5\frac{1}{2}$
C. 6 D. 8

Answer & Explanation

Answer: Option C

Explanation:

B's 10 day's work $= \left(\frac{1}{15} \times 10 \right) = \frac{2}{3}$.

Remaining work $= \left(1 - \frac{2}{3} \right) = \frac{1}{3}$.

Now, $\frac{1}{18}$ work is done by A in 1 day.

$\therefore \frac{1}{3}$ work is done by A in $\left(18 \times \frac{1}{3} \right) = 6$ days.

12. 4 men and 6 women can complete a work in 8 days, while 3 men and 7 women can complete it in 10 days. In how many days will 10 women complete it?

A. 35 B. 40
C. 45 D. 50

Answer & Explanation

Answer: Option B

Explanation:

Let 1 man's 1 day's work = x and 1 woman's 1 day's work = y.

Then, $4x + 6y = \frac{1}{8}$ and $3x + 7y = \frac{1}{10}$.

Solving the two equations, we get: $x = \frac{11}{400}, y = \frac{1}{400}$

$$\therefore 1 \text{ woman's 1 day's work} = \frac{1}{400}$$

$$\Rightarrow 10 \text{ women's 1 day's work} = \left(\frac{1}{400} \times 10 \right) = \frac{1}{40}$$

Hence, 10 women will complete the work in 40 days.

13. A and B can together finish a work 30 days. They worked together for 20 days and then B left. After another 20 days, A finished the remaining work. In how many days A alone can finish the work?

A. 40 B. 50
C. 54 D. 60

Answer & Explanation

Answer: Option D

Explanation:

$$(A + B)'s \text{ 20 day's work} = \left(\frac{1}{30} \times 20 \right) = \frac{2}{3}$$

$$\text{Remaining work} = \left(1 - \frac{2}{3} \right) = \frac{1}{3}$$

Now, $\frac{1}{3}$ work is done by A in 20 days.

Therefore, the whole work will be done by A in $(20 \times 3) = 60$ days.

14. P can complete a work in 12 days working 8 hours a day. Q can complete the same work in 8 days working 10 hours a day. If both P and Q work together, working 8 hours a day, in how many days can they complete the work?

A. $\frac{5}{11}$ B. $\frac{5}{6}$
C. $\frac{6}{11}$ D. $\frac{6}{11}$

Answer & Explanation

Answer: Option A

Explanation:

P can complete the work in (12×8) hrs. = 96 hrs.

Q can complete the work in (8×10) hrs. = 80 hrs.

$$\therefore P's \text{ 1 hour's work} = \frac{1}{96} \text{ and } Q's \text{ 1 hour's work} = \frac{1}{80}$$

$$(P + Q)'s \text{ 1 hour's work} = \left(\frac{1}{96} + \frac{1}{80} \right) = \frac{11}{480}$$

So, both P and Q will finish the work in $\left(\frac{480}{11} \right)$ hrs.

$$\therefore \text{Number of days of 8 hours each} = \left(\frac{480}{11} \times 8 \right) = \frac{60}{11} = 5 \frac{5}{11} \text{ days}$$

15. 10 women can complete a work in 7 days and 10 children take 14 days to complete the work. How many days will 5 women and 10 children take to complete the work?

A. 3 B. 5
C. 7 D. Cannot be determined

E. None of these

Answer & Explanation

Answer: Option C

Explanation:

$$1 \text{ woman's 1 day's work} = \frac{1}{70}$$

$$1 \text{ child's 1 day's work} = \frac{1}{140}$$

$$(5 \text{ women} + 10 \text{ children})'s \text{ day's work} = \left(\frac{5}{70} + \frac{10}{140} \right) = \left(\frac{1}{14} + \frac{1}{14} \right) = \frac{1}{7}$$

\therefore 5 women and 10 children will complete the work in 7 days.

16. X and Y can do a piece of work in 20 days and 12 days respectively. X started the work alone and then after 4 days Y joined him till the completion of the work. How long did the work last?

A. 6 days B. 10 days
C. 15 days D. 20 days

Answer & Explanation

Answer: Option B

Explanation:

$$\text{Work done by X in 4 days} = \left(\frac{1}{20} \times 4 \right) = \frac{1}{5}.$$

$$\text{Remaining work} = \left(1 - \frac{1}{5} \right) = \frac{4}{5}.$$

$$(X + Y)\text{'s 1 day's work} = \left(\frac{1}{20} + \frac{1}{12} \right) = \frac{8}{60} = \frac{2}{15}.$$

Now, $\frac{2}{15}$ work is done by X and Y in 1 day.

$$\text{So, } \frac{4}{5} \text{ work will be done by X and Y in } \left(\frac{15}{2} \times \frac{4}{5} \right) = 6 \text{ days.}$$

Hence, total time taken = (6 + 4) days = 10 days.

17. A is 30% more efficient than B. How much time will they, working together, take to complete a job which A alone could have done in 23 days?

- A. 11 days B. 13 days
C. $20\frac{3}{17}$ days D. None of these

Answer & Explanation

Answer: Option B

Explanation:

Ratio of times taken by A and B = 100 : 130
 = 10 : 13.

Suppose B takes x days to do the work.

$$\text{Then, } 10 : 13 :: 23 : x \Rightarrow \frac{23 \times 10}{13} = x \Rightarrow x = \frac{230}{13} = 17\frac{6}{13}.$$

$$\text{A's 1 day's work} = \frac{1}{23};$$

$$\text{B's 1 day's work} = \frac{10}{299}.$$

$$(A + B)\text{'s 1 day's work} = \left(\frac{1}{23} + \frac{10}{299} \right) = \frac{23}{299} = \frac{1}{13}.$$

Therefore, A and B together can complete the work in 13 days.

18. Ravi and Kumar are working on an assignment. Ravi takes 6 hours to type 32 pages on a computer, while Kumar takes 5 hours to type 40 pages. How much time will they take, working together on two different computers to type an assignment of 110 pages?

- A. 7 hours 30 minutes B. 8 hours
C. 8 hours 15 minutes D. 8 hours 25 minutes

Answer & Explanation

Answer: Option C

Explanation:

$$\text{Number of pages typed by Ravi in 1 hour} = \frac{32}{6} = \frac{16}{3}.$$

$$\text{Number of pages typed by Kumar in 1 hour} = \frac{40}{5} = 8.$$

$$\text{Number of pages typed by both in 1 hour} = \left(\frac{16}{3} + 8 \right) = \frac{40}{3}.$$

$$\therefore \text{Time taken by both to type 110 pages} = \left(\frac{110 \times 3}{40} \right) \text{ hours}$$

$$= 8\frac{1}{4} \text{ hours (or) 8 hours 15 minutes.}$$

19. A, B and C can complete a piece of work in 24, 6 and 12 days respectively. Working together, they will complete the same work in:

- A. $\frac{1}{24}$ day B. $\frac{7}{24}$ day
C. $3\frac{3}{7}$ days D. 4 days

Answer & Explanation

Answer: Option C

Explanation:

Formula: If A can do a piece of work in n days, then A's 1 day's work = $\frac{1}{n}$.

$$(A + B + C)\text{'s 1 day's work} = \left(\frac{1}{24} + \frac{1}{6} + \frac{1}{12} \right) = \frac{7}{24}.$$

= $\frac{24}{6} \times \frac{12}{12} = \frac{24}{6}$
 Formula: If A's 1 day's work = $\frac{1}{n}$ then A can finish the work in n days.

So, all the three together will complete the job in $\left(\frac{24}{7}\right) \times \frac{3}{1} = 3\frac{3}{7}$ days.

20. Sakshi can do a piece of work in 20 days. Tanya is 25% more efficient than Sakshi. The number of days taken by Tanya to do the same piece of work is:

A. 15 B. 16
C. 18 D. 25

Answer & Explanation

Answer: Option B

Explanation:

Ratio of times taken by Sakshi and Tanya = 125 : 100 = 5 : 4.

Suppose Tanya takes x days to do the work.

$$5 : 4 :: 20 : x \Rightarrow x = \left(\frac{4 \times 20}{5}\right)$$

$$\Rightarrow x = 16 \text{ days.}$$

Hence, Tanya takes 16 days to complete the work.

21. A takes twice as much time as B or thrice as much time as C to finish a piece of work. Working together, they can finish the work in 2 days. B can do the work alone in:

A. 4 days B. 6 days
C. 8 days D. 12 days

Answer & Explanation

Answer: Option B

Explanation:

Suppose A, B and C take x , $\frac{x}{2}$ and $\frac{x}{3}$ days respectively to finish the work.

$$\text{Then, } \left(\frac{1}{x} + \frac{2}{x} + \frac{3}{x}\right) = \frac{1}{2}$$

$$\Rightarrow \frac{6}{x} = \frac{1}{2}$$

$$\Rightarrow x = 12.$$

So, B takes $(12/2) = 6$ days to finish the work.

22. A and B can complete a work in 15 days and 10 days respectively. They started doing the work together but after 2 days B had to leave and A alone completed the remaining work. The whole work was completed in :

A. 8 days B. 10 days
C. 12 days D. 15 days

Answer & Explanation

Answer: Option C

Explanation:

$$(A + B)'s \text{ 1 day's work} = \left(\frac{1}{15} + \frac{1}{10}\right) = \frac{1}{6}.$$

$$\text{Work done by A and B in 2 days} = \left(\frac{1}{6} \times 2\right) = \frac{1}{3}.$$

$$\text{Remaining work} = \left(1 - \frac{1}{3}\right) = \frac{2}{3}.$$

Now, $\frac{1}{15}$ work is done by A in 1 day.

$$\therefore \frac{2}{3} \text{ work will be done by A in } \left(\frac{15 \times 2}{1 \times 3}\right) = 10 \text{ days.}$$

Hence, the total time taken = $(10 + 2) = 12$ days.

23. A and B can do a piece of work in 30 days, while B and C can do the same work in 24 days and C and A in 20 days. They all work together for 10 days when B and C leave. How many days more will A take to finish the work?

A. 18 days B. 24 days
C. 30 days D. 36 days

Answer & Explanation

Answer: Option A

Explanation:

$$2(A + B + C)\text{'s 1 day's work} = \left(\frac{1}{30} + \frac{1}{24} + \frac{1}{20} \right) = \frac{15}{120} = \frac{1}{8}$$

$$\text{Therefore, } (A + B + C)\text{'s 1 day's work} = \frac{1}{8} \times 2 = \frac{1}{4}$$

$$\text{Work done by A, B, C in 10 days} = \frac{10}{4} = \frac{5}{2}$$

$$\text{Remaining work} = \left(1 - \frac{5}{2} \right) = \frac{3}{2}$$

$$\text{A's 1 day's work} = \left(\frac{1}{16} - \frac{1}{24} \right) = \frac{1}{48}$$

Now, $\frac{1}{48}$ work is done by A in 1 day.

$$\text{So, } \frac{3}{2} \text{ work will be done by A in } \left(\frac{48 \times 3}{2} \right) = 72 \text{ days.}$$

24. A works twice as fast as B. If B can complete a work in 12 days independently, the number of days in which A and B can together finish the work in :

A. 4 days B. 6 days
C. 8 days D. 18 days

Answer & Explanation

Answer: Option A

Explanation:

Ratio of rates of working of A and B = 2 : 1.

So, ratio of times taken = 1 : 2.

$$\text{B's 1 day's work} = \frac{1}{12}$$

$$\therefore \text{A's 1 day's work} = \frac{1}{6} \quad ; \quad (2 \text{ times of B's work})$$

$$(A + B)\text{'s 1 day's work} = \left(\frac{1}{6} + \frac{1}{12} \right) = \frac{3}{12} = \frac{1}{4}$$

So, A and B together can finish the work in 4 days.

25. Twenty women can do a work in sixteen days. Sixteen men can complete the same work in fifteen days. What is the ratio between the capacity of a man and a woman?

A. 3 : 4 B. 4 : 3
C. 5 : 3 D. Data inadequate

Answer & Explanation

Answer: Option B

Explanation:

(20 x 16) women can complete the work in 1 day.

$$\therefore 1 \text{ woman's 1 day's work} = \frac{1}{320}$$

(16 x 15) men can complete the work in 1 day.

$$\therefore 1 \text{ man's 1 day's work} = \frac{1}{240}$$

$$\text{So, required ratio} = \frac{1}{240} : \frac{1}{320}$$

$$= \frac{1}{3} : \frac{1}{4}$$

$$= 4 : 3 \text{ (cross multiplied)}$$

26. A and B can do a work in 8 days, B and C can do the same work in 12 days. A, B and C together can finish it in 6 days. A and C together will do it in :

A. 4 days B. 6 days
C. 8 days D. 12 days

Answer & Explanation

Answer: Option C

Explanation:

$$(A + B + C)\text{'s 1 day's work} = \frac{1}{6}$$

$$(A + B)\text{'s 1 day's work} = \frac{1}{8}$$

$$(B + C)\text{'s 1 day's work} = \frac{1}{12}$$

$$\begin{aligned} \therefore (A + C)\text{'s 1 day's work} &= \left(2 \times \frac{1}{6} \right) - \left(\frac{1}{8} + \frac{1}{12} \right) \\ &= \left(\frac{1}{3} - \frac{5}{24} \right) \\ &= \frac{3}{24} \\ &= \frac{1}{8} \end{aligned}$$

So, A and C together will do the work in 8 days.

27. A can finish a work in 24 days, B in 9 days and C in 12 days. B and C start the work but are forced to leave after 3 days. The remaining work was done by A in:
A. 5 days B. 6 days
C. 10 days D. $10\frac{1}{2}$ days

Answer & Explanation

Answer: Option C

Explanation:

$$(B + C)\text{'s 1 day's work} = \left(\frac{1}{9} + \frac{1}{12}\right) = \frac{7}{36}$$

$$\text{Work done by B and C in 3 days} = \left(\frac{7}{36} \times 3\right) = \frac{7}{12}$$

$$\text{Remaining work} = \left(1 - \frac{7}{12}\right) = \frac{5}{12}$$

Now, $\frac{1}{24}$ work is done by A in 1 day.

$$\text{So, } \frac{5}{12} \text{ work is done by A in } \left(\frac{24}{5} \times \frac{5}{12}\right) = 10 \text{ days.}$$

28. X can do a piece of work in 40 days. He works at it for 8 days and then Y finished it in 16 days. How long will they together take to complete the work?

- A. $13\frac{1}{3}$ days B. 15 days
C. 20 days D. 26 days

Answer & Explanation

Answer: Option A

Explanation:

$$\text{Work done by X in 8 days} = \left(\frac{1}{40} \times 8\right) = \frac{1}{5}$$

$$\text{Remaining work} = \left(1 - \frac{1}{5}\right) = \frac{4}{5}$$

Now, $\frac{4}{5}$ work is done by Y in 16 days.

$$\text{Whole work will be done in } \left(8 + 16\right) = 24 \text{ days}$$

$$\begin{aligned} &\text{by Y in } \frac{4}{3} \text{ days.} \\ \therefore \text{X's 1 day's work} &= \frac{1}{40}, \text{ Y's 1 day's work} = \frac{1}{20} \end{aligned}$$

$$(X + Y)\text{'s 1 day's work} = \left(\frac{1}{40} + \frac{1}{20}\right) = \frac{3}{40}$$

$$\text{Hence, X and Y will together complete the work in } \left(\frac{40}{3}\right) = 13\frac{1}{3} \text{ days.}$$

29. A and B can do a job together in 7 days. A is $\frac{3}{4}$ times as efficient as B. The same job can be done by A alone in :

- A. $9\frac{1}{3}$ days B. 11 days
C. $12\frac{1}{4}$ days D. $16\frac{1}{3}$ days

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{aligned} (\text{A's 1 day's work}) : (\text{B's 1 day's work}) &= 7 : 1 \\ &= \frac{7}{4} : \frac{1}{4} \end{aligned}$$

Let A's and B's 1 day's work be $7x$ and $4x$ respectively.

$$\text{Then, } 7x + 4x = \frac{1}{7} \Rightarrow 11x = \frac{1}{7} \Rightarrow x = \frac{1}{77}$$

$$\therefore \text{A's 1 day's work} = \left(\frac{1}{77} \times 7\right) = \frac{1}{11}$$

30. A and B together can do a piece of work in 30 days. A having worked for 16 days, B finishes the remaining work alone in 44 days. In how many days shall B finish the whole work alone?

- A. 30 days B. 40 days
C. 60 days D. 70 days

Answer & Explanation

Answer: Option C

Explanation:

Let A's 1 day's work = x and B's 1 day's

work = y.

Then, $x + y = \frac{1}{30}$ and $16x + 44y = 1$.

Solving these two equations, we get: $x = \frac{1}{60}$ and $y = \frac{1}{60}$

\therefore B's 1 day's work = $\frac{1}{60}$.

Hence, B alone shall finish the whole work in 60 days.

3) Profit and Loss

1. Alfred buys an old scooter for Rs. 4700 and spends Rs. 800 on its repairs. If he sells the scooter for Rs. 5800, his gain percent is:

A. $4\frac{4}{7}\%$

B. $5\frac{5}{11}\%$

C. 10%

D. 12%

Answer & Explanation

Answer: Option B

Explanation:

Cost Price (C.P.) = Rs. (4700 + 800) = Rs. 5500.

Selling Price (S.P.) = Rs. 5800.

Gain = (S.P.) - (C.P.) = Rs. (5800 - 5500) = Rs. 300.

$$\text{Gain \%} = \left(\frac{300}{5500} \times 100 \right) \% = 5\frac{5}{11} \%$$

2. The cost price of 20 articles is the same as the selling price of x articles. If the profit is 25%, then the value of x is:

A. 15

B. 16

C. 18

D. 25

Answer & Explanation

Answer: Option B

Explanation:

Let C.P. of each article be Re. 1 C.P. of x articles = Rs. x .

S.P. of x articles = Rs. 20.

Profit = Rs. (20 - x).

$$\therefore \left(\frac{20 - x}{x} \times 100 = 25 \right)$$

$$\Rightarrow 2000 - 100x = 25x$$

$$125x = 2000$$

$$\Rightarrow x = 16.$$

3. If selling price is doubled, the profit triples. Find the profit percent.

A. $66\frac{2}{3}\%$

B. 100

C. $105\frac{1}{3}\%$

D. 120

Answer & Explanation

Answer: Option B

Explanation:

Let C.P. be Rs. x and S.P. be Rs. y .

$$\text{Then, } 3(y - x) = (2y - x) \Rightarrow y = 2x.$$

Profit = Rs. ($y - x$) = Rs. ($2x - x$) = Rs. x .

$$\therefore \text{Profit \%} = \left(\frac{x}{x} \times 100 \right) \% = 100\%$$

4. In a certain store, the profit is 320% of the cost. If the cost increases by 25% but the selling price remains constant, approximately what percentage of the selling price is the profit?

A. 30%

B. 70%

C. 100%

D. 250%

Answer & Explanation

Answer: Option B

Explanation:

Let C.P. = Rs. 100. Then, Profit = Rs. 320,
S.P. = Rs. 420.

New C.P. = 125% of Rs. 100 = Rs. 125

New S.P. = Rs. 420.

Profit = Rs. (420 - 125) = Rs. 295.

$$\therefore \text{Required percentage} = \left(\frac{295}{420 - 100} \right) \times 100 = 70\% \text{ (approximately).}$$

5. A vendor bought toffees at 6 for a rupee. How many for a rupee must he sell to gain 20%?

A. 3 B. 4
C. 5 D. 6

Answer & Explanation

Answer: Option C

Explanation:

C.P. of 6 toffees = Re. 1

S.P. of 6 toffees = 120% of Re. 1 = Rs. $\frac{6}{5}$

For Rs. $\frac{6}{5}$, toffees sold = 6.

For Re. 1, toffees sold = $\left(6 \times \frac{5}{6} \right) = 5$.

6. The percentage profit earned by selling an article for Rs. 1920 is equal to the percentage loss incurred by selling the same article for Rs. 1280. At what price should the article be sold to make 25% profit?

A. Rs. 2000 B. Rs. 2200
C. Rs. 2400 D. Data inadequate

Answer & Explanation

Answer: Option A

Explanation:

Let C.P. be Rs. x .

$$\text{Then, } \frac{1920 - x}{x} \times 100 = \frac{x - 1280}{x} \times 100$$

$$\Rightarrow 1920 - x = x - 1280$$

$$\Rightarrow 2x = 3200$$

$$\Rightarrow x = 1600$$

$$\therefore \text{Required S.P.} = \left(\frac{125}{100} \times 1600 \right) = \text{Rs. } 2000.$$

7. A shopkeeper expects a gain of 22.5% on his cost price. If in a week, his sale was of Rs. 392, what was his profit?

A. Rs. 18.20 B. Rs. 70
C. Rs. 72 D. Rs. 88.25

Answer & Explanation

Answer: Option C

Explanation:

$$\text{C.P.} = \left(\frac{100}{122.5} \times 392 \right) = \text{Rs. } 320$$

$$\therefore \text{Profit} = \text{Rs. } (392 - 320) = \text{Rs. } 72.$$

8. A man buys a cycle for Rs. 1400 and sells it at a loss of 15%. What is the selling price of the cycle?

A. Rs. 1090 B. Rs. 1160
C. Rs. 1190 D. Rs. 1202

Answer & Explanation

Answer: Option C

Explanation:

$$\text{S.P.} = 85\% \text{ of Rs. } 1400 = \left(\frac{85}{100} \times 1400 \right) = \text{Rs. } 1190$$

9. Sam purchased 20 dozens of toys at the rate of Rs. 375 per dozen. He sold each one of them at the rate of Rs. 33. What was his percentage profit?

A. 3.5 B. 4.5
C. 5.6 D. 6.5

Answer & Explanation

Answer: Option C

Explanation:

$$\text{Cost Price of 1 toy} = \text{Rs. } \left(\frac{375}{12} \right) = \text{Rs. } 31.25$$

$$\text{Selling Price of 1 toy} = \text{Rs. } 33$$

$$\text{So, Gain} = \text{Rs. } (33 - 31.25) = \text{Rs. } 1.75$$

$$\therefore \text{Profit \%} = \left(\frac{1.75}{31.25} \times 100 \right) \% = \frac{28}{5} \% = 5.6\%$$

10. Some articles were bought at 6 articles for Rs. 5 and sold at 5 articles for Rs. 6. Gain percent is:

A. 30% B. $33\frac{1}{3}\%$
C. 35% D. 44%

Answer & Explanation

Answer: Option D

Explanation:

Suppose, number of articles bought =
L.C.M. of 6 and 5 = 30.

$$\text{C.P. of 30 articles} = \text{Rs. } \left(\frac{5}{6} \times 30 \right) = \text{Rs. } 25.$$

$$\text{S.P. of 30 articles} = \text{Rs. } \left(\frac{6}{5} \times 30 \right) = \text{Rs. } 36.$$

$$\therefore \text{Gain \%} = \left(\frac{11}{25} \times 100 \right) \% = 44\%.$$

11. On selling 17 balls at Rs. 720, there is a loss equal to the cost price of 5 balls. The cost price of a ball is:

A. Rs. 45 B. Rs. 50
C. Rs. 55 D. Rs. 60

Answer & Explanation

Answer: Option D

Explanation:

$$(\text{C.P. of 17 balls}) - (\text{S.P. of 17 balls}) = (\text{C.P. of 5 balls})$$

of 5 balls)

$$\Rightarrow \text{C.P. of 12 balls} = \text{S.P. of 17 balls} = \text{Rs. } 720.$$

$$\Rightarrow \text{C.P. of 1 ball} = \text{Rs. } \left(\frac{720}{12} \right) = \text{Rs. } 60.$$

12. When a plot is sold for Rs. 18,700, the owner loses 15%. At what price must that plot be sold in order to gain 15%?

A. Rs. 21,000 B. Rs. 22,500
C. Rs. 25,300 D. Rs. 25,800

Answer & Explanation

Answer: Option C

Explanation:

$$85 : 18700 = 115 : x$$

$$\Rightarrow x = \left(\frac{18700 \times 115}{85} \right) = 25300.$$

$$\text{Hence, S.P.} = \text{Rs. } 25,300$$

13. 100 oranges are bought at the rate of Rs. 350 and sold at the rate of Rs. 48 per dozen. The percentage of profit or loss is:

A. $14\frac{2}{7}\%$ gain B. 15% gain
C. $14\frac{2}{7}\%$ loss D. 15% loss

Answer & Explanation

Answer: Option A

Explanation:

$$\text{C.P. of 1 orange} = \text{Rs. } \left(\frac{350}{100} \right) = \text{Rs. } 3.50$$

$$\text{S.P. of 1 orange} = \text{Rs. } \left(\frac{48}{12} \right) = \text{Rs. } 4$$

$$\therefore \text{Gain\%} = \left(\frac{0.50}{3.50} \times 100 \right) \% = \frac{100}{7} \% = 14\frac{2}{7}\%$$

14. A shopkeeper sells one transistor for Rs. 840 at a gain of 20% and another for Rs. 960 at a loss of 4%. His total gain or loss percent is:

A. $5\frac{15}{17}\%$ loss B. $5\frac{15}{17}\%$ gain
C. $6\frac{2}{3}\%$ gain D. None of these

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{aligned} \text{C.P. of 1}^{\text{st}} \text{ transistor} &= \left(\frac{100}{120} \times 840 \right) = \text{Rs. } 700. \\ \text{C.P. of 2}^{\text{nd}} \text{ transistor} &= \left(\frac{100}{96} \times 960 \right) = \text{Rs. } 1000 \end{aligned}$$

So, total C.P. = Rs. (700 + 1000) = Rs. 1700.

Total S.P. = Rs. (840 + 960) = Rs. 1800.

$$\therefore \text{Gain \%} = \left(\frac{100}{1700} \times 100 \right) \% = 5\frac{15}{17}\%$$

15. A trader mixes 26 kg of rice at Rs. 20 per kg with 30 kg of rice of other variety at Rs. 36 per kg and sells the mixture at Rs. 30 per kg. His profit percent is:

A. No profit, no loss B. 5%
C. 8% D. 10%
E. None of these

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{aligned} \text{C.P. of 56 kg rice} &= \text{Rs. } (26 \times 20 + 30 \times 36) \\ &= \text{Rs. } (520 + 1080) = \text{Rs. } 1600. \end{aligned}$$

$$\text{S.P. of 56 kg rice} = \text{Rs. } (56 \times 30) = \text{Rs. } 1680.$$

$$\therefore \text{Gain} = \left(\frac{80}{1600} \times 100 \right) \% = 5\%.$$

4. Problems on Ages

1. Father is aged three times more than his son Ronit. After 8 years, he would be two and a half times of Ronit's age. After further 8 years, how many times would he be of Ronit's age?

A. 2 times B. $2\frac{1}{2}$ times
C. $2\frac{3}{4}$ times D. 3 times

Answer & Explanation

Answer: Option A

Explanation:

Let Ronit's present age be x years. Then, father's present age = $(x + 3x)$ years = $4x$ years.

$$\therefore (4x + 8) = \frac{5}{2}(x + 8)$$

$$\Rightarrow 8x + 16 = 5x + 40$$

$$\Rightarrow 3x = 24$$

$$\Rightarrow x = 8.$$

$$\text{Hence, required ratio} = \frac{(4x + 16)}{(x + 16)} = \frac{48}{24} = 2.$$

2. The sum of ages of 5 children born at the intervals of 3 years each is 50 years. What is the age of the youngest child?

A. 4 years B. 8 years
C. 10 years D. None of these

Answer & Explanation

Answer: Option A

Explanation:

Let the ages of children be x , $(x + 3)$, $(x + 6)$, $(x + 9)$ and $(x + 12)$ years.

$$\begin{aligned} \text{Then, } x + (x + 3) + (x + 6) + (x + 9) + (x + 12) \\ = 50 \end{aligned}$$

$$\Rightarrow 5x = 20$$

$$\Rightarrow x = 4.$$

\therefore Age of the youngest child = $x = 4$ years.

3. A father said to his son, "I was as old as you are at the present at the time of your birth". If the father's age is 38 years now, the son's age five years back was:

A. 14 years

B. 19 years

C. 33 years

D. 38 years

Answer & Explanation

Answer: Option A

Explanation:

Let the son's present age be x years. Then, $(38 - x) = x$

$$\Rightarrow 2x = 38.$$

$$\Rightarrow x = 19.$$

\therefore Son's age 5 years back $(19 - 5) = 14$ years.

4. A is two years older than B who is twice as old as C. If the total of the ages of A, B and C be 27, the how old is B?

A. 7

B. 8

C. 9

D. 10

E. 11

Answer & Explanation

Answer: Option D

Explanation:

Let C's age be x years. Then, B's age = $2x$ years. A's age = $(2x + 2)$ years.

$$\therefore (2x + 2) + 2x + x = 27$$

$$\Rightarrow 5x = 25$$

$$\Rightarrow x = 5.$$

Hence, B's age = $2x = 10$ years.

5. Present ages of Sameer and Anand are in the ratio of 5 : 4 respectively. Three years hence, the ratio of their ages will become 11 : 9 respectively. What is Anand's present age in years?

A. 24

B. 27

C. 40

D. Cannot be determined

E. None of these

Answer & Explanation

Answer: Option A

Explanation:

Let the present ages of Sameer and Anand be $5x$ years and $4x$ years respectively.

$$\text{Then, } \frac{5x + 3}{4x + 3} = \frac{11}{9}$$

$$\Rightarrow 9(5x + 3) = 11(4x + 3)$$

$$\Rightarrow 45x + 27 = 44x + 33$$

$$\Rightarrow 45x - 44x = 33 - 27$$

$$\Rightarrow x = 6.$$

\therefore Anand's present age = $4x = 24$ years.

6. A man is 24 years older than his son. In two years, his age will be twice the age of his son. The present age of his son is:

A. 14 years

B. 18 years

C. 20 years

D. 22 years

Answer & Explanation

Answer: Option D

Explanation:

Let the son's present age be x years. Then, man's present age = $(x + 24)$ years.

$$\therefore (x + 24) + 2 = 2(x + 2)$$

$$\Rightarrow x + 26 = 2x + 4$$

$$\Rightarrow x = 22.$$

7. Six years ago, the ratio of the ages of Kunal and Sagar was 6 : 5. Four years hence, the ratio of their ages will be 11 : 10. What is Sagar's age at present?

A. 16 years B. 18 years
C. 20 years D. Cannot be determined
E. None of these

Answer & Explanation

Answer: Option A

Explanation:

Let the ages of Kunal and Sagar 6 years ago be $6x$ and $5x$ years respectively.

$$\text{Then, } \frac{(6x + 6) + 4}{(5x + 6) + 4} = \frac{11}{10}$$

$$\Rightarrow 10(6x + 10) = 11(5x + 10)$$

$$\Rightarrow 5x = 10$$

$$\Rightarrow x = 2.$$

$$\therefore \text{Sagar's present age} = (5x + 6) = 16 \text{ years.}$$

8. The sum of the present ages of a father and his son is 60 years. Six years ago, father's age was five times the age of the son. After 6 years, son's age will be:

A. 12 years B. 14 years
C. 18 years D. 20 years

Answer & Explanation

Answer: Option D

Explanation:

Let the present ages of son and father be x and $(60 - x)$ years respectively.

$$\text{Then, } (60 - x) - 6 = 5(x - 6)$$

$$\Rightarrow 54 - x = 5x - 30$$

$$\Rightarrow 6x = 84$$

$$\Rightarrow x = 14.$$

$$\therefore \text{Son's age after 6 years} = (x + 6) = 20 \text{ years.}$$

9. At present, the ratio between the ages of Arun and Deepak is 4 : 3. After 6 years, Arun's age will be 26 years. What is the age of Deepak at present ?

A. 12 years B. 15 years
C. 19 and half D. 21 years

Answer & Explanation

Answer: Option B

Explanation:

Let the present ages of Arun and Deepak be $4x$ years and $3x$ years respectively. Then,

$$4x + 6 = 26 \quad \Leftrightarrow \quad 4x = 20$$

$$x = 5.$$

$$\therefore \text{Deepak's age} = 3x = 15 \text{ years.}$$

10. Sachin is younger than Rahul by 7 years. If their ages are in the respective ratio of 7 : 9, how old is Sachin?

A. 16 years B. 18 years
C. 28 years D. 24.5 years
E. None of these

Answer & Explanation

Answer: Option D

Explanation:

Let Rahul's age be x years.

$$\text{Then, Sachin's age} = (x - 7) \text{ years.}$$

$$\therefore \frac{x - 7}{x} = \frac{7}{9}$$

$$\Rightarrow 9x - 63 = 7x$$

$$\Rightarrow 2x = 63$$

$$\Rightarrow x = 31.5$$

Hence, Sachin's age $= (x - 7) = 24.5$ years.

11. The present ages of three persons in proportions 4 : 7 : 9. Eight years ago, the sum of their ages was 56. Find their present ages (in years).

A. 8, 20, 28

B. 16, 28, 36

C. 20, 35, 45

D. None of these

Answer & Explanation

Answer: Option B

Explanation:

Let their present ages be $4x$, $7x$ and $9x$ years respectively.

$$\text{Then, } (4x - 8) + (7x - 8) + (9x - 8) = 56$$

$$\Rightarrow 20x = 80$$

$$\Rightarrow x = 4.$$

\therefore Their present ages are $4x = 16$ years, $7x = 28$ years and $9x = 36$ years respectively.

12. Ayesha's father was 38 years of age when she was born while her mother was 36 years old when her brother four years younger to her was born. What is the difference between the ages of her parents?

A. 2 years

B. 4 years

C. 6 years

D. 8 years

Answer & Explanation

Answer: Option C

Explanation:

Mother's age when Ayesha's brother was born = 36 years.

Father's age when Ayesha's brother was born

$$= (38 + 4) \text{ years} = 42 \text{ years.}$$

\therefore Required difference = $(42 - 36)$ years = 6 years.

13. A person's present age is two-fifth of the age of his mother. After 8 years, he will be one-half of the age of his mother. How old is the mother at present?

A. 32 years

B. 36 years

C. 40 years

D. 48 years

Answer & Explanation

Answer: Option C

Explanation:

Let the mother's present age be x years.

Then, the person's present age = $\left(\frac{2}{5}x\right)$ years.

$$\therefore \left(\frac{2}{5}x + 8\right) = \frac{1}{2}(x + 8)$$

$$\Rightarrow 2(2x + 40) = 5(x + 8)$$

$$\Rightarrow x = 40.$$

14. Q is as much younger than R as he is older than T. If the sum of the ages of R and T is 50 years, what is definitely the difference between R and Q's age?

A. 1 year

B. 2 years

C. 25 years

D. Data inadequate

E. None of these

Answer & Explanation

Answer: Option D

Explanation:

Given that:

1. The difference of age b/w R and Q = The difference of age b/w Q and T.

2. Sum of age of R and T is 50 i.e. $(R + T) = 50$.

Question: $R - Q = ?$.

Explanation:

$$R - Q = Q - T$$

$$(R + T) = 2Q$$

Now given that, $(R + T) = 50$

So, $50 = 2Q$ and therefore $Q = 25$.

Question is $(R - Q) = ?$

Here we know the value(age) of Q (25), but we don't know the age of R .

Therefore, $(R - Q)$ cannot be determined.

15. The age of father 10 years ago was thrice the age of his son. Ten years hence, father's age will be twice that of his son. The ratio of their present ages is:

A. 5 : 2 B. 7 : 3
C. 9 : 2 D. 13 : 4

Answer & Explanation

Answer: Option B

Explanation:

Let the ages of father and son 10 years ago be $3x$ and x years respectively.

$$\text{Then, } (3x + 10) + 10 = 2[(x + 10) + 10]$$

$$\Rightarrow 3x + 20 = 2x + 40$$

$$\Rightarrow x = 20.$$

A. 28 $\frac{4}{7}$ years B. 31 $\frac{5}{7}$ years
C. 32 $\frac{1}{7}$ years D. None of these

Answer & Explanation

Answer: Option B

Explanation:

$$\therefore \text{Required ratio} = (3x + 10) : (x + 10) = 70 : 30 = 7 : 3.$$

5. Average

1. In the first 10 overs of a cricket game, the run rate was only 3.2. What should be the run rate in the remaining 40 overs to reach the target of 282 runs?

A. 6.25 B. 6.5
C. 6.75 D. 7

Answer & Explanation

Answer: Option A

Explanation:

$$\text{Required run rate} = \left(\frac{282 - (3.2 \times 10)}{40} \right) = \frac{250}{40} = 6.25$$

2. A family consists of two grandparents, two parents and three grandchildren. The average age of the grandparents is 67 years, that of the parents is 35 years and that of the grandchildren is 6 years. What is the average age of the family?

$$\begin{aligned} \text{Required average} &= \left(\frac{67 \times 2 + 35 \times 2 + 6 \times 3}{2 + 2 + 3} \right) \\ &= \left(\frac{134 + 70 + 18}{7} \right) \\ &= \frac{222}{7} \\ &= 31 \frac{5}{7} \text{ years.} \end{aligned}$$

3. A grocer has a sale of Rs. 6435, Rs. 6927, Rs. 6855, Rs. 7230 and Rs. 6562 for 5

A.Rs. 4991

B.Rs. 5991

C.Rs. 6001

D.Rs. 6991

Answer & Explanation

Answer: Option A

Explanation:

Total sale for 5 months = Rs. $(6435 + 6927 + 6855 + 7230 + 6562)$ = Rs. 34009.

\therefore Required sale = Rs. $[(6500 \times 6) - 34009]$

= Rs. $(39000 - 34009)$

= Rs. 4991.

4. The average of 20 numbers is zero. Of them, at the most, how many may be greater than zero?

A.0

B.1

C.10

D.19

Answer & Explanation

Answer: Option D

Explanation:

Average of 20 numbers = 0.

\therefore Sum of 20 numbers $(0 \times 20) = 0$.

It is quite possible that 19 of these numbers may be positive and if their sum is a then 20th number is $(-a)$.

5. The average weight of 8 person's increases by 2.5 kg when a new person comes in place of one of them weighing 65 kg. What might be the weight of the new person?

A.76 kg

B.76.5 kg

C.85 kg

D.Data inadequate

E.None of these

Answer & Explanation

Answer: Option C

consecutive months. How much sale must he have in the sixth month so that he gets an average sale of Rs. 6500?

Explanation:

Total weight increased = (8×2.5) kg = 20 kg.

Weight of new person = $(65 + 20)$ kg = 85 kg.

6. The captain of a cricket team of 11 members is 26 years old and the wicket keeper is 3 years older. If the ages of these two are excluded, the average age of the remaining players is one year less than the average age of the whole team. What is the average age of the team?

A.23 years

B.24 years

C.25 years

D.None of these

Answer & Explanation

Answer: Option A

Explanation:

Let the average age of the whole team by x years.

$\therefore 11x - (26 + 29) = 9(x - 1)$

$\Rightarrow 11x - 9x = 46$

$\Rightarrow 2x = 46$

$\Rightarrow x = 23$.

So, average age of the team is 23 years.

7. The average monthly income of P and Q is Rs. 5050. The average monthly income of Q and R is Rs. 6250 and the average monthly income of P and R is Rs. 5200. The monthly income of P is:

A.3500

B.4000

C.4050

D.5000

Answer & Explanation

Answer: Option B

Explanation:

Let P, Q and R represent their respective monthly incomes. Then, we have:

$$P + Q = (5050 \times 2) = 10100 \dots (i)$$

$$Q + R = (6250 \times 2) = 12500 \dots (ii)$$

$$P + R = (5200 \times 2) = 10400 \dots (iii)$$

Adding (i), (ii) and (iii), we get: $2(P + Q + R) = 33000$
or $P + Q + R = 16500 \dots (iv)$

Subtracting (ii) from (iv), we get $P = 4000$.

\therefore P's monthly income = Rs. 4000.

8. The average age of husband, wife and their child 3 years ago was 27 years and that of wife and the child 5 years ago was 20 years. The present age of the husband is:

A. 35 years B. 40 years
C. 50 years D. None of these

Answer & Explanation

Answer: Option B

Explanation:

Sum of the present ages of husband, wife and child = $(27 \times 3 + 3 \times 3)$ years = 90 years.

Sum of the present ages of wife and child = $(20 \times 2 + 5 \times 2)$ years = 50 years.

Husband's present age = $(90 - 50)$ years = 40 years.

9. A car owner buys petrol at Rs.7.50, Rs. 8 and Rs. 8.50 per litre for three successive years. What approximately is the average cost per litre of petrol if he spends Rs. 4000 each year?

A. Rs. 7.98 B. Rs. 8
C. Rs. 8.50 D. Rs. 9

Answer & Explanation

Answer: Option A

Explanation:

$$\begin{aligned} \text{Total quantity of petrol consumed in 3 years} &= \left(\frac{400}{7.50} + \frac{400}{8} + \frac{400}{8.50} \right) \text{ litres} \\ &= 4000 \left(\frac{2}{15} + \frac{1}{8} + \frac{2}{17} \right) \text{ litres} \\ &= \left(\frac{76700}{51} \right) \text{ litres} \end{aligned}$$

Total amount spent = Rs. (3×4000) = Rs. 12000.

$$\therefore \text{Average cost} = \left(\frac{12000 \times 51}{76700} \right) = \frac{6120}{767} = \text{Rs. } 7.98$$

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10. In Arun's opinion, his weight is greater than 65 kg but less than 72 kg. His brother does not agree with Arun and he thinks that Arun's weight is greater than 60 kg but less than 70 kg. His mother's view is that his weight cannot be greater than 68 kg. If all are correct in their estimation, what is the average of different probable weights of Arun?

A. 67 kg. B. 68 kg.
C. 69 kg. D. Data inadequate
E. None of these

Answer & Explanation

Answer: Option A

Explanation:

Let Arun's weight be X kg.

According to Arun, $65 < X < 72$

According to Arun's brother, $60 < X < 70$.

According to Arun's mother, $X \leq 68$

The values satisfying all the above conditions are 66, 67 and 68.

$$\therefore \text{Required average} = \left(\frac{66 + 67 + 68}{3} \right) = \left(\frac{201}{3} \right) = 67 \text{ kg.}$$

11. The average weight of A, B and C is 45 kg. If the average weight of A and B be 40 kg and that of B and C be 43 kg, then the weight of B is:

A. 17 kg B. 20 kg
C. 26 kg D. 31 kg

Answer & Explanation

Answer: Option D

Explanation:

Let A, B, C represent their respective weights. Then, we have:

$$A + B + C = (45 \times 3) = 135 \dots (i)$$

$$A + B = (40 \times 2) = 80 \dots (ii)$$

$$B + C = (43 \times 2) = 86 \dots(iii)$$

Adding (ii) and (iii), we get: $A + 2B + C = 166 \dots (iv)$

Subtracting (i) from (iv), we get : $B = 31$.

\therefore B's weight = 31 kg.

12. The average weight of 16 boys in a class is 50.25 kg and that of the remaining 8 boys is 45.15 kg. Find the average weights of all the boys in the class.

A. 47.55 kg B. 48 kg
C. 48.55 kg D. 49.25 kg

Answer & Explanation

Answer: Option C

Explanation:

$$\begin{aligned} \text{Required average} &= \left(\frac{50.25 \times 16 + 45.15 \times 8}{16 + 8} \right) \\ &= \left(\frac{804 + 361.20}{24} \right) \\ &= \frac{1165.20}{24} \\ &= 48.55 \end{aligned}$$

13. A library has an average of 510 visitors on Sundays and 240 on other days. The average number of visitors per day in a month of 30 days beginning with a Sunday is:

A. 250 B. 276
C. 280 D. 285

Answer & Explanation

Answer: Option D

Explanation:

Since the month begins with a Sunday, to there will be five Sundays in the month.

$$\begin{aligned} \text{Required average} &= \left(\frac{510 \times 5 + 240 \times 25}{30} \right) \\ &= \frac{8550}{30} \\ &= 285 \end{aligned}$$

14. If the average marks of three batches of 55, 60 and 45 students respectively is 50, 55, 60, then the average marks of all the students is:

A. 53.33 B. 54.68
C. 55 D. None of these

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{aligned} \text{Required average} &= \left(\frac{55 \times 50 + 60 \times 55 + 45 \times 60}{55 + 60 + 45} \right) \\ &= \left(\frac{2750 + 3300 + 2700}{160} \right) \\ &= \frac{8750}{160} \\ &= 54.68 \end{aligned}$$

15. A pupil's marks were wrongly entered as 83 instead of 63. Due to that the average marks for the class got increased by half ($\frac{1}{2}$). The number of pupils in the class is:

A. 10 B. 20
C. 40 D. 73

Answer & Explanation

Answer: Option C

Explanation:

Let there be x pupils in the class.

$$\text{Total increase in marks} = \left(x \times \frac{1}{2} \right) = \frac{x}{2}$$

$$\therefore \frac{x}{2} = (83 - 63) \Rightarrow \frac{x}{2} = 20 \Rightarrow x = 40.$$

6. Permutation and Combination

1. From a group of 7 men and 6 women, five persons are to be selected to form a committee so that at least 3 men are there on the committee. In how many ways can it be done?

A. 564 B. 645
C. 735 D. 756
E. None of these

Answer & Explanation

Answer: Option D

Explanation:

We may have (3 men and 2 women) or (4 men and 1 woman) or (5 men only).

$$\begin{aligned} \therefore \text{Required number of ways} &= ({}^7C_3 \times {}^6C_2) + ({}^7C_4 \times {}^6C_1) + ({}^7C_5) \\ &= \left(\frac{7 \times 6 \times 5}{3 \times 2 \times 1} \times \frac{6 \times 5}{2 \times 1} \right) + \left(\frac{7 \times 6 \times 5 \times 4}{4 \times 3 \times 2 \times 1} \times \frac{6}{1} \right) + \left(\frac{7 \times 6 \times 5 \times 4 \times 3}{5 \times 4 \times 3 \times 2 \times 1} \right) \\ &= 35 \times 15 + 35 \times 6 + 21 \\ &= 525 + 210 + 21 \\ &= 756 \end{aligned}$$

$$\begin{aligned}
& \begin{array}{ccccc} & 3 & \times & 2 & \times & 2 & \times \\ & 1 & & 1 & & & \\ & & 7 & \times & 6 & \times & 5 \\ & & 3 & \times & 2 & \times & 1 \end{array} \times 6 \\
& = 525 + \left(\begin{array}{c} 7 \times 6 \times 5 \\ 3 \times 2 \times 1 \end{array} \right) + \left(\begin{array}{c} 7 \times 6 \\ 2 \times 1 \end{array} \right) \\
& = (525 + 210 + 21) \\
& = 756.
\end{aligned}$$

2. In how many different ways can the letters of the word 'LEADING' be arranged in such a way that the vowels always come together?

A.360 B.480
C.720 D.5040
E.None of these
Answer & Explanation

Answer: Option C

Explanation:

The word 'LEADING' has 7 different letters.

When the vowels EAI are always together, they can be supposed to form one letter.

Then, we have to arrange the letters LNDG (EAI).

Now, 5 (4 + 1 = 5) letters can be arranged in $5! = 120$ ways.

The vowels (EAI) can be arranged among themselves in $3! = 6$ ways.

\therefore Required number of ways = $(120 \times 6) = 720$.

3. In how many different ways can the letters of the word 'CORPORATION' be arranged so that the vowels always come together?

A.810 B.1440
C.2880 D.50400
E.5760
Answer & Explanation

Answer: Option D

Explanation:

In the word 'CORPORATION', we treat the vowels OOAIO as one letter.

Thus, we have CRPRTN (OOAIO).

This has 7 (6 + 1) letters of which R occurs 2 times and the rest are different.

Number of ways arranging these letters = $\frac{7!}{2!} = 2520$.

Now, 5 vowels in which O occurs 3 times and the rest are different, can be arranged

in $\frac{5!}{3!} = 20$ ways.

\therefore Required number of ways = $(2520 \times 20) = 50400$.

4. Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?

A.210 B.1050
C.25200 D.21400
E.None of these
Answer & Explanation

Answer: Option C

Explanation:

Number of ways of selecting (3 consonants out of 7) and (2 vowels out of 4)

$$\begin{aligned}
& = {}^7C_3 \times {}^4C_2 \\
& = \left(\begin{array}{c} 7 \times 6 \times 5 \times 4 \times 3 \\ 3 \times 2 \times 1 \times 2 \times 1 \end{array} \right) \\
& = 210.
\end{aligned}$$

Number of groups, each having 3 consonants and 2 vowels = 210.

Each group contains 5 letters.

Number of ways of arranging 5 letters among themselves = $5!$
 $= 5 \times 4 \times 3 \times 2 \times 1$
 $= 120$.

\therefore Required number of ways = $(210 \times 120) = 25200$.

5. In how many ways can the letters of the word 'LEADER' be arranged?

A.72 B.144
C.360 D.720
E.None of these
Answer & Explanation

Answer: Option C

Explanation:

The word 'LEADER' contains 6 letters, namely 1L, 2E, 1A, 1D and 1R.

\therefore Required number of ways = $\frac{6!}{(1!)(2!)(1!)(1!)(1!)} = 360$.

6. In a group of 6 boys and 4 girls, four children are to be selected. In how many different ways can they be selected such that at least one boy should be there?

A.159 B.194
C.205 D.209
E.None of these

Answer & Explanation

Answer: Option D

Explanation:

We may have (1 boy and 3 girls) or (2 boys and 2 girls) or (3 boys and 1 girl) or (4 boys).

$$\begin{aligned} \therefore \text{Required number of ways} &= ({}^6C_1 \times {}^4C_3) + ({}^6C_2 \times {}^4C_2) + ({}^6C_3 \times {}^4C_1) + ({}^6C_4) \\ &= ({}^6C_1 \times {}^4C_1) + ({}^6C_2 \times {}^4C_2) + ({}^6C_3 \times {}^4C_1) + ({}^6C_2) \\ &= (6 \times \frac{6 \times 4 \times 3}{1 \times 2 \times 1}) + (\frac{6 \times 5}{2 \times 1} \times \frac{4 \times 3}{2 \times 1}) + (\frac{6 \times 4 \times 3}{3 \times 2 \times 1} \times \frac{4}{1}) + (\frac{6 \times 5}{2 \times 1}) \\ &= (24 + 90 + 80 + 15) \\ &= 209. \end{aligned}$$

7. How many 3-digit numbers can be formed from the digits 2, 3, 5, 6, 7 and 9, which are divisible by 5 and none of the digits is repeated?

A.5 B.10
C.15 D.20

Answer & Explanation

Answer: Option D

Explanation:

Since each desired number is divisible by 5, so we must have 5 at the unit place. So, there is 1 way of doing it.

The tens place can now be filled by any of the remaining 5 digits (2, 3, 6, 7, 9). So, there are 5 ways of filling the tens place.

The hundreds place can now be filled by any of the remaining 4 digits. So, there are 4 ways of filling it.

$$\therefore \text{Required number of numbers} = (1 \times 5 \times 4) = 20.$$

8. In how many ways a committee, consisting of 5 men and 6 women can be formed from 8 men and 10 women?

A.266 B.5040
C.11760 D.86400
E.None of these

Answer & Explanation

Answer: Option C

Explanation:

$$\begin{aligned} \text{Required number of ways} &= ({}^8C_5 \times {}^{10}C_6) \\ &= ({}^8C_3 \times {}^{10}C_4) \\ &= \left(\frac{8 \times 7 \times 6}{3 \times 2 \times 1} \times \frac{10 \times 9 \times 8 \times 7}{4 \times 3 \times 2 \times 1} \right) \\ &= 11760. \end{aligned}$$

9. A box contains 2 white balls, 3 black balls and 4 red balls. In how many ways can 3 balls be drawn from the box, if at least one black ball is to be included in the draw?

A.32 B.48
C.64 D.96
E.None of these
Answer & Explanation

Answer: Option C

Explanation:

We may have (1 black and 2 non-black) or (2 black and 1 non-black) or (3 black).

$$\begin{aligned} \therefore \text{Required number of ways} &= ({}^3C_1 \times {}^6C_2) + ({}^3C_2 \times {}^6C_1) + ({}^3C_3) \\ &= \left(\frac{3 \times 6 \times 5}{2 \times 1} \right) + \left(\frac{3 \times 2}{2 \times 1} \times 6 \right) + 1 \\ &= (45 + 18 + 1) \\ &= 64. \end{aligned}$$

10. In how many different ways can the letters of the word 'DETAIL' be arranged in such a way that the vowels occupy only the odd positions?

A.32 B.48
C.36 D.60
E.120

Answer & Explanation

Answer: Option C

Explanation:

There are 6 letters in the given word, out of which there are 3 vowels and 3 consonants.

Let us mark these positions as under:

(1) (2) (3) (4) (5) (6)

Now, 3 vowels can be placed at any of the three places

out 4, marked 1, 3, 5.

Number of ways of arranging the vowels = ${}^3P_3 = 3! = 6$.

Also, the 3 consonants can be arranged at the remaining 3 positions.

Number of ways of these arrangements = ${}^3P_3 = 3! = 6$.

Total number of ways = $(6 \times 6) = 36$.

11. In how many ways can a group of 5 men and 2 women be made out of a total of 7 men and 3 women?

A.63 B.90

C.126 D.45

E.135

Answer & Explanation

Answer: Option A

Explanation:

$$\begin{aligned} \text{Required number of ways} &= ({}^7C_5 \times {}^3C_2) = \left(\begin{matrix} 7 \times 6 \times 5 \times 4 \times 3 \\ 2 \times 1 \end{matrix} \right) = 63. \\ &({}^7C_2 \times {}^3C_1) = \end{aligned}$$

12. How many 4-letter words with or without meaning, can be formed out of the letters of the word, 'LOGARITHMS', if repetition of letters is not allowed?

A.40 B.400

C.5040 D.2520

Answer & Explanation

Answer: Option C

Explanation:

'LOGARITHMS' contains 10 different letters.

Required number of words = Number of arrangements of 10 letters, taking 4 at a time.

$$= {}^{10}P_4$$

$$= (10 \times 9 \times 8 \times 7)$$

$$= 5040.$$

13. In how many different ways can the letters of the word 'MATHEMATICS' be arranged so that the vowels always come together?

A.10080

B.4989600

C.120960

D.None of these

Answer & Explanation

Answer: Option C

Explanation:

In the word 'MATHEMATICS', we treat the vowels AEAI as one letter.

Thus, we have MTHMTCS (AEAI).

Now, we have to arrange 8 letters, out of which M occurs twice, T occurs twice and the rest are different.

$$\therefore \text{Number of ways of arranging these 8 letters} = \frac{8!}{(2!)(2!)} = 10080.$$

Now, AEAI has 4 letters in which A occurs 2 times and the rest are different.

$$\text{Number of ways of arranging these letters} = \frac{4!}{2!} = 12.$$

$$\therefore \text{Required number of words} = (10080 \times 12) = 120960.$$

14. In how many different ways can the letters of the word 'OPTICAL' be arranged so that the vowels always come together?

A.120

B.720

C.4320

D.2160

E.None of these

Answer & Explanation

Answer: Option B

Explanation:

The word 'OPTICAL' contains 7 different letters.

When the vowels OIA are always together, they can be

supposed to form one letter.

Then, we have to arrange the letters PTCL (OIA).

Now, 5 letters can be arranged in $5! = 120$ ways.

The vowels (OIA) can be arranged among themselves in $3! = 6$ ways.

∴ Required number of ways = $(120 \times 6) = 72$

7. Problems on H.C.F and L.C.M

1. Find the greatest number that will divide 43, 91 and 183 so as to leave the same remainder in each case.

A.4 B.7

C.9 D.13

Answer & Explanation

Answer: Option A

Explanation:

Required number = H.C.F. of $(91 - 43)$, $(183 - 91)$ and $(183 - 43)$

= H.C.F. of 48, 92 and 140 = 4.

2. The H.C.F. of two numbers is 23 and the other two factors of their L.C.M. are 13 and 14. The larger of the two numbers is:

A.276 B.299

C.322 D.345

Answer & Explanation

Answer: Option C

Explanation:

Clearly, the numbers are (23×13) and (23×14) .

∴ Larger number = $(23 \times 14) = 322$.

3. Six bells commence tolling together and toll at intervals of 2, 4, 6, 8, 10 and 12 seconds respectively. In 30 minutes, how many times do they toll together?

A.4 B.10

C.15

D.16

Answer & Explanation

Answer: Option D

Explanation:

L.C.M. of 2, 4, 6, 8, 10, 12 is 120.

So, the bells will toll together after every 120 seconds (2 minutes).

In 30 minutes, they will toll together $\frac{30}{2} + 1 = 16$ times.

4. Let N be the greatest number that will divide 1305, 4665 and 6905, leaving the same remainder in each case. Then sum of the digits in N is:

A.4 B.5

C.6 D.8

Answer & Explanation

Answer: Option A

Explanation:

N = H.C.F. of $(4665 - 1305)$, $(6905 - 4665)$ and $(6905 - 1305)$

= H.C.F. of 3360, 2240 and 5600 = 1120.

Sum of digits in N = $(1 + 1 + 2 + 0) = 4$

5. The greatest number of four digits which is divisible by 15, 25, 40 and 75 is:

A.9000 B.9400

C.9600 D.9800

Answer & Explanation

Answer: Option C

Explanation:

Greatest number of 4-digits is 9999.

L.C.M. of 15, 25, 40 and 75 is 600.

On dividing 9999 by 600, the remainder is 399.

∴ Required number $(9999 - 399) = 9600$.

6. The product of two numbers is 4107. If the H.C.F. of these numbers is 37, then the greater number is:

A.101 B.107

C.111 D.185

Answer & Explanation

Answer: Option C

Explanation:

Let the numbers be $37a$ and $37b$.

Then, $37a \times 37b = 4107$

$\Rightarrow ab = 3$.

Now, co-primes with product 3 are (1, 3).

So, the required numbers are $(37 \times 1, 37 \times 3)$ i.e., (37, 111).

∴ Greater number = 111.

7. Three number are in the ratio of 3 : 4 : 5 and their L.C.M. is 2400. Their H.C.F. is:

A.40 B.80

C.120 D.200

Answer & Explanation

Answer: Option A

Explanation:

Let the numbers be $3x$, $4x$ and $5x$.

Then, their L.C.M. = $60x$.

So, $60x = 2400$ or $x = 40$.

∴ The numbers are (3×40) , (4×40) and (5×40) .

Hence, required H.C.F. = 40.

8. The G.C.D. of 1.08, 0.36 and 0.9 is:

A.0.03 B.0.9

C.0.18

D.0.108

Answer & Explanation

Answer: Option C

Explanation:

Given numbers are 1.08, 0.36 and 0.90. H.C.F. of 108, 36 and 90 is 18,

∴ H.C.F. of given numbers = 0.18.

9. The product of two numbers is 2028 and their H.C.F. is 13. The number of such pairs is:

A.1 B.2

C.3 D.4

Answer & Explanation

Answer: Option B

Explanation:

Let the numbers $13a$ and $13b$.

Then, $13a \times 13b = 2028$

$\Rightarrow ab = 12$.

Now, the co-primes with product 12 are (1, 12) and (3, 4).

[Note: Two integers a and b are said to be **coprime** or relatively prime if they have no common positive factor other than 1 or, equivalently, if their greatest common divisor is 1]

So, the required numbers are $(13 \times 1, 13 \times 12)$ and $(13 \times 3, 13 \times 4)$.

Clearly, there are 2 such pairs.

10. The least multiple of 7, which leaves a remainder of 4, when divided by 6, 9, 15 and 18 is:

A.74 B.94

C.184 D.364

Answer & Explanation

Answer: Option D

Explanation:

L.C.M. of 252, 308 and 198 = 2772.

So, A, B and C will again meet at the starting point in 2772 sec. i.e., 46 min. 12 sec.

16. The H.C.F. of two numbers is 11 and their L.C.M. is 7700. If one of the numbers is 275, then the other is:
A. 279 B. 283

C. 308 D. 318

Answer & Explanation

Answer: Option C

Explanation:

$$\text{Other number} = \left(\frac{11 \times 7700}{275} \right) = 308.$$

17. What will be the least number which when doubled will be exactly divisible by 12, 18, 21 and 30 ?

A. 196 B. 630

C. 1260 D. 2520

Answer & Explanation

Answer: Option B

Explanation:

L.C.M. of 12, 18, 21, 30 $2 \mid 12 - 18 - 21 - 30$

$$= 2 \times 3 \times 2 \times 3 \times 7 \times 5 = 1260. \quad 3 \mid 6 - 9 - 21 - 15$$

$$\text{Required number} = (1260 \div 2) \quad 2 - 3 - 7 - 5$$

$$= 630.$$

18. The ratio of two numbers is 3 : 4 and their H.C.F. is 4. Their L.C.M. is:

A. 12 B. 16

C. 24 D. 48

Answer & Explanation

Answer: Option D

Explanation:

Let the numbers be $3x$ and $4x$. Then, their H.C.F. = x .
 So, $x = 4$.

So, the numbers 12 and 16.

L.C.M. of 12 and 16 = 48.

19. The smallest number which when diminished by 7, is divisible 12, 16, 18, 21 and 28 is:

A. 1008 B. 1015

C. 1022 D. 1032

Answer & Explanation

Answer: Option B

Explanation:

Required number = (L.C.M. of 12, 16, 18, 21, 28) + 7

$$= 1008 + 7$$

$$= 1015$$

20. 252 can be expressed as a product of primes as:

A. $2 \times 2 \times 3 \times 3 \times 7$ B. $2 \times 2 \times 2 \times 3 \times 7$

C. $3 \times 3 \times 3 \times 3 \times 7$ D. $2 \times 3 \times 3 \times 3 \times 7$

Answer & Explanation

Answer: Option A

Explanation:

Clearly, $252 = 2 \times 2 \times 3 \times 3 \times 7$.

21. The greatest possible length which can be used to measure exactly the lengths 7 m, 3 m 85 cm, 12 m 95 cm is:

A. 15 cm B. 25 cm

C. 35 cm D. 42 cm

Answer & Explanation

Answer: Option C

Explanation:

Required length = H.C.F. of 700 cm, 385 cm and 1295 cm = 35 cm.

22. Three numbers which are co-prime to each other are such that the product of the first two is 551 and that of the last two is 1073. The sum of the three numbers is:

A.75 B.81

C.85 D.89

Answer & Explanation

Answer: Option C

Explanation:

Since the numbers are co-prime, they contain only 1 as the common factor.

Also, the given two products have the middle number in common.

So, middle number = H.C.F. of 551 and 1073 = 29;

$$\text{First number } \left(\frac{551}{29} \right) = 19; \quad \text{Third number } \left(\frac{1073}{29} \right) = 37.$$

$$\therefore \text{Required sum} = (19 + 29 + 37) = 85.$$

23. Find the highest common factor of 36 and 84.

A.4 B.6

C.12 D.18

Answer & Explanation

Answer: Option C

Explanation:

$$36 = 2^2 \times 3^2$$

$$84 = 2^2 \times 3 \times 7$$

$$\therefore \text{H.C.F.} = 2^2 \times 3 = 12.$$

24. Which of the following fraction is the largest ?

A. $\frac{7}{8}$ B. $\frac{13}{16}$

C.31 D.63

Answer & Explanation

Answer: Option A

Explanation:

L.C.M. of 8, 16, 40 and 80 = 80.

$$\frac{7}{8} = \frac{70}{80}; \quad \frac{13}{16} = \frac{65}{80}; \quad \frac{31}{40} = \frac{62}{80}$$

$$\frac{7}{8} > \frac{13}{16} > \frac{31}{40}$$

$$\text{Since, } \frac{70}{80} > \frac{65}{80} > \frac{62}{80}, \text{ so } \frac{7}{8} > \frac{13}{16} > \frac{31}{40}$$

$$\frac{7}{8} \text{ is the largest.}$$

25. The least number, which when divided by 12, 15, 20 and 54 leaves in each case a remainder of 8 is:

A.504 B.536

C.544 D.548

Answer & Explanation

Answer: Option D

Explanation:

Required number = (L.C.M. of 12, 15, 20, 54) + 8

$$= 540 + 8$$

$$= 548.$$

26. The greatest number which on dividing 1657 and 2037 leaves remainders 6 and 5 respectively, is:

A.123 B.127

C.235 D.305

Answer & Explanation

Answer: Option B

Explanation:

Required number = H.C.F. of (1657 - 6) and (2037 - 5)

$$= \text{H.C.F. of } 1651 \text{ and } 2032 = 127.$$

27. Which of the following has the most number of divisors?

- A. 99 B. 101
C. 176 D. 182

Answer & Explanation

Answer: Option C

Explanation:

$$99 = 1 \times 3 \times 3 \times 11$$

$$101 = 1 \times 101$$

$$176 = 1 \times 2 \times 2 \times 2 \times 2 \times 11$$

$$182 = 1 \times 2 \times 7 \times 13$$

So, divisors of 99 are 1, 3, 9, 11, 33, 99

Divisors of 101 are 1 and 101

Divisors of 176 are 1, 2, 4, 8, 11, 16, 22, 44, 88 and 176

Divisors of 182 are 1, 2, 7, 13, 14, 26, 91 and 182.

Hence, 176 has the most number of divisors.

28. The L.C.M. of two numbers is 48. The numbers are in the ratio 2 : 3. Then sum of the number is:

- A. 28 B. 32
C. 40 D. 64

Answer & Explanation

Answer: Option C

Explanation:

Let the numbers be $2x$ and $3x$.

Then, their L.C.M. = $6x$.

So, $6x = 48$ or $x = 8$.

∴ The numbers are 16 and 24.

Hence, required sum = $(16 + 24) = 40$.

29. The H.C.F. of 9, 12, 18 and 21 is:

10 25 35 40

- A. 3 B. 252
5 5
C. 3 D. 63
1400 700

Answer & Explanation

Answer: Option C

Explanation:

$$\begin{array}{l} \text{H.C.F. of 9, 12, 18, 21} = 3 \\ \text{Required H.C.F.} = \frac{3}{\text{L.C.M. of 10, 25, 35, 40}} = \frac{3}{1400} \end{array}$$

30. If the sum of two numbers is 55 and the H.C.F. and L.C.M. of these numbers are 5 and 120 respectively, then the sum of the reciprocals of the numbers is equal to:

- A. 55 B. 601
601 55
C. 11 D. 120
120 11

Answer & Explanation

Answer: Option C

Explanation:

Let the numbers be a and b .

Then, $a + b = 55$ and $ab = 5 \times 120 = 600$.

$$\therefore \text{The required sum} = \frac{1}{a} + \frac{1}{b} = \frac{a+b}{ab} = \frac{55}{600} = \frac{11}{120}$$

8. Square Root and Cube Root

1. The cube root of .000216 is:

- A. .6 B. .06
C. .77 D. .87

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{aligned} (.000216)^{1/3} &= \left(\frac{216}{10^6} \right)^{1/3} \\ &= \left(\frac{6 \times 6 \times 6}{10^2 \times 10^2 \times 10^2} \right)^{1/3} \\ &= \frac{6}{10^2} \\ &= \frac{6}{100} \\ &= 0.06 \end{aligned}$$

2. What should come in place of both x in the equation $\frac{x}{128} = \frac{162}{x}$.

- A.12 B.14
C.144 D.196

Answer & Explanation

Answer: Option A

Explanation:

$$\text{Let } \frac{x}{128} = \frac{162}{x}$$

$$\text{Then } x^2 = 128 \times 162$$

$$= 64 \times 2 \times 18 \times 9$$

$$= 8^2 \times 6^2 \times 3^2$$

$$= 8 \times 6 \times 3$$

$$= 144.$$

$$\therefore x = 144 = 12.$$

36 and 66 is:

A.213444 B.214344

C.214434 D.231444

Answer & Explanation

Answer: Option A

Explanation:

L.C.M. of 21, 36, 66 = 2772.

Now, $2772 = 2 \times 2 \times 3 \times 3 \times 7 \times 11$

To make it a perfect square, it must be multiplied by 7×11 .

$$\text{So, required number} = 2^2 \times 3^2 \times 7^2 \times 11^2 = 213444$$

4. 1.5625 = ?

A.1.05 B.1.25

C.1.45 D.1.55

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{array}{r} 1 \overline{) 1.5625} \quad (1.25 \\ \underline{1} \\ 22 \overline{) 56} \\ \underline{44} \\ 245 \overline{) 1225} \\ \underline{1225} \\ X \end{array}$$

$$\therefore 1.5625 = 1.25.$$

5. If $35 + 125 = 17.88$, then what will be the value of $80 + 65$?

A.13.41 B.20.46

C.21.66 D.22.35

Answer & Explanation

3. The least perfect square, which is divisible by each of 21,

Answer: Option D

Explanation:

$$35 + 125 = 17.88$$

$$\Rightarrow 35 + 25 \times 5 = 17.88$$

$$\Rightarrow 35 + 55 = 17.88$$

$$\Rightarrow 85 = 17.88$$

$$\Rightarrow 5 = 2.235$$

$$\therefore 80 + 65 = 16 \times 5 + 65$$

$$= 45 + 65$$

$$= 105 = (10 \times 2.235) = 22.35$$

6. If $a = 0.1039$, then the value of $4a^2 - 4a + 1 + 3a$ is:

A. 0.1039

B. 0.2078

C. 1.1039

D. 2.1039

Answer & Explanation

Answer: Option C

Explanation:

$$4a^2 - 4a + 1 + 3a = (1)^2 + (2a)^2 - 2 \times 1 \times 2a + 3a$$

$$= (1 - 2a)^2 + 3a$$

$$= (1 - 2a) + 3a$$

$$= (1 + a)$$

$$= (1 + 0.1039)$$

$$= 1.1039$$

7. If $x = \frac{3+1}{3-1}$ and $y = \frac{3-1}{3+1}$, then the value of $(x^2 + y^2)$ is:

A. 10

B. 13

C. 14

D. 15

Answer & Explanation

Answer: Option C

Explanation:

$$x = \frac{(3+1)(3+1)(3+1)^2}{(3-1)(3+1)(3-1)} = \frac{3+1+23}{2} = 2+3.$$

$$y = \frac{(3-1)(3-1)(3-1)^2}{(3+1)(3-1)(3-1)} = \frac{3+1-23}{2} = 2-3.$$

$$\therefore x^2 + y^2 = (2+3)^2 + (2-3)^2$$

$$= 2(4+3)$$

$$= 14$$

8. A group of students decided to collect as many paise from each member of group as is the number of members. If the total collection amounts to Rs. 59.29, the number of the member is the group is:

A. 57

B. 67

C. 77

D. 87

Answer & Explanation

Answer: Option C

Explanation:

$$\text{Money collected} = (59.29 \times 100) \text{ paise} = 5929 \text{ paise.}$$

$$\therefore \text{Number of members} = 5929 = 77.$$

9. The square root of $(7+35)(7-35)$ is

A. 5

B. 2

C. 4

D. 35

Answer & Explanation

Answer: Option B

Explanation:

$$(7+35)(7-35) = (7)^2 - (35)^2 = 49 - 1225 = -1176 = 4 = 2.$$

10. If $5 = 2.236$, then the value of $\frac{5}{2} - \frac{10}{5} + 125$ is equal to:

A.5.59

B.7.826

C.8.944

D.10.062

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{array}{r} 5 \ 10 \quad (5)^2 - 20 + 25 \times 55 \\ - \quad + 125 = \\ 2 \ 5 \quad \quad \quad 25 \end{array}$$

$$\begin{array}{r} 5 - 20 + 50 \\ = \\ 25 \end{array}$$

$$\begin{array}{r} 35 \ 5 \\ = \times \\ 25 \ 5 \end{array}$$

$$\begin{array}{r} 355 \\ = \\ 10 \end{array}$$

$$\begin{array}{r} 7 \times 2.236 \\ = \\ 2 \end{array}$$

$$= 7 \times 1.118$$

$$= 7.826$$

11. $\begin{pmatrix} 625 & 14 & 11 \\ \times & \times & \\ 11 & 25 & 196 \end{pmatrix}$ is equal to:

A.5

B.6

C.8

D.11

Answer & Explanation

Answer: Option A

Explanation:

$$\text{Given Expression} = \begin{array}{r} 25 \ 14 \ 11 \\ \times \ \times \ \\ 11 \ 5 \ 14 \end{array} = 5.$$

12. $0.0169 \times ? = 1.3$

A.10

B.100

C.1000

D.None of these

Answer & Explanation

Answer: Option B

Explanation:

$$\text{Let } 0.0169 \times x = 1.3.$$

$$\text{Then, } 0.0169x = (1.3)^2 = 1.69$$

$$\Rightarrow x = \frac{1.69}{0.0169} = 100$$

13. $\begin{pmatrix} 1 \\ 3 - \\ 3 \end{pmatrix}^2$ simplifies to:

A. $\frac{3}{4}$

B. $\frac{4}{3}$

C. $\frac{4}{3}$

D.None of these

Answer & Explanation

Answer: Option C

Explanation:

$$\begin{pmatrix} 1 \\ 3 - \\ 3 \end{pmatrix}^2 = (3)^2 + \begin{pmatrix} 1 \\ 3 \end{pmatrix}^2 - 2 \times 3 \times \frac{1}{3}$$

$$= 3 + \frac{1}{3} - 2$$

$$= 1 + \frac{1}{3}$$

$$= \frac{4}{3}$$

14. How many two-digit numbers satisfy this property.: The

last digit (unit's digit) of the square of the two-digit number is 8 ?

- A.1 B.2
C.3 D.None of these

Answer & Explanation

Answer: Option **D**

Explanation:

A number ending in 8 can never be a perfect square.

15. The square root of 64009 is:

- A.253 B.347
C.363 D.803

Answer & Explanation

Answer: Option **A**

Explanation:

$$\begin{array}{r} 2 \overline{)64009} 253 \\ \underline{4} \\ 240 \\ \underline{225} \\ 1509 \\ \underline{1509} \\ X \\ \underline{} \end{array}$$

$$\therefore 64009 = 253^2$$

9.Chain Rule

1. 3 pumps, working 8 hours a day, can empty a tank in 2 days. How many hours a day must 4 pumps work to empty the tank in 1 day?

- A.9 B.10
C.11 D.12

Answer & Explanation

Answer: Option **D**

Explanation:

Let the required number of working hours per day be x .

More pumps, Less working hours per day (Indirect Proportion)

Less days, More working hours per day (Indirect Proportion)

$$\left. \begin{array}{l} \text{Pumps } 4:3 \\ \text{Days } 1:2 \end{array} \right\} \therefore 8 : x$$

$$\therefore 4 \times 1 \times x = 3 \times 2 \times 8$$

$$\Rightarrow x = \frac{(3 \times 2 \times 8)}{(4)}$$

$$\Rightarrow x = 12.$$

2. If the cost of x metres of wire is d rupees, then what is the cost of y metres of wire at the same rate?

A.Rs. $\left(\frac{xy}{d}\right)$ B.Rs. (xd)

C.Rs. (yd) D.Rs. $\left(\frac{yd}{x}\right)$

Answer & Explanation

Answer: Option **D**

Explanation:

Cost of x metres = Rs. d .

$$\text{Cost of 1 metre} = \text{Rs. } \left(\frac{d}{x}\right)$$

$$\text{Cost of } y \text{ metres} = \text{Rs. } \left(\frac{d}{x} \cdot y\right) = \text{Rs. } \left(\frac{yd}{x}\right).$$

3. Running at the same constant rate, 6 identical machines can produce a total of 270 bottles per minute. At this rate, how many bottles could 10 such machines produce in 4 minutes?

- A.648 B.1800
C.2700 D.10800

Answer & Explanation

Answer: Option B

Explanation:

Let the required number of bottles be x .

More machines, More bottles (Direct Proportion)

More minutes, More bottles (Direct Proportion)

$$\left. \begin{array}{l} \text{Machines} \quad 6:10 \\ \text{Time (in minutes)} 1:4 \end{array} \right\} :: 270 : x$$

$$\therefore 6 \times 1 \times x = 10 \times 4 \times 270$$

$$\Rightarrow x = \frac{(10 \times 4 \times 270)}{(6)}$$

$$\Rightarrow x = 1800.$$

4. A fort had provision of food for 150 men for 45 days. After 10 days, 25 men left the fort. The number of days for which the remaining food will last, is:

$$\frac{1}{5} \quad \frac{1}{4}$$

A.29 B.37

C.42 D.54

Answer & Explanation

Answer: Option C

Explanation:

After 10 days : 150 men had food for 35 days.

Suppose 125 men had food for x days.

Now, *Less men, More days (Indirect Proportion)*

$$\therefore 125 : 150 :: 35 : x \Leftrightarrow 125 \times x = 150 \times 35$$

$$\Rightarrow x = \frac{150 \times 35}{125}$$

$$\Rightarrow x = 42.$$

5. 39 persons can repair a road in 12 days, working 5 hours a day. In how many days will 30 persons, working 6 hours a day, complete the work?

A.10 B.13

C.14 D.15

Answer & Explanation

Answer: Option B

Explanation:

Let the required number of days be x .

Less persons, More days (Indirect Proportion)

More working hours per day, Less days (Indirect Proportion)

$$\left. \begin{array}{l} \text{Persons} \quad 30:39 \\ \text{Working hours/day} \quad 6:5 \end{array} \right\} :: 12 : x$$

$$\therefore 30 \times 6 \times x = 39 \times 5 \times 12$$

$$\Rightarrow x = \frac{(39 \times 5 \times 12)}{(30 \times 6)}$$

$$\Rightarrow x = 13.$$

6. A man completes $\frac{5}{8}$ of a job in 10 days. At this rate, how many more days will it takes him to finish the job?

A.5 B.6

C.7 D. $\frac{7}{2}$

Answer & Explanation

Answer: Option B

Explanation:

$$\text{Work done} = \frac{5}{8}$$

$$\text{Balance work} = \left(1 - \frac{5}{8} \right) = \frac{3}{8}$$

Let the required number of days be x .

$$\text{Then, } \frac{5}{8} : \frac{3}{8} :: 10 : x \Leftrightarrow \frac{5}{8} \times x = \frac{3}{8} \times 10$$

$$\Rightarrow x = \left(\frac{3}{5} \times 10 \times \frac{8}{8} \right)$$

$$\Rightarrow x = 6.$$

7. If a quarter kg of potato costs 60 paise, how many paise will 200 gm cost?

- A. 48 paise B. 54 paise
C. 56 paise D. 72 paise

Answer & Explanation

Answer: Option A

Explanation:

Let the required weight be x kg.

Less weight, Less cost (Direct Proportion)

$$\therefore 250 : 200 :: 60 : x \Leftrightarrow 250 \times x = (200 \times 60)$$

$$\Rightarrow x = \frac{(200 \times 60)}{250}$$

$$\Rightarrow x = 48.$$

8. In a dairy farm, 40 cows eat 40 bags of husk in 40 days. In how many days one cow will eat one bag of husk?

- A. 1 B. $\frac{1}{40}$
C. 40 D. 80

Answer & Explanation

Answer: Option C

Explanation:

Let the required number of days be x .

Less cows, More days (Indirect Proportion)

Less bags, Less days (Direct Proportion)

$$\left. \begin{array}{l} \text{Cows } 1:40 \\ \text{Bags } 40:1 \end{array} \right\} :: 40 : x$$

$$\therefore 1 \times 40 \times x = 40 \times 1 \times 40$$

$$\Rightarrow x = 40.$$

9. A wheel that has 6 cogs is meshed with a larger wheel of 14 cogs. When the smaller wheel has made 21 revolutions, then the number of revolutions made by the larger wheel is:

- A. 4 B. 9
C. 12 D. 49

Answer & Explanation

Answer: Option B

Explanation:

Let the required number of revolutions made by larger wheel be x .

Then, More cogs, Less revolutions (Indirect Proportion)

$$\therefore 14 : 6 :: 21 : x \Leftrightarrow 14 \times x = 6 \times 21$$

$$\Rightarrow x = \frac{6 \times 21}{14}$$

$$\Rightarrow x = 9.$$

10. If 7 spiders make 7 webs in 7 days, then 1 spider will make 1 web in how many days?

- A. 1 B. $\frac{7}{2}$
C. 7 D. 49

Answer & Explanation

Answer: Option C

Explanation:

Let the required number days be x .

Less spiders, More days (Indirect Proportion)

Less webs, Less days (Direct Proportion)

$$\left. \begin{array}{l} \text{Spiders } 1:7 \\ \text{Webs } 7:1 \end{array} \right\} :: 7 : x$$

$$\therefore 1 \times 7 \times x = 7 \times 1 \times 7$$

$$\Rightarrow x = 7.$$

11. A flagstaff 17.5 m high casts a shadow of length 40.25 m. The height of the building, which casts a shadow of length 28.75 m under similar conditions will be:

- A. 10 m B. 12.5 m
C. 17.5 m D. 21.25 m

Answer & Explanation

Answer: Option B

Explanation:

Let the height of the building x metres.

Less lengthy shadow, Less in the height (Direct Proportion)

$$\therefore 40.25 : 28.75 :: 17.5 : x \Leftrightarrow 40.25 \times x = 28.75 \times 17.5$$

$$x = \frac{28.75 \times 17.5}{40.25}$$

$$\Rightarrow x = 12.5$$

12. In a camp, there is a meal for 120 men or 200 children. If 150 children have taken the meal, how many men will be catered to with remaining meal?

- A. 20 B. 30
C. 40 D. 50

Answer & Explanation

Answer: Option B

Explanation:

There is a meal for 200 children. 150 children have taken the meal.

Remaining meal is to be catered to 50 children.

Now, 200 children \equiv 120 men.

$$50 \text{ children} \equiv \left(\frac{120}{200} \times 50 \right) = 30 \text{ men.}$$

13. An industrial loom weaves 0.128 metres of cloth every second. Approximately, how many seconds will it take for the loom to weave 25 metres of cloth?

- A. 178 B. 195
C. 204 D. 488

Answer & Explanation

Answer: Option B

Explanation:

Let the required time be x seconds.

More metres, More time (Direct Proportion)

$$\therefore 0.128 : 25 :: 1 : x \Leftrightarrow 0.128x = 25 \times 1$$

$$x = \frac{25 \times 1000}{0.128 \times 128}$$

$$\Rightarrow x = 195.31.$$

$$\therefore \text{Required time} = 195 \text{ sec (approximately).}$$

14. 36 men can complete a piece of work in 18 days. In how many days will 27 men complete the same work?

- A. 12 B. 18
C. 22 D. 24
E. None of these

Answer & Explanation

Answer: Option D

Explanation:

Let the required number of days be x .

Less men, More days (Indirect Proportion)

$$\therefore 27 : 36 :: 18 : x \Leftrightarrow 27 \times x = 36 \times 18$$

$$\Rightarrow x = \frac{36 \times 18}{27}$$

$$\Rightarrow x = 24.$$

15. 4 mat-weavers can weave 4 mats in 4 days. At the same rate, how many mats would be woven by 8 mat-weavers in 8 days?

- A.4 B.8
C.12 D.16

Answer & Explanation

Answer: Option D

Explanation:

Let the required number of bottles be x .

More weavers, More mats (Direct Proportion)

More days, More mats (Direct Proportion)

$$\left. \begin{array}{l} \text{Wavers} 4:8 \\ \text{Days} \quad 4:8 \end{array} \right\} :: 4 : x$$

$$\therefore 4 \times 4 \times x = 8 \times 8 \times 4$$

$$\Rightarrow x = \frac{(8 \times 8 \times 4)}{(4 \times 4)}$$

$$\Rightarrow x = 16.$$

10. Alligation or Mixture

1. A vessel is filled with liquid, 3 parts of which are water and 5 parts syrup. How much of the mixture must be drawn off and replaced with water so that the mixture may be half water and half syrup?

- A. $\frac{1}{3}$ B. $\frac{1}{4}$
C. $\frac{1}{5}$ D. $\frac{1}{7}$

Answer & Explanation

Answer: Option C

Explanation:

Suppose the vessel initially contains 8 litres of liquid.

Let x litres of this liquid be replaced with water.

$$\text{Quantity of water in new mixture} = \left(3 - \frac{3x}{8} + x \right) \text{ litres}$$

$$\text{Quantity of syrup in new mixture} = \left(5 - \frac{5x}{8} \right) \text{ litres}$$

$$\therefore \left(3 - \frac{3x}{8} + x \right) = \left(5 - \frac{5x}{8} \right)$$

$$\Rightarrow 5x + 24 = 40 - 5x$$

$$\Rightarrow 10x = 16$$

$$\Rightarrow x = \frac{8}{5}$$

$$\text{So, part of the mixture replaced} = \left(\frac{8}{5} \times \frac{1}{8} \right) = \frac{1}{5}$$

2. Tea worth Rs. 126 per kg and Rs. 135 per kg are mixed with a third variety in the ratio 1 : 1 : 2. If the mixture is worth Rs. 153 per kg, the price of the third variety per kg will be:

- A.Rs. 169.50 B.Rs. 170
C.Rs. 175.50 D.Rs. 180

Answer & Explanation

Answer: Option C

Explanation:

Since first and second varieties are mixed in equal proportions.

$$\text{So, their average price} = \text{Rs.} \left(\frac{126 + 135}{2} \right) = \text{Rs. } 130.50$$

So, the mixture is formed by mixing two varieties, one at Rs. 130.50 per kg and the other at say, Rs. x per kg in the ratio 2 : 2, i.e., 1 : 1. We have to find x .

By the rule of alligation, we have:

Cost of 1 kg of 1st kind Cost of 1 kg tea of 2nd kind

Rs. 130.50	Mean Price	Rs. x
$(x - 153)$	Rs. 153	22.50

$$\therefore \frac{x - 153}{22.50} = 1$$

$$\Rightarrow x - 153 = 22.50$$

$$\Rightarrow x = 175.50$$

3. A can contains a mixture of two liquids A and B is the ratio 7 : 5. When 9 litres of mixture are drawn off and the can is filled with B, the ratio of A and B becomes 7 : 9. How many litres of liquid A was contained by the can initially?

- A.10 B.20
C.21 D.25

Answer & Explanation

Answer: Option C

Explanation:

Suppose the can initially contains $7x$ and $5x$ of mixtures A and B respectively.

$$\text{Quantity of A in mixture left} = \left(\frac{7x}{12} - \frac{x}{9} \right) \text{ litres} = \left(\frac{7x}{12} - \frac{x}{9} \right) \text{ litres.}$$

$$\text{Quantity of B in mixture left} = \left(\frac{5x}{12} + \frac{x}{9} \right) \text{ litres} = \left(\frac{5x}{12} + \frac{x}{9} \right) \text{ litres.}$$

$$\left(\frac{7x}{12} - \frac{x}{9} \right) = 7$$

$$\therefore \left(\frac{5x}{12} + \frac{x}{9} \right) = 9$$

$$\Rightarrow \frac{28x - 21}{20x + 21} = \frac{7}{9}$$

$$\Rightarrow 252x - 189 = 140x + 147$$

$$\Rightarrow 112x = 336$$

$$\Rightarrow x = 3.$$

So, the can contained 21 litres of A.

4. A milk vendor has 2 cans of milk. The first contains 25% water and the rest milk. The second contains 50% water. How much milk should he mix from each of the containers so as to get 12 litres of milk such that the ratio of water to milk is 3 : 5?
- A.4 litres, 8 litres B.6 litres, 6 litres
C.5 litres, 7 litres D.7 litres, 5 litres

Answer & Explanation

Answer: Option B

Explanation:

Let the cost of 1 litre milk be Re. 1

$$\begin{array}{ccc} \text{Milk in 1 litre mix. in 1}^{st} \text{ litre, C.P. of 1 litre mix. in 1}^{st} & & \\ \text{can} = & \frac{3}{4} & \text{can Re.} \end{array}$$

$$\begin{array}{ccc} \text{Milk in 1 litre mix. in 2}^{nd} \text{ litre, C.P. of 1 litre mix. in 2}^{nd} & & \\ \text{can} = & \frac{1}{2} & \text{can Re.} \end{array}$$

$$\begin{array}{ccc} \text{Milk in 1 litre of final mix.} & = & \frac{5}{8} \text{ litre, Mean price} = \text{Re.} \end{array}$$

By the rule of alligation, we have:

C.P. of 1 litre mixture in 1st can C.P. of 1 litre mixture in 2nd can

3		1
4	Mean Price	2
	5	
1		1
	8	
8		8

$$\therefore \text{Ratio of two mixtures} = \frac{1}{8} : \frac{1}{8} = 1 : 1.$$

So, quantity of mixture taken from each can = $\left(\frac{1}{2} \times 12 \right) = 6$ litres.

5. In what ratio must a grocer mix two varieties of pulses costing Rs. 15 and Rs. 20 per kg respectively so as to get a mixture worth Rs. 16.50 kg?

A. 3 : 7 B. 5 : 7

C. 7 : 3 D. 7 : 5

Answer & Explanation

Answer: Option C

Explanation:

By the rule of alligation:

Cost of 1 kg pulses of 1st kind Cost of 1 kg pulses of 2nd kind

Rs. 15	Mean Price	Rs. 20
3.50	Rs. 16.50	1.50

$$\therefore \text{Required rate} = 3.50 : 1.50 = 7 : 3.$$

6. A dishonest milkman professes to sell his milk at cost price but he mixes it with water and thereby gains 25%. The percentage of water in the mixture is:

A. 4% B. $\frac{1}{6} \frac{1}{4}\%$

C. 20% D. 25%

Answer & Explanation

Answer: Option C

Explanation:

Let C.P. of 1 litre milk be Re. 1

Then, S.P. of 1 litre of mixture = Re. 1, Gain = 25%.

$$\text{C.P. of 1 litre mixture} = \text{Re.} \left(\frac{100}{125} \times 1 \right) = \frac{4}{5}$$

By the rule of alligation, we have:

C.P. of 1 litre of milk C.P. of 1 litre of water

Re. 1	Mean Price	0
4	4	1
	Re.	
5	5	5

$$\therefore \text{Ratio of milk to water} = \frac{4}{5} : \frac{1}{5} = 4 : 1.$$

Hence, percentage of water in the mixture = $\left(\frac{1}{5} \times 100 \right) = 20\%.$

7. How many kilogram of sugar costing Rs. 9 per kg must be mixed with 27 kg of sugar costing Rs. 7 per kg so that there may be a gain of 10% by selling the mixture at Rs. 9.24 per kg?

A. 36 kg B. 42 kg

C. 54 kg D. 63 kg

Answer & Explanation

Answer: Option D

Explanation:

S.P. of 1 kg of mixture = Rs. 9.24, Gain 10%.

$$\therefore \text{C.P. of 1 kg of mixture} = \text{Rs.} \left(\frac{100}{110} \times 9.24 \right) = \text{Rs.} 8.40$$

By the rule of alligation, we have:

C.P. of 1 kg sugar of 1st kind Cost of 1 kg sugar of 2nd kind

Rs. 9	Mean Price	Rs. 7
1.40	Rs. 8.40	0.60

∴ Ratio of quantities of 1st and 2nd kind = 14 : 6 = 7 : 3.

Let x kg of sugar of 1st be mixed with 27 kg of 2nd kind.

Then, $7 : 3 = x : 27$

$$\Rightarrow x = \left(\frac{7 \times 27}{3} \right) = 63 \text{ kg.}$$

8. A container contains 40 litres of milk. From this container 4 litres of milk was taken out and replaced by water. This process was repeated further two times. How much milk is now contained by the container?

- A. 26.34 litres B. 27.36 litres
C. 28 litres D. 29.16 litres

Answer & Explanation

Answer: Option D

Explanation:

Amount of milk left after 3 operations = $\left[40 \left(1 - \frac{4}{40} \right)^3 \right]$ litres

$$= \left(40 \times \frac{9}{10} \times \frac{9}{10} \times \frac{9}{10} \right) = 29.16 \text{ litres.}$$

9. A jar full of whisky contains 40% alcohol. A part of this whisky is replaced by another containing 19% alcohol and now the percentage of alcohol was found to be 26%. The quantity of whisky replaced is:

- A. $\frac{1}{3}$ B. $\frac{2}{3}$
C. $\frac{2}{5}$ D. $\frac{3}{5}$

Answer & Explanation

Answer: Option B

Explanation:

By the rule of alligation, we have:

Strength of first jar Strength of 2nd jar

40%	Mean	19%
	Strength	
7	26%	14

So, ratio of 1st and 2nd quantities = 7 : 14 = 1 : 2

∴ Required quantity replaced = $\frac{2}{3}$

10. In what ratio must water be mixed with milk to gain 16 $\frac{2}{3}$ % on selling the mixture at cost price?

- A. 1 : 6 B. 6 : 1
C. 2 : 3 D. 4 : 3

Answer & Explanation

Answer: Option A

Explanation:

Let C.P. of 1 litre milk be Re. 1.

S.P. of 1 litre of mixture = Re. 1, Gain = $\frac{50}{3}$ %.

$$\therefore \text{C.P. of 1 litre of mixture} = \left(100 \times \frac{3}{350} \times 1 \right) = \frac{6}{7}$$

By the rule of alligation, we have:

C.P. of 1 litre of water C.P. of 1 litre of milk

0	Mean Price	Re. 1
1	6	6
7	Re. 7	7

∴ Ratio of water and milk = 1:6 = 1 : 6.

11. Find the ratio in which rice at Rs. 7.20 a kg be mixed with rice at Rs. 5.70 a kg to produce a mixture worth Rs.

6.30 a kg.

A. 1 : 3

B. 2 : 3

C. 3 : 4

D. 4 : 5

Answer & Explanation

Answer: Option B

Explanation:

By the rule of alligation:

Cost of 1 kg of 1st kind Cost of 1 kg of 2nd kind

720 p	Mean Price	570 p
60	630 p	90

∴ Required ratio = 60 : 90 = 2 : 3.

12. In what ratio must a grocer mix two varieties of tea worth Rs. 60 a kg and Rs. 65 a kg so that by selling the mixture at Rs. 68.20 a kg he may gain 10%?

A. 3 : 2

B. 3 : 4

C. 3 : 5

D. 4 : 5

Answer & Explanation

Answer: Option A

Explanation:

S.P. of 1 kg of the mixture = Rs. 68.20, Gain = 10%.

C.P. of 1 kg of the mixture = Rs. $\left(\frac{100}{110} \times 68.20 \right)$ = Rs. 62.

By the rule of alligation, we have:

Cost of 1 kg tea of 1st kind. Cost of 1 kg tea of 2nd kind.

Rs. 60	Mean Price	Rs. 65
3	Rs. 62	2

∴ Required ratio = 3 : 2.

13. The cost of Type 1 rice is Rs. 15 per kg and Type 2 rice is Rs. 20 per kg. If both Type 1 and Type 2 are mixed in

the ratio of 2 : 3, then the price per kg of the mixed variety of rice is:

A. Rs. 18

B. Rs. 18.50

C. Rs. 19

D. Rs. 19.50

Answer & Explanation

Answer: Option A

Explanation:

Let the price of the mixed variety be Rs. x per kg.

By rule of alligation, we have:

Cost of 1 kg of Type 1 rice Cost of 1 kg of Type 2 rice

Rs. 15	Mean Price	Rs. 20
(20 - x)	Rs. x	(x - 15)

$$\therefore \frac{(20 - x) \cdot 2}{(x - 15) \cdot 3} =$$

$$\Rightarrow 60 - 3x = 2x - 30$$

$$\Rightarrow 5x = 90$$

$$\Rightarrow x = 18.$$

14. 8 litres are drawn from a cask full of wine and is then filled with water. This operation is performed three more times. The ratio of the quantity of wine now left in cask to that of water is 16 : 65. How much wine did the cask hold originally?

A. 18 litres

B. 24 litres

C. 32 litres

D. 42 litres

Answer & Explanation

Answer: Option B

Explanation:

Let the quantity of the wine in the cask originally be x litres.

Then, quantity of wine left in cask after 4 operations = $\left[x \left(\frac{18}{x} \right)^4 \right]$ litres.

$$\therefore \left(\frac{x(1 - (8/x))^4}{x} \right) = \frac{16}{81}$$

$$\Rightarrow \left(1 - \frac{8}{x} \right)^4 = \left(\frac{2}{3} \right)^4$$

$$\Rightarrow \left(\frac{x-8}{x} \right)^4 = \frac{2}{3}$$

$$\Rightarrow 3x - 24 = 2x$$

$$\Rightarrow x = 24.$$

15. A merchant has 1000 kg of sugar, part of which he sells at 8% profit and the rest at 18% profit. He gains 14% on the whole. The quantity sold at 18% profit is:

- A. 400 kg B. 560 kg
C. 600 kg D. 640 kg

Answer & Explanation

Answer: Option C

Explanation:

By the rule of alligation, we have:

Profit on 1st part Profit on 2nd part

8%	Mean Profit	18%
4	14%	6

Ration of 1st and 2nd parts = 4 : 6 = 2 : 3

$$\therefore \text{Quantity of 2nd kind} = \left(\frac{3}{5} \times 1000 \right)_{\text{kg}} = 600 \text{ kg.}$$

11. Stocks and Shares

1. In order to obtain an income of Rs. 650 from 10% stock at Rs. 96, one must make an investment of:

- A. Rs. 3100 B. Rs. 6240
C. Rs. 6500 D. Rs. 9600

Answer & Explanation

Answer: Option B

Explanation:

To obtain Rs. 10, investment = Rs. 96.

$$\text{To obtain Rs. 650, investment} = \left(\frac{96}{10} \times \frac{650}{6240} \right) = \text{Rs. 6240.}$$

2. A man bought 20 shares of Rs. 50 at 5 discount, the rate

of dividend being 13%. The rate of interest obtained is:

- A. 12% B. 13%
2 2
C. 15% D. 16%
3 3

Answer & Explanation

Answer: Option C

Explanation:

Investment = Rs. [20 x (50 - 5)] = Rs. 900.

Face value = Rs. (50 x 20) = Rs. 1000.

$$\text{Dividend} = \text{Rs.} \left(\frac{27}{2} \times \frac{1000}{100} \right) = \text{Rs. 135.}$$

$$\text{Interest obtained} = \left(\frac{135}{900} \times 100 \right) \% = 15\%$$

- 3.

Which is better investment: 11% stock at 143 or 9% stock at 117?

A. 11% stock at 143

B. 9% stock at 117
3
4

C. Both are equally good

D. Cannot be compared, as the total amount of investment

is not given.

Answer & Explanation

Answer: Option B

Explanation:

Let investment in each case be Rs. (143 x 117).

$$\text{Income in 1}^{\text{st}} \text{ case} = \text{Rs.} \left(\frac{11}{143} \times 143 \times 117 \right) = \text{Rs.} 1287.$$

$$\text{Income in 2}^{\text{nd}} \text{ case} = \left(\frac{39}{4 \times 117} \times 143 \times 117 \right) = \text{Rs.} 1394.25$$

Clearly, $9\frac{3}{4}\%$ stock at 117 is better.

4. A man buys Rs. 20 shares paying 9% dividend. The man wants to have an interest of 12% on his money. The market value of each share is:

- A. Rs. 12 B. Rs. 15
C. Rs. 18 D. Rs. 21

Answer & Explanation

Answer: Option B

Explanation:

$$\text{Dividend on Rs. 20} = \text{Rs.} \left(\frac{9}{100} \times 20 \right) = \text{Rs.} \frac{9}{5}$$

Rs. 12 is an income on Rs. 100.

$$\therefore \text{Rs.} \frac{9}{5} \text{ is an income on Rs.} \left(\frac{100 \times 9}{12 \times 5} \right) = \text{Rs.} 15.$$

5. By investing in $16\frac{2}{3}\%$ stock at 64, one earns Rs. 1500. The investment made is:

- A. Rs. 5640 B. Rs. 5760

C. Rs. 7500

D. Rs. 9600

Answer & Explanation

Answer: Option B

Explanation:

To earn Rs. $\frac{50}{3}$, investment = Rs. 64.

$$\text{To earn Rs. 1500, investment} = \left(\frac{64 \times 3}{50} \times 1500 \right) = \text{Rs.} 5760.$$

6. A 6% stock yields 8%. The market value of the stock is:

- A. Rs. 48 B. Rs. 75
C. Rs. 96 D. Rs. 133.33

Answer & Explanation

Answer: Option B

Explanation:

For an income of Rs. 8, investment = Rs. 100.

$$\text{For an income of Rs. 6, investment} = \left(\frac{100 \times 6}{8} \right) = \text{Rs.} 75.$$

\therefore Market value of Rs. 100 stock = Rs. 75.

7. A man invested Rs. 4455 in Rs. 10 shares quoted at Rs. 8.25. If the rate of dividend be 12%, his annual income is:

- A. Rs. 207.40 B. Rs. 534.60
C. Rs. 648 D. Rs. 655.60

Answer & Explanation

Answer: Option C

Explanation:

$$\text{Number of shares} = \left(\frac{4455}{8.25} \right) = 540.$$

Face value = Rs. (540 x 10) = Rs. 5400.

$$\text{Annual income} = \text{Rs.} \left(\frac{12}{100} \times 5400 \right) = \text{Rs.} 648.$$

$$\text{For an income Re. 1 in 12\% stock at 120,} \left(\frac{120}{12} \right) = \text{Rs.} 10.$$

$$\text{investment} = \text{Rs.}$$

8. Rs. 9800 are invested partly in 9% stock at 75 and 10% stock at 80 to have equal amount of incomes. The investment in 9% stock is:

[A.](#)Rs. 4800 [B.](#)Rs. 5000

[C.](#)Rs. 5400 [D.](#)Rs. 5600

[Answer & Explanation](#)

Answer: Option B

Explanation:

Let the investment in 9% stock be Rs. x .

Then, investment in 10% stock = Rs. $(9800 - x)$.

$$\frac{9}{75} \times x = \frac{10}{80} \times (9800 - x)$$

$$\Rightarrow \frac{3x}{25} = \frac{9800 - x}{8}$$

$$\Rightarrow 24x = 9800 \times 25 - 25x$$

$$\Rightarrow 49x = 9800 \times 25$$

$$\Rightarrow x = 5000.$$

9. A man invests some money partly in 9% stock at 96 and partly in 12% stock at 120. To obtain equal dividends from both, he must invest the money in the ratio:

[A.](#)3 : 4 [B.](#)3 : 5

[C.](#)4 : 5 [D.](#)16 : 15

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$\text{For an income of Re. 1 in 9\% stock at 96,} \left(\frac{96}{9} \right) = \text{Rs.} 32$$

$$\text{investment} = \text{Rs.}$$

$$\therefore \text{Ratio of investments} = \frac{32}{3} : 10 = 32 : 30 = 16 : 15.$$

10. By investing Rs. 1620 in 8% stock, Michael earns Rs. 135. The stock is then quoted at:

[A.](#)Rs. 80 [B.](#)Rs. 96

[C.](#)Rs. 106 [D.](#)Rs. 108

[Answer & Explanation](#)

Answer: Option B

Explanation:

To earn Rs. 135, investment = Rs. 1620.

$$\text{To earn Rs. 8, investment} = \text{Rs.} \left(\frac{1620}{135} \times 8 \right) = \text{Rs.} 96.$$

\therefore Market value of Rs. 100 stock = Rs. 96.

11. A man invested Rs. 1552 in a stock at 97 to obtain an income of Rs. 128. The dividend from the stock is:

[A.](#)7.5%

[B.](#)8%

[C.](#)9.7%

[D.](#)None of these

[Answer & Explanation](#)

Answer: Option B

Explanation:

By investing Rs. 1552, income = Rs. 128.

$$\text{By investing Rs. 97, income} = \text{Rs.} \left(\frac{128}{1552} \times 97 \right) = \text{Rs.} 8.$$

\therefore Dividend = 8%

12. A 12% stock yielding 10% is quoted at:

[A.](#)Rs. 83.33

[B.](#)Rs. 110

[C.](#)Rs. 112

[D.](#)Rs. 120

Answer & Explanation

Answer: Option D

Explanation:

To earn Rs. 10, money invested = Rs. 100.

$$\text{To earn Rs. 12, money invested} = \left(\frac{100}{10} \times \frac{12}{12} \right) = \text{Rs. 120.}$$

∴ Market value of Rs. 100 stock = Rs. 120.

13. The market value of a 10.5% stock, in which an income of Rs. 756 is derived by investing Rs. 9000, brokerage being $\frac{1}{4}\%$, is:

A.Rs. 108.25 B.Rs. 112.20

C.Rs. 124.75 D.Rs. 125.25

Answer & Explanation

Answer: Option C

Explanation:

For an income of Rs. 756, investment = Rs. 9000.

$$\text{For an income of } \frac{21}{2}\%, \text{ investment} = \left(\frac{9000}{756} \times \frac{21}{2} \right) = \text{Rs. 124.75}$$

∴ For a Rs. 100 stock, investment = Rs. 125.

$$\text{Market value of Rs. 100 stock} = \left(\frac{125}{1} \times \frac{1}{4} \right) = \text{Rs. 124.75}$$

14. The cost price of a Rs. 100 stock at 4 discount, $\frac{1}{4}\%$ is: when brokerage is

A.Rs. 95.75 B.Rs. 96

C.Rs. 96.25 D.Rs. 104.25

Answer & Explanation

Answer: Option C

Explanation:

$$\text{C.P.} = \text{Rs.} \left(100 - 4 + \frac{1}{4} \right) = \text{Rs. 96.25}$$

15. Sakshi invests a part of Rs. 12,000 in 12% stock at Rs. 120 and the remainder in 15% stock at Rs. 125. If his total dividend per annum is Rs. 1360, how much does he invest in 12% stock at Rs. 120?

A.Rs. 4000

B.Rs. 4500

C.Rs. 5500

D.Rs. 6000

Answer & Explanation

Answer: Option A

Explanation:

Let investment in 12% stock be Rs. x .

Then, investment in 15% stock = Rs. $(12000 - x)$.

$$\therefore \frac{12}{120} \times x + \frac{15}{125} \times (12000 - x) = 1360.$$

$$\Rightarrow \frac{x}{10} + \frac{3}{25} (12000 - x) = 1360.$$

$$\Rightarrow 5x + 72000 - 6x = 1360 \times 50$$

$$\Rightarrow x = 4000$$

12 Banker's Discount

1. The banker's discount on a bill due 4 months hence at 15% is Rs. 420. The true discount is:

A.Rs. 400

B.Rs. 360

C.Rs. 480

D.Rs. 320

Answer & Explanation

Answer: Option A

Explanation:

$$\text{T.D.} = \text{B.D.} \times 100$$

$$100 + (R \times T)$$

$$\text{Rate} \times \text{Time}$$

$$10 \times 2$$

$$= \text{Rs.} \left[\frac{420 \times 100}{100 + \left(15 \times \frac{1}{3} \right)} \right]$$

$$= \text{Rs.} \left(\frac{420 \times 100}{105} \right)$$

$$= \text{Rs. } 400.$$

2. The banker's discount on Rs. 1600 at 15% per annum is the same as true discount on Rs. 1680 for the same time and at the same rate. The time is:

[A.](#) 3 months

[B.](#) 4 months

[C.](#) 6 months

[D.](#) 8 months

[Answer & Explanation](#)

Answer: Option B

Explanation:

S.I. on Rs. 1600 = T.D. on Rs. 1680.

∴ Rs. 1600 is the P.W. of Rs. 1680, i.e., Rs. 80 is on Rs. 1600 at 15%.

$$\therefore \text{Time} = \left(\frac{100 \times 80}{1600 \times 15} \right) \text{year} \times \frac{1}{3} = \text{year} = 4 \text{ months.}$$

3. The banker's gain of a certain sum due 2 years hence at 10% per annum is Rs. 24. The present worth is:

[A.](#) Rs. 480

[B.](#) Rs. 520

[C.](#) Rs. 600

[D.](#) Rs. 960

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$\text{T.D.} = \left(\frac{\text{B.G.} \times 100}{\text{Rate} \times \text{Time}} \right) = \text{Rs.} \left(\frac{24 \times 100}{10 \times 2} \right) = \text{Rs. } 120.$$

$$\therefore \text{P.W.} = 100 \times \text{T.D.} = \text{Rs.} \left(100 \times 120 \right) = \text{Rs. } 600.$$

4. The banker's discount on a sum of money for $1\frac{1}{2}$ years is Rs. 558 and the true discount on the same sum for 2 years is Rs. 600. The rate percent is:

[A.](#) 10%

[B.](#) 13%

[C.](#) 12%

[D.](#) 15%

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$\text{B.D. for } \frac{3}{2} \text{ years} = \text{Rs. } 558.$$

$$\begin{aligned} \text{B.D. for 2 years} &= \text{Rs.} \left(558 \times \frac{2}{3} \times 2 \right) \\ &= \text{Rs. } 744 \end{aligned}$$

$$\text{T.D. for 2 years} = \text{Rs. } 600.$$

$$\therefore \text{Sum} = \frac{\text{B.D.} \times \text{T.D.}}{\text{B.D.} - \text{T.D.}} = \text{Rs.} \left(\frac{744 \times 600}{144} \right) = \text{Rs. } 3100.$$

Thus, Rs. 744 is S.I. on Rs. 3100 for 2 years.

$$\therefore \text{Rate} = \left(\frac{100 \times 744}{3100 \times 2} \right) \% = 12\%$$

5. The banker's gain on a sum due 3 years hence at 12% per annum is Rs. 270. The banker's discount is:

[A.](#) Rs. 960

[B.](#) Rs. 840

[C.](#) Rs. 1020

[D.](#) Rs. 760

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$T.D. = \left(\frac{B.G. \times 100}{R \times T} \right) = Rs. \left(\frac{270 \times 100}{12 \times 3} \right) = Rs. 750.$$

$$\therefore B.D. = Rs.(750 + 270) = Rs. 1020.$$

6. The banker's discount of a certain sum of money is Rs. 72 and the true discount on the same sum for the same time is Rs. 60. The sum due is:

A.Rs. 360

B.Rs. 432

C.Rs. 540

D.Rs. 1080

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$\begin{array}{l} \text{Sum} \\ = \end{array} \frac{B.D. \times T.D.}{B.D. - T.D.} = Rs. \left(\frac{72 \times 60}{72 - 60} \right) = Rs. \left(\frac{72 \times 60}{12} \right) = Rs. 360.$$

7. The certain worth of a certain sum due sometime hence is Rs. 1600 and the true discount is Rs. 160. The banker's gain is:

A.Rs. 20

B.Rs. 24

C.Rs. 16

D.Rs. 12

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$B.G. = \frac{(T.D.)^2}{P.W.} = Rs. \left(\frac{160 \times 160}{1600} \right) = Rs. 16.$$

8. The present worth of a certain bill due sometime hence is Rs. 800 and the true discount is Rs. 36. The banker's discount is:

A.Rs. 37

B.Rs. 37.62

C.Rs. 34.38

D.Rs. 38.98

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$B.G. = \frac{(T.D.)^2}{P.W.} = Rs. \left(\frac{36 \times 36}{800} \right) = Rs. 1.62$$

$$\therefore B.D. = (T.D. + B.G.) = Rs. (36 + 1.62) = Rs. 37.62$$

9. The banker's gain on a bill due 1 year hence at 12% per annum is Rs. 6. The true discount is:

A.Rs. 72

B.Rs. 36

C.Rs. 54

D.Rs. 50

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$T.D. = \frac{B.G. \times 100}{R \times T} = Rs. \left(\frac{6 \times 100}{12 \times 1} \right) = Rs. 50.$$

10. The banker's gain on a certain sum due 1 $\frac{1}{2}$ years hence is $\frac{3}{25}$ of the banker's

discount. The rate percent is:

A. $5\frac{1}{5}\%$

B. $9\frac{1}{11}\%$

C. $8\frac{1}{8}\%$

D. $6\frac{1}{6}\%$

[Answer & Explanation](#)

Answer: Option B

Explanation:

Let, B.D = Re. 1.

$$\text{Then, } B.G. = Re. \frac{3}{25}$$

$$\therefore \text{T.D.} = (\text{B.D.} - \text{B.G.}) = \text{Re.} \left(1 - \frac{3}{25} \right) = \text{Re.} \frac{22}{25}$$

$$\text{Sum} = \left(\frac{1 \times (22/25)}{1 - (22/25)} \right) = \text{Rs.} \frac{22}{3}$$

$$\text{S.I. on Rs.} \frac{22}{3} \text{ for } \frac{1}{2} \text{ years is Re. } 1.$$

$$\therefore \text{Rate} = \left(\frac{100 \times 1}{\frac{22}{3} \times \frac{1}{2}} \right) \% = \frac{100}{11} = 9 \frac{1}{11} \%$$

11. The present worth of a sum due sometime hence is Rs. 576 and the banker's gain is Rs. 16. The true discount is:
[A.](#)Rs. 36 [B.](#)Rs. 72

[C.](#)Rs. 48 [D.](#)Rs. 96

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$\text{T.D.} = \text{P.W.} \times \text{B.G.} = 576 \times 16 = 96.$$

12. The true discount on a bill of Rs. 540 is Rs. 90. The banker's discount is:
[A.](#)Rs. 60 [B.](#)Rs. 108

[C.](#)Rs. 110 [D.](#)Rs. 112

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\text{P.W.} = \text{Rs.} (540 - 90) = \text{Rs.} 450.$$

$$\therefore \text{S.I. on Rs. } 450 = \text{Rs. } 90.$$

$$\text{S.I. on Rs. } 540 = \text{Rs.} \left(\frac{90}{450} \times 540 \right) = \text{Rs. } 108.$$

$$\therefore \text{B.D.} = \text{Rs. } 108.$$

13. The banker's discount on a certain sum due 2 years hence is $\frac{11}{10}$ of the true discount.

The rate percent is:

[A.](#)11% [B.](#)10%

[C.](#)5% [D.](#)5.5%

[Answer & Explanation](#)

Answer: Option C

Explanation:

Let T.D. be Re. 1.

$$\text{Then, B.D.} = \text{Rs.} \frac{11}{10} = \text{Rs. } 1.10.$$

$$\therefore \text{Sum} = \text{Rs.} \left(\frac{1.10 \times 1}{1.10 - 1} \right) = \text{Rs.} \left(\frac{110}{10} \right) = \text{Rs. } 11.$$

$$\therefore \text{S.I. on Rs. } 11 \text{ for } 2 \text{ years is Rs. } 1.10$$

$$\therefore \text{Rate} = \left(\frac{100 \times 1.10}{11 \times 2} \right) \% = 5\%.$$

13. [Time and Distance](#)

1. A person crosses a 600 m long street in 5 minutes. What is his speed in km per hour?

[A.](#)3.6 [B.](#)7.2

[C.](#)8.4 [D.](#)10

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\text{Speed} = \left(\frac{600}{5 \times 60} \right) \text{m/sec.}$$

$$= 2 \text{ m/sec.}$$

Converting m/sec to km/hr (see [important formulas](#))

section)

$$= \left(2 \times \frac{18}{5} \right) \text{ km/hr}$$

$$= 7.2 \text{ km/hr.}$$

2. An aeroplane covers a certain distance at a speed of 240 kmph in 5 hours. To cover the same distance in $1\frac{2}{3}$ hours, it must travel at a speed of:

- [A.](#) 300 kmph [B.](#) 360 kmph
[C.](#) 600 kmph [D.](#) 720 kmph

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$\text{Distance} = (240 \times 5) = 1200 \text{ km.}$$

$$\text{Speed} = \text{Distance/Time}$$

$$\text{Speed} = 1200 / (5/3) \text{ km/hr.} \quad [\text{We can write } 1\frac{2}{3} \text{ hours as } 5/3 \text{ hours}]$$

$$\therefore \text{Required speed} = \left(1200 \times \frac{3}{5} \right) \text{ km/hr} = 720 \text{ km/hr.}$$

3. If a person walks at 14 km/hr instead of 10 km/hr, he would have walked 20 km more. The actual distance travelled by him is:

- [A.](#) 50 km [B.](#) 56 km
[C.](#) 70 km [D.](#) 80 km

[Answer & Explanation](#)

Answer: Option A

Explanation:

Let the actual distance travelled be x km.

$$\frac{x}{10} = \frac{x + 20}{14}$$

$$\Rightarrow 14x = 10x + 200$$

$$\Rightarrow 4x = 200$$

$$\Rightarrow x = 50 \text{ km.}$$

4. A train can travel 50% faster than a car. Both start from point A at the same time and reach point B 75 kms away from A at the same time. On the way, however, the train lost about 12.5 minutes while stopping at the stations. The speed of the car is:

- [A.](#) 100 kmph [B.](#) 110 kmph
[C.](#) 120 kmph [D.](#) 130 kmph

[Answer & Explanation](#)

Answer: Option C

Explanation:

Let speed of the car be x kmph.

$$\text{Then, speed of the train} = \frac{150}{100} x = \left(\frac{3}{2} x \right) \text{ kmph.}$$

$$\therefore \frac{75}{x} - \frac{75}{(3/2)x} = \frac{125}{10 \times 60}$$

$$\Rightarrow \frac{75}{x} - \frac{50}{x} = \frac{5}{24}$$

$$\Rightarrow x = \left(\frac{25 \times 24}{5} \right) = 120 \text{ kmph.}$$

5. Excluding stoppages, the speed of a bus is 54 kmph and including stoppages, it is 45 kmph. For how many minutes does the bus stop per hour?

- [A.](#) 9 [B.](#) 10
[C.](#) 12 [D.](#) 20

[Answer & Explanation](#)

Answer: Option B

Explanation:

Due to stoppages, it covers 9 km less.

$$\text{Time taken to cover 9 km} = \left(\frac{9}{54} \times 60 \right)_{\text{min}} = 10 \text{ min.}$$

6. In a flight of 600 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/hr and the time of flight increased by 30 minutes. The duration of the flight is:

[A.](#) 1 hour [B.](#) 2 hours

[C.](#) 3 hours [D.](#) 4 hours

[Answer & Explanation](#)

Answer: Option A

Explanation:

Let the duration of the flight be x hours.

$$\text{Then, } \frac{600}{x} - \frac{600}{x + (1/2)} = 200$$

$$\Rightarrow \frac{600}{x} - \frac{1200}{2x + 1} = 200$$

$$\Rightarrow x(2x + 1) = 3$$

$$\Rightarrow 2x^2 + x - 3 = 0$$

$$\Rightarrow (2x + 3)(x - 1) = 0$$

$$\Rightarrow x = 1 \text{ hr. [neglecting the -ve value of } x]$$

7. A man complete a journey in 10 hours. He travels first half of the journey at the rate of 21 km/hr and second half at the rate of 24 km/hr. Find the total journey in km.

[A.](#) 220 km [B.](#) 224 km

[C.](#) 230 km [D.](#) 234 km

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\frac{(1/2)x}{21} + \frac{(1/2)x}{24} = 10$$

$$\Rightarrow x + x = 20$$

$$21 \quad 24$$

$$\Rightarrow 15x = 168 \times 20$$

$$\Rightarrow x = \left(\frac{168 \times 20}{15} \right) = 224 \text{ km.}$$

8. The ratio between the speeds of two trains is 7 : 8. If the second train runs 400 km in 4 hours, then the speed of the first train is:

[A.](#) 70 km/hr [B.](#) 75 km/hr

[C.](#) 84 km/hr [D.](#) 87.5 km/hr

[Answer & Explanation](#)

Answer: Option D

Explanation:

Let the speed of two trains be $7x$ and $8x$ km/hr.

$$\text{Then, } 8x = \left(\frac{400}{4} \right) = 100$$

$$\Rightarrow x = \left(\frac{100}{8} \right) = 12.5$$

$$\therefore \text{Speed of first train} = (7 \times 12.5) \text{ km/hr} = 87.5 \text{ km/hr.}$$

9. A man on tour travels first 160 km at 64 km/hr and the next 160 km at 80 km/hr. The average speed for the first 320 km of the tour is:

[A.](#) 35.55 km/hr [B.](#) 36 km/hr

[C.](#) 71.11 km/hr [D.](#) 71 km/hr

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$\text{Total time taken} = \left(\frac{160}{64} + \frac{160}{80} \right)_{\text{hrs.}} = \frac{9}{2} \text{ hrs.}$$

$$\therefore \text{Average speed} = \left(\frac{320 \times 2}{9} \right)_{\text{km/hr}} = 71.11 \text{ km/hr.}$$

10. A car travelling with $\frac{5}{7}$ of its actual speed covers 42 km in 1 hr 40 min 48 sec. Find the actual speed of the car.

A. $17\frac{6}{7}$ km/hr B. 25 km/hr
C. 30 km/hr D. 35 km/hr

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$\begin{aligned} \text{Time taken} &= 1 \text{ hr } 40 \text{ min } 48 \text{ sec} = 1 \text{ hr } 40 \frac{4}{5} \text{ min} = 1 \frac{51}{75} \text{ hrs} = 1 \frac{126}{75} \text{ hrs.} \\ &= 1 \text{ hr } 40 \frac{4}{5} \text{ min} = 1 \frac{51}{75} \text{ hrs} = 1 \frac{126}{75} \text{ hrs.} \end{aligned}$$

Let the actual speed be x km/hr.

$$\text{Then, } \frac{x}{7} \times \frac{126}{75} = 42$$

$$\Rightarrow x = \left(\frac{42 \times 7 \times 75}{5 \times 126} \right) = 35 \text{ km/hr.}$$

11. In covering a distance of 30 km, Abhay takes 2 hours more than Sameer. If Abhay doubles his speed, then he would take 1 hour less than Sameer. Abhay's speed is:

A. 5 kmph B. 6 kmph
C. 6.25 kmph D. 7.5 kmph

[Answer & Explanation](#)

Answer: Option A

Explanation:

Let Abhay's speed be x km/hr.

$$\text{Then, } \frac{30}{x} - \frac{30}{2x} = 3$$

$$\Rightarrow 6x = 30$$

$$\Rightarrow x = 5 \text{ km/hr.}$$

12. Robert is travelling on his cycle and has calculated to reach point A at 2 P.M. if he travels at 10 kmph, he will reach there at 12 noon if he travels at 15 kmph. At what speed must he travel to reach A at 1 P.M.?

A. 8 kmph B. 11 kmph
C. 12 kmph D. 14 kmph

[Answer & Explanation](#)

Answer: Option C

Explanation:

Let the distance travelled by x km.

$$\text{Then, } \frac{x}{10} - \frac{x}{15} = 2$$

$$\Rightarrow 3x - 2x = 60$$

$$\Rightarrow x = 60 \text{ km.}$$

$$\text{Time taken to travel 60 km at 10 km/hr} = \left(\frac{60}{10} \right) \text{ hrs} = 6 \text{ hrs.}$$

So, Robert started 6 hours before 2 P.M. *i.e.*, at 8 A.M.

$$\therefore \text{Required speed} = \left(\frac{60}{5} \right) \text{ kmph.} = 12 \text{ kmph.}$$

13. It takes eight hours for a 600 km journey, if 120 km is done by train and the rest by car. It takes 20 minutes more, if 200 km is done by train and the rest by car. The ratio of the speed of the train to that of the cars is:

A. 2 : 3 B. 3 : 2
C. 3 : 4 D. 4 : 3

[Answer & Explanation](#)

Answer: Option C

Explanation:

Let the speed of the train be x km/hr and that of the car be y km/hr.

$$\text{Then, } \frac{120}{x} + \frac{480}{y} = 8 \Rightarrow \frac{1}{x} + \frac{4}{y} = \frac{2}{15} \dots(i)$$

$$\text{And, } \frac{200}{x} + \frac{400}{y} = 25 \Rightarrow \frac{1}{x} + \frac{2}{y} = \frac{5}{24} \dots(ii)$$

Solving (i) and (ii), we get: $x = 60$ and $y = 80$.

\therefore Ratio of speeds = $60 : 80 = 3 : 4$.

14. A farmer travelled a distance of 61 km in 9 hours. He travelled partly on foot @ 4 km/hr and partly on bicycle @ 9 km/hr. The distance travelled on foot is:

- A. 14 km B. 15 km
C. 16 km D. 17 km

[Answer & Explanation](#)

Answer: Option C

Explanation:

Let the distance travelled on foot be x km.

Then, distance travelled on bicycle = $(61 - x)$ km.

$$\text{So, } \frac{x}{4} + \frac{(61 - x)}{9} = 9$$

$$\Rightarrow 9x + 4(61 - x) = 9 \times 36$$

$$\Rightarrow 5x = 80$$

$$\Rightarrow x = 16 \text{ km.}$$

15. A man covered a certain distance at some speed. Had he moved 3 kmph faster, he would have taken 40 minutes less. If he had moved 2 kmph slower, he would have taken 40 minutes more. The distance (in km) is:

- A. 35 B. 36
C. 37 D. 40

[Answer & Explanation](#)

Answer: Option D

Explanation:

Let distance = x km and usual rate = y kmph.

$$\text{Then, } \frac{x}{y} - \frac{x}{y+3} = \frac{40}{60} \Rightarrow 2y(y+3) = 9x \dots(i)$$

$$\text{And, } \frac{x}{y} - \frac{x}{y-2} = \frac{40}{60} \Rightarrow y(y-2) = 3x \dots(ii)$$

On dividing (i) by (ii), we get: $x = 40$

14. Simple Interest

1. A sum of money at simple interest amounts to Rs. 815 in 3 years and to Rs. 854 in 4 years. The sum is:

- A. Rs. 650 B. Rs. 690
C. Rs. 698 D. Rs. 700

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$\text{S.I. for 1 year} = \text{Rs. } (854 - 815) = \text{Rs. } 39.$$

$$\text{S.I. for 3 years} = \text{Rs. } (39 \times 3) = \text{Rs. } 117.$$

$$\therefore \text{Principal} = \text{Rs. } (815 - 117) = \text{Rs. } 698.$$

2. Mr. Thomas invested an amount of Rs. 13,900 divided in two different schemes A and B at the simple interest rate of 14% p.a. and 11% p.a. respectively. If the total amount of simple interest earned in 2 years be Rs. 3508, what was the amount invested in Scheme B?

- A. Rs. 6400 B. Rs. 6500
C. Rs. 7200 D. Rs. 7500

E. None of these

[Answer & Explanation](#)

Answer: Option A

Explanation:

Let the sum invested in Scheme A be Rs. x and that in Scheme B be Rs. $(13900 - x)$.

$$\text{Then, } \left(\frac{x \times 14 \times 2}{100} \right) + \left(\frac{(13900 - x) \times 11 \times 2}{100} \right) = 3508$$

$$\Rightarrow 28x - 22x = 350800 - (13900 \times 22)$$

$$\Rightarrow 6x = 45000$$

$$\Rightarrow x = 7500.$$

So, sum invested in Scheme B = Rs. $(13900 - 7500)$ = Rs. 6400.

3. A sum fetched a total simple interest of Rs. 4016.25 at the rate of 9 p.c.p.a. in 5 years. What is the sum?

[A.](#) Rs. 4462.50

[B.](#) Rs. 8032.50

[C.](#) Rs. 8900

[D.](#) Rs. 8925

[E.](#) None of these

[Answer & Explanation](#)

Answer: Option **D**

Explanation:

$$\text{Principal} = \text{Rs. } \left(\frac{4016.25}{9 \times 5} \right)$$

$$= \text{Rs. } \left(\frac{401625}{45} \right)$$

$$= \text{Rs. } 8925.$$

4. How much time will it take for an amount of Rs. 450 to yield Rs. 81 as interest at 4.5% per annum of simple interest?

[A.](#) 3.5 years

[B.](#) 4 years

[C.](#) 4.5 years

[D.](#) 5 years

[Answer & Explanation](#)

Answer: Option **B**

Explanation:

$$\text{Time} = \left(\frac{100 \times 81}{450 \times 4.5} \right) \text{ years} = 4 \text{ years.}$$

5. Reena took a loan of Rs. 1200 with simple interest for as many years as the rate of interest. If she paid Rs. 432 as interest at the end of the loan period, what was the rate of interest?

[A.](#) 3.6

[B.](#) 6

[C.](#) 18

[D.](#) Cannot be determined

[E.](#) None of these

[Answer & Explanation](#)

Answer: Option **B**

Explanation:

Let rate = $R\%$ and time = R years.

$$\text{Then, } \left(\frac{1200 \times R \times R}{100} \right) = 432$$

$$\Rightarrow 12R^2 = 432$$

$$\Rightarrow R^2 = 36$$

$$\Rightarrow R = 6.$$

6. A sum of Rs. 12,500 amounts to Rs. 15,500 in 4 years at the rate of simple interest. What is the rate of interest?

[A.](#) 3%

[B.](#) 4%

[C.](#) 5%

[D.](#) 6%

[E.](#) None of these

[Answer & Explanation](#)

Answer: Option **D**

Explanation:

$$\text{S.I.} = \text{Rs. } (15500 - 12500) = \text{Rs. } 3000.$$

$$\text{Rate} = \left(\frac{100 \times 3000}{12500 \times 4} \right) \% = 6\%$$

7. An automobile financier claims to be lending money at

simple interest, but he includes the interest every six months for calculating the principal. If he is charging an interest of 10%, the effective rate of interest becomes:

- [A.](#) 10% [B.](#) 10.25%
[C.](#) 10.5% [D.](#) None of these

[Answer & Explanation](#)

Answer: Option B

Explanation:

Let the sum be Rs. 100. Then,

$$\text{S.I. for first 6 months} = \text{Rs.} \left(\frac{100 \times 10 \times 1}{100 \times 2} \right) = \text{Rs. } 5$$

$$\text{S.I. for last 6 months} = \text{Rs.} \left(\frac{105 \times 10 \times 1}{100 \times 2} \right) = \text{Rs. } 5.25$$

So, amount at the end of 1 year = Rs. (100 + 5 + 5.25) = Rs. 110.25

$$\therefore \text{Effective rate} = (110.25 - 100) = 10.25\%$$

8. A lent Rs. 5000 to B for 2 years and Rs. 3000 to C for 4 years on simple interest at the same rate of interest and received Rs. 2200 in all from both of them as interest. The rate of interest per annum is:

- [A.](#) 5% [B.](#) 7%
[C.](#) $7\frac{1}{8}\%$ [D.](#) 10%

[Answer & Explanation](#)

Answer: Option D

Explanation:

Let the rate be R% p.a.

$$\text{Then,} \left(\frac{5000 \times R \times 2}{100} \right) + \left(\frac{3000 \times R \times 4}{100} \right) = 2200.$$

$$\Rightarrow 100R + 120R = 2200$$

$$\Rightarrow R = \left(\frac{2200}{220} \right) = 10.$$

220

$$\therefore \text{Rate} = 10\%.$$

9. A sum of Rs. 725 is lent in the beginning of a year at a certain rate of interest. After 8 months, a sum of Rs. 362.50 more is lent but at the rate twice the former. At the end of the year, Rs. 33.50 is earned as interest from both the loans. What was the original rate of interest?

- [A.](#) 3.6% [B.](#) 4.5%
[C.](#) 5% [D.](#) 6%
[E.](#) None of these

[Answer & Explanation](#)

Answer: Option E

Explanation:

Let the original rate be R%. Then, new rate = (2R)%.

Note:

Here, original rate is for 1 year(s); the new rate is for only 4 months i.e. $\frac{1}{3}$ year(s).

$$\therefore \left(\frac{725 \times R \times 1}{100} \right) + \left(\frac{362.50 \times 2R \times 1}{100 \times 3} \right) = 33.50$$

$$\Rightarrow (2175 + 725) R = 33.50 \times 100 \times 3$$

$$\Rightarrow (2175 + 725) R = 10050$$

$$\Rightarrow (2900)R = 10050$$

$$\Rightarrow R = \frac{10050}{2900} = 3.46$$

$$\therefore \text{Original rate} = 3.46\%$$

10. A man took loan from a bank at the rate of 12% p.a. simple interest. After 3 years he had to pay Rs. 5400 interest only for the period. The principal amount borrowed by him was:

- [A.](#) Rs. 2000 [B.](#) Rs. 10,000
[C.](#) Rs. 15,000 [D.](#) Rs. 20,000

Answer: Option C

$$\left(\frac{P \times R \times 9}{100} \right) = 9PR$$

Explanation:

$$\text{Principal} = \text{Rs.} \left(\frac{100 \times 5400}{12 \times 3} \right) = \text{Rs.} 15000.$$

11. A sum of money amounts to Rs. 9800 after 5 years and Rs. 12005 after 8 years at the same rate of simple interest. The rate of interest per annum is:

[A.](#) 5% [B.](#) 8%
[C.](#) 12% [D.](#) 15%

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$\text{S.I. for 3 years} = \text{Rs.} (12005 - 9800) = \text{Rs.} 2205.$$

$$\text{S.I. for 5 years} = \text{Rs.} \left(\frac{2205}{3} \times 5 \right) = \text{Rs.} 3675$$

$$\therefore \text{Principal} = \text{Rs.} (9800 - 3675) = \text{Rs.} 6125.$$

$$\text{Hence, rate} = \left(\frac{100 \times 3675}{6125 \times 5} \right) \% = 12\%$$

12. What will be the ratio of simple interest earned by certain amount at the same rate of interest for 6 years and that for 9 years?

[A.](#) 1 : 3 [B.](#) 1 : 4
[C.](#) 2 : 3 [D.](#) Data inadequate

[E.](#) None of these

[Answer & Explanation](#)

Answer: Option C

Explanation:

Let the principal be P and rate of interest be R%.

$$\therefore \text{Required ratio} = \left(\frac{P \times R \times 6}{P \times R \times 9} \right) = \frac{6PR}{9PR} = \frac{2}{3}.$$

13. A certain amount earns simple interest of Rs. 1750 after 7 years. Had the interest been 2% more, how much more interest would it have earned?

[A.](#) Rs. 35 [B.](#) Rs. 245
[C.](#) Rs. 350 [D.](#) Cannot be determined
[E.](#) None of these

[Answer & Explanation](#)

Answer: Option D

Explanation:

We need to know the S.I., principal and time to find the rate.

Since the principal is not given, so data is inadequate.

14. A person borrows Rs. 5000 for 2 years at 4% p.a. simple interest. He immediately lends it to another person at $6\frac{1}{4}$ p.a for 2 years. Find his gain in the transaction per year.

[A.](#) Rs. 112.50 [B.](#) Rs. 125
[C.](#) Rs. 150 [D.](#) Rs. 167.50

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$\begin{aligned} \text{Gain in 2 years} &= \left[\left(\frac{5000 \times 25}{4 \times 100} \right) - \left(\frac{5000 \times 4 \times 2}{100} \right) \right] \\ &= \text{Rs.} (625 - 400) \\ &= \text{Rs.} 225. \end{aligned}$$

$$\therefore \text{Gain in 1 year} = \text{Rs.} \left(\frac{225}{2} \right) = \text{Rs.} 112.50$$

15. Partnership

1. A and B invest in a business in the ratio 3 : 2. If 5% of the total profit goes to charity and A's share is Rs. 855, the total profit is:

A.Rs. 1425

B.Rs. 1500

C.Rs. 1537.50

D.Rs. 1576

Answer & Explanation

Answer: Option B

Explanation:

Let the total profit be Rs. 100.

After paying to charity, A's share = Rs. $\left(95 \times \frac{3}{5}\right)$ = Rs. 57.

If A's share is Rs. 57, total profit = Rs. 100.

If A's share Rs. 855, total profit = $\left(\frac{100}{57} \times 855\right)$ = 1500.

2. A, B and C jointly thought of engaging themselves in a business venture. It was agreed that A would invest Rs. 6500 for 6 months, B, Rs. 8400 for 5 months and C, Rs. 10,000 for 3 months. A wants to be the working member for which, he was to receive 5% of the profits. The profit earned was Rs. 7400. Calculate the share of B in the profit.

A.Rs. 1900

B.Rs. 2660

C.Rs. 2800

D.Rs. 2840

Answer & Explanation

Answer: Option B

Explanation:

For managing, A received = 5% of Rs. 7400 = Rs. 370.

Balance = Rs. (7400 - 370) = Rs. 7030.

Ratio of their investments = (6500 x 6) : (8400 x 5) : (10000 x 3)

$$= 39000 : 42000 : 30000$$

$$= 13 : 14 : 10$$

$$\therefore \text{B's share} = \text{Rs.} \left(7030 \times \frac{14}{37}\right) = \text{Rs.} 2660.$$

3. A, B and C enter into a partnership in the ratio $\frac{7}{2} : \frac{4}{3} : \frac{6}{5}$. After 4 months, A increases his share 50%. If the total profit at the end of one year be Rs. 21,600, then B's share in the profit is:

A.Rs. 2100

B.Rs. 2400

C.Rs. 3600

D.Rs. 4000

Answer & Explanation

Answer: Option D

Explanation:

$$\text{Ratio of initial investments} = \left(\frac{7}{2} : \frac{4}{3} : \frac{6}{5}\right) = 105 : 40 : 36.$$

Let the initial investments be 105x, 40x and 36x.

$$\therefore A : B : C = \left(105x \times 4 + \frac{150}{100} \times 105x \times 4\right) : (40x \times 12) : (36x \times 12)$$

$$= 1680x : 480x : 432x = 35 : 10 : 9.$$

$$\text{Hence, B's share} = \text{Rs.} \left(21600 \times \frac{10}{54}\right) = \text{Rs.} 4000.$$

4. A, B, C subscribe Rs. 50,000 for a business. A subscribes Rs. 4000 more than B and B Rs. 5000 more than C. Out of a total profit of Rs. 35,000, A receives:

A.Rs. 8400

B.Rs. 11,900

C.Rs. 13,600

D.Rs. 14,700

Answer & Explanation

Answer: Option D

Explanation:

Let C = x.

Then, B = x + 5000 and A = x + 5000 + 4000 = x + 9000.

$$\text{So, } x + x + 5000 + x + 9000 = 50000$$

$$\Rightarrow 3x = 36000$$

$$\Rightarrow x = 12000$$

$$A : B : C = 21000 : 17000 : 12000 = 21 : 17 : 12.$$

$$\therefore \text{A's share} = \text{Rs.} \left(35000 \times \frac{21}{50} \right) = \text{Rs. } 14,700.$$

5. Three partners shared the profit in a business in the ratio 5 : 7 : 8. They had partnered for 14 months, 8 months and 7 months respectively. What was the ratio of their investments?

A. 5 : 7 : 8

B. 20 : 49 : 64

C. 38 : 28 : 21

D. None of these

[Answer & Explanation](#)

Answer: Option B

Explanation:

Let their investments be Rs. x for 14 months, Rs. y for 8 months and Rs. z for 7 months respectively.

$$\text{Then, } 14x : 8y : 7z = 5 : 7 : 8.$$

$$\text{Now, } \frac{14x}{8y} = \frac{5}{7} \Leftrightarrow 98x = 40y \Leftrightarrow y = \frac{49}{20}x$$

$$\text{And, } \frac{14x}{7z} = \frac{5}{8} \Leftrightarrow 112x = 35z \Leftrightarrow z = \frac{112}{35}x = \frac{16}{5}x.$$

$$\therefore x : y : z = x : \frac{49}{20}x : \frac{16}{5}x = 20 : 49 : 64.$$

6. A starts business with Rs. 3500 and after 5 months, B joins with A as his partner. After a year, the profit is divided in the ratio 2 : 3. What is B's contribution in the capital?

A. Rs. 7500

B. Rs. 8000

C. Rs. 8500

D. Rs. 9000

[Answer & Explanation](#)

Answer: Option D

Explanation:

Let B's capital be Rs. x .

$$\text{Then, } \left(\frac{3500 \times 12}{7x} = \frac{2}{3} \right)$$

$$\Rightarrow 14x = 126000$$

$$\Rightarrow x = 9000.$$

7. A and B entered into partnership with capitals in the ratio 4 : 5. After 3 months, A withdrew $\frac{1}{4}$ of his capital and B withdrew $\frac{1}{5}$ of his capital. The gain at the end of 10 months was Rs. 760. A's share in this profit is:

A. Rs. 330

B. Rs. 360

C. Rs. 380

D. Rs. 430

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$A : B = \left[\frac{4x \times 3}{+} \left(\frac{4x \times 1}{-4} \right) \frac{x}{7} \right] : \left[\frac{5x \times 3}{+} \left(\frac{5x \times 1}{-5} \right) \frac{x}{7} \right]$$

$$= (12x + 21x) : (15x + 28x)$$

$$= 33x : 43x$$

$$= 33 : 43.$$

$$\therefore \text{A's share} = \text{Rs.} \left(760 \times \frac{33}{76} \right) = \text{Rs. } 330.$$

8. A and B started a partnership business investing some amount in the ratio of 3 : 5. C joined then after six months with an amount equal to that of B. In what proportion should the profit at the end of one year be distributed among A, B and C?

A. 3 : 5 : 2

B. 3 : 5 : 5

C. 6 : 10 : 5

D. Data inadequate

[Answer & Explanation](#)

Answer: Option C

Explanation:

Let the initial investments of A and B be $3x$ and $5x$.

$$A : B : C = (3x \times 12) : (5x \times 12) : (5x \times 6) = 36 : 60 : 30 = 6 : 10 : 5.$$

9. A, B, C rent a pasture. A puts 10 oxen for 7 months, B puts 12 oxen for 5 months and C puts 15 oxen for 3 months for grazing. If the rent of the pasture is Rs. 175, how much must C pay as his share of rent?

A.Rs. 45 B.Rs. 50

C.Rs. 55 D.Rs. 60

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$A : B : C = (10 \times 7) : (12 \times 5) : (15 \times 3) = 70 : 60 : 45 = 14 : 12 : 9.$$

$$\therefore \text{C's rent} = \text{Rs.} \left(175 \times \frac{9}{35} \right) = \text{Rs. } 45.$$

10. A and B started a business in partnership investing Rs. 20,000 and Rs. 15,000 respectively. After six months, C joined them with Rs. 20,000. What will be B's share in total profit of Rs. 25,000 earned at the end of 2 years from the starting of the business?

A.Rs. 7500 B.Rs. 9000

C.Rs. 9500 D.Rs. 10,000

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$A : B : C = (20,000 \times 24) : (15,000 \times 24) : (20,000 \times 18) = 4 : 3 : 3.$$

$$\therefore \text{B's share} = \text{Rs.} \left(25000 \times \frac{3}{10} \right) = \text{Rs. } 7,500.$$

11. A began a business with Rs. 85,000. He was joined

afterwards by B with Rs. 42,500. For how much period does B join, if the profits at the end of the year are divided in the ratio of 3 : 1?

A.4 months

B.5 months

C.6 months

D.8 months

[Answer & Explanation](#)

Answer: Option D

Explanation:

Suppose B joined for x months. Then,

$$\text{Then, } \left(\frac{85000 \times 12}{42500 \times x} = \frac{3}{1} \right)$$
$$\Rightarrow x = \left(\frac{85000 \times 12}{42500 \times 3} \right) = 8.$$

So, B joined for 8 months.

12. Aman started a business investing Rs. 70,000. Rakhi joined him after six months with an amount of Rs. 1,05,000 and Sagar joined them with Rs. 1.4 lakhs after another six months. The amount of profit earned should be distributed in what ratio among Aman, Rakhi and Sagar respectively, 3 years after Aman started the business?

A.7 : 6 : 10

B.12 : 15 : 16

C.42 : 45 : 56

D.Cannot be determined

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\text{Aman : Rakhi : Sagar} = (70,000 \times 36) : (1,05,000 \times 30) : (1,40,000 \times 24) = 12 : 15 : 16.$$

13. Arun, Kamal and Vinay invested Rs. 8000, Rs. 4000 and Rs. 8000 respectively in a business. Arun left after six months. If after eight months, there was a gain of Rs. 4005, then what will be the share of Kamal?

A.Rs. 890

B.Rs. 1335

C.Rs. 1602

D.Rs. 1780

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$\text{Arun : Kamal : Vinay} = (8,000 \times 6) : (4,000 \times 8) : (8,000 \times 8)$$

$$= 48 : 32 : 64$$

$$= 3 : 2 : 4.$$

$$\therefore \text{Kamal's share} = \text{Rs.} \left(4005 \times \frac{2}{9} \right) = \text{Rs. } 890.$$

14. Simran started a software business by investing Rs. 50,000. After six months, Nanda joined her with a capital of Rs. 80,000. After 3 years, they earned a profit of Rs. 24,500. What was Simran's share in the profit?

A.Rs. 9,423

B.Rs. 10,250

C.Rs. 12,500

D.Rs. 10,500

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$\text{Simran : Nanda} = (50000 \times 36) : (80000 \times 30) = 3 : 4.$$

$$\therefore \text{Simran's share} = \text{Rs.} \left(24500 \times \frac{3}{7} \right) = \text{Rs. } 10,500.$$

16. Calendar

1. It was Sunday on Jan 1, 2006. What was the day of the week Jan 1, 2010?

A.Sunday

B.Saturday

C.Friday

D.Wednesday

[Answer & Explanation](#)

Answer: Option C

Explanation:

On 31st December, 2005 it was Saturday.

Number of odd days from the year 2006 to the year 2009
 $= (1 + 1 + 2 + 1) = 5$ days.

\therefore On 31st December 2009, it was Thursday.

Thus, on 1st Jan, 2010 it is Friday.

2. What was the day of the week on 28th May, 2006?

A.Thursday

B.Friday

C.Saturday

D.Sunday

[Answer & Explanation](#)

Answer: Option D

Explanation:

28 May, 2006 = (2005 years + Period from 1.1.2006 to 28.5.2006)

Odd days in 1600 years = 0

Odd days in 400 years = 0

5 years = (4 ordinary years + 1 leap year) = $(4 \times 1 + 1 \times 2) \equiv 6$ odd days

Jan. Feb. March April May
 $(31 + 28 + 31 + 30 + 28) = 148$ days

$\therefore 148$ days = (21 weeks + 1 day) $\equiv 1$ odd day.

Total number of odd days = $(0 + 0 + 6 + 1) = 7 \equiv 0$ odd day.

Given day is Sunday.

3. What was the day of the week on 17th June, 1998?

A.Monday

B.Tuesday

C.Wednesday

D.Thursday

[Answer & Explanation](#)

Answer: Option C

Explanation:

17th June, 1998 = (1997 years + Period from 1.1.1998 to 17.6.1998)

Odd days in 1600 years = 0

Odd days in 300 years = $(5 \times 3) \equiv 1$

97 years has 24 leap years + 73 ordinary years.

Number of odd days in 97 years $(24 \times 2 + 73) = 121 = 2$ odd days.

Jan. Feb. March April May June
 $(31 + 28 + 31 + 30 + 31 + 17) = 168$ days

$\therefore 168$ days = 24 weeks = 0 odd day.

Total number of odd days = $(0 + 1 + 2 + 0) = 3$.

Given day is Wednesday.

4. What will be the day of the week 15th August, 2010?

[A.](#) Sunday [B.](#) Monday

[C.](#) Tuesday [D.](#) Friday

[Answer & Explanation](#)

Answer: Option A

Explanation:

15th August, 2010 = (2009 years + Period 1.1.2010 to 15.8.2010)

Odd days in 1600 years = 0

Odd days in 400 years = 0

9 years = (2 leap years + 7 ordinary years) = $(2 \times 2 + 7 \times 1) = 11$ odd days $\equiv 4$ odd days.

Jan. Feb. March April May June July Aug.
 $(31 + 28 + 31 + 30 + 31 + 30 + 31 + 15) = 227$ days

$\therefore 227$ days = (32 weeks + 3 days) $\equiv 3$ odd days.

Total number of odd days = $(0 + 0 + 4 + 3) = 7 \equiv 0$ odd days.

Given day is Sunday.

5. Today is Monday. After 61 days, it will be:

[A.](#) Wednesday [B.](#) Saturday

[C.](#) Tuesday [D.](#) Thursday

[Answer & Explanation](#)

Answer: Option B

Explanation:

Each day of the week is repeated after 7 days.

So, after 63 days, it will be Monday.

\therefore After 61 days, it will be Saturday.

6. If 6th March, 2005 is Monday, what was the day of the week on 6th March, 2004?

[A.](#) Sunday

[B.](#) Saturday

[C.](#) Tuesday

[D.](#) Wednesday

[Answer & Explanation](#)

Answer: Option A

Explanation:

The year 2004 is a leap year. So, it has 2 odd days.

But, Feb 2004 not included because we are calculating from March 2004 to March 2005. So it has 1 odd day only.

\therefore The day on 6th March, 2005 will be 1 day beyond the day on 6th March, 2004.

Given that, 6th March, 2005 is Monday.

\therefore 6th March, 2004 is Sunday (1 day before to 6th March, 2005).

7. On what dates of April, 2001 did Wednesday fall?

[A.](#) 1st, 8th, 15th, 22nd, 29th [B.](#) 2nd, 9th, 16th, 23rd, 30th

[C.](#) 3rd, 10th, 17th, 24th

[D.](#) 4th, 11th, 18th, 25th

[Answer & Explanation](#)

Answer: Option D

Explanation:

We shall find the day on 1st April, 2001.

1st April, 2001 = (2000 years + Period from 1.1.2001 to 1.4.2001)

Odd days in 1600 years = 0

Odd days in 400 years = 0

Jan. Feb. March April
(31 + 28 + 31 + 1) = 91 days = 0 odd days.

Total number of odd days = (0 + 0 + 0) = 0

On 1st April, 2001 it was Sunday.

In April, 2001 Wednesday falls on 4th, 11th, 18th and 25th.

8. How many days are there in x weeks x days?

A. $7x^2$ B. $8x$

C. $14x$ D. 7

[Answer & Explanation](#)

Answer: Option B

Explanation:

x weeks x days = $(7x + x)$ days = $8x$ days.

9. The last day of a century cannot be

A. Monday B. Wednesday

C. Tuesday D. Friday

[Answer & Explanation](#)

Answer: Option C

Explanation:

100 years contain 5 odd days.

∴ Last day of 1st century is Friday.

200 years contain $(5 \times 2) = 3$ odd days.

∴ Last day of 2nd century is Wednesday.

300 years contain $(5 \times 3) = 15 = 1$ odd day.

∴ Last day of 3rd century is Monday.

400 years contain 0 odd day.

∴ Last day of 4th century is Sunday.

This cycle is repeated.

∴ Last day of a century cannot be Tuesday or Thursday or Saturday.

10. On 8th Feb, 2005 it was Tuesday. What was the day of the week on 8th Feb, 2004?

A. Tuesday B. Monday

C. Sunday D. Wednesday

[Answer & Explanation](#)

Answer: Option C

Explanation:

The year 2004 is a leap year. It has 2 odd days.

∴ The day on 8th Feb, 2004 is 2 days before the day on 8th Feb, 2005.

Hence, this day is Sunday.

11. The calendar for the year 2007 will be the same for the year:

A. 2014 B. 2016

C. 2017 D. 2018

[Answer & Explanation](#)

Answer: Option D

Explanation:

Count the number of odd days from the year 2007 onwards to get the sum equal to 0 odd day.

Year : 2007 2008 2009 2010 2011 2012 2013 2014
2015 2016 2017
Odd day : 1 2 1 1 1 2 1 1 1 2 1

Sum = 14 odd days = 0 odd days.

∴ Calendar for the year 2018 will be the same as for the year 2007.

12. Which of the following is not a leap year?

A. 700 B. 800

C. 1200 D. 2000

[Answer & Explanation](#)

Answer: Option A

Explanation:

The century divisible by 400 is a leap year.

∴ The year 700 is not a leap year.

13. On 8th Dec, 2007 Saturday falls. What day of the week was it on 8th Dec, 2006?

[A.](#) Sunday [B.](#) Thursday

[C.](#) Tuesday [D.](#) Friday

[Answer & Explanation](#)

Answer: Option D

Explanation:

The year 2006 is an ordinary year. So, it has 1 odd day.

So, the day on 8th Dec, 2007 will be 1 day beyond the day on 8th Dec, 2006.

But, 8th Dec, 2007 is Saturday.

∴ 8th Dec, 2006 is Friday.

14. January 1, 2008 is Tuesday. What day of the week lies on Jan 1, 2009?

[A.](#) Monday [B.](#) Wednesday

[C.](#) Thursday [D.](#) Sunday

[Answer & Explanation](#)

Answer: Option C

Explanation:

The year 2008 is a leap year. So, it has 2 odd days.

1st day of the year 2008 is Tuesday (Given)

So, 1st day of the year 2009 is 2 days beyond Tuesday.

Hence, it will be Thursday.

15. January 1, 2007 was Monday. What day of the week lies on Jan. 1, 2008?

[A.](#) Monday [B.](#) Tuesday

[C.](#) Wednesday [D.](#) Sunday

[Answer & Explanation](#)

Answer: Option B

Explanation:

The year 2007 is an ordinary year. So, it has 1 odd day.

1st day of the year 2007 was Monday.

1st day of the year 2008 will be 1 day beyond Monday.

Hence, it will be Tuesday.

17. Area

1. The ratio between the length and the breadth of a rectangular park is 3 : 2. If a man cycling along the boundary of the park at the speed of 12 km/hr completes one round in 8 minutes, then the area of the park (in sq. m) is:

[A.](#) 15360 [B.](#) 153600

[C.](#) 30720 [D.](#) 307200

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\text{Perimeter} = \text{Distance covered in 8 min.} = \left(\frac{12000}{60} \times \frac{x}{8} \right) \text{m} = 1600 \text{ m.}$$

Let length = $3x$ metres and breadth = $2x$ metres.

Then, $2(3x + 2x) = 1600$ or $x = 160$.

∴ Length = 480 m and Breadth = 320 m.

∴ Area = $(480 \times 320) \text{ m}^2 = 153600 \text{ m}^2$.

2. An error 2% in excess is made while measuring the side of a square. The percentage of error in the calculated area of the square is:

[A.](#) 2% [B.](#) 2.02%

[C.](#) 4% [D.](#) 4.04%

[Answer & Explanation](#)

Answer: Option D

Explanation:

100 cm is read as 102 cm.

$$\therefore A_1 = (100 \times 100) \text{ cm}^2 \text{ and } A_2 (102 \times 102) \text{ cm}^2.$$

$$(A_2 - A_1) = [(102)^2 - (100)^2]$$

$$= (102 + 100) \times (102 - 100)$$

$$= 404 \text{ cm}^2.$$

$$\therefore \text{Percentage error} = \left(\frac{404}{100 \times 100} \times 100 \right) \% = 4.04\%$$

3. The ratio between the perimeter and the breadth of a rectangle is 5 : 1. If the area of the rectangle is 216 sq. cm, what is the length of the rectangle?

[A.](#) 16 cm

[B.](#) 18 cm

[C.](#) 24 cm

[D.](#) Data inadequate

[E.](#) None of these

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\frac{2(l + b)}{b} = \frac{5}{1}$$

$$\Rightarrow 2l + 2b = 5b$$

$$\Rightarrow 3b = 2l$$

$$b = \frac{2}{3}l$$

$$\text{Then, Area} = 216 \text{ cm}^2$$

$$\Rightarrow l \times b = 216$$

$$\Rightarrow l \times \frac{2}{3}l = 216$$

$$\Rightarrow l^2 = 324$$

$$\Rightarrow l = 18 \text{ cm.}$$

4. The percentage increase in the area of a rectangle, if each of its sides is increased by 20% is:

[A.](#) 40%

[B.](#) 42%

[C.](#) 44%

[D.](#) 46%

[Answer & Explanation](#)

Answer: Option C

Explanation:

Let original length = x metres and original breadth = y metres.

$$\text{Original area} = (xy) \text{ m}^2.$$

$$\text{New length} = \left(\frac{120}{100}x \right) \text{ m} = \left(\frac{6}{5}x \right) \text{ m}.$$

$$\text{New breadth} = \left(\frac{120}{100}y \right) \text{ m} = \left(\frac{6}{5}y \right) \text{ m}.$$

$$\text{New Area} = \left(\frac{6}{5}x \times \frac{6}{5}y \right) \text{ m}^2 = \left(\frac{36}{25}xy \right) \text{ m}^2.$$

The difference between the original area = xy and new-area $36/25$ xy is

$$= (36/25)xy - xy$$

$$= xy(36/25 - 1)$$

$$= xy(11/25) \text{ or } (11/25)xy$$

$$\therefore \text{Increase \%} = \left(\frac{11}{25}xy \times \frac{1}{xy} \times 100 \right) \% = 44\%.$$

5. A rectangular park 60 m long and 40 m wide has two concrete crossroads running in the middle of the park and rest of the park has been used as a lawn. If the area of the lawn is 2109 sq. m, then what is the width of the road?

[A.](#) 2.91 m

[B.](#) 3 m

[C.](#) 5.82 m

[D.](#) None of these

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\text{Area of the park} = (60 \times 40) \text{ m}^2 = 2400 \text{ m}^2.$$

$$\text{Area of the lawn} = 2109 \text{ m}^2.$$

$$\therefore \text{Area of the crossroads} = (2400 - 2109) \text{ m}^2 = 291 \text{ m}^2.$$

Let the width of the road be x metres. Then,

$$60x + 40x - x^2 = 291$$

$$\Rightarrow x^2 - 100x + 291 = 0$$

$$\Rightarrow (x - 97)(x - 3) = 0$$

$$\Rightarrow x = 3$$

6. The diagonal of the floor of a rectangular closet is $7\frac{1}{2}$ feet. The shorter side of the closet is $4\frac{1}{2}$ feet. What is the area of the closet in square feet?

$$\text{A. } 5\frac{1}{4} \qquad \text{B. } 13\frac{1}{2}$$

$$\text{C. } 27 \qquad \text{D. } 37$$

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$\text{Other side} = \left(5\frac{1}{2}\right)^2 - \left(4\frac{1}{2}\right)^2 \text{ ft}$$

$$= \frac{22}{4} - \frac{8}{4} \text{ ft}$$

$$= \frac{14}{4} \text{ ft}$$

$$= \frac{7}{2} \text{ ft}$$

$$= 3.5 \text{ ft}$$

$$= 6 \text{ ft.}$$

$$\therefore \text{Area of closet} = (6 \times 4.5) \text{ sq. ft} = 27 \text{ sq. ft.}$$

7. A towel, when bleached, was found to have lost 20% of its length and 10% of its breadth. The percentage of

decrease in area is:

$$\text{A. } 10\%$$

$$\text{B. } 10.08\%$$

$$\text{C. } 20\%$$

$$\text{D. } 28\%$$

[Answer & Explanation](#)

Answer: Option D

Explanation:

Let original length = x and original breadth = y .

$$\text{Decrease in area} = \left(\frac{80}{100}x \times \frac{90}{100}y \right)$$

$$= \left(\frac{18}{25}xy \right)$$

$$= \frac{7}{25}xy.$$

$$\therefore \text{Decrease \%} = \left(\frac{7}{25}xy \times \frac{1}{xy} \times 100 \right) \% = 28\%.$$

8. A man walked diagonally across a square lot. Approximately, what was the percent saved by not walking along the edges?

$$\text{A. } 20$$

$$\text{B. } 24$$

$$\text{C. } 30$$

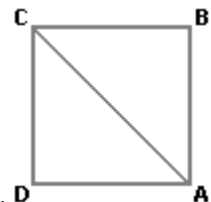
$$\text{D. } 33$$

[Answer & Explanation](#)

Answer: Option C

Explanation:

Let the side of the square(ABCD) be x metres.



Then, $AB + BC = 2x$ metres.

$$AC = 2x = (1.41x) \text{ m.}$$

$$\text{Saving on } 2x \text{ metres} = (0.59x) \text{ m.}$$

$$\text{Saving \%} = \left(\frac{0.59x}{2x} \times 100 \right) \% = 30\% \text{ (approx.)}$$

9. The diagonal of a rectangle is 41 cm and its area is 20 sq. cm. The perimeter of the rectangle must be:

[A.](#) 9 cm [B.](#) 18 cm

[C.](#) 20 cm [D.](#) 41 cm

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$l^2 + b^2 = 41.$$

$$\text{Also, } lb = 20.$$

$$(l + b)^2 = (l^2 + b^2) + 2lb = 41 + 40 = 81$$

$$\Rightarrow (l + b) = 9.$$

$$\therefore \text{Perimeter} = 2(l + b) = 18 \text{ cm.}$$

10. What is the least number of squares tiles required to pave the floor of a room 15 m 17 cm long and 9 m 2 cm broad?

[A.](#) 814 [B.](#) 820

[C.](#) 840 [D.](#) 844

[Answer & Explanation](#)

Answer: Option A

Explanation:

Length of largest tile = H.C.F. of 1517 cm and 902 cm = 41 cm.

$$\text{Area of each tile} = (41 \times 41) \text{ cm}^2.$$

$$\therefore \text{Required number of tiles} = \left(\frac{1517 \times 902}{41 \times 41} \right) = 814.$$

11. The difference between the length and breadth of a rectangle is 23 m. If its perimeter is 206 m, then its area is:

[A.](#) 1520 m² [B.](#) 2420 m²

[C.](#) 2480 m²

[D.](#) 2520 m²

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$\text{We have: } (l - b) = 23 \text{ and } 2(l + b) = 206 \text{ or } (l + b) = 103.$$

$$\text{Solving the two equations, we get: } l = 63 \text{ and } b = 40.$$

$$\therefore \text{Area} = (l \times b) = (63 \times 40) \text{ m}^2 = 2520 \text{ m}^2.$$

12. The length of a rectangle is halved, while its breadth is tripled. What is the percentage change in area?

[A.](#) 25% increase [B.](#) 50% increase

[C.](#) 50% decrease [D.](#) 75% decrease

[Answer & Explanation](#)

Answer: Option B

Explanation:

Let original length = x and original breadth = y .

Original area = xy .

$$\text{New length} = \frac{x}{2}$$

New breadth = $3y$.

$$\text{New area} = \left(\frac{x}{2} \times 3y \right) = \frac{3}{2} xy.$$

$$\therefore \text{Increase \%} = \left(\frac{1}{2} xy \times \frac{1}{xy} \times 100 \right) \% = 50\%.$$

13. The length of a rectangular plot is 20 metres more than its breadth. If the cost of fencing the plot @ 26.50 per metre is Rs. 5300, what is the length of the plot in metres?

[A.](#) 40

[B.](#) 50

[C.](#) 120

[D.](#) Data inadequate

[E.](#) None of these

[Answer & Explanation](#)

Answer: Option E

Explanation:

Let breadth = x metres.

Then, length = $(x + 20)$ metres.

$$\text{Perimeter} = \left(\frac{5300}{26.50} \right) \text{m} = 200 \text{ m.}$$

$$\therefore 2[(x + 20) + x] = 200$$

$$\Rightarrow 2x + 20 = 100$$

$$\Rightarrow 2x = 80$$

$$\Rightarrow x = 40.$$

Hence, length = $x + 20 = 60$ m.

14. A rectangular field is to be fenced on three sides leaving a side of 20 feet uncovered. If the area of the field is 680 sq. feet, how many feet of fencing will be required?

[A.](#) 34 [B.](#) 40

[C.](#) 68 [D.](#) 88

[Answer & Explanation](#)

Answer: Option D

Explanation:

We have: $l = 20$ ft and $lb = 680$ sq. ft.

So, $b = 34$ ft.

$$\therefore \text{Length of fencing} = (l + 2b) = (20 + 68) \text{ ft} = 88 \text{ ft.}$$

15. A tank is 25 m long, 12 m wide and 6 m deep. The cost of plastering its walls and bottom at 75 paise per sq. m, is:

[A.](#) Rs. 456 [B.](#) Rs. 458

[C.](#) Rs. 558 [D.](#) Rs. 568

[Answer & Explanation](#)

Answer: Option C

Explanation:

Area to be plastered = $[2(l + b) \times h] + (l \times b)$

$$= \{[2(25 + 12) \times 6] + (25 \times 12)\} \text{ m}^2$$

$$= (444 + 300) \text{ m}^2$$

$$= 744 \text{ m}^2.$$

$$\therefore \text{Cost of plastering} = \text{Rs.} \left(744 \times \frac{75}{100} \right) = \text{Rs. } 558.$$

[19. Numbers](#)

1. Which one of the following is not a prime number?

[A.](#) 31

[B.](#) 61

[C.](#) 71

[D.](#) 91

[Answer & Explanation](#)

Answer: Option D

Explanation:

91 is divisible by 7. So, it is not a prime number.

2. $(112 \times 5^4) = ?$

[A.](#) 67000

[B.](#) 70000

[C.](#) 76500

[D.](#) 77200

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$(112 \times 5^4) = 112 \times \left(\frac{10}{2} \right)^4 = \frac{112 \times 10^4}{2^4} = \frac{1120000}{16} = 70000$$

3. It is being given that $(2^{32} + 1)$ is completely divisible by a whole number. Which of the following numbers is completely divisible by this number?

[A.](#) $(2^{16} + 1)$

[B.](#) $(2^{16} - 1)$

[C.](#) (7×2^{23})

[D.](#) $(2^{96} + 1)$

[Answer & Explanation](#)

Answer: Option D

Explanation:

Let $2^{32} = x$. Then, $(2^{32} + 1) = (x + 1)$.

Let $(x + 1)$ be completely divisible by the natural number N. Then,

$(2^{96} + 1) = [(2^{32})^3 + 1] = (x^3 + 1) = (x + 1)(x^2 - x + 1)$, which is completely divisible by N, since $(x + 1)$ is divisible by N.

4. What least number must be added to 1056, so that the sum is completely divisible by 23 ?

[A.2](#) [B.3](#)
[C.18](#) [D.21](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

23) 1056 (45
92

136
115

21

Required number = $(23 - 21)$
= 2.

5. $1397 \times 1397 = ?$

[A.1951609](#) [B.1981709](#)
[C.18362619](#) [D.2031719](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

$1397 \times 1397 = (1397)^2$

$$= (1400 - 3)^2$$

$$= (1400)^2 + (3)^2 - (2 \times 1400 \times 3)$$

$$= 1960000 + 9 - 8400$$

$$= 1960009 - 8400$$

$$= 1951609.$$

6. How many of the following numbers are divisible by 132 ?

264, 396, 462, 792, 968, 2178, 5184, 6336

[A.4](#) [B.5](#)
[C.6](#) [D.7](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$132 = 4 \times 3 \times 11$$

So, if the number divisible by all the three number 4, 3 and 11, then the number is divisible by 132 also.

$$264 \rightarrow 11, 3, 4 (/)$$

$$396 \rightarrow 11, 3, 4 (/)$$

$$462 \rightarrow 11, 3 (X)$$

$$792 \rightarrow 11, 3, 4 (/)$$

$$968 \rightarrow 11, 4 (X)$$

$$2178 \rightarrow 11, 3 (X)$$

$$5184 \rightarrow 3, 4 (X)$$

$$6336 \rightarrow 11, 3, 4 (/)$$

Therefore the following numbers are divisible by 132 :
264, 396, 792 and 6336.

Required number of number = 4.

7. $(935421 \times 625) = ?$

[A.575648125](#) [B.584638125](#)
[C.584649125](#) [D.585628125](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$935421 \times 625 = 935421 \times 5^4 = 935421 \times \left(\frac{10}{2}\right)^4$$

$$\begin{array}{r} 935421 \times 10^4 \\ = \end{array} \quad \begin{array}{r} 9354210000 \\ = \end{array}$$
$$\begin{array}{r} 2^4 \\ 16 \end{array}$$

$$= 584638125$$

8. The largest 4 digit number exactly divisible by 88 is:

[A.9944](#)

[B.9768](#)

[C.9988](#)

[D.8888](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

Largest 4-digit number = 9999

$$\begin{array}{r} 88) 9999 \text{ (113)} \\ 88 \\ \hline 1199 \\ 88 \\ \hline 319 \\ 264 \\ \hline 55 \\ \hline \end{array}$$

$$\begin{array}{l} \text{Required number} = (9999 - 55) \\ = 9944. \end{array}$$

9. Which of the following is a prime number ?

[A.33](#)

[B.81](#)

[C.93](#)

[D.97](#)

[Answer & Explanation](#)

Answer: Option D

Explanation:

Clearly, 97 is a prime number.

10. What is the unit digit in $\{(6374)^{1793} \times (625)^{317} \times (341^{491})\}$?

[A.0](#)

[B.2](#)

[C.3](#)

[D.5](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$\text{Unit digit in } (6374)^{1793} = \text{Unit digit in } (4)^{1793}$$

$$= \text{Unit digit in } [(4^2)^{896} \times 4]$$

$$= \text{Unit digit in } (6 \times 4) = 4$$

$$\text{Unit digit in } (625)^{317} = \text{Unit digit in } (5)^{317} = 5$$

$$\text{Unit digit in } (341)^{491} = \text{Unit digit in } (1)^{491} = 1$$

$$\text{Required digit} = \text{Unit digit in } (4 \times 5 \times 1) = 0.$$

11. $5358 \times 51 = ?$

[A.273258](#)

[B.273268](#)

[C.273348](#)

[D.273358](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$5358 \times 51 = 5358 \times (50 + 1)$$

$$= 5358 \times 50 + 5358 \times 1$$

$$= 267900 + 5358$$

$$= 273258.$$

12. The sum of first five prime numbers is:

[A.11](#)

[B.18](#)

[C.26](#)

[D.28](#)

Answer: Option D

Explanation:

Required sum = $(2 + 3 + 5 + 7 + 11) = 28$.

Note: 1 is not a prime number.

Definition: A prime number (or a prime) is a natural number that has exactly two distinct natural number divisors: 1 and itself.

13. The difference of two numbers is 1365. On dividing the larger number by the smaller, we get 6 as quotient and the 15 as remainder. What is the smaller number ?

[A.](#)240 [B.](#)270
[C.](#)295 [D.](#)360

[Answer & Explanation](#)

Answer: Option B

Explanation:

Let the smaller number be x . Then larger number = $(x + 1365)$.

$$\therefore x + 1365 = 6x + 15$$

$$\Rightarrow 5x = 1350$$

$$\Rightarrow x = 270$$

\therefore Smaller number = 270.

14. $(12)^3 \times 6^4 \div 432 = ?$

[A.](#)5184 [B.](#)5060
[C.](#)5148 [D.](#)5084
[E.](#)None of these

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$\begin{aligned} \text{Given Exp. } (12)^3 \times \frac{(12)^3 \times}{6^4} &= \frac{(12)^3 \times}{6^4} = (12)^2 \times 6^2 = (72)^2 = \\ &= 5184 \end{aligned}$$

15. $72519 \times 9999 = ?$

[A.](#)725117481 [B.](#)674217481
[C.](#)685126481 [D.](#)696217481
[E.](#)None of these

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$\begin{aligned} 72519 \times 9999 &= 72519 \times (10000 - 1) \\ &= 72519 \times 10000 - 72519 \times 1 \\ &= 725190000 - 72519 \\ &= 725117481. \end{aligned}$$

16. If the number $517*324$ is completely divisible by 3, then the smallest whole number in the place of * will be:

[A.](#)0 [B.](#)1
[C.](#)2 [D.](#)None of these

[Answer & Explanation](#)

Answer: Option C

Explanation:

Sum of digits = $(5 + 1 + 7 + x + 3 + 2 + 4) = (22 + x)$, which must be divisible by 3.

$$\therefore x = 2.$$

17. The smallest 3 digit prime number is:

[A.](#)101 [B.](#)103
[C.](#)109 [D.](#)113

[Answer & Explanation](#)

Answer: Option A

Explanation:

The smallest 3-digit number is 100, which is divisible

by 2.

∴ 100 is not a prime number.

$101 < 11$ and 101 is not divisible by any of the prime numbers 2, 3, 5, 7, 11.

∴ 101 is a prime number.

Hence 101 is the smallest 3-digit prime number.

18. Which one of the following numbers is exactly divisible by 11?

[A.235641](#)

[B.245642](#)

[C.315624](#)

[D.415624](#)

[Answer & Explanation](#)

Answer: Option D

Explanation:

$(4 + 5 + 2) - (1 + 6 + 3) = 1$, not divisible by 11.

$(2 + 6 + 4) - (4 + 5 + 2) = 1$, not divisible by 11.

$(4 + 6 + 1) - (2 + 5 + 3) = 1$, not divisible by 11.

$(4 + 6 + 1) - (2 + 5 + 4) = 0$, So, 415624 is divisible by 11.

19. (?) - 19657 - 33994 = 9999

[A.63650](#)

[B.53760](#)

[C.59640](#)

[D.61560](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

19657 Let $x - 53651 = 9999$
33994 Then, $x = 9999 + 53651 = 63650$

53651

20. The sum of first 45 natural numbers is:

[A.1035](#)

[B.1280](#)

[C.2070](#)

[D.2140](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

Let $S_n = (1 + 2 + 3 + \dots + 45)$. This is an A.P. in which $a = 1$, $d = 1$, $n = 45$.

$$\begin{aligned} S_n &= \frac{n}{2} [2a + (n-1)d] = \frac{45}{2} [2 \times 1 + (45-1) \times 1] = \frac{45}{2} \times 46 = 45 \times 23 \\ &= 45 \times (20 + 3) \\ &= 45 \times 20 + 45 \times 3 \\ &= 900 + 135 \\ &= 1035. \end{aligned}$$

Shortcut Method:

$$S_n = \frac{n(n+1)}{2} = \frac{45(45+1)}{2} = 1035.$$

21. Which of the following number is divisible by 24 ?

[A.35718](#)

[B.63810](#)

[C.537804](#)

[D.3125736](#)

[Answer & Explanation](#)

Answer: Option D

Explanation:

$24 = 3 \times 8$, where 3 and 8 co-prime.

Clearly, 35718 is not divisible by 8, as 718 is not divisible by 8.

Similarly, 63810 is not divisible by 8 and 537804 is not divisible by 8.

Cibsubder oart (d).

Sum of digits = $(3 + 1 + 2 + 5 + 7 + 3 + 6) = 27$, which is divisible by 3.

Also, 736 is divisible by 8.

∴ 3125736 is divisible by (3 × 8), i.e., 24.

22. $753 \times 753 + 247 \times 247 - 753 \times 247 = ?$
 $753 \times 753 \times 753 + 247 \times 247 \times 247$

A. $\frac{1}{1000}$

B. $\frac{1}{506}$

C. $\frac{253}{500}$

D. None of these

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$\text{Given Exp.} = \frac{(a^2 + b^2 - ab)}{(a^3 + b^3)} = \frac{1}{(a + b)} = \frac{1}{(753 + 247)} = \frac{1}{1000}$$

23. $(?) + 3699 + 1985 - 2047 = 31111$

A. 34748

B. 27474

C. 30154

D. 27574

E. None of these

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$x + 3699 + 1985 - 2047 = 31111$$

$$\Rightarrow x + 3699 + 1985 = 31111 + 2047$$

$$\Rightarrow x + 5684 = 33158$$

$$\Rightarrow x = 33158 - 5684 = 27474.$$

24. If the number $481 * 673$ is completely divisible by 9, then the smallest whole number in place of * will be:

A. 2

B. 5

C. 6

D. 7

E. None of these

[Answer & Explanation](#)

Answer: Option D

Explanation:

Sum of digits = $(4 + 8 + 1 + x + 6 + 7 + 3) = (29 + x)$, which must be divisible by 9.

$$\therefore x = 7.$$

25. The difference between the local value and the face value of 7 in the numeral 32675149 is

A. 75142

B. 64851

C. 5149

D. 69993

E. None of these

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$(\text{Local value of 7}) - (\text{Face value of 7}) = (70000 - 7) = 69993$$

26. The difference between a positive proper fraction and its reciprocal is $\frac{9}{20}$. The fraction is:

A. $\frac{3}{5}$

B. $\frac{3}{10}$

C. $\frac{4}{5}$

D. $\frac{4}{3}$

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$\text{Let the required fraction be } x. \text{ Then } \frac{1}{x} - x = \frac{9}{20}$$

$$\therefore \frac{1 - x^2}{x} = \frac{9}{20}$$

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$\begin{aligned} 107 \times 107 + 93 \times 93 &= (107)^2 + (93)^2 \\ &= (100 + 7)^2 + (100 - 7)^2 \\ &= 2 \times [(100)^2 + 7^2] \quad [\text{Ref: } (a + b)^2 + (a - b)^2 = 2(a^2 + b^2)] \\ &= 20098 \end{aligned}$$

$$\begin{aligned} \Rightarrow 20 - 20x^2 &= 9x \\ \Rightarrow 20x^2 + 9x - 20 &= 0 \\ \Rightarrow 20x^2 + 25x - 16x - 20 &= 0 \\ \Rightarrow 5x(4x + 5) - 4(4x + 5) &= 0 \\ \Rightarrow (4x + 5)(5x - 4) &= 0 \end{aligned}$$

$$\frac{4}{x} = \frac{5}{5}$$

27. On dividing a number by 56, we get 29 as remainder. On dividing the same number by 8, what will be the remainder ?

[A.4](#) [B.5](#)
[C.6](#) [D.7](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

No answer description available for this question. [Let us discuss.](#)

28. If n is a natural number, then $(6n^2 + 6n)$ is always divisible by:

[A.6 only](#) [B.6 and 12 both](#)
[C.12 only](#) [D.by 18 only](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

$(6n^2 + 6n) = 6n(n + 1)$, which is always divisible by 6 and 12 both, since $n(n + 1)$ is always even.

29. $107 \times 107 + 93 \times 93 = ?$

[A.19578](#) [B.19418](#)
[C.20098](#) [D.21908](#)
[E. None of these](#)

30. What will be remainder when $(67^{67} + 67)$ is divided by 68 ?

[A.1](#) [B.63](#)
[C.66](#) [D.67](#)

[Answer & Explanation](#)

Answer: Option C

Explanation:

$(x^n + 1)$ will be divisible by $(x + 1)$ only when n is odd.

$\therefore (67^{67} + 1)$ will be divisible by $(67 + 1)$

$\therefore (67^{67} + 1) + 66$, when divided by 68 will give 66 as remainder.

31. On dividing a number by 5, we get 3 as remainder. What will the remainder when the square of the this number is divided by 5 ?

[A.0](#) [B.1](#)
[C.2](#) [D.4](#)

[Answer & Explanation](#)

Answer: Option D

Explanation:

Let the number be x and on dividing x by 5, we get k as quotient and 3 as remainder.

$$\therefore x = 5k + 3$$

$$\Rightarrow x^2 = (5k + 3)^2$$

$$= (25k^2 + 30k + 9)$$

$$= 5(5k^2 + 6k + 1) + 4$$

∴ On dividing x^2 by 5, we get 4 as remainder.

32. How many 3-digit numbers are completely divisible 6 ?

[A.149](#)

[B.150](#)

[C.151](#)

[D.166](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

3-digit number divisible by 6 are: 102, 108, 114,... , 996

This is an A.P. in which $a = 102$, $d = 6$ and $l = 996$

Let the number of terms be n . Then $t_n = 996$.

$$\therefore a + (n - 1)d = 996$$

$$\Rightarrow 102 + (n - 1) \times 6 = 996$$

$$\Rightarrow 6 \times (n - 1) = 894$$

$$\Rightarrow (n - 1) = 149$$

$$\Rightarrow n = 150$$

∴ Number of terms = 150.

33. How many natural numbers are there between 23 and 100 which are exactly divisible by 6 ?

[A.8](#)

[B.11](#)

[C.12](#)

[D.13](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option D

Explanation:

Required numbers are 24, 30, 36, 42, ..., 96

This is an A.P. in which $a = 24$, $d = 6$ and $l = 96$

Let the number of terms in it be n .

$$\text{Then } t_n = 96 \Rightarrow a + (n - 1)d = 96$$

$$\Rightarrow 24 + (n - 1) \times 6 = 96$$

$$\Rightarrow (n - 1) \times 6 = 72$$

$$\Rightarrow (n - 1) = 12$$

$$\Rightarrow n = 13$$

Required number of numbers = 13.

34. How many of the following numbers are divisible by 3 but not by 9 ?

2133, 2343, 3474, 4131, 5286, 5340, 6336, 7347, 8115, 9276

[A.5](#)

[B.6](#)

[C.7](#)

[D. None of these](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

Marking (/) those which are divisible by 3 but not by 9 and the others by (X), by taking the sum of digits, we get:s

2133 \rightarrow 9 (X)

2343 \rightarrow 12 (/)

3474 \rightarrow 18 (X)

4131 \rightarrow 9 (X)

5286 \rightarrow 21 (/)

5340 \rightarrow 12 (/)

6336 \rightarrow 18 (X)

7347 \rightarrow 21 (/)

8115 \rightarrow 15 (/)

9276 \rightarrow 24 (/)

Required number of numbers = 6.

35. $(963 + 476)^2 + (963 - 476)^2 = ?$
 $(963 \times 963 + 476 \times 476)$

- [A.](#)1449 [B.](#)497
[C.](#)2 [D.](#)4
[E.](#)None of these

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$\begin{aligned} \text{Given Exp.} &= \frac{(a+b)^2 + (a-b)^2}{(a^2+b^2)} = \frac{2(a^2+b^2)}{(a^2+b^2)} = 2 \end{aligned}$$

36. How many 3 digit numbers are divisible by 6 in all ?
[A.](#)149 [B.](#)150
[C.](#)151 [D.](#)166

[Answer & Explanation](#)

Answer: Option B

Explanation:

Required numbers are 102, 108, 114, ... , 996

This is an A.P. in which $a = 102$, $d = 6$ and $l = 996$

Let the number of terms be n . Then,

$$\begin{aligned} a + (n-1)d &= 996 \\ \Rightarrow 102 + (n-1) \times 6 &= 996 \\ \Rightarrow 6 \times (n-1) &= 894 \\ \Rightarrow (n-1) &= 149 \\ \Rightarrow n &= 150. \end{aligned}$$

37. A 3-digit number $4a3$ is added to another 3-digit number 984 to give a 4-digit number $13b7$, which is divisible by 11. Then, $(a+b) = ?$
[A.](#)10 [B.](#)11
[C.](#)12 [D.](#)15

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$\begin{array}{r} 4 \ a \ 3 \\ 9 \ 8 \ 4 \\ \hline 13 \ b \ 7 \end{array} \Rightarrow a + 8 = b \Rightarrow b - a = 8$$

Also, $13 \ b \ 7$ is divisible by 11 $\Rightarrow (7+3) - (b+1) = (9-b)$

$$\Rightarrow (9-b) = 0$$

$$\Rightarrow b = 9$$

$$\therefore (b = 9 \text{ and } a = 1) \Rightarrow (a+b) = 10.$$

38. $8597 - ? = 7429 - 4358$
[A.](#)5426 [B.](#)5706
[C.](#)5526 [D.](#)5476
[E.](#)None of these

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$\begin{array}{r} 7429 \\ -4358 \\ \hline 3071 \\ ---- \end{array} \quad \begin{array}{l} \text{Let } 8597 - x = 3071 \\ \text{Then, } x = 8597 - 3071 \\ \quad = 5526 \end{array}$$

39. The smallest prime number is:
[A.](#)1 [B.](#)2
[C.](#)3 [D.](#)4

[Answer & Explanation](#)

Answer: Option B

Explanation:

The smallest prime number is 2.

40. $(12345679 \times 72) = ?$

[A.88888888](#)

[B.888888888](#)

[C.898989898](#)

[D.999999998](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\begin{aligned}12345679 \times 72 &= 12345679 \times (70 + 2) \\&= 12345679 \times 70 + 12345679 \times 2 \\&= 864197530 + 24691358 \\&= 888888888\end{aligned}$$

41. On dividing a number by 357, we get 39 as remainder. On dividing the same number 17, what will be the remainder ?

[A.0](#)

[B.3](#)

[C.5](#)

[D.11](#)

[Answer & Explanation](#)

Answer: Option C

Explanation:

Let x be the number and y be the quotient. Then,

$$\begin{aligned}x &= 357 \times y + 39 \\&= (17 \times 21 \times y) + (17 \times 2) + 5 \\&= 17 \times (21y + 2) + 5\end{aligned}$$

\therefore Required remainder = 5.

42. If the product $4864 \times 9P2$ is divisible by 12, then the value of P is:

[A.2](#)

[B.5](#)

[C.6](#)

[D.8](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option E

Explanation:

Clearly, 4864 is divisible by 4.

So, $9P2$ must be divisible by 3. So, $(9 + P + 2)$ must be divisible by 3.

$\therefore P = 1$.

43. Which one of the following is the common factor of $(47^{43} + 43^{43})$ and $(47^{47} + 43^{47})$?

[A. \$\(47 - 43\)\$](#)

[B. \$\(47 + 43\)\$](#)

[C. \$\(47^{43} + 43^{43}\)\$](#)

[D. None of these](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

When n is odd, $(x^n + a^n)$ is always divisible by $(x + a)$.

\therefore Each one of $(47^{43} + 43^{43})$ and $(47^{47} + 43^{47})$ is divisible by $(47 + 43)$.

44. $-84 \times 29 + 365 = ?$

[A.2436](#)

[B.2801](#)

[C.-2801](#)

[D.-2071](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$\begin{aligned}\text{Given Exp.} &= -84 \times (30 - 1) + 365 \\&= -(84 \times 30) + 84 + 365 \\&= -2520 + 449 \\&= -2071\end{aligned}$$

45. A number when divided by 296 leaves 75 as remainder.

When the same number is divided by 37, the remainder will be:

- [A.](#)1 [B.](#)2
[C.](#)8 [D.](#)11

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$\begin{aligned}\text{Let } x &= 296q + 75 \\ &= (37 \times 8q + 37 \times 2) + 1 \\ &= 37(8q + 2) + 1\end{aligned}$$

Thus, when the number is divided by 37, the remainder is 1.

46. In dividing a number by 585, a student employed the method of short division. He divided the number successively by 5, 9 and 13 (factors 585) and got the remainders 4, 8, 12 respectively. If he had divided the number by 585, the remainder would have been

- [A.](#)24 [B.](#)144
[C.](#)292 [D.](#)584

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$\begin{array}{lcl} 5 \mid x & z = 13 \times 1 + 12 = 25 \\ \hline 9 \mid y - 4 & y = 9 \times z + 8 = 9 \times 25 + 8 = 233 \\ \hline 13 \mid z - 8 & x = 5 \times y + 4 = 5 \times 233 + 4 = 1169 \\ \hline & | 1 - 12 \end{array}$$

$$\begin{array}{r} 585 \overline{) 1169} \quad (1 \\ \underline{585} \\ 584 \\ \underline{584} \\ 0 \end{array}$$

Therefore, on dividing the number by 585, remainder = 584.

47. In a division sum, the divisor is 10 times the quotient and 5 times the remainder. If the remainder is 46, what

is the dividend ?

- [A.](#)4236 [B.](#)4306
[C.](#)4336 [D.](#)5336
[E.](#)None of these

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$\text{Divisor} = (5 \times 46) = 230$$

$$\therefore 10 \times \text{Quotient} = 230 \Rightarrow \frac{230}{10} = 23$$

$$\text{Dividend} = (\text{Divisor} \times \text{Quotient}) + \text{Remainder}$$

$$\begin{aligned} &= (230 \times 23) + 46 \\ &= 5290 + 46 \\ &= 5336. \end{aligned}$$

$$48. 4500 \times ? = 3375$$

- [A.](#) $\frac{2}{5}$ [B.](#) $\frac{3}{4}$
[C.](#) $\frac{1}{4}$ [D.](#) $\frac{3}{5}$

[E.](#)None of these

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$4500 \times x = 3375 \Rightarrow x = \frac{3375^{75}}{4500_{100}} = \frac{3}{4}$$

49. What smallest number should be added to 4456 so that the sum is completely divisible by 6 ?

- [A.](#)4 [B.](#)3

[C.2](#)

[D.1](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option C

Explanation:

6) 4456 (742

42

25

24

Therefore, Required number = $(6 - 4) = 2$.

16

12

4

50. What least number must be subtracted from 13601, so that the remainder is divisible by 87 ?

[A.23](#)

[B.31](#)

[C.29](#)

[D.37](#)

[E.49](#)

[Answer & Explanation](#)

Answer: Option C

Explanation:

87) 13601 (156

87

490

435

551

522

29

Therefore, the required number = 29.

51. 476 ** 0 is divisible by both 3 and 11. The non-zero digits in the hundred's and ten's places are respectively:

[A.7 and 4](#)

[B.7 and 5](#)

[C.8 and 5](#)

[D. None of these](#)

[Answer & Explanation](#)

Answer: Option C

Explanation:

Let the given number be 476 xy 0.

Then $(4 + 7 + 6 + x + y + 0) = (17 + x + y)$ must be divisible by 3.

And, $(0 + x + 7) - (y + 6 + 4) = (x - y - 3)$ must be either 0 or 11.

$$x - y - 3 = 0 \Rightarrow y = x - 3$$

$$(17 + x + y) = (17 + x + x - 3) = (2x + 14)$$

$$\Rightarrow x = 2 \text{ or } x = 8.$$

$$\therefore x = 8 \text{ and } y = 5.$$

52. If the number 97215 * 6 is completely divisible by 11, then the smallest whole number in place of * will be:

[A.3](#)

[B.2](#)

[C.1](#)

[D.5](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

Given number = 97215 x 6

$(6 + 5 + 2 + 9) - (x + 1 + 7) = (14 - x)$, which must be divisible by 11.

$$\therefore x = 3$$

53. $(11^2 + 12^2 + 13^2 + \dots + 20^2) = ?$

[A.385](#)

[B.2485](#)

[C.2870](#)

[D.3255](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$(11^2 + 12^2 + 13^2 + \dots + 20^2) = (1^2 + 2^2 + 3^2 + \dots + 20^2) - (1^2 + 2^2 + 3^2 + \dots + 10^2)$$

$$\left[\text{Ref: } (1^2 + 2^2 + 3^2 + \dots + n^2) = \frac{1}{6} n(n+1)(2n+1) \right]$$

$$= \left(\frac{20 \times 21 \times 41}{6} - \frac{10 \times 11 \times 21}{6} \right)$$

$$= (2870 - 385)$$

$$= 2485.$$

54. If the number $5 * 2$ is divisible by 6, then $*$ = ?

A.2 B.3

C.6 D.7

[Answer & Explanation](#)

Answer: Option A

Explanation:

$6 = 3 \times 2$. Clearly, $5 * 2$ is divisible by 2. Replace $*$ by x .

Then, $(5 + x + 2)$ must be divisible by 3. So, $x = 2$.

55. Which of the following numbers will completely divide $(49^{15} - 1)$?

A.8 B.14

C.46 D.50

[Answer & Explanation](#)

Answer: Option A

Explanation:

$(x^n - 1)$ will be divisibly by $(x + 1)$ only when n is even.

$(49^{15} - 1) = \{(7^2)^{15} - 1\} = (7^{30} - 1)$, which is divisible by $(7 + 1)$, i.e., 8.

56. $9 + \frac{3}{4} + 7 + \frac{2}{17} - \left(9 + \frac{1}{15} \right) = ?$

A.7 + $\frac{719}{1020}$ B.9 + $\frac{817}{1020}$

C.9 + $\frac{719}{1020}$ D.7 + $\frac{817}{1020}$

E.None of these

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$\begin{aligned} \text{Given sum} &= 9 + \frac{3}{4} + 7 + \frac{2}{17} - \left(9 + \frac{1}{15} \right) \\ &= (9 + 7 - 9) + \left(\frac{3}{4} + \frac{2}{17} - \frac{1}{15} \right) \\ &= 7 + \frac{765 + 120 - 68}{1020} \\ &= 7 + \frac{817}{1020} \end{aligned}$$

57. $\left(1 - \frac{1}{n} \right) + \left(1 - \frac{2}{n} \right) + \left(1 - \frac{3}{n} \right) + \dots$ up to n terms = ?

A. $\frac{n}{2}$ B. $\frac{1}{2} (n - 1)$

C. $\frac{1}{2} n(n - 1)$ D.None of these

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\begin{aligned} \text{Given sum} &= (1 + 1 + 1 + \dots \text{ to } n \text{ terms}) - \left(\frac{1}{n} + \frac{2}{n} + \frac{3}{n} + \dots \text{ to } n \text{ terms} \right) \\ &= n - \frac{n}{2} \left(\frac{1}{n} + 1 \right) \quad [\text{Ref: } n\text{th terms} = (n/n) = 1] \\ &= n - n + 1 \end{aligned}$$

2

$$\frac{1}{2} = (n - 1)$$

58. On dividing 2272 as well as 875 by 3-digit number N, we get the same remainder. The sum of the digits of N is:

[A.10](#) [B.11](#)
[C.12](#) [D.13](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

Clearly, $(2272 - 875) = 1397$, is exactly divisible by N.

Now, $1397 = 11 \times 127$

∴ The required 3-digit number is 127, the sum of whose digits is 10.

59. A boy multiplied 987 by a certain number and obtained 559981 as his answer. If in the answer both 9 are wrong and the other digits are correct, then the correct answer would be:

[A.553681](#) [B.555181](#)
[C.555681](#) [D.556581](#)

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$987 = 3 \times 7 \times 47$$

So, the required number must be divisible by each one of 3, 7, 47

553681 → (Sum of digits = 28, not divisible by 3)

555181 → (Sum of digits = 25, not divisible by 3)

555681 is divisible by 3, 7, 47.

60. How many prime numbers are less than 50 ?

[A.16](#) [B.15](#)

[C.14](#) [D.18](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

Prime numbers less than 50 are:

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47

Their number is 15

61. When a number is divided by 13, the remainder is 11. When the same number is divided by 17, then remainder is 9. What is the number ?

[A.339](#) [B.349](#)

[C.369](#) [D.Data inadequate](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$x = 13p + 11 \text{ and } x = 17q + 9$$

$$\therefore 13p + 11 = 17q + 9$$

$$\Rightarrow 17q - 13p = 2$$

$$\Rightarrow q = \frac{2 + 13p}{17}$$

The least value of p for which $q = \frac{2 + 13p}{17}$ is a whole number is $p = 26$

$$\therefore x = (13 \times 26 + 11)$$

$$= (338 + 11)$$

$$= 349$$

62. $(51 + 52 + 53 + \dots + 100) = ?$

[A.2525](#) [B.2975](#)

[C.3225](#) [D.3775](#)

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$S_n = (1 + 2 + 3 + \dots + 50 + 51 + 52 + \dots + 100) - (1 + 2 + 3 + \dots + 50)$$

$$= \frac{100}{2} \times (1 + 100) - \frac{50}{2} \times (1 + 50)$$

$$= (50 \times 101) - (25 \times 51)$$

$$= (5050 - 1275)$$

$$= 3775.$$

63. $(800 \div 64) \times (1296 \div 36) = ?$

[A.420](#)

[B.460](#)

[C.500](#)

[D.540](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option E

Explanation:

$$\text{Given Exp.} = \frac{800}{64} \times \frac{1296}{36} = 450$$

64. Which natural number is nearest to 8485, which is completely divisible by 75 ?

[A.8475](#)

[B.8500](#)

[C.8550](#)

[D.8525](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

On dividing, we get

$$\begin{array}{r} 75 \overline{) 8485} \quad 113 \\ 75 \end{array}$$

$$\begin{array}{r} --- \\ 98 \\ 75 \\ --- \\ 235 \\ 225 \\ --- \\ 10 \\ --- \end{array}$$

$$\begin{aligned} \text{Required number} &= (8485 - 10) // \text{ Because } 10 < (75 - 10) \\ &= 8475. \end{aligned}$$

65. If the number 42573 * is exactly divisible by 72, then the minimum value of * is:

[A.4](#)

[B.5](#)

[C.6](#)

[D.7](#)

[E.8](#)

[Answer & Explanation](#)

Answer: Option C

Explanation:

72 = 9 x 8, where 9 and 8 are co-prime.

The minimum value of x for which 73x for which 73x is divisible by 8 is, x = 6.

Sum of digits in 425736 = (4 + 2 + 5 + 7 + 3 + 6) = 27, which is divisible by 9.

∴ Required value of * is 6.

66. Which of the following numbers is divisible by each one of 3, 7, 9 and 11 ?

[A.639](#)

[B.2079](#)

[C.3791](#)

[D.37911](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

639 is not divisible by 7

2079 is divisible by each of 3, 7, 9, 11.

67. Which natural number is nearest to 9217, which is completely divisible by 88 ?

[A.](#)9152 [B.](#)9240

[C.](#)9064 [D.](#)9184

[E.](#)None of these

[Answer & Explanation](#)

Answer: Option B

Explanation:

On dividing we get,

$$\begin{array}{r} 88 \overline{) 9217} \quad (104 \\ 88 \\ \hline 417 \\ 352 \\ \hline 65 \\ \hline \end{array}$$

Therefore, Required number = $9217 + (88 - 65)$ //
Because $(88 - 65) < 65$.

$$\begin{aligned} &= 9217 + 23 \\ &= 9240. \end{aligned}$$

68. $(4300731) - ? = 2535618$

[A.](#)1865113 [B.](#)1775123

[C.](#)1765113 [D.](#)1675123

[E.](#)None of these

[Answer & Explanation](#)

Answer: Option C

Explanation:

Let $4300731 - x = 2535618$

Then $x, = 4300731 - 2535618 = 1765113$

69. n is a whole number which when divided by 4 gives 3 as remainder. What will be the remainder when $2n$ is divided by 4 ?

[A.](#)3 [B.](#)2

[C.](#)1

[D.](#)0

[Answer & Explanation](#)

Answer: Option B

Explanation:

Let $n = 4q + 3$. Then $2n = 8q + 6 = 4(2q + 1) + 2$.

Thus, when $2n$ is divided by 4, the remainder is 2.

$$\begin{aligned} 70. (489 + 375)^2 - (489 - 375)^2 &= ? \\ &= (489 + 375) \end{aligned}$$

[A.](#)144

[B.](#)864

[C.](#)2

[D.](#)4

[E.](#)None of these

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$\begin{aligned} \text{Given } (a+b)^2 - (a-b)^2 &= 4ab \\ \text{Exp. } &= ab \end{aligned}$$

71. $397 \times 397 + 104 \times 104 + 2 \times 397 \times 104 = ?$

[A.](#)250001

[B.](#)251001

[C.](#)260101

[D.](#)261001

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\begin{aligned} \text{Given Exp.} &= (397)^2 + (104)^2 + 2 \times 397 \times 104 \\ &= (397 + 104)^2 \\ &= (501)^2 = (500 + 1)^2 \\ &= (500^2) + (1)^2 + (2 \times 500 \times 1) \\ &= 250000 + 1 + 1000 \\ &= 251001 \end{aligned}$$

72. $(35423 + 7164 + 41720) - (317 \times 89) = ?$

[A.](#)28213

[B.](#)84307

[C.](#)50694

[D.](#)56094

[E.](#)None of these

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$\begin{array}{r} 35423 \\ + 7164 \\ + 41720 \\ \hline 84307 \\ - 28213 \\ \hline 56094 \end{array}$$

$$\begin{array}{r} 317 \times 89 = 317 \times (90 - 1) \\ = (317 \times 90 - 317) \\ = (28530 - 317) \\ = 28213 \end{array}$$

73. $(x^n - a^n)$ is completely divisible by $(x - a)$, when

[A.](#) n is any natural number [B.](#) n is an even natural number

[C.](#) n is and odd natural number

[D.](#) n is prime

[Answer & Explanation](#)

Answer: Option A

Explanation:

For every natural number n , $(x^n - a^n)$ is completely divisible by $(x - a)$.

74. Which one of the following numbers is completely divisible by 45?

[A.](#)181560

[B.](#)331145

[C.](#)202860

[D.](#)2033555

[E.](#)None of these

[Answer & Explanation](#)

Answer: Option C

Explanation:

45 = 5 x 9, where 5 and 9 are co-primes.

Unit digit must be 0 or 5 and sum of digits must be divisible by 9.

Among given numbers, such number is 202860.

75. Which of the following numbers will completely divide $(3^{25} + 3^{26} + 3^{27} + 3^{28})$?

[A.](#)11

[B.](#)16

[C.](#)25

[D.](#)30

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$\begin{aligned} (3^{25} + 3^{26} + 3^{27} + 3^{28}) &= 3^{25} \times (1 + 3 + 3^2 + 3^3) = 3^{25} \times 40 \\ &= 3^{24} \times 3 \times 4 \times 10 \\ &= (3^{24} \times 4 \times 30), \text{ which is divisible by } 30. \end{aligned}$$

76. A number when divide by 6 leaves a remainder 3. When the square of the number is divided by 6, the remainder is:

[A.](#)0

[B.](#)1

[C.](#)2

[D.](#)3

[Answer & Explanation](#)

Answer: Option D

Explanation:

Let $x = 6q + 3$.

Then, $x^2 = (6q + 3)^2$

$= 36q^2 + 36q + 9$

$= 6(6q^2 + 6q + 1) + 3$

Thus, when x^2 is divided by 6, then remainder = 3.

77. The sum of the two numbers is 12 and their product is 35. What is the sum of the reciprocals of these numbers ?

[A.](#)12

[B.](#) 1

35

35

C.
8

D.
32

[Answer & Explanation](#)

Answer: Option A

Explanation:

Let the numbers be a and b . Then, $a + b = 12$ and $ab = 35$.

$$\therefore \begin{matrix} a+b & 12 \\ ab & 35 \end{matrix} \Rightarrow \begin{pmatrix} 1 & 1 \\ b & a \end{pmatrix} = \begin{matrix} 12 \\ 35 \end{matrix}$$

$$\therefore \text{Sum of reciprocals of given numbers} = \frac{12}{35}$$

78. What will be remainder when 17^{200} is divided by 18 ?

A. 17

B. 16

C. 1

D. 2

[Answer & Explanation](#)

Answer: Option C

Explanation:

When n is even, $(x^n - a^n)$ is completely divisibly by $(x + a)$

$(17^{200} - 1^{200})$ is completely divisible by $(17 + 1)$, i.e., 18.

$\Rightarrow (17^{200} - 1)$ is completely divisible by 18.

\Rightarrow On dividing 17^{200} by 18, we get 1 as remainder.

79. If $1400 \times x = 1050$. Then, $x = ?$

A.
4

B.
5

C.
3

D.
4

E. None of these

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$1400 \times x = 1050 \Rightarrow x = \frac{1050}{1400} = \frac{3}{4}$$

80. $(1^2 + 2^2 + 3^2 + \dots + 10^2) = ?$

A. 330

B. 345

C. 365

D. 385

[Answer & Explanation](#)

Answer: Option D

Explanation:

We know that $(1^2 + 2^2 + 3^2 + \dots + n^2) = \frac{1}{6} n(n+1)(2n+1)$

Putting $n = 10$, required sum $= \left(\frac{1}{6} \times 10 \times 11 \times 21 \right) = 385$

81. The difference of the squares of two consecutive even integers is divisible by which of the following integers ?

A. 3

B. 4

C. 6

D. 7

[Answer & Explanation](#)

Answer: Option B

Explanation:

Let the two consecutive even integers be $2n$ and $(2n + 2)$. Then,

$$(2n + 2)^2 - (2n)^2 = (2n + 2 + 2n)(2n + 2 - 2n)$$

$$= 2(4n + 2)$$

$$= 4(2n + 1), \text{ which is divisible by 4.}$$

82. Which one of the following is a prime number ?

A. 119

B. 187

[C.247](#)

[D.551](#)

[E.](#)None of these

[Answer & Explanation](#)

Answer: Option E

Explanation:

$$551 > 22$$

All prime numbers less than 24 are : 2, 3, 5, 7, 11, 13, 17, 19, 23.

119 is divisible by 7; 187 is divisible by 11; 247 is divisible by 13 and 551 is divisible by 19.

So, none of the given numbers is prime.

value of 6 in the numeral 856973 is

[A.973](#)

[B.6973](#)

[C.5994](#)

[D.](#)None of these

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$(\text{Place value of 6}) - (\text{Face value of 6}) = (6000 - 6) = 5994$$

85. If a and b are odd numbers, then which of the following is even ?

[A.](#) $a + b$

[B.](#) $a + b + 1$

[C.](#) ab

[D.](#) $ab + 2$

[E.](#)None of these

[Answer & Explanation](#)

Answer: Option A

Explanation:

The sum of two odd number is even. So, $a + b$ is even.

83. The sum all even natural numbers between 1 and 31 is:

[A.16](#)

[B.128](#)

[C.240](#)

[D.512](#)

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$\text{Required sum} = (2 + 4 + 6 + \dots + 30)$$

This is an A.P. in which $a = 2$, $d = (4 - 2) = 2$ and $l = 30$.

Let the number of terms be n . Then,

$$t_n = 30 \Rightarrow a + (n - 1)d = 30$$

$$\Rightarrow 2 + (n - 1) \times 2 = 30$$

$$\Rightarrow n - 1 = 14$$

$$\Rightarrow n = 15$$

$$\therefore S_n = \frac{n}{2} (a + l) = \frac{15}{2} \times (2 + 30) = 240.$$

86. Which one of the following numbers is completely divisible by 99?

[A.3572404](#)

[B.135792](#)

[C.913464](#)

[D.114345](#)

[E.](#)None of these

[Answer & Explanation](#)

Answer: Option D

Explanation:

$99 = 11 \times 9$, where 11 and 9 are co-prime.

By hit and trial, we find that 114345 is divisible by 11 as well as 9. So, it is divisible by 99.

87. The sum of how many terms of the series $6 + 12 + 18 + 24 + \dots$ is 1800 ?

[A.16](#)

[B.24](#)

84. The difference between the place value and the face

C.20

D.18

E.22

[Answer & Explanation](#)

Answer: Option B

Explanation:

This is an A.P. in which $a = 6$, $d = 6$ and $S_n = 1800$

$$\text{Then, } \frac{n}{2} [2a + (n - 1)d] = 1800$$

$$\Rightarrow \frac{n}{2} [2 \times 6 + (n - 1) \times 6] = 1800$$

$$\Rightarrow 3n(n + 1) = 1800$$

$$\Rightarrow n(n + 1) = 600$$

$$\Rightarrow n^2 + n - 600 = 0$$

$$\Rightarrow n^2 + 25n - 24n - 600 = 0$$

$$\Rightarrow n(n + 25) - 24(n + 25) = 0$$

$$\Rightarrow (n + 25)(n - 24) = 0$$

$$\Rightarrow n = 24$$

Number of terms = 24.

$$88. (51 + 52 + 53 + \dots + 100) = ?$$

A.2525

B.2975

C.3225

D.3775

[Answer & Explanation](#)

Answer: Option D

Explanation:

This is an A.P. in which $a = 51$, $l = 100$ and $n = 50$.

$$\therefore \text{Sum } \frac{n}{2} (a + l) = \frac{50}{2} \times (51 + 100) = (25 \times 151) = 3775.$$

$$89. 1904 \times 1904 = ?$$

A.3654316

B.3632646

C.3625216

D.3623436

E.None of these

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$\begin{aligned} 1904 \times 1904 &= (1904)^2 \\ &= (1900 + 4)^2 \\ &= (1900)^2 + (4)^2 + (2 \times 1900 \times 4) \\ &= 3610000 + 16 + 15200. \\ &= 3625216. \end{aligned}$$

$$90. \text{What is the unit digit in } (7^{95} - 3^{58})?$$

A.0

B.4

C.6

D.7

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\begin{aligned} \text{Unit digit in } 7^{95} &= \text{Unit digit in } [(7^4)^{23} \times 7^3] \\ &= \text{Unit digit in } [(\text{Unit digit in } (2401))^{23} \times (343)] \\ &= \text{Unit digit in } (1^{23} \times 343) \\ &= \text{Unit digit in } (343) \\ &= 3 \end{aligned}$$

$$\begin{aligned} \text{Unit digit in } 3^{58} &= \text{Unit digit in } [(3^4)^{14} \times 3^2] \\ &= \text{Unit digit in } [(\text{Unit digit in } (81))^{14} \times 3^2] \\ &= \text{Unit digit in } [(1)^{14} \times 3^2] \\ &= \text{Unit digit in } (1 \times 9) \\ &= \text{Unit digit in } (9) \\ &= 9 \end{aligned}$$

$$\text{Unit digit in } (7^{95} - 3^{58}) = \text{Unit digit in } (343 - 9) = \text{Unit digit in } (334) = 4.$$

So, Option B is the answer.

$$91. \text{Which one of the following is a prime number ?}$$

A.161

B.221

C.373

D.437

E.None of these

[Answer & Explanation](#)

Answer: Option C

Explanation:

$437 > 22$

All prime numbers less than 22 are : 2, 3, 5, 7, 11, 13, 17, 19.

161 is divisible by 7, and 221 is divisible by 13.

373 is not divisible by any of the above prime numbers.

\therefore 373 is prime.

92. The smallest 6 digit number exactly divisible by 111 is:

A.111111

B.110011

C.100011

D.110101

E.None of these

[Answer & Explanation](#)

Answer: Option C

Explanation:

The smallest 6-digit number 100000.

$$\begin{array}{r} 111 \overline{) 100000} \quad (900 \\ 999 \\ \hline 100 \\ \hline \end{array}$$

Required number = $100000 + (111 - 100)$
= 100011.

93. The largest 5 digit number exactly divisible by 91 is:

A.99921

B.99918

C.99981

D.99971

E.None of these

[Answer & Explanation](#)

Answer: Option B

Explanation:

Largest 5-digit number = 99999

91) 99999 (1098

$$\begin{array}{r} 91 \\ --- \\ 899 \\ 819 \\ --- \\ 809 \\ 728 \\ --- \\ 81 \\ --- \end{array}$$

Required number = $(99999 - 81)$
= 99918.

94. $768 \times 768 \times 768 + 232 \times 232 \times 232 = ?$

$768 \times 768 - 768 \times 232 + 232 \times 232$

A.1000

B.536

C.500

D.268

E.None of these

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$\begin{array}{l} \text{Given Exp.} \quad (a^3 + b^3) \\ = \quad (a^2 - ab + b^2) \end{array} = (a + b) = (768 + 232) = 1000$$

95. The smallest 5 digit number exactly divisible by 41 is:

A.1004

B.10004

C.10045

D.10025

E.None of these

[Answer & Explanation](#)

Answer: Option B

Explanation:

The smallest 5-digit number = 10000.

41) 10000 (243

82

180

164

160

123

37

Required number = $10000 + (41 - 37)$
= 10004.

96. How many terms are there in the G.P. 3, 6, 12, 24, ..., 384 ?

[A.8](#)

[B.9](#)

[C.10](#)

[D.11](#)

[E.7](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

Here $a = 3$ and $r = 2$. Let the number of terms be n .

Then, $t_n = 384 \Rightarrow ar^{n-1} = 384$

$\Rightarrow 3 \times 2^{n-1} = 384$

$\Rightarrow 2^{n-1} = 128 = 2^7$

$\Rightarrow n - 1 = 7$

$\Rightarrow n = 8$

\therefore Number of terms = 8.

97. If x and y are positive integers such that $(3x + 7y)$ is a multiple of 11, then which of the following will be divisible by 11 ?

[A. \$4x + 6y\$](#)

[B. \$x + y + 4\$](#)

[C. \$9x + 4y\$](#)

[D. \$4x - 9y\$](#)

[Answer & Explanation](#)

Answer: Option D

Explanation:

By hit and trial, we put $x = 5$ and $y = 1$ so that $(3x + 7y) = (3 \times 5 + 7 \times 1) = 22$, which is divisible by 11.

$\therefore (4x + 6y) = (4 \times 5 + 6 \times 1) = 26$, which is not divisible by 11;

$(x + y + 4) = (5 + 1 + 4) = 10$, which is not divisible by 11;

$(9x + 4y) = (9 \times 5 + 4 \times 1) = 49$, which is not divisible by 11;

$(4x - 9y) = (4 \times 5 - 9 \times 1) = 11$, which is divisible by 11.

98. $9548 + 7314 = 8362 + (?)$

[A.8230](#)

[B.8410](#)

[C.8500](#)

[D.8600](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option C

Explanation:

9548	$16862 = 8362 + x$
+ 7314	$x = 16862 - 8362$
-----	$= 8500$
16862	

99. In a division sum, the remainder is 0. As student mistook the divisor by 12 instead of 21 and obtained 35 as quotient. What is the correct quotient ?

[A.0](#)

[B.12](#)

[C.13](#)

[D.20](#)

[Answer & Explanation](#)

Answer: Option D

Explanation:

Number = (12×35)

Correct Quotient = $420 \div 21 = 20$

100. $2 + 2^2 + 2^3 + \dots + 2^9 = ?$

[A.2044](#)

[B.1022](#)

[C.1056](#)

[D.None of these](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

This is a G.P. in which $a = 2$, $r = \frac{2^2}{2} = 2$ and $n = 9$.

$$\therefore S_n = \frac{a(r^n - 1)}{(r - 1)} = \frac{2 \times (2^9 - 1)}{(2 - 1)} = 2 \times (512 - 1) = 2 \times 511 = 1022.$$

101. The sum of even numbers between 1 and 31 is:

[A.6](#)

[B.28](#)

[C.240](#)

[D.512](#)

[Answer & Explanation](#)

Answer: Option C

Explanation:

Let $S_n = (2 + 4 + 6 + \dots + 30)$. This is an A.P. in which $a = 2$, $d = 2$ and $l = 30$

Let the number of terms be n . Then,

$$a + (n - 1)d = 30$$

$$\Rightarrow 2 + (n - 1) \times 2 = 30$$

$$\Rightarrow n = 15.$$

$$\therefore S_n = \frac{n}{2} (a + l) = \frac{15}{2} \times (2 + 30) = (15 \times 16) = 240.$$

102. If the number $91876 * 2$ is completely divisible by 8, then the smallest whole number in place of $*$ will be:

[A.1](#)

[B.2](#)

[C.3](#)

[D.4](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option C

Explanation:

Then number $6x2$ must be divisible by 8.

$$\therefore x = 3, \text{ as } 632 \text{ is divisible } 8.$$

103. $2056 \times 987 = ?$

[A.1936372](#)

[B.2029272](#)

[C.1896172](#)

[D.1926172](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\begin{aligned} 2056 \times 987 &= 2056 \times (1000 - 13) \\ &= 2056 \times 1000 - 2056 \times 13 \\ &= 2056000 - 26728 \\ &= 2029272. \end{aligned}$$

104. On multiplying a number by 7, the product is a number each of whose digits is 3. The smallest such number is:

[A.47619](#)

[B.47719](#)

[C.48619](#)

[D.47649](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

By hit and trial, we find that

$$47619 \times 7 = 333333.$$

105. $\frac{3}{5}$ of a number is 36, then the number is:

[A.80](#) [B.100](#)
[C.75](#) [D.90](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

Let the number be x . Then

$$\frac{3}{5} \text{ of } x = 36$$

$$\Rightarrow \frac{60}{100} x = 36$$

$$\Rightarrow x = \left(36 \times \frac{25}{9} \right) = 100$$

∴ Required number = 100

106. If x and y are the two digits of the number $653xy$ such that this number is divisible by 80, then $x + y = ?$

[A.2 or 6](#) [B.4](#)
[C.4 or 8](#) [D.8](#)
[E. None of these](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$80 = 2 \times 5 \times 8$$

Since $653xy$ is divisible by 2 and 5 both, so $y = 0$.

Now, $653x$ is divisible by 8, so $13x$ should be divisible by 8.

This happens when $x = 6$.

$$\therefore x + y = (6 + 0) = 6.$$

107. The difference of the squares of two consecutive odd integers is divisible by which of the following integers?

[A.3](#) [B.6](#)
[C.7](#) [D.8](#)

[Answer & Explanation](#)

Answer: Option D

Explanation:

Let the two consecutive odd integers be $(2n + 1)$ and $(2n + 3)$. Then,

$$(2n + 3)^2 - (2n + 1)^2 = (2n + 3 + 2n + 1)(2n + 3 - 2n - 1)$$

$$= (4n + 4) \times 2$$

$$= 8(n + 1), \text{ which is divisible by 8.}$$

108. What is the unit digit in $(4137)^{754}$?

[A.1](#) [B.3](#)
[C.7](#) [D.9](#)

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$\text{Unit digit in } (4137)^{754} = \text{Unit digit in } \{ [(4137)^4]^{188} \times (4137)^2 \}$$

$$= \text{Unit digit in } \{ 292915317923361 \times 17114769 \}$$

$$= (1 \times 9) = 9$$

109. $587 \times 999 = ?$

[A.586413](#) [B.587523](#)
[C.614823](#) [D.615173](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$\begin{aligned}
 587 \times 999 &= 587 \times (1000 - 1) \\
 &= 587 \times 1000 - 587 \times 1 \\
 &= 587000 - 587 \\
 &= 586413.
 \end{aligned}$$

110. A number was divided successively in order by 4, 5 and 6. The remainders were respectively 2, 3 and 4.

The number is:

[A.214](#) [B.476](#)

[C.954](#) [D.1908](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$\begin{array}{rcl}
 4 \mid x & z = 6 \times 1 + 4 = 10 \\
 \hline
 5 \mid y - 2 & y = 5 \times z + 3 = 5 \times 10 + 3 = 53 \\
 \hline
 6 \mid z - 3 & x = 4 \times y + 2 = 4 \times 53 + 2 = 214 \\
 \hline
 & \mid 1 - 4
 \end{array}$$

Hence, required number = 214.

111. If $(64)^2 - (36)^2 = 20 \times x$, then $x = ?$

[A.70](#) [B.120](#)

[C.180](#) [D.140](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$20 \times x = (64 + 36)(64 - 36) = 100 \times 28$$

$$\Rightarrow x = \frac{100 \times 28}{20} = 140$$

112. Which one of the following can't be the square of natural number ?

[A.32761](#) [B.81225](#)

[C.42437](#)

[D.20164](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option C

Explanation:

The square of a natural number never ends in 7.

\therefore 42437 is not the square of a natural number.

113. $(2^2 + 4^2 + 6^2 + \dots + 20^2) = ?$

[A.770](#) [B.1155](#)

[C.1540](#) [D.385 \times 385](#)

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$(2^2 + 4^2 + 6^2 + \dots + 20^2) = (1 \times 2)^2 + (2 \times 2)^2 + (2 \times 3)^2 + \dots + (2 \times 10)^2$$

$$= (2^2 \times 1^2) + (2^2 \times 2^2) + (2^2 \times 3^2) + \dots + (2^2 \times 10^2)$$

$$= 2^2 \times [1^2 + 2^2 + 3^2 + \dots + 10^2]$$

$$\left[\text{Ref: } (1^2 + 2^2 + 3^2 + \dots + n^2) = \frac{1}{6} n(n+1)(2n+1) \right]$$

$$= \left(\frac{1}{6} \times 4 \times 5 \times 10 \times 11 \times 21 \right)$$

$$= (4 \times 5 \times 77)$$

$$= 1540.$$

114. $854 \times 854 \times 854 - 276 \times 276 \times 276 = ?$

$$854 \times 854 + 854 \times 276 + 276 \times 276$$

[A.1130](#)

[B.578](#)

[C.565](#)

[D.1156](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\begin{array}{rcl} \text{Given Exp.} & (a^3 - b^3) & \\ = & (a^2 + ab + b^2) & = (a - b) = (854 - 276) = 578 \end{array}$$

115. $35 + 15 \times 1.5 = ?$

[A.](#)85

[B.](#)51.5

[C.](#)57.5

[D.](#)5.25

[E.](#)None of these

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$\begin{array}{rcl} \text{Given Exp.} & = 35 + 15 \times \frac{3}{2} & = 35 + 22.5 = 57.5 \end{array}$$

116. The sum of first 45 natural numbers is:

[A.](#)1035

[B.](#)1280

[C.](#)2070

[D.](#)2140

[Answer & Explanation](#)

Answer: Option A

Explanation:

Let $S_n = (1 + 2 + 3 + \dots + 45)$

This is an A.P. in which $a = 1$, $d = 1$, $n = 45$ and $l = 45$

$$\therefore S_n = \frac{n}{2} (a + l) = \frac{45}{2} \times (1 + 45) = (45 \times 23) = 1035$$

Required sum = 1035.

117. $666 \div 6 \div 3 = ?$

[A.](#)37

[B.](#)333

[C.](#)111

[D.](#)84

[E.](#)None of these

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$\text{Given Exp.} = 666 \times \frac{1}{6} \times \frac{1}{3} = 37$$

118. The sum of all two digit numbers divisible by 5 is:

[A.](#)1035

[B.](#)1245

[C.](#)1230

[D.](#)945

[E.](#)None of these

[Answer & Explanation](#)

Answer: Option D

Explanation:

Required numbers are 10, 15, 20, 25, ..., 95

This is an A.P. in which $a = 10$, $d = 5$ and $l = 95$.

$$t_n = 95 \Rightarrow a + (n - 1)d = 95$$

$$\Rightarrow 10 + (n - 1) \times 5 = 95$$

$$\Rightarrow (n - 1) \times 5 = 85$$

$$\Rightarrow (n - 1) = 17$$

$$\Rightarrow n = 18$$

$$\therefore \text{Required Sum} = \frac{n}{2} (a + l) = \frac{18}{2} \times (10 + 95) = (9 \times 105) = 945.$$

119. The difference between the place values of two sevens in the numeral 69758472 is

[A.](#)0

[B.](#)6993

[C.](#)699930

[D.](#)None of these

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$\text{Required difference} = (700000 - 70) = 699930$$

120. On dividing a number by 68, we get 269 as quotient and 0 as remainder. On dividing the same number by 67, what will the remainder ?

[A.](#)0 [B.](#)1
[C.](#)2 [D.](#)3

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\text{Number} = 269 \times 68 + 0 = 18292$$

$$\begin{array}{r} 67 \overline{) 18292} \quad (273 \\ 134 \\ \text{----} \\ 489 \\ 469 \\ \text{----} \\ 202 \\ 201 \\ \text{---} \\ 1 \\ \text{---} \end{array}$$

Therefore, Required remainder = 1

121. What is the unit digit in the product $(3^{65} \times 6^{59} \times 7^{71})$?

[A.](#)1 [B.](#)2
[C.](#)4 [D.](#)6

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$\text{Unit digit in } 3^4 = 1 \Rightarrow \text{Unit digit in } (3^4)^{16} = 1$$

$$\therefore \text{Unit digit in } 3^{65} = \text{Unit digit in } [(3^4)^{16} \times 3] = (1 \times 3) = 3$$

$$\text{Unit digit in } 6^{59} = 6$$

$$\text{Unit digit in } 7^4 \Rightarrow \text{Unit digit in } (7^4)^{17} \text{ is } 1.$$

$$\text{Unit digit in } 7^{71} = \text{Unit digit in } [(7^4)^{17} \times 7^3] = (1 \times 3) = 3$$

$$\therefore \text{Required digit} = \text{Unit digit in } (3 \times 6 \times 3) = 4.$$

$$122. 3251 + 587 + 369 - ? = 3007$$

[A.](#)1250 [B.](#)1300
[C.](#)1375 [D.](#)1200
[E.](#)None of these

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$\begin{array}{rcl} 3251 & \text{Let } 4207 - x = 3007 \\ + 587 & \text{Then, } x = 4207 - 3007 = 1200 \\ + 369 & \\ \text{----} & \\ 4207 & \\ \text{----} & \end{array}$$

$$123. 7589 - ? = 3434$$

[A.](#)4242 [B.](#)4155
[C.](#)1123 [D.](#)11023
[E.](#)None of these

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\text{Let } 7589 - x = 3434$$

$$\text{Then, } x = 7589 - 3434 = 4155$$

$$124. 217 \times 217 + 183 \times 183 = ?$$

[A.](#)79698 [B.](#)80578
[C.](#)80698 [D.](#)81268

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\begin{aligned}
(217)^2 + (183)^2 &= (200 + 17)^2 + (200 - 17)^2 \\
&= 2 \times [(200)^2 + (17)^2] \quad [\text{Ref: } (a + b)^2 + (a - b)^2 = 2(a^2 + b^2)] \\
&= 2[40000 + 289] \\
&= 2 \times 40289 \\
&= 80578.
\end{aligned}$$

125. The unit digit in the product (784 x 618 x 917 x 463) is:

- [A.2](#) [B.3](#)
[C.4](#) [D.5](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

Unit digit in the given product = Unit digit in $(4 \times 8 \times 7 \times 3) = (672) = 2$

126. If the number 653 xy is divisible by 90, then $(x + y) = ?$

- [A.2](#) [B.3](#)
[C.4](#) [D.6](#)

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$90 = 10 \times 9$$

Clearly, 653 xy is divisible by 10, so $y = 0$

Now, 653 $x0$ is divisible by 9.

So, $(6 + 5 + 3 + x + 0) = (14 + x)$ is divisible by 9. So, $x = 4$.

Hence, $(x + y) = (4 + 0) = 4$.

127. $3897 \times 999 = ?$

- [A.3883203](#) [B.3893103](#)
[C.3639403](#) [D.3791203](#)
[E. None of these](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\begin{aligned}
3897 \times 999 &= 3897 \times (1000 - 1) \\
&= 3897 \times 1000 - 3897 \times 1 \\
&= 3897000 - 3897 \\
&= 3893103.
\end{aligned}$$

128. What is the unit digit in 7^{105} ?

- [A.1](#) [B.5](#)
[C.7](#) [D.9](#)

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$\text{Unit digit in } 7^{105} = \text{Unit digit in } [(7^4)^{26} \times 7]$$

$$\text{But, unit digit in } (7^4)^{26} = 1$$

$$\therefore \text{Unit digit in } 7^{105} = (1 \times 7) = 7$$

129. Which of the following numbers will completely divide $(4^{61} + 4^{62} + 4^{63} + 4^{64})$?

- [A.3](#) [B.10](#)
[C.11](#) [D.13](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\begin{aligned}
(4^{61} + 4^{62} + 4^{63} + 4^{64}) &= 4^{61} \times (1 + 4 + 4^2 + 4^3) = 4^{61} \times 85 \\
&= 4^{60} \times (4 \times 85)
\end{aligned}$$

$= (4^{60} \times 340)$, which is divisible by 10.

130. $106 \times 106 - 94 \times 94 = ?$

[A.2400](#)

[B.2000](#)

[C.1904](#)

[D.1906](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option A

Explanation:

$$\begin{aligned} 106 \times 106 - 94 \times 94 &= (106)^2 - (94)^2 \\ &= (106 + 94)(106 - 94) \quad [\text{Ref: } (a^2 - b^2) \\ &= (a + b)(a - b)] \\ &= (200 \times 12) \\ &= 2400. \end{aligned}$$

131. A number when divided successively by 4 and 5 leaves remainders 1 and 4 respectively. When it is successively divided by 5 and 4, then the respective remainders will be

[A.1, 2](#)

[B.2, 3](#)

[C.3, 2](#)

[D.4, 1](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\begin{array}{rcl} 4 \mid x & y = (5 \times 1 + 4) = 9 \\ \hline 5 \mid y - 1 & x = (4 \times y + 1) = (4 \times 9 + 1) = 37 \\ \hline & \mid 1 - 4 \end{array}$$

Now, 37 when divided successively by 5 and 4, we get

$$\begin{array}{rcl} 5 \mid 37 & & \\ \hline 4 \mid 7 - 2 & & \\ \hline & \mid 1 - 3 \end{array}$$

Respective remainders are 2 and 3.

132. $8796 \times 223 + 8796 \times 77 = ?$

[A.2736900](#)

[B.2638800](#)

[C.2658560](#)

[D.2716740](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\begin{aligned} 8796 \times 223 + 8796 \times 77 &= 8796 \times (223 + 77) \quad [\text{Ref: By} \\ &\quad \text{Distributive Law}] \\ &= (8796 \times 300) \\ &= 2638800 \end{aligned}$$

133. $8988 \div 8 \div 4 = ?$

[A.4494](#)

[B.561.75](#)

[C.2247](#)

[D.280.875](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option D

Explanation:

$$\text{Given Exp.} = 8988 \times \frac{1}{8} \times \frac{1}{4} = \frac{2247}{8} = 280.875$$

134. $287 \times 287 + 269 \times 269 - 2 \times 287 \times 269 = ?$

[A.534](#)

[B.446](#)

[C.354](#)

[D.324](#)

[E. None of these](#)

[Answer & Explanation](#)

Answer: Option D

Explanation:

Given Exp. $= a^2 + b^2 - 2ab$, where $a = 287$ and $b = 269$

$$= (a - b)^2 = (287 - 269)^2$$

$$= (18^2)$$

$$= 324$$

135. $3 + 33 + 333 + 3.33 = ?$

[A.](#) 362.3

[B.](#) 372.33

[C.](#) 702.33

[D.](#) 702

[E.](#) None of these

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\begin{array}{r} 3 \\ + 33 \\ + 333 \\ + 3.33 \\ \hline 372.33 \\ \hline \end{array}$$

136. Which one of the following can't be the square of natural number ?

[A.](#) 30976

[B.](#) 75625

[C.](#) 28561

[D.](#) 143642

[E.](#) None of these

[Answer & Explanation](#)

Answer: Option D

Explanation:

The square of a natural number never ends in 2.

\therefore 143642 is not the square of natural number.

137. $(1000)^9 \div 10^{24} = ?$

[A.](#) 10000

[B.](#) 1000

[C.](#) 100

[D.](#) 10

[E.](#) None of these

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\begin{aligned} \text{Given Exp. } & (1000)^9 \div (10^3)^9 \div (10)^{27} = 10^{(27-24)} = 10^3 = \\ & = \frac{1000^9}{10^{24}} = \frac{10^{27}}{10^{24}} = 10^3 = 1000 \end{aligned}$$

138. $\{(476 + 424)^2 - 4 \times 476 \times 424\} = ?$

[A.](#) 2906

[B.](#) 3116

[C.](#) 2704

[D.](#) 2904

[E.](#) None of these

[Answer & Explanation](#)

Answer: Option C

Explanation:

$$\begin{aligned} \text{Given Exp. } & = [(a + b)^2 - 4ab], \text{ where } a = 476 \text{ and } b = 424 \\ & = [(476 + 424)^2 - 4 \times 476 \times 424] \\ & = [(900)^2 - 807296] \\ & = 810000 - 807296 \\ & = 2704. \end{aligned}$$

20. Decimal Fraction

1. Evaluate : $\frac{(2.39)^2 - (1.61)^2}{2.39 - 1.61}$

[A.](#) 2

[B.](#) 4

[C.](#) 6

[D.](#) 8

[Answer & Explanation](#)

Answer: Option B

Explanation:

$$\begin{aligned} \text{Given Expression } & = \frac{a^2 - b^2}{a - b} = \frac{(a + b)(a - b)}{(a - b)} = (a + b) = (2.39 + 1.61) = 4. \end{aligned}$$

2. What decimal of an hour is a second ?

[A.](#) .0025

[B.](#) .0256

[C.](#) .00027

[D.](#) .000126

Answer & Explanation**Answer:** Option C**Explanation:**

$$\text{Required decimal} = \frac{1}{60 \times 60} = \frac{1}{3600} = .00027$$

3. The value of $\frac{(0.96)^3 - (0.1)^3}{(0.96)^2 + 0.096 + (0.1)^2}$ is:

A. 0.86 B. 0.95
C. 0.97 D. 1.06

Answer & Explanation**Answer:** Option A**Explanation:**

$$\begin{aligned} \text{Given expression} &= \frac{(0.96)^3 - (0.1)^3}{(0.96)^2 + 0.096 + (0.1)^2} \\ &= \frac{a^3 - b^3}{a^2 + ab + b^2} \\ &= (a - b) \\ &= (0.96 - 0.1) \\ &= 0.86 \end{aligned}$$

4. The value of $\frac{0.1 \times 0.1 \times 0.1 + 0.02 \times 0.02 \times 0.02}{0.2 \times 0.2 \times 0.2 + 0.04 \times 0.04 \times 0.04}$ is:

A. 0.0125 B. 0.125
C. 0.25 D. 0.5

Answer & Explanation**Answer:** Option B**Explanation:**

$$\text{Given expression} = \frac{(0.1)^3 + (0.02)^3}{2^3 [(0.1)^3 + (0.02)^3]} = \frac{1}{8} = 0.125$$

5. If $2994 \div 14.5 = 172$, then $29.94 \div 1.45 = ?$

A. 0.172 B. 1.72
C. 17.2 D. 172

Answer & Explanation**Answer:** Option C**Explanation:**

$$\begin{aligned} 29.94 \div 1.45 &= \frac{299.4}{14.5} \\ &= \left(\frac{2994}{14.5 \times 10} \right) \times \frac{1}{10} \quad \left[\text{Here, Substitute 172 in the place of } 2994/14.5 \right] \\ &= 172 \end{aligned}$$

10

$$= 17.2$$

6. When 0.232323..... is converted into a fraction, then the result is:

A. $\frac{1}{5}$ B. $\frac{2}{9}$
C. $\frac{23}{99}$ D. $\frac{23}{100}$

Answer & Explanation**Answer:** Option C**Explanation:**

$$0.232323... = 0.23 = \frac{23}{99}$$

7. $\frac{.009}{?} = .01$

A. .0009 B. .09
C. .9 D. 9

Answer & Explanation**Answer:** Option C**Explanation:**

$$\text{Let } \frac{.009}{x} = .01; \quad \text{Then } x = \frac{.009}{.01} = \frac{.9}{1} = .9$$

8. The expression $(11.98 \times 11.98 + 11.98 \times x + 0.02 \times 0.02)$ will be a perfect square for x equal to:

A. 0.02 B. 0.2
C. 0.04 D. 0.4

Answer & Explanation**Answer:** Option C**Explanation:**

$$\text{Given expression} = (11.98)^2 + (0.02)^2 + 11.98 \times x.$$

For the given expression to be a perfect square, we must have

$$11.98 \times x = 2 \times 11.98 \times 0.02 \text{ or } x = 0.04$$

9. $\frac{(0.1667)(0.8333)(0.3333)}{(0.2222)(0.6667)(0.1250)}$ is approximately equal to:

A. 2 B. 2.40
C. 2.43 D. 2.50

Answer & Explanation**Answer:** Option D

Explanation:

$$\begin{aligned} \text{Given expression} &= \frac{(0.3333 \dots)^2 (0.1667 \dots)^3 (0.8333 \dots)^3}{(0.2222 \dots)^2 (0.6667 \dots)^3 (0.125 \dots)^3} \\ &= \frac{3^3 \times 10^{-3} \times 16^3 \times 8^3}{2^4 \times 6^3 \times 1000} \\ &= \left(\frac{3}{2} \right)^3 \times \left(\frac{1}{6} \right)^3 \times \left(\frac{5}{2} \right)^3 \times \left(\frac{1}{1000} \right) \\ &= \frac{5}{2} \\ &= 2.50 \end{aligned}$$

10. $3889 + 12.952 - ? = 3854.002$

- A. 47.095 B. 47.752
C. 47.932 D. 47.95

Answer & Explanation

Answer: Option D

Explanation:

Let $3889 + 12.952 - x = 3854.002$.

Then $x = (3889 + 12.952) - 3854.002$

$= 3901.952 - 3854.002$

$= 47.95$.

11. 0.04×0.0162 is equal to:

- A. 6.48×10^{-3} B. 6.48×10^{-4}
C. 6.48×10^{-5} D. 6.48×10^{-6}

Answer & Explanation

Answer: Option B

Explanation:

$4 \times 162 = 648$. Sum of decimal places = 6.
 So, $0.04 \times 0.0162 = 0.000648 = 6.48 \times 10^{-4}$

12. $4.2 \times 4.2 - 1.9 \times 1.9$ is equal to:
 2.3×6.1

- A. 0.5 B. 1.0
C. 20 D. 22

Answer & Explanation

Answer: Option B

Explanation:

Given Expression = $\frac{(a^2 - b^2)}{(a + b)(a - b)} = \frac{(a^2 - b^2)}{(a^2 - b^2)} = 1$.

13. If $\frac{144}{0.144} = \frac{14.4}{x}$, then the value of x is:

- A. 0.0144 B. 1.44
C. 14.4 D. 144

Answer & Explanation

Answer: Option A

Explanation:

$$\begin{aligned} \frac{144}{0.144} &= \frac{14.4}{x} \\ \Rightarrow \frac{144 \times 1000}{144} &= \frac{14.4}{x} \\ \Rightarrow x &= \frac{14.4}{1000} = 0.0144 \end{aligned}$$

14. The price of commodity X increases by 40 paise every year, while the price of commodity Y increases by 15 paise every year. If in 2001, the price of commodity X was Rs. 4.20 and that of Y was Rs. 6.30, in which year commodity X will cost 40 paise more than the commodity Y?

- A. 2010 B. 2011
C. 2012 D. 2013

Answer & Explanation

Answer: Option B

Explanation:

Suppose commodity X will cost 40 paise more than Y after z years.

Then, $(4.20 + 0.40z) - (6.30 + 0.15z) = 0.40$

$\Rightarrow 0.25z = 0.40 + 2.10$

$\Rightarrow z = \frac{2.50}{0.25} = \frac{250}{25} = 10$.

\therefore X will cost 40 paise more than Y 10 years after 2001 i.e., 2011.

15. Which of the following are in descending order of their value?

- A. 1 2 3 4 5 6
 3'5'7'5'6'7 B. 1 2 3 4 5 6
 3'5'5'7'6'7
C. 1 2 3 4 5 6 D. 6 5 4 3 2 1
 3'5'5'6'7'7 7'6'5'7'5'3

Answer & Explanation

Answer: Option D

Explanation:

No answer description available for this question. **Let us discuss.**

16. Which of the following fractions is $\frac{3}{4}$ and less $\frac{5}{6}$ greater than

A. $\frac{1}{2}$ B. $\frac{2}{3}$
C. $\frac{4}{5}$ D. $\frac{9}{10}$

Answer & Explanation

Answer: Option C

Explanation:

$$\frac{3}{4} = 0.75, \frac{5}{6} = 0.833, \frac{1}{2} = 0.5, \frac{2}{3} = 0.66, \frac{4}{5} = 0.8, \frac{9}{10} = 0.9$$

Clearly, 0.8 lies between 0.75 and 0.833.

$$\therefore \frac{4}{5} \text{ lies between } \frac{3}{4} \text{ and } \frac{5}{6}$$

17. The rational number for recurring decimal 0.125125.... is:

A. $\frac{63}{487}$ B. $\frac{119}{993}$
C. $\frac{125}{999}$ D. None of these

Answer & Explanation

Answer: Option C

Explanation:

$$0.125125... = 0.125 = \frac{125}{999}$$

18. $617 + 6.017 + 0.617 + 6.0017 = ?$

A. 6.2963 B. 62.965
C. 629.6357 D. None of these

Answer & Explanation

Answer: Option C

Explanation:

$$\begin{array}{r} 617.00 \\ 6.017 \\ 0.617 \\ + 6.0017 \\ \hline 629.6357 \\ \hline \end{array}$$

19. The value of $\frac{489.1375 \times 0.0483 \times 1.956}{0.0873 \times 92.581 \times 99.749}$ is closet to:

A. 0.006 B. 0.06
C. 0.6 D. 6

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{aligned} \frac{489.1375 \times 0.0483 \times 1.956}{0.0873 \times 92.581 \times 99.749} &\approx \frac{489 \times 0.05 \times 2}{0.09 \times 93 \times 100} \\ &= \frac{489}{9 \times 93 \times 10} \\ &= \frac{163}{279} \approx \frac{1}{10} \\ &= 0.58 \\ &= 10 \end{aligned}$$

$$= 0.058 \approx 0.06$$

20. $0.002 \times 0.5 = ?$

A. 0.0001 B. 0.001
C. 0.01 D. 0.1

Answer & Explanation

Answer: Option B

Explanation:

$$2 \times 5 = 10.$$

Sum of decimal places = 4

$$\therefore 0.002 \times 0.5 = 0.001$$

$$\begin{array}{r} 240.016 \\ + 23.98 \\ \hline \end{array}$$

$$\begin{array}{r} 298.946 \\ \hline \end{array}$$

22. Which of the following is equal to 3.14×10^6 ?

A. 314 B. 3140
C. 3140000 D. None of these

Answer & Explanation

Answer: Option C

Explanation:

$$3.14 \times 10^6 = 3.14 \times 1000000 = 3140000.$$

23. The least among the following is:

A. 0.2 B. $1 \div 0.2$
C. 0.2 D. $(0.2)^2$

Answer & Explanation

Answer: Option D

Explanation:

$$1 \div 0.2 = \frac{1}{0.2} = \frac{10}{2} = 5;$$

$$0.2 = 0.222...;$$

$$(0.2)^2 = 0.04.$$

$$0.04 < 0.2 < 0.22... < 5.$$

Since 0.04 is the least, so $(0.2)^2$ is the least.

24. $5 \times 1.6 - 2 \times 1.4 = ?$
1.3

A. 0.4

B. 1.2

C. 1.4

D. 4

Answer & Explanation

Answer: Option D

Explanation:

$$\text{Given Expression} = \frac{8 - 2.8}{1.3} = \frac{5.2}{1.3} = \frac{52}{13} = 4.$$

25. How many digits will be there to the right of the decimal point in the product of 95.75 and .02554 ?

A. 5

B. 6

C. 7

D. None of these

Answer & Explanation

Answer: Option B

Explanation:

Sum of decimal places = 7.

Since the last digit to the extreme right will be zero (since $5 \times 4 = 20$), so there will be 6 significant digits to the right of the decimal point.

26. The correct expression of 6.46 in the fractional form is:

A. $\frac{646}{99}$

B. $\frac{64640}{1000}$

C. $\frac{640}{100}$

D. $\frac{640}{99}$

Answer & Explanation

Answer: Option D

Explanation:

$$6.46 = 6 + 0.46 = 6 + \frac{46}{99} = \frac{594 + 46}{99} = \frac{640}{99}.$$

27. The fraction $101\frac{27}{100000}$ in decimal form is:

A. .01027

B. .10127

C. 101.00027

D. 101.000027

Answer & Explanation

Answer: Option C

Explanation:

$$101\frac{27}{100000} = 101 + \frac{27}{100000} = 101 + .00027 = 101.00027$$

28. 0.0203×2.92
 $0.0073 \times 14.5 \times 0.7 = ?$

A. 0.8

B. 1.45

C. 2.40

D. 3.25

Answer & Explanation

Answer: Option A

Explanation:

$$\frac{0.0203 \times 2.92}{0.0073 \times 14.5 \times 0.7} = \frac{203 \times 292}{73 \times 145 \times 7} \times \frac{4}{5} = 0.8$$

29. 4.036 divided by 0.04 gives :

A. 1.009

B. 10.09

C. 100.9

D. None of these

Answer & Explanation

Answer: Option C

Explanation:

$$\frac{4.036}{0.04} = \frac{403.6}{4} = 100.9$$

30. $3.87 - 2.59 = ?$

A. 1.20

B. 1.2

C. 1.27

D. 1.28

Answer & Explanation

Answer: Option D

Explanation:

$$3.87 - 2.59 = (3 + 0.87) - (2 + 0.59)$$

$$= \left(3 + \frac{87}{99} \right) - \left(2 + \frac{59}{99} \right)$$
$$= 1 + \left(\frac{87}{99} - \frac{59}{99} \right)$$

$$= 1 + \frac{28}{99}$$

$$= 1.28.$$

20. Surds and Indices

1. $(17)^{3.5} \times (17)^? = 17^8$

A. 2.29

C. 4.25

B. 2.75

D. 4.5

Answer & Explanation

Answer: Option D

Explanation:

Let $(17)^{3.5} \times (17)^x = 17^8$.

Then, $(17)^{3.5+x} = 17^8$.

$$\therefore 3.5 + x = 8$$

$$\Rightarrow x = (8 - 3.5)$$

$$\Rightarrow x = 4.5$$

2. If $\left(\frac{a}{b}\right)^{x-1} = \left(\frac{b}{a}\right)^{x-3}$, then the value of x is:

A. $\frac{1}{2}$

B. 1

C. 2

D. $\frac{7}{2}$

Answer & Explanation

Answer: Option C

Explanation:

Given $\left(\frac{a}{b}\right)^{x-1} = \left(\frac{b}{a}\right)^{x-3}$

$$\Rightarrow \left(\frac{a}{b}\right)^{x-1} = \left(\frac{a}{b}\right)^{-(x-3)} = \left(\frac{a}{b}\right)^{(3-x)}$$

$$\Rightarrow x - 1 = 3 - x$$

$$\Rightarrow 2x = 4$$

$$\Rightarrow x = 2.$$

3. Given that $10^{0.48} = x$, $10^{0.70} = y$ and $x^z = y^2$, then the value of z is close to:

A. 1.45

B. 1.88

C. 2.9

D. 3.7

Answer & Explanation

Answer: Option C

Explanation:

$$x^z = y^2 \Leftrightarrow 10^{(0.48z)} = 10^{(2 \times 0.70)} = 10^{1.40}$$

$$\Rightarrow 0.48z = 1.40$$

$$\Rightarrow z = \frac{140}{48} = \frac{35}{12} = 2.9 \text{ (approx.)}$$

4. If $5^a = 3125$, then the value of $5^{(a-3)}$ is:

A. 25

B. 125

C. 625

D. 1625

Answer & Explanation

Answer: Option A

Explanation:

$$5^a = 3125 \Leftrightarrow 5^a = 5^5$$

$$\Rightarrow a = 5.$$

$$\therefore 5^{(a-3)} = 5^{(5-3)} = 5^2 = 25.$$

5. If $3^{(x-y)} = 27$ and $3^{(x+y)} = 243$, then x is equal to:

A. 0

B. 2

C. 4

D. 6

Answer & Explanation

Answer: Option C

Explanation:

$$3^{x-y} = 27 = 3^3 \Leftrightarrow x - y = 3 \text{(i)}$$

$$3^{x+y} = 243 = 3^5 \Leftrightarrow x + y = 5 \text{(ii)}$$

On solving (i) and (ii), we get $x = 4$.

6. $(256)^{0.16} \times (256)^{0.09} = ?$

A. 4

B. 16

C. 64

D. 256.25

Answer & Explanation

Answer: Option A

Explanation:

$$(256)^{0.16} \times (256)^{0.09} = (256)^{(0.16+0.09)}$$

$$= (256)^{0.25}$$

$$= (256)^{(25/100)}$$

$$= (256)^{(1/4)}$$

$$= (4^4)^{(1/4)}$$

$$= 4^{4(1/4)}$$

$$= 4^1$$

$$= 4$$

7. The value of $[(10)^{150} \div (10)^{146}]$

A. 1000

B. 10000

C. 100000

D. 10^6

Answer & Explanation

Answer: Option B

Explanation:

$$(10)^{150} \div (10)^{146} = \frac{10^{150}}{10^{146}}$$

$$= 10^{150 - 146}$$

$$= 10^4$$

$$= 10000.$$

8. $\frac{1}{1 + x^{(b-a)}} + \frac{1}{x^{(c-a)} + 1} + \frac{1}{x^{(a-b)} + x^{(c-b)} + 1} + \frac{1}{x^{(b-c)} + x^{(a-c)}} = ?$

A. 0

B. 1

C. x^{a-b-c}

D. None of these

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{aligned} \text{Given Exp.} &= \left(\frac{1}{1 + \frac{x^b}{x^a} + \frac{x^c}{x^a}} \right) + \left(\frac{1}{1 + \frac{x^a}{x^b} + \frac{x^c}{x^b}} \right) + \left(\frac{1}{1 + \frac{x^b}{x^c} + \frac{x^a}{x^c}} \right) \\ &= \frac{x^a}{(x^a + x^b + x^c)} + \frac{x^b}{(x^a + x^b + x^c)} + \frac{x^c}{(x^a + x^b + x^c)} \\ &= \frac{(x^a + x^b + x^c)}{(x^a + x^b + x^c)} \\ &= 1. \end{aligned}$$

9. $(25)^{7.5} \times (5)^{2.5} \div (125)^{1.5} = 5^?$

A. 8.5

B. 13

C. 16

D. 17.5

E. None of these

Answer & Explanation

Answer: Option B

Explanation:

$$\text{Let } (25)^{7.5} \times (5)^{2.5} \div (125)^{1.5} = 5^x.$$

$$\text{Then, } \frac{(5^2)^{7.5} \times (5)^{2.5}}{(5^3)^{1.5}} = 5^x$$

$$\Rightarrow \frac{5^{(2 \times 7.5)} \times 5^{2.5}}{5^{(3 \times 1.5)}} = 5^x$$

$$\Rightarrow \frac{5^{15} \times 5^{2.5}}{5^{4.5}} = 5^x$$

$$\Rightarrow 5^x = 5^{(15 + 2.5 - 4.5)}$$

$$\Rightarrow 5^x = 5^{13}$$

$$\therefore x = 13.$$

10. $(0.04)^{-1.5} = ?$

A. 25

B. 125

C. 250

D. 625

Answer & Explanation

Answer: Option B

Explanation:

$$(0.04)^{-1.5} = \left(\frac{4}{100} \right)^{-1.5}$$

$$= \left(\frac{1}{25} \right)^{-(3/2)}$$

$$= (25)^{(3/2)}$$

$$= (5^2)^{(3/2)}$$

$$= (5)^{2 \times (3/2)}$$

$$= 5^3$$

$$= 125.$$

11. $(243)^{n/5} \times 3^{2n+1} = ?$

A. 1

B. 2

C. 9

D. 3^n

Answer & Explanation

Answer: Option C

Explanation:

$$\begin{aligned} \text{Given Expression} &= \frac{(243)^{(n/5)} \times 3^{2n+1}}{9^n \times 3^{n-1}} \\ &= \frac{(3^5)^{(n/5)} \times 3^{2n+1}}{(3^2)^n \times 3^{n-1}} \\ &= \frac{3^{5 \times (n/5)} \times 3^{2n+1}}{3^{2n} \times 3^{n-1}} \end{aligned}$$

$$\begin{aligned}
& (3^{2n} \times 3^{n-1}) \\
&= 3^n \times 3^{2n+1} \\
&= 3^{2n} \times 3^{n-1} \\
&= 3^{(n+2n+1)} \\
&= 3^{(2n+n-1)} \\
&= 3^{3n+1} \\
&= 3^{3n-1} \\
&= 3^{(3n+1-3n+1)} = 3^2 = 9.
\end{aligned}$$

12. $\frac{1}{1+a^{(n-m)+}} + \frac{1}{1+a^{(m-n)}} = ?$

- A. 0
B. $\frac{1}{2}$
C. 1
D. a^{m+n}

Answer & Explanation

Answer: Option C

Explanation:

$$\begin{aligned}
\frac{1}{1+a^{(n-m)+}} + \frac{1}{1+a^{(m-n)}} &= \frac{1}{1+a^n} + \frac{1}{1+a^m} \\
&= \frac{a^m}{(a^m+a^n)} + \frac{a^n}{(a^m+a^n)} \\
&= \frac{(a^m+a^n)}{(a^m+a^n)} \\
&= 1.
\end{aligned}$$

13. If m and n are whole numbers such that $m^n = 121$, the value of $(m-1)^{n+1}$ is:

- A. 1
B. 10
C. 121
D. 1000

Answer & Explanation

Answer: Option D

Explanation:

We know that $11^2 = 121$.

Putting $m = 11$ and $n = 2$, we get:

$$(m-1)^{n+1} = (11-1)^{(2+1)} = 10^3 = 1000.$$

14. $\left(\frac{x^b}{x^c}\right)^{(b+c-a)} \cdot \left(\frac{x^c}{x^a}\right)^{(c+a-b)} \cdot \left(\frac{x^a}{x^b}\right)^{(a+b-c)} = ?$

- A. x^{abc}
B. 1
C. $x^{ab+bc+ca}$
D. x^{a+b+c}

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{aligned}
\text{Given Exp.} &= x^{(b-c)(b+c-a)} \cdot x^{(c-a)(c+a-b)} \cdot x^{(a-b)(a+b-c)} \\
&= x^{(b-c)(b+c-a)(b-c)} \cdot x^{(c-a)(c+a-b)(c-a)} \\
&\quad \cdot x^{(a-b)(a+b-c)(a-b)} \\
&= x^{(b^2-c^2+c^2-a^2+a^2-b^2)} \cdot x^{-a(b-c)-b(c-a)-c(a-b)} \\
&= (x^0 \times x^0) \\
&= (1 \times 1) = 1.
\end{aligned}$$

15. If $x = 3 + 22$, then the value of $\left(x - \frac{1}{x}\right)$ is:

- A. 1
B. 2
C. 22
D. 33

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{aligned}
\left(x - \frac{1}{x}\right)^2 &= x + \frac{1}{x} - 2 \\
&= (3 + 22) + \frac{1}{(3 + 22)} - 2 \\
&= (3 + 22) + \frac{1}{(3 + 22)} \times \frac{(3 - 22)}{(3 - 22)} - 2 \\
&= (3 + 22) + (3 - 22) - 2 \\
&= 4. \\
\therefore \left(x - \frac{1}{x}\right) &= 2.
\end{aligned}$$

21. Pipes and Cistern

1. Three pipes A, B and C can fill a tank from empty to full in 30 minutes, 20 minutes, and 10 minutes respectively. When the tank is empty, all the three pipes are opened. A, B and C discharge chemical solutions P, Q and R respectively. What is the proportion of the solution R in the liquid in the tank after 3 minutes?

- A. $\frac{5}{11}$
B. $\frac{6}{11}$
C. $\frac{7}{11}$
D. $\frac{8}{11}$

Answer & Explanation

Answer: Option B

Explanation:

Part filled by (A + B + C) in $\left(\frac{1}{30} + \frac{1}{20} + \frac{1}{10}\right) = \left(\frac{3}{x} + \frac{11}{60}\right) = \frac{11}{20}$
3 minutes = 3

Part filled by C in 3 minutes = $\frac{3}{10}$

\therefore Required ratio = $\left(\frac{3}{10} \times \frac{20}{11}\right) = \frac{6}{11}$

2. Pipes A and B can fill a tank in 5 and 6 hours respectively. Pipe C can empty it in 12 hours. If all the three pipes are opened together, then the tank will be filled in:

A. $1\frac{13}{17}$ hours

B. $2\frac{8}{11}$ hours

C. $3\frac{9}{17}$ hours

D. $4\frac{1}{2}$ hours

Answer & Explanation

Answer: Option C

Explanation:

Net part filled in 1 hour $\left(\frac{1}{5} + \frac{1}{6} - \frac{1}{12}\right) = \frac{17}{60}$

\therefore The tank will be full in $\frac{60}{17}$ hours i.e., $3\frac{9}{17}$ hours.

3. A pump can fill a tank with water in 2 hours. Because of a leak, it took $2\frac{1}{3}$ hours to fill the tank. The leak can drain all the water of the tank in:

A. $4\frac{1}{3}$ hours

B. 7 hours

C. 8 hours

D. 14 hours

Answer & Explanation

Answer: Option D

Explanation:

Work done by the leak in 1 hour = $\left(\frac{1}{2} - \frac{3}{7}\right) = \frac{1}{14}$

\therefore Leak will empty the tank in 14 hrs.

4. Two pipes A and B can fill a cistern in $37\frac{1}{2}$ minutes and 45 minutes respectively. Both pipes are opened. The cistern will be filled in just half an hour, if the B is turned off after:

A. 5 min.

B. 9 min.

C. 10 min.

D. 15 min.

Answer & Explanation

Answer: Option B

Explanation:

Let B be turned off after x minutes. Then,

Part filled by (A + B) in x min. + Part filled by A in $(30 - x)$ min. = 1.

$$\therefore x \left(\frac{2}{75} + \frac{1}{45}\right) + (30 - x) \cdot \frac{2}{75} = 1$$

$$\Rightarrow \frac{11x}{225} + \frac{(60 - 2x)}{75} = 1$$

$$\Rightarrow 11x + 180 - 6x = 225.$$

$$\Rightarrow x = 9.$$

5. A tank is filled by three pipes with uniform flow. The first two pipes operating simultaneously fill the tank in the same time during which the tank is filled by the third pipe alone. The second pipe fills the tank 5 hours faster than the first pipe and 4 hours slower than the third pipe.

The time required by the first pipe is:

A. 6 hours

B. 10 hours

C. 15 hours

D. 30 hours

Answer & Explanation

Answer: Option C

Explanation:

Suppose, first pipe alone takes x hours to fill the tank.

Then, second and third pipes will take $(x - 5)$ and $(x - 9)$ hours respectively to fill the tank.

$$\therefore \frac{1}{x} + \frac{1}{(x - 5)} = \frac{1}{(x - 9)}$$

$$\Rightarrow \frac{x - 5 + x}{x(x - 5)} = \frac{1}{(x - 9)}$$

$$\Rightarrow (2x - 5)(x - 9) = x(x - 5)$$

$$\Rightarrow x^2 - 18x + 45 = 0$$

$$(x - 15)(x - 3) = 0$$

$$\Rightarrow x = 15. \quad [\text{neglecting } x = 3]$$

6. Two pipes can fill a tank in 20 and 24 minutes respectively and a waste pipe can empty 3 gallons per minute. All the three pipes working together can fill the tank in 15 minutes. The capacity of the tank is:

A. 60 gallons

B. 100 gallons

C. 120 gallons

D. 180 gallons

Answer & Explanation

Answer: Option C

Explanation:

$$\begin{aligned}\text{Work done by the waste pipe in 1 minute} &= \frac{1}{15} - \left(\frac{1}{20} + \frac{1}{24} \right) \\ &= \left(\frac{1}{15} - \frac{11}{120} \right) \\ &= -\frac{1}{40} \quad [\text{-ve sign means emptying}]\end{aligned}$$

$$\therefore \text{Volume of } \frac{1}{40} \text{ part} = 3 \text{ gallons.}$$

$$\text{Volume of whole} = (3 \times 40) \text{ gallons} = 120 \text{ gallons.}$$

7. A tank is filled in 5 hours by three pipes A, B and C. The pipe C is twice as fast as B and B is twice as fast as A. How much time will pipe A alone take to fill the tank?

- A. 20 hours B. 25 hours
C. 35 hours D. Cannot be determined
E. None of these

Answer & Explanation

Answer: Option C

Explanation:

Suppose pipe A alone takes x hours to fill the tank.

Then, pipes B and C will take $\frac{x}{2}$ and $\frac{x}{4}$ hours respectively to fill the tank.

$$\begin{aligned}\therefore \frac{1}{x} + \frac{2}{x} + \frac{4}{x} &= \frac{1}{5} \\ \Rightarrow \frac{7}{x} &= \frac{1}{5}\end{aligned}$$

$$\Rightarrow x = 35 \text{ hrs.}$$

8. Two pipes A and B together can fill a cistern in 4 hours. Had they been opened separately, then B would have taken 6 hours more than A to fill the cistern. How much time will be taken by A to fill the cistern separately?

- A. 1 hour B. 2 hours
C. 6 hours D. 8 hours

Answer & Explanation

Answer: Option C

Explanation:

Let the cistern be filled by pipe A alone in x hours.

Then, pipe B will fill it in $(x + 6)$ hours.

$$\begin{aligned}\therefore \frac{1}{x} + \frac{1}{x+6} &= \frac{1}{4} \\ \Rightarrow \frac{x+6+x}{x(x+6)} &= \frac{1}{4}\end{aligned}$$

$$\Rightarrow x^2 - 2x - 24 = 0$$

$$\Rightarrow (x-6)(x+4) = 0$$

$$\Rightarrow x = 6. \quad [\text{neglecting the negative value of } x]$$

9. Two pipes A and B can fill a tank in 20 and 30 minutes respectively. If both the pipes are used together, then how long will it take to fill the tank?

- A. 12 min B. 15 min
C. 25 min D. 50 min

Answer & Explanation

Answer: Option A

Explanation:

$$\text{Part filled by A in 1 min} = \frac{1}{20}$$

$$\text{Part filled by B in 1 min} = \frac{1}{30}$$

$$\text{Part filled by (A + B) in 1 min} = \left(\frac{1}{20} + \frac{1}{30} \right) = \frac{1}{12}$$

\therefore Both pipes can fill the tank in 12 minutes.

10. Two pipes A and B can fill a tank in 15 minutes and 20 minutes respectively. Both the pipes are opened together but after 4 minutes, pipe A is turned off. What is the total time required to fill the tank?

- A. 10 min. 20 sec. B. 11 min. 45 sec.
C. 12 min. 30 sec. D. 14 min. 40 sec.

Answer & Explanation

Answer: Option D

Explanation:

$$\text{Part filled in 4 minutes} = 4 \left(\frac{1}{15} + \frac{1}{20} \right) = \frac{7}{15}$$

$$\text{Remaining part} = \left(1 - \frac{7}{15} \right) = \frac{8}{15}$$

$$\text{Part filled by B in 1 minute} = \frac{1}{20}$$

$$\therefore \frac{1}{20} : \frac{8}{15} :: 1 : x$$

$$x = \left(\frac{8}{15} \times 1 \times 20 \right) = 10 \frac{2}{3} \text{ min} = 10 \text{ min. 40 sec.}$$

\therefore The tank will be full in (4 min. + 10 min. + 40 sec.) = 14 min. 40 sec.

11. One pipe can fill a tank three times as fast as another pipe. If together the two pipes can fill the tank in 36 minutes, then the slower pipe alone will be able to fill the tank in:

- A. 81 min. B. 108 min.
C. 144 min. D. 192 min.

Answer & Explanation

Answer: Option C

Explanation:

Let the slower pipe alone fill the tank in x minutes.

Then, faster pipe will fill it in $\frac{x}{3}$ minutes.

$$\therefore \frac{1}{x} + \frac{3}{x} = \frac{1}{36}$$

$$\Rightarrow \frac{4}{x} = \frac{1}{36}$$

$$\Rightarrow x = 144 \text{ min.}$$

12. A large tanker can be filled by two pipes A and B in 60 minutes and 40 minutes respectively. How many minutes will it take to fill the tanker from empty state if B is used for half the time and A and B fill it together for the other half?

- A. 15 min B. 20 min
C. 27.5 min D. 30 min

Answer & Explanation

Answer: Option D

Explanation:

$$\text{Part filled by (A + B) in 1 minute} = \left(\frac{1}{60} + \frac{1}{40} \right) = \frac{1}{24}$$

Suppose the tank is filled in x minutes.

$$\text{Then, } x \left(\frac{1}{24} + \frac{1}{40} \right) = 1$$

$$\Rightarrow \frac{x}{24} = \frac{1}{15}$$

$$\Rightarrow x = 30 \text{ min.}$$

13. A tap can fill a tank in 6 hours. After half the tank is filled, three more similar taps are opened. What is the total time taken to fill the tank completely?

- A. 3 hrs 15 min B. 3 hrs 45 min
C. 4 hrs D. 4 hrs 15 min

Answer & Explanation

Answer: Option B

Explanation:

Time taken by one tap to fill **half of the tank** = 3 hrs.

Part filled by the four taps in 1 hour = $(4 \times \frac{1}{6}) = 2$.

$$\text{Remaining part} = \left(1 - \frac{1}{2} \right) = \frac{1}{2}$$

$$\therefore \frac{2}{3} : \frac{1}{2} :: 1 : x$$

$$\Rightarrow x = \left(\frac{1}{2} \times 1 \times \frac{3}{2} \right) = \frac{3}{4} \text{ hours i.e., 45 mins.}$$

So, total time taken = 3 hrs. 45 mins.

14. Three taps A, B and C can fill a tank in 12, 15 and 20 hours respectively. If A is open all the time and B and C are open for one hour each alternately, the tank will be full in:

- A. 6 hours B. $6\frac{2}{3}$ hours
C. 7 hours D. $7\frac{1}{2}$ hours

Answer & Explanation

Answer: Option C

Explanation:

$$(A + B)\text{'s 1 hour's work} = \left(\frac{1}{12} + \frac{1}{15} \right) = \frac{9}{60} = \frac{3}{20}$$

$$(A + C)\text{'s hour's work} = \left(\frac{1}{12} + \frac{1}{20} \right) = \frac{8}{60} = \frac{2}{15}$$

$$\text{Part filled in 2 hrs} = \left(\frac{3}{20} + \frac{2}{15} \right) = \frac{17}{60}$$

$$\text{Part filled in 6 hrs} = \left(3 \times \frac{17}{60} \right) = \frac{17}{20}$$

$$\text{Remaining part} = \left(1 - \frac{17}{20} \right) = \frac{3}{20}$$

Now, it is the turn of A $\frac{3}{20}$ part is filled by A and B in
 and B and 1 hour.

\therefore Total time taken to fill the tank = $(6 + 1)$ hrs = 7 hrs.

15. Three pipes A, B and C can fill a tank in 6 hours. After working at it together for 2 hours, C is closed and A and B can fill the remaining part in 7 hours. The number of hours taken by C alone to fill the tank is:

- A. 10 B. 12
C. 14 D. 16

Answer & Explanation

Answer: Option C

Explanation:

$$\text{Part filled in 2 hours} = \frac{2}{6} = \frac{1}{3}$$

$$\text{Remaining part} = \left(1 - \frac{1}{3} \right) = \frac{2}{3}$$

$$\therefore (A + B)'s \frac{3}{7} \text{ hour's work} = \frac{2}{3}$$

$$(A + B)'s \frac{1}{21} \text{ hour's work} = \frac{2}{21}$$

$$\therefore C's \frac{1}{14} \text{ hour's work} = \{ (A + B + C)'s \frac{1}{14} \text{ hour's work} \} - \{ (A + B)'s \frac{1}{21} \text{ hour's work} \}$$

$$= \left(\frac{1}{6} - \frac{2}{21} \right) = \frac{1}{14}$$

\therefore C alone can fill the tank in 14 hours.

22. Logarithm

1. Which of the following statements is not correct?

A. $\log_{10} 10 = 1$

B. $\log (2 + 3) = \log (2 \times 3)$

C. $\log_{10} 1 = 0$

D. $\log (1 + 2 + 3) = \log 1 + \log 2 + \log 3$

Answer & Explanation

Answer: Option B

Explanation:

(a) Since $\log_a a = 1$, so $\log_{10} 10 = 1$.

(b) $\log (2 + 3) = \log 5$ and $\log (2 \times 3) = \log 6 = \log 2 + \log 3$

$$\therefore \log (2 + 3) \neq \log (2 \times 3)$$

(c) Since $\log_a 1 = 0$, so $\log_{10} 1 = 0$.

(d) $\log (1 + 2 + 3) = \log 6 = \log (1 \times 2 \times 3) = \log 1 + \log 2 + \log 3$.

So, (b) is incorrect.

2. If $\log 2 = 0.3010$ and $\log 3 = 0.4771$, the value of $\log_5 512$ is:

A. 2.870

B. 2.967

C. 3.876

D. 3.912

Answer & Explanation

Answer: Option C

Explanation:

$$\begin{aligned} \log_5 512 &= \frac{\log 512}{\log 5} \\ &= \frac{\log 2^9}{\log (10/2)} \end{aligned}$$

$$\begin{aligned} &= \frac{9 \log 2}{\log 10 - \log 2} \\ &= \frac{(9 \times 0.3010)}{1 - 0.3010} \\ &= \frac{2.709}{0.699} \\ &= \frac{2709}{699} \\ &= 3.876 \end{aligned}$$

3. $\log 8$ is equal to:

A. $\frac{1}{8}$

B. $\frac{1}{4}$

C. $\frac{1}{2}$

D. $\frac{1}{8}$

Answer & Explanation

Answer: Option C

Explanation:

$$\frac{\log 8}{\log 8} = \frac{\log (8)^{1/2}}{\log 8} = \frac{1}{2} \log 8 = \frac{1}{2}$$

4. If $\log 27 = 1.431$, then the value of $\log 9$ is:

A. 0.934

B. 0.945

C. 0.954

D. 0.958

Answer & Explanation

Answer: Option C

Explanation:

$$\log 27 = 1.431$$

$$\Rightarrow \log (3^3) = 1.431$$

$$\Rightarrow 3 \log 3 = 1.431$$

$$\Rightarrow \log 3 = 0.477$$

$$\therefore \log 9 = \log (3^2) = 2 \log 3 = (2 \times 0.477) = 0.954.$$

5. If $\log_a^a + \log_b^b = \log (a + b)$, then:

A. $a + b = 1$

B. $a - b = 1$

C. $a = b$

D. $a^2 - b^2 = 1$

Answer & Explanation

Answer: Option A

Explanation:

$$\log_b^a + \log_a^b = \log(a+b)$$

$$\Rightarrow \log(a+b) = \log\left(\frac{a}{b} \times \frac{b}{a}\right) = \log 1.$$

So, $a+b=1$.

6. If $\log_{10} 7 = a$, then $\log_{10} \left(\frac{1}{70}\right)$ is equal to:

A. $-(1+a)$

B. $(1+a)^{-1}$

C. $\frac{a}{10}$

D. $\frac{1}{10a}$

Answer & Explanation

Answer: Option A

Explanation:

$$\begin{aligned}\log_{10} \left(\frac{1}{70}\right) &= \log_{10} 1 - \log_{10} 70 \\ &= -\log_{10} (7 \times 10) \\ &= -(\log_{10} 7 + \log_{10} 10) \\ &= -(a+1).\end{aligned}$$

7. If $\log_{10} 2 = 0.3010$, then $\log_2 10$ is equal to:

A. $\frac{699}{301}$

B. $\frac{1000}{301}$

C. 0.3010

D. 0.6990

Answer & Explanation

Answer: Option B

Explanation:

$$\log_2 10 = \frac{1}{\log_{10} 2} = \frac{1}{0.3010} = \frac{10000}{3010} = \frac{1000}{301}.$$

8. If $\log_{10} 2 = 0.3010$, the value of $\log_{10} 80$ is:

A. 1.6020

B. 1.9030

C. 3.9030

D. None of these

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{aligned}\log_{10} 80 &= \log_{10} (8 \times 10) \\ &= \log_{10} 8 + \log_{10} 10 \\ &= \log_{10} (2^3) + 1 \\ &= 3 \log_{10} 2 + 1 \\ &= (3 \times 0.3010) + 1 \\ &= 1.9030.\end{aligned}$$

9. If $\log_{10} 5 + \log_{10} (5x+1) = \log_{10} (x+5) + 1$, then x is equal to:

A. 1

B. 3

C. 5

D. 10

Answer & Explanation

Answer: Option B

Explanation:

$$\log_{10} 5 + \log_{10} (5x+1) = \log_{10} (x+5) + 1$$

$$\Rightarrow \log_{10} 5 + \log_{10} (5x+1) = \log_{10} (x+5) + \log_{10} 10$$

$$\Rightarrow \log_{10} [5(5x+1)] = \log_{10} [10(x+5)]$$

$$\Rightarrow 5(5x+1) = 10(x+5)$$

$$\Rightarrow 5x+1 = 2x+10$$

$$\Rightarrow 3x = 9$$

$$\Rightarrow x = 3.$$

10. The value of $\left(\frac{1}{\log_3 60} + \frac{1}{\log_4 60} + \frac{1}{\log_5 60}\right)$ is:

A. 0

B. 1

C. 5

D. 60

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{aligned}\text{Given expression} &= \log_{60} 3 + \log_{60} 4 + \log_{60} 5 \\ &= \log_{60} (3 \times 4 \times 5) \\ &= \log_{60} 60 \\ &= 1.\end{aligned}$$

11. If $\log 2 = 0.30103$, the number of digits in 2^{64} is:

A. 18

B. 19

C. 20

D. 21

Answer & Explanation

Answer: Option C

Explanation:

$$\begin{aligned}\log (2^{64}) &= 64 \times \log 2 \\ &= (64 \times 0.30103) \\ &= 19.26592\end{aligned}$$

Its characteristic is 19.

Hence, then number of digits in 2^{64} is 20.

12. If $\log_x \left(\frac{9}{16}\right) = -\frac{1}{2}$, then x is equal to:

A. $\frac{3}{4}$

B. $\frac{3}{4}$

C. $\frac{81}{256}$

D. $\frac{256}{81}$

Answer & Explanation

Answer: Option D

Explanation:

$$\begin{aligned}\log_x \left(\frac{9}{16} \right) &= -\frac{1}{2} \\ \Rightarrow x^{-1/2} &= \frac{9}{16} \\ \Rightarrow \frac{1}{x} &= \frac{9}{16} \\ \Rightarrow x &= \frac{16}{9} \\ \Rightarrow x &= \left(\frac{16}{9} \right)^2 \\ \Rightarrow x &= \frac{256}{81}\end{aligned}$$

13. If $a^x = b^y$, then:

A. $\log_b a = \frac{x}{y}$

B. $\frac{\log a}{\log b} = \frac{x}{y}$

C. $\frac{\log a}{\log b} = \frac{y}{x}$

D. None of these

Answer & Explanation

Answer: Option C

Explanation:

$$a^x = b^y$$

$$\Rightarrow \log a^x = \log b^y$$

$$\Rightarrow x \log a = y \log b$$

$$\Rightarrow \frac{\log a}{\log b} = \frac{y}{x}$$

14. If $\log_x y = 100$ and $\log_2 x = 10$, then the value of y is:

A. 2^{10}

B. 2^{100}

C. 2^{1000}

D. 2^{10000}

Answer & Explanation

Answer: Option C

Explanation:

$$\log_2 x = 10 \Rightarrow x = 2^{10}.$$

$$\therefore \log_x y = 100$$

$$\Rightarrow y = x^{100}$$

$$\Rightarrow y = (2^{10})^{100} \quad [\text{put value of } x]$$

$$\Rightarrow y = 2^{1000}.$$

15. The value of $\log_2 16$ is:

A. $\frac{1}{8}$

B. 4

C. 8

D. 16

Answer & Explanation

Answer: Option B

Explanation:

$$\text{Let } \log_2 16 = n.$$

$$\text{Then, } 2^n = 16 = 2^4 \Rightarrow n = 4.$$

$$\therefore \log_2 16 = 4.$$

23. Probability

1. Tickets numbered 1 to 20 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 5?

A. $\frac{1}{2}$

B. $\frac{2}{5}$

C. $\frac{8}{15}$

D. $\frac{9}{20}$

Answer & Explanation

Answer: Option D

Explanation:

$$\text{Here, } S = \{1, 2, 3, 4, \dots, 19, 20\}.$$

$$\text{Let } E = \text{event of getting a multiple of 3 or 5} = \{3, 6, 9, 12, 15, 18, 5, 10, 20\}.$$

$$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{9}{20}.$$

2. A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?

A. $\frac{10}{21}$

B. $\frac{11}{21}$

C. $\frac{2}{7}$

D. $\frac{5}{7}$

Answer & Explanation

Answer: Option A

Explanation:

Total number of balls = $(2 + 3 + 2) = 7$.

Let S be the sample space.

$$\begin{aligned}\text{Then, } n(S) &= \text{Number of ways of drawing 2 balls out of 7} \\ &= {}^7C_2 \\ &= \frac{(7 \times 6)}{(2 \times 1)} \\ &= 21.\end{aligned}$$

Let E = Event of drawing 2 balls, none of which is blue.

$$\begin{aligned}\therefore n(E) &= \text{Number of ways of drawing 2 balls out of } (2 + 3) \text{ balls.} \\ &= {}^5C_2 \\ &= \frac{(5 \times 4)}{(2 \times 1)} \\ &= 10. \\ \therefore P(E) &= \frac{n(E)}{n(S)} = \frac{10}{21}.\end{aligned}$$

3. In a box, there are 8 red, 7 blue and 6 green balls. One ball is picked up randomly. What is the probability that it is neither red nor green?

$$\begin{array}{ll}\text{A. } \frac{1}{3} & \text{B. } \frac{3}{4} \\ \text{C. } \frac{7}{19} & \text{D. } \frac{8}{21} \\ \text{E. } \frac{9}{21}\end{array}$$

Answer & Explanation

Answer: Option A

Explanation:

Total number of balls = $(8 + 7 + 6) = 21$.

Let E = event that the ball drawn is neither red nor green
= event that the ball drawn is blue.

$$\therefore n(E) = 7.$$

$$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{7}{21} = \frac{1}{3}.$$

4. What is the probability of getting a sum 9 from two throws of a dice?

$$\begin{array}{ll}\text{A. } \frac{1}{6} & \text{B. } \frac{1}{8} \\ \text{C. } \frac{1}{9} & \text{D. } \frac{1}{12}\end{array}$$

Answer & Explanation

Answer: Option C

Explanation:

In two throws of a die, $n(S) = (6 \times 6) = 36$.

Let E = event of getting a sum = $\{(3, 6), (4, 5), (5, 4), (6, 3)\}$.

$$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{4}{36} = \frac{1}{9}.$$

5. Three unbiased coins are tossed. What is the probability of getting at most two heads?

$$\begin{array}{ll}\text{A. } \frac{3}{4} & \text{B. } \frac{1}{4} \\ \text{C. } \frac{3}{8} & \text{D. } \frac{7}{8}\end{array}$$

Answer & Explanation

Answer: Option D

Explanation:

Here $S = \{TTT, TTH, THT, HTT, THH, HTH, HHT, HHH\}$

Let E = event of getting at most two heads.

Then $E = \{TTT, TTH, THT, HTT, THH, HTH, HHT\}$.

$$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{7}{8}.$$

6. Two dice are thrown simultaneously. What is the probability of getting two numbers whose product is even?

$$\begin{array}{ll}\text{A. } \frac{1}{2} & \text{B. } \frac{3}{4} \\ \text{C. } \frac{3}{8} & \text{D. } \frac{5}{16}\end{array}$$

Answer & Explanation

Answer: Option B

Explanation:

In a simultaneous throw of two dice, we have $n(S) = (6 \times 6) = 36$.

Then, $E = \{(1, 2), (1, 4), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 2), (3, 4), (3, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (5, 2), (5, 4), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)\}$

$$\therefore n(E) = 27.$$

$$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{27}{36} = \frac{3}{4}.$$

7. In a class, there are 15 boys and 10 girls. Three students are selected at random. The probability that 1 girl and 2 boys are selected, is:

A. $\frac{21}{46}$ B. $\frac{25}{117}$
C. $\frac{1}{50}$ D. $\frac{3}{25}$

Answer & Explanation

Answer: Option A

Explanation:

Let S be the sample space and E be the event of selecting 1 girl and 2 boys.

Then, $n(S)$ = Number ways of selecting 3 students out of 25
 $= {}^{25}C_3$
 $= \frac{(25 \times 24 \times 23)}{(3 \times 2 \times 1)}$
 $= 2300$
 $n(E) = ({}^{10}C_1 \times {}^{15}C_2)$
 $= \left[10 \times \frac{(15 \times 14)}{(2 \times 1)} \right]$
 $= 1050$

$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{1050}{2300} = \frac{21}{46}$

8. In a lottery, there are 10 prizes and 25 blanks. A lottery is drawn at random. What is the probability of getting a prize?

A. $\frac{1}{10}$ B. $\frac{2}{5}$
C. $\frac{2}{7}$ D. $\frac{5}{7}$

Answer & Explanation

Answer: Option C

Explanation:

$P(\text{getting a prize}) = \frac{10}{(10 + 25)} = \frac{10}{35} = \frac{2}{7}$

9. From a pack of 52 cards, two cards are drawn together at random. What is the probability of both the cards being kings?

A. $\frac{1}{15}$ B. $\frac{25}{57}$
C. $\frac{35}{256}$ D. $\frac{1}{221}$

Answer & Explanation

Answer: Option D

Explanation:

Let S be the sample space.

Then, $n(S) = {}^{52}C_2 = \frac{(52 \times 51)}{(2 \times 1)} = 1326$

Let E = event of getting 2 kings out of 4.

$\therefore n(E) = {}^4C_2 = \frac{(4 \times 3)}{(2 \times 1)} = 6$

$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{6}{1326} = \frac{1}{221}$

10. Two dice are tossed. The probability that the total score is a prime number is:

A. $\frac{1}{6}$ B. $\frac{5}{12}$
C. $\frac{1}{2}$ D. $\frac{7}{9}$

Answer & Explanation

Answer: Option B

Explanation:

Clearly, $n(S) = (6 \times 6) = 36$.

Let E = Event that the sum is a prime number.

Then $E = \{ (1, 1), (1, 2), (1, 4), (1, 6), (2, 1), (2, 3), (2, 5), (3, 2), (3, 4), (4, 1), (4, 3), (5, 2), (5, 6), (6, 1), (6, 5) \}$

$\therefore n(E) = 15$

$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{15}{36} = \frac{5}{12}$

11. A card is drawn from a pack of 52 cards. The probability of getting a queen of club or a king of heart is:

A. $\frac{1}{13}$ B. $\frac{2}{13}$
C. $\frac{1}{26}$ D. $\frac{1}{52}$

Answer & Explanation

Answer: Option C

Explanation:

Here, $n(S) = 52$.

Let E = event of getting a queen of club or a king of heart.

Then, $n(E) = 2$.

$$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{2}{52} = \frac{1}{26}$$

12. A bag contains 4 white, 5 red and 6 blue balls. Three balls are drawn at random from the bag. The probability that all of them are red, is:

A. $\frac{1}{22}$ B. $\frac{3}{22}$
C. $\frac{2}{91}$ D. $\frac{2}{77}$

Answer & Explanation

Answer: Option C

Explanation:

Let S be the sample space.

Then, $n(S)$ = number of ways of drawing 3 balls out of 15
 $= {}^{15}C_3$
 $= \frac{(15 \times 14 \times 13)}{(3 \times 2 \times 1)}$
 $= 455$.

Let E = event of getting all the 3 red balls.

$$\therefore n(E) = {}^5C_3 = {}^5C_2 = \frac{(5 \times 4)}{(2 \times 1)} = 10.$$
$$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{10}{455} = \frac{2}{91}$$

13. Two cards are drawn together from a pack of 52 cards. The probability that one is a spade and one is a heart, is:

A. $\frac{3}{20}$ B. $\frac{29}{34}$
C. $\frac{47}{100}$ D. $\frac{13}{102}$

Answer & Explanation

Answer: Option D

Explanation:

Let S be the sample space.

$$\text{Then, } n(S) = {}^{52}C_2 = \frac{(52 \times 51)}{(2 \times 1)} = 1326.$$

Let E = event of getting 1 spade and 1 heart.

$$\therefore n(E) = \text{number of ways of choosing 1 spade out of 13 and 1 heart out of 13}$$
$$= ({}^{13}C_1 \times {}^{13}C_1)$$

$$= (13 \times 13)$$

$$= 169.$$

$$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{169}{1326} = \frac{13}{102}$$

14. One card is drawn at random from a pack of 52 cards. What is the probability that the card drawn is a face card (Jack, Queen and King only)?

A. $\frac{1}{13}$ B. $\frac{3}{13}$
C. $\frac{1}{4}$ D. $\frac{9}{52}$

Answer & Explanation

Answer: Option B

Explanation:

Clearly, there are 52 cards, out of which there are 12 face cards.

$$\therefore P(\text{getting a face card}) = \frac{12}{52} = \frac{3}{13}$$

15. A bag contains 6 black and 8 white balls. One ball is drawn at random. What is the probability that the ball drawn is white?

A. $\frac{3}{4}$ B. $\frac{4}{7}$
C. $\frac{1}{8}$ D. $\frac{3}{7}$

Answer & Explanation

Answer: Option B

Explanation:

Let number of balls = $(6 + 8) = 14$.

Number of white balls = 8.

$$P(\text{drawing a white ball}) = \frac{8}{14} = \frac{4}{7}$$

24.Odd Man Out and Series

Directions to Solve

Find the odd man out.

1. 3, 5, 11, 14, 17, 21

A. 21

C. 14

Answer & Explanation

Answer: Option C

B. 17

D. 3

Explanation:

Each of the numbers except 14 is an odd number.

The number '14' is the only EVEN number.

2. 8, 27, 64, 100, 125, 216, 343

A.27

C.125

Answer & Explanation

B.100

D.343

Answer: Option B

Explanation:

The pattern is $2^3, 3^3, 4^3, 5^3, 6^3, 7^3$. But, 100 is not a perfect cube.

3. 10, 25, 45, 54, 60, 75, 80

A.10

C.54

Answer & Explanation

B.45

D.75

Answer: Option C

Explanation:

Each of the numbers except 54 is multiple of 5.

4. 396, 462, 572, 427, 671, 264

A.396

C.671

Answer & Explanation

B.427

D.264

Answer: Option B

Explanation:

In each number except 427, the middle digit is the sum of other two.

5. 6, 9, 15, 21, 24, 28, 30

A.28

C.24

Answer & Explanation

B.21

D.30

Answer: Option A

Explanation:

Each of the numbers except 28, is a multiple of 3.

6. 1, 4, 9, 16, 23, 25, 36

A.9

C.25

Answer & Explanation

B.23

D.36

Answer: Option B

Explanation:

Each of the numbers except 23, is perfect square.

7. 1, 4, 9, 16, 20, 36, 49

A.1

C.20

Answer & Explanation

B.9

D.49

Answer: Option C

Explanation:

The pattern is $1^2, 2^2, 3^2, 4^2, 5^2, 6^2, 7^2$. But, instead of 5^2 , it is 20 which to be turned out.

8. 2, 5, 10, 17, 26, 37, 50, 64

A.50

C.37

Answer & Explanation

B.26

D.64

Answer: Option D

Explanation:

$(1*1)+1, (2*2)+1, (3*3)+1, (4*4)+1, (5*5)+1, (6*6)+1, (7*7)+1, (8*8)+1$

But, 64 is out of pattern.

9. 10, 14, 16, 18, 21, 24, 26

A.26

C.21

Answer & Explanation

B.24

D.18

Answer: Option C

Explanation:

Each of the numbers except 21 is an even number.

10. 16, 25, 36, 72, 144, 196, 225

A.36

C.196

Answer & Explanation

B.72

D.225

Answer: Option B

Explanation:

Each of the numbers except 72 is a perfect square.

11. 331, 482, 551, 263, 383, 362, 284

A.263

C.331

Answer & Explanation

B.383

D.551

Answer: Option B

Explanation:

In each number except 383, the product of first and third digits is the middle one.

12. 835, 734, 642, 751, 853, 981, 532

A.751

B.853

C.981

D.532

Answer & Explanation

Answer: Option A

Explanation:

In each number except 751, the difference of third and first digit is the middle one.

13. 41, 43, 47, 53, 61, 71, 73, 81

A.61

B.71

C.73

D.81

Answer & Explanation

Answer: Option D

Explanation:

Each of the numbers except 81 is a prime number.

14. 3, 5, 7, 12, 17, 19

A.19

B.17

C.5

D.12

Answer & Explanation

Answer: Option D

Explanation:

Each of the numbers is a prime number except 12.

Directions to Solve

Find out the wrong number in the given sequence of numbers.

1. 582, 605, 588, 611, 634, 617, 600

A.634

B.611

C.605

D.600

Answer & Explanation

Answer: Option A

Explanation:

Alternatively 23 is added and 17 is subtracted from the terms. So, 634 is

wrong.

2. 22, 33, 66, 99, 121, 279, 594

A.33

B.121

C.279

D.594

Answer & Explanation

Answer: Option C

Explanation:

Each of the number except 279 is a multiple of 11.

3. 8, 13, 21, 32, 47, 63, 83

A.47

B.63

C.32

D.83

Answer & Explanation

Answer: Option A

Explanation:

Go on adding 5, 8, 11, 14, 17, 20.

So, the number 47 is wrong and must be replaced by 46.

4. 1, 8, 27, 64, 124, 216, 343

A.8

B.27

C.64

D.124

Answer & Explanation

Answer: Option D

Explanation:

The numbers are 1^3 , 2^3 , 3^3 , 4^3 etc. So, 124 is wrong; it must have been 5^3 i.e., 125.

5. 1, 2, 6, 15, 31, 56, 91

A.31

B.91

C.56

D.15

Answer & Explanation

Answer: Option B

Explanation:

$1, 1 + 1^2 = 2, 2 + 2^2 = 6, 6 + 3^2 = 15,$
 $15 + 4^2 = 31, 31 + 5^2 = 56, 56 + 6^2 = 92$

Last number of given series must be 92 not 91.

6. 52, 51, 48, 43, 34, 27, 16

A.27

B.34

C.43

D.48

Answer & Explanation

Answer: Option B

Explanation:

Subtract 1, 3, 5, 7, 9, 11 from successive numbers.

So, 34 is wrong.

7. 4, 6, 8, 9, 10, 11, 12

A.10

B.11

C.12

D.9

Answer & Explanation

Answer: Option B

Explanation:

Each number is a composite number except 11.

8. 105, 85, 60, 30, 0, -45, -90

A.0

B.85

C.-45

D.60

Answer & Explanation

Answer: Option A

Explanation:

Subtract 20, 25, 30, 35, 40, 45 from successive numbers.

So, 0 is wrong.

9. 5, 16, 6, 16, 7, 16, 9

A.9

B.7

C.6

D.None of these

Answer & Explanation

Answer: Option A

Explanation:

Terms at odd places are 5, 6, 7, 8 etc. and each term at even place is 16.

So, 9 is wrong.

10. 125, 127, 130, 135, 142, 153, 165

A.130

B.142

C.153

D.165

Answer & Explanation

Answer: Option D

Explanation:

Prime numbers 2, 3, 5, 7, 11, 13 are to be added successively.

So, 165 is wrong.

11. 46080, 3840, 384, 48, 24, 2, 1

A.1

B.2

C.24

D.384

Answer & Explanation

Answer: Option C

Explanation:

The terms are successively divided by 12, 10, 8, 6, ...etc.

So, 24 is wrong, it should be 8 ($48/6 = 8$).

12. 6, 13, 18, 25, 30, 37, 40

A.25

B.30

C.37

D.40

Answer & Explanation

Answer: Option D

Explanation:

The differences between two successive terms from the beginning are 7, 5, 7, 5, 7, 5.

So, 40 is wrong.

13. 36, 54, 18, 27, 9, 18.5, 4.5

A.4.5

B.18.5

C.54

D.18

Answer & Explanation

Answer: Option B

Explanation:

The terms are alternatively multiplied by 1.5 and divided by 3. However, 18.5 does not satisfy it.

14. 56, 72, 90, 110, 132, 150

A.72

B.110

C.132

D.150

Answer & Explanation

Answer: Option D

Explanation:

The numbers are 7×8 , 8×9 , 9×10 , 10×11 , 11×12 , 12×13 .

So, 150 is wrong.

15. 25, 36, 49, 81, 121, 169, 225

- A.36 B.49
C.121 D.169

Answer & Explanation

Answer: Option A

Explanation:

The numbers are squares of odd natural numbers, starting from 5 up to 15.

So, 36 is wrong.

Directions to Solve

Insert the missing number.

1. 16, 33, 65, 131, 261, (...)
A.523 B.521
C.613 D.721

Answer & Explanation

Answer: Option A

Explanation:

Each number is twice the preceding one with 1 added or subtracted alternatively.

So, the next number is $(2 \times 261 + 1) = 523$.

2. 10, 5, 13, 10, 16, 20, 19, (...)

- A.22 B.40
C.38 D.23

Answer & Explanation

Answer: Option B

Explanation:

There are two series (10, 13, 16, 19) and (5, 10, 20, 40), one increasing by 3 and the other multiplied by 2.

3. 1, 4, 9, 16, 25, 36, 49, (...)

- A.54 B.56
C.64 D.81

Answer & Explanation

Answer: Option C

Explanation:

Numbers are $1^2, 2^2, 3^2, 4^2, 5^2, 6^2, 7^2$.

So, the next number is $8^2 = 64$.

4. 2, 4, 12, 48, 240, (...)

- A.960 B.1440
C.1080 D.1920

Answer & Explanation

Answer: Option B

Explanation:

Go on multiplying the given numbers by 2, 3, 4, 5, 6.

So, the correct next number is 1440.

5. 8, 7, 11, 12, 14, 17, 22, (...)

- A.27 B.20
C.22 D.24

Answer & Explanation

Answer: Option B

Explanation:

There are two series (8, 11, 14, 17, 20) and (7, 12, 17, 22) increasing by 3 and 5 respectively.

6. 11, 13, 17, 19, 23, 29, 31, 37, 41, (...)
A.43 B.47

C.53 D.51

Answer & Explanation

Answer: Option A

Explanation:

Numbers are all primes. The next prime is 43.

7. 8, 24, 12, 36, 18, 54, (...)

- A.27 B.108
C.68 D.72

Answer & Explanation

Answer: Option A

Explanation:

Numbers are alternatively multiplied by 3 and divided by 2.

So, the next number = $54 \div 2 = 27$.

8. 2, 6, 12, 20, 30, 42, 56, (....)

A.61

B.64

C.72

D.70

Answer & Explanation

Answer: Option C

Explanation:

The pattern is $1 \times 2, 2 \times 3, 3 \times 4, 4 \times 5, 5 \times 6, 6 \times 7, 7 \times 8$.

So, the next number is $8 \times 9 = 72$.

9. 4, -8, 16, -32, 64, (....)

A.128

B.-128

C.192

D.-192

Answer & Explanation

Answer: Option B

Explanation:

Each number is the proceeding number multiplied by -2.

So, the required number is -128.

10. 7, 26, 63, 124, 215, 342, (....)

A.481

B.511

C.391

D.421

Answer & Explanation

Answer: Option B

Explanation:

Numbers are $(2^3 - 1), (3^3 - 1), (4^3 - 1), (5^3 - 1), (6^3 - 1), (7^3 - 1)$ etc.

So, the next number is $(8^3 - 1) = (512 - 1) = 511$.

11. 5, 10, 13, 26, 29, 58, 61, (....)

A.122

B.64

C.125

D.128

Answer & Explanation

Answer: Option A

Explanation:

Numbers are alternatively multiplied by 2 and increased by 3.

So, the missing number = $61 \times 2 = 122$.

12. 15, 31, 63, 127, 255, (....)

A.513

B.511

C.517

D.523

Answer & Explanation

Answer: Option B

Explanation:

Each number is double the preceding one plus 1.

So, the next number is $(255 \times 2) + 1 = 511$.

13. 1, 8, 27, 64, 125, 216, (....)

A.354

B.343

C.392

D.245

Answer & Explanation

Answer: Option B

Explanation:

Numbers are $1^3, 2^3, 3^3, 4^3, 5^3, 6^3$.

So, the missing number is $7^3 = 343$.

14. 3, 7, 6, 5, 9, 3, 12, 1, 15, (....)

A.18

B.13

C.-1

D.3

Answer & Explanation

Answer: Option C

Explanation:

There are two series, beginning respectively with 3 and 7. In one 3 is added and in another 2 is subtracted.

The next number is $1 - 2 = -1$.

Directions to Solve

Find out the wrong number in the series.

1. 7, 8, 18, 57, 228, 1165, 6996

A.8

B.18

C.57

D.228

E.1165

Answer & Explanation

Answer: Option D

Explanation:

Let the given numbers be A, B, C, D, E, F, G.

Then, A, $A \times 1 + 1$, $B \times 2 + 2$, $C \times 3 + 3$, $D \times 4 + 4$, $E \times 5 + 5$, $F \times 6 + 6$ are

the required numbers.

Clearly, 228 is wrong.

-
2. 1, 1, 2, 6, 24, 96, 720
A. 720 B. 96
C. 24 D. 6
E. 2

Answer & Explanation

Answer: Option B

Explanation:

Go on multiplying with 1, 2, 3, 4, 5, 6 to get next number.

So, 96 is wrong.

-
3. 196, 169, 144, 121, 100, 80, 64
A. 169 B. 144
C. 121 D. 100
E. 80

Answer & Explanation

Answer: Option E

Explanation:

Numbers must be $(14)^2$, $(13)^2$, $(12)^2$, $(11)^2$, $(10)^2$, $(9)^2$, $(8)^2$.

So, 80 is wrong.

-
4. 445, 221, 109, 46, 25, 11, 4
A. 221 B. 109
C. 46 D. 25
E. 11

Answer & Explanation

Answer: Option C

Explanation:

Go on subtracting 3 and dividing the result by 2 to obtain the next number.

Clearly, 46 is wrong.

-
5. 190, 166, 145, 128, 112, 100, 91
A. 100 B. 166
C. 145 D. 128
E. 112

Answer & Explanation

Answer: Option D

Explanation:

Go on subtracting 24, 21, 18, 15, 12, 9 from the numbers to get the next number.

$190 - 24 = 166$
 $166 - 21 = 145$
 $145 - 18 = 127$ [Here, 128 is placed instead of 127]
 $127 - 15 = 112$
 $112 - 12 = 100$... and so on.

Therefore, 128 is wrong.

6. 19, 26, 33, 46, 59, 74, 91
A. 26 B. 33
C. 46 D. 59
E. 74

Answer & Explanation

Answer: Option B

Explanation:

Go on adding 7, 9, 11, 13, 15, 17 respectively to obtain the next number.

So, 33 is wrong. It must be 35

-
7. 1, 3, 10, 21, 64, 129, 356, 777
A. 10 B. 21
C. 64 D. 129
E. 356

Answer & Explanation

Answer: Option E

Explanation:

$A \times 2 + 1$, $B \times 3 + 1$, $C \times 2 + 1$, $D \times 3 + 1$ and so on.

So, 356 is wrong.

-
8. 6, 12, 48, 100, 384, 768, 3072
A. 768 B. 384
C. 100 D. 48
E. 12

Answer & Explanation

Answer: Option C

Explanation:

Each even term of the series is obtained by multiplying the previous term by 2.

$$2^{\text{nd}} \text{ term} = (1^{\text{st}} \text{ term}) \times 2 = 6 \times 2 = 12$$

$$4^{\text{th}} \text{ term} = (3^{\text{rd}} \text{ term}) \times 2 = 48 \times 2 = 96.$$

$$6^{\text{th}} \text{ term} = (5^{\text{th}} \text{ term}) \times 2 = 384 \times 2 = 768.$$

\therefore 4th term should be 96 instead of 100.

9. 40960, 10240, 2560, 640, 200, 40, 10

A. 640

B. 40

C. 200

D. 2560

E. 10240

Answer & Explanation

Answer: Option C

Explanation:

Go on dividing by 4 to get the next number.

So, 200 is wrong.

10. 3, 7, 15, 39, 63, 127, 255, 511

A. 7

B. 15

C. 39

D. 63

E. 127

Answer & Explanation

Answer: Option C

Explanation:

Go on multiplying 2 and adding 1 to get the next number.

So, 39 is wrong.

11. 64, 71, 80, 91, 104, 119, 135, 155

A. 71

B. 80

C. 104

D. 119

E. 135

Answer & Explanation

Answer: Option E

Explanation:

Go on adding 7, 9, 11, 13, 15, 17, 19 respectively to obtain the next number.

So, 135 is wrong.

12. 15, 16, 34, 105, 424, 2124, 12756

A. 16

B. 34

C. 105

D. 424

E. 2124

Answer & Explanation

Answer: Option E

Explanation:

$$2^{\text{nd}} \text{ term} = (1^{\text{st}} \text{ term}) \times 1 + 1 = 15 \times 1 + 1 = 16.$$

$$3^{\text{rd}} \text{ term} = (2^{\text{nd}} \text{ term}) \times 2 + 2 = 16 \times 2 + 2 = 34.$$

$$4^{\text{th}} \text{ term} = (3^{\text{th}} \text{ term}) \times 3 + 3 = 34 \times 3 + 3 = 105.$$

$$5^{\text{th}} \text{ term} = (4^{\text{th}} \text{ term}) \times 4 + 4 = 105 \times 4 + 4 = 424$$

$$6^{\text{th}} \text{ term} = (5^{\text{th}} \text{ term}) \times 5 + 5 = 424 \times 5 + 5 = 2125$$

\therefore 6th term should be 2125 instead of 2124.

13. 10, 26, 74, 218, 654, 1946, 5834

A. 26

B. 74

C. 218

D. 654

E. 1946

Answer & Explanation

Answer: Option D

Explanation:

$$2^{\text{nd}} \text{ term} = (1^{\text{st}} \text{ term}) \times 3 - 4 = 10 \times 3 - 4 = 26.$$

$$3^{\text{rd}} \text{ term} = (2^{\text{nd}} \text{ term}) \times 3 - 4 = 26 \times 3 - 4 = 74.$$

$$4^{\text{th}} \text{ term} = (3^{\text{th}} \text{ term}) \times 3 - 4 = 74 \times 3 - 4 = 218.$$

$$5^{\text{th}} \text{ term} = (4^{\text{th}} \text{ term}) \times 3 - 4 = 218 \times 3 - 4 = 650.$$

\therefore 5th term must be 650 instead of 654.

14. 2880, 480, 92, 24, 8, 4, 4

A. 480

B. 92

C. 24

D. 8

E. 4

Answer & Explanation

Answer: Option B

Explanation:

Go on dividing by 6, 5, 4, 3, 2, 1 respectively to obtain the next number.

Clearly, 92 is wrong.

15. 3, 7, 15, 27, 63, 127, 255

A. 7

B. 15

C. 27

D. 63

E. 127

Answer & Explanation

Answer: Option C

Explanation:

Go on multiplying the number by 2 and adding 1 to it to get the next number.

So, 27 is wrong.

26.Height and Distance

1. Two ships are sailing in the sea on the two sides of a lighthouse. The angle of elevation of the top of the lighthouse is observed from the ships are 30° and 45° respectively. If the lighthouse is 100 m high, the distance between the two ships is:

A. 173 m

B. 200 m

C. 273 m

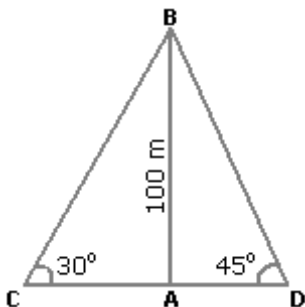
D. 300 m

Answer & Explanation

Answer: Option C

Explanation:

Let AB be the lighthouse and C and D be the positions of the ships.



Then, $AB = 100$ m, $\angle ACB = 30^\circ$ and $\angle ADB = 45^\circ$.

$$\frac{AB}{AC} = \tan 30^\circ = \frac{1}{3} \Rightarrow AC = AB \times 3 = 100 \times 3 = 1003 \text{ m.}$$

$$\frac{AB}{AD} = \tan 45^\circ = 1 \Rightarrow AD = AB = 100 \text{ m.}$$

$$\begin{aligned} \therefore CD &= (AC + AD) = (1003 + 100) \text{ m} \\ &= 100(3 + 1) \\ &= (100 \times 2.73) \text{ m} \\ &= 273 \text{ m.} \end{aligned}$$

2. A man standing at a point P is watching the top of a tower, which makes an angle of elevation of 30° with the man's eye. The man walks some distance towards the tower to watch its top and the angle of the elevation becomes 60° . What is the distance between the base of the tower and the point P?

A. 43 units

C. 12 units

E. None of these

B. 8 units

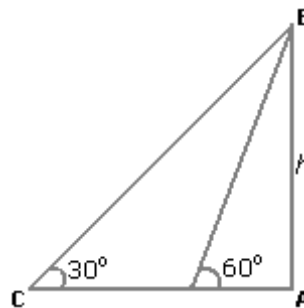
D. Data inadequate

Answer & Explanation

Answer: Option D

Explanation:

One of AB, AD and CD must have given.



So, the data is inadequate.

3. The angle of elevation of a ladder leaning against a wall is 60° and the foot of the ladder is 4.6 m away from the wall. The length of the ladder is:

A. 2.3 m

B. 4.6 m

C. 7.8 m

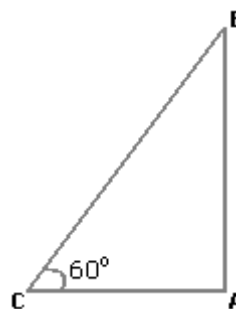
D. 9.2 m

Answer & Explanation

Answer: Option D

Explanation:

Let AB be the wall and BC be the ladder.



Then, $\angle ACB = 60^\circ$ and $AC = 4.6$ m.

$$\frac{AC}{BC} = \cos 60^\circ = \frac{1}{2}$$

$$\begin{aligned} \Rightarrow BC &= 2 \times AC \\ &= (2 \times 4.6) \text{ m} \\ &= 9.2 \text{ m.} \end{aligned}$$

4. An observer 1.6 m tall is 203 away from a tower. The angle of elevation from his eye to the top of the tower is 30° . The heights of the tower is:

A. 21.6 m

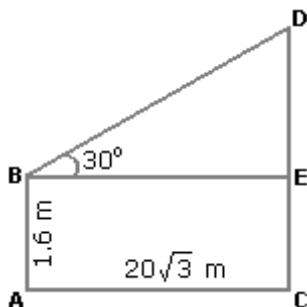
C. 24.72 m

Answer & Explanation

Answer: Option A

Explanation:

Let AB be the observer and CD be the tower.



Draw $BE \perp CD$.

Then, $CE = AB = 1.6$ m,

$$BE = AC = 203 \text{ m.}$$

$$\frac{DE}{BE} = \tan 30^\circ = \frac{1}{3}$$

$$\Rightarrow DE = \frac{203}{3} \text{ m} = 20 \text{ m.}$$

$$\therefore CD = CE + DE = (1.6 + 20) \text{ m} = 21.6 \text{ m.}$$

5. From a point P on a level ground, the angle of elevation of the top tower is 30° . If the tower is 100 m high, the distance of point P from the foot of the tower is:

A. 149 m

B. 156 m

C. 173 m

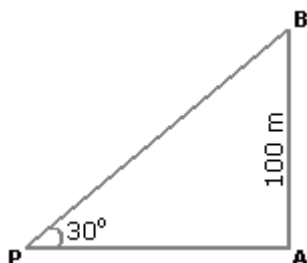
D. 200 m

Answer & Explanation

Answer: Option C

Explanation:

Let AB be the tower.



Then, $\angle APB = 30^\circ$ and $AB = 100$ m.

$$\frac{AB}{AP} = \tan 30^\circ = \frac{1}{3}$$

$$\Rightarrow AP = (AB \times 3) \text{ m}$$

$$= 1003 \text{ m}$$

$$= (100 \times 1.73) \text{ m}$$

$$= 173 \text{ m.}$$

The angle of elevation of the sun, when the length of the shadow of a tree 3 times the height of the tree, is:

A. 30°

B. 45°

C. 60°

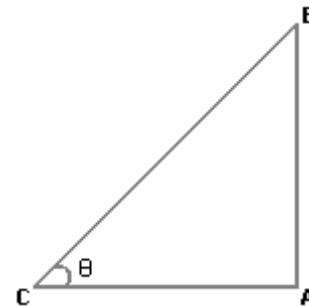
D. 90°

Answer & Explanation

Answer: Option A

Explanation:

Let AB be the tree and AC be its shadow.



Let $\angle ACB = \theta$.

$$\text{Then, } \frac{AC}{AB} = 3 \Rightarrow \cot \theta = 3$$

$$\therefore \theta = 30^\circ.$$

27. Compound Interest

1. A bank offers 5% compound interest calculated on half-yearly basis. A customer deposits Rs. 1600 each on 1st January and 1st July of a year. At the end of the year, the amount he would have gained by way of interest is:

A. Rs. 120

B. Rs. 121

C. Rs. 122

D. Rs. 123

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{aligned} \text{Amount} &= \text{Rs.} \left[1600 \times \left(1 + \frac{5}{2 \times 100} \right)^2 + 1600 \times \left(1 + \frac{5}{2 \times 100} \right) \right] \\ &= \text{Rs.} \left[1600 \times \frac{41}{40} \times \frac{41}{40} + 1600 \times \frac{41}{40} \right] \\ &= \text{Rs.} \left[1600 \times \frac{41}{40} \left(\frac{41}{40} + 1 \right) \right] \\ &= \text{Rs.} \left[\frac{1600 \times 41 \times 81}{40 \times 40} \right] \\ &= \text{Rs.} 3321. \end{aligned}$$

$$\therefore \text{C.I.} = \text{Rs.} (3321 - 3200) = \text{Rs.} 121$$

2. The difference between simple and compound interests compounded annually on a certain sum of money for 2 years at 4% per annum is Re. 1. The sum (in Rs.) is:

A. 625 B. 630
C. 640 D. 650

Answer & Explanation

Answer: Option A

Explanation:

Let the sum be Rs. x . Then,

$$\text{C.I.} = \left[x \left(1 + \frac{4}{100} \right)^2 - x \right] = \left(\frac{676}{625} x - x \right) = \frac{51}{625} x.$$

$$\text{S.I.} = \left(\frac{x \times 4 \times 2}{100} \right) = \frac{2x}{25}.$$

$$\therefore \frac{51x}{625} - \frac{2x}{25} = 1$$

$$\Rightarrow x = 625.$$

3. There is 60% increase in an amount in 6 years at simple interest. What will be the compound interest of Rs. 12,000 after 3 years at the same rate?

A. Rs. 2160 B. Rs. 3120
C. Rs. 3972 D. Rs. 6240

E. None of these

Answer & Explanation

Answer: Option C

Explanation:

Let $P = \text{Rs. } 100$. Then, $\text{S.I.} = \text{Rs. } 60$ and $T = 6$ years.

$$\therefore R = \left(\frac{100 \times 60}{100 \times 6} \right) = 10\% \text{ p.a.}$$

Now, $P = \text{Rs. } 12000$. $T = 3$ years and $R = 10\% \text{ p.a.}$

$$\begin{aligned} \therefore \text{C.I.} &= \text{Rs.} \left[12000 \times \left\{ \left(1 + \frac{10}{100} \right)^3 - 1 \right\} \right] \\ &= \text{Rs.} \left[12000 \times \frac{331}{1000} \right] \\ &= 3972. \end{aligned}$$

4. What is the difference between the compound interests on Rs. 5000 for $1\frac{1}{2}$ years at 4% per annum compounded yearly and half-yearly?

A. Rs. 2.04 B. Rs. 3.06
C. Rs. 4.80 D. Rs. 8.30

Answer & Explanation

Answer: Option A

Explanation:

$$\begin{aligned} \text{C.I. when interest compounded yearly} &= \text{Rs.} \left[5000 \times \left(1 + \frac{4}{100} \right)^2 - 5000 \right] \\ &= \text{Rs.} \left[5000 \times \frac{2651}{2500} - 5000 \right] \\ &= \text{Rs. } 5304. \end{aligned}$$

$$\begin{aligned} \text{C.I. when interest is compounded half-yearly} &= \text{Rs.} \left[5000 \times \left(1 + \frac{2}{100} \right)^3 - 5000 \right] \\ &= \text{Rs.} \left[5000 \times \frac{5151}{5000} - 5000 \right] \\ &= \text{Rs. } 5306.04 \end{aligned}$$

$$\therefore \text{Difference} = \text{Rs. } (5306.04 - 5304) = \text{Rs. } 2.04$$

5. The compound interest on Rs. 30,000 at 7% per annum is Rs. 4347. The period (in years) is:

A. 2 B. $2\frac{1}{2}$
C. 3 D. 4

Answer & Explanation

Answer: Option A

Explanation:

$$\text{Amount} = \text{Rs. } (30000 + 4347) = \text{Rs. } 34347.$$

Let the time be n years.

$$\begin{aligned} \text{Then, } 30000 \left(1 + \frac{7}{100} \right)^n &= 34347 \\ \Rightarrow \left(\frac{107}{100} \right)^n &= \frac{34347}{30000} = \frac{11449}{10000} = \left(\frac{107}{100} \right)^2 \end{aligned}$$

$$\therefore n = 2 \text{ years.}$$

6. What will be the compound interest on a sum of Rs. 25,000 after 3 years at the rate of 12 p.c.p.a.?

A. Rs. 9000.30 B. Rs. 9720
C. Rs. 10123.20 D. Rs. 10483.20

E. None of these

Answer & Explanation

Answer: Option C

Explanation:

$$\text{Amount} = \text{Rs.} \left[25000 \times \left(1 + \frac{12}{100} \right)^3 \right]$$

$$= \text{Rs.} \left(25000 \times \frac{28}{25} \times \frac{28}{25} \right)$$

$$= \text{Rs.} 35123.20$$

$$\therefore \text{C.I.} = \text{Rs.} (35123.20 - 25000) = \text{Rs.} 10123.20$$

7. At what rate of compound interest per annum will a sum of Rs. 1200 become Rs. 1348.32 in 2 years?

A. 6% B. 6.5%
C. 7% D. 7.5%

Answer & Explanation

Answer: Option A

Explanation:

Let the rate be R% p.a.

$$\text{Then, } 1200 \times \left(1 + \frac{R}{100} \right)^2 = 1348.32$$

$$\Rightarrow \left(1 + \frac{R}{100} \right)^2 = \frac{1348.32}{1200} = \frac{11236}{10000}$$

$$\therefore \left(1 + \frac{R}{100} \right)^2 = \left(\frac{106}{100} \right)^2$$

$$\Rightarrow 1 + \frac{R}{100} = \frac{106}{100}$$

$$\Rightarrow R = 6\%$$

8. The least number of complete years in which a sum of money put out at 20% compound interest will be more than doubled is:

A. 3 B. 4
C. 5 D. 6

Answer & Explanation

Answer: Option B

Explanation:

$$P \left(1 + \frac{20}{100} \right)^n > 2P \Rightarrow \left(\frac{6}{5} \right)^n > 2.$$

$$\text{Now, } \left(\frac{6}{5} \right)^4 > 2.$$

So, $n = 4$ years.

9. Albert invested an amount of Rs. 8000 in a fixed deposit scheme for 2 years at compound interest rate 5 p.c.p.a. How much amount will Albert get on maturity of the fixed deposit?

A. Rs. 8600 B. Rs. 8620
C. Rs. 8820 D. None of these

Answer & Explanation

Answer: Option C

Explanation:

$$\text{Amount} = \text{Rs.} \left[8000 \times \left(1 + \frac{5}{100} \right)^2 \right]$$

$$= \text{Rs.} \left(8000 \times \frac{21}{20} \times \frac{21}{20} \right)$$

$$= \text{Rs.} 8820.$$

10. The effective annual rate of interest corresponding to a nominal rate of 6% per annum payable half-yearly is:

A. 6.06% B. 6.07%
C. 6.08% D. 6.09%

Answer & Explanation

Answer: Option D

Explanation:

$$\left. \begin{array}{l} \text{Amount of Rs. 100} \\ \text{for 1 year} \\ \text{when compounded} \\ \text{half-yearly} \end{array} \right\} = \text{Rs.} \left[100 \times \left(1 + \frac{3}{100} \right)^2 \right] = \text{Rs.} 106.09$$

$$\therefore \text{Effective rate} = (106.09 - 100)\% = 6.09\%$$

11. Simple interest on a certain sum of money for 3 years at 8% per annum is half the compound interest on Rs. 4000 for 2 years at 10% per annum. The sum placed on simple interest is:

A. Rs. 1550 B. Rs. 1650
C. Rs. 1750 D. Rs. 2000

Answer & Explanation

Answer: Option C

Explanation:

$$\text{C.I.} = \text{Rs.} \left[4000 \times \left(1 + \frac{10}{100} \right)^2 - 4000 \right]$$

$$= \text{Rs.} \left(4000 \times \frac{11}{10} \times \frac{11}{10} - 4000 \right)$$

$$= \text{Rs.} 840.$$

$$\therefore \text{Sum} = \text{Rs.} \left(\frac{420 \times 100}{3 \times 8} \right) = \text{Rs.} 1750.$$

12. If the simple interest on a sum of money for 2 years at 5% per annum is Rs. 50, what is the compound interest on the same at the same rate and for the same time?

A. Rs. 51.25 B. Rs. 52
C. Rs. 54.25 D. Rs. 60

Answer & Explanation

Answer: Option A

Explanation:

$$\begin{aligned}\text{Sum} &= \text{Rs.} \left(\frac{50 \times 100}{2 \times 5} \right) = \text{Rs.} 500. \\ \text{Amount} &= \text{Rs.} \left[\frac{500}{x} \left(1 + \frac{5}{100} \right)^2 \right] \\ &= \text{Rs.} \left(500 \times \frac{21}{20} \times \frac{21}{20} \right) \\ &= \text{Rs.} 551.25\end{aligned}$$

$$\therefore \text{C.I.} = \text{Rs.} (551.25 - 500) = \text{Rs.} 51.25$$

13. The difference between simple interest and compound on Rs. 1200 for one year at 10% per annum reckoned half-yearly is:

A.Rs. 2.50 B.Rs. 3
C.Rs. 3.75 D.Rs. 4

E.None of these

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{aligned}\text{S.I.} &= \text{Rs} \left(\frac{1200 \times 10 \times 1}{100} \right) = \text{Rs.} 120. \\ \text{C.I.} &= \text{Rs.} \left[1200 \times \left(1 + \frac{5}{100} \right)^2 - 1200 \right] = \text{Rs.} 123.\end{aligned}$$

$$\therefore \text{Difference} = \text{Rs.} (123 - 120) = \text{Rs.} 3.$$

14. The difference between compound interest and simple interest on an amount of Rs. 15,000 for 2 years is Rs. 96. What is the rate of interest per annum?

A.8 B.10
C.12 D.Cannot be determined

E.None of these

Answer & Explanation

Answer: Option A

Explanation:

$$\begin{aligned}\left[15000 \times \left(1 + \frac{R}{100} \right)^2 - 15000 \right] - \left(\frac{15000 \times R \times 2}{100} \right) &= 96 \\ \Rightarrow 15000 \left[\left(1 + \frac{R}{100} \right)^2 - 1 - \frac{2R}{100} \right] &= 96 \\ \Rightarrow 15000 \left[\frac{(100 + R)^2}{10000} - \frac{10000}{10000} - \frac{(200 \times R)}{10000} \right] &= 96\end{aligned}$$

$$\Rightarrow R^2 = \left(\frac{96 \times 2}{3} \right) = 64$$

$$\Rightarrow R = 8.$$

$$\therefore \text{Rate} = 8\%.$$

15. The compound interest on a certain sum for 2 years at 10% per annum is Rs. 525. The simple interest on the same sum for double the time at half the rate percent per annum is:

A.Rs. 400 B.Rs. 500
C.Rs. 600 D.Rs. 800

Answer & Explanation

Answer: Option B

Explanation:

Let the sum be Rs. P.

$$\begin{aligned}\text{Then, } \left[P \left(1 + \frac{10}{100} \right)^2 - P \right] &= 525 \\ \Rightarrow P \left[\left(\frac{11}{10} \right)^2 - 1 \right] &= 525 \\ \Rightarrow P \left(\frac{525 \times 100}{21} \right) &= 2500.\end{aligned}$$

$$\therefore \text{Sum} = \text{Rs.} 2500.$$

$$\text{So, S.I.} = \text{Rs.} \left(\frac{2500 \times 5 \times 4}{100} \right) = \text{Rs.} 500$$

28. Percentage

1. A batsman scored 110 runs which included 3 boundaries and 8 sixes. What percent of his total score did he make by running between the wickets?

A.45% B. $45\frac{5}{11}\%$
C. $54\frac{6}{11}\%$ D.55%

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{aligned}\text{Number of runs made by running} &= 110 - (3 \times 4 + 8 \times 6) \\ &= 110 - (60) \\ &= 50.\end{aligned}$$

$$\therefore \text{Required percentage} = \left(\frac{50}{110} \times 100 \right) \% = 45\frac{5}{11} \%$$

2. Two students appeared at an examination. One of them secured 9 marks more than the other and his marks was 56% of the sum of their marks. The marks obtained by them are:

A. 39, 30 B. 41, 32

C. 42, 33 D. 43, 34

Answer & Explanation

Answer: Option C

Explanation:

Let their marks be $(x + 9)$ and x .

$$\text{Then, } x + 9 = \frac{56}{100}(x + 9 + x)$$

$$\Rightarrow 25(x + 9) = 14(2x + 9)$$

$$\Rightarrow 3x = 99$$

$$\Rightarrow x = 33$$

So, their marks are 42 and 33.

3. A fruit seller had some apples. He sells 40% apples and still has 420 apples. Originally, he had:

A. 588 apples B. 600 apples

C. 672 apples D. 700 apples

Answer & Explanation

Answer: Option D

Explanation:

Suppose originally he had x apples.

$$\text{Then, } (100 - 40)\% \text{ of } x = 420.$$

$$\Rightarrow \frac{60}{100}x = 420$$

$$\Rightarrow x = \left(\frac{420 \times 100}{60} \right) = 700.$$

4. What percentage of numbers from 1 to 70 have 1 or 9 in the unit's digit?

A. 1 B. 14

C. 20 D. 21

Answer & Explanation

Answer: Option C

Explanation:

Clearly, the numbers which have 1 or 9 in the unit's digit, have squares that end in the digit 1. Such numbers from 1 to 70 are 1, 9, 11, 19, 21, 29, 31, 39, 41, 49, 51, 59, 61, 69.

Number of such number = 14

$$\therefore \text{Required percentage} = \left(\frac{14}{70} \times 100 \right) \% = 20\%.$$

5. If $A = x\%$ of y and $B = y\%$ of x , then which of the following is true?

A. A is smaller than B. B. A is greater than B

Relationship between A and B cannot be determined. D. If x is smaller than y , then A is greater than B.

E. None of these

Answer & Explanation

Answer: Option E

Explanation:

$$x\% \text{ of } y = \left(\frac{x}{100} \times y \right) = \left(\frac{y}{100} \times x \right) = y\% \text{ of } x$$

$$\therefore A = B.$$

6. If 20% of $a = b$, then $b\%$ of 20 is the same as:

A. 4% of a

B. 5% of a

C. 20% of a

D. None of these

Answer & Explanation

Answer: Option A

Explanation:

$$20\% \text{ of } a = b \Rightarrow \frac{20}{100}a = b.$$

$$\therefore b\% \text{ of } \left(\frac{b}{100} \times 20 \right) = \left(\frac{20}{100} \times \frac{a}{100} \times \frac{1}{100} \times 20 \right) = \frac{4}{100}a = 4\% \text{ of } a.$$

7. In a certain school, 20% of students are below 8 years of age. The number of students above 8 years of age is $\frac{2}{3}$ of the number of students of 8 years of age which is 48. What is the total number of students in the school?

A. 72

B. 80

C. 120

D. 150

E. 100

Answer & Explanation

Answer: Option E

Explanation:

Let the number of students be x . Then,

Number of students above 8 years of age = $(100 - 20)\%$ of $x = 80\%$ of x .

$$\therefore 80\% \text{ of } x = 48 + \frac{2}{3} \text{ of } 48$$

$$\Rightarrow \frac{80}{100}x = 80$$

$$\Rightarrow x = 100.$$

8. Two numbers A and B are such that the sum of 5% of A and 4% of B is two-third of the sum of 6% of A and 8% of B. Find the ratio of A : B.

A. 2 : 3

B. 1 : 1

C. 3 : 4

D. 4 : 3

Answer & Explanation

Answer: Option D

Explanation:

$$5\% \text{ of } A + 4\% \text{ of } B = \frac{2}{3} (6\% \text{ of } A + 8\% \text{ of } B)$$

$$\Rightarrow \frac{5}{100}A + \frac{4}{100}B = \frac{2}{3} \left(\frac{6}{100}A + \frac{8}{100}B \right)$$

$$\Rightarrow \frac{1}{20}A + \frac{1}{25}B = \frac{1}{25}A + \frac{4}{75}B$$

$$\Rightarrow \left(\frac{1}{20} - \frac{1}{25} \right) A = \left(\frac{4}{75} - \frac{1}{25} \right) B$$

$$\Rightarrow \frac{1}{100}A = \frac{1}{75}B$$

$$\frac{A}{B} = \frac{100}{75} = \frac{4}{3}$$

$$\therefore \text{Required ratio} = 4 : 3$$

9. A student multiplied a number by $\frac{3}{5}$ instead of $\frac{5}{3}$.

What is the percentage error in the calculation?

A. 34%

B. 44%

C. 54%

D. 64%

Answer & Explanation

Answer: Option D

Explanation:

Let the number be x .

$$\text{Then, error} = \frac{5}{3}x - \frac{3}{5}x = \frac{16}{15}x.$$

$$\text{Error}\% = \left(\frac{16x}{15} \times \frac{3}{5x} \times 100 \right) \% = 64\%.$$

10. In an election between two candidates, one got 55% of the total valid votes, 20% of the votes were invalid. If the total number of votes was 7500, the number of valid votes that the other candidate got, was:

A. 2700

B. 2900

C. 3000

D. 3100

Answer & Explanation

Answer: Option A

Explanation:

Number of valid votes = 80% of 7500 = 6000.

\therefore Valid votes polled by other candidate = 45% of 6000

$$= \left(\frac{45}{100} \times 6000 \right) = 2700.$$

11. Three candidates contested an election and received 1136, 7636 and 11628 votes respectively. What percentage of the total votes did the winning candidate get?

A. 57%

B. 60%

C. 65%

D. 90%

Answer & Explanation

Answer: Option A

Explanation:

Total number of votes polled = $(1136 + 7636 + 11628)$
= 20400.

$$\therefore \text{Required percentage} = \left(\frac{11628}{20400} \times 100 \right) \% = 57\%.$$

12. Two tailors X and Y are paid a total of Rs. 550 per week by their employer. If X is paid 120 percent of the sum paid to Y, how much is Y paid per week?

A. Rs. 200

B. Rs. 250

C. Rs. 300

D. None of these

Answer & Explanation

Answer: Option B

Explanation:

Let the sum paid to Y per week be Rs. z .

Then, $z + 120\%$ of $z = 550$.

$$\Rightarrow z + 120z = 550$$

$$\begin{aligned} &100 \\ \Rightarrow \frac{11}{5}z &= 550 \\ \Rightarrow z &= \left(\frac{550 \times 5}{11} \right) = 250. \end{aligned}$$

13. Gauri went to the stationers and bought things worth Rs. 25, out of which 30 paise went on sales tax on taxable purchases. If the tax rate was 6%, then what was the cost of the tax free items?

A.Rs. 15 B.Rs. 15.70
C.Rs. 19.70 D.Rs. 20

Answer & Explanation

Answer: Option C

Explanation:

Let the amount taxable purchases be Rs. x .

$$\begin{aligned} \text{Then, } 6\% \text{ of } x &= \frac{30}{100} \\ \Rightarrow x &= \left(\frac{30}{100} \times \frac{100}{6} \right) = 5. \end{aligned}$$

\therefore Cost of tax free items = Rs. $[25 - (5 + 0.30)]$ = Rs. 19.70

14. Rajeev buys good worth Rs. 6650. He gets a rebate of 6% on it. After getting the rebate, he pays sales tax @ 10%. Find the amount he will have to pay for the goods.

A.Rs. 6876.10 B.Rs. 6999.20
C.Rs. 6654 D.Rs. 7000

Answer & Explanation

Answer: Option A

Explanation:

$$\begin{aligned} \text{Rebate} &= 6\% \text{ of Rs. } 6650 = \text{Rs. } \left(\frac{6}{100} \times 6650 \right) = \text{Rs. } 399. \\ \text{Sales tax} &= 10\% \text{ of Rs. } (6650 - 399) = \text{Rs. } \left(\frac{10}{100} \times 6251 \right) = \text{Rs. } 625.10 \end{aligned}$$

\therefore Final amount = Rs. $(6251 + 625.10)$ = Rs. 6876.10

15. The population of a town increased from 1,75,000 to 2,62,500 in a decade. The average percent increase of population per year is:

A.4.37% B.5%
C.6% D.8.75%

Answer & Explanation

Answer: Option B

Explanation:

Increase in 10 years = $(262500 - 175000) = 87500$.

$$\text{Increase\%} = \left(\frac{87500}{175000} \times 100 \right) \% = 50\%.$$

$$\therefore \text{Required average} = \left(\frac{50}{10} \right) \% = 5\%.$$

29.CLOCK

1. An accurate clock shows 8 o'clock in the morning. Through how many degrees will the hour hand rotate when the clock shows 2 o'clock in the afternoon?

A. 144° B. 150°
C. 168° D. 180°

Answer & Explanation

Answer: Option D

Explanation:

$$\text{Angle traced by the hour hand in 6 hours} = \left(\frac{360 \times 6}{12} \right)^\circ = 180^\circ.$$

2. The reflex angle between the hands of a clock at 10.25 is:

A. 180° B. $192\frac{1}{2}^\circ$
C. 195° D. $197\frac{1}{2}^\circ$

Answer & Explanation

Answer: Option D

Explanation:

$$\begin{aligned} \text{Angle traced by hour hand in } 12\frac{1}{2} \text{ hrs} &= \left(\frac{360 \times 12\frac{1}{2}}{12} \right)^\circ = 312\frac{1}{2}^\circ \\ \text{Angle traced by minute hand in 25 min} &= \left(\frac{360 \times 25}{60} \right)^\circ = 150^\circ \\ \therefore \text{Reflex angle} &= \left(312\frac{1}{2} - 150 \right)^\circ = 162\frac{1}{2}^\circ = 162^\circ + 125^\circ = 197\frac{1}{2}^\circ \end{aligned}$$

3. A clock is started at noon. By 10 minutes past 5, the hour hand has turned through:

A. 145° B. 150°
C. 155° D. 160°

Answer & Explanation

Answer: Option C

Explanation:

Angle traced by hour hand in 12 hrs = 360° .

$$\text{Angle traced by hour hand in } 5\frac{1}{6} \text{ hrs} = \left(\frac{360 \times 5\frac{1}{6}}{12} \right)^\circ = 155^\circ.$$

4. A watch which gains 5 seconds in 3 minutes was set right at 7 a.m. In the afternoon of the same day, when the watch indicated quarter past 4 o'clock, the true time is:

A. $59\frac{7}{12}$ min. past 3 B. 4 p.m.
C. $58\frac{7}{12}$ min. past 3 D. 2 3 min. past 4

11

11

Answer & Explanation

Answer: Option B

Explanation:

$$\text{Time from 7 a.m. to 4.15 p.m.} = 9 \text{ hrs } 15 \text{ min.} = \frac{37}{4} \text{ hrs.}$$

3 min. 5 sec. of this clock = 3 min. of the correct clock.

$$\Rightarrow \frac{37}{720} \text{ hrs of this clock} = \frac{1}{20} \text{ hrs of the correct clock.}$$

$$\Rightarrow \frac{37 \text{ hrs of this clock}}{4} = \left(\frac{1}{20} \times \frac{720}{37} \times \frac{37}{4} \right) \text{ hrs of the correct clock.}$$

$$= 9 \text{ hrs of the correct clock.}$$

\therefore The correct time is 9 hrs after 7 a.m. i.e., 4 p.m.

5. How much does a watch lose per day, if its hands coincide every 64 minutes?

A. $32\frac{8}{11}$ min. B. $36\frac{5}{11}$ min.
C. 90 min. D. 96 min.

Answer & Explanation

Answer: Option A

Explanation:

55 min. spaces are covered in 60 min.

$$60 \text{ min. spaces are covered in } \left(\frac{60}{55} \times 60 \right) \text{ min.} = 65\frac{5}{11} \text{ min.}$$

$$\text{Loss in 64 min.} = \left(65\frac{5}{11} - 64 \right) = \frac{16}{11} \text{ min.}$$

$$\text{Loss in 24 hrs} = \left(\frac{16}{11} \times \frac{1}{64} \times 24 \times 60 \right) \text{ min.} = 32\frac{8}{11} \text{ min.}$$

6. At what time between 7 and 8 o'clock will the hands of a clock be in the same straight line but, not together?

A. 5 min. past 7 B. $5\frac{2}{11}$ min. past 7

C. $5\frac{3}{11}$ min. past 7 D. $5\frac{5}{11}$ min. past 7

Answer & Explanation

Answer: Option D

Explanation:

When the hands of the clock are in the same straight line but not together, they are 30 minute spaces apart.

At 7 o'clock, they are 25 min. spaces apart.

∴ Minute hand will have to gain only 5 min. spaces.

55 min. spaces are gained in 60 min.

5 min. spaces are gained in $\left(\frac{60}{55} \times 5\right)_{\text{min}} = 5\frac{5}{11}$ min.

∴ Required time = $5\frac{5}{11}$ min. past 7.

7. At what time between 5.30 and 6 will the hands of a clock be at right angles?

A. $43\frac{5}{11}$ min. past 5

B. $43\frac{7}{11}$ min. past 5

C. 40 min. past 5

D. 45 min. past 5

Answer & Explanation

Answer: Option B

Explanation:

At 5 o'clock, the hands are 25 min. spaces apart.

To be at right angles and that too between 5.30 and 6, the minute hand has to gain $(25 + 15) = 40$ min. spaces.

55 min. spaces are gained in 60 min.

40 min. spaces are gained in $\left(\frac{60}{55} \times 40\right)_{\text{min}} = 43\frac{7}{11}$ min.

∴ Required time = $43\frac{7}{11}$ min. past 5.

8. The angle between the minute hand and the hour hand of a clock when the time is 4.20, is:

A. 0°

B. 10°

C. 5°

D. 20°

Answer & Explanation

Answer: Option B

Explanation:

Angle traced by hour hand in $\frac{13}{3}$ hrs = $\left(\frac{360}{12} \times \frac{13}{3}\right)^\circ = 130^\circ$.

Angle traced by min. hand in 20 min. $\left(\frac{360}{60} \times 20\right)^\circ = 120^\circ$.

∴ Required angle = $(130 - 120)^\circ = 10^\circ$.

9. At what angle the hands of a clock are inclined at 15 minutes past 5?

A. $58\frac{1}{2}^\circ$

B. 64°

C. $67\frac{1}{2}^\circ$

D. $72\frac{1}{2}^\circ$

Answer & Explanation

Answer: Option C

Explanation:

Angle traced by hour hand in $\frac{21}{4}$ hrs = $\left(\frac{360}{12} \times \frac{21}{4}\right)^\circ = 157\frac{1}{2}^\circ$

Angle traced by min. hand in 15 min. = $\left(\frac{360}{60} \times 15\right)^\circ = 90^\circ$.

∴ Required angle = $\left(157\frac{1}{2}\right)^\circ - 90^\circ = 67\frac{1}{2}^\circ$

10. At 3.40, the hour hand and the minute hand of a clock form an angle of:

A. 120°

B. 125°

C. 130°

D. 135°

Answer & Explanation

Answer: Option C

Explanation:

Angle traced by hour hand in 12 hrs. = 360° .

Angle traced by it in $\frac{11}{3}$ hrs = $\left(\frac{360}{12} \times \frac{11}{3}\right)^\circ = 110^\circ$.

Angle traced by minute hand in 60 min. = 360° .

Angle traced by it in 40 min. = $\left(\frac{360}{60} \times 40\right)^\circ = 240^\circ$.

∴ Required angle $(240 - 110)^\circ = 130^\circ$.

11. How many times are the hands of a clock at right angle in a day?

A. 22

B. 24

C. 44

D. 48

Answer & Explanation

Answer: Option C

Explanation:

In 12 hours, they are at right angles 22 times.

∴ In 24 hours, they are at right angles 44 times.

12. The angle between the minute hand and the hour hand of a clock when the time is 8.30, is:

A. 80°

B. 75°

C. 60°

D. 105°

Answer & Explanation

Answer: Option B

Explanation:

Angle traced by hour hand in $\frac{17}{2}$ hrs = $\left(\frac{360}{12} \times \frac{17}{2}\right)^\circ = 255^\circ$.

Angle traced by min. hand in 30 min. $\left(\frac{360}{60} \times \frac{30}{60}\right)^\circ = 180^\circ$.

\therefore Required angle = $(255 - 180)^\circ = 75^\circ$.

13. How many times in a day, are the hands of a clock in straight line but opposite in direction?

A.20 B.22
C.24 D.48

Answer & Explanation

Answer: Option B

Explanation:

The hands of a clock point in opposite directions (in the same straight line) 11 times in every 12 hours. (Because between 5 and 7 they point in opposite directions at 6 o'clock only).

So, in a day, the hands point in the opposite directions 22 times.

14. At what time between 4 and 5 o'clock will the hands of a watch point in opposite directions?

A.45 min. past 4 B.40 min. past 4
C. $50\frac{4}{11}$ min. past 4 D. $54\frac{6}{11}$ min. past 4

Answer & Explanation

Answer: Option D

Explanation:

At 4 o'clock, the hands of the watch are 20 min. spaces apart.

To be in opposite directions, they must be 30 min. spaces apart.

\therefore Minute hand will have to gain 50 min. spaces.

55 min. spaces are gained in 60 min.

50 min. spaces are gained in $\left(\frac{60}{55} \times 50\right)$ min. or $54\frac{6}{11}$ min.

\therefore Required time = $54\frac{6}{11}$ min. past 4.

15. At what time between 9 and 10 o'clock will the hands of a watch be together?

A.45 min. past 9 B.50 min. past 9
C. $49\frac{1}{11}$ min. past 9 D. $48\frac{2}{11}$ min. past 9

Answer & Explanation

Answer: Option C

Explanation:

To be together between 9 and 10 o'clock, the minute hand has to gain 45 min. spaces.

55 min. spaces gained in 60 min.

45 min. spaces are gained in $\left(\frac{60}{55} \times 45\right)$ min or $49\frac{1}{11}$ min.

\therefore The hands are together at $49\frac{1}{11}$ min. past 9.

16. At what time, in minutes, between 3 o'clock and 4 o'clock, both the needles will coincide each other?

A. $5\frac{1}{11}$ " B. $12\frac{4}{11}$ "
C. $13\frac{4}{11}$ " D. $16\frac{4}{11}$ "

Answer & Explanation

Answer: Option D

Explanation:

At 3 o'clock, the minute hand is 15 min. spaces apart from the hour hand.

To be coincident, it must gain 15 min. spaces.

55 min. are gained in 60 min.

15 min. are gained in $\left(\frac{60}{55} \times 15\right)$ min = $16\frac{4}{11}$ min.

\therefore The hands are coincident at $16\frac{4}{11}$ min. past 3.

17. How many times do the hands of a clock coincide in a day?

A.20 B.21
C.22 D.24

Answer & Explanation

Answer: Option C

Explanation:

The hands of a clock coincide 11 times in every 12 hours (Since between 11 and 1, they coincide only once, *i.e.*, at 12 o'clock).

AM

12:00
1:05
2:11
3:16
4:22
5:27
6:33
7:38
8:44
9:49
10:55

PM

12:00
1:05
2:11
3:16
4:22
5:27
6:33
7:38
8:44
9:49
10:55

The hands overlap about every 65 minutes, not every 60 minutes.

∴ The hands coincide 22 times in a day.

18. How many times in a day, the hands of a clock are straight?

A.22 B.24
C.44 D.48

Answer & Explanation

Answer: Option C

Explanation:

In 12 hours, the hands coincide or are in opposite direction 22 times.

∴ In 24 hours, the hands coincide or are in opposite direction 44 times a day.

19. A watch which gains uniformly is 2 minutes low at noon on Monday and is 4 min. 48 sec fast at 2 p.m. on the following Monday. When was it correct?

A.2 p.m. on Tuesday B.2 p.m. on Wednesday

C.3 p.m. on Thursday
Answer & Explanation

D.1 p.m. on Friday

Answer: Option B

Explanation:

Time from 12 p.m. on Monday to 2 p.m. on the following Monday = 7 days 2 hours = 170 hours.

∴ The watch gains $\left(2 + 4\frac{4}{5}\right)$ min. or $5\frac{34}{5}$ min. in 170 hrs.

Now, $5\frac{34}{5}$ min. are gained in 170 hrs.

∴ 2 min. are gained in $\left(170 \times \frac{5}{34} \times 2\right)$ hrs = 50 hrs.

∴ Watch is correct 2 days 2 hrs. after 12 p.m. on Monday *i.e.*, it will be correct at 2 p.m. on Wednesday.

30. Volume and Surface Area

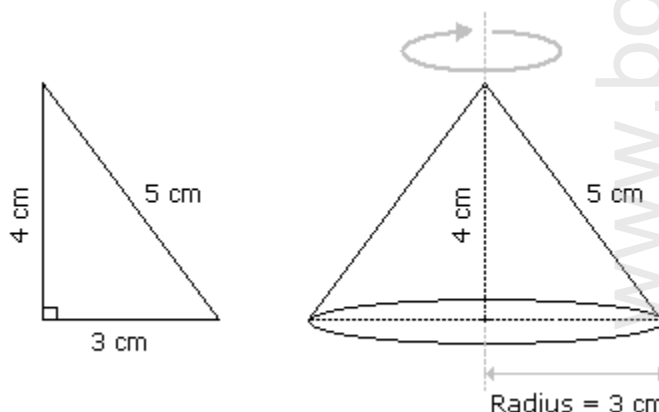
1. A right triangle with sides 3 cm, 4 cm and 5 cm is rotated the side of 3 cm to form a cone. The volume of the cone so formed is:

A. $12\pi \text{ cm}^3$ B. $15\pi \text{ cm}^3$
C. $16\pi \text{ cm}^3$ D. $20\pi \text{ cm}^3$

Answer & Explanation

Answer: Option A

Explanation:



Clearly, we have $r = 3$ cm and $h = 4$ cm.

∴ Volume = $\frac{1}{3} \pi r^2 h = \left(\frac{1}{3} \times \pi \times 3^2 \times 4\right) \text{ cm}^3 = 12\pi \text{ cm}^3$.

2. In a shower, 5 cm of rain falls. The volume of water that falls on 1.5 hectares of ground is:

A.75 cu. m B.750 cu. m

C. 7500 cu. m D. 75000 cu. m

Answer & Explanation

Answer: Option B

Explanation:

$$1 \text{ hectare} = 10,000 \text{ m}^2$$

$$\text{So, Area} = (1.5 \times 10000) \text{ m}^2 = 15000 \text{ m}^2.$$

$$\text{Depth} = \frac{5}{100} \text{ m} = \frac{1}{20} \text{ m}.$$

$$\therefore \text{Volume} = (\text{Area} \times \text{Depth}) = \left(15000 \times \frac{1}{20} \right) \text{ m}^3 = 750 \text{ m}^3.$$

3. A hall is 15 m long and 12 m broad. If the sum of the areas of the floor and the ceiling is equal to the sum of the areas of four walls, the volume of the hall is:

A. 720 B. 900
C. 1200 D. 1800

Answer & Explanation

Answer: Option C

Explanation:

$$2(15 + 12) \times h = 2(15 \times 12)$$

$$\Rightarrow h = \frac{180}{27} \text{ m} = \frac{20}{3} \text{ m}.$$

$$\therefore \text{Volume} = \left(15 \times 12 \times \frac{20}{3} \right) \text{ m}^3 = 1200 \text{ m}^3.$$

4. 66 cubic centimetres of silver is drawn into a wire 1 mm in diameter. The length of the wire in metres will be:

A. 84 B. 90
C. 168 D. 336

Answer & Explanation

Answer: Option A

Explanation:

Let the length of the wire be h .

$$\text{Radius} = \frac{1}{2} \text{ mm} = \frac{1}{20} \text{ cm. Then,}$$

$$\Rightarrow \frac{22}{7} \times \frac{1}{20} \times \frac{1}{20} \times h = 66.$$

$$\Rightarrow h = \left(\frac{66 \times 20 \times 20 \times 7}{22} \right) = 8400 \text{ cm} = 84 \text{ m}.$$

5. A hollow iron pipe is 21 cm long and its external diameter is 8 cm. If the thickness of the pipe is 1 cm and

iron weighs 8 g/cm^3 , then the weight of the pipe is:

A. 3.6 kg B. 3.696 kg
C. 36 kg D. 36.9 kg

Answer & Explanation

Answer: Option B

Explanation:

External radius = 4 cm,

Internal radius = 3 cm.

$$\begin{aligned} \text{Volume of iron} &= \left(\frac{22}{7} \times [(4)^2 - (3)^2] \times 21 \right) \text{ cm}^3 \\ &= \left(\frac{22}{7} \times 7 \times 1 \times 21 \right) \text{ cm}^3 \\ &= 462 \text{ cm}^3. \end{aligned}$$

\therefore Weight of iron = $(462 \times 8) \text{ gm} = 3696 \text{ gm} = 3.696 \text{ kg}$.

6. A boat having a length 3 m and breadth 2 m is floating on a lake. The boat sinks by 1 cm when a man gets on it. The mass of the man is:

A. 12 kg B. 60 kg
C. 72 kg D. 96 kg

Answer & Explanation

Answer: Option B

Explanation:

$$\begin{aligned} \text{Volume of water displaced} &= (3 \times 2 \times 0.01) \text{ m}^3 \\ &= 0.06 \text{ m}^3. \end{aligned}$$

$$\begin{aligned} \therefore \text{Mass of man} &= \text{Volume of water displaced} \times \text{Density of water} \\ &= (0.06 \times 1000) \text{ kg} \\ &= 60 \text{ kg}. \end{aligned}$$

7. 50 men took a dip in a water tank 40 m long and 20 m broad on a religious day. If the average displacement of water by a man is 4 m^3 , then the rise in the water level in the tank will be:

A. 20 cm B. 25 cm
C. 35 cm D. 50 cm

Answer & Explanation

Answer: Option B

Explanation:

$$\text{Total volume of water displaced} = (4 \times 50) \text{ m}^3 = 200 \text{ m}^3.$$

$$\therefore \text{Rise in water level} = \left(\frac{200}{40 \times 20} \right) \text{ m} = 0.25 \text{ m} = 25 \text{ cm}.$$

8. The slant height of a right circular cone is 10 m and its height is 8 m. Find the area of its curved surface.

A. $30\pi \text{ m}^2$ B. $40\pi \text{ m}^2$
C. $60\pi \text{ m}^2$ D. $80\pi \text{ m}^2$

Answer & Explanation

Answer: Option C

Explanation:

$$l = 10 \text{ m,}$$

$$h = 8 \text{ m.}$$

$$\text{So, } r = \sqrt{l^2 - h^2} = (10)^2 - 8^2 = 6 \text{ m.}$$

$$\therefore \text{Curved surface area} = \pi rl = (\pi \times 6 \times 10) \text{ m}^2 = 60\pi \text{ m}^2.$$

9. A cistern 6m long and 4 m wide contains water up to a depth of 1 m 25 cm. The total area of the wet surface is:

A. 49 m^2 B. 50 m^2
C. 53.5 m^2 D. 55 m^2

Answer & Explanation

Answer: Option A

Explanation:

$$\begin{aligned} \text{Area of the wet surface} &= [2(lb + bh + lh) - lb] \\ &= 2(bh + lh) + lb \\ &= [2(4 \times 1.25 + 6 \times 1.25) + 6 \times 4] \text{ m}^2 \\ &= 49 \text{ m}^2. \end{aligned}$$

10. A metallic sheet is of rectangular shape with dimensions 48 m x 36 m. From each of its corners, a square is cut off so as to make an open box. If the length of the square is 8 m, the volume of the box (in m^3) is:

A. 4830 B. 5120
C. 6420 D. 8960

Answer & Explanation

Answer: Option B

Explanation:

$$\text{Clearly, } l = (48 - 16) \text{ m} = 32 \text{ m,}$$

$$b = (36 - 16) \text{ m} = 20 \text{ m,}$$

$$h = 8 \text{ m.}$$

$$\therefore \text{Volume of the box} = (32 \times 20 \times 8) \text{ m}^3 = 5120 \text{ m}^3.$$

11. The curved surface area of a cylindrical pillar is 264 m^2 and its volume is 924 m^3 . Find the ratio of its diameter to its height.

A. 3 : 7 B. 7 : 3
C. 6 : 7 D. 7 : 6

Answer & Explanation

Answer: Option B

Explanation:

$$\frac{\pi r^2 h}{2\pi rh} = \frac{924}{264} \Rightarrow r = \left(\frac{924}{264} \times 2 \right) = 7 \text{ m.}$$

$$\text{And, } 2\pi rh = 264 \Rightarrow h = \left(264 \times \frac{7}{22} \times \frac{1}{2} \times \frac{1}{7} \right) = 6 \text{ m.}$$

$$\therefore \text{Required ratio} = \frac{2r}{h} = \frac{14}{6} = 7 : 3.$$

12. A cistern of capacity 8000 litres measures externally 3.3 m by 2.6 m by 1.1 m and its walls are 5 cm thick. The thickness of the bottom is:

A. 90 cm B. 1 dm
C. 1 m D. 1.1 cm

Answer & Explanation

Answer: Option B

Explanation:

Let the thickness of the bottom be x cm.

$$\text{Then, } [(330 - 10) \times (260 - 10) \times (110 - x)] = 8000 \times 1000$$

$$\Rightarrow 320 \times 250 \times (110 - x) = 8000 \times 1000$$

$$\Rightarrow (110 - x) = \frac{8000 \times 1000}{320 \times 250} = 100$$

$$\Rightarrow x = 10 \text{ cm} = 1 \text{ dm.}$$

13. What is the total surface area of a right circular cone of height 14 cm and base radius 7 cm?

A. 344.35 cm^2 B. 462 cm^2
C. 498.35 cm^2 D. None of these

Answer & Explanation

Answer: Option C

Explanation:

$$h = 14 \text{ cm, } r = 7 \text{ cm.}$$

$$\text{So, } l = \sqrt{(7)^2 + (14)^2} = 245 = 75 \text{ cm.}$$

$$\begin{aligned} \therefore \text{Total surface area} &= \pi r l + \pi r^2 \\ &= \left(\frac{22}{7} \times 7 \times 75 + \frac{22}{7} \times 7 \times 7 \right) \text{ cm}^2 \\ &= [154(5 + 1)] \text{ cm}^2 \\ &= (154 \times 3.236) \text{ cm}^2 \\ &= 498.35 \text{ cm}^2. \end{aligned}$$

14. A large cube is formed from the material obtained by melting three smaller cubes of 3, 4 and 5 cm side. What is the ratio of the total surface areas of the smaller cubes and the large cube?

A. 2 : 1 B. 3 : 2
C. 25 : 18 D. 27 : 20

Answer & Explanation

Answer: Option C

Explanation:

$$\text{Volume of the large cube} = (3^3 + 4^3 + 5^3) = 216 \text{ cm}^3.$$

Let the edge of the large cube be a .

$$\text{So, } a^3 = 216 \Rightarrow a = 6 \text{ cm.}$$

$$\therefore \text{Required ratio} = \left(\frac{6 \times (3^2 + 4^2 + 5^2)}{6 \times 6^2} \right) = \frac{50}{36} = 25 : 18.$$

15. How many bricks, each measuring 25 cm x 11.25 cm x 6 cm, will be needed to build a wall of 8 m x 6 m x 22.5 cm?

A. 5600 B. 6000
C. 6400 D. 7200

Answer & Explanation

Answer: Option C

Explanation:

$$\begin{aligned} \text{Number of bricks} &= \frac{\text{Volume of the wall}}{\text{Volume of 1 brick}} = \left(\frac{800 \times 600 \times 22.5}{25 \times 11.25 \times 6} \right) = 6400. \end{aligned}$$

31. Problems on Numbers

1. If one-third of one-fourth of a number is 15, then three-tenth of that number is:

A. 35 B. 36
C. 45 D. 54

Answer & Explanation

Answer: Option D

Explanation:

Let the number be x .

$$\text{Then, } \frac{1}{3} \text{ of } \frac{1}{4} \text{ of } x = 15 \Leftrightarrow x = 15 \times 12 = 180.$$

$$\text{So, required number} = \left(\frac{3}{10} \times 180 \right) = 54.$$

2. Three times the first of three consecutive odd integers is 3 more than twice the third. The third integer is:

A. 9 B. 11
C. 13 D. 15

Answer & Explanation

Answer: Option D

Explanation:

Let the three integers be x , $x + 2$ and $x + 4$.

$$\text{Then, } 3x = 2(x + 4) + 3 \Leftrightarrow x = 11.$$

$$\therefore \text{Third integer} = x + 4 = 15.$$

3. The difference between a two-digit number and the number obtained by interchanging the positions of its digits is 36. What is the difference between the two digits of that number?

A. 3 B. 4
C. 9 D. Cannot be determined
E. None of these

Answer & Explanation

Answer: Option B

Explanation:

Let the ten's digit be x and unit's digit be y .

$$\text{Then, } (10x + y) - (10y + x) = 36$$

$$\Rightarrow 9(x - y) = 36$$

$$\Rightarrow x - y = 4.$$

4. The difference between a two-digit number and the number obtained by interchanging the digits is 36. What is the difference between the sum and the difference of the digits of the number if the ratio between the digits of the number is 1 : 2 ?

A. 4 B. 8
C. 16 D. None of these

Answer & Explanation

Answer: Option B

Explanation:

Since the number is greater than the number obtained on reversing the digits, so the ten's digit is greater than the unit's digit.

Let ten's and unit's digits be $2x$ and x respectively.

$$\text{Then, } (10 \times 2x + x) - (10x + 2x) = 36$$

$$\Rightarrow 9x = 36$$

$$\Rightarrow x = 4.$$

$$\therefore \text{ Required difference} = (2x + x) - (2x - x) = 2x = 8.$$

5. A two-digit number is such that the product of the digits is 8. When 18 is added to the number, then the digits are reversed. The number is:

- A. 18 B. 24
C. 42 D. 81

Answer & Explanation

Answer: Option B

Explanation:

Let the ten's and unit digit be x and $\frac{8}{x}$ respectively.

$$\text{Then, } \left(10x + \frac{8}{x}\right) + 18 = 10 \times \frac{8}{x} + x$$

$$\Rightarrow 10x^2 + 8 + 18x = 80 + x^2$$

$$\Rightarrow 9x^2 + 18x - 72 = 0$$

$$\Rightarrow x^2 + 2x - 8 = 0$$

$$\Rightarrow (x + 4)(x - 2) = 0$$

$$\Rightarrow x = 2.$$

6. The sum of the digits of a two-digit number is 15 and the difference between the digits is 3. What is the two-digit number?

- A. 69 B. 78
C. 96 D. Cannot be determined
E. None of these

Answer & Explanation

Answer: Option D

Explanation:

Let the ten's digit be x and unit's digit be y .

$$\text{Then, } x + y = 15 \text{ and } x - y = 3 \text{ or } y - x = 3.$$

$$\text{Solving } x + y = 15 \text{ and } x - y = 3, \text{ we get: } x = 9, y = 6.$$

$$\text{Solving } x + y = 15 \text{ and } y - x = 3, \text{ we get: } x = 6, y = 9.$$

So, the number is either 96 or 69.

Hence, the number cannot be determined.

7. The sum of the squares of three numbers is 138, while the sum of their products taken two at a time is 131. Their sum is:

- A. 20 B. 30
C. 40 D. None of these

Answer & Explanation

Answer: Option A

Explanation:

Let the numbers be a, b and c .

$$\text{Then, } a^2 + b^2 + c^2 = 138 \text{ and } (ab + bc + ca) = 131.$$

$$(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca) = 138 + 2 \times 131 = 400.$$

$$\Rightarrow (a + b + c) = 400 = 20.$$

8. A number consists of two digits. If the digits interchange places and the new number is added to the original number, then the resulting number will be divisible by:

- A. 3 B. 5
C. 9 D. 11

Answer & Explanation

Answer: Option D

Explanation:

Let the ten's digit be x and unit's digit be y .

$$\text{Then, number} = 10x + y.$$

$$\text{Number obtained by interchanging the digits} = 10y + x.$$

$$\therefore (10x + y) + (10y + x) = 11(x + y), \text{ which is divisible by } 11.$$

9. In a two-digit, if it is known that its unit's digit exceeds its ten's digit by 2 and that the product of the given number and the sum of its digits is equal to 144, then the number is:

- A. 24 B. 26
C. 42 D. 46

Answer & Explanation

Answer: Option A

Explanation:

Let the ten's digit be x .

Then, unit's digit = $x + 2$.

$$\text{Number} = 10x + (x + 2) = 11x + 2.$$

$$\text{Sum of digits} = x + (x + 2) = 2x + 2.$$

$$\therefore (11x + 2)(2x + 2) = 144$$

$$\Rightarrow 22x^2 + 26x - 140 = 0$$

$$\Rightarrow 11x^2 + 13x - 70 = 0$$

$$\Rightarrow (x - 2)(11x + 35) = 0$$

$$\Rightarrow x = 2.$$

Hence, required number = $11x + 2 = 24$.

10. Find a positive number which when increased by 17 is equal to 60 times the reciprocal of the number.

A.3

B.10

C.17

D.20

Answer & Explanation

Answer: Option A

Explanation:

Let the number be x .

$$\text{Then, } x + 17 = \frac{60}{x}$$

$$\Rightarrow x^2 + 17x - 60 = 0$$

$$\Rightarrow (x + 20)(x - 3) = 0$$

$$\Rightarrow x = 3.$$

$$- (x - y)^2$$

$$= (25)^2 - (13)^2$$

$$= (625 - 169)$$

$$= 456$$

$$\therefore xy = 114.$$

15. What is the sum of two consecutive even numbers, the difference of whose squares is 84?

A.34

B.38

C.42

D.46

Answer & Explanation

Answer: Option C

Explanation:

Let the numbers be x and $x + 2$.

$$\text{Then, } (x + 2)^2 - x^2 = 84$$

$$\Rightarrow 4x + 4 = 84$$

$$\Rightarrow 4x = 80$$

$$\Rightarrow x = 20.$$

$$\therefore \text{The required sum} = x + (x + 2) = 2x + 2 = 42.$$

32.Simplification

1. A man has Rs. 480 in the denominations of one-rupee notes, five-rupee notes and ten-rupee notes. The number of notes of each denomination is equal. What is the total number of notes that he has ?

A.45

B.60

C.75

D.90

Answer & Explanation

Answer: Option D

Explanation:

Let number of notes of each denomination be x .

$$\text{Then } x + 5x + 10x = 480$$

$$\Rightarrow 16x = 480$$

$$\therefore x = 30.$$

Hence, total number of notes = $3x = 90$.

2. There are two examinations rooms A and B. If 10 students are sent from A to B, then the number of students in each room is the same. If 20 candidates are sent from B to A, then the number of students in A is double the number of students in B. The number of students in room A is:

A.20

B.80

C.100

D.200

Answer & Explanation

Answer: Option C

Explanation:

Let the number of students in rooms A and B be x and y respectively.

$$\text{Then, } x - 10 = y + 10 \Rightarrow x - y = 20 \dots (i)$$

$$\text{and } x + 20 = 2(y - 20) \Rightarrow x - 2y = -60 \dots (ii)$$

Solving (i) and (ii) we get: $x = 100$, $y = 80$.

∴ The required answer A = 100.

3. The price of 10 chairs is equal to that of 4 tables. The price of 15 chairs and 2 tables together is Rs. 4000. The total price of 12 chairs and 3 tables is:

A.Rs. 3500

B.Rs. 3750

C.Rs. 3840

D.Rs. 3900

Answer & Explanation

Answer: Option D

Explanation:

Let the cost of a chair and that of a table be Rs. x and Rs. y respectively.

$$\text{Then, } 10x = 4y \text{ or } y = \frac{5}{2}x.$$

$$\therefore 15x + 2y = 4000$$

$$\Rightarrow 15x + 2 \times \frac{5}{2}x = 4000$$

$$\Rightarrow 20x = 4000$$

$$\therefore x = 200.$$

$$\text{So, } y = \left(\frac{5}{2} \times 200 \right) = 500.$$

Hence, the cost of 12 chairs and 3 tables = $12x + 3y$

$$= \text{Rs. } (2400 + 1500)$$

$$= \text{Rs. } 3900.$$

4. If $a - b = 3$ and $a^2 + b^2 = 29$, find the value of ab .

A.10

B.12

C.15

D.18

Answer & Explanation

Answer: Option A

Explanation:

$$2ab = (a^2 + b^2) - (a - b)^2$$

$$= 29 - 9 = 20$$

$$\Rightarrow ab = 10.$$

5. The price of 2 sarees and 4 shirts is Rs. 1600. With the same money one can buy 1 saree and 6 shirts. If one wants to buy 12 shirts, how much shall he have to pay ?

A.Rs. 1200

B.Rs. 2400

C.Rs. 4800

D.Cannot be determined

E.None of these

Answer & Explanation

Answer: Option B

Explanation:

Let the price of a saree and a shirt be Rs. x and Rs. y respectively.

$$\text{Then, } 2x + 4y = 1600 \dots (i)$$

$$\text{and } x + 6y = 1600 \dots (ii)$$

Divide equation (i) by 2, we get the below equation.

$$\Rightarrow x + 2y = 800. \dots (iii)$$

Now subtract (iii) from (ii)

$$x + 6y = 1600 \quad (-)$$

$$x + 2y = 800$$

$$\hline$$

$$4y = 800$$

$$\hline$$

Therefore, $y = 200$.

Now apply value of y in (iii)

$$\Rightarrow x + 2 \times 200 = 800$$

$$\Rightarrow x + 400 = 800$$

Therefore $x = 400$

Solving (i) and (ii) we get $x = 400$, $y = 200$.

\therefore Cost of 12 shirts = Rs. $(12 \times 200) = \text{Rs. } 2400$.

6. A sum of Rs. 1360 has been divided among A, B and C

such that A gets $\frac{2}{3}$ of what B gets and B gets $\frac{1}{4}$ of what C gets. B's share is:

- A. Rs. 120 B. Rs. 160
C. Rs. 240 D. Rs. 300

Answer & Explanation

Answer: Option C

Explanation:

Let C's share = Rs. x

Then, B's share = Rs. $\frac{x}{4}$, A's share = Rs. $\left(\frac{2}{3} \times \frac{x}{4}\right) = \text{Rs. } \frac{x}{6}$

$$\therefore \frac{x}{6} + \frac{x}{4} + x = 1360$$

$$\Rightarrow \frac{17x}{12} = 1360$$

$$\Rightarrow x = \frac{1360 \times 12}{17} = \text{Rs. } 960$$

$$\text{Hence, B's share} = \text{Rs. } \left(\frac{960}{4}\right) = \text{Rs. } 240.$$

7. One-third of Rahul's savings in National Savings Certificate is equal to one-half of his savings in Public Provident Fund. If he has Rs. 1,50,000 as total savings, how much has he saved in Public Provident Fund ?

- A. Rs. 30,000 B. Rs. 50,000
C. Rs. 60,000 D. Rs. 90,000

Answer & Explanation

Answer: Option C

Explanation:

Let savings in N.S.C and P.P.F. be Rs. x and Rs. $(150000 - x)$ respectively. Then,

$$\frac{1}{3}x = \frac{1}{2}(150000 - x)$$

$$\Rightarrow \frac{x}{3} + \frac{x}{2} = 75000$$

$$\Rightarrow \frac{5x}{6} = 75000$$

$$\Rightarrow x = \frac{75000 \times 6}{5} = 90000$$

\therefore Savings in Public Provident Fund = Rs. $(150000 - 90000) = \text{Rs. } 60000$

8. A fires 5 shots to B's 3 but A kills only once in 3 shots while B kills once in 2 shots. When B has missed 27 times, A has killed:

- A. 30 birds B. 60 birds
C. 72 birds D. 90 birds

Answer & Explanation

Answer: Option A

Explanation:

Let the total number of shots be x . Then,

$$\text{Shots fired by A} = \frac{5}{8}x$$

$$\text{Shots fired by B} = \frac{3}{8}x$$

$$\text{Killing shots by A} = \frac{1}{3} \text{ of } \frac{5}{8}x = \frac{5}{24}x$$

$$\text{Shots missed by B} = \frac{1}{2} \text{ of } \frac{3}{8}x = \frac{3}{16}x$$

$$\therefore \frac{3x}{16} = 27 \text{ or } x = \left(\frac{27 \times 16}{3}\right) = 144.$$

$$\text{Birds killed by A} = \frac{5x}{24} = \left(\frac{5}{24} \times 144\right) = 30.$$

9. Eight people are planning to share equally the cost of a rental car. If one person withdraws from the arrangement and the others share equally the entire cost of the car, then the share of each of the remaining persons increased by:

- A. $\frac{1}{7}$ B. $\frac{1}{8}$
C. $\frac{1}{9}$ D. $\frac{7}{8}$

Answer & Explanation

Answer: Option A

Explanation:

$$\text{Original share of 1 person} = \frac{1}{8}$$

$$\text{New share of 1 person} = \frac{1}{7}$$

$$\text{Increase} = \left(\frac{1}{7} - \frac{1}{8}\right) = \frac{1}{56}$$

$$\therefore \text{Required fraction} = \frac{(1/56)}{(1/8)} = \left(\frac{1}{56} \times 8\right) = \frac{1}{7}$$

10. To fill a tank, 25 buckets of water is required. How many buckets of water will be required to fill the same tank if the capacity of the bucket is reduced to two-fifth of its present ?

- A. 10 B. 35
C. 62.5 D. Cannot be determined

E. None of these
Answer & Explanation

Answer: Option C

Explanation:

Let the capacity of 1 bucket = x .

Then, the capacity of tank = $25x$.

New capacity of bucket = $\frac{2}{5}x$

\therefore Required number of buckets = $\frac{25x}{(2x/5)}$

$$= \left(\frac{25x \times 5}{2x} \right) \\ = \frac{125}{2}$$

$$= 62.5$$

11. In a regular week, there are 5 working days and for each day, the working hours are 8. A man gets Rs. 2.40 per hour for regular work and Rs. 3.20 per hours for overtime. If he earns Rs. 432 in 4 weeks, then how many hours does he work for ?

A. 160 B. 175
C. 180 D. 195

Answer & Explanation

Answer: Option B

Explanation:

Suppose the man works overtime for x hours.

Now, working hours in 4 weeks = $(5 \times 8 \times 4) = 160$.

$$\therefore 160 \times 2.40 + x \times 3.20 = 432$$

$$\Rightarrow 3.20x = 432 - 384 = 48$$

$$\Rightarrow x = 15.$$

Hence, total hours of work = $(160 + 15) = 175$.

12. Free notebooks were distributed equally among children of a class. The number of notebooks each child got was one-eighth of the number of children. Had the number of children been half, each child would have got 16 notebooks. Total how many notebooks were distributed ?

A. 256 B. 432
C. 512 D. 640

E. None of these

Answer & Explanation

Answer: Option C

Explanation:

Let total number of children be x .

$$\text{Then, } x \times \frac{1}{8}x = \frac{x}{2} \times 16 \Leftrightarrow x = 64.$$

$$\therefore \text{Number of notebooks} = \frac{1}{8}x^2 = \left(\frac{1}{8} \times 64 \times 64 \right) = 512.$$

13. A man has some hens and cows. If the number of heads be 48 and the number of feet equals 140, then the number of hens will be:

A. 22 B. 23
C. 24 D. 26

Answer & Explanation

Answer: Option D

Explanation:

Let the number of hens be x and the number of cows be y .

$$\text{Then, } x + y = 48 \dots (i)$$

$$\text{and } 2x + 4y = 140 \Rightarrow x + 2y = 70 \dots (ii)$$

Solving (i) and (ii) we get: $x = 26, y = 22$.

\therefore The required answer = 26.

$$14. \frac{(469 + 174)^2 - (469 - 174)^2}{(469 \times 174)} = ?$$

A. 2 B. 4
C. 295 D. 643

Answer & Explanation

Answer: Option B

Explanation:

$$\text{Given exp.} = \frac{(a + b)^2 - (a - b)^2}{ab}$$

$$= \frac{4ab}{ab}$$

$$= 4 \text{ (where } a = 469, b = 174.)$$

15. David gets on the elevator at the 11th floor of a building and rides up at the rate of 57 floors per minute. At the same time, Albert gets on an elevator at the 51st floor of the same building and rides down at the rate of 63 floors per minute. If they continue travelling at these rates,

then at which floor will their paths cross ?

- A.19 B.28
C.30 D.37

Answer & Explanation

Answer: Option C

Explanation:

Suppose their paths cross after x minutes.

$$\text{Then, } 11 + 57x = 51 - 63x \Leftrightarrow 120x = 40$$

$$x = \frac{1}{3}$$

$$\text{Number of floors covered by David in } \left(\frac{1}{3} \times \frac{x}{57} \right) = 19.$$

So, their paths cross at $(11 + 19)$ i.e., 30th floor.

33. Ratio and Proportion

1. A and B together have Rs. 1210. If $\frac{4}{15}$ of A's amount is equal to $\frac{2}{5}$ of B's amount, how much amount does B have?

- A.Rs. 460 B.Rs. 484
C.Rs. 550 D.Rs. 664

Answer & Explanation

Answer: Option B

Explanation:

$$\frac{4}{15}A = \frac{2}{5}B$$

$$\Rightarrow A = \left(\frac{2 \times 15}{5 \times 4} \right) B$$

$$\Rightarrow A = \frac{3}{2}B$$

$$\Rightarrow \frac{A}{B} = \frac{3}{2}$$

$$\Rightarrow A : B = 3 : 2.$$

$$\therefore \text{B's share} = \text{Rs. } \left(1210 \times \frac{2}{5} \right) = \text{Rs. } 484.$$

2. Two numbers are respectively 20% and 50% more than a third number. The ratio of the two numbers is:

- A.2 : 5 B.3 : 5
C.4 : 5 D.6 : 7

Answer & Explanation

Answer: Option C

Explanation:

Let the third number be x .

$$\text{Then, first number} = 120\% \text{ of } x = \frac{120x}{100} = \frac{6x}{5}$$

$$\text{Second number} = 150\% \text{ of } x = \frac{150x}{100} = \frac{3x}{2}$$

$$\therefore \text{Ratio of first two numbers} = \left(\frac{6x}{5} : \frac{3x}{2} \right) = 12x : 15x = 4 : 5.$$

3. A sum of money is to be distributed among A, B, C, D in the proportion of 5 : 2 : 4 : 3. If C gets Rs. 1000 more than D, what is B's share?

- A.Rs. 500 B.Rs. 1500
C.Rs. 2000 D.None of these

Answer & Explanation

Answer: Option C

Explanation:

Let the shares of A, B, C and D be Rs. $5x$, Rs. $2x$, Rs. $4x$ and Rs. $3x$ respectively.

$$\text{Then, } 4x - 3x = 1000$$

$$\Rightarrow x = 1000.$$

$$\therefore \text{B's share} = \text{Rs. } 2x = \text{Rs. } (2 \times 1000) = \text{Rs. } 2000.$$

4. Seats for Mathematics, Physics and Biology in a school are in the ratio 5 : 7 : 8. There is a proposal to increase these seats by 40%, 50% and 75% respectively. What will be the ratio of increased seats?

- A.2 : 3 : 4 B.6 : 7 : 8
C.6 : 8 : 9 D.None of these

Answer & Explanation

Answer: Option A

Explanation:

Originally, let the number of seats for Mathematics, Physics and Biology be $5x$, $7x$ and $8x$ respectively.

Number of increased seats are (140% of $5x$), (150% of $7x$) and (175% of $8x$).

$$\Rightarrow \left(\frac{140}{100} \times 5x \right), \left(\frac{150}{100} \times 7x \right) \text{ and } \left(\frac{175}{100} \times 8x \right) \\ \Rightarrow 7x, 21x \text{ and } 14x.$$

∴ The required ratio = $7x : \frac{21x}{2} : 14x$

$$\Rightarrow 14x : 21x : 28x$$

$$\Rightarrow 2 : 3 : 4.$$

5. In a mixture 60 litres, the ratio of milk and water 2 : 1. If the this ratio is to be 1 : 2, then the quantity of water to be further added is:

A. 20 litres

B. 30 litres

C. 40 litres

D. 60 litres

Answer & Explanation

Answer: Option D

Explanation:

$$\text{Quantity of milk} = \left(60 \times \frac{2}{3} \right) \text{ litres} = 40 \text{ litres.}$$

$$\text{Quantity of water in it} = (60 - 40) \text{ litres} = 20 \text{ litres.}$$

$$\text{New ratio} = 1 : 2$$

Let quantity of water to be added further be x litres.

$$\text{Then, milk : water} = \left(\frac{40}{20 + x} \right).$$

$$\text{Now, } \left(\frac{40}{20 + x} \right) = \frac{1}{2}$$

$$\Rightarrow 20 + x = 80$$

$$\Rightarrow x = 60.$$

∴ Quantity of water to be added = 60 litres.

6. The ratio of the number of boys and girls in a college is 7 : 8. If the percentage increase in the number of boys and girls be 20% and 10% respectively, what will be the new ratio?

A. 8 : 9

B. 17 : 18

C. 21 : 22

D. Cannot be determined

Answer & Explanation

Answer: Option C

Explanation:

Originally, let the number of boys and girls in the college be $7x$ and $8x$ respectively.

Their increased number is (120% of $7x$) and (110% of $8x$).

$$\Rightarrow \left(\frac{120}{100} \times 7x \right) \text{ and } \left(\frac{110}{100} \times 8x \right)$$

$$\Rightarrow \frac{42x}{5} \text{ and } \frac{44x}{5}$$

$$\therefore \text{The required ratio} = \left(\frac{42x}{5} : \frac{44x}{5} \right) = 21 : 22.$$

7. Salaries of Ravi and Sumit are in the ratio 2 : 3. If the salary of each is increased by Rs. 4000, the new ratio becomes 40 : 57. What is Sumit's salary?

A. Rs. 17,000

B. Rs. 20,000

C. Rs. 25,500

D. Rs. 38,000

Answer & Explanation

Answer: Option D

Explanation:

Let the original salaries of Ravi and Sumit be Rs. $2x$ and Rs. $3x$ respectively.

$$\text{Then, } \frac{2x + 4000}{3x + 4000} = \frac{40}{57}$$

$$\Rightarrow 57(2x + 4000) = 40(3x + 4000)$$

$$\Rightarrow 6x = 68,000$$

$$\Rightarrow 3x = 34,000$$

$$\text{Sumit's present salary} = (3x + 4000) = \text{Rs.}(34000 + 4000) = \text{Rs. } 38,000.$$

8. If $0.75 : x :: 5 : 8$, then x is equal to:

A. 1.12

B. 1.2

C. 1.25

D. 1.30

Answer & Explanation

Answer: Option B

Explanation:

$$(x \times 5) = (0.75 \times 8) \Rightarrow x = \left(\frac{6}{5} \right) = 1.20$$

9. The sum of three numbers is 98. If the ratio of the first to second is 2 : 3 and that of the second to the third is 5 : 8, then the second number is:

A. 20

B. 30

C. 48

D. 58

Answer & Explanation

Answer: Option B

Explanation:

Let the three parts be A, B, C. Then,

$$A : B = 2 : 3 \text{ and } B : C = 5 : 8 = \left(5 \times \frac{3}{5} \right) : \left(8 \times \frac{3}{5} \right) = 3 : \frac{24}{5}$$

$$\Rightarrow A : B : C = 2 : 3 : \frac{24}{5} = 10 : 15 : 24$$

$$\Rightarrow B = \left(98 \times \frac{15}{49} \right) = 30.$$

10. If Rs. 782 be divided into three parts, proportional to $\frac{1}{2} : \frac{2}{3} : \frac{3}{4}$, then the first part is:

A.Rs. 182 B.Rs. 190
C.Rs. 196 D.Rs. 204

Answer & Explanation

Answer: Option D

Explanation:

$$\text{Given ratio} = \frac{1}{2} : \frac{2}{3} : \frac{3}{4} = 6 : 8 : 9.$$

$$\therefore 1^{\text{st}} \text{ part} = \text{Rs.} \left(782 \times \frac{6}{23} \right) = \text{Rs.} 204$$

11. The salaries A, B, C are in the ratio 2 : 3 : 5. If the increments of 15%, 10% and 20% are allowed respectively in their salaries, then what will be new ratio of their salaries?

A.3 : 3 : 10 B.10 : 11 : 20
C.23 : 33 : 60 D.Cannot be determined

Answer & Explanation

Answer: Option C

Explanation:

$$\text{Let } A = 2k, B = 3k \text{ and } C = 5k.$$

$$A's \text{ new salary} = \frac{115}{100} \text{ of } 2k = \left(\frac{115}{100} \times 2k \right) = \frac{23k}{10}$$

$$B's \text{ new salary} = \frac{110}{100} \text{ of } 3k = \left(\frac{110}{100} \times 3k \right) = \frac{33k}{10}$$

$$C's \text{ new salary} = \frac{120}{100} \text{ of } 5k = \left(\frac{120}{100} \times 5k \right) = 6k$$

$$\therefore \text{New ratio} \left(\frac{23k}{10} : \frac{33k}{10} : 6k \right) = 23 : 33 : 60$$

12. If 40% of a number is equal to two-third of another number, what is the ratio of first number to the second number?

A.2 : 5 B.3 : 7
C.5 : 3 D.7 : 3

Answer & Explanation

Answer: Option C

Explanation:

$$\text{Let } 40\% \text{ of } A = \frac{2}{3}B$$

$$\text{Then, } \frac{40A}{100} = \frac{2B}{3}$$

$$\Rightarrow \frac{2A}{5} = \frac{2B}{3}$$

$$\Rightarrow \frac{A}{B} = \left(\frac{2}{3} \times \frac{5}{2} \right) = \frac{5}{3}$$

$$\therefore A : B = 5 : 3.$$

13. The fourth proportional to 5, 8, 15 is:

A.18 B.24
C.19 D.20

Answer & Explanation

Answer: Option B

Explanation:

Let the fourth proportional to 5, 8, 15 be x.

$$\text{Then, } 5 : 8 :: 15 : x$$

$$\Rightarrow 5x = (8 \times 15)$$

$$x = \frac{(8 \times 15)}{5} = 24.$$

14. Two number are in the ratio 3 : 5. If 9 is subtracted from each, the new numbers are in the ratio 12 : 23. The smaller number is:

A.27 B.33
C.49 D.55

Answer & Explanation

Answer: Option B

Explanation:

Let the numbers be 3x and 5x.

$$\text{Then, } \frac{3x - 9}{5x - 9} = \frac{12}{23}$$

$$\Rightarrow 23(3x - 9) = 12(5x - 9)$$

$$\Rightarrow 9x = 99$$

$$\Rightarrow x = 11.$$

∴ The smaller number = $(3 \times 11) = 33$.

15. In a bag, there are coins of 25 p, 10 p and 5 p in the ratio of 1 : 2 : 3. If there is Rs. 30 in all, how many 5 p coins are there?

A.50 B.100
C.150 D.200

Answer & Explanation

Answer: Option C

Explanation:

Let the number of 25 p, 10 p and 5 p coins be x , $2x$, $3x$ respectively.

$$\text{Then, sum of their values} \left(\frac{25x}{100} + \frac{10x}{100} + \frac{5x}{100} \right) = \frac{60x}{100} \text{ Rs.}$$

$$\therefore \frac{60x}{100} = 30 \Leftrightarrow x = \frac{30 \times 100}{60} = 50.$$

Hence, the number of 5 p coins = $(3 \times 50) = 150$.

34.Boats and Streams

1. A boat can travel with a speed of 13 km/hr in still water. If the speed of the stream is 4 km/hr, find the time taken by the boat to go 68 km downstream.

A.2 hours B.3 hours
C.4 hours D.5 hours

Answer & Explanation

Answer: Option C

Explanation:

Speed downstream = $(13 + 4)$ km/hr = 17 km/hr.

$$\text{Time taken to travel 68 km downstream} = \left(\frac{68}{17} \right) \text{ hrs} = 4 \text{ hrs.}$$

2. A man's speed with the current is 15 km/hr and the speed of the current is 2.5 km/hr. The man's speed against the current is:

A.8.5 km/hr B.9 km/hr
C.10 km/hr D.12.5 km/hr

Answer & Explanation

Answer: Option C

Explanation:

Man's rate in still water = $(15 - 2.5)$ km/hr = 12.5 km/hr.

Man's rate against the current = $(12.5 - 2.5)$ km/hr = 10 km/hr.

3. A boat running upstream takes 8 hours 48 minutes to cover a certain distance, while it takes 4 hours to cover the same distance running downstream. What is the ratio between the speed of the boat and speed of the water current respectively?

A.2 : 1 B.3 : 2
C.8 : 3 D.Cannot be determined

E. None of these

Answer & Explanation

Answer: Option C

Explanation:

Let the man's rate upstream be x kmph and that downstream be y kmph.

Then, distance covered upstream in 8 hrs 48 min = Distance covered downstream in 4 hrs.

$$\Rightarrow \left(x \times 8\frac{4}{5} \right) = (y \times 4)$$

$$\Rightarrow \frac{44}{5}x = 4y$$

$$\Rightarrow y = \frac{11}{5}x.$$

$$\therefore \text{Required ratio} = \left(\frac{y+x}{2} \right) : \left(\frac{y-x}{2} \right)$$

$$= \left(\frac{16x+11x}{2} \right) : \left(\frac{6x-11x}{2} \right)$$

$$= \frac{27}{5}x : \frac{-5}{2}x$$

$$= 8 : 3.$$

4. A motorboat, whose speed in 15 km/hr in still water goes 30 km downstream and comes back in a total of 4 hours 30 minutes. The speed of the stream (in km/hr) is:

A.4 B.5
C.6 D.10

Answer & Explanation

Answer: Option B

Explanation:

Let the speed of the stream be x km/hr. Then,

Speed downstream = $(15 + x)$ km/hr,

Speed upstream = $(15 - x)$ km/hr.

$$\therefore 30 + 30 = 41$$

$$\begin{aligned} & (15+x)(15-x) = 2 \\ \Rightarrow & 225 - x^2 = 2 \end{aligned}$$

$$\Rightarrow 9x^2 = 225$$

$$\Rightarrow x^2 = 25$$

$$\Rightarrow x = 5 \text{ km/hr.}$$

5. In one hour, a boat goes 11 km/hr along the stream and 5 km/hr against the stream. The speed of the boat in still water (in km/hr) is:

A. 3 km/hr

B. 5 km/hr

C. 8 km/hr

D. 9 km/hr

Answer & Explanation

Answer: Option C

Explanation:

Speed in still water = $\frac{1}{2}(11 + 5) \text{ kmph} = 8 \text{ kmph.}$

6. A boat running downstream covers a distance of 16 km in 2 hours while for covering the same distance upstream, it takes 4 hours. What is the speed of the boat in still water?

A. 4 km/hr

B. 6 km/hr

C. 8 km/hr

D. Data inadequate

Answer & Explanation

Answer: Option B

Explanation:

$$\text{Rate downstream} = \left(\frac{16}{2} \right) \text{ kmph} = 8 \text{ kmph.}$$

$$\text{Rate upstream} = \left(\frac{16}{4} \right) \text{ kmph} = 4 \text{ kmph.}$$

$$\therefore \text{Speed in still water} = \frac{1}{2}(8 + 4) \text{ kmph} = 6 \text{ kmph.}$$

7. The speed of a boat in still water is 15 km/hr and the rate of current is 3 km/hr. The distance travelled downstream in 12 minutes is:

A. 1.2 km

B. 1.8 km

C. 2.4 km

D. 3.6 km

Answer & Explanation

Answer: Option D

Explanation:

Speed downstream = $(15 + 3) \text{ kmph} = 18 \text{ kmph.}$

$$\text{Distance travelled} = \{ 18 \times 12 \}$$

8. A boat takes 90 minutes less to travel 36 miles downstream than to travel the same distance upstream. If the speed of the boat in still water is 10 mph, the speed of the stream is:

A. 2 mph

B. 2.5 mph

C. 3 mph

D. 4 mph

Answer & Explanation

Answer: Option A

Explanation:

Let the speed of the stream x mph. Then,

Speed downstream = $(10 + x) \text{ mph,}$

Speed upstream = $(10 - x) \text{ mph.}$

$$\therefore \frac{36}{(10 - x)} - \frac{36}{(10 + x)} = \frac{90}{60}$$

$$\Rightarrow 72x \times 60 = 90(100 - x^2)$$

$$\Rightarrow x^2 + 48x - 100 = 0$$

$$\Rightarrow (x + 50)(x - 2) = 0$$

$$\Rightarrow x = 2 \text{ mph.}$$

9. A man can row at 5 kmph in still water. If the velocity of current is 1 kmph and it takes him 1 hour to row to a place and come back, how far is the place?

A. 2.4 km

B. 2.5 km

C. 3 km

D. 3.6 km

Answer & Explanation

Answer: Option A

Explanation:

Speed downstream = $(5 + 1) \text{ kmph} = 6 \text{ kmph.}$

Speed upstream = $(5 - 1) \text{ kmph} = 4 \text{ kmph.}$

Let the required distance be x km.

$$\text{Then, } \frac{x}{6} + \frac{x}{4} = 1$$

$$\Rightarrow 2x + 3x = 12$$

$$\Rightarrow 5x = 12$$

$$\Rightarrow x = 2.4 \text{ km.}$$

10. A boat covers a certain distance downstream in 1 hour, while it comes back in $1\frac{1}{2}$ hours. If the speed of the stream be 3 kmph, what is the speed of the boat in still water?

A. 12 kmph B. 13 kmph
C. 14 kmph D. 15 kmph
E. None of these

Answer & Explanation

Answer: Option D

Explanation:

Let the speed of the boat in still water be x kmph. Then,

Speed downstream = $(x + 3)$ kmph,

Speed upstream = $(x - 3)$ kmph.

$$\therefore (x + 3) \times 1 = (x - 3) \times \frac{3}{2}$$

$$\Rightarrow 2x + 6 = 3x - 9$$

$$\Rightarrow x = 15 \text{ kmph.}$$

11. A boatman goes 2 km against the current of the stream in 1 hour and goes 1 km along the current in 10 minutes. How long will it take to go 5 km in stationary water?

A. 40 minutes B. 1 hour
C. 1 hr 15 min D. 1 hr 30 min

Answer & Explanation

Answer: Option C

Explanation:

$$\text{Rate downstream} = \left(\frac{1}{10 \times 60} \right) \text{ km/hr} = 6 \text{ km/hr.}$$

$$\text{Rate upstream} = 2 \text{ km/hr.}$$

$$\text{Speed in still water} = \frac{1}{2}(6 + 2) \text{ km/hr} = 4 \text{ km/hr.}$$

$$\therefore \text{Required time} = \left(\frac{5}{4} \right) \text{ hrs} = 1\frac{1}{4} \text{ hrs} = 1 \text{ hr } 15 \text{ min.}$$

12. A man can row three-quarters of a kilometre against the stream in $11\frac{1}{4}$ minutes and down the stream in $7\frac{1}{2}$ minutes. The speed (in km/hr) of the man in still water is:

A. 2 B. 3
C. 4 D. 5

Answer & Explanation

Answer: Option D

Explanation:

We can write three-quarters of a kilometre as 750 metres,

and $11\frac{1}{4}$ minutes as 675 seconds.

$$\text{Rate upstream} = \left(\frac{750}{675} \right) \text{ m/sec} = \frac{10}{9} \text{ m/sec.}$$

$$\text{Rate downstream} = \left(\frac{750}{450} \right) \text{ m/sec} = \frac{5}{3} \text{ m/sec.}$$

$$\therefore \text{Rate in still water} = \frac{1}{2} \left(\frac{10}{9} + \frac{5}{3} \right) \text{ m/sec}$$

$$= \frac{25}{18} \text{ m/sec}$$

$$= \left(\frac{25}{18} \times \frac{18}{5} \right) \text{ km/hr}$$

$$= 5 \text{ km/hr.}$$

13. Speed of a boat in standing water is 9 kmph and the speed of the stream is 1.5 kmph. A man rows to a place at a distance of 105 km and comes back to the starting point. The total time taken by him is:

A. 16 hours B. 18 hours
C. 20 hours D. 24 hours

Answer & Explanation

Answer: Option D

Explanation:

Speed upstream = 7.5 kmph.

Speed downstream = 10.5 kmph.

$$\therefore \text{Total time taken} = \left(\frac{105}{7.5} + \frac{105}{10.5} \right) \text{ hours} = 24 \text{ hours.}$$

14. A man takes twice as long to row a distance against the stream as to row the same distance in favour of the stream. The ratio of the speed of the boat (in still water) and the stream is:

A. 2 : 1 B. 3 : 1
C. 3 : 2 D. 4 : 3

Answer & Explanation

Answer: Option B

Explanation:

Let man's rate upstream be x kmph.

Then, his rate downstream = $2x$ kmph.

$$\therefore (\text{Speed in still water}) : (\text{Speed of stream}) = \left(\frac{2x + x}{2} \right) : \left(\frac{2x - x}{2} \right) = \frac{3x}{2} : \frac{x}{2}$$

$$= 3 : 1.$$

15. A man rows to a place 48 km distant and come back in 14 hours. He finds that he can row 4 km with the stream in the same time as 3 km against the stream. The rate of the stream is:

A. 1 km/hr

B. 1.5 km/hr

C. 2 km/hr

D. 2.5 km/hr

Answer & Explanation

Answer: Option A

Explanation:

Suppose he move 4 km downstream in x hours. Then,

$$\text{Speed downstream} = \left(\frac{4}{x} \right) \text{ km/hr.}$$

$$\text{Speed upstream} = \left(\frac{3}{x} \right) \text{ km/hr.}$$

$$\therefore \frac{48}{(4/x)} + \frac{48}{(3/x)} = 14 \text{ or } x = \frac{1}{2}.$$

So, Speed downstream = 8 km/hr, Speed upstream = 6 km/hr.

$$\text{Rate of the stream} = \frac{1}{2}(8 - 6) \text{ km/hr} = 1 \text{ km/hr.}$$

35. Races and Games

1. In a 100 m race, A can give B 10 m and C 28 m. In the same race B can give C:

A. 18 m

B. 20 m

C. 27 m

D. 9 m

Answer & Explanation

Answer: Option B

Explanation:

$$A : B = 100 : 90.$$

$$A : C = 100 : 72.$$

$$B : C = \frac{B}{A} \times \frac{A}{C} = \frac{90}{100} \times \frac{100}{72} = \frac{90}{72}.$$

When B runs 90 m, C runs 72 m.

$$\text{When B runs 100 m, C runs } \left(\frac{72}{90} \times 100 \right) \text{ m} = 80 \text{ m.}$$

\therefore B can give C 20 m.

2. A and B take part in 100 m race. A runs at 5 kmph. A gives B a start of 8 m and still beats him by 8 seconds. The speed of B is:

A. 5.15 kmph

B. 4.14 kmph

C. 4.25 kmph

D. 4.4 kmph

Answer & Explanation

Answer: Option B

Explanation:

$$\text{A's speed} = \left(5 \times \frac{5}{18} \right) \text{ m/sec} = \frac{25}{18} \text{ m/sec.}$$

$$\text{Time taken by A to cover 100 m} = \left(\frac{100}{\frac{25}{18}} \right) \text{ sec} = 72 \text{ sec.}$$

\therefore Time taken by B to cover 92 m = $(72 + 8) = 80$ sec.

$$\therefore \text{B's speed} = \left(\frac{92}{80} \times \frac{18}{5} \right) \text{ kmph} = 4.14 \text{ kmph.}$$

3. In a 500 m race, the ratio of the speeds of two contestants A and B is 3 : 4. A has a start of 140 m. Then, A wins by:

A. 60 m

B. 40 m

C. 20 m

D. 10 m

Answer & Explanation

Answer: Option C

Explanation:

To reach the winning post A will have to cover a distance of $(500 - 140)$ m, i.e., 360 m.

While A covers 3 m, B covers 4 m.

$$\text{While A covers 360 m, B covers } \left(\frac{4}{3} \times 360 \right) \text{ m} = 480 \text{ m.}$$

Thus, when A reaches the winning post, B covers 480 m and therefore remains 20 m behind.

\therefore A wins by 20 m.

4. In a 100 m race, A beats B by 10 m and C by 13 m. In a race of 180 m, B will beat C by:

A. 5.4 m B. 4.5 m
C. 5 m D. 6 m

Answer & Explanation

Answer: Option D

Explanation:

$$A : B = 100 : 90.$$

$$A : C = 100 : 87.$$

$$\frac{B}{C} = \frac{B}{A} \times \frac{A}{C} = \frac{90}{100} \times \frac{100}{87} = \frac{30}{29}$$

When B runs 30 m, C runs 29 m.

$$\text{When B runs 180 m, C runs } \left(\frac{29}{30} \times 180 \right) \text{ m} = 174 \text{ m.}$$

$$\therefore \text{B beats C by } (180 - 174) \text{ m} = 6 \text{ m.}$$

5. At a game of billiards, A can give B 15 points in 60 and A can give C to 20 points in 60. How many points can B give C in a game of 90?

A. 30 points B. 20 points
C. 10 points D. 12 points

Answer & Explanation

Answer: Option C

Explanation:

$$A : B = 60 : 45.$$

$$A : C = 60 : 40.$$

$$\therefore \frac{B}{C} = \left(\frac{B}{A} \times \frac{A}{C} \right) = \left(\frac{45}{60} \times \frac{60}{40} \right) = \frac{45}{40} = \frac{90}{80} = 90 : 80.$$

$$\therefore \text{B can give C 10 points in a game of 90.}$$

6. In a race of 200 m, A can beat B by 31 m and C by 18 m. In a race of 350 m, C will beat B by:

A. 22.75 m B. 25 m
C. 19.5 m D. $7\frac{4}{7}$ m

Answer & Explanation

Answer: Option B

Explanation:

$$A : B = 200 : 169.$$

$$A : C = 200 : 182.$$

$$\frac{C}{B} = \left(\frac{C}{A} \times \frac{A}{B} \right) = \left(\frac{182}{200} \times \frac{200}{169} \right) = 182 : 169.$$

When C covers 182 m, B covers 169 m.

$$\text{When C covers 350 m, B covers } \left(\frac{169}{182} \times 350 \right) \text{ m} = 325 \text{ m.}$$

$$\text{Therefore, C beats B by } (350 - 325) \text{ m} = 25 \text{ m.}$$

7. In 100 m race, A covers the distance in 36 seconds and B in 45 seconds. In this race A beats B by:

A. 20 m B. 25 m
C. 22.5 m D. 9 m

Answer & Explanation

Answer: Option A

Explanation:

$$\text{Distance covered by B in 9 sec.} = \left(\frac{100}{45} \times 9 \right) \text{ m} = 20 \text{ m.}$$

$$\therefore \text{A beats B by 20 metres.}$$

8. In a game of 100 points, A can give B 20 points and C 28 points. Then, B can give C:

A. 8 points B. 10 points
C. 14 points D. 40 points

Answer & Explanation

Answer: Option B

Explanation:

$$A : B = 100 : 80.$$

$$A : C = 100 : 72.$$

$$\therefore \frac{B}{C} = \left(\frac{B}{A} \times \frac{A}{C} \right) = \left(\frac{80}{100} \times \frac{100}{72} \right) = \frac{10}{9} = \frac{100}{90} = 100 : 90.$$

$$\therefore \text{B can give C 10 points.}$$

9. In a 200 metres race A beats B by 35 m or 7 seconds. A's time over the course is:

A. 40 sec B. 47 sec
C. 33 sec D. None of these

Answer & Explanation

Answer: Option C

Explanation:

B runs 35 m in 7 sec.

$$\therefore \text{B covers 200 m in } \left(\frac{7}{35} \times 200 \right) = 40 \text{ sec.}$$

B's time over the course = 40 sec.

$$\therefore \text{A's time over the course } (40 - 7) \text{ sec} = 33 \text{ sec.}$$

10. A can run 22.5 m while B runs 25 m. In a kilometre race B beats A by:

A. 100 m B. $111\frac{1}{9}$ m
C. 25 m D. 50 m

Answer & Explanation

Answer: Option A

Explanation:

When B runs 25 m, A runs $\frac{45}{2}$ m.

$$\text{When B runs 1000 m, A runs } \left(\frac{45}{2} \times \frac{1000}{25} \right) = 900 \text{ m.}$$

\therefore B beats A by 100 m.

11. In a 300 m race A beats B by 22.5 m or 6 seconds. B's time over the course is:

A. 86 sec B. 80 sec
C. 76 sec D. None of these

Answer & Explanation

Answer: Option B

Explanation:

B runs $\frac{45}{2}$ m in 6 sec.

$$\therefore \text{B covers 300 m in } \left(6 \times \frac{2}{45} \times 300 \right)_{\text{sec}} = 80 \text{ sec.}$$

12. $\frac{2}{3}$
A runs $1\frac{2}{3}$ times as fast as B. If A gives B a start of 80 m, how far must the winning post be so that A and B might reach it at the same time?

A. 200 m B. 300 m
C. 270 m D. 160 m

Answer & Explanation

Answer: Option A

Explanation:

Ratio of the speeds of A and B = $\frac{5}{3}$: 1 = 5 : 3.

Thus, in race of 5 m, A gains 2 m over B.

2 m are gained by A in a race of 5 m.

$$80 \text{ m will be gained by A in race of } \left(\frac{5}{2} \times 80 \right)_{\text{m}} = 200 \text{ m.}$$

\therefore Winning post is 200 m away from the starting point.

13. In a 100 m race, A can beat B by 25 m and B can beat C by 4 m. In the same race, A can beat C by:

A. 21 m B. 26 m
C. 28 m D. 29 m

Answer & Explanation

Answer: Option C

Explanation:

$$A : B = 100 : 75$$

$$B : C = 100 : 96.$$

$$\therefore A : C = \left(\frac{A}{B} \times \frac{B}{C} \right) = \left(\frac{100}{75} \times \frac{100}{96} \right) = \frac{100}{72} = 100 : 72.$$

$$\therefore \text{A beats C by } (100 - 72) \text{ m} = 28 \text{ m.}$$

36. True Discount

1. A man purchased a cow for Rs. 3000 and sold it the same day for Rs. 3600, allowing the buyer a credit of 2 years. If the rate of interest be 10% per annum, then the man has a gain of:

A. 0% B. 5%
C. 7.5% D. 10%

Answer & Explanation

Answer: Option A

Explanation:

$$C.P. = \text{Rs. } 3000.$$

$$S.P. = \text{Rs. } \left[\frac{3600 \times 100}{100 + (10 \times 2)} \right] = \text{Rs. } 3000.$$

Gain = 0%.

$$= \text{Rs.} \left(\frac{12880 \times 100}{112} \right) \\ = \text{Rs.} 11500.$$

2. The true discount on Rs. 2562 due 4 months hence is Rs. 122. The rate percent is:

A. 12% B. $13\frac{1}{3}\%$
C. 15% D. 14%

Answer & Explanation

Answer: Option C

Explanation:

$$\text{P.W.} = \text{Rs.} (2562 - 122) = \text{Rs.} 2440.$$

\therefore S.I. on Rs. 2440 for 4 months is Rs. 122.

$$\therefore \text{Rate} = \left[\frac{100 \times 122}{2440 \times \frac{1}{3}} \right] \% = 15\%.$$

3. A trader owes a merchant Rs. 10,028 due 1 year hence. The trader wants to settle the account after 3 months. If the rate of interest 12% per annum, how much cash should he pay?

A. Rs. 9025.20 B. Rs. 9200
C. Rs. 9600 D. Rs. 9560

Answer & Explanation

Answer: Option B

Explanation:

Required money = P.W. of Rs. 10028 due 9 months hence

$$= \text{Rs.} \left[\frac{10028 \times 100}{100 + \left(12 \times \frac{9}{12} \right)} \right] \\ = \text{Rs.} 9200.$$

4. A man wants to sell his scooter. There are two offers, one at Rs. 12,000 cash and the other a credit of Rs. 12,880 to be paid after 8 months, money being at 18% per annum. Which is the better offer?

A. Rs. 12,000 in cash B. Rs. 12,880 at credit

C. Both are equally good

Answer & Explanation

Answer: Option A

Explanation:

$$\text{P.W. of Rs. 12,880 due 8 months hence} = \text{Rs.} \left[\frac{12880 \times 100}{100 + \left(18 \times \frac{8}{12} \right)} \right]$$

5. If Rs. 10 be allowed as true discount on a bill of Rs. 110 due at the end of a certain time, then the discount allowed on the same sum due at the end of double the time is:

A. Rs. 20 B. Rs. 21.81
C. Rs. 22 D. Rs. 18.33

Answer & Explanation

Answer: Option D

Explanation:

S.I. on Rs. (110 - 10) for a certain time = Rs. 10.

S.I. on Rs. 100 for double the time = Rs. 20.

T.D. on Rs. 120 = Rs. (120 - 100) = Rs. 20.

T.D. on Rs. 110 = Rs. $\left(\frac{20}{120} \times 110 \right) = \text{Rs.} 18.33$

6. Goods were bought for Rs. 600 and sold the same for Rs. 688.50 at a credit of 9 months and thus gaining 2% The rate of interest per annum is:

A. $16\frac{2}{3}\%$ B. $14\frac{1}{2}\%$
C. $13\frac{1}{3}\%$ D. 15%

Answer & Explanation

Answer: Option A

Explanation:

$$\text{S.P.} = 102\% \text{ of Rs. } 600 = \left(\frac{102}{100} \times 600 \right) = \text{Rs. } 612.$$

Now, P.W. = Rs. 612 and sum = Rs. 688.50.

\therefore T.D. = Rs. (688.50 - 612) = Rs. 76.50.

Thus, S.I. on Rs. 612 for 9 months is Rs. 76.50.

$$\therefore \text{Rate} = \left[\frac{100 \times 76.50}{612 \times \frac{3}{4}} \right] \% = 16\frac{2}{3}\%$$

7. The true discount on a bill due 9 months hence at 16% per annum is Rs. 189. The amount of the bill is:

A. Rs. 1386 B. Rs. 1764
C. Rs. 1575 D. Rs. 2268

Answer & Explanation

Answer: Option B

Explanation:

Let P.W. be Rs. x .

Then, S.I. on Rs. x at 16% for 9 months = Rs. 189.

$$\therefore x \times 16 \times \frac{9}{12} \times \frac{1}{100} = 189 \text{ or } x = 1575.$$

$$\therefore \text{P.W.} = \text{Rs. } 1575.$$

$$\therefore \text{Sum due} = \text{P.W.} + \text{T.D.} = \text{Rs. } (1575 + 189) = \text{Rs. } 1764.$$

8. A man buys a watch for Rs. 1950 in cash and sells it for Rs. 2200 at a credit of 1 year. If the rate of interest is 10% per annum, the man:

A. gains Rs. 55

B. gains Rs. 50

C. loses Rs. 30

D. gains Rs. 30

Answer & Explanation

Answer: Option B

Explanation:

S.P. = P.W. of Rs. 2200 due 1 year hence

$$= \text{Rs. } \left[\frac{2200 \times 100}{100 + (10 \times 1)} \right]$$
$$= \text{Rs. } 2000.$$

$$\therefore \text{Gain} = \text{Rs. } (2000 - 1950) = \text{Rs. } 50.$$

9. The true discount on Rs. 1760 due after a certain time at 12% per annum is Rs. 160. The time after which it is due is:

A. 6 months

B. 8 months

C. 9 months

D. 10 months

Answer & Explanation

Answer: Option D

Explanation:

$$\text{P.W.} = \text{Rs. } (1760 - 160) = \text{Rs. } 1600.$$

$$\therefore \text{S.I. on Rs. } 1600 \text{ at } 12\% \text{ is Rs. } 160.$$

$$\therefore \text{Time} \left(\frac{100 \times 160}{1600 \times 12} \right) = \frac{5}{6} \text{ years} = \left(\frac{5}{6} \times \frac{12}{1} \right) \text{ months} = 10 \text{ months.}$$

10. The present worth of Rs. 2310 due $2\frac{1}{2}$ years hence, the rate of interest being 15% per annum, is:

A. Rs. 1750

B. Rs. 1680

C. Rs. 1840

D. Rs. 1443.75

Answer & Explanation

Answer: Option B

Explanation:

$$\text{P.W.} = \text{Rs. } \left[\frac{100 \times 2310}{100 + \left(15 \times \frac{5}{2} \right)} \right] = \text{Rs. } 1680.$$

11. Rs. 20 is the true discount on Rs. 260 due after a certain time. What will be the true discount on the same sum due after half of the former time, the rate of interest being the same?

A. Rs. 10

B. Rs. 10.40

C. Rs. 15.20

D. Rs. 13

Answer & Explanation

Answer: Option B

Explanation:

$$\text{S.I. on Rs. } (260 - 20) \text{ for a given time} = \text{Rs. } 20.$$

$$\text{S.I. on Rs. } 240 \text{ for half the time} = \text{Rs. } 10.$$

$$\text{T.D. on Rs. } 250 = \text{Rs. } 10.$$

$$\therefore \text{T.D. on Rs. } 260 = \text{Rs. } \left(\frac{10}{250} \times 260 \right) = \text{Rs. } 10.40$$

12. The interest on Rs. 750 for 2 years is the same as the true discount on Rs. 960 due 2 years hence. If the rate of interest is the same in both cases, it is:

A. 12%

B. 14%

C. 15%

D. $16\frac{2}{3}\%$

Answer & Explanation

Answer: Option B

Explanation:

$$\text{S.I. on Rs. } 750 = \text{T.D. on Rs. } 960.$$

This means P.W. of Rs. 960 due 2 years hence is Rs. 750.

$$\therefore \text{T.D.} = \text{Rs. } (960 - 750) = \text{Rs. } 210.$$

Thus, S.I. on Rs. 750 for 2 years is Rs. 210.

$$\therefore \text{Rate} = \left(\frac{100 \times 210}{750 \times 2} \right) \% = 14\%$$

13. The simple interest and the true discount on a certain sum for a given time and at a given rate are Rs. 85 and Rs. 80 respectively. The sum is:

A.Rs. 1800 B.Rs. 1450
C.Rs. 1360 D.Rs. 6800

Answer & Explanation

Answer: Option C

Explanation:

$$\text{Sum} = \frac{\text{S.I.} \times \text{T.D.}}{(\text{S.I.}) - (\text{T.D.})} = \frac{85 \times 80}{(85 - 80)} = \text{Rs. } 1360.$$

14. The present worth of Rs. 1404 due in two equal half-yearly installments at 8% per annum simple interest is:

A.Rs. 1325 B.Rs. 1300
C.Rs. 1350 D.Rs. 1500

Answer & Explanation

Answer: Option A

Explanation:

$$\begin{aligned} \text{Required sum} &= \text{P.W. of Rs. 702 due 6 months} + \text{P.W. of Rs. 702 due 1 year hence} \\ &= \text{Rs. } \left[\left(\frac{100 \times 702}{100 + 8 \times \frac{1}{2}} \right) + \left(\frac{100 \times 702}{100 + (8 \times 1)} \right) \right] \\ &= \text{Rs. } (675 + 650) \\ &= \text{Rs. } 1325. \end{aligned}$$

15. If the true discount on a sum due 2 years hence at 14% per annum be Rs. 168, the sum due is:

A.Rs. 768 B.Rs. 968
C.Rs. 1960 D.Rs. 2400

Answer & Explanation

Answer: Option A

Explanation:

$$\text{P.W.} = \frac{100 \times \text{T.D.}}{\text{R} \times \text{T}} = \frac{100 \times 168}{14 \times 2} = 600.$$

$$\therefore \text{Sum} = (\text{P.W.} + \text{T.D.}) = \text{Rs. } (600 + 168) = \text{Rs. } 768.$$