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(1) 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 : [C]

Explanation:

$$\text{T.D.} = \left(\frac{\text{B.G.} \times 100}{\text{Rate} \times \text{Time}} \right) = \text{Rs.} \left(\frac{24 \times 100}{10 \times 2} \right) = \text{Rs.} 120.$$

$$\therefore \text{P.W.} = \frac{100 \times \text{T.D.}}{\text{Rate} \times \text{Time}} = \text{Rs.} \left(\frac{100 \times 120}{10 \times 2} \right) = \text{Rs.} 600.$$

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(2) 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 : [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.

$$\therefore \text{Rate} = \left(\frac{100 \times 744}{3100 \times 2} \right)\% = 12\%$$

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(3) 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 : [B]

Explanation:

$$\text{S.I. on Rs. 1600} = \text{T.D. on Rs. 1680.}$$

\therefore Rs. 1600 is the P.W. of Rs. 1680, i.e., Rs. 80 is on Rs. 1600 at 15%.

$$\therefore \text{Time} = \left(\frac{100 \times 80}{1600 \times 15} \right)_{\text{year}} = \frac{1}{3} \text{ year} = 4 \text{ months.}$$

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(4) 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 : [A]

Explanation:

$$\begin{aligned} \text{T.D.} &= \frac{\text{B.D.} \times 100}{100 + (\text{R} \times \text{T})} \\ &= \text{Rs.} \left[\frac{420 \times 100}{100 + \left(15 \times \frac{1}{3}\right)} \right] \\ &= \text{Rs.} \left(\frac{420 \times 100}{105} \right) \\ &= \text{Rs.} 400. \end{aligned}$$

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(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 : [C]

Explanation:

$$\text{T.D.} = \left(\frac{\text{B.G.} \times 100}{\text{R} \times \text{T}} \right) = \text{Rs.} \left(\frac{270 \times 100}{12 \times 3} \right) = \text{Rs.} 750.$$

$$\therefore \text{B.D.} = \text{Rs.}(750 + 270) = \text{Rs.} 1020.$$

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(6) 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 : [B]

Explanation:

$$\begin{aligned} \log_{10} 5 + \log_{10} (5x + 1) &= \log_{10} (x + 5) + 1 \\ \Rightarrow \log_{10} 5 + \log_{10} (5x + 1) &= \log_{10} (x + 5) + \log_{10} 10 \\ \Rightarrow \log_{10} [5(5x + 1)] &= \log_{10} [10(x + 5)] \\ \Rightarrow 5(5x + 1) &= 10(x + 5) \\ \Rightarrow 5x + 1 &= 2x + 10 \\ \Rightarrow 3x &= 9 \\ \Rightarrow x &= 3. \end{aligned}$$

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(7)

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 : [D]

Explanation:

$$\log_x\left(\frac{9}{16}\right) = -\frac{1}{2}$$

$$\Rightarrow x^{-1/2} = \frac{9}{16}$$

$$\Rightarrow \frac{1}{x} = \frac{9}{16}$$

$$\Rightarrow x = \frac{16}{9}$$

$$\Rightarrow x = \left(\frac{16}{9}\right)^2$$

$$\Rightarrow x = \frac{256}{81}$$

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(8) If $\log 2 = 0.30103$, the number of digits in 2^{64} is:

[A] 18

[B] 19

[C] 20

[D] 21

Answer : [C]

Explanation:

$$\log(2^{64}) = 64 \times \log 2$$

$$= (64 \times 0.30103)$$

$$= 19.26592$$

Its characteristic is 19.

Hence, then number of digits in 2^{64} is 20.

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(9) The value of $\log_2 16$ is:

[A]
 $\frac{1}{8}$

[B] 4

[C] 8

[D] 16

Answer : [B]

Explanation:

Let $\log_2 16 = n$.

Then, $2^n = 16 = 2^4 \Rightarrow n = 4$.

$\therefore \log_2 16 = 4$.

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(10) 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 : [C]

Explanation:

$\log_2 x = 10 \Rightarrow x = 2^{10}$.

$\therefore \log_x y = 100$

$\Rightarrow y = x^{100}$

$\Rightarrow y = (2^{10})^{100}$ [put value of x]

$\Rightarrow y = 2^{1000}$.

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(11) 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

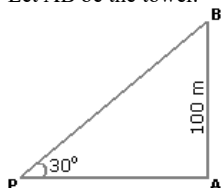
[C] 173 m

[D] 200 m

Answer : [C]

Explanation:

Let AB be the tower.



Then, $\angle APB = 30^\circ$ and $AB = 100$ m.

$$\frac{AB}{AP} = \tan 30^\circ = \frac{1}{\sqrt{3}}$$

$$\Rightarrow AP = (AB \times \sqrt{3}) \text{ m}$$

$$= 100 \sqrt{3} \text{ m}$$

$$= (100 \times 1.73) \text{ m}$$

$$= 173 \text{ m.}$$

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(12) An observer 1.6 m tall is $20\sqrt{3}$ away from a tower. The angle of elevation from his eye to the top of the tower is 30° . The height of the tower is:

[A] 21.6 m

[B] 23.2 m

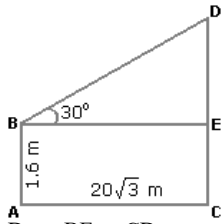
[C] 24.72 m

[D] None of these

Answer : [A]

Explanation:

Let AB be the observer and CD be the tower.



Draw $BE \perp CD$.

Then, $CE = AB = 1.6$ m,

$BE = AC = 20\sqrt{3}$ m.

$$\frac{DE}{BE} = \tan 30^\circ = \frac{1}{\sqrt{3}}$$

$$\Rightarrow DE = \frac{20\sqrt{3}}{\sqrt{3}} \text{ m} = 20 \text{ m.}$$

$$\therefore CD = CE + DE = (1.6 + 20) \text{ m} = 21.6 \text{ m.}$$

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(13) 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

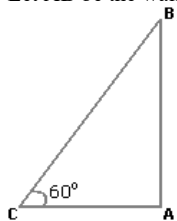
[C] 7.8 m

[D] 9.2 m

Answer : [D]

Explanation:

Let AB be the wall and BC be the ladder.



Then, $\angle ACB = 60^\circ$ and $AC = 4.6$ m.

$$\frac{AC}{BC} = \cos 60^\circ = \frac{1}{2}$$

$$\Rightarrow BC = 2 \times AC$$

$$= (2 \times 4.6) \text{ m}$$

$$= 9.2 \text{ m.}$$

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(14) Which of the following is a prime number ?

[A] 33

[B] 81

[C] 93

[D] 97

Answer : [D]

Explanation: Clearly, 97 is a prime number.

(15) Which one of the following is not a prime number?

- [A] 31
- [B] 61
- [C] 71
- [D] 91

Answer : [D]

Explanation: 91 is divisible by 7. So, it is not a prime number.

(16) 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 : [A]

Explanation:

$$23 \mid 1056 \quad (45 \quad 92 \quad \dots \quad 136 \quad 115 \quad \dots \quad 21 \quad \dots \quad \text{Required number} = (23 - 21))$$

(17) $106 \times 106 - 94 \times 94 = ?$

- [A] 2400
- [B] 2000
- [C] 1904
- [D] 1906
- [E] None of these

Answer : [A]

Explanation:

$$\begin{aligned} 106 \times 106 - 94 \times 94 &= (106)^2 - (94)^2 \\ &= (106 + 94)(106 - 94) \quad [\text{Ref: } (a^2 - b^2) = (a + b)(a - b)] \\ &= (200 \times 12) \\ &= 2400. \end{aligned}$$

(18) 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 : [B]

Explanation:

$$\begin{aligned}(4^{61} + 4^{62} + 4^{63} + 4^{64}) &= 4^{61} \times (1 + 4 + 4^2 + 4^3) = 4^{61} \times 85 \\ &= 4^{60} \times (4 \times 85) \\ &= (4^{60} \times 340), \text{ which is divisible by } 10.\end{aligned}$$

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(19) $8796 \times 223 + 8796 \times 77 = ?$

[A] 2736900

[B] 2638800

[C] 2658560

[D] 2716740

[E] None of these

Answer : [B]

Explanation:

$$\begin{aligned}8796 \times 223 + 8796 \times 77 &= 8796 \times (223 + 77) \quad [\text{Ref: By Distributive Law}] \\ &= (8796 \times 300) \\ &= 2638800\end{aligned}$$

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(20) $(1000)^9 \div 10^{24} = ?$

[A] 10000

[B] 1000

[C] 100

[D] 10

[E] None of these

Answer : [B]

Explanation:

$$\text{Given Exp.} = \frac{(1000)^9}{10^{24}} = \frac{(10^3)^9}{10^{24}} = \frac{(10)^{27}}{10^{24}} = 10^{(27-24)} = 10^3 = 1000$$

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