Book For

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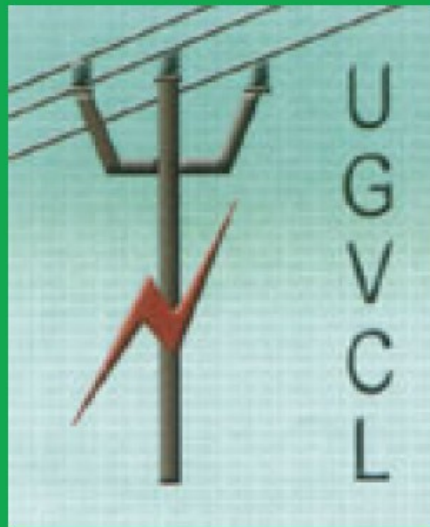
UGVCL Math Aptitude Sample Paper 2016 PDF Download

(1)

If $\log \dfrac{a}{b} + \log \dfrac{b}{a} = \log (a + b)$, then:

[A] $a + b = 1$

[B] $a - b = 1$

[C] $a = b$

[D] $a^2 - b^2 = 1$

Answer : [A]

Explanation:

$\log \dfrac{a}{b} + \log \dfrac{b}{a} = \log (a + b)$

$\Rightarrow \log (a + b) = \log\left(\dfrac{a}{b} \times \dfrac{b}{a}\right) = \log 1.$

So, $a + b = 1$.

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(2)

$\dfrac{\log \sqrt{8}}{\log 8}$ is equal to:

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

[B]
$\dfrac{1}{4}$

[C]
$\dfrac{1}{2}$

[D]
$\dfrac{1}{8}$

Answer : [C]

Explanation:

$\dfrac{\log \sqrt{8}}{\log 8} = \dfrac{\log (8)^{1/2}}{\log 8} = \dfrac{\frac{1}{2}\log 8}{\log 8} = \dfrac{1}{2}.$

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(3) 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 : [C]

Explanation:
$\log 27 = 1.431$
$\Rightarrow \log (3^3) = 1.431$
$\Rightarrow 3 \log 3 = 1.431$
$\Rightarrow \log 3 = 0.477$
$\therefore \log 9 = \log(3^2) = 2 \log 3 = (2 \times 0.477) = 0.954.$

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(4) 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 : [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.

(5) 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 : [C]

Explanation:

$$\log_5 512 = \frac{\log 512}{\log 5}$$

$$= \frac{\log 2^9}{\log (10/2)}$$

$$= \frac{9 \log 2}{\log 10 - \log 2}$$

$$= \frac{(9 \times 0.3010)}{1 - 0.3010}$$

$$= \frac{2.709}{0.699}$$

$$= \frac{2709}{699}$$

$$= 3.876$$

(6) If $3\sqrt{5} + \sqrt{125} = 17.88$, then what will be the value of $\sqrt{80} + 6\sqrt{5}$?

[A] 13.41

[B] 20.46

[C] 21.66

[D] 22.35

Answer : [D]

Explanation:
$3\sqrt{5} + \sqrt{125} = 17.88$
$\Rightarrow 3\sqrt{5} + \sqrt{25 \times 5} = 17.88$
$\Rightarrow 3\sqrt{5} + 5\sqrt{5} = 17.88$
$\Rightarrow 8\sqrt{5} = 17.88$
$\Rightarrow \sqrt{5} = 2.235$
$\therefore \sqrt{80} + 6\sqrt{5} = \sqrt{16 \times 5} + 6\sqrt{5}$
  $= 4\sqrt{5} + 6\sqrt{5}$
  $= 10\sqrt{5} = (10 \times 2.235) = 22.35$

(7) 1.5625 = ?

[A] 1.05

[B] 1.25

[C] 1.45

[D] 1.55

Answer : [B]

Explanation:

```
1|1.56 25( 1.25    |1    |-------   22| 56   | 44   |-------   245| 1225   | 1225   |-------   |   X   |-------
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∴ $1.5625 = 1.25$.

(8) The least perfect square, which is divisible by each of 21, 36 and 66 is:

[A] 213444

[B] 214344

[C] 214434

[D] 231444

Answer : [A]

Explanation:
L.C.M. of 21, 36, 66 = 2772.
Now, 2772 = 2 x 2 x 3 x 3 x 7 x 11
To make it a perfect square, it must be multiplied by 7 x 11.
So, required number = 2^2 x 3^2 x 7^2 x 11^2 = 213444

(9) The cube root of .000216 is:

[A] .6

[B] .06

[C] 77

[D] 87

Answer : [B]

Explanation:

$(.000216)^{1/3} = \left(\dfrac{216}{10^6}\right)^{1/3}$

$= \left(\dfrac{6 \times 6 \times 6}{10^2 \times 10^2 \times 10^2}\right)^{1/3}$

$= \dfrac{6}{10^2}$

$= \dfrac{6}{100}$

$= 0.06$

(10)

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

[A] 12

[B] 14

[C] 144

[D] 196

Answer : [A]

Explanation:

Let $\dfrac{x}{128} = \dfrac{162}{x}$

Then $x^2 = 128 \times 162$

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

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

$= 8 \times 6 \times 3$

$= 144.$

$\therefore x = 144 = 12.$

(11) 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 : [A]

Explanation:

Let the sum be Rs. x. Then,

$$\text{C.I.} = \left[x \left(1 + \frac{4}{100} \right)^2 - x \right] = \left(\frac{676}{625}x - x \right) = \frac{51}{625}x.$$

$$\text{S.I.} = \left(\frac{x \times 4 \times 2}{100} \right) = \frac{2x}{25}.$$

$$\therefore \frac{51x}{625} - \frac{2x}{25} = 1$$

$$\Rightarrow x = 625.$$

(12) 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 : [A]

Explanation:

C.I. when interest compounded yearly

$$= \text{Rs.} \left[5000 \times \left(1 + \frac{4}{100} \right) \times \left(1 + \frac{\frac{1}{2} \times 4}{100} \right) \right]$$

$$= \text{Rs.} \left(5000 \times \frac{26}{25} \times \frac{51}{50} \right)$$

$$= \text{Rs. } 5304.$$

C.I. when interest is compounded half-yearly

$$= \text{Rs.} \left[5000 \times \left(1 + \frac{2}{100} \right)^3 \right]$$

$$= \text{Rs.} \left(5000 \times \frac{51}{50} \times \frac{51}{50} \times \frac{51}{50} \right)$$

= Rs. 5306.04

∴ Difference = Rs. (5306.04 - 5304) = Rs. 2.04

(13) 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 : [C]

Explanation:
Let P = Rs. 100. Then, S.I. Rs. 60 and T = 6 years.

∴ R = $\left(\dfrac{100 \times 60}{100 \times 6}\right)$ = 10% p.a.

Now, P = Rs. 12000. T = 3 years and R = 10% p.a.

∴ C.I. = Rs. $\left[12000 \times \left\{\left(1 + \dfrac{10}{100}\right)^3 - 1\right\}\right]$

= Rs. $\left(12000 \times \dfrac{331}{1000}\right)$

= 3972.

(14) 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 : [B]

Explanation:
Amount = Rs. $\left[1600 \times \left(1 + \dfrac{5}{2 \times 100}\right)^2 + 1600 \times \left(1 + \dfrac{5}{2 \times 100}\right)\right]$

= Rs. $\left[1600 \times \dfrac{41}{40} \times \dfrac{41}{40} + 1600 \times \dfrac{41}{40}\right]$

= Rs. $\left[1600 \times \dfrac{41}{40}\left(\dfrac{41}{40} + 1\right)\right]$

= Rs. $\left[\dfrac{1600 \times 41 \times 81}{40 \times 40}\right]$

= Rs. 3321.

∴ C.I. = Rs. (3321 - 3200) = Rs. 121

(15) 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 : [A]

Explanation:
Amount = Rs. (30000 + 4347) = Rs. 34347.
Let the time be n years.

Then, $30000 \left(1 + \dfrac{7}{100}\right)^n = 34347$

$\Rightarrow \left(\dfrac{107}{100}\right)^n = \dfrac{34347}{30000} = \dfrac{11449}{10000} = \left(\dfrac{107}{100}\right)^2$

$\therefore$ $n = 2$ years.

(16) 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 : [D]

Explanation:
100 cm is read as 102 cm.
$\therefore$ A_1 = (100 x 100) cm^2 and A_2 (102 x 102) cm^2.
$(A_2 - A_1)$ = [(102)^2 - (100)^2]
= (102 + 100) x (102 - 100)
= 404 cm^2.
$\therefore$ Percentage error = $\left(\dfrac{404}{100 \text{ x } 100} \text{ x } 100\right)_{\%}$ = 4.04%

(17) 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 : [C]

Explanation:
Let original length = x metres and original breadth = y metres.
Original area = (xy) m^2.
New length = $\left(\dfrac{120}{100}x\right)_m = \left(\dfrac{6}{5}x\right)_m$.

New breadth = $\left(\dfrac{120}{100}y\right)_m = \left(\dfrac{6}{5}y\right)_m$.

New Area = $\left(\dfrac{6}{5}x \text{ x } \dfrac{6}{5}y\right)_{m^2} = \left(\dfrac{36}{25}xy\right)_{m^2}$.

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) or (11/25)xy

11   1

∴ Increase % = $\left(\dfrac{xy}{25} \times \dfrac{1}{xy} \times 100\right)_\%$ = 44%.

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(18) 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 : [B]

Explanation:

$\dfrac{2(l + b)}{b} = \dfrac{5}{1}$

$\Rightarrow 2l + 2b = 5b$
$\Rightarrow 3b = 2l$

$b = \dfrac{2}{3}l$

Then, Area = 216 cm^2
$\Rightarrow l \times b = 216$
$\Rightarrow l \times \dfrac{2}{3}l = 216$

$\Rightarrow l^2 = 324$
$\Rightarrow l = 18$ cm.

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(19) 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 : [B]

Explanation:
Area of the park = (60 x 40) m^2 = 2400 m^2.
Area of the lawn = 2109 m^2.
∴ Area of the crossroads = (2400 - 2109) m^2 = 291 m^2.
Let the width of the road be x metres. Then,
$60x + 40x - x^2 = 291$
$\Rightarrow x^2 - 100x + 291 = 0$
$\Rightarrow (x - 97)(x - 3) = 0$
$\Rightarrow x = 3$.

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(20) 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 : [B]

Explanation:

Perimeter = Distance covered in 8 min. = $\left(\dfrac{12000}{60} \times 8\right)$ m = 1600 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 x 320) m^2 = 153600 m^2.