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(1) 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 : [C]

Explanation:
$2(15 + 12) \times h = 2(15 \times 12)$
$\Rightarrow h = \frac{180}{27}m = \frac{20}{3}m.$

$\therefore$ Volume $= \left(15 \times 12 \times \frac{20}{3}\right)_{m^3} = 1200\ m^3.$

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(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 : [B]

Explanation:
1 hectare = 10,000 m^2
So, Area = (1.5 x 10000) m^2 = 15000 m^2.
Depth $= \frac{5}{100}m = \frac{1}{20}m.$

$\therefore$ Volume = (Area x Depth) $= \left(15000 \times \frac{1}{20}\right)_{m^3} = 750\ m^3.$

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(3) 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 : [A]

Explanation:
Let the length of the wire be h.
Radius $= \frac{1}{2}mm = \frac{1}{20}cm.$ Then,

$\Rightarrow \frac{22}{7} \times \frac{1}{20} \times \frac{1}{20} \times h = 66.$

$\Rightarrow h = \left(\frac{66 \times 20 \times 20 \times 7}{22}\right) = 8400\ cm = 84\ m.$

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(4) 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 : [B]

Explanation:
Clearly, $l = (48 - 16)m = 32$ m,
$b = (36 - 16)m = 20$ m,
$h = 8$ m.
$\therefore$ Volume of the box = $(32 \times 20 \times 8)$ $m^3 = 5120$ m^3.

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(5) 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 : [C]

Explanation:
Volume of the large cube = $(3^3 + 4^3 + 5^3) = 216$ cm^3.
Let the edge of the large cube be a.
So, $a^3 = 216 \Rightarrow a = 6$ cm.
$\therefore$ Required ratio = $\left(\frac{6 \times (3^2 + 4^2 + 5^2)}{6 \times 6^2}\right) = \frac{50}{36} = 25 : 18.$

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(6) 1397 x 1397 = ?

[A] 1951609

[B] 1981709

[C] 18362619

[D] 2031719

[E] None of these

Answer : [A]

Explanation:
$1397 \times 1397 = (1397)^2$

$= (1400 - 3)^2$

$= (1400)^2 + (3)^2 - (2 \times 1400 \times 3)$

$= 1960000 + 9 - 8400$

$= 1960009 - 8400$

$= 1951609.$

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(7) How many 3-digit numbers are completely divisible 6 ?

[A] 149

[B] 150

[C] 151

[D] 166

Answer : [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 $t_n = 996$.
$\therefore$ $a + (n - 1)d = 996$
$\Rightarrow 102 + (n - 1) \times 6 = 996$
$\Rightarrow 6 \times (n - 1) = 894$
$\Rightarrow (n - 1) = 149$
$\Rightarrow n = 150$
$\therefore$ Number of terms = 150.

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(8)
$9 + \frac{3}{4} + 7 + \frac{2}{17} - \left(9 + \frac{1}{15}\right) = ?$

[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 : [D]

Explanation:
Given sum $= 9 + \frac{3}{4} + 7 + \frac{2}{17} - \left(9 + \frac{1}{15}\right)$

$= (9 + 7 - 9) + \left(\frac{3}{4} + \frac{2}{17} - \frac{1}{15}\right)$

$= 7 + \frac{765 + 120 - 68}{1020}$

$= 7 + \frac{817}{1020}$

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(9) 9548 + 7314 = 8362 + (?)

[A] 8230

[B] 8410

[C] 8500

[D] 8600

[E] None of these

Answer : [C]

Explanation:

9548 16862 = 8362 + x + 7314 x = 16862 - 8362 ----- = 8500 16862 -----

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(10) 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 : [D]

Explanation:
The square of a natural number nerver ends in 2.
∴ 143642 is not the square of natural number.

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(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,

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

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

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

$$\Rightarrow x = 625.$$

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(12) 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.

$$\therefore \quad \text{R} = \left(\frac{100 \times 60}{100 \times 6} \right) = 10\% \text{ p.a.}$$

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

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

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

$$= 3972.$$

(13) 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 : [D]

Explanation:

$$\left.\begin{matrix}\text{Amount of Rs. 100 for 1 year}\\ \text{when compounded half-yearly}\end{matrix}\right\} = \text{Rs.}\left[100 \times \left(1 + \frac{3}{100}\right)^2\right] = \text{Rs. } 106.09$$

$\therefore$ Effective rate = (106.09 - 100)% = 6.09%

(14) 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 : [B]

Explanation:

$$P\left(1 + \frac{20}{100}\right)^n > 2P \quad \Rightarrow \quad \left(\frac{6}{5}\right)^n > 2.$$

Now, $\left(\frac{6}{5} \times \frac{6}{5} \times \frac{6}{5} \times \frac{6}{5}\right) > 2.$

So, $n = 4$ years.

(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 : [B]

Explanation:

Let the sum be Rs. P.

Then, $\left[P\left(1 + \frac{10}{100}\right)^2 - P\right] = 525$

$$\Rightarrow \quad P\left[\left(\frac{11}{10}\right)^2 - 1\right] = 525$$

$$\Rightarrow P = \left(\frac{525 \times 100}{21}\right) = 2500.$$

$\therefore$ Sum = Rs . 2500.

So, S.I. = Rs. $\left(\frac{2500 \times 5 \times 4}{100}\right)$ = Rs. 500

(16) 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 : [D]

Explanation:
Let number of notes of each denomination be x.
Then $x + 5x + 10x = 480$
$\Rightarrow 16x = 480$
$\therefore \ x = 30$.
Hence, total number of notes = $3x = 90$.

(17) 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 : [C]

Explanation:
Let the number of students in rooms A and B be x and y respectively.
Then, $x - 10 = y + 10 \ \Rightarrow \ x - y = 20$ .... (i)
and $x + 20 = 2(y - 20) \ \Rightarrow \ x - 2y = -60$ .... (ii)
Solving (i) and (ii) we get: $x = 100$, $y = 80$.
$\therefore$ The required answer A = 100.

(18) 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 : [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 = $\frac{25x}{(2x/5)}$

$= \left(\frac{}{25x} \times \frac{5}{2x} \right)$

$= \frac{125}{2}$

$= 62.5$

(19)

$$\frac{(469 + 174)^2 - (469 - 174)^2}{(469 \times 174)} = ?$$

[A] 2

[B] 4

[C] 295

[D] 643

Answer : [B]

Explanation:

Given exp. $= \frac{(a + b)^2 - (a - b)^2}{ab}$

$= \frac{4ab}{ab}$

$= 4$ (where $a = 469$, $b = 174$.)

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(20) 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 : [B]

Explanation:

Suppose the man works overtime for x hours.
Now, working hours in 4 weeks = (5 x 8 x 4) = 160.
$\therefore$ 160 x 2.40 + x x 3.20 = 432
$\Rightarrow$ 3.20x = 432 - 384 = 48
$\Rightarrow$ x = 15.
Hence, total hours of work = (160 + 15) = 175.

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