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(1) 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:

B.D. for $\frac{3}{2}$ years = Rs. 558.

B.D. for 2 years = Rs. $\left(558 \times \frac{2}{3} \times 2\right)$

= Rs. 744

T.D. for 2 years = Rs. 600.

∴ Sum = $\frac{\text{B.D. x T.D.}}{\text{B.D. - T.D}}$ = Rs. $\left(\frac{744 \times 600}{144}\right)$ = Rs. 3100.

Thus, Rs. 744 is S.I. on Rs. 3100 for 2 years.

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

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(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 : [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%.

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

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(3) 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:

T.D. = $\frac{\text{B.D. x 100}}{100 + (R \times T)}$

= Rs. $\left[\frac{420 \times 100}{100 + \left(15 \times \frac{1}{3}\right)}\right]$

= Rs. $\left(\frac{420 \times 100}{105}\right)$

(4) 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 : [D]

Explanation:

$$T.D. = \frac{B.G. \times 100}{R \times T} = Rs. \left(\frac{6 \times 100}{12 \times 1}\right) = Rs.\ 50.$$

(5) 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 : [D]

Explanation:

T.D. = $\sqrt{P.W. \times B.G.}$ = $\sqrt{576 \times 16}$ = 96.

(6) 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.

(7) 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/cm³, then the weight of the pipe is:

[A] 3.6 kg

[B] 3.696 kg

[C] 36 kg

[D] 36.9 kg

Answer : [B]

Explanation:
External radius = 4 cm,
Internal radius = 3 cm.

$$\text{Volume of iron} = \left(\frac{22}{7} \times [(4)^2 - (3)^2] \times 21\right)_{cm^3}$$

$$= \left(\frac{22}{7} \times 7 \times 1 \times 21\right)_{cm^3}$$

$$= 462 \; cm^3.$$

∴ Weight of iron = (462 x 8) gm = 3696 gm = 3.696 kg.

(8) 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,

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

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

(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 : [A]

Explanation:
Area of the wet surface = $[2(lb + bh + lh) - lb]$

$$= 2(bh + lh) + lb$$

$$= [2 (4 \times 1.25 + 6 \times 1.25) + 6 \times 4] \; m^2$$

$$= 49 \; m^2.$$

(10) 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, $a^3 = 216 \implies a = 6$ cm.
$\therefore$ Required ratio = $\left(\dfrac{6 \times (3^2 + 4^2 + 5^2)}{6 \times 6^2} \right) = \dfrac{50}{36} = 25 : 18$.

(11) 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 $x + 5x + 10x = 480$
$\implies 16x = 480$
$\therefore x = 30$.
Hence, total number of notes = $3x = 90$.

(12) 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 : [D]

Explanation:
Let the cost of a chair and that of a table be Rs. x and Rs. y respectively.
Then, $10x = 4y$ or $y = \dfrac{5}{2}x$.

$\therefore 15x + 2y = 4000$
$\implies 15x + 2 \times \dfrac{5}{2}x = 4000$

$\implies 20x = 4000$
$\therefore x = 200$.
So, $y = \left(\dfrac{5}{2} \times 200 \right) = 500$.

Hence, the cost of 12 chairs and 3 tables = $12x + 3y$
= Rs. $(2400 + 1500)$
= Rs. 3900.

(13) 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* - 2*y* = -60 .... (ii)
Solving (i) and (ii) we get: *x* = 100 , *y* = 80.
∵ The required answer A = 100.

(14) 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 : [A]

Explanation:
Original share of 1 person = $\frac{1}{8}$

New share of 1 person = $\frac{1}{7}$

Increase = $\left(\frac{1}{7} - \frac{1}{8}\right) = \frac{1}{56}$

∵ Required fraction = $\frac{(1/56)}{(1/8)} = \left(\frac{1}{56} \times \frac{8}{1}\right) = \frac{1}{7}$

(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 : [C]

Explanation:
Suppose their paths cross after *x* minutes.
Then, 11 + 57*x* = 51 - 63*x* $\Leftrightarrow$ 120*x* = 40
x = $\frac{1}{3}$

Number of floors covered by David in (1/3) min. = $\left(\frac{1}{3} \times 57\right) = 19$.

So, their paths cross at (11 +19) *i.e.,* 30th floor.

(16) 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 : [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 $8x$).

$\Rightarrow \left(\dfrac{140}{100} \times 5x\right)$, $\left(\dfrac{150}{100} \times 7x\right)$ and $\left(\dfrac{175}{100} \times 8x\right)$

$\Rightarrow 7x, \dfrac{21x}{2}$ and $14x$.

$\therefore$ The required ratio $= 7x : \dfrac{21x}{2} : 14x$

$\Rightarrow 14x : 21x : 28x$
$\Rightarrow 2 : 3 : 4$.

(17) 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 : [C]

Explanation:

Let the third number be x.

Then, first number = 120% of $x = \dfrac{120x}{100} = \dfrac{6x}{5}$

Second number = 150% of $x = \dfrac{150x}{100} = \dfrac{3x}{2}$

$\therefore$ Ratio of first two numbers $= \left(\dfrac{6x}{5} : \dfrac{3x}{2}\right) = 12x : 15x = 4 : 5$.

(18) 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 : [B]

Explanation:

Let the three parts be A, B, C. Then,

A : B = 2 : 3 and B : C = 5 : 8 $= \left(5 \times \dfrac{3}{5}\right) : \left(8 \times \dfrac{3}{5}\right) = 3 : \dfrac{24}{5}$

$\Rightarrow$ A : B : C = 2 : 3 : $\dfrac{24}{5}$ = 10 : 15 : 24

$\Rightarrow$ B $= \left(98 \times \dfrac{15}{49}\right) = 30$.

(19) 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 : [D]

Explanation:
Let the original salaries of Ravi and Sumit be Rs. $2x$ and Rs. $3x$ respectively.

Then, $\dfrac{2x + 4000}{3x + 4000} = \dfrac{40}{57}$

$\Rightarrow 57(2x + 4000) = 40(3x + 4000)$
$\Rightarrow 6x = 68,000$
$\Rightarrow 3x = 34,000$
Sumit's present salary = $(3x + 4000)$ = Rs.$(34000 + 4000)$ = Rs. 38,000.

(20) 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 : [B]

Explanation:
Let the numbers be $3x$ and $5x$.

Then, $\dfrac{3x - 9}{5x - 9} = \dfrac{12}{23}$

$\Rightarrow 23(3x - 9) = 12(5x - 9)$
$\Rightarrow 9x = 99$
$\Rightarrow x = 11.$
$\therefore$ The smaller number = (3×11) = 33.