Book For

Maharashtra State Road Transport Corporation (MSRTC)

MSRTC Junior Supervisor Mathematics Sample Paper

(1) A man bought 20 shares of Rs. 50 at 5 discount, the rate of dividend being $13\frac{1}{2}$. The rate of interest obtained is:

[A]
$12\frac{1}{2}\%$

[B]
$13\frac{1}{2}\%$

[C] 15%

[D]
$16\frac{2}{3}\%$

Answer : [C]

Explanation:
Investment = Rs. [20 x (50 - 5)] = Rs. 900.
Face value = Rs. (50 x 20) = Rs. 1000.
Dividend = Rs. $\left(\frac{27}{2} \times \frac{1000}{100}\right)$ = Rs. 135.

Interest obtained = $\left(\frac{135}{900} \times 100\right)\%$ = 15%

(2) 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 : [B]

Explanation:
Dividend on Rs. 20 = Rs. $\left(\frac{9}{100} \times 20\right)$ = Rs. $\frac{9}{5}$.

Rs. 12 is an income on Rs. 100.

∴ Rs. $\frac{9}{5}$ is an income on Rs. $\left(\frac{100}{12} \times \frac{9}{5}\right)$ = Rs. 15.

(3) 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 : [C]

Explanation:

Number of shares = $\left(\dfrac{4455}{8.25}\right)$ = 540.

Face value = Rs. (540 x 10) = Rs. 5400.

Annual income = Rs. $\left(\dfrac{12}{100} \times 5400\right)$ = Rs. 648.

(4) 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 : [B]

Explanation:
Let the investment in 9% stock be Rs. x.
Then, investment in 10% stock = Rs. (9800 - x).

$\dfrac{9}{75} \times x = \dfrac{10}{80} \times (9800 - x)$

$\Rightarrow \dfrac{3x}{25} = \dfrac{9800 - x}{8}$

$\Rightarrow 24x = 9800 \times 25 - 25x$
$\Rightarrow 49x = 9800 \times 25$
$\Rightarrow x = 5000.$

(5) 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 : [D]

Explanation:

For an income of Re. 1 in 9% stock at 96, investment = Rs. $\left(\dfrac{96}{9}\right)$ = Rs. $\dfrac{32}{3}$

For an income Re. 1 in 12% stock at 120, investment = Rs. $\left(\dfrac{120}{12}\right)$ = Rs. 10.

∴ Ratio of investments = $\dfrac{32}{3}$: 10 = 32 : 30 = 16 : 15.

(6) 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 : [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.
Then, $(10 \times 2x + x) - (10x + 2x) = 36$
$\Rightarrow 9x = 36$
$\Rightarrow x = 4$.
$\because$ Required difference = $(2x + x) - (2x - x) = 2x = 8$.

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(7) 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 : [B]

Explanation:
Let the ten's digit be x and unit's digit be y.
Then, $(10x + y) - (10y + x) = 36$
$\Rightarrow 9(x - y) = 36$
$\Rightarrow x - y = 4$.

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(8) 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 : [A]

Explanation:
Let the ten's digit be x.
Then, unit's digit = $x + 2$.
Number = $10x + (x + 2) = 11x + 2$.
Sum of digits = $x + (x + 2) = 2x + 2$.
$\because$ $(11x + 2)(2x + 2) = 144$
$\Rightarrow 22x^2 + 26x - 140 = 0$
$\Rightarrow 11x^2 + 13x - 70 = 0$
$\Rightarrow (x - 2)(11x + 35) = 0$
$\Rightarrow x = 2$.
Hence, required number = $11x + 2 = 24$.

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(9) The product of two numbers is 9375 and the quotient, when the larger one is divided by the smaller, is 15. The sum of the numbers is:

[A] 380

[B] 395

[C] 400

[D] 425

Answer : [C]

Explanation:

Let the numbers be x and y.

Then, $xy = 9375$ and $\dfrac{x}{y} = 15$.

$$\dfrac{xy}{(x/y)} = \dfrac{9375}{15}$$

$\Rightarrow y^2 = 625.$
$\Rightarrow y = 25.$
$\Rightarrow x = 15y = (15 \times 25) = 375.$
∴ Sum of the numbers = $x + y = 375 + 25 = 400.$

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(10) 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 : [C]

Explanation:

Let the numbers be x and $x + 2$.
Then, $(x + 2)^2 - x^2 = 84$
$\Rightarrow 4x + 4 = 84$
$\Rightarrow 4x = 80$
$\Rightarrow x = 20.$
∴ The required sum = $x + (x + 2) = 2x + 2 = 42.$

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(11) 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 : [D]

Explanation:

A : B = 100 : 90.
A : C = 100 : 87.
$$\dfrac{B}{C} = \dfrac{B}{A} \times \dfrac{A}{C} = \dfrac{90}{100} \times \dfrac{100}{87} = \dfrac{30}{29}.$$

When B runs 30 m, C runs 29 m.

When B runs 180 m, C runs $\left(\dfrac{29}{30} \times 180 \right)_m = 174$ m.

∴ B beats C by (180 – 174) m = 6 m.

(12) 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 : [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.

While A covers 360 m, B covers $\left(\dfrac{4}{3} \times 360\right)_m$ = 480 m.

Thus, when A reaches the winning post, B covers 480 m and therefore remains 20 m behind.
∴ A wins by 20 m.

(13) 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 : [B]

Explanation:
A's speed = $\left(5 \times \dfrac{5}{18}\right)_{m/sec}$ = $\dfrac{25}{18}$ m/sec.

Time taken by A to cover 100 m = $\left(100 \times \dfrac{18}{25}\right)_{sec}$ = 72 sec.

∴ Time taken by B to cover 92 m = (72 + 8) = 80 sec.

∴ B's speed = $\left(\dfrac{92}{80} \times \dfrac{18}{5}\right)_{kmph}$ = 4.14 kmph.

(14) 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 : [B]

Explanation:
A : B = 100 : 90.
A : C = 100 : 72.
B : C = $\dfrac{B}{A} \times \dfrac{A}{C}$ = $\dfrac{90}{100} \times \dfrac{100}{72}$ = $\dfrac{90}{72}$.

When B runs 90 m, C runs 72 m.

When B runs 100 m, C runs $\left(\dfrac{72}{90} \times 100\right)_m$ = 80 m.

∴ B can give C 20 m.

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(15) 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 : [B]

Explanation:
A : B = 100 : 80.
A : C = 100 : 72.

∴ $\dfrac{B}{C} = \left(\dfrac{B}{A} \times \dfrac{A}{C}\right) = \left(\dfrac{80}{100} \times \dfrac{100}{72}\right) = \dfrac{10}{9} = \dfrac{100}{90} = 100 : 90.$

∴ B can give C 10 points.

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(16) 8, 27, 64, 100, 125, 216, 343

[A] 27

[B] 100

[C] 125

[D] 343

Answer : [B]

Explanation:
Each of the numbers except 14 is an odd number.
The number '14' is the only EVEN number.

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(17) 396, 462, 572, 427, 671, 264

[A] 396

[B] 427

[C] 671

[D] 264

Answer : [B]

Explanation: Each of the numbers except 54 is multiple of 5.

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(18) 10, 25, 45, 54, 60, 75, 80

[A] 10

[B] 45

[C] 54

[D] 75

Answer : [C]

Explanation: The pattern is $2^3, 3^3, 4^3, 5^3, 6^3, 7^3$. But, 100 is not a perfect cube.

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(19) 16, 25, 36, 72, 144, 196, 225

[A] 36

[B] 72

[C] 196

[D] 225

Answer : [B]

Explanation: Each of the numbers except 21 is an even number.

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(20) 331, 482, 551, 263, 383, 362, 284

[A] 263

[B] 383

[C] 331

[D] 551

Answer : [B]

Explanation: Find the odd man out.