# CMAT 2018 Slot 2

## Quant

1. **What is the probability of getting a 'nine' or 'ten' on a single throw of two dice?**

**A** 2/9

**B** 7/36

**C** 1/5

**D** 2/7

**Answer:** B

**Explanation:**
Probability = Expected number of outcomes/ Total number of outcomes.

Total number of outcomes we get in a single throw of two dice = $6 \times 6$ = 36.

Possible cases of getting 'nine' in a single throw of two dice:

| dice 1 | dice 2 |
|---|---|
| three | six.....(1) |
| six | three.....(2) |
| four | five.....(3) |
| five | four.....(4) |

So, total of 4 cases.

Possible cases of getting 'ten' in a single throw of two dice:

| dice 1 | dice 2 |
|---|---|
| four | six.....(1) |
| six | four.....(2) |
| five | five.....(3) |

So, total of 3 cases.

Expected number of outcomes = Total possible cases of getting 'nine' or 'ten' in a single throw of two dice = 4 + 3 = 7 .

So, Probability = $\frac{7}{36}$

2. **The length of a room exceeds its breadth by 2 meters. If the length be increased by 4 meters and the breadth decreased by 2 meters, the area remains the same. Find the surface area of its walls if the height is 3 meters.**

**A** $248m^2$

**B** $424m^2$

**C** $112m^2$

**D** $84m^2$

**Answer:** D

**Explanation:**
Let the breadth(b) of the room be 'x' metres.

then, length(l) of the room = x+2 metres.

Area(A) = $l \times b$ = x(x+2) $m^2$

Given, length is increased by 4 meters and the breadth decreased by 2 meters

Then, new length(l') of the room = x+6 metres

new breadth(b') of the room = x-2 metres

New Area(A') of the room = $l' \times b'$ = (x+6)(x-2) $m^2$

Also given that, A = A'

$\Rightarrow x(x+2) = (x+6)(x-2)$

$\Rightarrow x^2 + 2x = x^2 + 4x - 12$

$\Rightarrow 2x = 12$

$\Rightarrow x = 6$

Therefore the length of the room (l) = 8 metres

and breadth of the room (b) = 6 metres

and given height of the room (h) = 3 metres

Since the room will be in the shape of a cuboid, Surface area = 2 ($l \times b + b \times h + l \times h$)

But the Surface area of Walls = Total Surface area - Area of Roof and Floor = 2 ($l \times b + b \times h + l \times h$) $- 2(l \times b) = 2(8 \times 3 + 6 \times 3) = 84m^2$

Hence, Surface Area of walls = 84 $m^2$.

3. **A bus covers a distance of first 50 km in 40 minutes, next 50 km at a speed of 2 km per minute and the next 30 km at a speed of 1.0 km per minute. What is its average speed during the entire journey?**

**A** 61.5 kmph

**B** 55.06 kmph

**C** 82.1 kmph

**D** 80 kmph

**Answer:** C

**Explanation:**

Average Speed = Total distance covered $\div$ Total time taken

Total distance travelled = 50 + 50 + 30 = 130 km.

Total time taken = Time taken to travel first 50 km + Time taken to travel next 50 km + Time taken to travel next 30 km = $40 + 50 \div 2 + 30 \div 1 = 95$ minutes = $\frac{95}{60}$ hours.

$\Rightarrow$ Average Speed = $130 \div \frac{95}{60} = 82.1$ kmph

4. **Three wheels making 60, 36 and 24 revolutions in a minute start with a certain point in their circumference ownwards. Find when they will again come together in the same position.**

**A** 4 seconds

**B** 5 seconds

**C** 10 seconds

**D** Never

**Answer:** B

**Explanation:**
First wheel makes 60 revolutions in 1 minute

$\Rightarrow$ It makes 60 revolutions in 60 seconds

$\Rightarrow$ It makes 1 revolution in 1 second.

This implies, after every 1 second the certain point at which the wheel started its revolution reaches its initial position.

Similarly, Second wheel and Third wheel makes 36 and 24 revolutions in 1 minute respectively.

$\Rightarrow$ Second and Third wheel makes 1 revolution in $\frac{5}{3} and \frac{5}{2}$ seconds respectively.

So for all the multiples of $\frac{5}{3} and \frac{5}{2}$ seconds the certain point of second wheel and third wheel reaches its initial position respectively.

After LCM $\{1, \frac{5}{3}, \frac{5}{2}\}$ seconds all the three wheels will come together in the same position.

LCM of fractions = LCM of numerators/ HCF of denominators

$\Rightarrow$ LCM $\{1, \frac{5}{3}, \frac{5}{2}\}$ = LCM {1,5,5}$\div$HCF {1,3,2} = 5$\div$1 = 5.

Hence, after 5 seconds all the wheels will come again together in the same position.

## CMAT Free Solved Previous Papers.

5. **A certain amount of money invested at 10% per annum compound interest for two years became Rs. 2000. What is the initial investment?**

**A** Rs. 856

**B** Rs. 1,625

**C** Rs. 1,653

**D** Rs. 1,275

**Answer:** C

**Explanation:**
If the principle amount 'P' when compounded annually for 'n' years at 'R%" interest rate per annum becomes P'.

Then $P' = P[1 + \frac{R}{100}]^n$

Given P' = 2000, n = 2 years, R = 10%

$\Rightarrow P = P' \div [1 + \frac{R}{100}]^n$

$\Rightarrow P = 2000 \div [1 + \frac{10}{100}]^2$

$\Rightarrow P = 2000 \div 1.21$

$\Rightarrow P = 1653$

Hence the initial amount P = Rs. 1,653.

6. **If the height of a right circular cone is increased by 200% and the radius of the base is reduced by 50%, then the volume of the cone.**

**A** Remains unaltered

**B** Decreases by 25%

**C** Increases by 25%

**D** Increases by 50%

**Answer:** B

**Explanation:**

The Volume of the right circular cone of base radius 'r' and height 'h' is given by 'V' = $\frac{1}{3}\pi r^2 h$

Given 'h' has been increased by 200%

$\Rightarrow$ New height h' = h[1 + $\frac{200}{100}$] = 3h

also,radius of the base is reduced by 50%

$\Rightarrow$ New base radius r' = r[1 - $\frac{50}{100}$] = $\frac{r}{2}$

New Volume of the cone with new base radius r' and new height h' is given by V' = $\frac{1}{3}\pi r'^2 h' = \frac{1}{3}\pi(\frac{r}{2})^2(3h) = \frac{3V}{4}$.

Change in Volume = $\frac{NewVolume - OldVolume}{OldVolume} \times 100 = \frac{\frac{3V}{4} - V}{V} \times 100 = -25$

Hence the new volume decreased by 25 %.

7. **An electric appliance is priced at Rs. 600 initially. Because of market recession, price was successively reduced three times, each time by 10% of the price after the earlier reduction. What is the current price?**

**A** Rs. 420

**B** Rs. 437.40

**C** Rs. 444.30

**D** Rs. 478

**Answer:** B

**Explanation:**

Initial price is given as 'I' = Rs. 600

After the first reduction, the initial price is reduced by 10%

$\Rightarrow$ the new price I' = $600[1 - \frac{10}{100}] = 540$

After second reduction, I' is reduced by 10%

$\Rightarrow$ the new price I'' = $540[1 - \frac{10}{100}] = 486$

After third reduction, I'' is reduced by 10%

$\Rightarrow$ the new price I''' = $486[1 - \frac{10}{100}] = 437.4$

Hence the Current price after three successive reductions is Rs. 437.4



8. **Below given is the Table showing Age-wise Ownership of mobiles:**

| Brand | Up to 1 year old | 1-2 years old | 2-3 years old | More than 3 years old |
|---|---|---|---|---|
| LG | 15% | 45% | 40% | |
| SAMSUNG | 5% | 15% | 25% | 55% |
| NOKIA | 10% | 10% | 10% | 70% |
| SONY | 25% | 55% | 20% | |
| MICROMAX | 15% | 50% | 20% | 15% |

**If 1 crore mobiles were sold last year, how many LG sets were sold?**

**A** 10, 000

**B** 12,500

**C** 15,000

**D** Cannot be determined

**Answer:** D

**Explanation:**
Let say,

The number mobiles sold in last year of the brands LG, SAMSUNG, NOKIA, SONY, MICRO-MAX be A, B, C, D, and E respectively.

Given that A+B+C+D+E = 1 crore.

Out of these 1 crore mobiles, the number of mobile sets of LG sold are 15% of A = $\frac{15}{100} \times A$.

But from the given data, the values of A, B, C, D, and E cannot be found out.

So the number of LG sets sold last year cannot be determined.

Note that the 15% does not represent the percentage of LG mobiles among the ones that are 1 yr old, but the percentage of 1 yr old mobiles among LG mobiles.

9. $\sqrt{188 + \sqrt{51 + \sqrt{169}}}$ = ?

**A** 16.4

**B** 14.4

**C** 16

**D** 14

**Answer:** D

**Explanation:**
$\sqrt{188 + \sqrt{51 + \sqrt{169}}}$ = $\sqrt{188 + \sqrt{51 + 13}}$ = $\sqrt{188 + \sqrt{64}}$ = $\sqrt{188 + 8}$ = $\sqrt{196}$ = 14

10. **In what time will Rs. 6,250 amount to Rs. 6,632.55 at 4% compound interest payable half-yearly?**

**A** 1 year

**B** $\frac{3}{2}$ years

**C** 3 years

**D** $\frac{5}{2}$ years

**Answer:** B

**Explanation:**
If the principle amount 'P' when compounded half-yearly at R% interest rate per annum for 'n' years, the new amount is P'.

then $P' = P[1 + \frac{R}{2\times100}]^n$

Given P' = 6,632.55, P = 6,250 and R = 4%

$\Rightarrow 6,632.55 = 6,250[1 + \frac{4}{2\times100}]^n$

$\Rightarrow 1.061 = 1.02^n$

Taking logarithm on both sides we get,

n = log(1.061) ÷ log(1.02) = 3

Since n refers to half a year in this case, the number of years will be $\frac{3}{2}$ years.



11. **Expenditures of a Company (in Lakh Rupees) per Annum Over the given Years was as under.**

| year | Salary | Fuel and Transport | Bonus | Interests on loans | Taxes |
|---|---|---|---|---|---|
| 2008 | 576 | 196 | 6 | 25.4 | 85 |
| 2009 | 682 | 224 | 5 | 32 | 112 |
| 2011 | 648 | 202 | 7.5 | 44.6 | 78 |
| 2012 | 672 | 266 | 7.3 | 40.4 | 98 |
| 2013 | 740 | 282 | 8 | 52.4 | 105 |

**What is the average salary expenditure(in Lakh Rupees) per Annum during this period?**

**A** 663.6

**B** 666.3

**C** 636.6

**D** 663.3

**Answer:** A

**Explanation:**

Average Salary Expenditure (in Lakh Rupees) per annum = Total salary expenditure in all these years ÷Total number of years

$= \frac{576+682+648+672+740}{5}$

= 663.6

12. **Number of different categories of goods sold in the city over the years (in thousands) is as given under:**

| Year | TV | Refrigerator | Microwave | Laptops | cell phones |
|---|---|---|---|---|---|
| 2010 | 26 | 64 | 232 | 153 | 340 |
| 2011 | 45 | 60 | 242 | 172 | 336 |
| 2012 | 72 | 79 | 248 | 210 | 404 |
| 2013 | 81 | 93 | 280 | 241 | 411 |
| 2014 | 107 | 112 | 266 | 235 | 442 |

**In which of the following years was the number of refrigerators sold approximately 25% of the number of cell phones sold?**

**A** 2011

**B** 2012

**C** 2013

**D** 2014

**Answer:** D

**Explanation:**

Option A:

In 2011, number of Refrigerators sold =60

number of Cell phones sold = 336

$\Rightarrow$ number of refrigerators sold as a percentage of number of cell phones sold = $\frac{60}{336} \times 100 = 17.85$

Option B:

In 2012, number of Refrigerators sold = 79

number of Cell phones sold = 404

$\Rightarrow$ number of refrigerators sold as a percentage of number of cell phones sold = $\frac{79}{404} \times 100$ = 19.5

Option C:

In 2013,number of Refrigerators sold = 93

number of Cell phones sold = 411

$\Rightarrow$ number of refrigerators sold as a percentage of number of cell phones sold = $\frac{93}{411} \times 100$ = 22.6

Option D:

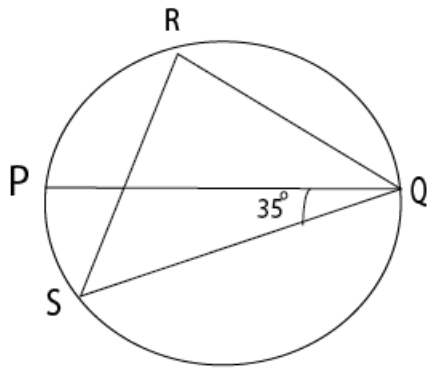
In 2014, number of Refrigerators sold = 112

number of Cell phones sold = 442

$\Rightarrow$ number of refrigerators sold as a percentage of number of cell phones sold = $\frac{112}{442} \times 100$ = 25.33

Hence Option D is the correct answer.

13. **In the figure, PQ is a diameter of the circle. Angle PQS = $35°$. Find angle QRS.**




**A** $55°$

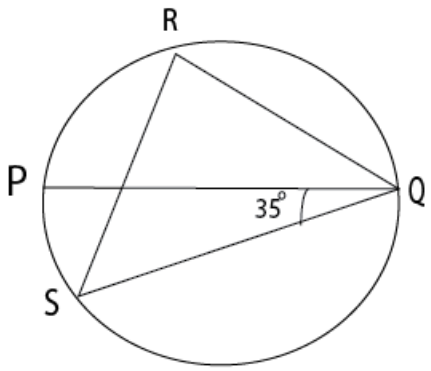
**B** $45°$

**C** $35°$

**D** $60°$

**Answer:** A

**Explanation:**




SInce PQ is the diameter, the angle subtended by it at R is 90 deg. i.e., $\angle$ PRQ = 90 deg.

Let $\angle$ RPQ = $\theta$, then $\angle$RQP = 90 - $\theta$

As the angles subtended by a chord in same segment are equal, $\angle$RPQ = $\angle$RSQ = $\theta$

In triangle RSQ, ∠QRS + ∠RSQ + ∠RQS = 180

$\Rightarrow$ ∠QRS + $\theta$ + 35 + 90 - $\theta$ = 180

$\Rightarrow$ ∠QRS = 180 - 125 = 55 deg.

Hence ∠QRS = 55 deg.



14. **If x = $\sqrt[6]{5}$ and y = $\sqrt[5]{4}$, Which of the following is true?**

**A** x > y

**B** y > x

**C** x = y

**D** None

**Answer:** B

**Explanation:**
Given x = $\sqrt[6]{5}$ and y = $\sqrt[5]{4}$

which can also be written as x = $5^{\frac{5}{30}}$ and y = $4^{\frac{6}{30}}$

which can be further written as x = $\sqrt[30]{5^5}$ and y = $\sqrt[30]{4^6}$

As we know $4^6 > 5^5$

$\Rightarrow$ $\sqrt[30]{4^6} > \sqrt[30]{5^5}$

$\Rightarrow$ y > x

15. **If a and b are positive real numbers and $a * b$ denotes $\sqrt{a \times b}$, what is the value of 8 * (4 * 16)?**

**A** $4^{1/3}$

**B** 16

**C** 8

**D** $4\sqrt{2}$

**Answer:** C

**Explanation:**
Given, If a and b are positive real numbers then a * b denotes √ab

Consider 4 * 16 = $\sqrt{4 \times 16} = \sqrt{64} = 8$

then 8 * 8 = $\sqrt{8 \times 8} = \sqrt{64} = 8$

Hence the value of 8 * (4 * 16) = 8

16. **The average age of three men is 50 years and their ages are in the proportion 3:5:7. The age of the youngest man is:**

**A** 40 years

**B** 30 years

**C** 35 years

**D** 50 years

**Answer:** B

**Explanation:**

Given the proportion of ages of three men are 3:5:7.

Let their ages be 3k, 5k, 7k ,where k is any constant.

Given average of ages of three men = 50

$\Rightarrow \frac{3k+5k+7k}{3} = 50$

$\Rightarrow \frac{15k}{3} = 50$

$\Rightarrow 5k = 50$

$\Rightarrow k = 10$

Therefore the ages of three men are 30, 50, and 70 years.

The age of the youngest men is 30 years.



17. **By selling mangoes at the rate of 64 for Rs. 2,000, the vendor loses 40%. How many should he sell for Rs.1000 so as to gain 20%?**

**A** 12

**B** 16

**C** 15

**D** 20

**Answer:** B

**Explanation:**

If 64 mangoes are sold at Rs.2000, each mango will be sold at Rs. $\frac{2000}{64}$

Hence Selling price (S.P) of each mango = Rs. 31.25

Given loss percentage of vendor at this S.P = 40%

Loss percentage = $\frac{C.P-S.P}{C.P} \times 100$

$\Rightarrow \frac{40}{100} = \frac{C.P-S.P}{C.P}$

$\Rightarrow S.P = 0.6 \times C.P$

$\Rightarrow C.P = \frac{31.25}{0.6} = 52$

Therefore Cost Price of 1 mango (C.P) = Rs. 52

Let us calculate the S.P of each mango in order to get a 20% gain.

Gain percentage = $\frac{S.P-C.P}{C.P} \times 100$

$\Rightarrow \frac{20}{100} = \frac{S.P-C.P}{C.P}$

$\Rightarrow S.P = 1.2 \times C.P$

$\Rightarrow S.P = 62.5$

So, to get a gain of 20% we need to sell each mango at Rs. 62.5

Let say we sold 'x' number of mangoes.

Selling price of these 'x' number of mangoes (S.P) = Rs. 62.5x

But given that this S.P = Rs. 1000

$\Rightarrow 62.5x = 1000$

$\Rightarrow x = \frac{1000}{62.5} = 16.$

Therefore a total of 16 mangoes are to be sold for Rs. 1000 to get a gain of 20%.

18. **The area of a triangle metal plate with base 88 cm and altitude 64 cm is to be reduced to one-fourth of its original area by making a hole of circular shape at the center. The radius of this hole will be:-**

**A** 24.8 cm

**B** 28 cm

**C** 56 cm

**D** $4\sqrt{42}$ cm

**Answer:** D

**Explanation:**

Area of triangular metal plate with base(b) = 88 cm and altitude(h) = 64 cm is given as A = $\frac{1}{2}b \times h = \frac{1}{2}88 \times 64 = 2816cm^2$

Given this area is to be reduced to one-fourth by making a hole in the shape of circle

$\Rightarrow$ Reduction in the area of the triangle = Area of the circular hole

$\Rightarrow \frac{3}{4} \times A = \pi r^2$

$\Rightarrow \frac{\frac{3}{4} \times 2816}{\pi} = r^2$

$\Rightarrow r = \sqrt{672} = 4\sqrt{42}$

So, the radius of the circular hole = $4\sqrt{42}$ cm.

19. **Find the value of** $\sqrt{\frac{2+\sqrt{3}}{2-\sqrt{3}}}$

**Correct to three places of decimal.**

**A** 3.141

**B** 2.732

**C** 3.124

**D** 3.732

**Answer:** D

**Explanation:**

Let us consider $\frac{2+\sqrt{3}}{2-\sqrt{3}}$

Rationalising the denominator by multiplying and diving with 2+ $\sqrt{3}$ we get,

$\frac{(2+\sqrt{3}) \times (2+\sqrt{3})}{(2-\sqrt{3}) \times (2+\sqrt{3})} = \frac{(2+\sqrt{3})^2}{4-3} = (2+\sqrt{3})^2$

Now,

$\sqrt{\frac{2+\sqrt{3}}{2-\sqrt{3}}} = \sqrt{(2+\sqrt{3})^2} = 2+\sqrt{3} = 2+1.732 = 3.732$



20. **A mixture of petrol and kerosene weighing 5 kg contains 5% kerosene. How much more kerosene (approx.) must be added into it to make it 10%?**

**A** 250 gm

**B** 275 gm

**C** 300 gm

**D** 425 gm

**Answer:** B

**Explanation:**

Initial amount of Kerosene(I) = 5% of 5 kg mixture of petrol and kerosene = $\frac{5}{100} \times 5000 = 250$ grams

Let say 'x' gm of Kerosene is added to the mixture.

The final amount of Kerosene in the mixture after the addition is given as 10%.

$\Rightarrow \frac{250+x}{5000+x} = \frac{10}{100}$

$\Rightarrow 2500 + 10x = 5000 + x$

$\Rightarrow 9x = 2500$

$\Rightarrow x = 275$ gm approximately.

Therefore additionally 275 gm of kerosene is to be added to the mixture to make it 10%.

21. **A student who gets 20% marks fails by 20 marks, but another student who gets 36% marks gets 44 marks more than minimum passing marks. Find the maximum number of marks and percentage necessary for passing.**

**A** 300, 20%

**B** 600, 20%

**C** 400, 25%

**D** 400, 20%

**Answer:** C

**Explanation:**

Let the maximum number of marks be 'x' and minimum passing marks be 'y'.

Given, A student who gets 20% marks fails by 20 marks.

$\Rightarrow \frac{20}{100} \times x = y - 20$

$\Rightarrow 20x = 100y - 2000$.....(1)

Also given that, another student who gets 36% marks gets 44 marks more than minimum passing marks.

$\Rightarrow \frac{36}{100} \times x = y + 44$

$\Rightarrow 36x = 100y + 4400$.....(2)

(2) - (1) $\Rightarrow$ 16x = 6400

$\Rightarrow$ x = 400

From (1) or (2), we get y = 100

Hence, maximum number of marks = x = 400

Percentage necessary for passing = $\frac{y}{x} \times 100$ = 25%

22. **If 26 horses or 20 bullocks eat up the fodder in store in 170 days, in what time will 10 horses and 8 bullocks finish the same quantity of fodder?**

**A** 212.67 days

**B** 162.33 days

**C** 212 days

**D** 216.67 days

**Answer:** D

**Explanation:**
Let amount eaten by each horse and each bullock in one day be 'h' units and 'b' units respectively.

So Total fodder = Total effciency $\times$ Total number of days

$\Rightarrow$ Total work = $26 \times h \times 170 = 20 \times b \times 170$

$\Rightarrow b = 1.3h$.....(1)

The amount of fodder eaten by 10 horses and 8 bullocks in one day = 10h + 8b = 10h + 8(1.3h) = 20.4h

Time taken by them to eat the same amount of fodder = total fodder/amount eaten by them in one day

$= \frac{26 \times h \times 170}{20.4h}$

= 216.67 days



23. **A boat covers 24 km upstream and 72 km downstream in 8 hours, while it covers 48 km upstream and 108 km downstream in 14 hours. Find the speed of the boat in still water and the speed of the stream respectively.**

**A** 12 km/h, 6 km/h

**B** 10 km/h, 5 km/h

**C** 10 km/h, 6 km/h

**D** 12 km/h, 5km/h

**Answer:** A

**Explanation:**
Let the speed of the boat in still water be V and speed of the stream be V'.

Relative speed of boat in upstream = V - V', as water stream flows against the direction of boat.

whereas Relative speed of boat in downstream = V + V', as water stream flows in the direction of boat.

Case (1)

Given Total time taken = Time taken during upstream + Time taken during downstream = 8 hours.

$\Rightarrow \frac{24}{V-V'} + \frac{72}{V+V'} = 8$

$\Rightarrow 3[\frac{1}{V-V'} + \frac{3}{V+V'}] = 1$.....(1)

$\Rightarrow 3[4V - 2V'] = V^2 - V'^2$.....(2)

Case (2)

Given Total time taken = Time taken during upstream + Time taken during downstream = 14 hours

$\Rightarrow \frac{48}{V-V'} + \frac{108}{V+V'} = 14$

$\Rightarrow 6[\frac{4}{V-V'} + \frac{9}{V+V'}] = 7$

$\Rightarrow 6[13V - 5V'] = 7[V^2 - V'^2]$.....(3)

Dividing equation (3) by (2), we get

$\frac{2[13V-5V']}{4V-2V'} = 7$

$\Rightarrow 26V - 10V' = 28V - 14V'$

$\Rightarrow V = 2V'$

Substituting this value in equation (1) we get,

$\Rightarrow 3[\frac{1}{V'} + \frac{1}{V'}] = 1$

$\Rightarrow V' = 6$

$\Rightarrow V = 12$

Hence, Speed of the boat in still water = 12 km/h.

and Speed of the stream = 6 km/h.

24. **A shopkeeper sells rice at the cost price, but uses false weight. He gains 20% in this process. What weight does he uses for one kilogram?**

**A** $733\frac{1}{3}g$

**B** 750 g

**C** $833\frac{1}{3}g$

**D** 850 g

**Answer:** C

**Explanation:**
Let say cost price(C.P) of 1 kg(1000 g) of rice be Rs. 100

Given Shopkeeper is selling rice at cost price,

$\Rightarrow$ Selling price(S.P) = C.P = Rs. 100

If he had used correct weight of 1000 g then C.P would have also been Rs. 100.

But given that he uses false weight. Let the weight he had used be 'x' g.

For 1000 g of rice the C.P = Rs. 100

$\Rightarrow$ For '1' g of rice the C.P will be Rs. $\frac{1}{10}$

$\Rightarrow$ For 'x' g of rice the C.P will be Rs. $\frac{x}{10}$

Given that, by using this false weight the shop keeper gains 20%.

Gain percentage = $\frac{S.P-C.P}{C.P} \times 100$

$\Rightarrow \frac{20}{100} = \frac{S.P-C.P}{C.P}$

$\Rightarrow S.P = 1.2 \times C.P$

$\Rightarrow 100 = 1.2 \times \frac{x}{10}$

$\Rightarrow x = 833.33$

Hence the false weight used is 833.33 g

25. **Working together, Rakesh, Prakash and Ashok can finish the same job in an hour. Also, if Prakash works for an hour, and then Ashok works for four hours, the job will be completed. If Rakesh can do the job an hour quicker than Prakash, how many hours would Ashok take to complete the job alone?**

**A** 3

**B** 4

**C** 2.5

**D** 6

**Answer:** D

**Explanation:**

Let the efficiencies of Rakesh, Prakash, and Ashok be 'r' 'p' and 'a' respectively.

GIven that Rakesh can do a job an hour quicker than Prakash.

So let time taken by Prakash be 't' hours, then time taken by Rakesh will be 't-1' hours.

Total work(W) = Efficiency $\times$ Time taken = p $\times$ t = r $\times$ (t-1)

$\Rightarrow$ t = $\frac{r}{r-p}$.....(1)

Given that, Working together, Rakesh, Prakash and Ashok can finish the same job in an hour.

$\Rightarrow$ Total work(W) = (r+p+a) (1) units.....(2)

Also given that, if Prakash works for an hour, and then Ashok works for four hours, the job will be completed.

$\Rightarrow$ Total work(W) = p(1) + a(4) units.....(3)

Equating (2) and (3), we get

(r+p+a) (1) = p(1) + a(4)

$\Rightarrow$ r = 3a.....(4)

Substituting this value in equation (1), we get

t = $\frac{3a}{3a-p}$.....(5)

As the Total work is always constant, p $\times$ t = p(1) + a(4)

$\Rightarrow$ t = 1 + 4$\frac{a}{p}$.....(6)

Equating (5) and (6), we get

$$\frac{3a}{3a-p} = 1 + 4\frac{a}{p}$$

Let $\frac{a}{p}$ = 'k'

$$\Rightarrow \frac{3k}{3k-1} = 1 + 4k$$

$$\Rightarrow 3k = 12k^2 + 3k - 4k - 1$$

$$\Rightarrow 12k^2 - 4k - 1 = 0$$

Solving for k, we get k = $\frac{1}{2} or -\frac{1}{6}$ [which is not possible]

Hence k = $\frac{1}{2}$

$\Rightarrow$ p =2a.....(7)

Substituting (4) and (7) in equation (2) we get,

Total work(W) = 6a units.

Time taken by Ashok alone to do the job = Total work/ Efficiency of Ashok

= 6a/a

=6 hours.