

1. Two students appeared at an examination. One of them secured 9 marks more than the other and his marks was 56% of the sum of their marks. What are the marks obtained by them?

- A. 42, 33
- C. 44, 33

- B. 42, 36
- D. 44, 36

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**Answer :** Option A

**Explanation :**

Let the marks secured by them be  $x$  and  $(x + 9)$

Then sum of their marks =  $x + (x + 9) = 2x + 9$

Given that  $(x + 9)$  was 56% of the sum of their marks

$$\Rightarrow (x + 9) = \frac{56}{100} (2x + 9)$$

$$\Rightarrow (x + 9) = \frac{14}{25} (2x + 9)$$

$$\Rightarrow 25x + 225 = 28x + 126$$

$$\Rightarrow 3x = 99$$

$$\Rightarrow x = 33$$

Then  $(x + 9) = 33 + 9 = 42$

Hence their marks are 33 and 42

2. If  $A = x\%$  of  $y$  and  $B = y\%$  of  $x$ , then which of the following is true?

- A. None of these
- C. Relationship between  $A$  and  $B$  cannot be determined.
- E.  $A$  is greater than  $B$ .

- B.  $A$  is smaller than  $B$ .
- D. If  $x$  is smaller than  $y$ , then  $A$  is greater than  $B$ .

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**Answer :** Option A

**Explanation :**

$$A = \frac{x}{100} y = \frac{xy}{100} \dots\dots\dots(\text{Equation 1})$$

$$B = \frac{y}{100} x = \frac{yx}{100} \dots\dots\dots(\text{Equation 2})$$

From these equations, it is clear that  $A = B$

3. If 20% of  $a = b$ , then  $b\%$  of 20 is the same as:

- A. None of these                      B. 10% of  $a$   
C. 4% of  $a$                               D. 20% of  $a$

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**Answer :** Option C

**Explanation :**

20% of  $a = b$

$$\Rightarrow b = \frac{20}{100} a$$

$$\begin{aligned} b\% \text{ of } 20 &= \frac{b}{100} \cdot 20 = \frac{\left(\frac{20}{100} a\right)}{100} \cdot 20 = \frac{20 \times 20 \times a}{100 \times 100} \\ &= \frac{4a}{100} = 4\% \text{ of } a \end{aligned}$$

4. Two numbers  $A$  and  $B$  are such that the sum of 5% of  $A$  and 4% of  $B$  is two-third of the sum of 6% of  $A$  and 8% of  $B$ . Find the ratio of  $A : B$ .

- A. 2 : 1                                      B. 1 : 2  
C. 1 : 1                                      D. 4 : 3

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**Answer :** Option D

**Explanation :**

$$5\% \text{ of } A + 4\% \text{ of } B = \frac{2}{3} (6\% \text{ of } A + 8\% \text{ of } B)$$

$$\frac{5A}{100} + \frac{4B}{100} = \frac{2}{3} \left( \frac{6A}{100} + \frac{8B}{100} \right)$$

$$\Rightarrow 5A + 4B = \frac{2}{3} (6A + 8B)$$

$$\Rightarrow 15A + 12B = 12A + 16B$$

$$\Rightarrow 3A = 4B$$

$$\Rightarrow \frac{A}{B} = \frac{4}{3}$$

$$\Rightarrow A : B = 4 : 3$$

5. Two employees  $X$  and  $Y$  are paid a total of Rs. 550 per week by their employer. If  $X$  is paid 120 percent of the sum paid to  $Y$ , how much is  $Y$  paid per week?

- A. Rs. 150                                      B. Rs. 300

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**Answer :** Option C

**Explanation :**

Let the amount paid to X per week = x

and the amount paid to Y per week = y

Then  $x + y = 550$

But  $x = 120\%$  of  $y = \frac{120y}{100} = \frac{12y}{10}$

$$\therefore \frac{12y}{10} + y = 550$$

$$\Rightarrow y \left[ \frac{12}{10} + 1 \right] = 550$$

$$\Rightarrow \frac{22y}{10} = 550$$

$$\Rightarrow 22y = 5500$$

$$\Rightarrow y = \frac{5500}{22} = \frac{500}{2} = \text{Rs.}250$$

6. Rahul went to a shop and bought things worth Rs. 25, out of which 30 Paise went on sales tax on taxable purchases. If the tax rate was 6%, then what was the cost of the tax free items?

A. Rs. 15

B. Rs. 12.10

C. Rs. 19.70

D. Rs. 16.80

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**Answer :** Option C

**Explanation :**

Total cost of the items he purchased = Rs.25

Given that out of this Rs.25, 30 Paise is given as tax

$$\Rightarrow \text{Total tax incurred} = 30 \text{ Paise} = \text{Rs.} \frac{30}{100}$$

Let the cost of the tax free items = x

Given that tax rate = 6%

$$\begin{aligned} \therefore (25 - \frac{30}{100} - x) \frac{6}{100} &= \frac{30}{100} \\ \Rightarrow 6(25 - 0.3 - x) &= 30 \\ \Rightarrow (25 - 0.3 - x) &= 5 \\ \Rightarrow x &= 25 - 0.3 - 5 = 19.7 \end{aligned}$$

7. The population of a town increased from 1,75,000 to 2,62,500 in a decade. What is the average percent increase of population per year?

- A. 4% B. 6%  
C. 5% D. 50%

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**Answer :** Option C

**Explanation :**

Increase in the population in 10 years = 2,62,500 - 1,75,000 = 87500

$$\% \text{ increase in the population in 10 years} = \frac{87500}{175000} \times 100 = \frac{8750}{175} = 50\%$$

$$\text{Average \% increase of population per year} = \frac{50\%}{10} = 5\%$$

8. Three candidates contested an election and received 1136, 7636 and 11628 votes respectively. What percentage of the total votes did the winning candidate get?

- A. 57% B. 50%  
C. 52% D. 60%

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**Answer :** Option A

**Explanation :**

Votes received by the winning candidate = 11628

Total votes = 1136 + 7636 + 11628 = 20400

$$\text{Required percentage} = \frac{11628}{20400} \times 100 = \frac{11628}{204} = \frac{2907}{51} = \frac{969}{17} = 57\%$$

9. A fruit seller had some oranges. He sells 40% oranges and still has 420 oranges. How many oranges he had originally?

- A. 420 B. 700  
C. 220 D. 400

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**Answer :** Option B

**Explanation :**

He sells 40% of oranges and still there are 420 oranges remaining

=> 60% of oranges = 420

$$\Rightarrow \frac{60 \times \text{Total Oranges}}{100} = 420$$

$$\Rightarrow \frac{\text{Total Oranges}}{100} = 7$$

$$\Rightarrow \text{Total Oranges} = 7 \times 100 = 700$$

10. A batsman scored 110 runs which included 3 boundaries and 8 sixes. What percent of his total score did he make by running between the wickets?

A.  $45 \frac{4}{11} \%$

B. 45 %

C.  $45 \frac{5}{11} \%$

D.  $44 \frac{5}{11} \%$

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**Answer :** Option C

**Explanation :**

Total runs scored = 110

Total runs scored from boundaries and sixes =  $3 \times 4 + 8 \times 6 = 60$

Total runs scored by running between the wickets =  $110 - 60 = 50$

$$\text{Required \%} = \frac{50}{110} \times 100 = \frac{500}{11} = 45 \frac{5}{11} \%$$

11. What percentage of numbers from 1 to 70 have 1 or 9 in the unit's digit?

A.  $20 \frac{2}{3} \%$

B. 20%

C. 21%

D.  $22 \frac{2}{3} \%$

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**Answer :** Option B

**Explanation :**

Total numbers = 70

Total numbers in 1 to 70 which has 1 in the unit digit = 7

Total numbers in 1 to 70 which has 9 in the unit digit = 7

Total numbers in 1 to 70 which has 1 or 9 in the unit digit =  $7 + 7 = 14$

$$\text{Required percentage} = \frac{14}{70} \times 100 = \frac{140}{7} = 20\%$$

12. In an election between two candidates, one got 55% of the total valid votes, 20% of the votes were invalid. If the total number of votes was 7500, what was the number of valid votes that the other candidate got?

- A. 2800  
B. 2700  
C. 2100  
D. 2500

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**Answer :** Option B

**Explanation :**

Total number of votes = 7500

Given that 20% of Percentage votes were invalid

=> Valid votes = 80%

$$\text{Total valid votes} = 7500 \times \frac{80}{100}$$

1<sup>st</sup> candidate got 55% of the total valid votes.

Hence the 2<sup>nd</sup> candidate should have got 45% of the total valid votes

$$\begin{aligned} \Rightarrow \text{Valid votes that 2nd candidate got} &= \text{total valid votes} \times \frac{45}{100} \\ &= 7500 \times \frac{80}{100} \times \frac{45}{100} = 75 \times \frac{4}{5} \times 45 = 75 \times 4 \times 9 = 300 \times 9 = 2700 \end{aligned}$$

13. In a competitive examination in State A, 6% candidates got selected from the total appeared candidates. State B had an equal number of candidates appeared and 7% candidates got selected with 80 more candidates got selected than A. What was the number of candidates appeared from each State?

- A. 8200  
B. 7500  
C. 7000  
D. 8000

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**Answer :** Option D

**Explanation :**

State A and State B had an equal number of candidates appeared.

In state A, 6% candidates got selected from the total appeared candidates

In state B, 7% candidates got selected from the total appeared candidates

But in State B, 80 more candidates got selected than State A

From these, it is clear that 1% of the total appeared candidates in State B = 80

=> total appeared candidates in State B =  $80 \times 100 = 8000$

=> total appeared candidates in State A = total appeared candidates in State B = 8000

14. What percent of a day is 6 hours?

- A. 6.25%                      B. 20%  
C. 25%                         D. 12.5%

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**Answer :** Option C

**Explanation :**

Total hours in a day = 24

$$\text{Required percentage} = \frac{6}{24} \times 100 = 25\%$$

15. A student has to obtain 33% of the total marks to pass. He got 125 marks and failed by 40 marks. The maximum marks are

- A. 600                                      B. 500  
C. 400                                      D. 300

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**Answer :** Option B

**Explanation :**

Given that the student got 125 marks and still he failed by 40 marks

=> The minimum pass mark =  $125 + 40 = 165$

Given that minimum pass mark = 33% of the total mark

$$\Rightarrow \text{Total Mark} \times \frac{33}{100} = 165$$

$$\Rightarrow \text{Total Mark} = \frac{16500}{33} = 500$$

16. In a certain school, 20% of students are below 8 years of age. The number of students above 8 years of age is  $\frac{2}{3}$  of the number of students of 8 years of age which is 48. What is the total number of students in the school?

- A. 100  
B. 102  
C. 110  
D. 90

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**Answer :** Option A

**Explanation :**

Let the total number of students =  $x$

Given that 20% of students are below 8 years of age

then The number of students above or equal to 8 years of age = 80% of  $x$  -----  
(Equation 1)

Given that number of students of 8 years of age = 48 -----(Equation 2)

Given that number of students above 8 years of age =  $\frac{2}{3}$  of number of students of 8 years of age

$\Rightarrow$  number of students above 8 years of age =  $\frac{2}{3} \times 48 = 32$ ----- (Equation 3)

From Equation 1, Equation 2 and Equation 3,

$$80\% \text{ of } x = 48 + 32 = 80$$

$$\Rightarrow \frac{80x}{100} = 80$$

$$\Rightarrow \frac{x}{100} = 1$$

$$\Rightarrow x = 100$$

17. In an examination, 5% of the applicants were found ineligible and 85% of the eligible candidates belonged to the general category. If 4275 eligible candidates belonged to other categories, then how many candidates applied for the examination?

- A. 28000  
B. 30000  
C. 32000  
D. 33000

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**Answer :** Option B

**Explanation :**

Let the number of candidates applied for the examination =  $x$



Given that 5% of the applicants were found ineligible.

It means that 95% of the applicants were eligible ( $\therefore 100\% - 5\% = 95\%$ )

$$\text{Hence total eligible candidates} = \frac{95x}{100}$$

Given that 85% of the eligible candidates belonged to the general category

It means 15% of the eligible candidates belonged to other categories ( $\therefore 100\% - 85\% = 15\%$ )

Hence Total eligible candidates belonged to other categories

$$\begin{aligned} &= \text{total eligible candidates} \times \frac{15}{100} = \frac{95x}{100} \times \frac{15}{100} \\ &= \frac{95x \times 15}{100 \times 100} \end{aligned}$$

Given that Total eligible candidates belonged to other categories = 4275

$$\Rightarrow \frac{95x \times 15}{100 \times 100} = 4275$$

$$\Rightarrow \frac{19x \times 15}{100 \times 100} = 855$$

$$\Rightarrow \frac{19x \times 3}{100 \times 100} = 171$$

$$\Rightarrow \frac{x \times 3}{100 \times 100} = 9$$

$$\Rightarrow \frac{x}{100 \times 100} = 3$$

$$\Rightarrow x = 3 \times 100 \times 100 = 30000$$

18. A student multiplied a number by  $\frac{3}{5}$  instead of  $\frac{5}{3}$ . What is the percentage error in the calculation?

A. 64%

B. 32%

C. 34%

D. 42%

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**Answer :** Option A

**Explanation :**

Let the number = 1

Then, ideally he should have multiplied 1 by  $\frac{5}{3}$ .

Hence the correct result was  $1 \times (5/3) = (5/3)$

By mistake, he multiplied 1 by  $3/5$ .

Hence the result with the error =  $1 \times (3/5) = (3/5)$

$$\text{Error} = \frac{5}{3} - \frac{3}{5} = \frac{25 - 9}{15} = \frac{16}{15}$$

$$\text{percentage error} = \frac{\text{Error}}{\text{True Value}} \times 100 = \frac{\left(\frac{16}{15}\right)}{\left(\frac{5}{3}\right)} \times 100$$

$$= \frac{16 \times 3 \times 100}{15 \times 5} = \frac{16 \times 100}{5 \times 5} = 16 \times 4 = 64\%$$

19. 270 students appeared for an examination, of which 252 passed. What is the pass percentage?

A.  $93 \frac{1}{3} \%$

B.  $93 \frac{2}{3} \%$

C.  $92 \frac{2}{3} \%$

D. 92%

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**Answer :** Option A

**Explanation :**

$$\text{Pass percentage} = \frac{252}{270} \times 100 = \frac{2520}{27} = \frac{280}{3} = 93 \frac{1}{3} \%$$

20. John's salary was decreased by 50% and subsequently increased by 50%. How much percent does he loss?

A. 35%

B. 25%

C. 32%

D. 28%

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**Answer :** Option B

**Explanation :**

Let John's initial salary = Rs.100

$$\text{Then, after decreasing 50\%, john's salary} = 100 \times \frac{(100 - 50)}{100} = 100 \times \frac{50}{100} = \text{Rs.50}$$

$$\text{After the increase by 50\%, john's salary} = 50 \times \frac{(100 + 50)}{100} = 50 \times \frac{150}{100} = \text{Rs.75}$$

$$\text{Actual loss} = \text{Rs.100} - \text{Rs.75} = \text{Rs.25}$$

$$\text{Loss percentage} = \frac{25}{100} \times 100 = 25\%$$

21. How many litres of pure acid are there in 8 litres of a 20% solution?

- A. 2 litres  
B. 1.4 litres  
C. 1 litres  
D. 1.6 litres

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**Answer :** Option D

**Explanation :**

$$\text{Quantity of pure acid} = 8 \times \frac{20}{100} = 1.6$$

22. The price of a car is Rs. 3,25,000. It was insured to 85% of its price. The car was damaged completely in an accident and the insurance company paid 90% of the insurance. What was the difference between the price of the car and the amount received ?

- A. Rs. 76,375  
B. Rs. 34,000  
C. Rs. 82,150  
D. Rs. 70,000

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**Answer :** Option A

**Explanation :**

Price of the car = Rs.3,25,000

Car insured to 85% of its price

$$\Rightarrow \text{Insured price} = 325000 \times \frac{85}{100}$$

Insurance company paid 90% of the insurance

$$\Rightarrow \text{Amount paid by Insurance company} = \text{Insured price} \times \frac{90}{100}$$

$$= 325000 \times \frac{85}{100} \times \frac{90}{100} = 325 \times 85 \times 9 = \text{Rs.}248625$$

Difference between the price of the car and the amount received

$$= \text{Rs.}325000 - \text{Rs.}248625 = \text{Rs.}76375$$

23. If number x is 10% less than another number y and y is 10% more than 125, then find out the value of x.

- A. 123  
B. 122

C. 122.25

D. 123.75

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**Answer :** Option D

**Explanation :**

y is 10% more than 125

$$\Rightarrow y = 125 \times \frac{(100 + 10)}{100} = 125 \times \frac{110}{100}$$

x is 10% less than another number y

$$\Rightarrow x = y \times \frac{(100 - 10)}{100} = y \times \frac{90}{100} = 125 \times \frac{110}{100} \times \frac{90}{100}$$

$$= \frac{125 \times 110 \times 90}{100 \times 100} = \frac{125 \times 11 \times 9}{100} = \frac{1375 \times 9}{100} = \frac{1375 \times 9}{100} = 123.75$$

24. A housewife saved Rs. 2.50 in buying an item on sale. If she spent Rs. 25 for the item, approximately how much percent she saved in the transaction ?

A. 9%

B. 10%

C. 7%

D. 6%

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**Answer :** Option A

**Explanation :**

Actual Price = Rs.25 + Rs.2.50 = Rs.27.5

Saving = Rs.2.5

$$\text{Percentage Saving} = \frac{2.5}{27.5} \times 100 = \frac{250}{27.5} = \frac{2500}{275}$$

$$= \frac{100}{11} = 9 \frac{1}{11} \% \approx 9\%$$

25. A pipe X is 30 meters and 45% longer than another pipe Y. find the length of the pipe Y.

A. 20.12

B. 20.68

C. 20

D. 20.5

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**Answer :** Option B

**Explanation :**

Length of pipe X = 30 meter

Given that pipe X is 45% longer than Y

Let the length of pipe Y = y

$$\text{Then, Length of pipe X} = y \times \frac{(100 + 45)}{100}$$

$$\Rightarrow 30 = y \times \frac{145}{100} \Rightarrow y = \frac{30 \times 100}{145} = \frac{6 \times 100}{29} = \frac{600}{29} = 20.68$$

26. On my sister's 15th birthday, she was 159 cm in height, having grown 6% since the year before. How tall was she the previous year?

A. 150 cm

B. 140 cm

C. 142 cm

D. 154 cm

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**Answer :** Option A

**Explanation :**

Given that height on 15th birthday = 159 cm and growth = 6%

Let the previous year height = x

$$\text{Then height on 15th birthday} = x \times \frac{(100 + 6)}{100} = x \times \frac{106}{100}$$

$$\Rightarrow 159 = x \times \frac{106}{100}$$

$$\Rightarrow x = \frac{159 \times 100}{106} = 1.5 \times 100 = 150 \text{ cm}$$

27. Q as a percentage of P is equal to P as a percentage of (P + Q). Find Q as a percentage of P.

A. 62%

B. 50%

C. 75%

D. 66%

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**Answer :** Option A

**Explanation :**

Given that  $\frac{Q}{P} = \frac{P}{P+Q}$  .....(Equation 1)

Since Q can be written as a certain percentage of P, we can assume that  $Q = KP$

Hence equation 1 becomes  $\frac{KP}{P} = \frac{P}{P+KP}$

$$\Rightarrow K = \frac{1}{1+K}$$

$$\Rightarrow K(K+1) = 1 \text{ .....(Equation 2)}$$

Q as a percentage of P =  $\frac{Q}{P} \times 100 = \frac{KP}{P} \times 100 = 100K \% \text{ ..... (Equation 3)}$

From here we have two approaches.

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### Approach 1 - trial and error method

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Here we use the values given in the choices to find out the answer

Take 50% from the given choice

if 50% is the answer,  $100K = 50$  as per equation 3  $\Rightarrow K = \frac{50}{100} = \frac{1}{2}$

But if we substitute K as  $\frac{1}{2}$  in equation 2,

$$K(K+1) = \frac{1}{2} \left( \frac{1}{2} + 1 \right) = \frac{1}{2} \times \frac{3}{2} = \frac{3}{4} \neq 1$$

Now Take another choice, say 62%

if 62% is the answer,  $100K = 62$  as per equation 3  $\Rightarrow K = \frac{62}{100}$

But if we substitute K as  $\frac{62}{100}$  in equation 2,

$$K(K+1) = \frac{62}{100} \left( \frac{62}{100} + 1 \right) = \frac{62}{100} \times \frac{162}{100} = \frac{10044}{10000} \approx 1$$

Hence 62% is the answer

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### Approach 2 - solving in the traditional way

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Now let's solve the quadratic equation, equation 2

$$K(K+1) = 1$$

$$K^2 + K - 1 = 0$$

$$K = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-1 \pm \sqrt{1^2 - [4 \times 1 \times (-1)]}}{2 \times 1} = \frac{-1 \pm \sqrt{5}}{2}$$

$$= \frac{-1 \pm 2.24}{2} = \frac{1.24}{2} \text{ or } \frac{-3.24}{2} \text{ (avoiding -ve answer as here the answer should be positive)}$$

$$= 0.62$$

From Equation 3, Q as a percentage of P =  $100K \% = 100 \times .62 = 62\%$

- A. 8%  
C. 10%

- B. 7%  
D. 6%

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**Answer :** Option A

**Explanation :**

Assume that the initial price of 1 Litre petrol = Rs.100 ,Benson spends Rs.100 for petrol,

such that Benson buys 1 litre of petrol

$$\text{After the increase by 25\%, price of 1 Litre petrol} = 100 \times \frac{(100 + 25)}{100} = \text{Rs.125}$$

Since Benson spends additional 15% on petrol,

$$\text{amount spent by Benson} = 100 \times \frac{(100 + 15)}{100} = \text{Rs.115}$$

$$\text{Hence Quantity of petrol that he can purchase} = \frac{115}{125} \text{ Litre}$$

$$\text{Quantity of petrol reduced} = \left(1 - \frac{115}{125}\right) \text{ Litre}$$

$$\begin{aligned} \text{Percentage Quantity of reduction} &= \frac{\left(1 - \frac{115}{125}\right)}{1} \times 100 \\ &= \frac{10}{125} \times 100 = \frac{10}{5} \times 4 = 2 \times 4 = 8\% \end{aligned}$$

29. Arun got 30% of the maximum marks in an examination and failed by 10 marks. However, Sujith who took the same examination got 40% of the total marks and got 15 marks more than the passing marks. What were the passing marks in the examination?

- A. 90  
C. 75  
B. 250  
D. 85

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**Answer :** Option D

**Explanation :**

Let x is the maximum marks of the examination

$$\text{Marks that Arun got} = 30 \% \text{ of } x = \frac{30x}{100}$$

Given that Arun failed by 10 marks

$$\Rightarrow \text{Minimum Pass Mark} = \frac{30x}{100} + 10 \dots \text{(Equation 1)}$$

$$\text{Marks that Sujith got} = 40 \% \text{ of } x = \frac{40x}{100}$$

Given that Sujith got 15 marks more than the passing marks

$$\Rightarrow \frac{40x}{100} = \text{Minimum Pass Mark} + 15$$

$$\Rightarrow \text{Minimum Pass Mark} = \frac{40x}{100} - 15 \dots \text{(Equation 2)}$$

From equations 1 and 2, we have

$$\frac{30x}{100} + 10 = \frac{40x}{100} - 15$$

$$\Rightarrow \frac{10x}{100} = 10 + 15 = 25$$

$$\Rightarrow \frac{x}{10} = 25$$

$$\Rightarrow x = 10 \times 25 = 250$$

$$\Rightarrow \text{Maximum marks of the examination} = x = 250$$

Substituting the value of x in Equation 1, we have

$$\text{Minimum Pass Mark} = \frac{30x}{100} + 10 = \frac{30 \times 250}{100} + 10 = 75 + 10 = 85$$

30. 30% of the men are more than 25 years old and 80% of the men are less than or equal to 50 years old. 20% of all men play football. If 20% of the men above the age of 50 play football, what percentage of the football players are less than or equal to 50 years?

A. 60%

B. 70%

C. 80%

D. 90%

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**Answer :** Option C

**Explanation :**

Let total number of men = 100

Then



80 men are less than or equal to 50 years old

(Since 80% of the men are less than or equal to 50 years old)

=> 20 men are above 50 years old (Since we assumed total number of men as 100)

20% of the men above the age of 50 play football

$$\Rightarrow \text{Number of men above the age of 50 who play football} = 20 \times \frac{20}{100} = 4$$

Number of men who play football = 20 (Since 20% of all men play football)

$$\text{Percentage of men who play football above the age of 50} = \frac{4}{20} \times 100 = 20\%$$

$$\Rightarrow \text{Percentage of men who play football less than or equal to the age 50} = 100\% - 20\% = 80\%$$