8th CLASS
MATHEMATICS
COMPARING QUANTITIES

TEACHING TASK

JEE MAINS LEVEL QUESTIONS

(1) Let the number be x.

25% of x is $0.25x$

18% of 650 is $0.18 \times 650 = 117$

$\Rightarrow 0.25x = 117 + 19$

$0.25x = 136 \Rightarrow x = \frac{136}{0.25} = 544.$

Ans: C

(2) Let the man's income be x.

He donated 5% of his income, left with 95% of his income, which is $0.95x$.

deposited 20% of the remainder in the bank, leaving him with 80% of $0.95x$.

$\Rightarrow 0.8 \times 0.95x = 1919 \Rightarrow 0.76x = 1919$

$x = \frac{1919}{0.76} = 2525.$

Ans: B

(3) Let the cost price of one copy be x.

Cost price of 21 copies $= 21x$.

Selling price of 18 copies $= 21x$.

Selling price of one copy $= \frac{21x}{18}$.

Gain = Selling price − Cost price $= \frac{21x}{18} - x$.

$= \frac{21x - 18x}{18} = \frac{3x}{18} = \frac{x}{6}$.

Gain percentage $= \frac{\text{Gain}}{\text{cost price}} \times 100 = \left(\frac{\frac{x}{6}}{x}\right) \times 100$

$= \frac{1}{6} \times 100 = 16\frac{2}{3}\%$

Ans: B

(4) Let x be the quantity sold at 25% profit.

$120 - x$, is the quantity sold at 10% profit.

Total profit = Profit from first part + profit from second part.

$= 25\%$ of $x + 10\%$ of $(120 - x)$

$= 0.25x + 0.10(120 - x)$

$= 0.25x + 0.10(120 - x) = 0.15(120)$

$\Rightarrow 0.25x + 12 - 0.10x = 18 \Rightarrow 0.15x + 12 = 18$

$\Rightarrow 0.15x = 18 - 12 \Rightarrow 0.15x = 6$

$x = \frac{6}{0.15} = \frac{6}{15} \times 100 = 2 \times 20 = 40$ kg

Ans: B

(5) Selling price for a 10% loss = 10.80 Rupees

$\Rightarrow \frac{10.80}{(1-0.10)} = \frac{10.80}{0.90} = \frac{108}{9} = 12$ Rupees.

20% profit, the selling price should be:

= cost price × (1 + profit %)

= $12 \times (1+0.20) = 12 \times 1.20 = 14.40$ Rupees.

Ans: C

(6) $\left(\frac{0.05}{20}\right) \times 100 = 5 \times 0.05 = 0.25\%$

Ans: C

(7) Let the number be x.

$\Rightarrow 0.75x + 75 = x. \Rightarrow x - 0.75x = 75$

$\Rightarrow 0.25x = 75 \Rightarrow x = \frac{75}{0.25} = \frac{75}{25} \times 100$

$= 75 \times 4 = 300$

Ans: D

(8) Let A's income be x and B's income by y.

35% of x = 25% of y

$= 0.35x = 0.25y \Rightarrow \frac{0.35}{0.25}x = y \Rightarrow \frac{35}{25}x$

$\Rightarrow y = \frac{7}{5}x \Rightarrow 5y = 7x \Rightarrow \frac{x}{y} = \frac{5}{7}$

$x : y = 5 : 7$

Ans: B

(9) Let the cost price be x.

Marked price = x + 20% of x = $x + 0.20x = 1.20x$.

Discount = 5% of marked price = $0.05x \times 1.20x$
$= 0.06x$.

Selling price = Marked price − Discount $= 1.20x - 0.06x$
$= 1.14x$.

profit = Selling price − cost price = D
$= 0.14x$

$$\text{profit \%} = \frac{\text{Profit}}{\text{cost price}} \times 100 = \frac{0.14x}{x} \times 100 = 14\%$$

Ans: B

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(10) Selling price = 4,55,000

$$\text{Loss \%} = 25\%, \quad \text{cost price} = \frac{\text{Selling price}}{1 - \text{Loss \%}}$$

$$= \frac{4,55,000}{1-0.25} = \frac{4,55,000}{0.75} = 6,06,667$$

Loss = cost price − Selling price

$= 6,06,667 - 4,55,000 = 1,51,667$

Ans: D

JEE ADVANCED LEVEL QUESTION

MULTICORRECT ANSWER TYPE QUESTIONS.

(11) 90% of $A = 30\%$ of $B \Rightarrow 0.9A = 0.3B$

$B = \frac{0.9A}{0.3} = 3A$

$B = x\%$ of A, $3A = \frac{x}{100} \times A$

$3 = \frac{x}{100} \Rightarrow x = 300.$

Ans: D

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(12) $1206 \times \frac{1}{3} = 402$

percentage of 402 is of 134 : $\frac{402}{134} \times 100 = 300\%$

Ans : C

Statement Type Questions:

(13) Statement-I: Buying price = $\frac{1}{15}$ per banana.

Selling price = $\frac{1}{9}$ Rupees per banana.

Gain = Selling price - Buying price = $\frac{1}{9} - \frac{1}{15}$

$= \frac{5-3}{45} = \frac{2}{45}$ Rupees for banana

Gain % = $\frac{\text{Gain}}{\text{Buying price}} \times 100 = \frac{\left(\frac{2}{45}\right)}{\left(\frac{1}{15}\right)} \times 100 = 66\frac{2}{3}\%$.

Statement-II: The formula for decrease % is correct: Decrease % = $\left(\frac{\text{Decrease}}{\text{original value}}\right) \times 100$.

Both statements are true.

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(14) Statement-I: 30% of 150 = 45.

$\frac{30}{100} \times 150 = 3 \times 15 = 45$.

Statement-II: P% of x = $\frac{100P}{x}$, this statement is incorrect, the correct formula is:

P% of $x = \left(\frac{P}{100}\right) \times x$.

Statement-I is correct, but statement II is incorrect.

COMPREHENSION TYPE QUESTIONS.

(15) $A = PX\left(1+\frac{R}{n}\right)^n$

$= 4096 \times \left(1+\frac{0.0625}{1}\right)^3 = 4096 \times (1.0625)^3$

$= 4096 \times 1.1995 \Rightarrow 4913.$

Ans: A

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(16) $A = PX\left(1+\frac{R}{n}\right)^n$

$= 5,06,000 \times \left(1+\frac{0.025}{1}\right)^2 = 5,06,000 \times (1.025)^2$

$= 5,06,000 \times 1.050625 = 531616.25$

Ans: A

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(17) profit = Selling price − cost price

$= 715 - 620 = 95.$

Ans: No correct option.

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(18) cost price = Selling price − profit

$= 840 - 62 = 778$

Ans: D

Integer Answer type Questions:

(19) 75% of $20 = \frac{75}{100} \times 20 = 15$ Students

No. of students good at english = Total students − Students not good at English

$= 20 - 15 = 5$ students.

(20) Initial salt $= 2\%$ of $30\ kg = 0.6\ kg$

Final salt $= 10\%$ of $\left(30\ kg + \frac{4n}{3}\ kg\right)$

$\Rightarrow 0.6 + \frac{4n}{3} = 0.1\left(30 + \frac{4n}{3}\right)$

$\Rightarrow 0.6 + \frac{4n}{3} = 3 + \frac{0.4n}{3}$

$\Rightarrow 0.6 - 3 = \frac{0.4n}{3} - \frac{4n}{3}$

$\Rightarrow -2.4 = \frac{0.4n - 4n}{3}$

$\Rightarrow -2.4 = -\frac{3.6n}{3}$

$\Rightarrow \frac{-24}{10} = \frac{-36n}{30} \Rightarrow -24 = -12n$

$\Rightarrow n = \frac{24}{12} = 2.$

MATRIX MATCHING TYPE

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(i) $A = P\left(1+\frac{R}{100}\right)^n = 12600\left(1+\frac{10}{100}\right)^2 = 12600\left(\frac{110}{100}\right)^2$

$= 12600 \times \frac{110}{100} \times \frac{110}{100} = 126 \times 11 \times 11 = 15246.$

$C.I = A - P = 15246 - 12600 = 2646.$

Ans: No correct option.

(ii) $A = P\left(1+\frac{R}{100}\right)^n = 18000\left(1+\frac{10}{100}\right)^2 = 18000\left(\frac{110}{10}\right)^2$

$= 18000 \times \frac{110}{100} \times \frac{110}{100} = 180 \times 11 \times 11 = 21780$

$C.I = A - P = 21780 - 18000 = 3780.$

Ans: r

(iii) $A = P\left(1+\frac{R}{100}\right)^n = 16000\left(1+\frac{12.5}{100}\right)^3 = 16000\left(\frac{112.5}{100}\right)^3$

$= 16000\left(\frac{112.5}{100}\right) \times \frac{112.5}{100} \times \frac{112.5}{100} = 16 \times \frac{112.5}{1} \times \frac{112.5}{10} \times \frac{112.5}{100}$

$= 22781.25$

$C.I = A - P = 22781.25 - 16000 = 6781.25$

Ans: P and Q.

(iv) $A = P\left(1+\frac{R}{100}\right)^n = 1500\left(1+\frac{10}{100}\right) = 1500\left(\frac{110}{100}\right)^{\frac{5}{2}}$

For 2 years:

$A = 1500\left(\frac{110}{100}\right)^2$

$= 1500 \times \frac{110}{100} \times \frac{110}{100} = 1815$

For 0.5 years

$= 1815 \times 0.10 \times 0.5$

$= 90.75$

$A = 1815 + 90.75$

$= 1905.75$

$CI = A - P$

$= 1905.75 - 1500$

$= 405.75$

Ans: S

(22)

(i) Ratio = Speed of cycle / Speed of scooter

$= \frac{15\ km/h}{30\ km/h} = \frac{1}{2} = 1:2$

Ans: t

(ii) 1 kilometer = 1000 meters.

5 meters = $\frac{5}{1000}$ kilometers.

Ratio = $\frac{0.005\ km}{10\ km} = \frac{1}{2000} = 1:2000$

Ans: P

(iii) $\frac{3}{\cancel{4}_{1}} \times \frac{25}{\cancel{100}} = 3 \times 25 = 75\%$ Ans: Q

(iv) No. of Students good in mathematics = 72% of 25

$= \frac{72}{\cancel{100}_{4}} \times \cancel{25}^{1} = \frac{\cancel{72}^{18}}{\cancel{4}_{1}} = 18$

No. of Students not good in mathematics

= Total Students - Students good in mathematics

= 25 - 18 = 7.

Ans: R

LEARNER'S TASK.

Conceptual understanding questions:

① P% of $Q = \frac{P}{100} \times Q$

Ans: D

② Decrease % $= \frac{\text{decrease}}{\text{original value}} \times 100$

Ans: A

③ Through options.

A: $\frac{100 \times C.P}{100 + \text{profit}\%}$ is incorrect because it's trying to find the cost price using the cost price itself.

B: $\frac{100 \times S.P}{(100 + \text{profit}\%)}$ is correct because it's using the selling price to find the cost price, taking into account the profit percentage.

C: $\frac{100 \times S.P}{(100 - \text{loss}\%)}$ is also correct because it's using the selling price to find the cost price, taking into accont the loss %.

Ans: B and C.

(4) Rate of discount $= \frac{\text{Discount}}{\text{Marked price}} \times 100$

Ans: B

(5) Original price $= \frac{\text{C.P} \times 100}{100 + \text{Tax Rate}}$. Ans: C

(6) The amount $A = P\left(1 + \frac{R}{100}\right)^n$ Ans: D

(7) profit % or loss % is always calculated on cost price.

profit % $= \frac{\text{Profit}}{\text{C.P}} \times 100$, loss % $= \frac{\text{Loss}}{\text{C.P}} \times 100$.

Ans: B

(8) Through options:

A: profit = SP - CP; This formula calculate the profit.

B: $SP - CP = \frac{CP \times (100 - \text{loss \%})}{100}$, this formula calculate the Selling price.

C: $SP = MP \times \left(\frac{100 - \text{discount \%}}{100}\right)$, This formula also correct, calculate the selling price.

Ans: D

(9) Discount = Marked price - Selling price.

Ans: C

(10) $\frac{75}{100} \times 500 = 75 \times 5 = 375$

Ans: D

JEE MAINS LEVEL QUESTIONS:

(1) $x \times 15 = \frac{37.5}{100} \times 220 \Rightarrow x = \frac{37.5}{100 \times 15} \times 220$

$= \frac{375}{10 \times 5 \times 15} \times 11 = \frac{5 \times 11}{10} = \frac{55}{10} = 5.5$

Ans: D

(2) Let the number be x.

$x = 20\%$ of $x + 40$

$x = \frac{20}{100} \times x + 40 \Rightarrow x = \frac{1}{5}x + 40$

$\Rightarrow x - \frac{x}{5} = 40 \Rightarrow \frac{5x - x}{5} = 40 \Rightarrow 4x = 40 \times 5$

$\Rightarrow x = \frac{40 \times 5}{4} = 10 \times 5 = 50.$

Ans: A

(3) Let the original number of apples be x.

60% of x = 420.

$\Rightarrow \frac{60}{100} \times x = 420 \Rightarrow x = \frac{420 \times 10}{6}$

$x = 70 \times 10 = 700$.

Ans: D

(4) $\sqrt{36\% \text{ of } 40} = \sqrt{\frac{3.6}{100} \times 40} = \sqrt{\frac{36}{10 \times 100} \times 40}$

$= \sqrt{\frac{36}{100} \times 4} = \sqrt{\frac{6^2}{5^2}} = \frac{6}{5} = 1.2$

Ans: B

(5) Let B's salary be x.

$\Rightarrow$ 30% of $x = x + 0.3x = 1.3x$

$\Rightarrow \frac{(1.3x - x)}{1.3x} \times 100 = \frac{0.3x}{1.3x} \times 100 = \frac{3}{13} \times 100$

$= 23\frac{1}{13}\%$

Ans: C

(6) Selling price = C.P + Gain

$1980 = C.P + (10\% \text{ of } CP) \Rightarrow 1980 = C.P + \left(\frac{10}{100} \times C.P\right)$

$\Rightarrow 1980 = CP + 0.1CP \Rightarrow 1980 = 1.10CP$

$\Rightarrow CP = \frac{1980}{1.10} \Rightarrow \frac{1980}{110} \times 100 = 180 \times 10 = 1800$

Ans: B

(7) SP = CP + profit

$247.50 = CP + (12.5\% \text{ of } CP)$

$247.50 = CP + \frac{12.5}{100} \times CP \Rightarrow CP + 0.125CP$

$247.50 = 1.125\,CP \Rightarrow CP = \frac{247.50}{1.125} = 220$

Ans: B

(8) Mounika's marks = Percentage × Total marks

$98 = \frac{56}{100} \times \text{Total marks} = \frac{98 \times 100}{56}$

$\text{Total marks} = \frac{7 \times 100^{25}}{4_1} = 7 \times 25 = 175$

Ans: D

(9) $\frac{2a}{3b} \times \frac{6ab}{5c^2} \times \frac{c}{a}$

$\Rightarrow 2a \times 6ab \times c = 12a^2bc$

$\Rightarrow 3b \times 5c^2 \times a = 15abc^2$

$\Rightarrow 12a^2bc \div 15abc^2 \Rightarrow 12a \div 15c$

$\Rightarrow 4a \div 5c \Rightarrow 4a : 5c$

Ans: D

(10) No. of engineers = Percentage × Total employees.

$80 = \left(\frac{40}{100}\right) \times$ Total employees.

Total employees $= \frac{80 \times 5}{2} = 40 \times 5 = 200.$

Ans: D

JEE ADVANCED LEVEL QUESTIONS.

(1) $x = \frac{90}{100} = 0.9y.$

$\frac{y}{x} \times 100 = \left(\frac{1}{0.9}\right) \times 100 = \frac{100}{0.9} = \frac{1000}{9} = 111.11\%$

Ans: D

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(2) 12.5% of $192 \Rightarrow \frac{12.5}{100} \times 192 \Rightarrow \frac{125}{1000} \times 192$

$\Rightarrow \frac{5 \times 48}{10} = 24.$

$\Rightarrow 24 = \frac{50}{100} \times x \Rightarrow 24 \times \frac{100}{50} = x$

$x = 24 \times 2 = 48.$

Ans: A

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(3) Percentage passed in both = 100% - (percentage failed in Hindi + Percentage failed in English - % failed in both)

Percentage passed in both = 100% - (42% + 52% - 17%)

= 100% - (94% - 17%)

= 100% - (77%)

= 23%

Ans: A

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(4) SP = CP - (5% of CP)

1140 = CP - 0.05CP ⇒ 1140 = 0.95CP

CP = 1140/0.95 = 1200.

To gain 5%, SP = CP + (5% of CP)

= 1200 + (0.05 × 1200) ⇒ 1200 + 60 = 1260.

Ans: D

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(5) C.P of 10 articles = 8

SP of 1 article = 1.25

SP of 10 articles = 10 × 1.25 = 12.50

Gain = SP - CP = 12.50 - 8 = 4.50.

$$\text{Gain \%} = \frac{\text{Gain}}{\text{C.P}} \times 100 = \frac{4.50}{8_2} \times \frac{25}{100}$$

$$\Rightarrow \frac{4.50 \times 25}{2} = 56.25\% = 56\frac{1}{4}\%$$

Ans: D

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⑥ $SP = CP - (\text{loss}\% \times CP)$

$150 = CP - \left(\frac{25}{100} \times CP\right)$

$150 = CP - 0.25CP \Rightarrow 150 = 0.75CP$

$CP = \frac{150}{0.75} = \frac{150}{75} \times 100 = 2 \times 100 = 200$

Ans: C

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⑦ S.P = 100, Gain = 10.

C.P = S.P − Gain = 100 − 10 = 90.

$\text{Gain}\% = \frac{\text{Gain}}{CP} \times 100 = \frac{10}{90} \times 100 = \frac{100}{9} = 11\frac{1}{9}\%$

Ans: C

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⑧ Let the C.P be x.

SP at 10% profit = x + 10% of x = $x + 0.1x = 1.1x$.

SP at 15% profit = $x + 15\%$ of $x = x + 0.15x = 1.15x$.

Difference between the two SPs is Rs 10:

$\Rightarrow 1.15x - 1.12x = 10 \Rightarrow 0.05x = 10$

$x = \frac{10}{0.05} \Rightarrow \frac{10}{5} \times 100 = 20 \times 10 = 200.$

Ans: D

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(9) 12% of $x = 18$.

$\Rightarrow \frac{12}{100} \times x = 18 \Rightarrow x = \frac{\cancel{18}^{6} \times \cancel{100}^{25}}{\cancel{12}_{1}}$

$x = 6 \times 25 = 150$

Ans: D

(10) In this case, $\frac{72}{10} = 7.2$ years, so it would take approximately 7.2 years for the sum to double at 10% per annum. However, since the interest is compounded annually, it will actually take around 10 years to double.

To double in 12 years, the interest rate would need to be lower than 10%.

Ans: B.

JEE ADVANCED LEVEL QUESTIONS

Multicorrect Answer Type questions.

(11) Through options

A: This formula calculates the selling price after a discount is applied to the marked price.

B: This formula is incorrect because it doesn't calculate the selling price.

C: This formula shows that the selling price is equal to the marked price, minus the discount amount.

D: This statement is incorrect because it states that profit is equal to cost price minus selling price.

Ans: A and C.

(12) SP = 810, Gain % = 8%

SP = CP + (Gain % × CP) ⇒ 810 = CP + (8% of CP)

$810 = CP + 0.08CP \Rightarrow 810 = 1.08CP$

$CP = \frac{810}{108} \Rightarrow \frac{810}{108} \times 100 = \frac{90 \times 100}{12}$

$= \frac{15 \times 50}{2/1}$

CP = 15 × 50 = 750

Ans: B

Statement type Questions:

(13) Statement-I: Claims that if x is 90% of y, then the percent of x in y is 111.1%. However, this is incorrect. If x is 90% of y, then x = 0.9y and the percent of x in y is actually 90%.

Statement-II: When "is" is placed before "of", the required percentage is indeed $\frac{x}{y} \times 100\%$ it is true.

(14) SP = 1980, Gain % = 10%.

CP = SP / (1 + Gain %)

$= 1980/(1+0.10) = \frac{1980}{1.10} \Rightarrow \frac{1980}{110} \times 100$

$= 18 \times 100 = 1800$, It is true.

Statement-II: It is correct, it provides the correct formulas for calculating increase and decrease percentage.

$\text{Increase \%} = \frac{\text{Increase}}{\text{original value}} \times 100\%$

$\text{Decrease \%} = \frac{\text{Decrease}}{\text{original value}} \times 100\%$.

Comprehension Type Questions:

Comprehension-I:

(15) SP = 1980, CP = 2200.

Loss = CP − SP = 2200 − 1980 = 220.

$\text{Loss \%} = \frac{\text{loss}}{CP} \times 100 \Rightarrow \frac{220}{2200} \times 100 = 10\%$

Ans: A and D

(16) SP = 1980, Gain % = 10 %

SP = CP + (Gain % × CP)

1980 = CP + 0.10CP ⇒ 1980 = 1.10CP

$CP = \frac{1980}{1.10} = 1800$

Ans: B

Comprehension-II:

(17) $\frac{2a}{3b} \times \frac{6ab}{5c^2} \times \frac{c}{a}$

$\Rightarrow 2a \times 6ab \times c = 12a^2bc$

$\Rightarrow 3b \times 5c^2 \times a = 15abc^2$

$\therefore 12a^2bc : 15abc^2 \Rightarrow 12a : 15c = 4a : 5c$

Ans: D

(18) A's present salary $= \frac{4}{5} \times 3x \times \frac{5}{4} = 3x \times \frac{5}{4} = \frac{15x}{4}$

B's present salary $= \left(\frac{2}{5}\right) \times 4x \times \frac{5}{2} = 4x \times \frac{5}{2} = 10x$

Sum of their present salaries is 4160.

$\frac{15x}{4} + 10x = 4160. \Rightarrow \frac{55x}{4} = 4160 \Rightarrow 55x = 16640$

$x = \frac{16640}{55} \simeq 303$

A's present salary $= \frac{15x}{4} = \frac{15(303)}{4} = 1136.$

Integer Answer Type Questions.

(19) 50% of $(x-y) = 30\%$ of $(x+y)$

$\Rightarrow \frac{50}{100} \times (x-y) = \frac{30}{100}(x+y)$

$\Rightarrow 5x-5y = 3x+3y \Rightarrow 5x-3x = 3y+5y$

$\Rightarrow 2x = 8y \Rightarrow x = \frac{8y}{2} \Rightarrow x = 4y$

$\therefore x = 4y$, $x = ky$ comparing both $k = 4$.

(20) Gain $= \frac{1}{10}$ of CP $\Rightarrow \frac{1}{10} \times CP$

$SP = CP + \text{Gain}$

$= CP + \left(\frac{1}{10}\right) \times CP = \left(\frac{11}{10}\right) \times CP$

$SP = 550$, $\left(\frac{11}{10}\right) \times CP = 550$

$CP = \frac{550 \times 10}{11} = 50 \times 10 = 500$

Gain $= SP - CP = 550 - 500 = 50$.

Gain $\% = \frac{\text{Gain}}{CP} \times 100 = \frac{50}{500} \times 100 = 10\%$

Given gain $\% = 10n$

$10n = 10$

$\therefore n = 1$

MATRIX MATCHING TYPE

(21)

(i) $2:5 \Rightarrow \frac{2}{7} \times 100 = 0.2857 \times 100 = 28.57\%$

Ans: P

(ii) $2:7 \Rightarrow \frac{2}{9} \times 100 = 22.22\%$

Ans: No correct option

(iii) $13:20 \Rightarrow \frac{13}{33} \times 100 = 39.39 \simeq 40\%$

Ans: S

(iv) $13:75 \Rightarrow \frac{13}{78} \times 100 \simeq 17.33\%$

Ans: Q

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(22)

(i) 36 to 64 $\Rightarrow$ $\overset{9}{\cancel{36}} : \overset{16}{\cancel{64}} = 9:16$

Ans: 2

(ii) 40 paise : 300 paise $\Rightarrow$ $\overset{2}{\cancel{4}} : \overset{15}{\cancel{30}} = 2:15$

Ans: S

(iii) $\overset{2}{\cancel{24}}$ minutes : $\overset{5}{\cancel{60}}$ minutes $= 2:5$

Ans: P

(iv) 125ml : 2 liters = $\overset{1}{\cancel{125}}$ ml : $\overset{16}{\cancel{2000}}$ ml $= 1:16$.

Ans: R