## Quantitative Aptitude - Ratio and Proportions - Formulas E-book



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# Quantitative Aptitude - Ratio and Proportions - Formulas E-book 

## Quantitative Aptitude - Ratio and Proportions- Formulas

## Introduction to Quantitative Aptitude:

Quantitative Aptitude is an important section in the employment-related competitive exams in India. Quantitative Aptitude Section is one of the key sections in recruitment exams in India including but not limited to Banking, Railways, and Staff Selection Commission, Insurance, Teaching, UPSC and many others. The Quantitative Aptitude section has questions related to Profit and Loss, Percentage and Discount, Simple Equations, Time and Work and Quadratic Equations, Ratio and Proportions etc.

## RATIO AND PROPORTIONS - IMPORTANT TERMS:

1. What is Ratio?

Тпи
In certain situations, the comparison of two quantities by the method of division is very efficient. We can say that the comparison or simplified form of two quantities of the same kind is referred to as ratio. This relation gives us how many times one quantity is equal to the other quantity. In simple words, the ratio is the number which can be used to express one quantity as a fraction of the other ones.
2. What is Indices?

Ratio and proportions are said to be faces of the same coin. When two ratios are equal in value, then they are said to be in proportion. In simple words, it compares two ratios. Proportions are denoted by the symbol ' $:$ ' or ' $=$ '.

## RATIO AND PROPORTIONS - QUICK TIPS AND TRICKS

1. If $\frac{u}{v}=\frac{x}{y}$, then $u y=v x$
2. If $\frac{u}{v}=\frac{x}{y^{\prime}}$, then $\frac{u}{x}=\frac{v}{y^{\prime}}$
3. If $\frac{u}{v}=\frac{x}{y^{\prime}}$ then $\frac{v}{x^{\prime}}=\frac{y}{x}$
4. If $\frac{u}{v}=\frac{x}{y}$, then $\frac{(u+v)}{v}=\frac{(x+y)}{v}$
5. If $\frac{u}{v}=\frac{x}{y}$, then $\frac{(u-v)}{v}=\frac{(x-y)}{y}$
6. If $\frac{u}{v}=\frac{x}{y^{\prime}}$, then $\frac{(u+v)}{(u-v)}=\frac{(x+y)}{(x-y)}$, which is known as componendo -Dividendo Rule
7. If $\frac{u}{v}=\frac{v}{x}$, then $\frac{u}{x}=\frac{\mathrm{u} 2}{v 2}$
8. If $\frac{u}{v}=\frac{x}{y^{\prime}}$, then $u=x$ and $v=y$

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9. If $\frac{a}{(\mathrm{~b}+\mathrm{c})}=\frac{b}{(\mathrm{c}+\mathrm{a})}=\frac{c}{(\mathrm{a}+\mathrm{b})}$ and $\mathrm{a}+\mathrm{b}+\mathrm{c} \neq 0$, then $\mathrm{a}=\mathrm{b}=\mathrm{c}$

## RATIO AND PROPORTIONS FORMULAS:

1. If four quantities are in proportion, then

- Product of means = Product of extremes
- Thus, if $a, b, c$ and $d$ are in proportion i.e. $a: b: c: d$, then
- $b x c=a x d$

2. The mean proportion between any two numbers is equal to the square root of their product.

- For example, if $a: x: x: b$, then
- $X^{2}=a b$
- $\mathrm{x}=\sqrt{a b}$

3. If $\mathrm{a}: \mathrm{b}$ and c : d are two ratios, and
(i) $a d>b c$, then

$$
\stackrel{a}{b}>\frac{c}{d}
$$

(ii) ad < b c, then

$$
\frac{a}{b}<\frac{c}{d}
$$

(iii) $\mathrm{d}=\mathrm{b}$ c, then

$$
\frac{a}{b}=\frac{c}{d}
$$

4. Duplicate ratio of $a: b=a^{2}: b^{2}$
5. Sub-duplicate ratio of $\mathrm{a}: \mathrm{b}=\sqrt{a}: \sqrt{b}$
6. Triplicate ratio of $a: b={ }^{3}: b^{3}$
7. Sub-triplicate ratio of $\mathrm{a}: \mathrm{b}=\left(a^{\frac{1}{3}}: b^{\frac{1}{3}}\right)$
8. If $a, b, c$ and $d$ are four quantities such that $a: b: c: d$, then

$$
\frac{a+b}{a-b}=\frac{c+d}{c-d}
$$

9. Important formula-

$$
\frac{a}{b}=\frac{c}{d}=\frac{e}{f}=\frac{\mathrm{a}+\mathrm{c}+\mathrm{e}}{\mathrm{~b}+\mathrm{d}+\mathrm{f}}
$$

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10. If a quantity ' $k$ ' has to be divided in the ratio of $a$ : $b: c$, then the proportional parts is

$$
\frac{K a}{a+b+c}, \frac{K b}{a+b+c}, \frac{K c}{a+b+c}
$$

11. If $\frac{a}{b}=\frac{c}{d}$ then $\mathrm{ad}=\mathrm{b} \mathrm{c}$
12. If $\frac{a}{b}=\frac{c}{d}$ then $\frac{a}{c}=\frac{b}{d}$
13. If $\frac{a}{b}=\frac{c}{d}$ then $\frac{b}{a}=\frac{d}{c}$
14. If $\frac{a}{b}=\frac{c}{d}$ then $\frac{\mathrm{a}+\mathrm{b}}{b}=\frac{\mathrm{c}+\mathrm{d}}{d}$
15. If $\frac{a}{b}=\frac{c}{d}$ then $\frac{\mathrm{a}-\mathrm{b}}{b}=\frac{\mathrm{c}-\mathrm{d}}{d}$
16. I If $\frac{a}{b}=\frac{c}{d}$ then $\frac{a+b}{a-b}=\frac{c+d}{c-d}$ is called the Componendo-Dividendo Rule.
17. If $\frac{a}{b}=\frac{c}{d}$ then $\frac{a}{c}=\mathrm{a} 2 \mathrm{~b} 2 \frac{a^{2}}{b^{2}}$
18. If $\frac{a}{b}=\frac{c}{d}$ and $\mathrm{a}=\mathrm{c}$ then $\mathrm{b}=\mathrm{d}$
19. If $\frac{\mathrm{a}}{\mathrm{b}+\mathrm{c}}=\frac{b}{\mathrm{c}+\mathrm{a}}=\frac{a}{\mathrm{a}+\mathrm{b}}$ and $\mathrm{a}+\mathrm{b}+\mathrm{c} \neq 0$ then $\mathrm{a}=\mathrm{b}=\mathrm{c}$
20. If $\frac{a}{b}=\frac{c}{d}$ then, $\frac{a^{2}+b^{2}}{c^{2}+d^{2}}=\frac{a^{2}}{b^{2}}$
21. If $\mathrm{ax}=\mathrm{by}=\mathrm{c} z$ then, $\frac{a^{2}+b^{2}+c^{2}}{x^{2} x^{2}+y^{2} z^{2}+z^{2} x^{2}}=\frac{\mathrm{ab}+\mathrm{bc}+\mathrm{ca}}{\mathrm{xyz}(\mathrm{x}+\mathrm{y}+\mathrm{z})}$
22. If $\frac{a}{b}=\frac{c}{d}$ then $\frac{a^{2}+b^{2}}{c^{2}+d^{2}}=\frac{\mathrm{ac}+\mathrm{bd}}{\mathrm{ac}-\mathrm{bd}}$
23. If $\frac{a}{b}=\frac{c}{d}=\frac{e}{f}=\frac{\mathrm{la}+\mathrm{mc}+\mathrm{ne}}{\mathrm{lb}+\mathrm{md}+\mathrm{nf}}$
24. If $\frac{a}{b}=\frac{c}{d}$ then $\frac{\mathrm{a}-\mathrm{b}}{b}=\frac{\mathrm{c}-\mathrm{d}}{d}$
25. If $\frac{a}{b}=\frac{c}{d}$ then $\frac{\mathrm{pa}+\mathrm{qb}}{\mathrm{ra}+\mathrm{sb}}=\frac{\mathrm{pc}+\mathrm{qd}}{r c+s d}$
26. If $\frac{a}{b}=\frac{c}{d}=\frac{e}{f}=\cdots=\mathrm{m}$ then

$$
M=\frac{p a+q c+r e+\cdots}{p b+q d+r f+\cdots}=\frac{a+c+e+\cdots}{b+d+f+\cdots}
$$

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## RATIO AND PROPORTIONS EXAMPLES:

1. The salaries of $A, B$ and $C$ are in the ratio 5:3:2. If the increments of $20 \%, 10 \%$ and $20 \%$ are allowed in their salaries, then what will be the new ratio of their salaries?
A. $22: 11: 9$
B. $22: 10: 8$
C. $20: 11: 8$
D. 20:10:9

## Answer: C

## Explanation:

5:3:2 $=500: 300: 200$
$500 \times\left(\frac{20}{100}\right)=100=>500+100=600$
$300 \times\left(\frac{20}{100}\right)=30=>300+33=330$ TM
$200 \times\left(\frac{20}{100}\right)=40=>200+40=240$
$600: 330: 240=20: 11: 8$
2. Two numbers are respectively $40 \%$ and $60 \%$ more than the third number. The ratio of the two numbers is
A. $6: 7$
B. $7: 8$
C. $8: 7$
D. $7: 5$

Answer: B

## Explanation:

Let third number $=\mathrm{x}$
$\left(\frac{140}{100}\right) x=\left(\frac{7}{5}\right) x$
$\left(\frac{160}{100}\right) x=\left(\frac{8}{5}\right) x$
$\left(\frac{7}{5}\right):\left(\frac{8}{5}\right)=35: 40=7: 8$

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3. A sum of money is to be distributed among $P, Q, R$ and $S$ in the proportion 2:5:6:7, If $R$ get Rs. 500 more than What is P's share?
A. 500
B. 700
C. 1000
D. 1200

## Answer: C

## Explanation:

$S-R=7-6=1=>500$
$2 \times 500=1000$
4. The sum of the three number is 68 .If the ratio of the first to second is $\mathbf{3 : 2}$ and that of the second to the third is $5: 3$, then the second number is
A. 21
B. 22
C. 23
D. 24

Answer: B

Explanation:
$A: B=3: 2$

B: $C=5: 3$
B: $C=\left(5 \times\left[\frac{2}{5}\right]\right):\left(3 \times\left[\frac{2}{5}\right]\right)=2:\left(\frac{6}{5}\right)$
A: B: $C=3: 2:\left(\frac{6}{5}\right)=15: 10: 6$
Second number $=\left(\frac{31}{10}\right) \times 68=21.9=22$
5. The ratio of prices of 2 dresses is $\mathbf{1 0 : 1 5}$. If the price of the first dress is increased by $\mathbf{1 0 \%}$ and that of the second dress by Rs. 400 then the ratio of their prices is $4: 7$. What are the initial prices of the dresses?
A. 91
B. 92
C. 93

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D. 94

## Answer: D

## Explanation:

Let the initial price of the dress $=10 x$ and $15 x$
Price of the 1 st dress after increment $=10 \mathrm{x} \times\left(\frac{110}{100}\right)=11 \mathrm{x}$
Price of the 2 nd dress after increment $=15 \mathrm{x}+400$
$\left[\frac{11 \mathrm{x}}{(15 \mathrm{x}+400)}\right]=\frac{4}{7}$
$77 x=60 x+1600$
$17 x=1600$
$X=\frac{1600}{17}=94.11=94$
6. A Zoo has 66 fishes, some white and rest orange, which of the following could be the ratio of white to orange fishes in the zoo?
A. $1: 7$
B. $2: 9$
C. $3: 7$
D. $2: 5$
E. None of these

Answer: B
Explanation:
$2+9=11$
66 can divisible by 11.
7. The ratio of the number of boys to that of girls in a school is 3:2. If $\mathbf{3 0 \%}$ of boys and $\mathbf{7 0 \%}$ of girls appeared in an examination, the ratio of students appeared in the examinations to that not appeared in the examination is
A. $23: 27$
B. $22: 25$
C. $21: 17$
D. $18: 17$
E. None of these

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Answer: A

## Explanation:

$3: 2=30: 20$
$30 \%$ boys $=\left(\frac{30}{100}\right) \times 30=9$
$70 \%$ girls $=\left(\frac{70}{100}\right) \times 20=14$
$(9+14):(50-23)=23: 27$
8. If $\mathbf{2 0 \%}$ of $x=\mathbf{3 0 \%}$ of $y$ then $x$ : $y$ is
A. $2: 3$
B. $3: 2$
C. $1: 2$
D. $1: 3$
E. None of these

Answer: A
Explanation:
$\left(\frac{20}{100}\right) x=\left(\frac{30}{100}\right) y$
$\frac{x}{y}=\left(\frac{30}{100}\right) /\left(\frac{100}{20}\right)=\frac{3}{2}=3: 2$
9. In a bag there are coins of $\mathbf{2 5 p}, \mathbf{1 0 p}$ and 5 p in the ratio 1:2:3.If there are Rs. 45 in all then find how many $\mathbf{2 5 p}$ coins are there?
A. 60
B. 65
C. 70
D. 75
E. None of these

Answer: D
Explanation:
$\frac{[(25 \mathrm{x})+(10 \mathrm{x} \times 2)+(5 \mathrm{x} \times 3)]}{100}=45$
$\frac{[25 x+20 x+15 x]}{100}=45$

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$60 x=4500$
$X=\frac{4500}{60}=75$
10. If $a: b=2: 3, b: c=6: 5$ and $c: d=3: 5$ then find the value of $a: b: c$
A. $18: 25: 12: 18$
B. $12: 18: 15: 25$
C. $25: 18: 15: 12$
D. $12: 25: 18: 25$

Answer: B
Explanation:
$a: b=2: 3=12: 18$
$b: c=6: 5=18: 15$
c: $d=3: 5=15: 25$
a: $b: c: d=12: 18: 15: 25$
11. If $A: B=2: 3, B: C=4: 5$ and $C: D=6: 7$, then find the value of $A: B: C$
A. $15: 24: 30: 35$
B. $16: 24: 30: 35$
C. 17:24:30:35
D. 18:24:30:35

Answer: B
Explanation:
$A: B=2: 3$
B: $C=4: 5=\left(4 * \frac{3}{4}: 5 * \frac{3}{4}\right)$
$=3: \frac{15}{4}$
C: $\mathrm{D}=6: 7=(6 * 1524: 7 * 1524)$
$=\frac{15}{24}: \frac{35}{8}$
A: B: $C: D=2: 3: \frac{15}{4}: \frac{35}{8}$

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=16: 24: $30: 35=8: 12: 9$
12. Salaries of Ravi and Summit are in the ratio $2: 3$. If the salary of each is increased by Rs 4000 , the new ratio becomes 40:57. What is Summit present salary.
A. 32000
B. 34000
C. 38000
D. 40000

## Answer: C

## Explanation:

Let the original Salaries of Ravi and Summit is $2 x$ and $3 x$.

So as per question
$\frac{2 x+4000}{3 x+4000}=\frac{40}{57}$
$=>57(2 x+4000)=40(3 x+4000)$
$=>6 x=68000$
$=>3 x=34000$

Summit Salary $=3 x+4000$
$34000+4000=38000$
13. If $A: B: C=2: 3: 4$, then find
$\frac{\mathrm{A}}{\mathrm{B}}: \frac{\mathrm{B}}{\mathrm{C}}: \frac{\mathrm{C}}{\mathrm{A}}$
A. $5: 9: 24$
B. $6: 9: 24$
C. 7:9:24
D. 8:9:24

Answer: D

## Explanation:

Let $A=2 x, B=3 x, C=4 x$, then, $\frac{A}{B}=\frac{2 x}{3 x}=\frac{2}{3}$

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$\frac{B}{C}=\frac{3 x}{4 x}=\frac{3}{4}$
$\frac{\mathrm{C}}{\mathrm{A}}=\frac{4 \mathrm{x}}{2 \mathrm{x}}=\frac{3}{4}$
$\Rightarrow \frac{A}{B}: \frac{B}{C}: \frac{C}{A}$
$=\frac{2}{3}: \frac{3}{4}: \frac{2}{1}$
$=8: 9: 24$
14. The least whole number which when subtracted from both the terms of the ratio $\mathbf{6 : 7}$ to give a ratio less than 16 : 21 , is
A. 3
B. 4
C. 5
D. 6

Answer: A

## Explanation:

Let x is subtracted.
Then, $\frac{(6-x)( }{(7-x)}<\frac{16}{21}$
$21(6-x)<16(7-x)$
$=>5 x>14=x>2.8$

Least such number is 3
15. in a mixture 60 liters, the ratio of milk and water $2: 1$. If this ratio is to be $1: 2$, then the quantity of water to be further added is
A. 20 liters
B. 30 liters
C. 50 liters
D. 60 liters

## Answer: D

## Explanation:

Quantity of Milk $=60^{*}\left(\frac{2}{3}\right)=40$ liters

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Quantity of water $=60-40=20$ liters

As per question we need to add water to get quantity $2: 1$
$\Rightarrow \frac{40}{(20+x)}=\frac{1}{2}$
$\Rightarrow 20+x=80$
$\Rightarrow x=60$ liters
16. The sum of three numbers is 98 . If the ratio of the first to the second is $2: 3$ and that of the second to the third is $5: 8$, then the second number is
A. 10
B. 25
C. 1997
D. 1998

Answer: D

## Explanation:

$a: b=2: 3$
$\mathrm{b}: \mathrm{c}=5: 8=\left(5 * \frac{3}{5}: 8 * \frac{3}{5}\right)$
$=3: \frac{24}{5}$
$\mathrm{a}: \mathrm{b}: \mathrm{c}=2: 3: \frac{24}{5}$
$=10: 15: 24$
$B=98 * \frac{15}{49}$
$=30$
17. In a college, the ratio of the number of boys to girls is 8 : 5 . If there are $\mathbf{2 0 0}$ girls, the total number of students in the college is
A. 420
B. 520
C. 620
D. 720

Answer: B

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## Explanation:

Let the boy are 8 x and Girls are 5 x
$\Rightarrow 5 x=200 \Rightarrow x=40$
Total students $=8 x+5 x=13 x=13(40)=520$
18. if $x: y=1: 3$, then find the value of $(7 x+3 y):(2 x+y)$
A. $14: 5$
B. $15: 5$
C. $16: 5$
D. 17:5

Answer: C
Explanation:
Let $x=1 k$ and $y=3 k$, so
$=\frac{7(k)+3(3 k)}{2(k)+1(3 k)}$
$=\frac{16 \mathrm{k}}{5 \mathrm{k}}$
$=16: 5$
19. 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. 6:5

Answer: C
Explanation:
Let the third number be x .
First Number $\left(\frac{120}{100}\right) * x=\frac{6 X}{5}$
Second Number $\left(\frac{150}{100}\right) * x=\frac{3 X}{2}$
Ratio $=\frac{6 X}{\frac{5: 3 X}{2}}$

LESSONS

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=> 4:5
20. The salaries of $A, B$ and $C$ are of ratio 2:3:5. If the increments of $\mathbf{1 5 \%}, \mathbf{1 0 \%}$ and $\mathbf{2 0 \%}$ are done to their respective salaries, then find the new ratio of their salaries.
A. 20:33:60
B. $21: 33: 60$
C. $22: 33: 60$
D. 23:33:60

## Answer: D

## Explanation:

Let A salary be 2 k
B salary be $3 k$ and $C$ salary be $5 k$
A's new salary $=\frac{115}{100} * 2 k$
$=\frac{23}{10 \mathrm{~K}}$
B's new salary $=\frac{115}{100} * 3 \mathrm{k}$
$=\frac{33}{10 \mathrm{~K}}$
C's new salary $=\frac{120}{100} * * 5 \mathrm{k}$
$=6 \mathrm{k}$
New ratio $=: \frac{23}{10 \mathrm{~K}}: \frac{33}{10 \mathrm{~K}}: 6 \mathrm{k}$
$=23: 33: 60$
21. $A$ and $B$ together have Rs. 1210. If $4 / 15$ of $A$ 's amount is equal to $2 / 5$ of $B$ 's amount. How much $B$ amount has?
A. Rs 484
B. Rs. 480
C. Rs 478
D. Rs 470

Answer: A

Explanation:

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In this type of question, we will first try to calculate the ratio of two persons. Once we get ratio then we can easily get our answer. So let's solve this.
$\frac{4}{15} \mathrm{~A}=\frac{2}{5} \mathrm{~B}$
$A=\left(\frac{2}{5} * \frac{4}{14}\right) B$
$A=\frac{3}{2} B$
$\frac{A}{B}=\frac{3}{2}$
$A: B=3: 2$
B's Share $=\frac{2}{5} * 1210=484$
22. If three numbers in the ratio $3: 2: 5$ are such that the sum of their squares is 1862 , the middle number will be
A. 10
B. 14
C. 18
D. 22

Answer: B
Explanation:
Let the numbers be $3 x, 2 x$ and $5 x$.
Then,
$9 x+4 x+25 x=1862$
$\Rightarrow 38 \mathrm{x}=1862$
$\Rightarrow x=49 \Rightarrow x=7$.
Middle number $=2 x=14$
23. A dog takes 3 leaps for every 5 leaps of a hare. If one leap of the dog is equal to 3 leaps of the hare, the ratio of the speed of the dog to that of the hare is
A. $4: 5$
B. $9: 5$
C. $8: 5$

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D. $9: 2$

## Answer: B

## Explanation:

Dog: Hare $=\left(3^{*} 3\right)$ leaps of hare: 5 leaps of hare
= 9: 5
24. If $40 \%$ of a number is equal to two-third of another number, what is the ratio of first number to the second number?
A. $2: 5$
B. $2: 7$
C. $5: 7$
D. $5: 3$

Answer: D
Explanation:
Let the first number is $A$ and second number is $B$.

As per question
$\frac{40}{100} A=\frac{2}{3} B$
$\frac{A}{B}=\frac{2}{3} * \frac{40}{100}$
$\frac{A}{B}=\frac{5}{3}$
=> A: B=5:3
25. If Rs. 782 is divided into three parts, proportional to
$\frac{1}{2}: \frac{2}{3}: \frac{3}{4}$ find the first part.
A. 190
B. 204
C. 220
D. 230

Answer: B
Explanation:

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$\frac{1}{2}: \frac{2}{3}: \frac{3}{4}$
$=6: 8: 9$
First part $=782 * \frac{6}{23}$
$=204$
26. Find the fourth proportion to 2,3,6
A. 18
B. 12
C. 9
D. 4

Answer: C

## Explanation:

2:3:: 6: x
$\Rightarrow \frac{2}{3}=\frac{6}{X}$
$\Rightarrow x=\frac{18}{2}$
$\Rightarrow x=9$
27. If 2: 9: $x: 18$, then find the value of $x$
A. 2
B. 3
C. 4
D. 6

Answer: C

## Explanation:

Treat $2: 9$ as $\frac{2}{9}$ and $\mathrm{x}: 18$ as $\frac{X}{18}$, treat:: as
= So we get $\frac{2}{9}=\frac{X}{18}$
$\Rightarrow 9 x=36$
$\Rightarrow x=4$

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28. If $a: b=2: 3$ and $b: c=4: 3$, then find $a: b: c$
A. $8: 12: 9$
B. $2: 3: 8$
C. $2: 3: 9$
D. $2: 3: 12$

## Answer: C

Explanation:
$a: b=2: 3$
$\mathrm{b}: \mathrm{c}=4: 3=\left(4 * \frac{3}{4}: 3 * \frac{3}{4}\right)$
$=3: \frac{9}{4}$
$a: b: c=2: 3: \frac{9}{4}$
$=8: 12: 9$
29. Rs. 120 are divided among $A, B, C$ such that $A$ 's share is Rs. 20 more than $B$ 's and Rs. 20 less than C's. What is B's share?
A. Rs 10
B. Rs 20
C. Rs 24
D. Rs 28

Answer: B

Explanation:
Let $C=x$. Then $A=(x-20)$ and $B=(x-40)$.
$x+x-20+x-40=120$ or $x=60$.
$A: B: C=40: 20: 60=2: 1: 3$.
B's share $=$ Rs. $120^{*}\left(\frac{1}{6}\right)=$ Rs. 20
30. Two numbers are in the ratio 17: 45. One third of the smaller is less than one fifth of the larger by 15. The smaller number is,
A. $25 \frac{1}{2}$

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B. $86 \frac{1}{2}$
C. $67 \frac{1}{2}$
D. $76 \frac{1}{2}$

## Answer: D

## Explanation:

From first statement,
$\frac{\mathrm{S}}{\mathrm{L}}=\frac{17}{45^{\prime}}$, where S is the smaller and L is the larger number.
From second statement,
$\frac{1}{5} L-\frac{1}{3} S=15$,
From first relation,
$S=17 x$ and $L=45 x$, where $x$ is the HCF of $S$ and $L$
Putting these in last relation,
$9 x-\frac{1}{3} x=15$,
Or, $\frac{10}{3} x=15$,
Or, $x=\frac{9}{2}$
So,
$S=17 x=\frac{153}{2}=76 \frac{1}{2}$
31. Two numbers are in ratio of $3: 5$ and their LCM is 225 . The smaller number is,
A. 75
B. 45
C. 60
D. 90

Answer: B

## Explanation:

Problem analysis and execution Introducing the canceled out HCF as $x$ in the ratio we have the transformed ratio as $3 x: 5 x$ where the actual numbers are $3 x$ and $5 x$.

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Now applying the method of forming the LCM by multiplying the two numbers and excluding one occurrence of HCF from the product, we have,
$L C M=15 x=225$.
So $x=15$
Thus the smaller number is 45 .
32. A bag contains $50 \mathrm{P}, 25 \mathrm{P}$ and 10 P coins in the ratio 5: 9: 4, amounting to Rs. 206. Find the number of coins of each type respectively.
A. $360,160,200$
B. $160,360,200$
C. $200,360,160$
D. $200,160,300$

Answer: C

## Explanation:

Let ratio be x .
Hence no. of coins be $5 x, 9 x, 4 x$ respectively
Now given total amount $=$ Rs. 206
$\Rightarrow>(.50)(5 x)+(.25)(9 x)+(.10)(4 x)=206$
We get $\mathrm{x}=40$
=> No. of 50 p coins $=200$
=> No. of 25 p coins $=360$
=> No. of 10 p coins $=160$
33. Two numbers are respectively $\mathbf{2 0 \%}$ and $50 \%$ more than a third number. The ratio of the two numbers is:
A. $2: 5$
B. $3: 5$
C. $4: 5$
D. $5: 4$

Answer: C

## Explanation:

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Let the third number be $x$.
Then, first number $=120 \%$ of $\mathrm{x}=\frac{120}{100}=\frac{6 X}{5}$
Second number $=150 \%$ of $x=\frac{150}{100}=\frac{3 X}{2}$
Ratio of first two numbers $=\frac{6 X}{5}: \frac{3 X}{2}=12 x: 15 x=4: 5$
34. A mixture contains alcohol and water in the ratio 4: 3. If 5 liters of water is added to the mixture, the ratio becomes 4: 5. Find the quantity of alcohol in the given mixture.
A. 10
B. 12
C. 15
D. 18

Answer: A

## Explanation:

Let the quantity of alcohol and water be $4 x$ liters and $3 x$ liters respectively
$\frac{4 X}{(3 x+5)}=\frac{4}{5}$
$20 x=4(3 x+5)$
$8 x=20$
$x=2.5$

Quantity of alcohol = (4 x 2.5) liters = 10 liters.
35. A sum of Rs. 312 was divided among 100 boys and girls in such a way that the boy gets Rs. 3.60 and each girl Rs. 2.40 the number of girls is
A. 35
B. 40
C. 45
D. 50

Answer: B

## Explanation:

Step (i): Let $x$ be the number of boys and $y$ be the number of girls.

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Given total number of boys and girls = 100
$x+y=100$
Step (ii): A boy gets Rs. 3.60 and a girl gets Rs. 2.40
The amount given to 100 boys and girls = Rs. 312
$3.60 x+2.40 y=312$
Step (iii):
Solving (i) and (ii)
$3.60 x+3.60 y=360$--------- Multiply (i) by 3.60
$3.60 x+2.40 y=312$ (ii)
$1.20 y=48$
$y=\frac{48}{1.20}$
$=40$
Number of girls $=40$
36. If Rs. 782 be divided into three parts, proportional to 12:23:34, then the first part is?
A. Rs. 182
B. Rs. 190
C. Rs. 192
D. Rs. 204

Answer: D
Explanation:
Rs. $\left(782 * \frac{6}{23}\right)$
Given ratio $=\frac{1}{2}: \frac{2}{3}: \frac{3}{4}=6: 8: 9$
1st part $=$ Rs. $\left(782 * \frac{6}{23}\right)=$ Rs. 204
36. The compounded ratio of (2: 3), (6:11) and (11:2) is
A. $1: 2$
B. $2: 1$

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C. $11: 24$
D. $36: 121$

## Answer: B

## Explanation:

Compounded Ratio: When we compound two or more ratios with each other through product or multiplication, the result is simply a compound ratio.

Thus, the product of two or more ratios; i.e., $\mathrm{a} \mathrm{b}: \mathrm{c} \mathrm{d}$ is a ratio compounded of the simple ratios $\mathrm{a}: \mathrm{c}$ and b : d.

Required compounded ratio $=\left(\frac{2}{3} \times \frac{6}{11} \times \frac{11}{2}\right)=\frac{2}{1}$.
37. If 0.75 : $x:=5: 8$, then $x$ is equal to:
A. 1.12
B. 1.16
C. 1.20
D. 1.30

Answer: C
Explanation:
$(X * 5)=(0.75 * 8)$
$X=\frac{6}{5}=1.20$
38. A sum of Rs. 427 is to be divided among $A, B$ and $C$ such that 3 times A's share, 4 tunes $B$ 's share and 7 times C's share are all equal. The share of $C$ is:
A. 84
B. 140
C. 196
D. 240

Answer: A
Explanation:
$3 \mathrm{~A}=4 \mathrm{~B}=7 \mathrm{C}=\mathrm{k}$, Then $\mathrm{A}=\frac{K}{3}, \mathrm{~B}=\frac{K}{4}$ and $\mathrm{C}=\frac{K}{7}$.
A: $\mathrm{B}: \mathrm{C}=: \frac{K}{3}: \frac{K}{4}: \frac{K}{7}=28: 21: 12 . \frac{K}{3}$

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Cs share $=$ Rs. $\left[427 \times\left(\frac{12}{61}\right)\right]=$ Rs. 84
39. The salaries of $A, B$, and $C$ are in the ratio of $1: 2$ : 3. The salary of $B$ and $C$ together is Rs. 6000. By what percent is the salary of $C$ more than that of $A$ ?
A. $100 \%$
B. $200 \%$
C. $300 \%$
D. $600 \%$

Answer: B

## Explanation:

Let the salaries of $A, B, C$ be $x, 2 x$ and $3 x$ respectively.
Then, $2 x+3 x=6000 \Rightarrow>x=1200$.
A's salary = Rs. 1200, B's salary = Rs. 2400, and Cs salary Rs. 3600.

## TM

Excess of C's salary over A's $=\left[\left(\frac{2400}{1200}\right) \times 100\right]=200 \%$.
40. In a zoo, there are rabbits and pigeons. If heads are counted, there are 340 heads and if legs are counted there are 1060 legs. How many pigeons are there?
A. 120
B. 150
C. 170
D. 180

Answer: B

## Explanation:

Suppose there are all the pigeons then total no of heads are 340 and total no of legs are 680.
Now, since 380 (1060-680) legs are extra, it means there will be $190(380 / 2)$ rabbits. As we know a rabbit has two extra legs than that of a pigeon.

Therefore, number of rabbits $=190$

And number of pigeons $=340-190=150$
41. The third proportional to 9 and 12 is?
A. 14
B. 16

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C. 18
D. 20

Answer: B

## Explanation:

Let the third proportion to $9 \& 12$ be ' $x$ '.
$\Rightarrow 9: 12=12: p$
$\Rightarrow p=\frac{12}{9}=16$.
42. The students in 3 classes are in the ratio 3:4:5.If 20 students added in each class, the ratio becomes 5:6:7. Find the total no of students in all the 3 classes now?
A. 160
B. 170
C. 180
D. 200

Answer: C
Explanation:
$5 x+6 x+7 x+18 x=180$
$X=10$
Check $3 x+4 x+5 x=12 x=120$
$120+60=180$
43. Two equal containers are filled with water and acid. The concentration of acid in each container is $\mathbf{2 0 \%}$ and $\mathbf{3 0 \%}$. What is the ratio of water in both the containers respectively?
A. $7: 8$
B. $8: 7$
C. $6: 4$
D. $3: 2$

Answer: B

## Explanation:

Acid: 2030
Water: 8070 => 8:7

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44. A horse takes 8 steps for every 5 steps of a fox, but 6 steps of a fox are equal to the 3 steps of the horse. What is the ratio of the speed of horse to the fox?
A. $16: 5$
B. $20: 19$
C. $18: 23$
D. 17:21

Answer: B

## Explanation:

6 step fox=3 step horse $=2: 1$
16 step fox=8step horse $=5$ step fox
16 step fox=5 step fox
16:5
45. The ratio of age of Krish and her mother is $5: 12$ and difference of their ages is 21 . What will be the ratio of their ages after 3 years?
A. $7: 15$
B. $11: 5$
C. $13: 7$
D. $9: 13$

Answer: D

## Explanation:

$12 x-5 x=>7 x=21$
$X=\frac{21}{7}$
Present ratio $=15: 36$

After 3 years $=18: 39=6: 13$
46. A started a business with Rs. 32,000 after 4 months B joins with the business by investing Rs. 48,000. At the end of the year, in what ratio should share their profit?
A. $8: 7$
B. $7: 6$
C. $5: 7$
D. $9: 5$

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## Answer: A

## Explanation:

32000*12: 48,000*8 = 32*12: 42*8
384: $384=1: 1$
47. A working partner gets $\mathbf{2 5 \%}$ as his commissions after his commissions paid that is equal to Rs.7500, then what is the total profit?
A. Rs.32,000
B. Rs. 30,000
C. Rs.37,500
D. Rs. 40,000

Answer: C

## Explanation:

X = total profit
$\frac{25}{100} A=\pi r^{2 *}[\mathrm{x}-7500]=7500$
$X-7500=\frac{7500 * 100}{25}=30,000$
$x=37,500$
48. Equal quantities of 3 mixtures of milk and water are mixed in the ratio 1:3, 2:3 and 3:4.The ratio of water and milk in the new mixture is
A. $45: 76$
B. $151: 269$
C. $123: 154$
D. $145: 245$

Answer: B

## Explanation:

Milk $=\frac{1}{4}: \frac{2}{5}: \frac{3}{7}$
$=\frac{35}{140}: \frac{56}{140}: \frac{60}{140}$
Quantity of milk in new mix $=35+56+60=151$

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Quantity of water in new mix $=140 * 3=420-151=269$
$M: W=151: 269$
49. The speed of $P, Q$ and $R$ are in the ratio of 2:3:6, what is the ratio of time taken by each one of them for the same distance?
A. $5: 7: 2$
B. $3: 2: 4$
C. $1: 2: 3$
D. $3: 2: 1$

## Answer: D

## Explanation:

Seed $=\frac{1}{2}: \frac{1}{3}: \frac{1}{6}$
$=\frac{3}{6}: \frac{2}{6}: \frac{1}{6}$
Time $=3: 2: 1$
50. The ratio of income of $X$ and $Y$ is 4:3. The sum of their expenditure is Rs. 12,000 and the amount of savings is $X$ is equal to the amount of expenditure of What is the salary of $Y$ ?
A. 9000
B. 7000
C. 12000
D. 15000

Answer: A

## Explanation:

$X^{\prime}$ 's saving $=$ Expenditure of $Y=S$
$4 x-S+S=12000$
$X=3000$
$3 x=3 * 3000=9000$

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