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PREVIOUS EXAMS SOLVED PAPERS

Quantitative Aptitude

Key Highlights

- ▶ Coverage of Past Examination Questions with Solutions
- ▶ Coverage of Additional Questions for Exam in Selected Chapters
- ▶ Chapter-wise Marks Distribution of Past Exams
- ▶ Chapter-wise Mapping with Study Material of ICAI

Kailash Thakur



9th Edition

AS PER
NEW SCHEME OF ICAI

APPLICABLE FOR
JUNE 2024
ONWARD EXAMS

PAPER-3

Calculator & Shortcut Tricks are given



PREVIOUS EXAMS SOLVED PAPERS

QUANTITATIVE
APTITUDE



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Quantitative Aptitude

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TaxMann®

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CHAPTER-WISE MARKS DISTRIBUTION

S. No.	Chapter	2018		2019		2020	2021			2022		2023	Average
		J	D	J	D	D	Jan	July	D	J	D	J	
1	Ratio & Proportion	1	2	1	1	3	3	3	3	2	1	-	1.81
2	Indices	1	1	2	2	1	1	1	4	2	1	3	1.72
3	Logarithm	2	1	2	2	2	1	1	2	2	2	2	1.72
4	Linear Equation	2	-	1	1	0	0	-	1	2	3	2	1.09
5	Quadratic Equation	3	2	1	3	4	3	4	2	1	2	2	2.45
6	Inequalities	1	1	3	1	1	1	1	2	1	1	2	1.36
7	Mathematics of Finance - Simple Interest	1	3	4	5	1	3	2	1	3	1	1	2.27
8	Mathematics of Finance - Compound Interest	2	11	3	7	6	7	5	4	3	8	5	5.54
9	Mathematics of Finance - Annuity	3	-	3	1	4	4	7	1	8	5	8	4.00
10	Permutations and Combinations	2	4	4	4	4	6	4	4	7	4	4	4.27
11	Sequence & Series	4	4	4	4	3	3	3	3	4	2	3	3.36
12	Sets, Function and Relation	3	4	5	2	4	3	4	3	3	3	5	3.54
13	*Calculus (Limit & Continuity)												
14	Differential Calculus	1	2	2	3	2	1	3	3	1	3	3	2.18
15	Integration	3	2	3	3	3	1	1	1	2	3	1	2.09
16	Number Series, Coding & Decoding	3	5	4	5	4	5	5	5	5	6	5	4.72
17	Direction Tests	6	5	4	6	4	3	4	8	5	5	4	4.90
18	Seating Arrangement	5	3	4	2	5	4	4	3	4	2	4	3.63
19	Blood Relations	4	4	4	4	3	4	4	5	5	7	7	4.63
20	Description of Data	4	7	5	4	7	10	8	5	8	4	5	6.09
21	Central Tendency	5	7	5	7	11	4	4	10	6	8	8	6.81
22	Measures of Dispersion	2	4	8	8	1	5	7	1	5	8	6	5.00
23	Probability	7	6	5	3	4	6	6	4	6	7	5	5.36

Sl. No.	Chapter	2018		2019		2020	2021			2022			Average
		J	D	J	D	D	Jan	July	D	J	D	J	
24	Probability (Theoretical) Distribution	6	5	4	7	7	4	5	8	5	4	6	5.5
25	Sampling Theory of Estimation												
26	Correlation	3	1	4	3	3	2	1	1	4	2	2	2.8
27	Regression Analysis	5	5	2	2	-	3	4	3	1	3	3	2.8
28	Index Numbers	3	3	4	3	3	3	4	5	5	5	4	4.2

Note : J: June; D: December

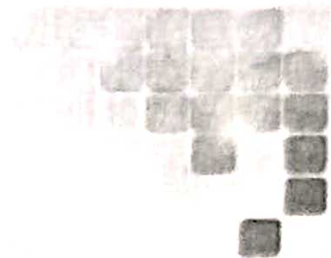
* Chapter 13 & Chapter 25 are newly added Chapters in Syllabus.

CHAPTER-WISE COMPARISON WITH STUDY MATERIAL

No.	Name of Chapter	Study Material Chapter
1	Ratio & Proportion	1
2	Indices	1
3	Logarithm	1
4	Linear Equation	2
5	Quadratic Equation	2
6	Inequalities	3
7	Mathematics of Finance - Simple Interest	4
8	Mathematics of Finance - Compound Interest	4
9	Mathematics of Finance - Annuity	4
10	Permutations and Combinations	5
11	Sequence & Series	6
12	Sets, Function and Relation	7
13	Calculus (Limit & Continuity)	7
14	Differential Calculus	8
15	Integration	8
16	Number Series, Coding & Decoding	9
17	Direction Tests	10
18	Seating Arrangement	11
19	Blood Relations	12
20	Description of Data	13
21	Central Tendency	14
22	Measures of Dispersion	14
23	Probability	15
24	Probability (Theoretical) Distribution	16
25	Sampling Theory of Estimation	

No.	Name of Chapter	Study Material Chapter
26	Correlation	17
27	Regression Analysis	17
28	Index Numbers	18

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CHAPTER

RATIO & PROPORTION

RATIO

The comparison of two or more things of same kind is called RATIO. If x and y are two values of same kind (in same units), then the ratio of x to y is written as $x : y$ and read as x is to y .

In $\frac{x}{y}$

- ◆ Numerator “ x ” is called **1st term or Antecedent** and
- ◆ Denominator “ y ” is called **2nd term or Consequent**.
- ◆ Antecedent and Consequent must be of **same units**
- ◆ Ratio has no unit.

Remarks:

1. Normally a ratio is expressed in simplest form. As. $10 : 16 = 5 : 8$.
2. The order of the terms in a ratio must be maintained. As $3 : 4$ is not same as $4 : 3$.
3. Ratio exists only with quantities having same unit (kind).
4. (i) If $x > y$, then the ratio $x : y$ is called of **greater inequality**.
(ii) If $x < y$, then the ratio $x : y$ is called of **lesser inequality**.
(iii) If $x = y$, then the ratio $a : b$ is called ratio of **Equal Equality**.
5. (i) **Duplicate ratio** of $a : b$ is $a^2 : b^2$
(ii) **Triplicate ratio** of $a : b$ is $a^3 : b^3$
(iii) **Sub-Duplicate ratio** of $a : b$ is $\sqrt{a} : \sqrt{b} = a^{1/2} : b^{1/2}$
(iv) **Sub-Triplicate ratio** of $a : b$ is $\sqrt[3]{a} : \sqrt[3]{b} = a^{1/3} : b^{1/3}$

6. Inverse ratio of $x : y$ is $y : x$.

7. (i) *Commensurable* : If the terms of the ratio are integers, the ratio is called commensurable. As. $3 : 2$

(ii) *Incommensurable* : If the terms of the ratio are not integers, the ratio is called Incommensurable.

As. $\sqrt{3} : \sqrt{2}$ cannot be expressed in terms of integers. So, it is Incommensurable.

8. Compound/Combined Ratio = Product of all ratios.

PROPORTION

An equality of two ratios is called Proportion. Four quantities a, b, c, d are said to be in proportion if $a : b = c : d$.

It is also written as

$$a : b :: c : d$$

Here a, b, c, d are called 1st; 2nd; 3rd and 4th term of proportionals respectively

$$\text{If, } \frac{a}{b} = \frac{c}{d} \Rightarrow ad = bc.$$

\therefore Product of extreme terms = Product of middle terms.

This rule is called **Cross - Product Rule**.

In $a : b :: c : d$ proportion, unit of a and b should be same and that of c and d should also be same.

As. ₹ 6 : ₹ 8 = 12 toffees : 16 toffees are in proportion.

Let a, b and c are of same kind (in same units).

$$\text{If } \frac{a}{b} = \frac{b}{c} \Rightarrow a : b :: b : c$$

i.e. a, b, c are in proportion.

Then, this proportion is called **continuous proportion**.

Here a is 1st proportion c is called 3rd proportion and b is called mean proportion.

$$\therefore b = \sqrt{ac} = \text{GM of } a \text{ \& } c.$$

Properties of Proportion**1. Cross - Product**If $a : b :: c : d$,

$$= \frac{a}{b} = \frac{c}{d} \therefore ad = bc.$$

2. InvertendoIf $a : b :: c : d$, Then its inverse $b : a :: d : c$ also becomes in proportion.

$$\text{i.e. If } \frac{a}{b} = \frac{c}{d} \quad \text{Then, } \frac{b}{a} = \frac{d}{c}.$$

3. ComponendoIf $a : b :: c : d$,Then $a + b : b :: c + d : d$.

$$\text{Proof: } \frac{a}{b} + 1 = \frac{c}{d} + 1 \Rightarrow \frac{a+b}{b} = \frac{c+d}{d}.$$

4. DividendoIf $a : b = c : d$,Then $a - b : b = c - d : d$.

$$\text{Proof: } \frac{a}{b} = \frac{c}{d} \Rightarrow \frac{a}{b} - 1 = \frac{c}{d} - 1$$

$$\text{or } \frac{a-b}{b} = \frac{c-d}{d}$$

5. Componendo and DividendoIf $a : b :: c : d$; Dividing (3) by (4)

$$\text{Then, } \frac{a+b}{a-b} = \frac{c+d}{c-d}.$$

6. AlternendoIf $a : b :: c : d$,Then $a : c :: b : d$.*i.e.* ratio of alternate terms are also in proportion.**7. Addendo**If $a : b = c : d = e : f = \dots$

Solution : If $A : B = 2 : 5$ Then

$$\frac{10A + 3B}{5A + 2B} = \frac{10 \times 2 + 3 \times 5}{5 \times 2 + 2 \times 5} = \frac{35}{20} = \frac{7}{4}$$

$$= 7 : 4$$

(a) is correct

Q.4. In a film shooting, A and B received money in a certain ratio and B and C also received the money in the same ratio. If A gets ₹1,60,000 and C gets ₹2,50,000. Find the amount received by B ?

- (a) ₹2,00,000 (b) ₹2,50,000
(c) ₹1,00,000 (d) ₹1,50,000

[June 2011]

Solution : Detail Method

$$A : B = B : C$$

$$\text{So, } B^2 = AC ;$$

$$\text{So, } B$$

$$= \sqrt{AC} = \sqrt{1,60,000 \times 2,50,000}$$

$$= 400 \times 500 = 2,00,000$$

Q.5. The ratio compounded of 4:5 and sub-duplicate of "a" : 9 is 8:15. Then value of "a" is

- (a) 2 (b) 3
(c) 4 (d) 5

[Dec. 2011]

Solution : (c) $\frac{4}{5} \times \sqrt{\frac{a}{9}} = \frac{8}{15}$

or $\frac{4}{5} \times \frac{\sqrt{a}}{3} = \frac{8}{15}$

$$\therefore \sqrt{a} = 2 \Rightarrow a = 4$$

\therefore (c) is correct

Q.6. If X varies inversely as square of Y and given that Y = 2 for X = 1, then the value of X for Y = 6 will be

- (a) 3 (b) 9
(c) 1/3 (d) 6

[Dec. 2011]

Solution : (d) is correct

$$x \propto \frac{1}{y^2} \Rightarrow x = K \cdot \frac{1}{y^2} \Rightarrow x = \frac{k}{y^2}; \text{ where}$$

k = proportional constant

$$\text{When } x = 1 \text{ Then } y = 2$$

$$\therefore 1 = \frac{k}{2^2} \Rightarrow k = 4 \therefore x = \frac{4}{y^2}$$

$$\text{When } y = 6, \text{ Then } x = \frac{4}{6^2} = \frac{1}{9}$$

$$\therefore x = \frac{1}{9}$$

Q.7. Which of the numbers are not in proportion ?

- (a) 6,8,5,7 (b) 7,14,6,12
(c) 18,27,12,18 (d) 8,6,12,9

[June 2012]

Solution : (a) Go by choices

$$\text{For (a) } \frac{6}{8} = \frac{3}{4} \neq \frac{5}{7}$$

\therefore (a) is not in proportion

Q.8. Find two numbers such that mean proportional between them is 18 and third proportional between them is 144

- (a) 9 ; 36 (b) 8 ; 32
(c) 7 ; 28 (d) 6 ; 14

[Dec. 2012]

Solution : (a) is correct

Tricks : Go by choices

For (a) Mean Proportional of 9 and 36

$$= \sqrt{9 \times 36} = 18$$

It satisfies 1st condition.

If 144 is its 3rd condition.

$$36^2 = 9 \times 144$$

It also satisfies the 2nd Condition.

Q.9. Triplicate ratio of 4 : 5 is

- (a) 125 : 64 (b) 16 : 25
(c) 64 : 125 (d) 120 : 46

[June 2013]

Solution : (c) Triplicate ratio of 4:5

$$= 4^3 : 5^3 = 64 : 125$$

Q.10. The mean proportion between 24 and 54 is _____

- (a) 33 (b) 34
(c) 35 (d) 36

[June 2013]

Solution : (d) Mean - Proportion

$$= \sqrt{24 \times 54} = 36$$

Q.11. The ratio of numbers is 1 : 2 : 3 and sum of their squares is 504 then the numbers are

- (a) 6,12,18 (b) 3,6,9
(c) 4,8,12 (d) 5,10,15

[Dec. 2013]

Solution : (a) is correct

Tricks : Go by choices

$$6:12:18 = 1:2:3 \text{ (True)}$$

$$\text{and } 6^2 + 12^2 + 18^2 = 504 \text{ (True)}$$

Q.12. If P is 25% less than Q and R is 20% higher than Q the Ratio of R and P

- (a) 5:8 (b) 8:5
(c) 5:3 (d) 3:5

[Dec. 2013]

Solution : (b) is correct

$$\text{Let } Q = 100, \text{ So, } P = 100 - 25 = 75$$

$$\& R = 100 + 20 = 120$$

$$\frac{R}{P} = \frac{120}{75} = \frac{8}{5}$$

Q.13. A person has assets worth ₹1,48,200. He wish to divide it amongst his wife, son and daughter in the ratio 3 : 2 : 1 respectively. From this assets the share of his son will be

- (a) ₹ 74,100 (b) ₹ 37,050
(c) ₹ 49,400 (d) ₹ 24,700

[June 2014]

Solution : (c) is correct

$$\begin{aligned} \text{Share of son} &= \frac{2}{3+2+1} \times 1,48,200 \\ &= ₹49,400 \end{aligned}$$

Q.14. If $x : y = 2 : 3$ then $(5x+2y) :$

- (3x - y) =
(a) 19 : 3 (b) 16 : 3
(c) 7 : 2 (d) 7 : 3

[June 2014]

Solution : (b) is correct

$$\frac{5x+2y}{3x-y} = \frac{5 \times 2 + 2 \times 3}{3 \times 2 - 3} = \frac{16}{3}$$

Q.15. The first, second and third month salaries of a person are in the ratio 2:4:5. The difference between the product of the salaries of first 2 months & last 2 months is ₹4,80,00,000. Find the salary of the second month

- (a) ₹ 4,000 (b) ₹ 6,000
 (c) ₹ 12,000 (d) ₹ 8,000

[Dec. 2014]

Solution : (d) is correct

Let x is common in the ratio.

1st, 2nd and 3rd month salaries of a person = 2x ; 4x ; 5x

:- From Qts.

$$4x \times 5x - 2x \times 4x = 4,80,00,000.$$

$$\text{or, } 12x^2 = 4,80,00,000.$$

$$\text{or, } x^2 = 4000000$$

$$x = 2000.$$

$$\therefore 2^{\text{nd}} \text{ month salary} = 4x = 4 \times 2000 = ₹ 8000$$

Q.16. $15(2p^2 - q^2) = 7pq$, where p, q are positive then p : q

- (a) 5:6 (b) 5:7
 (c) 3:5 (d) 3:7

[June 2015]

Solution : (a) is correct

$$15(2p^2 - q^2) = 7pq$$

Tricks : Go by choices

For (a) put p = 5; q = 6 we get

$$15[2 \times 5^2 - 6^2] = 3 \times 5 \times 6$$

$$\text{or } 15 \times 14 = 210$$

$$\text{or } 210 = 210$$

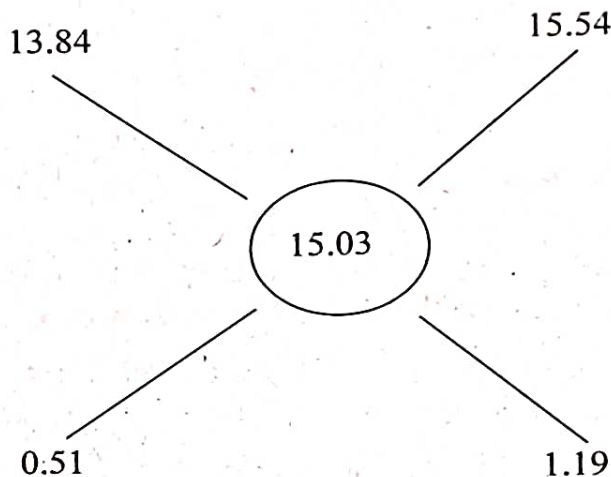
Q.17. If one type of rice of cost ₹13.84 is mixed with another type of rice of cost ₹15.54, the mixture is sold at ₹17.60 with a profit of 14.6% on selling price then in which proportion the two types of rice mixed ?

- (a) 3:7 (b) 5:7
 (c) 7:9 (d) 9:1

[June 2015]

Solution : Cost of mixture per kg = 17.60 - 14.6% = 15.0304 = 15.03 (approx.)

By rules of Alligation



$$51:119 = 3:7$$

Go by choices

(a) is correct (approx)

Q.18. Find the ratio of third proportional of 12 ; 30 and mean proportional of 9 ; 25 :

- (a) 7 : 2 (b) 5 : 1
 (c) 9 : 4 (d) None of these

[Dec. 2015]

Solution : 3rd proportional = $\frac{30^2}{12} = 75$

$$\text{Mean Proportional} = \sqrt{9 \times 25} = 15$$

$$\text{Ratio} = \frac{75}{15} = 5:1$$

(b) is correct

Q.19. What must be added to each of the numbers 10, 18, 22, 38 to make them proportional:

- (a) 5 (b) 2
(c) 3 (d) 9

[Dec. 2015]

Solution : (b) is correct

let x be added.

$$\therefore \frac{10+x}{18+x} = \frac{22+x}{38+x}$$

Tricks: Go by choices.

 $\therefore x = 2$ satisfies it.

Q.20. x, y, z together starts a business, if x invests 3 times as much as y invests and y invests two third of what z invests, then the ratio of capitals of x, y, z is _____

- (a) 3 : 9 : 2 (b) 6 : 3 : 2
(c) 3 : 6 : 2 (d) 6 : 2 : 3

[June 2016]

Solution : (d)

Detail Method

$$x = 3y \Rightarrow \frac{x}{y} = \frac{3}{1} \Rightarrow x : y = 3 : 1$$

$$\text{and } y = \frac{2}{3}z \Rightarrow y : z = 2 : 3$$

$$x : y = 3 : 1] \times 2$$

$$y : z = 2 : 3$$

$$\Rightarrow x : y = 6 : 2$$

$$y : z = 2 : 3$$

$$x : y : z = 6 : 2 : 3$$

(d) is correct

Tricks: Go by choices

$$6 = 3 \times 2 \text{ and } 2 = 3 \times \frac{2}{3}$$

Q.21. A bag contains 23 number of coins in the form of 1 rupee, 2 rupee

and 5 rupee coins. The total sum of the coins is ₹43. The ratio between 1 rupee and 2 rupees coins is 3 : 2. Then the number of 1 rupee coins is

- (a) 12 (b) 8
(c) 10 (d) 16

[Dec. 2016]

Solution : (a)

Tricks : Go by choices

Let option (a) is correct.

Let x is common in the ratio.

$$\text{So, ₹1 coins} = 3x = 12 ; \text{ So, } x = 4$$

$$\text{No. of ₹2 coins} = 2 \times 4 = 8$$

$$\text{Hence No. of coins of ₹5 coins} = 23 - 12 - 8 = 3$$

$$\text{Total money} = 12 \times 1 + 8 \times 2 + 3 \times 5 = ₹43 \text{ Satisfied.}$$

So (a) is correct

Detail Method:

Let x is common in the ratio.

$$\therefore \text{No. of ₹1 coins \& ₹2 coins are } 3x; 2x$$

$$\therefore \text{No. of ₹5 coins} = 23 - 3x - 2x = 23 - 5x$$

Total Sum

$$= 3x \times 1 + 2x \times 2 + (23 - 5x) \times 5 = 43$$

$$7x - 25x + 115 = 43$$

$$\text{or } 115 - 43 = 18x$$

$$\text{or } 72 = 18x$$

$$\text{or } x = 4$$

$$\therefore \text{No. of ₹1 coins}$$

$$= 3x$$

$$= 3 \times 4$$

$$= 12$$

Q.22. If $a : b = 2 : 3$, $b : c = 4 : 5$, $c : d = 6 : 7$ then $a : d$ is _____

- (a) 24 : 35 (b) 8 : 15
(c) 16 : 35 (d) 7 : 15

[June 2017]

Solution : Option (c) is correct.

Multiply all ratios.

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

$$= \frac{2}{3} \times \frac{4}{5} \times \frac{6}{7} = \frac{16}{35}$$

Q.23. The ratio of the number of five rupee coins to number of ten rupee coins is 8: 15. If the total value of five rupee coins is 360, then the no. of ten rupee coins is _____

- (a) 72 (b) 60
(c) 150 (d) 135

[Dec. 2017]

Solution : Option (d) is correct.

Total No. of ₹5 coins = $360/5 = 72$

Let x is common in the ratio.

So, ₹5 coins = $8x = 72$; So, $x = 9$

No. of ₹ 10 coins = $15 \times 9 = 135$

Q.24. If $\frac{1}{2}, \frac{1}{3}, \frac{1}{5}, \frac{1}{x}$ are in proportion then $x =$

- (a) $\frac{15}{2}$ (b) $\frac{3}{15}$
(c) $\frac{2}{15}$ (d) $\frac{1}{15}$

[Dec. 2017]

Solution : Option (a) is correct.

Product of middle two terms
= Product of extremes

$$\text{So, } \frac{1}{2x} = \frac{1}{15}; x = 15/2$$

Q.25. If $(a + b) : (b + c) : (c + a) = 7 : 8 : 9$ and $a + b + c = 18$ then $a : b : c =$

- (a) 5 : 4 : 3 (b) 3 : 4 : 5
(c) 4 : 3 : 5 (d) 4 : 5 : 3

[June 2018]

Solution : (c) is correct.

Tricks: Go by choices.

(c) Let $a : b : c = 4 : 3 : 5$

It is in ratio. So, it should must satisfy given ratio $(a + b) : (b + c) : (c + a) = 7 : 8 : 9$ i.e. $(4 + 3) : (3 + 5) : (5 + 4) = 7 : 8 : 9$ (True) Avoid 2nd condition.

In detail method it will take too much time.

Q.26. If $p : q$ is the sub-duplicate ratio of $p - x^2 : q - x^2$, then x^2 is :

- (a) $\frac{p}{p+q}$ (b) $\frac{q}{p+q}$
(c) $\frac{qp}{p-q}$ (d) None

[May 2018]

Solution : Detail Method:

$$\frac{\sqrt{p-x^2}}{\sqrt{q-x^2}} = \frac{p}{q}$$

Squaring on both side; we get

$$\frac{p-x^2}{q-x^2} = \frac{p^2}{q^2}$$