



GROUP - D

RAILWAY RECRUITMENT BOARD

Quantitative Aptitude - I



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SIMPLIFICATION

Fraction

$1 = 100\%$

$\frac{1}{2} = 50\%$

$\frac{1}{3} = 33.33\%$

$\frac{1}{4} = 25\%$

$\frac{1}{5} = 20\%$

$\frac{1}{6} = 16.66\%$

$\frac{1}{7} = 14.28\%$

$\frac{1}{8} = 12.5\%$

$\frac{1}{9} = 11.11\%$

$\frac{1}{10} = 10\%$

$\frac{1}{11} = 9.09\%$

$\frac{1}{12} = 8.33\%$

$\frac{1}{13} = 7.69\%$

$\frac{1}{14} = 7.14\%$

$\frac{1}{15} = 6.66\%$

$\frac{1}{16} = 6.25\%$

$\frac{1}{17} = 5.88\%$

$\frac{1}{18} = 5.56\%$

$\frac{1}{19} = 5.26\%$

$\frac{1}{20} = 5\%$

$\frac{3}{8} = 37.5\%$

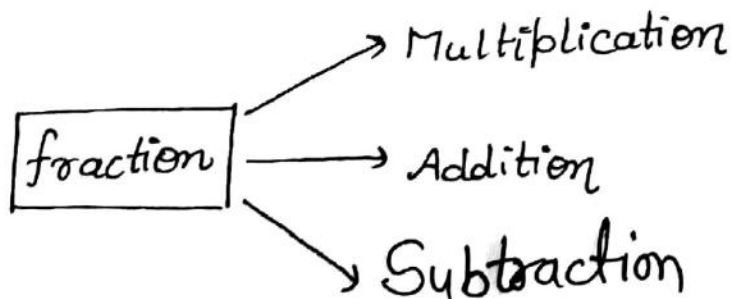
$\frac{5}{8} = 62.5\%$

$\frac{7}{8} = 87.5\%$

$\frac{5}{6} = 83.33\%$

$\frac{11}{12} = 91.67\%$

संजीवनी



शख भी बिकेगी; सोने के भाव, जल कर ली देख

Multiplication form:

(a) $\frac{1}{7} = 14.28\%$
 $\left(\times \frac{1}{2} \right)$
 $\rightarrow \frac{1}{14} = 7.14\%$

(b) $\frac{1}{4} = 25\%$
 $\left(\times \frac{1}{2} \right)$
 $\rightarrow \frac{1}{8} = 12.5\%$
 $\left(\times \frac{1}{2} \right)$
 $\rightarrow \frac{1}{16} = 6.25\%$

(c) $\frac{1}{6} = 16.66\%$
 $\left(\times \frac{1}{2} \right)$
 $\rightarrow \frac{1}{12} = 8.32\%$

(d) $\frac{1}{11} = 9.09\%$
 $\left(\times 2 \right)$
 $\rightarrow \frac{2}{11} = 18.18\%$

Addition form:

(a) 107.69%
 $\rightarrow 100\% + 7.69\%$
 $= 1 + \frac{1}{13} = 1\frac{1}{13}$

(b) 116.66%
 $\rightarrow 100\% + 16.66\%$
 $= 1 + \frac{1}{6} = 1\frac{1}{6}$

(c) 137.5%
 $\rightarrow 100\% + 37.5\%$
 $= 1 + \frac{3}{8} = 1\frac{3}{8}$

(d) 162.5%
 $\rightarrow 100\% + 62.5\%$
 $= 1 + \frac{5}{8}$
 $= 1\frac{5}{8}, \frac{13}{8}$

Subtraction form:

(a) 90.91%

→ 100% - 9.09%

→ $1 - \frac{1}{11}$

= $\frac{10}{11}$ Ans

(b) 87.5%

→ 100% - 12.5%

→ $1 - \frac{1}{8}$

= $\frac{7}{8}$ Ans

(c) 92.86%

→ 100% - 7.14%

$1 - \frac{1}{14}$

= $\frac{13}{14}$ Ans

Eg:- $\boxed{1}$. 28.56% of 35 + 87.5% of 32 = x

= $(2 \times \frac{1}{7}) \times 35 + (100\% - 12.5\%) \times 32 = x$

= $\frac{2}{7} \times 35 + (1 - \frac{1}{8}) \times 32$

= $\frac{2}{7} \times 35 + \frac{7}{8} \times 32$

= 10 + 28 = 38 Ans

$\boxed{2}$. 37.5% of 64 + 16.66% of 24 = $\sqrt{729} + x$

= $3(12.5\%) \times 64 + (\frac{1}{6}) \times 24 = 27 + x$

= $3 \times \frac{1}{8} \times 64 + \frac{1}{6} \times 24 = 27 + x$

$$= 24 + 4 = 27 + x$$

$$\boxed{x = 1}$$

3. 48% of 2434

$$\begin{array}{l} \wedge \\ 50\% - 2\% \end{array}$$

$$= 1217 - 48.68$$

$$= 1168.32 \text{ Ans}$$

$$100\% = 2434$$

$$50\% = 1217$$

$$1\% = 24.34$$

$$2\% = 48.68$$

4. 45% of 2460

$$\begin{array}{l} \wedge \\ 50\% - 5\% \end{array}$$

$$1230 - 123$$

$$= 1107 \text{ Ans}$$

$$100\% \rightarrow 2460$$

$$50\% \rightarrow 1230$$

$$5\% \rightarrow 123$$

5. 55% of 525

$$\begin{array}{l} \wedge \\ 50\% + 5\% \end{array}$$

$$262.5 + 26.25$$

$$= 288.75 \text{ Ans}$$

$$100\% \rightarrow 525$$

$$50\% \rightarrow 262.5$$

$$5\% = 26.25$$

6. 26% of 1248

$$\begin{array}{l} \wedge \\ 25\% + 1\% \end{array}$$

$$312 + 12.48$$

$$= 324.48 \text{ Ans}$$

$$100\% \rightarrow 1248$$

$$25\% \rightarrow \frac{1}{4} \times 1248 = 312$$

$$1\% = 12.48\%$$

7. $67.66\% \text{ of } 3369$

\swarrow
 $66.66\% + 1\%$
 $2246 + 33.69$
 $= 2279.69$ Ans

66.66%

$\hookrightarrow \frac{2}{3} \times 3369$
 $= 2 \times 1123$
 $= 2246$

Brahmastro-2

$x\% \text{ of } y = y\% \text{ of } x$

$\frac{x}{100} \times y = \frac{y}{100} \times x$ Both are same

How it's works :

***56% of 50**

$\rightarrow 56\% \text{ of } 50 = 50\% \text{ of } 56$

\downarrow
 Dimag ko Sochna
 Padega.

\downarrow
 Kuch bhi nahi Sochna,
 Direct

$= 28$ Ans.

68% of 150?

→ 150% of 68

100% → 68

50% → 34 +

102 Ans

90.6% of 16.67?

→ 16.67% of 90.6

$$\frac{1}{6} \times 90.6 = 15.1 \text{ Ans}$$

25.6% of 250?

→ 250% of 25.6

200% → 51.2

$$50\% \rightarrow \frac{12.8}{64.0} = 64 \text{ Ans}$$

Addition & Subtraction tricks

Q. [L.] $4859 + 6424 + 9234$

School Method

$$\begin{array}{r}
 \textcircled{0}\textcircled{0}\textcircled{0} \\
 4859 \\
 6424 \\
 + 9234 \\
 \hline
 20517 \text{ Ans}
 \end{array}$$

Sarkari Naukri lagane Wala Method

Q. $4859 + 6424 + 9234$

$$\begin{array}{r}
 4000 \\
 6000 \\
 \underline{9000} \\
 19000
 \end{array}
 +
 \begin{array}{r}
 800 \\
 400 \\
 \underline{200} \\
 1400
 \end{array}
 +
 \begin{array}{r}
 59 \\
 24 \\
 \underline{34} \\
 117
 \end{array}
 = 20517$$

Solve all Calculation in mind, not on pen & paper.

Solve in mind

1. $4600 + 8400 + 7600 = 20,600$

2. $3848 + 5238 - 3316 = 5,770$

3. $1184 + 1982 - 768 = 2398$

4. $2368 + 1464 + 108 - 29 = 3911$

5. $49352 + 61264 + 89316 = 1,99,932$

Multiplication trick

Multiply by 5

a) eg: 648×5

$$\frac{6480}{2} = 3240 \text{ Ans}$$

Helping hand

Multiply by 10 & then divide by 2; in mind not paper.

b) 3224×5

$$\rightarrow \frac{32240}{2} = 16120 \text{ Ans.}$$

c) 325×5

$$\rightarrow \frac{3250}{2} = 1625 \text{ Ans.}$$

d) 3223×5

$$= \frac{32230}{2} = 16115 \text{ Ans.}$$

Multiply by 25

eg: (a) 313×25

$$\rightarrow \frac{31300}{4} = 7825 \text{ Ans.}$$

Helping hand:
Multiply by 100 & then
divide by 4 in mind.

(b) 1816×25

$$\rightarrow \frac{181600}{4} = 45400 \text{ Ans.}$$

(c) 2131×25

$$\rightarrow \frac{213100}{4} = 53275 \text{ Ans.}$$

Multiply by 125:

e.g. (a) 417×125

$$\rightarrow \frac{417000}{8} = 52125 \text{ Ans.}$$

Multiply by 1000 & then divide by 8 in mind.

(b) 3728×125

$$\rightarrow \frac{3728000}{8} = 466000 \text{ Ans.}$$

Do not learn any other tricks for Multiplication.

Smart Division Method

Helpful in solving DI.

$$\frac{273}{741} \approx \frac{249}{700} \approx .355$$

$\xrightarrow{-41}$ Nearest 100 Multiple
 \rightarrow let's call it 42. $3 \rightarrow 42$
 $L \rightarrow 14$

\rightarrow Ratio of this fraction $\approx \frac{1}{3} \approx \left(\frac{250}{750}\right)$

$\frac{1}{3} \rightarrow 14$	\Rightarrow	Maintaining Ratio everywhere.
$\frac{1}{3} \rightarrow 42$		

Helping hand :

a) $\frac{273}{741} \approx \frac{\quad}{700}$

-41

Go to the nearest Multiple of 100.

(b) See the ratio of original fraction approximately.

$$\frac{250}{750} \approx \frac{1}{3}$$

(c) $-41 \approx -42 \Rightarrow$

$$\frac{1}{3} \approx \frac{14}{42}$$

x14

(d) $\frac{273}{741} \approx \frac{249}{700}$

(e) divide

(i) $\frac{249}{7} = 35.5$

(ii) $\frac{35.5}{100} = .355$

2. $\frac{998}{1437}$

$\rightarrow \frac{998}{1437} \approx \frac{1000}{1400} \approx \frac{5}{7}$

$\frac{998}{1437} \approx \frac{973}{1400} \approx .72$

-37

7 \rightarrow 35

1 \rightarrow 5

Calculator showing $\approx .69$.

3. $\frac{537}{884}$

$\rightarrow \frac{5}{8} \approx \frac{537}{884} \approx \frac{553}{900} \approx 0.601$

(Diagram showing adjustments: $2 \times 8 = +16$ for numerator, $8 \rightarrow 16$ for denominator, $1 \rightarrow 2$ for denominator)

Calculator shows ≈ 0.607

This Method gives us approximate idea than we can calculate data by options easily.

Examples

Calculator results

- | | |
|---------------------------------------|-------|
| i) $\frac{937}{1534} \approx 0.61$ | .610 |
| ii) $\frac{1738}{937} \approx 1.85$ | 1.854 |
| iii) $\frac{2097}{1352} \approx 1.55$ | 1.55 |
| iv) $\frac{641}{937} \approx 0.68$ | .684 |

Cube & Cube Root

$$1^3 = 1$$

$$11^3 = 1331$$

$$2^3 = 8$$

$$12^3 = 1728$$

$$3^3 = 27$$

$$13^3 = 2197$$

$$4^3 = 64$$

$$14^3 = 2744$$

$$5^3 = 125$$

$$15^3 = 3375$$

$$6^3 = 216$$

$$16^3 = 4096$$

$$7^3 = 343$$

$$17^3 = 4913$$

$$8^3 = 512$$

$$18^3 = 5832$$

$$9^3 = 729$$

$$19^3 = 6859$$

$$10^3 = 1000$$

$$20^3 = 8000$$

* Learn Cube of 1 to 20 for the faster Calculation.

* Trick to find Cube of any number:

Eg. $(12)^3$

(a) Make Cube of 1 & 2.

SQUARES

Squares of 1-50 :

$1^2 = 1$	$11^2 = 121$	$21^2 = 441$	$31^2 = 961$	$41^2 = 1681$
$2^2 = 4$	$12^2 = 144$	$22^2 = 484$	$32^2 = 1024$	$42^2 = 1764$
$3^2 = 9$	$13^2 = 169$	$23^2 = 529$	$33^2 = 1089$	$43^2 = 1849$
$4^2 = 16$	$14^2 = 196$	$24^2 = 576$	$34^2 = 1156$	$44^2 = 1936$
$5^2 = 25$	$15^2 = 225$	$25^2 = 625$	$35^2 = 1225$	$45^2 = 2025$
$6^2 = 36$	$16^2 = 256$	$26^2 = 676$	$36^2 = 1296$	$46^2 = 2116$
$7^2 = 49$	$17^2 = 289$	$27^2 = 729$	$37^2 = 1369$	$47^2 = 2209$
$8^2 = 64$	$18^2 = 324$	$28^2 = 784$	$38^2 = 1444$	$48^2 = 2304$
$9^2 = 81$	$19^2 = 361$	$29^2 = 841$	$39^2 = 1521$	$49^2 = 2401$
$10^2 = 100$	$20^2 = 400$	$30^2 = 900$	$40^2 = 1600$	$50^2 = 2500$

Trick of Square of any two digit Number

Brahmagostoa - 3

$\downarrow \cdot (63)^2$
 $\downarrow \downarrow$
 $36 \ 09$
 $360 \rightarrow 6 \times 3 \times 2 \times 10$

 3969

Steps

a) write the Square of individual number

$$\begin{array}{ccc}
 & 63 & \\
 \swarrow & & \searrow \\
 36 & & 09 = 3609
 \end{array}$$

b) Multiply the digits

$$6 \times 3 = 18$$

c) Multiply by 2, than 10

$$18 \times 2 = 36 \times 10 = 360$$

(d) Add (a) & (c)

$$3609 + 360 = 3969 \text{ Ans}$$

2. $(79)^2$

$$\begin{array}{cc}
 \downarrow \downarrow \\
 49 & 81
 \end{array}$$

$$\begin{array}{cc}
 12 & 60 \rightarrow 7 \times 9 \times 2 \times 10 \\
 \hline
 62 & 41
 \end{array}$$

$$6241$$

3. $(84)^2$

$$\begin{array}{cc}
 \downarrow \downarrow \\
 64 & 16
 \end{array}$$

$$6416$$

$$\begin{array}{cc}
 640 & \rightarrow 8 \times 4 \times 2 \times 10 \\
 \hline
 7056 & \text{Ans}
 \end{array}$$

$$7056 \text{ Ans}$$

$$\begin{array}{r}
 4. (96)^2 \\
 \downarrow \downarrow \\
 8136 \\
 1080 \\
 \hline
 9216 \text{ Ans}
 \end{array}$$

* Try to Square at least 30 in mind.
 Really it takes less than 10 second.

Square Root

* $\sqrt{\quad}$ or $(\quad)^{\frac{1}{2}}$
 Always a positive Number.

$$\begin{aligned}
 1^2 &= 1 \\
 2^2 &= 4 \\
 3^2 &= 9 \\
 4^2 &= 16 \\
 5^2 &= 25 \\
 6^2 &= 36 \\
 7^2 &= 49 \\
 8^2 &= 64 \\
 9^2 &= 81 \\
 10^2 &= 100
 \end{aligned}$$

* we observed that unit digit of Square of any Number is only can be: 1, 4, 5, 6, 9

1 \rightarrow 1, 9
 4 \rightarrow 2, 8
 5 \rightarrow 5
 6 \rightarrow 4, 6
 9 \rightarrow 3, 7

If unit digit of a Number is 2, 3, 7, 8 then Square root is not a number.

$$\sqrt{173} \approx 13.15$$