

QUANTITATIVE APTITUDE

Simplification

VBODMAS

'VBODMAS' (Vinculum - Bracket - Of - Division - Multiplication - Addition - Subtraction) rule should be applied for solving problems involving one or more mathematical operations like multiplication, division, addition, subtraction etc. Such problems are solved in the order of vinculum, bracket, of, division, multiplication, addition and subtraction. Remember 'Of' in VBODMAS means multiplication.

Solved Examples

1. $45 - 4 \times 6 - 5 + 14 \div 7 = ?$
 $45 - 4 \times 6 - 5 + 14 \div 7 = 45 - 24 - 5 + 2 = 18$
2. $21 \div 3 (10 - 3) - 20 + 1 = ?$
 $= 21 \div 3 \times 7 - 20 + 1$
 $= 7 \times 7 - 20 + 1$
 $= 49 - 20 + 1 = 30$
3. 3 of $\frac{4}{5} \div \frac{4}{5} + \frac{1}{6} = ?$
 $3 \text{ of } \frac{4}{5} \div \frac{4}{5} + \frac{1}{6} = \frac{12}{5} \div \frac{4}{5} + \frac{1}{6}$

$$= \frac{12}{5} \times \frac{5}{4} + \frac{1}{6} = 3 + \frac{1}{6} = 3\frac{1}{6}$$

$$3 \div \left[(8 - 5) \div \left\{ (4 - 2) \div \left(2 + \frac{8}{13} \right) \right\} \right] = ?$$

$$4. \quad = 3 \div \left[3 \div \left\{ 2 \div \frac{34}{13} \right\} \right]$$

$$= 3 \div \left[3 \div \left\{ 2 \times \frac{13}{34} \right\} \right] =$$

$$3 \div \left[3 \div \frac{13}{7} \right] = 3 \div \left[\frac{3 \times 7}{13} \right]$$

$$= \frac{3 \times 13}{3 \times 7} = \frac{13}{7}$$

$$5. \quad \frac{(4 + 4 + 4) \div 4}{6 + 6 + 6 \div 6} = ?$$

$$\frac{(4 + 4 + 4) \div 4}{6 + 6 + 6 \div 6} = \frac{12 \div 4}{6 + 6 + 1} = \frac{3}{13}$$

SIMPLIFICATION USING IDENTITIES

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. $a \times (b + c) = a \times b + a \times c$ 2. $(a + b)^2 = a^2 + 2ab + b^2$ 3. $(a - b)^2 = a^2 - 2ab + b^2$ 4. $(a + b)^2 = (a - b)^2 + 4ab$ 5. $(a - b)^2 = (a + b)^2 - 4ab$ 6. $(a - b)(a + b) = a^2 - b^2$ 7. $(a + b)^3 = a^3 + 3ab(a + b) + b^3$ 8. $(a - b)^3 = a^3 - 3ab(a - b) - b^3$ 9. $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$ 10. $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$ | <ol style="list-style-type: none"> 11. $\frac{a^3 - b^3}{a^2 + ab + b^2} = a - b$ 12. $\frac{a^3 + b^3}{a^2 - ab + b^2} = a + b$ 13. $\frac{a^2 - ab + b^2}{a^3 + b^3} = \frac{1}{a + b}$ 14. $\frac{a^2 + ab + b^2}{a^3 - b^3} = \frac{1}{a - b}$ 15. $(a + b)^2 + (a - b)^2 = 2(a^2 + b^2)$ 16. $(a + b)^2 - (a - b)^2 = 4ab$ |
|---|---|

FRACTIONS

CLASSIFICATION OF FRACTIONS

1. **Proper Fraction** : A Proper fraction is one whose numerator is less than its denominator.

$$\text{eg. } \frac{1}{3}, \frac{4}{9}$$

2. **Improper Fraction** : An improper fraction is one whose numerator is equal to or greater than its denominator

$$\text{eg. } \frac{6}{5}, \frac{4}{4}$$

3. **Mixed Fraction**: A mixed fraction is a quantity consisting of two parts, one a whole number and other a proper fraction.

$$\text{eg. } 4\frac{1}{8}, 9\frac{3}{4}$$

A mixed fraction can always be expressed as an improper fraction.

$$\text{eg. } 5\frac{2}{3} = 5 + \frac{2}{3} = \frac{(5 \times 3) + 2}{3} = \frac{17}{3}$$

Similarly an improper fraction can always be expressed as a mixed fraction. For that divide the numerator by the denominator and write the quotient as the whole number part of the mixed fraction, the remainder as the numerator and the divisor as the denominator.

$$\text{eg. } \frac{19}{5} = 3\frac{4}{5}; \frac{26}{7} = 3\frac{5}{7}$$

Basic Property of Fractions

1. The value of a fraction is not altered by multiplying the numerator and denominator by the same number.

$$\text{ie. } \frac{a}{b} = \frac{axc}{bxc} = \frac{ac}{bc}$$

2. The value of a fraction is not altered by

dividing the numerator and the denominator by the same number.

$$\text{ie. } \frac{a}{b} = \frac{a \div c}{b \div c}$$

Reduction of a fraction to its lowest terms

To change a fraction to its lowest terms, divide its numerator and denominator by the H.C.F. of the numbers.

$$\text{eg. Reduce } \frac{12}{36} \text{ to its lowest terms.}$$

$$\frac{12}{36} = \frac{12 \div 12}{36 \div 12} = \frac{1}{3}$$

(Since H.C.F. of 12 and 36 is 12)

Reducing fractions to their common denominators

To reduce fractions to their common denominators, change the denominators into their L.C.M.

$$\text{eg. } \frac{3}{4}, \frac{4}{5}$$

L.C.M. of 4 and 5 = 20

To convert the denominator of $\frac{3}{4}$ into 20,

multiply it by 5. To convert the denominator of $\frac{4}{5}$ into 20, multiply it by 4.

$$\text{(ie) } \frac{3 \times 5}{4 \times 5}; \frac{4 \times 4}{5 \times 4} \text{ (ie) } \frac{15}{20}; \frac{16}{20}$$

Comparing Fractions

Let $\frac{a}{c}$ and $\frac{b}{c}$, be two fractions with same denominator c.

Then $\frac{a}{c} > \frac{b}{c}$ if $a > b$ eg. $\frac{4}{5} > \frac{3}{5}$

$\frac{a}{c} < \frac{b}{c}$ if $a < b$ eg. $\frac{1}{3} < \frac{2}{3}$

$\frac{a}{c} = \frac{b}{c}$ if $a = b$ eg. $\frac{1}{2} = \frac{1}{2}$

Addition and Subtraction of Fractions

Method : Convert the fractions with the same denominator by taking L.C.M. and then add or subtract.

Examples

1. $\frac{3}{7} + \frac{2}{7} = \frac{3+2}{7} = \frac{5}{7}$

2. $\frac{1}{4} + \frac{3}{4} = \frac{4}{4} = 1$

3. $\frac{2}{7} + \frac{4}{9} = ?$

L.C.M. of 7, 9 = 63

$$\frac{2}{7} + \frac{4}{9} = \frac{18}{63} + \frac{28}{63} = \frac{46}{63}$$

4. $\frac{2}{3} + \frac{3}{4} + \frac{4}{5} = ?$

L.C.M. of 3, 4 and 5 is 60

$$\therefore \frac{2}{3} + \frac{3}{4} + \frac{4}{5} = \frac{40}{60} + \frac{45}{60} + \frac{48}{60}$$

$$= \frac{40 + 45 + 48}{60} = \frac{133}{60} = 2 \frac{13}{60}$$

5. $6\frac{3}{4} - 3\frac{4}{5} = ?$

$$6\frac{3}{4} - 3\frac{4}{5} = (6-3) + \frac{3}{4} - \frac{4}{5}$$

$$= 3 + \frac{15-16}{20} = 3 - \frac{1}{20}$$

$$= 2 + 1 - \frac{1}{20} = 2 \frac{19}{20}$$

6. $13\frac{1}{3} - 12\frac{3}{4} - 11\frac{5}{6} + 10\frac{11}{12} = ?$

L.C.M. of 3, 4, 6 and 12 is 12

$$= (13+10-12-11) + \frac{1}{3} + \frac{11}{12} - \frac{3}{4} - \frac{5}{6}$$

$$= 0 + \frac{4+11-9-10}{12} = \frac{-4}{12} = \frac{-1}{3}$$

Multiplication of fractions

1. To multiply a fraction by a whole number, multiply the numerator by the whole number.

eg. $2 \times \frac{3}{5} = \frac{(2 \times 3)}{5} = \frac{6}{5}$

2. To multiply a fraction by another fraction multiply corresponding numerators and denominators and then simplify.

eg. $\frac{4}{5} \times \frac{3}{12} = \frac{4 \times 3}{5 \times 12} = \frac{1}{5}$

Division of Fractions

1. To divide a fraction by a whole number, multiply the denominator of the fraction by the whole number.

eg. $\frac{2}{3} \div 7 = \frac{2}{3 \times 7} = \frac{2}{21}$

2. To divide a fraction by a fraction, find the reciprocal of the divisor and then multiply.

eg. $\frac{2}{3} \div \frac{4}{5} = \frac{2}{3} \times \frac{5}{4} = \frac{10}{12} = \frac{5}{6}$

Note: Cancellation can be performed only to multiplication and division of fractions; it can not be performed in addition or subtraction of fractions.

Point to remember:

1. To multiply a whole number and a mixed

fraction together, perform separate multiplication and then add the results.

$$\begin{aligned} \text{eg. } 18 \times 5 \frac{2}{3} &= (18 \times 5) + 18 \times \frac{2}{3} \\ &= 90 + 12 = 102 \end{aligned}$$

2. To divide a mixed fraction by a whole number divide the whole number part of the mixed fraction by the divisor (let the quotient be a). Reduce the remainder to a single fraction and divide this single fraction by the divisor. (Let the quotient be b). Now the required result is $a+b$.

$$\text{eg. } 21 \frac{2}{3} \div 4$$

$$4 \overline{) 21 \frac{2}{3}} (5$$

$$\underline{20}$$

$$1 \frac{2}{3} = \frac{5}{3}$$

$$\text{Now } \frac{5}{3} \div 4 = \frac{5}{3} \times \frac{1}{4} = \frac{5}{12}$$

$$\therefore 21 \frac{2}{3} \div 4 = 5 + \frac{5}{12} = 5 \frac{5}{12}$$

More Solved Examples

1. There are 40 students in a class. One day only $\frac{7}{10}$ th of total students were present.

Find the number of absentees on that day.

Number of absentees

= Fraction of absentees x Total number

$$= \left(1 - \frac{7}{10}\right) \times 40 = 12 \text{ students}$$

2. A man spends $\frac{2}{5}$ of his salary on food,

$\frac{3}{10}$ of his salary on house rent and $\frac{1}{8}$ of the salary on clothes. He still has Rs. 1,400 left with him. Find his total salary.

Totally he spends $\left(\frac{2}{5} + \frac{3}{10} + \frac{1}{8}\right)$ of his total salary.

\therefore He saves $\left[1 - \left(\frac{2}{5} + \frac{3}{10} + \frac{1}{8}\right)\right]$ part of his salary.

$$\therefore \left(1 - \frac{33}{40}\right) \times \text{total salary} = 1400$$

$$\text{(ie) } \frac{7}{40} \times \text{total salary} = 1400$$

$$\text{total salary} = 1400 \times \frac{40}{7} = \text{Rs. } 8000$$

3. In an examination, a student was asked to find $\frac{3}{14}$ of a certain number. By mistake,

he found $\frac{3}{4}$ of it. His answer was 150 more than the correct answer. Find the given number.

Let the given number be x then

$$\frac{3x}{4} - \frac{3x}{14} = 150$$

$$\Rightarrow x \left(\frac{3}{4} - \frac{3}{14}\right) = 150 \Rightarrow \frac{15}{28} x = 150$$

$$\Rightarrow x = \frac{150 \times 28}{15} = 280$$

4. By how much is $\frac{4}{5}$ of 70 less than $\frac{5}{7}$ of 112?

$$\frac{5}{7} \times 112 - \frac{4}{5} \times 70 = 5 \times 16 - 4 \times 14 = 24$$

5. $\frac{5}{12}$ part of what amount will be equal to

$3\frac{3}{4}$ part of Rs. 100.

Let the amount be Rs.y

$$\frac{5}{12} \text{ of } y = 3\frac{3}{4} \text{ of } 100$$

$$\Rightarrow \frac{5}{12} y = \frac{15}{4} \times 100$$

$$\Rightarrow y = \frac{15 \times 100}{4} \times \frac{12}{5}$$

$$\Rightarrow y = 900$$

Decimal Fractions

Fractions that have powers of 10 in the denominators are called decimal fractions.

(ie) Fractions whose denominators are 10, 10^2 , 10^3 , 10^4 are called decimal fractions.

eg. 0.5, 0.063, 8.98 etc.

Here

$$0.5 = \frac{5}{10}; 0.063 = \frac{63}{1000}; 8.98 = \frac{898}{100}$$

Annexing zeros to the extreme right of decimal fraction does not change its value. $0.47 = 0.470 = 0.4700$ etc.

Addition

For adding a decimal number with another decimal number or with another whole number write the given number in such a way that the number of decimal places are equal for all the numbers.

$$\text{eg. } 2 + 0.63 + 0.712$$

Here maximum number of decimal place = 3

\therefore Convert all the numbers to 3 decimal places.

$$\therefore 2 + 0.63 + 0.712 =$$

$$2.000 + 0.630 + 0.712 = 3.342$$

Subtraction

In subtraction also, the given numbers are to be written in such a way that the number of decimal places become equal for all numbers.

$$\text{eg. } 5 - 0.473$$

$$\text{Maximum number of decimal place} \\ = 3 \text{ (in } 0.473)$$

$$\text{ie. } 5 - 0.473 = 5.000 - 0.473 = 4.527$$

Multiplication

1. Multiplication of a Decimal Fraction by a power of 10:

Shift the decimal point to the right by as many places of decimal as the power of 10.

$$\text{eg. } 4.5291 \times 100 = 452.91$$

2. Multiplication of two or more decimal fractions :

$$0.002 \times 0.08 \times 0.5 = ?$$

Step 1: Multiply the given numbers as if they are without any decimal point.

$$\text{ie. } 2 \times 8 \times 5 = 80$$

Step 2 : Add the total number of decimal places in the given numbers

$$\text{ie } 3 + 2 + 1 = 6$$

Step 3 : Write the result of step 1 and convert it to a number whose number of decimal places is same as the number obtained in step 2 by shifting the decimal point to the left.

$$\therefore 0.002 \times 0.08 \times 0.5 = 0.000080 = 0.00008$$

Division

1. While dividing a decimal fraction by powers of 10, the result is obtained by shifting the decimal point to the left by as many places of decimal as is the power of 10.

$$\text{eg. } 3.45 \div 10 = 0.345$$

$$961.1 \div 100 = 9.611$$

2. While dividing a decimal fraction by a natural number, divide the given fraction without the decimal point by the given natural number. In the answer thus got, place the decimal point

to the left as many places of decimal as are there in the dividend.

eg. $\frac{125}{25} = ?$

First step is $\frac{125}{25} = 5$

$\frac{1.25}{25} = 0.05$

3. While dividing a decimal fraction by a decimal fraction, shift the decimal point to the right of the dividend and the divisor both by equal number of digits such that the divisor is converted into a whole number.

eg. $\frac{3.15}{3.5} = \frac{315}{35} = 0.9$

$\frac{28.6}{0.143} = \frac{28600}{143} = 200$

Expressing a decimal into a vulgar fraction

Put 1 in the denominator under the decimal point and annex with it as many zeros as is the number of digits after the decimal point. Remove the decimal point and reduce the fraction to its lowest terms.

Thus $\frac{0.125}{1000} = \frac{125}{1000} = \frac{1}{8}$

If numerator and denominator of a fraction contain the same number of decimal places, then we may remove the decimal sign.

eg. $\frac{8.86}{9.25} = \frac{886}{925}$

◆ To multiply a decimal by any multiple of ten, move the decimal point as many places to the right as is the number of zeros in the multiplier.

◆ To divide a decimal by any multiple of ten move the decimal point as many places to the left as is the number of zeros in the divisor.

◆ When a divisor as well as dividend is a decimal, we multiply both the dividend and the divisor by suitable multiple of 10 to make the divisor a whole number and then proceed division.

Solved Examples:

1. Evaluate

$237 \times 237 + 363 \times 363 + 2 \times 237 \times 363$

Given expression is of the form

$a^2 + b^2 + 2ab = (a+b)^2$

$= (237 + 363)^2 = (600)^2 = 360000$

2. $\sqrt{221^2 - 220^2} = ?$

Given expression is

$\sqrt{a^2 - b^2} = \sqrt{(a+b)(a-b)}$

$= \sqrt{(221 + 220)(221 - 220)}$

$= \sqrt{441 \times 1} = 21$

3. $\frac{0.45 \times 0.45 \times 0.45 - 0.21 \times 0.21 \times 0.21}{0.45 \times 0.45 + 0.45 \times 0.21 + 0.21 \times 0.21}$

Given expression is of the form

$\frac{a^3 - b^3}{a^2 + ab + b^2} = a - b = 0.45 - 0.21 = 0.24$

4. $\frac{4.7 \times 6.5 + 5.3 \times 6.5}{1.3 \times 7.9 - 1.3 \times 6.9} = ?$

Given expression is $\frac{ax + bx}{cy - dy} = \frac{(a + b)x}{(c - d)y}$

$\frac{(4.7 + 5.3)6.5}{(7.9 - 6.9)1.3} = \frac{10 \times 6.5}{1 \times 1.3} = 50$

5. $\frac{0.75 \times 0.75 - 0.74 \times 0.74}{1.49} = ?$

Given expression is $\frac{a^2 - b^2}{a + b} = a - b$

$$= 0.75 - 0.74 = 0.01$$

6.
$$\frac{6.4 \times 6.4 + 2 \times 6.4 \times 3.6 + 3.6 \times 3.6}{(6.4)^2 - (3.6)^2} = ?$$

The given expression is $\frac{a^2 + 2ab + b^2}{a^2 - b^2}$

$$= \frac{(a+b)^2}{(a+b)(a-b)} = \frac{a+b}{a-b} = \frac{6.4+3.6}{6.4-3.6}$$

$$= \frac{10}{2.8} = \frac{100}{28} = \frac{25}{7} = 3\frac{4}{7}$$

7. $0.7 \times 0.7 \times 0.7 - 0.3 \times 0.3 \times 0.3$
 $- 3 \times 0.7 \times 0.3 \times 0.4 = ?$

The given expression is

$$a^3 - b^3 - 3ab(a-b)$$

$$= (a-b)^3 = (0.7-0.3)^3 = (0.4)^3$$

$$= 0.064$$

8. Simplify

$$7\frac{1}{2} - \left[2\frac{1}{4} \div \left\{ 1\frac{1}{4} - \frac{1}{2} \left(1\frac{1}{2} - \frac{1}{3} - \frac{1}{6} \right) \right\} \right]$$

$$7\frac{1}{2} - \left[2\frac{1}{4} \div \left\{ 1\frac{1}{4} - \frac{1}{2} \left(1\frac{1}{2} - \frac{1}{3} - \frac{1}{6} \right) \right\} \right]$$

$$= 7\frac{1}{2} - \left[2\frac{1}{4} \div \left\{ 1\frac{1}{4} - \frac{1}{2} \times 1 \right\} \right]$$

$$= 7\frac{1}{2} - \left[2\frac{1}{4} \div \frac{3}{4} \right]$$

$$= 7\frac{1}{2} - \left(\frac{9}{4} \times \frac{4}{3} \right) = 7\frac{1}{2} - 3 = 4\frac{1}{2}$$

9. Find the value of $4 - \frac{5}{1 + \frac{1}{3 + \frac{1}{2 + \frac{1}{4}}}}$

$$4 - \frac{5}{1 + \frac{1}{3 + \frac{1}{2 + \frac{1}{4}}}} = 4 - \frac{5}{1 + \frac{1}{3 + \frac{4}{9}}}$$

$$= 4 - \frac{5}{1 + \frac{9}{31}} = 4 - 5 \times \frac{31}{40}$$

$$= 4 - \frac{31}{8} = \frac{32-31}{8} = \frac{1}{8}$$

10. Find the value of

$$\left(1 + \frac{1}{2}\right) \left(1 - \frac{1}{2}\right) \left(1 + \frac{1}{3}\right) \left(1 - \frac{1}{3}\right) \left(1 + \frac{1}{4}\right) \left(1 - \frac{1}{4}\right)$$

$$\left(1 + \frac{1}{2}\right) \left(1 - \frac{1}{2}\right) \left(1 + \frac{1}{3}\right) \left(1 - \frac{1}{3}\right) \left(1 + \frac{1}{4}\right) \left(1 - \frac{1}{4}\right)$$

$$= \left(1 - \frac{1}{4}\right) \left(1 - \frac{1}{9}\right) \left(1 - \frac{1}{16}\right)$$

$$= \frac{3}{4} \times \frac{8}{9} \times \frac{15}{16} = \frac{5}{8}$$

11. Find the value of

$$2 + \sqrt{2} + \frac{1}{2 + \sqrt{2}} + \frac{1}{\sqrt{2} - 2}$$

$$2 + \sqrt{2} + \frac{1}{2 + \sqrt{2}} + \frac{1}{\sqrt{2} - 2} =$$

$$2 + \sqrt{2} + \frac{\sqrt{2} - 2 + 2 + \sqrt{2}}{(2 + \sqrt{2})(\sqrt{2} - 2)}$$

$$= 2 + \sqrt{2} + \left(\frac{2\sqrt{2}}{2 - 4} \right)$$

$$= 2 + \sqrt{2} - \sqrt{2} = 2$$

12. If $\frac{x}{y} = \frac{3}{4}$ then find the value of

$$\frac{6}{7} + \frac{y-x}{y+x}$$

$$\frac{6}{7} + \frac{y-x}{y+x} = \frac{6}{7} + \frac{1-\frac{x}{y}}{1+\frac{x}{y}}$$

$$= \frac{6}{7} + \frac{1-\frac{3}{4}}{1+\frac{3}{4}}$$

$$= \frac{6}{7} + \frac{\frac{1}{4}}{\frac{7}{4}} = \frac{6}{7} + \frac{1}{7} = 1$$

PRACTICE TEST

- $20 - [9 - \{7 + (2 \times 3)\} + 5] = ?$
a) 20 b) 15 c) 17 d) 19
- $6 + [2 + \{4x(8-3) - (2 \times 6) - 1\} + 2] = ?$
a) 17 b) 13 c) 19 d) 15
- $\frac{1}{5}$ of $35 + 4(9-3) = ?$
a) 31 b) 15 c) 24 d) 42
- $\frac{1}{2} + \frac{1}{3} \times \frac{1}{4} - \frac{1}{12}$
a) $\frac{1}{3}$ b) $\frac{4}{5}$ c) $\frac{1}{2}$ d) $\frac{1}{6}$
- $\frac{(7+7+7) \div 7}{3+3+3 \div 3} = ?$
a) $\frac{3}{11}$ b) $\frac{3}{13}$ c) $\frac{5}{7}$ d) $\frac{3}{7}$

6. 2 of $\frac{3}{4} \div \frac{3}{4} + \frac{1}{4} = ?$

- a) $\frac{4}{9}$ b) $\frac{3}{2}$ c) 2 d) $2\frac{1}{4}$

7. $\frac{23.5 \times 23.5 - 3.5 \times 3.5}{9.6 \times 9.6 - 2 \times 9.6 \times 8.6 + 8.6 \times 8.6} = ?$

- a) 540 b) 27 c) 54 d) 670

8. $32.5 \times 32.5 - 2 \times 32.5 \times 2.5 + 2.5 \times 2.5 = ?$

- a) 900 b) 30 c) 500 d) 1225

9. $\frac{8.9 \times 8.9 \times 8.9 - 1.4 \times 1.4 \times 1.4}{8.9 \times 8.9 + 8.9 \times 1.4 + 1.4 \times 1.4} = ?$

- a) 75 b) 10.3 c) 14.5 d) 7.5

10. $\frac{24.4 \times 24.4 - 2 \times 24.4 \times 5.6 + 5.6 \times 5.6}{24.4 \times 24.4 - 5.6 \times 5.6} = ?$

- a) $\frac{188}{0.3}$ b) $\frac{188}{30}$ c) $\frac{47}{75}$ d) $\frac{16}{25}$

11. $0.7 \times 0.7 \times 0.7 + 0.3 \times 0.3 \times 0.3 + 3 \times 0.7 \times 0.3 = ?$

- a) 4 b) 1 c) 10 d) 16

12. $\frac{(0.356)^2 \times -2 \times 0.356 \times 0.106 + (0.106)^2}{(0.632)^2 + 2 \times 0.632 \times 0.368 + (0.368)^2} = ?$

- a) 0.625 b) 0.0625
c) 0.0345 d) 0.345

13. $\frac{0.637 \times 0.637 - 2 \times 0.637 \times 0.395 + 0.395 \times 0.395}{0.242} = ?$

- a) 1.132 b) 0.242
c) 1.422 d) 1

14. $\frac{4.75 \times 4.75 \times 4.75 + 125 \times 125 \times 125}{4.75 \times 4.75 + 125 \times 125 - 4.75 \times 125} = ?$

- a) 5.25 b) 3.5 c) 0 d) 6

15. $\frac{775 \times 775 + 225 \times 225 - 775 \times 225}{775 \times 775 \times 775 + 225 \times 225 \times 225} = ?$

- a) 1000 b) 0.01
c) 0.001 d) 0.0001

$$16. \frac{(0.337 + 0.126)^2 - (0.337 - 0.126)^2}{0.337 \times 0.126} = ?$$

- a) 0.211 b) 0.463
c) 4 d) 2.11

$$17. \frac{(695 + 345)^2 + (695 - 345)^2}{(695)^2 + (345)^2} = ?$$

- a) 2 b) 345 c) 695 d) 4

$$18. \frac{(4.621 - 2.954)^2 + (4.621 + 2.954)^2}{4.621 \times 4.621 + 2.954 \times 2.954} = ?$$

- a) 4 b) 2 c) 0 d) 1

$$19. \frac{64852 \times 64852 - 24852 \times 24852}{64852 + 24852} = ?$$

- a) 20000 b) 80000
c) 30000 d) 40000

$$20. 126.5 \times 126.5 - 2 \times 126.5 \times 6.5 + 6.5 \times 6.5 = ?$$

- a) 12000 b) 14400
c) 17689 d) 1440

$$21. \frac{0.52 \times 0.52 + 0.4 \times 0.4 - 2 \times 0.52 \times 0.4}{0.52 - 0.4} = ?$$

- a) 1.2 b) 0.92
c) 0.48 d) 0.12

$$22. \frac{(4.8)^3 - 0.027}{(4.8)^2 + 1.44 + 0.09} = ?$$

- a) 4.5 b) 0.45 c) 5.1 d) 2.20

$$23. \frac{1}{1 + \frac{1}{1 + \frac{1}{2}}} = ?$$

- a) 3 b) $\frac{5}{3}$ c) 1 d) $\frac{3}{5}$

$$24. 5 - \left[\frac{3}{4} + \left\{ 2 \frac{1}{2} - \left(0.5 + \frac{1}{6} - \frac{1}{7} \right) \right\} \right] = ?$$

- a) $1 \frac{19}{84}$ b) $2 \frac{61}{84}$ c) $2 \frac{23}{84}$ d) $2 \frac{47}{84}$

$$25. \frac{3 \frac{1}{4} - \frac{4}{5} \text{ of } \frac{5}{6}}{4 \frac{1}{3} \div \frac{1}{5} - \left(\frac{3}{10} + 21 \frac{1}{5} \right)} = ?$$

- a) $\frac{1}{6}$ b) $2 \frac{7}{12}$

- c) $15 \frac{1}{2}$ d) $21 \frac{1}{2}$

$$26. \frac{1}{2} + \frac{1}{2} \left\{ \frac{3}{4} - \frac{1}{2} \left(\frac{7}{8} - \frac{3}{4} \right) \right\} = ?$$

- a) $\frac{27}{16}$ b) $\frac{27}{32}$

- c) $\frac{27}{64}$ d) $\frac{107}{112}$

$$27. \frac{\frac{1}{5} \div \frac{1}{5} \text{ of } \frac{1}{5}}{\frac{1}{5} \text{ of } \frac{1}{5} \div \frac{1}{5}} = ?$$

- a) 1 b) 5 c) $\frac{1}{5}$ d) 25

$$28. \frac{(79 - 24) \times (11 - 6)}{5 \times 9 - (13 + 12)} = ?$$

- a) $8 \frac{7}{20}$ b) $\frac{55}{4}$

- c) $\frac{5}{4}$ d) $\frac{-1}{20}$

29. If $\frac{a}{b} = \frac{7}{8}$, then $\left(\frac{14}{23} - \frac{2b-a}{2b+a} \right)$ is equal to

- a) $\frac{5}{14}$ b) $\frac{5}{9}$ c) $\frac{5}{23}$ d) $\frac{5}{92}$

30. $\left(2-\frac{1}{3}\right)\left(2-\frac{3}{5}\right)\left(2-\frac{5}{7}\right)\left(2-\frac{7}{9}\right)\dots\left(2-\frac{997}{999}\right)=?$
- a) $\frac{5}{999}$ b) $\frac{7}{1000}$
c) $\frac{1000}{7}$ d) $\frac{1001}{3}$
31. If $\frac{a}{b} = \frac{4}{3}$, then the value of $\frac{6a+4b}{6a-5b}$ is
a) -1 b) 3 c) 4 d) 5
32. If $\frac{1}{x}\left(\frac{1}{2} + \frac{1}{3} + \frac{1}{4}\right) = 1 + \frac{1}{2} + \frac{1}{3}$, then the value of x is
a) $\frac{1}{4}$ b) $\frac{13}{22}$ c) 2 d) 4
33. $\frac{1}{2 + \frac{1}{2 + \frac{1}{2 - \frac{1}{2}}}} = ?$
a) $\frac{8}{19}$ b) $\frac{19}{8}$ c) $\frac{7}{8}$ d) $\frac{8}{9}$
34. $1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{9}}} = ?$
- a) $1\frac{5}{9}$ b) $1\frac{10}{19}$ c) $\frac{10}{19}$ d) $\frac{19}{10}$
35. If (a-b) is 6 more than (c+d) and (a+b) is 3 less than (c-d), then (a-c) is
a) 0.5 b) 1.0 c) 1.5 d) 2.0
36. The expression $(7.98x + 7.98 + 7.98x^2 + 0.02x + 0.02)$ will be a perfect square for x equal to
a) 4.0 b) 0.4
c) 0.04 d) 0.004
37. The sum of the smallest six digit number and the greatest five digit number is
a) 199999 b) 201110
c) 211110 d) 1099999
38. The sum of two numbers is 22 and their difference is 14. Find the product of the numbers.
a) 70 b) 75 c) 72 d) 82
39. The sum of squares of two numbers is 80 and the square of their difference is 36. The product of the two numbers is
a) 22 b) 44 c) 58 d) 116
40. The product of two numbers is 120. The sum of their squares is 289. The sum of the two numbers is
a) 20 b) 23 c) 169 d) 150

ANSWERS TO PRACTICE TEST

1. (d) 2. (a) 3. (a) 4. (c) 5. (d) 6. (d) 7. (a) 8. (a)
9. (d) 10. (c) 11. (b) 12. (b) 13. (b) 14. (d) 15. (c) 16. (c)
17. (a) 18. (b) 19. (d) 20. (b) 21. (d) 22. (a) 23. (d) 24. (c)
25. (c) 26. (b) 27. (d) 28. (b) 29. (c) 30. (d) 31. (c) 32. (b)
33. (a) 34. (b) 35. (c) 36. (c) 37. (a) 38. (c) 39. (a) 40. (b)