EXERCISE 14(D)

Point to Remember :
BODMAS :- While simplifying an expressions we can involve six operation in following orders.
B Stands for **"BRACKET"**
O Stands for **"OF"**
D Stands for **"DIVISION"**
M Stands for **"MULTIPLICATION"**
A Stands for **"ADDITION"**
S Stands for **"SUBTRACTION"**

Question 1.

(*i*) $\frac{3}{7} \times \frac{2}{5}$

(*ii*) $\frac{4}{9} \times \frac{3}{5}$

(*iii*) $\frac{5}{12} \times 8$

(*iv*) $\frac{7}{6}$ of $\frac{3}{14}$

(*v*) $3\frac{3}{8} \times 3\frac{6}{7}$

(*vi*) $\frac{1}{2}$ of $\frac{1}{3} \times \frac{3}{4}$ (*vii*) $\frac{3}{7} \times \frac{5}{9} \times 4\frac{1}{5}$

(*viii*) $1\frac{1}{3} \times 1\frac{2}{7}$ of $1\frac{1}{4}$

Solution:

(*i*) $\frac{3}{7} \times \frac{2}{5} = \frac{3 \times 2}{7 \times 5} = \mathbf{\frac{6}{35}}$

(*ii*) $\frac{4}{9} \times \frac{3}{5} = \frac{4 \times 3}{9 \times 5} = \frac{4 \times 1}{3 \times 5} = \mathbf{\frac{4}{15}}$

(*iii*) $\frac{5}{12} \times 8 = \frac{5}{12} \times \frac{8}{1} = \frac{5 \times 2}{3 \times 1} = \frac{10}{3} = \mathbf{3\frac{1}{3}}$

(*iv*) $\frac{7}{6}$ of $\frac{3}{14} = \frac{7}{6} \times \frac{3}{14} = \frac{3 \times 1}{2 \times 1} = \frac{1}{4}$

(*v*) $3\frac{3}{8} \times 3\frac{6}{7} = \frac{27}{8} \times \frac{27}{7}$

$= \frac{27 \times 27}{8 \times 7} = \frac{729}{56} = \mathbf{13\frac{1}{56}}$

(*vi*) $\frac{1}{2}$ of $\frac{1}{3} \times \frac{3}{4} = \frac{1}{2} \times \frac{1}{3} \times \frac{3}{4} = \frac{1}{6} \times \frac{3}{4} = \frac{1 \times 1}{2 \times 4} = \mathbf{\frac{1}{8}}$

[Using Bodmas $\frac{1}{2}$ of $\frac{1}{3} = \frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$]

(*vii*) $\frac{3}{7} \times \frac{5}{9} \times 4\frac{1}{5} = \frac{3}{7} \times \frac{5}{9} \times \frac{21}{5}$

$$= \frac{3 \times 5 \times 21}{7 \times 9 \times 5} = \mathbf{1}$$

(viii) $1\frac{1}{3} \times 1\frac{2}{7}$ of $1\frac{1}{4} = \frac{4}{3} \times \frac{9}{7} \times \frac{5}{4}$

$$= \frac{4 \times 9 \times 5}{3 \times 7 \times 4} = \frac{15}{7} = \mathbf{2\frac{1}{7}}$$

Question 2.

Simplify :

(i) $\frac{2}{3} \div 1\frac{1}{5}$

(ii) $4\frac{1}{2} \div \frac{4}{9}$

(iii) $1 \div \frac{2}{5}$

(iv) $\frac{4}{9} \div \frac{4}{9}$

(v) $2\frac{1}{3} \div 1\frac{3}{4}$

(vi) $2\frac{2}{3} \times 3\frac{1}{2} \div 2\frac{4}{9}$

Solution:

(i)

$$\frac{2}{3} \div 1\frac{1}{5} = \frac{2}{3} \div \frac{6}{5} = \frac{2}{3} \times \frac{5}{6} = \frac{2 \times 5}{3 \times 6} = \mathbf{\frac{5}{9}}$$

(ii) $4\frac{1}{2} \div \frac{4}{9} = \frac{9}{2} \div \frac{4}{9} = \frac{9}{2} \times \frac{9}{4} = \frac{9 \times 9}{2 \times 4}$

$$= \frac{81}{8} = \mathbf{10\frac{1}{8}}$$

(iii) $1 \div \frac{2}{5} = \frac{1}{1} \div \frac{2}{5} = \frac{1}{1} \times \frac{5}{2} = \frac{5}{2} = \mathbf{2\frac{1}{2}}$

(iv) $\frac{4}{9} \div \frac{4}{9} = \frac{4}{9} \times \frac{9}{4} = \frac{4 \times 9}{9 \times 4} = \mathbf{1}$

(v) $2\frac{1}{3} \div 1\frac{3}{4} = \frac{7}{3} \div \frac{7}{4} = \frac{7}{3} \times \frac{4}{7}$

$$= \frac{4}{3} = \mathbf{1\frac{1}{3}}$$

(vi) $2\frac{2}{3} \times 3\frac{1}{2} \div 2\frac{4}{9} = \frac{8}{3} \times \frac{7}{2} \div \frac{22}{9}$

$$= \frac{8}{3} \times \frac{7}{2} \times \frac{9}{22} = \frac{2 \times 7 \times 3}{11} = \frac{42}{11} = \mathbf{3\frac{9}{11}}$$

Question 3.

Simplify:

(*i*) $\frac{1}{4}$ of $2\frac{2}{7} \div \frac{3}{5}$

(*ii*) $1\frac{1}{4} \times \frac{1}{2} \div 1\frac{1}{3}$

(*iii*) $6\frac{1}{7} \times 0 \times 5\frac{3}{8}$

(*iv*) $\frac{3}{4} \times 1\frac{1}{3} \div \frac{3}{7}$ of $2\frac{5}{8}$

(*v*) $2\frac{1}{4} \div \frac{2}{7}$ of $1\frac{1}{3} \times \frac{2}{3}$

(*vi*) $\left(\frac{3}{7} \div \frac{1}{2}\right)$ of $1\frac{1}{7}$

(*vii*) $\left(1\frac{7}{8} \div 1\frac{1}{2}\right)$ of $\left(8\frac{1}{3} \div 1\frac{1}{2}\right)$

(*viii*) $\frac{1}{3}$ of $60 \div 60$.

Solution:

(*i*) $\frac{1}{4}$ of $2\frac{2}{7} \div \frac{3}{5}$

$= \frac{1}{4} \times \frac{16}{7} \div \frac{3}{5} = \frac{4}{7} \times \frac{5}{3} = \mathbf{\frac{20}{21}}$

(*ii*) $1\frac{1}{4} \times \frac{1}{2} \div 1\frac{1}{3} = \frac{5}{4} \times \frac{1}{2} \div \frac{4}{3}$

$= \frac{5}{8} \times \frac{3}{4} = \mathbf{\frac{15}{32}}$

(*iii*) $6\frac{1}{7} \times 0 \times 5\frac{3}{8} = \frac{43}{7} \times \frac{0}{0} \times \frac{43}{8}$

$= \frac{43 \times 0 \times 43}{7 \times 0 \times 8} = \mathbf{0}$

(*iv*) $\frac{3}{4} \times 1\frac{1}{3} \div \frac{3}{7}$ of $2\frac{5}{8} = \frac{3}{4} \times \frac{4}{3} \div \frac{9}{8}$

$\left[\frac{3}{7} \text{ of } 2\frac{5}{8} = \frac{3}{7} \times \frac{21}{8} = \frac{9}{8}\right]$

$= \frac{3}{4} \times \frac{4}{3} \times \frac{8}{9} = \mathbf{\frac{8}{9}}$

(*v*) $2\frac{1}{4} \div \frac{2}{7}$ of $1\frac{1}{3} \times \frac{2}{3}$

$$\left[\frac{2}{7} \text{ of } 1\frac{1}{3} = \frac{2}{7} \times \frac{4}{3} = \frac{8}{21}\right]$$

$$= \frac{9}{4} \div \frac{8}{21} \times \frac{2}{3}$$

$$= \frac{9}{4} \times \frac{21}{8} \times \frac{2}{3} = \frac{63}{16} = \mathbf{3\frac{15}{16}}$$

(*vi*) $\left(\frac{3}{7} \div \frac{1}{2}\right) \text{ of } 1\frac{1}{7} = \frac{3}{7} \times \frac{2}{1} \text{ of } \frac{8}{7}$

$$\left[\frac{2}{1} \text{of} \frac{8}{7} = \frac{2 \times 8}{7 \times 1} = \frac{16}{7}\right]$$

$$= \frac{3}{7} \times \frac{16}{7} = \mathbf{\frac{48}{49}}$$

(*vii*) $\left(1\frac{7}{8} \div 1\frac{1}{2}\right) \text{ of } \left(8\frac{1}{3} \div 1\frac{1}{2}\right)$

$$= \left(\frac{15}{8} \div \frac{3}{2}\right) \text{ of } \left(\frac{25}{3} \div \frac{3}{2}\right)$$

$$= \frac{15}{8} \times \frac{2}{3} \text{ of } \frac{25}{3} \times \frac{2}{3}$$

$$= \frac{5}{4} \text{ of } \frac{50}{9} = \frac{5}{4} \times \frac{50}{9} = \frac{125}{18} = \mathbf{6\frac{17}{18}}$$

(*viii*) $\frac{1}{3} \text{ of } 60 \div 60 = \frac{1}{3} \times \frac{60}{1} \div \frac{60}{1}$

$$= 20 \times \frac{1}{60} = \frac{20}{60} = \mathbf{\frac{1}{3}}$$

Question 4.

Simplify :

(i) $5-\left(\frac{8}{11}-3\frac{3}{11}\right)$

(ii) $\frac{1}{2}\div\left(\frac{7}{8}-\frac{3}{5}\right)$

(iii) $2\frac{1}{3}\div\left(5\frac{1}{2}+3\frac{3}{4}\right)$

(iv) $\left(3\frac{7}{8}-3\frac{3}{5}\right)\div\frac{1}{2}$

(v) $\frac{4}{7}\div\left(\frac{1}{3}\times 2\frac{4}{5}\right)$

(vi) $\frac{3}{4}\div\left(\frac{1}{6}\div\frac{1}{2}\right)$

(vii) $\left(\frac{1}{4}-\frac{1}{6}\right)$ of $\left(\frac{2}{3}-\frac{5}{12}\right)\times\left(\frac{5}{8}-\frac{7}{12}\right)$

Solution:

(i) $5-\left(\frac{8}{11}-3\frac{3}{11}\right)=5-\left(\frac{8}{11}-\frac{36}{11}\right)$

$=5-\frac{8}{11}+\frac{36}{11}=\frac{55-8+36}{11}$

$=\frac{55+36-8}{11}=\frac{83}{11}=7\frac{6}{11}$

(ii) $\frac{1}{2}\div\left(\frac{7}{8}-\frac{3}{5}\right)=\frac{1}{2}\div\left(\frac{5\times 7-8\times 3}{40}\right)$

$=\frac{1}{2}\div\left(\frac{35-24}{40}\right)=\frac{1}{2}\div\left(\frac{11}{40}\right)$

$=\frac{1}{2}\times\frac{40}{11}=\frac{20}{11}=1\frac{9}{11}$

(iii) $2\frac{1}{3} \div \left(5\frac{1}{2} + 3\frac{3}{4}\right) = \frac{7}{3} \div \left(\frac{11}{2} + \frac{15}{4}\right)$

$= \frac{7}{3} \div \left(\frac{2 \times 11 + 1 \times 15}{4}\right)$

$= \frac{7}{3} \div \left(\frac{22 + 15}{4}\right) = \frac{7}{3} \div \left(\frac{37}{4}\right)$

$= \frac{7}{3} \times \frac{4}{37} = \mathbf{\frac{28}{111}}$

(iv) $\left(3\frac{7}{8} - 3\frac{3}{5}\right) \div \frac{1}{2}$

$= \left(\frac{31}{8} - \frac{18}{5}\right) \div \frac{1}{2}$

$= \left(\frac{31 \times 5}{8 \times 5} - \frac{18 \times 8}{5 \times 8}\right) \div \frac{1}{2}$

$= \left(\frac{155}{40} - \frac{144}{40}\right) \div \frac{1}{2}$

$= \frac{11}{40} \div \frac{1}{2} = \frac{11}{40} \times \frac{2}{1} = \frac{11}{20}$

(v) $\frac{4}{7} \div \left(\frac{1}{3} \times 2\frac{4}{5}\right)$

$= \frac{4}{7} \div \left(\frac{1}{3} \times \frac{14}{5}\right) = \frac{4}{7} \div \left(\frac{14}{15}\right)$

$= \frac{4}{7} \times \frac{15}{14} = \frac{60}{98} = \mathbf{\frac{30}{49}}$

(vi) $\frac{3}{4} \div \left(\frac{1}{6} \div \frac{1}{2}\right)$

$= \frac{3}{4} \div \left(\frac{1}{6} \times \frac{2}{1}\right) = \frac{3}{4} \div \left(\frac{1}{3}\right)$

$= \frac{3}{4} \times \frac{3}{1} = \frac{9}{4} = \mathbf{2\frac{1}{4}}$

(vii) $\left(\frac{1}{4} - \frac{1}{6}\right) \text{of} \left(\frac{2}{3} - \frac{5}{12}\right) \times \left(\frac{5}{8} - \frac{7}{12}\right)$

$= \left(\frac{3-2}{12}\right) \text{of} \left(\frac{8-5}{12}\right) \times \left(\frac{15-14}{24}\right)$

$= \left(\frac{1}{12}\right) \text{of} \left(\frac{3}{12}\right) \times \left(\frac{1}{24}\right)$

$= \frac{1}{12} \text{ of } \frac{3}{12} \times \frac{1}{24}$

$= \frac{1}{12} \times \frac{1}{96} = \mathbf{\frac{1}{1152}}$

Question 5.
Simplify :

(i) $\left(\frac{1}{2}+\frac{1}{3}\right)\div\left(\frac{1}{4}-\frac{1}{6}\right)$

(ii) $\left(\frac{24}{35}\div\frac{6}{7}+\frac{5}{9}\right)\times\frac{3}{4}$

(iii) $\frac{3}{4}$ of $6\frac{1}{8}-\frac{2}{3}$ of $2\frac{1}{4}$

(iv) $\frac{7}{30}$ of $\left(\frac{1}{3}+\frac{7}{15}\right)\div\left(\frac{5}{6}-\frac{3}{5}\right)$

(v) $2\frac{1}{2}-3\frac{1}{2}\times1\frac{3}{4}+2\frac{1}{2}$

(vi) $4\frac{5}{7}\left(3\frac{1}{8}\div\frac{11}{12}\right)$

(vii) $\frac{2}{5}$ of $\left(\frac{1}{7}-\frac{1}{12}\right)$ of $1\frac{2}{5}$

(viii) $\left(\frac{1}{2}-\frac{1}{3}\right)\left(\frac{3}{4}-\frac{4}{5}\right)\div\left(\frac{1}{2}-\frac{2}{5}+\frac{1}{7}\right)$

(ix) $\frac{5}{6}-\frac{3}{5}\left(\frac{1}{3}+\frac{2}{11}\right)$

(x) $4\frac{2}{3}\div\left(3-\frac{1}{2}\right)+\left(\frac{2}{5}\div1\frac{1}{5}\right)$

(xi) $\frac{1}{2}$ of $40+1\frac{3}{4}$ of $2\frac{2}{9}+2\frac{1}{5}\times0$

(xii) $\left(1\div2\frac{1}{5}\right)\div2\frac{1}{5}$ of $2\frac{1}{2}-2$

(xiii) $2\frac{6}{11}$ of $1\frac{2}{7}\div2\frac{2}{11}$

Solution:

$$(i)\ \left(\frac{1}{2}+\frac{1}{3}\right)\div\left(\frac{1}{4}-\frac{1}{6}\right)$$

$$=\left(\frac{3+2}{6}\right)\div\left(\frac{3-2}{12}\right)=\left(\frac{5}{6}\right)\div\left(\frac{1}{12}\right)$$

$$=\frac{5}{6}\times\frac{12}{1}=\mathbf{10}$$

$$(ii)\ \left(\frac{24}{35}\div\frac{6}{7}+\frac{5}{9}\right)\times\frac{3}{4}$$

$$=\left(\frac{24}{35}\times\frac{7}{6}+\frac{5}{9}\right)\times\frac{3}{4}=\left(\frac{4}{5}+\frac{5}{9}\right)\times\frac{3}{4}$$

$$=\left(\frac{36+25}{45}\right)\times\frac{3}{4}$$

$$=\frac{61}{45}\times\frac{3}{4}=\frac{61}{60}=\mathbf{1\frac{1}{60}}$$

$$(iii)\ \frac{3}{4}\text{ of }6\frac{1}{8}-\frac{2}{3}\text{ of }2\frac{1}{4}$$

$$=\frac{3}{4}\text{ of }\frac{49}{8}-\frac{2}{3}\text{ of }\frac{9}{4}$$

$$=\frac{3}{4}\times\frac{49}{8}-\frac{2}{3}\times\frac{9}{4}$$

$$=\frac{147}{32}-\frac{3}{2}=\frac{147-48}{32}=\frac{99}{32}$$

$$=\mathbf{3\frac{3}{32}}$$

(iv) $\frac{7}{30}$ of $\left(\frac{1}{3}+\frac{7}{15}\right)\div\left(\frac{5}{6}-\frac{3}{5}\right)$

$=\frac{7}{30}$ of $\left(\frac{5+7}{15}\right)\div\left(\frac{25-18}{30}\right)$

$=\frac{7}{30}\times\frac{12}{15}\div\left(\frac{7}{30}\right)$

$=\frac{7}{30}\times\frac{12}{15}\times\frac{30}{7}=\frac{12}{15}=\mathbf{\frac{4}{5}}$

(v) $2\frac{1}{2}-3\frac{1}{2}\times1\frac{3}{4}+2\frac{1}{2}$

$=\frac{5}{2}-\frac{7}{2}\times\frac{7}{4}+\frac{5}{2}$

$=\frac{5}{2}-\frac{49}{8}+\frac{5}{2}=\frac{5}{2}+\frac{5}{2}-\frac{49}{8}$

$=\mathbf{\frac{20+20-49}{8}=-\frac{9}{8}=-1\frac{1}{8}}$

(vi) $4\frac{5}{7}\left(3\frac{1}{8}\div\frac{11}{12}\right)=\frac{33}{7}\left(\frac{25}{8}\div\frac{11}{12}\right)$

$=\frac{33}{7}\left(\frac{25}{8}\times\frac{12}{11}\right)=\frac{33}{7}\left(\frac{75}{22}\right)$

$=\frac{33}{7}\times\frac{75}{22}=\frac{225}{14}=\mathbf{16\frac{1}{14}}$

(vii) $\frac{2}{5}$ of $\left(\frac{1}{7}-\frac{1}{12}\right)$ of $1\frac{2}{5}$

$=\frac{2}{5}$ of $\left(\frac{12-7}{84}\right)$ of $\frac{7}{5}$

$=\frac{2}{5}$ of $\left(\frac{5}{84}\right)$ of $\frac{7}{5}$

$=\frac{2}{5}\times\frac{5}{84}\times\frac{7}{5}=\mathbf{\frac{1}{30}}$

(viii) $\left(\frac{1}{2}-\frac{1}{3}\right)\left(\frac{3}{4}-\frac{4}{5}\right)\div\left(\frac{1}{2}-\frac{2}{5}+\frac{1}{7}\right)$

$=\left(\frac{3-2}{6}\right)\left(\frac{15-16}{20}\right)\div\left(\frac{35-28+10}{70}\right)$

$=\left(\frac{1}{6}\right)\left(\frac{-1}{20}\right)\div\left(\frac{17}{70}\right)=\frac{1}{6}\times\frac{-1}{20}\div\frac{17}{70}$

$=\frac{1}{6}\times\frac{-1}{20}\times\frac{70}{17}=\mathbf{-\frac{7}{204}}$

(ix) $\frac{5}{6}-\frac{3}{5}\left(\frac{1}{3}+\frac{2}{11}\right)=\frac{5}{6}-\frac{3}{5}\left(\frac{11+6}{33}\right)$

$=\frac{5}{6}-\frac{3}{5}\times\frac{17}{33}=\frac{5}{6}-\frac{17}{55}$

$=\frac{275-102}{330}=\mathbf{\frac{173}{330}}$

(x) $4\frac{2}{3}\div\left(3-\frac{1}{2}\right)+\left(\frac{2}{5}\div1\frac{1}{5}\right)$

$=\frac{14}{3}\div\left(3-\frac{1}{2}\right)+\left(\frac{2}{5}\div\frac{6}{5}\right)$

$=\frac{14}{3}\div\left(\frac{6-1}{2}\right)+\left(\frac{2}{5}\times\frac{5}{6}\right)$

$=\frac{14}{3}\div\left(\frac{5}{2}\right)+\frac{1}{3}$ $=\frac{14}{3}\times\frac{2}{5}+\frac{1}{3}$

$=\frac{28}{15}+\frac{1}{3}=\frac{28+5}{15}=\frac{33}{15}=\frac{11}{5}=\mathbf{2\frac{1}{5}}$

(xi) $\frac{1}{2}$ of $40+1\frac{3}{4}$ of $2\frac{2}{9}+2\frac{1}{5}\times0$

$=\frac{1}{2}\times40+\frac{7}{4}\times\frac{20}{9}+\frac{11}{5}\times0$

$=20+\frac{35}{9}+0=\frac{180+35}{9}=\frac{215}{9}$

$=\mathbf{23\frac{8}{9}}$

(xii) $\left(1\div2\frac{1}{5}\right)\div2\frac{1}{5}$ of $2\frac{1}{2}-2$

$=\left(1\div\frac{11}{5}\right)\div\frac{11}{5}$ of $\frac{5}{2}-2$

$=\left(1\times\frac{5}{11}\right)\div\frac{11}{5}$ of $\frac{5}{2}-2$

$=\frac{5}{11}\div\frac{11}{5}\times\frac{5}{2}-2=\frac{5}{11}\div\frac{11}{2}-2$

$=\frac{5}{11}\times\frac{2}{11}-2=\frac{10}{121}-2$

$=\frac{10-242}{121}=-\frac{232}{121}=\mathbf{-1\frac{111}{121}}$

(xiii) $2\frac{6}{11}$ of $1\frac{2}{7}\div2\frac{2}{11}$

$$= \frac{28}{11} \text{ of } \frac{9}{7} \div \frac{24}{11}$$

$$= \frac{28}{11} \times \frac{9}{7} \div \frac{24}{11} = \frac{36}{11} \div \frac{24}{11}$$

$$= \frac{36}{11} \times \frac{11}{24} = \frac{3}{2} = \mathbf{1\frac{1}{2}}$$