(ii) $\left(\frac{2}{3}\right)^2 \times \left(\frac{3}{4}\right)^3 = \frac{2}{3} \times \frac{2}{3} \times \frac{3}{4} \times \frac{3}{4} \times \frac{3}{4}$

$= \frac{1 \cancel{2} \times \cancel{2} \times 1 \cancel{3} \times \cancel{3} \times 3}{1 \cancel{3} \times \cancel{3} \times \cancel{4} \times 4 \times 4}$

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

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(iii) $\left(\frac{-1}{5}\right)^3 \times \left(\frac{-5}{9}\right)^2 = \left(\frac{-1}{5}\right) \times \left(\frac{-1}{5}\right) \times \left(\frac{-1}{5}\right) \times \left(\frac{-5}{9}\right) \times \left(\frac{-5}{9}\right)$

$= \frac{(-1) \times (-1) \times (-1) \times (-5) \times (-5)}{5 \times 5 \times 5 \times 9 \times 9}$

$= \frac{1 \times 1 \cancel{5} \times \cancel{(-5)} (-1)}{1 \cancel{5} \times \cancel{5} \times 5 \times 9 \times 9}$

$= \frac{-1}{5 \times 9 \times 9} = \frac{-1}{405}$

(iv) $(-4)^3 \times \left(\frac{5}{8}\right)^2 = (-4) \times (-4) \times (-4) \times \frac{5}{8} \times \frac{5}{8}$

$= \frac{2 \cancel{16} \times (-4) \times 5 \times 5}{\cancel{8} \times 8}$

$= \frac{-1 \cancel{8} \times 25}{\cancel{8}\ 1}$

$= \frac{-25}{1} = -25$

v, $\left(\frac{5}{3}\right)^2 \times 9^2 \times \left(\frac{2}{3}\right)^2 = \frac{5}{3} \times \frac{5}{3} \times 9 \times 9 \times \left(\frac{2}{3}\right)$

$= \frac{25}{9_1} \times \cancel{9}^1 \times 9 \times \frac{2}{3} \times \frac{2}{3}$

$= \frac{25}{1} \times \frac{9}{1} \times \frac{2}{3} \times \frac{2}{3}$

$= \frac{25 \times \cancel{9}^{\cancel{3}^1} \times 2 \times 2}{1 \times 1 \times \cancel{3}_1 \times \cancel{3}_1}$

$= \frac{25 \times 1 \times 2 \times 2}{1 \times}$

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$= \frac{100}{1} = 100.$

vi, $\left(5^3 - 5^2\right) \times \left(\frac{3}{2}\right)^2 \times \left(\frac{4}{5}\right)^2$

$= (125 - 25) \times \frac{3}{2} \times \frac{3}{2} \times \frac{4}{5} \times \frac{4}{5}$

$= 100 \times \frac{3 \times 3 \times 4 \times 4}{1 \cancel{2} \times \cancel{2}_1 \times 5 \times 5}$

$= 4 \frac{100 \times 9 \times 4}{1 \times 1 \times \cancel{25}_1}$

$= \frac{4 \times 9 \times 4}{1 \times 1 \times 1}$

$= 36 \times 4$

$= 144$

6 Simplify and express as a rational number:

i) $\left(\frac{2}{3}\right)^3 \times \left(\frac{9}{4}\right)^2 = \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{9}{4} \times \frac{9}{4}$

$= \frac{1\cancel{2} \times \cancel{2}^{1} \times \cancel{2}^{1} \times \cancel{9}^{3} \times \cancel{9}\ 3 \times 1}{1\ \cancel{2} \times \cancel{2}_{1} \times \cancel{2}_{1} \times \cancel{4}_{2} \times \cancel{4}\ 2 \times 1}$

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

ii) $\left(\frac{4}{7}\right)^2 \times \frac{35}{8} \times \left(\frac{-2}{5}\right)^2$



$= \frac{4}{7} \times \frac{4}{7} \times \frac{35}{8} \times \left(\frac{-2}{5}\right) \times \left(\frac{-2}{5}\right)$

$= \frac{4 \times \cancel{4}^{1} \times \cancel{35}^{\cancel{5}^{1}} \times (-2) \times \cancel{(-2)}\ (-1)}{1\ \cancel{7} \times 7 \times \cancel{8}^{\cancel{4}_{1}} \times \cancel{5}_{1} \times 5}$

$= \frac{4 \times 1 \times 1 \times (-2) \times (-1)}{1 \times 7 \times 1 \times 1 \times 5}$

$= \frac{8}{35}$

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

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

$= \frac{2 \times 2 \times 2 \times \cancel{3}^{1} \times \cancel{3}^{1} \times \cancel{3}^{1} \times 3}{1\ \cancel{2} \times \cancel{2}_{1} \times \cancel{2}_{1}} \times \frac{(-1)^3}{+4^3}$

$$= \frac{\cancel{2}^{1} \times \cancel{2}^{1} \times \cancel{2}^{1} \times 3 \times (-1) \times (-1) \times (-1)}{1 \times \cancel{4}^{2} \times \cancel{4}^{2} \times 4}$$

$$= \frac{3 \times (-1)}{2 \times 4} = \frac{-3}{8}$$

(iv) $\left(\frac{3}{4}\right)^3 \times \left(\frac{1}{3}\right)^2 \times \left(\frac{-8}{27}\right)$



$$= \frac{3}{4} \times \frac{3}{4} \times \frac{3}{4} \times \frac{1}{3} \times \frac{1}{3} \times \left(\frac{-8}{27}\right)$$

$$= \frac{\cancel{3}^{1} \times \cancel{3}^{1} \times \cancel{3}^{1} \times 1 \times \cancel{(-8)}^{-2} \times (-1)}{1 \; \cancel{4}^{2} \times \cancel{4}^{2} \times 4 \times \cancel{3}^{1} \times \cancel{3}^{1} \times \cancel{27}^{9}}$$

$$= \frac{-1}{2 \times 9 \times 4} = \frac{-1}{72}$$

(v) $\left(\frac{2}{3}\right)^2 \div \left(\frac{-2}{3}\right)^3 = \left(\frac{2}{3}\right)^2 \times \left(\frac{-3}{2}\right)^3$

$$= \frac{2}{3} \times \frac{2}{3} \times \left(\frac{-3}{2}\right) \times \left(\frac{-3}{2}\right) \times \left(\frac{-3}{2}\right)$$

$$= \frac{\cancel{2}^{1} \times \cancel{2}^{1} \times \cancel{(-3)}^{-1} \times (-3) \times (-3) \times (-1)}{1 \; \cancel{3} \times \cancel{3}^{1} \times 2 \times \cancel{2}^{1} \times \cancel{2} \; 1}$$

$$= \frac{(-1) \times (-3) \times (-1)}{2 \times 1} = \frac{-3}{2}$$

(vi) $\left[\frac{4}{9} - \left(\frac{-2}{3}\right)^3\right] \div \left(\frac{5}{3}\right)^2$

$$= \left[\frac{4}{9} - \frac{(-8)}{27}\right] \times \left(\frac{3}{5}\right)^2$$

$$= \left(\frac{4}{9} + \frac{8}{27}\right) \times \frac{9}{25}$$

$$= \left(\frac{12+8}{27}\right) \times \frac{9}{25}$$



$$= \frac{4}{\cancel{27}_3} \times \frac{\cancel{9}^1}{\cancel{25}_5}$$

$$= \frac{4 \times 1}{3 \times 5} = \frac{4}{15}$$

(vii) $\left(3^2 + 4^2\right) \times \left(\frac{1}{5}\right)^3 \times \frac{20}{7}$

$$= (9+16) \times \frac{1}{125} \times \frac{20}{7}$$

$$= {}^{1}\cancel{25} \times \frac{1}{\cancel{125}_5} \times \frac{20}{7}$$

$$= \frac{1}{1} \times \frac{20}{7}\,4 = \frac{4}{7}$$

(viii) $\left(13^2 - 12^2\right) \times \left(\frac{-3}{5}\right)^3 \times \frac{5}{2}$

$$= (169-144) \times \left(\frac{27}{125}\right) \times \frac{5}{2}$$

$$= {}^{1}\frac{\cancel{25}}{1} \times \frac{-27}{\cancel{125}_1} \times \frac{\cancel{5}^1}{2}$$

$$= \frac{1 \times (-27) \times 1}{1 \times 1 \times 2} = \frac{-27}{2}$$

(ix) $\left(\frac{3}{7}\right)^2 \times \frac{35}{3^2} \times \left(\frac{-1}{5}\right)^2$

$= \frac{1}{\cancel{49}_{7}} \times \frac{\overset{5}{\cancel{35}}}{\cancel{9}_{1}} \times \frac{1}{25}$

$= \frac{1 \cancel{5}}{7 \times \cancel{25}\ 5} = \frac{1}{35}$

(x) $\left[\left(\frac{1}{3}\right)^2 - \left(\frac{1}{2}\right)^3\right] \times \frac{6^2}{5}$

$= \left(\frac{1}{9} - \frac{1}{8}\right) \times \frac{36}{5}$

$= \left(\frac{8-9}{72}\right) \times \frac{36}{5}$

$= \frac{-1}{\cancel{72}_{2}} \times \frac{\cancel{36}^{1}}{5}$

$= \frac{-1 \times 1}{2 \times 5} = \frac{-1}{10}$

(xi) $\left[\left(\frac{1}{2}\right)^3 - \left(\frac{1}{3}\right)^2\right] \times \left(\frac{3}{5}\right)^2 \times \left(\frac{-2}{3}\right)^3$

$= \left(\frac{1}{8} - \frac{1}{9}\right) \times \frac{9}{25} \times \frac{-8}{27}$

$= \left(\frac{9-8}{72}\right) \times \frac{9}{25} \times \frac{(-8)}{27}$

$= \frac{1}{8\ \cancel{72}} \times \frac{\cancel{9}^{1}}{25} \times \frac{(-8)}{27}$

$= \frac{1 \times 1 \times (-8)}{8 \times 25 \times 27} = \frac{\overset{-1}{\cancel{-8}}}{\cancel{8} \times 25 \times 27} = \frac{-1}{675}$