VII-1.Number System

EXERCISE 1

LEVEL 1

1. $\left(\frac{3}{2} - \frac{2}{3}\right) - x = -\frac{1}{6}$

$\frac{9-4}{6} - x = -\frac{1}{6}$

$\frac{5}{6} + \frac{1}{6} = x = 1$

2. $\left(\frac{2}{3} + \frac{3}{5}\right) + x = -\frac{2}{15}$

$\frac{10+9}{15} + x = -\frac{2}{15}$

$x = -\frac{2}{15} - \frac{19}{15} = -\frac{21}{15} = -\frac{7}{5}$

3. $\left(\frac{1}{2} + \frac{1}{3} + \frac{1}{5}\right) + x = 3$

$\frac{15+10+6}{30} + x = 3$

$x = 3 - \frac{31}{30} = \frac{59}{30}$

4. $\frac{3}{7} - x = \frac{5}{4}$

$x = \frac{3}{7} - \frac{5}{4} = \frac{12-35}{28} = -\frac{23}{38}$

5. (a) $\frac{3}{12} + \frac{35}{6} - \frac{52}{24} = \frac{3}{12} + \frac{35}{6} - \frac{13}{6} = \frac{3}{12} + \frac{22}{6} = \frac{3+44}{12} = \frac{47}{12}$

(b) $\frac{1}{14} + \frac{5}{21} + \frac{27}{14} = 2 + \frac{5}{21} = \frac{47}{21}$

(c) $-\frac{65}{6} - \frac{56}{15} + \frac{3}{10} = \frac{-65 \times 5 - 56 \times 2 + 3 \times 3}{30} = -\frac{428}{30} = -\frac{214}{15}$

(d) $\frac{15}{66} - \frac{36}{36} + \frac{90}{195} = \frac{5}{22} - 1 + \frac{2}{13} = \frac{5}{22} - \frac{11}{13} = \frac{65-242}{286} = -\frac{177}{286}$

6. $-\frac{15}{28} \times x = -\frac{5}{7}$

$x = -5 \times \frac{28}{-15 \times 7} = \frac{4}{3}$

7. $-\frac{1}{6} \times x = -\frac{23}{9}$

$x = -23 \times \frac{-6}{9} = \frac{46}{3}$

8. $-\frac{8}{3} \times x = 24$

$x = 24 \times \frac{3}{-8} = -9$

9. $-10 \times x = 15$

$x = \frac{15}{-10} = -\frac{3}{2}$

10. $-\frac{4}{15} \times x = -\frac{8}{9}$

$x = \frac{-15 \times 8}{9 \times 4} = -\frac{10}{3}$

11. (a) Proper (as less than 1)   (b) Mixed   (c) improper (as more than 1) (d) improper (1 is improper)

(e) improper (as more than 1) (f) Mixed   (g) improper (as more than 1) (h) proper (as less than 1)

(i) Mixed   (j) proper (as less than 1)

12. (a) $\frac{8 \times 6 + 3}{8} = \frac{51}{8}$

(b) $\frac{2 \times 17 + 15}{17} = \frac{49}{17}$

(c) $\frac{19 \times 5 + 12}{19} = \frac{107}{19}$

(d) $\frac{15 \times 9 + 4}{15} = \frac{139}{15}$

(e) $\frac{12 \times 11 + 11}{12} = \frac{143}{12}$

13.(a) $\frac{71}{13} = \frac{13 \times 5 + 5}{13} = 5\frac{5}{13}$

(b) $\frac{80}{17} = \frac{17 \times 4 + 12}{17} = 4\frac{12}{17}$

(c) $\frac{100}{11} = \frac{11 \times 9 + 1}{11} = 9\frac{1}{11}$

(d) $\frac{103}{8} = \frac{8 \times 12 + 7}{8} = 12\frac{7}{8}$

(e) $\frac{135}{16} = \frac{16 \times 8 + 7}{16} = 8\frac{7}{16}$

14. (a) $\frac{17 \times 3}{17 \times 4} = \frac{3}{4}$

(b) $\frac{14 \times 5}{14 \times 8} = \frac{5}{8}$

(c) $\frac{16 \times 5}{16 \times 9} = \frac{5}{9}$

(d) $\frac{19 \times 4}{19 \times 7} = \frac{4}{7}$

(e) $\frac{17 \times 7}{17 \times 9} = \frac{7}{9}$

15. (a) $\frac{6}{11} : \frac{12}{22} ; \frac{18}{33} ; \frac{24}{44} ; \frac{30}{55}$

(b) $0 : \frac{0}{2} ; \frac{0}{3} ; \frac{0}{4} ; \frac{0}{5}$

(c) $6 : \frac{12}{2} ; \frac{18}{3} ; \frac{24}{4} ; \frac{30}{5}$

(d) $\frac{10}{13} : \frac{20}{26} ; \frac{30}{39} ; \frac{40}{52} ; \frac{50}{65}$

(e) $\frac{14}{9} : \frac{28}{18} ; \frac{42}{27} ; \frac{56}{36} ; \frac{70}{45}$

16. $24\frac{1}{2} = 1\frac{3}{4} \times x => \frac{49}{2} = \frac{7}{4} \times x => x = 49 \times \frac{4}{7 \times 2} = 14$

So 14 pieces can be cut.

17. SP $= \frac{3}{5} \times Marked\ price = \frac{3}{5} \times 160 = 96$

18. $\frac{2}{3} \times x = 486000$

$x = 486000 \times \frac{3}{2} = 729000$: worth of estate

19. as ¾ th is solved so 1/4th is remaining.

$\frac{1}{4} \times 32 = 8$ = Problems remaining.

20. $\frac{4}{5} \times D = 48$

$D = 48 \times \frac{5}{4} = 60$ =Total distance

Distance remaining = 60-48=12 km

21. $35 + \frac{3}{8} \times D = D$ \qquad\qquad D= total journey

$35 \times 8 = 8D - 3D$

$280 = 5D$

D = 56 km

22 (a) d=sum of digits at even place-sum of digits at odd place

d= 16-16=0   (so divisible by 11)

(b) d=sum of digits at even place-sum of digits at odd place

d=2-3=-1 (not divisible)

(c) d=sum of digits at even place-sum of digits at odd place

d= 11-22=-11 (divisible by 11)

(d) d=sum of digits at even place-sum of digits at odd place

d= 15-10=5 (not divisible by 11)

(e) d=sum of digits at even place-sum of digits at odd place

d= 16-16=0 (divisible by 11)

(f) d=sum of digits at even place-sum of digits at odd place

d= 7-24=-17 (not divisible by 11)

23. (a) S=sum of all the digits

S= 15 (Divisible by 3)

(b) S=sum of all the digits

S= 27 (Divisible by 3)

(c) S=sum of all the digits

S= 23 (not divisible by 3)

(d) S=sum of all the digits

S= 29 (not divisible by 3)

(e) S=sum of all the digits

S= 15 (divisible by 3)

(f) S=sum of all the digits

S= 36 (divisible by 3)

(g) S=sum of all the digits

S= 24 (divisible by 3)

(h) S=sum of all the digits

S= 23 (not divisible by 3)

(i) S=sum of all the digits

S= 32 (not divisible by 3)

In b and f only sum of digits is divisible by 9 or we can say divisible by 9.

24.(a) Its even so divisible by 2.

 S=sum of all the digits

S=25 (not divisible by 6 as not divisible by 3)

(b)) Its even so divisible by 2.

 S=sum of all the digits

S= 18 (divisible by 3)

So divisible by 6.

(c)) Its not even so not divisible by 2 and thus 6.

 (d)) Its even so divisible by 2.

 S=sum of all the digits

S= 22 (not divisible by 6 as not divisible by 3)

(e) Its even so divisible by 2.

 S=sum of all the digits

S= 24 (divisible by 3)

So divisible by 6.

(f) Its even so divisible by 2.

 S=sum of all the digits

S= 21 (divisible by 3)

So divisible by 6.

LEVEL 2

1. $-\frac{33}{16} \div x = -\frac{11}{4}$

$-\frac{33}{6} \times \frac{1}{x} = -\frac{11}{4}$

$x = -\frac{33 \times 3}{-11 \times 6} = \frac{3}{2}$

2. $\left(-\frac{13}{5} + \frac{12}{7}\right) \div \left(-\frac{13}{7} \times \frac{-1}{2}\right) = \frac{-91+60}{35} \div \frac{13}{14} = -\frac{31}{35} \times \frac{14}{13} = -\frac{62}{65}$

3. let x= length of each trouser

$24x = 54$

$x = \frac{54}{24} = \frac{9}{4} = 2.25$

4. $\left(\frac{65}{12} + \frac{12}{7}\right) \div \left(\frac{65}{12} - \frac{12}{7}\right) = \frac{455+144}{84} \div \frac{455-144}{84} = \frac{599}{84} \times \frac{84}{311} = \frac{599}{311}$

5. $\frac{1}{4} = \frac{11}{44}$ and $\frac{1}{2} = \frac{22}{44}$

$\frac{12}{44}, \frac{13}{44}, \frac{14}{44}, \frac{15}{44}, \frac{16}{44}, \frac{17}{44}, \frac{18}{44}, \frac{19}{44}, \frac{20}{44}, \frac{21}{44}$: 10 rational numbers

6. $-\frac{2}{5} = -\frac{8}{20}$; and $\frac{1}{2} = \frac{10}{20}$

$-\frac{7}{20}, -\frac{6}{20}, -\frac{5}{20}, -\frac{4}{20}, -\frac{3}{20}, -\frac{2}{20}, -\frac{1}{20}, \frac{1}{20}, \frac{2}{20}, \frac{3}{20}$: can be any other form also

7.(i) let $x = 0.\dot{7}$

$10x = 7.\dot{7}$

Subtract them

9x =7

x=7/9

(ii) $x = 3.\dot{8}$

$10x = 38.\dot{8}$

Subtract them

9x=35

x=35/9

(iii) $x = 0.\overline{36}$

$100x = 36.\overline{36}$

Subtract them

99x =36

$x = \frac{36}{99} = \frac{4}{11}$

(iv) $x = 0.\overline{87}$

$100x = 87.\overline{87}$

Subtract them

99x =87

$x = \frac{87}{99} = \frac{29}{33}$

(v) $x = 4.\overline{26}$

$100x = 426.\overline{26}$

Subtract them

99x =422

$x = \frac{422}{99}$

(vi) $x = 5.2\overline{3}$

$10x = 52.\overline{3}$

$100x = 523.\overline{3}$

Subtract them

90x =471

$x = \frac{471}{90} = \frac{157}{30}$

8. (i) $\frac{3}{7} = \frac{15}{35}$ and $\frac{2}{5} = \frac{14}{35}$ so $\frac{3}{7} > \frac{2}{5}$

(ii) $\frac{5}{6} = \frac{35}{42}$ and $\frac{4}{7} = \frac{24}{42}$ so $\frac{5}{6} > \frac{4}{7}$

(iii) $\frac{7}{12} = \frac{49}{84}$ and $\frac{9}{14} = \frac{54}{84}$ so $\frac{9}{14} > \frac{7}{12}$

(iv) $\frac{2}{9} = \frac{10}{45}$ and $\frac{3}{5} = \frac{15}{45}$ $so\frac{3}{5} > \frac{2}{9}$

(v) 4>12/5(2.4)

(vi) $\frac{1}{3} = \frac{2}{6}$ $and\frac{1}{2} = \frac{3}{6}$ $so\frac{1}{2} > \frac{1}{3}$

(vii) $\frac{8}{13} = \frac{72}{117}$ and $\frac{7}{9} = \frac{91}{117}$ $so\frac{7}{9} > \frac{8}{13}$

(viii) $\frac{11}{15} = \frac{187}{255}$ and $\frac{12}{17} = \frac{180}{255}$ $so\frac{11}{15} > \frac{12}{17}$

(ix) $\frac{6}{7} = \frac{78}{91}$ $and\frac{9}{13} = \frac{63}{91}$ so $\frac{6}{7} > \frac{9}{13}$

9. (i) $\frac{2}{3} = \frac{24}{36}; \frac{5}{6} = \frac{30}{36}; \frac{4}{9} = \frac{16}{36}; \frac{7}{12} = \frac{21}{36}; \frac{13}{18} = \frac{26}{36}$ as 16 < 21 < 24 < 26 < 30

$\frac{4}{9} < \frac{7}{12} < \frac{2}{3} < \frac{13}{18} < \frac{5}{6}$

(ii) $\frac{3}{5} = \frac{42}{70}; \frac{4}{7} = \frac{40}{70}; \frac{7}{10} = \frac{49}{70}; \frac{11}{14} = \frac{55}{70}; \frac{18}{35} = \frac{36}{70}$

$\frac{18}{35} < \frac{4}{7} < \frac{3}{5} < \frac{7}{10} < \frac{11}{14}$

(iii) $\frac{5}{8} = \frac{30}{48}; \frac{11}{12} = \frac{44}{48}; \frac{13}{16} = \frac{39}{48}; \frac{17}{24} = \frac{34}{48}; \frac{5}{6} = \frac{40}{48}$

$\frac{5}{8} < \frac{17}{24} < \frac{12}{16} < \frac{5}{6} < \frac{11}{12}$

(iv) $\frac{5}{9} = \frac{50}{90}; \frac{11}{15} = \frac{66}{90}; \frac{2}{3} = \frac{60}{90}; \frac{1}{2} = \frac{45}{90}; \frac{3}{5} = \frac{54}{90}$

$\frac{1}{2} < \frac{5}{9} < \frac{3}{5} < \frac{2}{3} < \frac{11}{15}$

10. (i) $\frac{5}{7} = \frac{40}{56}; \frac{3}{4} = \frac{42}{56}; \frac{9}{14} = \frac{36}{56}; \frac{3}{8} = \frac{21}{56}; \frac{19}{28} = \frac{38}{56}$

$\frac{3}{4} > \frac{5}{7} > \frac{19}{28} > \frac{9}{14} > \frac{3}{8}$

(ii) $\frac{2}{5} = \frac{24}{60}; \frac{3}{4} = \frac{45}{60}; \frac{1}{2} = \frac{30}{60}; \frac{5}{6} = \frac{50}{60}; \frac{1}{3} = \frac{20}{60}$

$\frac{5}{6} > \frac{3}{4} > \frac{1}{2} > \frac{2}{5} > \frac{1}{3}$

(iii) $\frac{5}{8} = \frac{75}{120}; \frac{11}{15} = \frac{88}{120}; \frac{17}{24} = \frac{85}{120}; \frac{7}{12} = \frac{70}{120}; \frac{19}{30} = \frac{76}{120}$

$\frac{11}{15} > \frac{17}{24} > \frac{19}{30} > \frac{5}{8} > \frac{7}{12}$

(iv) $\frac{5}{7} = \frac{60}{84}; \frac{3}{4} = \frac{63}{84}; \frac{9}{14} = \frac{54}{84}; \frac{16}{21} = \frac{64}{84}; \frac{17}{28} = \frac{51}{84}$

$$\frac{16}{21} > \frac{3}{4} > \frac{5}{7} > \frac{9}{14} > \frac{17}{28}$$

11. (i)3/5 (ii) ½ (iii) 33/72=11/24   (iv) 155/182 (v) 22/28=11/14 (vi)66/99=2/3

12. (i)1/2=6/12 and ¾=9/12   so ans:7/12;8/12

(ii) 1/3=5/15 and 3/5=9/15   so ans:6/15,7/15

(iii) 5/7=60/84 and ¾=63/84   so ans : 61/84 and 62/84

13. (i) 1/3=8/24 and1/2 =12/24   ans: 9/24;10/24;11/24

(ii) 7/12=77/132; 9/11=108/132   ans: 78/132 and 79/132,80/132

(iii) 6/7=78/91 and 12/13=84/91 ans: 79/91,80/91,81/91

14. 1. $\frac{4}{3} - \left\{\frac{5}{8} + \frac{9-4}{12}\right\} = \frac{4}{3} - \frac{5}{8} - \frac{5}{12} = \frac{32-15-10}{24} = \frac{7}{24}$

2. $\frac{7}{5} - \left\{\frac{3}{2} - \left(\frac{13}{5} - \frac{5}{4}\right)\right\} = \frac{28}{20} - \left\{\frac{30}{20} - \frac{52-25}{20}\right\} = \frac{28}{20} - \frac{\{30-27\}}{20} = \frac{25}{20} = \frac{5}{4}$

3. 15-[9+{7-(6-3)}]=15-[9+{7-3}]=15-13=2

4. $\frac{33}{2} - \left[\frac{17}{2} + \{11 - (8 - 4)\}\right] = \frac{33}{2} - \frac{17}{2} - 7 = 8 - 7 = 1$

5. $\frac{31}{10} - \left[\frac{39}{5} \div \left(\frac{25}{4} - \frac{11}{8}\right)\right] = \frac{31}{10} - \left[\frac{39}{5} \div \frac{50-11}{8}\right] = \frac{31}{10} - \frac{39}{5} \times \frac{8}{39} = \frac{31}{10} - \frac{16}{10} = \frac{15}{10} = \frac{3}{2}$

6. $1 - \left[\frac{8}{5} - \left(\frac{21}{4} \div \left(\frac{25}{8} + \frac{19}{4}\right)\right)\right] = 1 - \left[\frac{8}{5} - \left(\frac{21}{4} \div \frac{25+38}{8}\right)\right] = 1 - \left[\frac{8}{5} - \frac{21}{4} \times \frac{8}{63}\right]$

$= 1 - \frac{8}{5} + \frac{2}{3} = \frac{15-24+10}{15} = \frac{1}{15}$

7. $\left(\frac{19}{3} - \frac{13}{6}\right) - \left[\frac{9}{2} - \left\{8 - \left(\frac{22}{3} - 3 - \frac{9}{4}\right)\right\}\right] = \frac{38-13}{6} - \left[\frac{9}{2} - \left\{8 - \frac{88-36-27}{12}\right\}\right] = \frac{25}{6} - \left[\frac{9}{2} - \frac{96-25}{12}\right]$

$= \frac{50}{12} - \frac{54}{12} + \frac{71}{12} = \frac{67}{12}$

8. $\left(\frac{33}{4} - \left(\frac{13}{8} + \frac{5}{2}\right)\right) \div \left[\frac{7}{2} + \left(\frac{17}{2} - \left(8 - \left(4 - \frac{5}{2}\right)\right)\right)\right] = \left(\frac{66}{8} - \frac{13}{8} - \frac{20}{8}\right) \div \left[\frac{7}{2} + \left(\frac{17}{2} - \left(4 + \frac{5}{2}\right)\right\}\right]$

$= \frac{31}{8} \div \left[\frac{7}{2} + 2\right] = \frac{31}{8} \times \frac{2}{11} = \frac{31}{44}$

9. $\left(\frac{15}{2} - \left(\frac{20}{3} - \frac{31}{6}\right)\right) \div \left[\frac{36}{5} - \left(\frac{29}{4} - \left(\frac{7}{2} - \frac{9}{4}\right)\right)\right] = \left(\frac{15}{2} - \frac{40-31}{6}\right) \div \left[\frac{36}{5} - \frac{29-14+9}{4}\right]$

$= 6 \div \left[\frac{36}{5} - 6\right] = 6 \div \frac{6}{5} = 5$

15. $x \times 18\frac{1}{5} = 7$

$x \times \frac{91}{5} = 7$

$x = 5/13$

16. Let total pages be x

$x \times \frac{3}{8} + x \times \frac{5}{8} \times \frac{2}{5} + 48 = x$

$\frac{3x}{8} + \frac{x}{4} + 48 = x$

$x - \frac{3x}{8} - \frac{2x}{8} = 48$

$3x = 48 \times 8 \ or \ x = 128$

17. Let total capacity be x L

$\frac{3}{7} \times x - 28 = \frac{5}{14} \times x$

$-28 = \frac{5x}{14} - \frac{6x}{14}$

$x = 14 \times 28 = 392$