

6

CHAPTER

Fractions

Warm-up Exercise

2. (d) $3\frac{5}{9} = \frac{3 \times 9 + 5}{9} = \frac{32}{9}$

3. (c) $\frac{41}{13} = 13 \overline{) 41} = 3\frac{2}{13}$

5. (c) $\frac{11}{14} = \frac{11 \times 2}{14 \times 2} = \frac{22}{28};$

$$\frac{11}{14} = \frac{11 \times 3}{14 \times 3} = \frac{33}{42}$$

6. (c) Two fractions will be equivalent if their simplest form will be of the same.

Therefore, first find the simplest form of the two fractions, $\frac{12}{18}$ and $\frac{4}{6}$.

$$\frac{12 \div 6}{18 \div 6} = \frac{2}{3} \text{ and } \frac{4 \div 2}{6 \div 2} = \frac{2}{3}$$

Since, both the fractions have the same simplest form, thus the fractions $\frac{12}{18}$ and $\frac{4}{6}$ are equivalent.

$$9. (c) 1\frac{1}{4} + 2\frac{1}{4} + 6\frac{3}{4} = \frac{5}{4} + \frac{9}{4} + \frac{27}{4}$$

$$= \frac{5+9+27}{4} = \frac{41}{4} = 10\frac{1}{4}$$

Here, the sum $\frac{41}{4} = 10\frac{1}{4}$ is already in its simplest form.

$$10. (c) 1\frac{2}{13} - \frac{5}{13} = \frac{15}{13} - \frac{5}{13} = \frac{15-5}{13} = \frac{10}{13}$$

12. Since, the given fractions are as follows:

$$\frac{1}{3}, \frac{5}{6}, \frac{1}{12}, \frac{5}{24}, \frac{2}{3}$$

First we find the LCM of the denominators of the fractions to make them equivalent, that is,

3	3, 6, 12, 24, 3
2	1, 2, 4, 8, 1
2	1, 1, 2, 4, 1
	1, 1, 1, 2, 1

$$\text{LCM} = 3 \times 2 \times 2 \times 2 = 24$$

Thus, making the given fractions with denominator 24 as follows:

$$\frac{1 \times 8}{3 \times 8}, \frac{5 \times 4}{6 \times 4}, \frac{1 \times 2}{12 \times 2}, \frac{5 \times 1}{24 \times 1}, \frac{2 \times 8}{3 \times 8},$$

$$\text{That is, } \frac{8}{24}, \frac{20}{24}, \frac{2}{24}, \frac{5}{24}, \frac{16}{24}$$

Now comparing their numerators, we get

$$\text{Ascending Order: } < \frac{2}{24} < \frac{5}{24} < \frac{8}{24} < \frac{16}{24} < \frac{20}{24}$$

$$\text{Descending Order: } \frac{20}{24} > \frac{16}{24} > \frac{8}{24} > \frac{5}{24} > \frac{2}{24}$$

Checkpoint 6A

1. (e) The given fractions are unlike. We compare these fractions using cross multiplication method.

$$\frac{8}{13} \times \frac{9}{11}$$

Here, $8 \times 11 = 88$ is the first product and $9 \times 13 = 117$ is the second product.

Since, the first product (88) < the second product (117).

$$\text{Thus, } \frac{8}{13} < \frac{9}{11}.$$

3. (d) First convert the given fractions into like improper fractions, then compare.

$$1\frac{4}{9} = \frac{13}{9}; 2\frac{5}{9} = \frac{23}{9}; \frac{1}{7}$$

Now, convert these fractions into like fractions and find the LCM of their denominators.

Here, LCM of 9 and 7 = 63.

$$1\frac{4}{9} = \frac{13}{9} = \frac{13 \times 7}{9 \times 7} = \frac{91}{63};$$

$$2\frac{5}{9} = \frac{23}{9} = \frac{23 \times 7}{9 \times 7} = \frac{161}{63};$$

$$\frac{1}{7} = \frac{1 \times 9}{7 \times 9} = \frac{9}{63}$$

On comparing and arranging their numerators in ascending order, we can see that

$$9 < 91 < 161$$

$$\text{Which implies, } \frac{9}{63} < \frac{91}{63} < \frac{161}{63}$$

$$\text{That is, } \frac{1}{7} < 1\frac{4}{9} < 2\frac{5}{9}$$

Checkpoint 6B

$$1. (c) \frac{7}{12} + \frac{5}{36}$$

LCM of 12 and 36 = 36.

Therefore,

$$\frac{7}{12} + \frac{5}{36} = \frac{3 \times 7 + 5}{36} = \frac{26}{36} = \frac{13}{18}$$

2. (d) $\frac{11}{21} - \frac{7}{15}$

LCM of 21 and 15 = $3 \times 5 \times 7 = 105$.

Therefore, $\frac{11}{21} - \frac{7}{15} = \frac{11 \times 5 - 7 \times 7}{105}$

$$= \frac{55 - 49}{105} = \frac{6}{105} = \frac{2}{35}$$

4. (a) $7\frac{5}{7} + 6\frac{3}{5} - 7\frac{6}{8} = \frac{54}{7} + \frac{33}{5} - \frac{62}{8}$

$$= \frac{54 \times 40 + 33 \times 56 - 62 \times 35}{280}$$

$$= \frac{2160 + 1848 - 2170}{280}$$

$$= \frac{4008 - 2170}{280} = \frac{1838}{280} = \frac{919}{140} = 6\frac{79}{140}$$

(b) $5\frac{2}{7} - 5\frac{4}{6} + 4\frac{2}{6} = \frac{37}{7} - \frac{34}{6} + \frac{26}{6}$

$$= \frac{6 \times 37 - 7 \times 34 - 7 \times 26}{42}$$

$$= \frac{222 - 238 + 182}{42}$$

$$= \frac{222 + 182 - 238}{42} = \frac{404 - 238}{42} = \frac{166}{42}$$

$$= \frac{83}{21} = 3\frac{20}{21}$$

5. (a) $5\frac{1}{4} - 3\frac{1}{2}$

Here, the fractional part $\frac{1}{4} < \frac{1}{2}$, therefore

$$5\frac{1}{4} = (4+1)\frac{1}{4} = \left(4 + \frac{4}{4}\right)\frac{1}{4}$$

$$= 4\left(\frac{4}{4} + \frac{1}{4}\right) = 4\frac{5}{4}$$

Thus, $5\frac{1}{4} - 3\frac{1}{2} = 4\frac{5}{4} - 3\frac{1}{2} = (4-3)\left(\frac{5}{4} - \frac{1}{2}\right)$

$$= 1\left(\frac{5-2}{4}\right) = 1\frac{3}{4}$$

Checkpoint 6C

1. (a) $\frac{3}{5} \times 25 = \frac{3}{\cancel{5}_1} \times \cancel{25}^5 = 3 \times 5 = 15$

(d) $\frac{2}{8} \times 16 = \frac{2}{\cancel{8}_1} \times \cancel{16}^2 = 2 \times 2 = 4$

(f) $15 \times \frac{4}{5} = \cancel{15}^3 \times \frac{4}{\cancel{5}_1} = 3 \times 4 = 12$

(h) $10 \times \frac{1}{8} = \cancel{10}^5 \times \frac{1}{\cancel{8}_4} = \frac{5}{4} = 1\frac{1}{4}$

2. (b) $\frac{7}{9} \times \frac{3}{5} = \frac{7}{\cancel{9}_3} \times \frac{\cancel{3}^1}{5} = \frac{7 \times 1}{3 \times 5} = \frac{7}{15}$

(d) $\frac{7}{11} \times \frac{22}{35} = \frac{\cancel{7}^1}{\cancel{11}_1} \times \frac{\cancel{22}^2}{\cancel{35}_5} = \frac{1 \times 2}{1 \times 5} = \frac{2}{5}$

3. (a) $2\frac{4}{5} \times \frac{3}{6} = \frac{\cancel{14}^7}{\cancel{5}_1} \times \frac{\cancel{3}^1}{\cancel{6}_2} = \frac{7}{5} = 1\frac{2}{5}$

(b) $\frac{3}{11} \times 6\frac{2}{7} = \frac{3}{\cancel{11}_1} \times \frac{\cancel{44}^4}{\cancel{7}_1} = \frac{3 \times 4}{7} = \frac{12}{7} = 1\frac{5}{7}$

(e) $5\frac{6}{7} \times 2\frac{1}{7} = \frac{41}{\cancel{7}_1} \times \frac{\cancel{15}^3}{\cancel{7}_1} = \frac{615}{7} = 87\frac{6}{7}$

4. (a) $\frac{1}{\cancel{2}_1} \times \frac{\cancel{4}^2}{\cancel{8}_1} \times \frac{\cancel{8}^1}{\cancel{7}_1} = \frac{1 \times 2 \times 1}{1 \times 1 \times 7} = \frac{2}{7}$

(c) $6\frac{3}{4} \times 3\frac{3}{4} \times \frac{8}{105} = \frac{27}{\cancel{4}_2} \times \frac{\cancel{15}^1}{\cancel{4}_1} \times \frac{\cancel{8}^2}{\cancel{105}_7}$

$$= \frac{27 \times 1 \times 1}{2 \times 1 \times 7} = \frac{27}{14} = 1\frac{13}{14}$$

Checkpoint 6D

$$1. (c) 88 \div \frac{22}{55} = \cancel{88}^{\cancel{8}^1} \times \frac{55}{\cancel{22}_{\cancel{2}_1}} = 4 \times 55 = 220$$

$$(d) 2 \div 3\frac{1}{7} = 2 \div \frac{22}{7} = \cancel{2}^1 \times \frac{7}{\cancel{22}_{11}} = \frac{7}{11}$$

$$2. (a) \frac{5}{9} \div \frac{15}{19} = \frac{\cancel{5}^1}{9} \times \frac{19}{\cancel{15}_3} = \frac{19}{9 \times 3} = \frac{19}{27}$$

$$(e) \frac{10}{15} \div \frac{100}{25} = \frac{\cancel{10}^{\cancel{1}^1}}{\cancel{15}_3} \times \frac{\cancel{25}^{\cancel{5}^1}}{\cancel{100}_{\cancel{20}_{\cancel{2}_2}}} = \frac{1 \times 1}{3 \times 2} = \frac{1}{6}$$

$$3. (d) 7 \div 2\frac{6}{31} = 7 \div \frac{68}{31} = 7 \times \frac{31}{68} = \frac{217}{68} = 3\frac{13}{68}$$

$$(e) 1\frac{1}{2} \div 2\frac{1}{2} = \frac{3}{2} \div \frac{5}{2} = \frac{3}{\cancel{2}_1} \times \frac{\cancel{2}^1}{5} = \frac{3}{5}$$

$$4. (b) 5\frac{7}{9} \div 7\frac{3}{7} = \frac{52}{9} \div \frac{52}{7} = \frac{\cancel{52}^1}{9} \times \frac{7}{\cancel{52}_1} = \frac{7}{9}$$

$$(e) 6\frac{6}{7} \div 7\frac{1}{2} = \frac{48}{7} \div \frac{15}{2} = \frac{\cancel{48}^{16}}{7} \times \frac{2}{\cancel{15}_5} = \frac{32}{35}$$

Checkpoint 6E

1. Distance of my school from the house = $\frac{7}{15}$ km

Distance of my friends house from the school

$$= \frac{7}{10} \text{ km}$$

Comparing $\frac{7}{15}$ and $\frac{7}{10}$, we observe

$\frac{7}{10}$ has smaller denominator as compare to $\frac{7}{15}$

when both have the same numerator as 7.

$$\text{Thus, } \frac{7}{10} > \frac{7}{15}.$$

So, my house is nearer to the school.

3. Maarut bought,

$$\text{Spinach} = 1\frac{1}{4} \text{ kg} = \frac{5}{4} \text{ kg}$$

$$\text{Lettuce} = \frac{1}{2} \text{ kg}$$

$$\text{Potatoes} = 2\frac{1}{3} \text{ kg} = \frac{7}{3} \text{ kg}$$

$$\text{Carrots} = 1\frac{2}{3} \text{ kg} = \frac{5}{3} \text{ kg}$$

Total weight of vegetables bought by Maarut

$$= \frac{5}{4} \text{ kg} + \frac{1}{2} \text{ kg} + \frac{7}{3} \text{ kg} + \frac{5}{3} \text{ kg}$$

LCM of 4, 2, 3, 3

2	4, 2, 3, 3
3	2, 1, 3, 3
	2, 1, 1, 1

$$\text{LCM} = 2 \times 3 \times 2 = 12$$

$$= \frac{3 \times 5 + 6 \times 1 + 4 \times 7 + 4 \times 5}{12} \text{ kg}$$

$$= \frac{15 + 6 + 28 + 20}{12} = \frac{\cancel{69}^{23}}{\cancel{12}_4} \text{ kg} = \frac{23}{4} \text{ kg}$$

$$= 5\frac{3}{4} \text{ kg}$$

4. Total weight of mixed variety of apples

$$= 50\frac{1}{3} \text{ kg} + 75\frac{2}{3} \text{ kg}$$

$$= (50 + 75) \left(\frac{1}{3} + \frac{2}{3} \right)$$

$$= 125 \left(\frac{3}{3} \right) \text{ kg} = \frac{378}{3} \text{ kg} = 126 \text{ kg}$$

Total weight of sold mixed apples

$$= 40\frac{5}{6} \text{ kg} + 45\frac{1}{6} \text{ kg}$$

$$= (40 + 45) \left(\frac{5}{6} + \frac{1}{6} \right) \text{ kg}$$

$$= 85\frac{6}{6} \text{ kg} = \frac{516}{6} \text{ kg} = 86 \text{ kg}$$

Quantity of mixed apples unsold

$$= 126 \text{ kg} - 86 \text{ kg} = 40 \text{ kg}$$

6. Distance driven by Daljeet singh = $60\frac{2}{3} \text{ km}$

Time taken = $1\frac{1}{3} \text{ hours}$

Distance driven by him in 1 hour (with uniform speed)

$$= 60\frac{2}{3} \div 1\frac{1}{3}$$

$$= \frac{182}{3} \div \frac{4}{3} = \frac{182}{3} \times \frac{3}{4} = \frac{91}{2}$$

$$= 45\frac{1}{2} \text{ km}$$

7. Given thickness of a book = $2\frac{1}{4} \text{ cm}$

Length of the shelf = 1 m 80 cm = 180 cm

$$(\because 1 \text{ m} = 100 \text{ cm})$$

Number of such books that can be fit vertically

end to end on the shelf = $180 \div 2\frac{1}{4}$

$$= 180 \div \frac{9}{4} = 180 \times \frac{4}{9} = 80 \text{ books}$$

9. Length of the ribbon Saanvi has = 58 cm

Length of a piece of the ribbon = $7\frac{1}{4} \text{ cm}$

Number of such pieces which can be cut

$$= 58 \div 7\frac{1}{4} = 58 \div \frac{29}{4}$$

$$= 58 \times \frac{4}{29} = 2 \times 4 = 8 \text{ pieces}$$

Let Us Assess

1. (d) $10\frac{1}{5} + 5\frac{1}{2} + 1\frac{1}{10}$

$$= (10 + 5 + 1) \left(\frac{1}{5} + \frac{1}{2} + \frac{1}{10} \right) = 16 \left(\frac{2+5+1}{10} \right)$$

$$= 16 \frac{8}{10} = 16\frac{4}{5}$$

2. (e) $7\frac{5}{6} - 1\frac{1}{8} = \frac{47}{6} - \frac{9}{8} = \frac{4 \times 47 - 3 \times 9}{24}$

$$= \frac{88 - 27}{24} = \frac{61}{24} = 6\frac{17}{24}$$

5. (a) $\frac{1}{3} \text{ of } 15 = \frac{1}{3} \times 15 = 5$

So, multiplying $\frac{1}{3} \text{ of } 15$ by $3\frac{1}{5} = 5 \times 3\frac{1}{5}$

$$= 5 \times \frac{16}{5} = 16$$

(b) Product of $\frac{1}{2}$ and $15\frac{1}{2} = \frac{1}{2} \times 15\frac{1}{2}$

$$= \frac{1}{2} \times \frac{31}{2} = \frac{31}{4}$$

and product of $\frac{1}{3}$ and $13\frac{1}{2} = \frac{1}{3} \times 13\frac{1}{2}$

$$= \frac{1}{3} \times \frac{27}{2} = \frac{9}{2}$$

According to the question,

$$\frac{31}{4} \div \frac{9}{2} = \frac{31}{4} \times \frac{2}{9} = \frac{31}{18} = 1\frac{13}{18}$$

6. Length of the movie = $3\frac{1}{5} \text{ hours} = \frac{16}{5} \text{ hours}$

$$= \frac{16}{5} \times 60^{12} \text{ (Since, } 1 \text{ h} = 60 \text{ min)}$$

$$= 192 \text{ minutes}$$

Part of the movie Snehil watched

$$= \frac{1}{4} \text{ of } 192 \text{ minutes}$$

$$= \frac{1}{4} \times 192 = 48 \text{ minutes}$$

$$= 48 \text{ minutes}$$

And part of the movie Snehil did not watch

$$(192 - 48) \text{ min} = 144 \text{ minutes}$$

In fraction part of the movie Snehil didn't watch

$$= \frac{144}{192} = \frac{3}{4} \text{ part}$$

Therefore, Snehil could not watch $\frac{3}{4}$ part or 144 minutes length of the movie.

8. (e) Multiplicative inverse of $12\frac{1}{6} = ?$

$$\text{Since, } 12\frac{1}{6} = \frac{12 \times 6 + 1}{6} = \frac{73}{6}$$

(Converting into improper fraction)

$$\text{So, multiplicative inverse of } \frac{73}{6} = \frac{6}{73}$$

$$\left(\text{inverting } \frac{73}{6} \right)$$

$$\text{Check: } \frac{73}{6} \times \frac{6}{73} = 1$$

9. (a) Fraction of the people responded positive

= Worth watching people + Rocking people

$$= \frac{3}{5} + \frac{1}{4} = \frac{4 \times 3 + 5 \times 1}{20} = \frac{12 + 5}{20} = \frac{17}{20}$$

Number of people watching 1st show of a movie = 100

So, number of people responded positive

$$= \frac{17}{20} \text{ of } 100 = \frac{17}{20} \times 100 = 85$$

(b) Fraction of the people responded negative

= Boring + Good sleep time

$$= \frac{1}{20} + \frac{1}{10} = \frac{1 + 2}{20} = \frac{3}{20}$$

So, number of people responded negative

$$= \frac{3}{20} \text{ of } 100 = \frac{3}{20} \times 100 = 15$$

HOTS

1. Number of beads Manisha has = 72

$$\text{No. of red beads} = \frac{1}{3} \text{ of } 72 = \frac{1}{3} \times 72 = 24 \text{ beads}$$

$$\text{No. of blue beads} = \frac{1}{2} \text{ of } 72 = 36 \text{ beads}$$

$$\text{No. of green beads} = \text{No. of red beads} = 24 \text{ beads}$$

$$\text{No. of yellow beads} = \frac{1}{3} \text{ of blue beads}$$

$$= \frac{1}{3} \times 36 = 12 \text{ beads}$$

Number of white beads

$$= 72 - \text{No. of (red + blue + green + yellow beads)}$$

$$= 72 - (24 + 36 + 24 + 12)$$

$$= 72 - 96 = -24 \text{ beads}$$

Let's Work in Mind

$$5. \frac{6}{7} = \frac{6 \times 1}{7} = 6 \times \frac{1}{7}$$

$$= 6 \text{ (whole number)} \times \frac{1}{7} \text{ (unit fraction)}$$

$$= 6 \text{ times } \frac{1}{7}$$

$$= \frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} \text{ (Repeated addition)}$$