

CHAPTER-1 : LARGE NUMBERS AROUND US

Assessment Time 1.1

1.
 - a. 7,06,500: Seven lakh six thousand five hundred
 - b. 6,45,600: Six lakh forty-five thousand six hundred
 - c. 8,05,143: Eight lakh five thousand one hundred forty-three
 - d. 9,79,060: Nine lakh seventy-nine thousand sixty
 - e. 64,30,987: Sixty-four lakh thirty thousand nine hundred eighty-seven
 - f. 87,65,490: Eighty-seven lakh sixty-five thousand four hundred ninety
 - g. 98,65,437: Ninety-eight lakh sixty-five thousand four hundred thirty-seven
 - h. 57,68,905: Fifty-seven lakh sixty-eight thousand nine hundred five
2.
 - a. Three lakh forty-four thousand five hundred $\rightarrow$ 3,44,500
 - b. Forty - four lakh eight thousand seven hundred and four $\rightarrow$ 44,08,704
 - c. Sixty lakh five thousand and fifty $\rightarrow$ 60,05,050
 - d. Thirty- seven lakh three hundred and fifty- five $\rightarrow$ 37,00,355
3.
 - a. **First way:** +10000 button four times, +1000 button five times, +100 button three times
Second way: +1000 buttons forty-five times, +10 button thirty times
 - b. **First way:** +10000 buttons seven times, +100 button six times, +10 button two times, +1 button nine times
Second way: +1000 button seventy times, +10 buttons sixty-two times, +1 button nine times
 - c. **First way:** +10000 button eight times, +1000 button six times, +100 button three times, +10 button five times, +1 button four times
Second way: +1000 button eighty-six times, +10 buttons thirty-five times, +1 button four times
 - d. **First way:** +10000 buttons seven times, +1000 button six times, +100 button eight times, +10 button nine times, + 1 button five times
Second way: +1000 button seventy-six times, +10 button eighty-nine times, +1 button five times
 - e. **First way:** +100000 button five times, +10000 button six times, +1000 button seven times, +100 button eight times, +10 button nine times, +1 button six times
Second way: +10000 button fifty-six times, +100 button seventy-eight times, +10 button nine times, +1 button six times
 - f. **First way:** +100000 button six times, +10000 button seven times, +1000 button eight times, +100 button nine times, +10 button six times, +1 button five times
Second way: +10000 button sixty-seven times, +100 button eighty-nine times, +1 button sixty-five times
 - g. **First way:** +100000 button five times, +10000 button six times, +1000 button nine times, +100 button four times, +10 button three times, +1 button two times
Second way: +10000 button fifty-six times, + 100 button ninety-four times, +1 button thirty-two times

- 3.
- | | TC | C | TL | L | TTh | Th | H | T | O |
|-----|----|---|----|---|-----|----|---|---|---|
| (a) | | 5 | 1 | 9 | 6 | 3 | 2 | 8 | 5 |
| (b) | 4 | 0 | 5 | 9 | 6 | 3 | 8 | 2 | 1 |
| (c) | 9 | 1 | 6 | 3 | 2 | 8 | 5 | 4 | 1 |
| (d) | 8 | 1 | 5 | 6 | 0 | 2 | 9 | 4 | 3 |

- 5,19,63,285: Five crore nineteen lakh sixty-three thousand two hundred eighty-five
- 40,59,63,821: Forty crore fifty-nine lakh sixty-three thousand eight hundred twenty-one
- 91,63,28,541: ninety-one crore sixty-three lakh twenty-eight thousand five hundred forty-one
- 81,56,02,943: Eighty-one crore fifty-six lakh two thousand nine hundred forty-three

- | | | | | | | | | | | |
|----|-----|----|----|---|-----|-----|----|---|---|---|
| 4. | | HM | TM | M | HTh | TTh | Th | H | T | O |
| | (a) | | 9 | 0 | 3 | 7 | 6 | 4 | 2 | 8 |
| | (b) | 4 | 1 | 3 | 9 | 6 | 3 | 2 | 8 | 5 |
| | (c) | 3 | 7 | 2 | 8 | 9 | 1 | 6 | 3 | 1 |
| | (d) | 3 | 8 | 1 | 4 | 9 | 0 | 6 | 3 | 2 |

- 90,376,428: Ninety million three hundred seventy-six thousand four hundred twenty-eight
- 413,963,285: Four hundred thirteen million nine hundred sixty-three thousand two hundred eighty-five
- 372,891,631: Three hundred seventy-two million eight hundred ninety-one thousand six hundred thirty- one
- 6,381,490,632: Six billion three hundred eighty- one million four hundred ninety thousand six hundred thirty-two

5. a. Two million three hundred forty-six thousand three hundred fifty
b. Nine million one hundred six thousand five hundred sixty-nine
c. Fifty-eight million two hundred fifty-four thousand nine hundred seven
d. Six hundred seventy-two million eight hundred thirty-seven thousand four hundred eighty-three
6. a. 54637308
 └───→ 30000 (Since, 3 is at ten thousand place)
b. 16429437
 └───→ 400 (Since, 4 is at hundred place)

- Collected data on Martian topography, mineralogy, atmosphere (including methane) and the dynamics of the upper atmosphere.

Assessment Time 1.3

1. a. $814\boxed{5}67 \rightarrow 815000$ (Since hundred place digit is equal to 5.)
b. $516\boxed{4}28 \rightarrow 516000$ (Since hundred place digit is less than 5.)
c. $978\boxed{6}54 \rightarrow 979000$ (Since hundred place digit is more than 5.)
d. $5476\boxed{3}89 \rightarrow 5476000$ (Since hundred place digit is less than 5.)
2. a. $781\boxed{4}567 \rightarrow 7810000$ (Since thousand place digit is less than 5.)
b. $351\boxed{6}428 \rightarrow 3520000$ (Since thousand place digit is more than 5.)
c. $197\boxed{8}654 \rightarrow 1980000$ (Since thousand place digit is more than 5.)
d. $2546\boxed{7}389 \rightarrow 25470000$ (Since thousand place digit is more than 5.)
3. a. $543\boxed{8}64 \rightarrow 544000$
 $916\boxed{3}20 \rightarrow 916000$
So, $544000 + 916000 = 14,60,000$
b. $372\boxed{8}69 \rightarrow 373000$
 $372\boxed{8}59 \rightarrow 373000$
 $6381\boxed{4}24 \rightarrow 6381000$
So, $373000 + 373000 + 6381000$
 $= 71,27,000$
c. $406\boxed{3}82 \rightarrow 406000$
 $916\boxed{3}84 \rightarrow 916000$
So, $406000 + 916000 = 13,22,000$
d. $106\boxed{6}82 \rightarrow 107000$
 $916\boxed{3}84 \rightarrow 916000$
So, $107000 + 916000 = 10,23,000$
4. a. $91\boxed{6}3281 \rightarrow 9200000$
 $40\boxed{6}2391 \rightarrow 4100000$
So, $9200000 + 4100000$
 $= 1,33,00,000$
b. $41\boxed{8}2632 \rightarrow 4200000$
 $51\boxed{6}3284 \rightarrow 5200000$
So, $4200000 + 5200000 = 94,00,000$
c. $372\boxed{8}1694 \rightarrow 37300000$
 $81\boxed{3}7286 \rightarrow 8100000$
So, $37300000 + 8100000 = 4,54,00,000$
d. $51\boxed{6}3824 \rightarrow 5200000$
 $96\boxed{2}8453 \rightarrow 9600000$
So, $5200000 + 9600000 = 1,48,00,000$

4 Key Math-07 (Brainbee)

5. a. $63482\boxed{1}6 \rightarrow 6348200$
 $41906\boxed{3}2 \rightarrow 4190600$
 So, $6348200 - 4190600 = 21,57,600$
- b. $891463\boxed{2}8 \rightarrow 89146300$
 $490632\boxed{8}4 \rightarrow 49063300$
 So, $89146300 - 49063300 = 4,00,83,000$
- c. $763284\boxed{1}5 \rightarrow 76328400$
 $63281\boxed{9}4 \rightarrow 6328200$
 So, $76328400 - 6328200 = 7,00,00,200$
- d. $169378\boxed{2}4 \rightarrow 16937800$
 $9863\boxed{4}2 \rightarrow 986300$
 So, $16937800 - 986300 = 1,59,51,500$
6. a. $816\boxed{9}137 \rightarrow 8170000$
 $561\boxed{3}782 \rightarrow 5610000$
 So, $8170000 - 5610000 = 25,60,000$
- b. $516\boxed{3}829 \rightarrow 5160000$
 $372\boxed{8}163 \rightarrow 3730000$
 So, $5160000 - 3730000 = 14,30,000$
- c. $9163\boxed{2}814 \rightarrow 91630000$
 $7063\boxed{2}814 \rightarrow 70630000$
 So, $91630000 - 70630000 = 2,10,00,000$
- d. $916\boxed{3}728 \rightarrow 9160000$
 $706\boxed{3}284 \rightarrow 7060000$
 So, $9160000 - 7060000 = 21,00,000$
7. a. $37\boxed{2}4 \rightarrow 3700$
 $51\boxed{6}4 \rightarrow 5200$
 So, $3700 \times 5200 = 1,92,40,000$
- b. $81\boxed{9}6 \rightarrow 8200$
 $347\boxed{2}4 \rightarrow 34700$
 So, $8200 \times 34700 = 28,45,40,000$
- c. $91\boxed{6}3 \rightarrow 9200$
 $412\boxed{3}8 \rightarrow 41200$
 So, $9200 \times 41200 = 37,90,40,000$
- d. $314\boxed{7}2 \rightarrow 31500$
 $51\boxed{7}6 \rightarrow 5200$
 So, $31500 \times 5200 = 16,38,00,000$
8. a. $17\boxed{6}32 \rightarrow 18000$
 $8\boxed{1}36 \rightarrow 8000$
 So, $18000 \times 8000 = 14,40,00,000$
- b. $16\boxed{2}48 \rightarrow 16000$
 $51\boxed{4}32 \rightarrow 51000$
 So, $16000 \times 51000 = 81,60,00,000$
- c. $15\boxed{6}32 \rightarrow 16000$
 $6\boxed{7}18 \rightarrow 7000$
 So, $16000 \times 7000 = 11,20,00,000$
- d. $3\boxed{2}76 \rightarrow 3000$
 $81\boxed{9}63 \rightarrow 82000$
 So, $3000 \times 82000 = 24,60,00,000$
9. a. $572\boxed{8}6 \rightarrow 57300$
 $3\boxed{2}1 \rightarrow 300$
 So, $57300 \div 300 = 191$
- b. $9163\boxed{2}8 \rightarrow 916300$
 $1\boxed{4}3 \rightarrow 100$
 So, $916300 \div 100 = 9163$
- c. $6381\boxed{9}6 \rightarrow 938200$
 $5\boxed{3}2 \rightarrow 500$
 So, $638200 \div 500 = 1276.4$
- d. $6728\boxed{9}2 \rightarrow 672900$
 $2\boxed{5}9 \rightarrow 300$
 So, $672900 \div 300 = 2243$
10. Total stools sold in 32 days = $1171 \times 32 = 37472$
 Total stools = 39482
 Left stools = $39489 - 37472 = 2017$
 2000 (Nearest hundreds)
11. Mr. Tyagi earns = ₹ 48,648 $\rightarrow$ ₹ 48,600 (nearest 100)
 Expenditure = ₹ 31,372 $\rightarrow$ ₹ 31,400 (nearest 100)
 Saving = ₹ 12,546

8. Bold eagles fly at height of 4500 – 6000 m
Rahul's building is 80 m high

On comparing $\frac{4500}{80} = 56.25$ times and $\frac{6000}{80} = 75$ times

9. a. $81\boxed{6}3281 \rightarrow 8200000$
 $4\boxed{0}6237 \rightarrow 400000$
 So, $8200000 + 400000 = 86,00,000$
- b. $1\boxed{8}2632 \rightarrow 200000$
 $1\boxed{6}3284 \rightarrow 200000$
 So, $200000 + 200000 = 4,00,000$
- c. $672\boxed{8}1694 \rightarrow 67300000$
 $71\boxed{3}7286 \rightarrow 7100000$
 So, $67300000 + 7100000 = 7,44,00,000$
- d. $41\boxed{6}3824 \rightarrow 4200000$
 $86\boxed{2}8453 \rightarrow 8600000$
 So, $4200000 + 8600000 = 1,28,00,000$
10. a. $86\boxed{9}137 \rightarrow 870000$
 $61\boxed{3}782 \rightarrow 610000$
 So, $870000 - 610000 = 2,60,000$
- b. $316\boxed{3}829 \rightarrow 3160000$
 $72\boxed{8}163 \rightarrow 730000$
 So, $3160000 - 730000 = 24,30,000$
- c. $763\boxed{2}814 \rightarrow 7630000$
 $663\boxed{2}814 \rightarrow 6630000$
 So, $7630000 - 6630000 = 10,00,000$
- d. $816\boxed{3}728 \rightarrow 8160000$
 $506\boxed{3}284 \rightarrow 5060000$
 So, $8160000 - 5060000 = 31,00,000$

CHAPTER-2: ARITHMETIC EXPRESSIONS

Assessment Time 2.1

1. a. $18 + 4 = x + 8$
 $\Rightarrow x = 12 - 8 = 4$
- b. $32 + x = 8 \times 5$
 $\Rightarrow x = 40 - 32 = 8$
- c. $9 \times x = 81 \div 3$
 $\Rightarrow x = \frac{27}{9} = 3$
- d. $54 - x = 45$
 $\Rightarrow x = 54 - 45 = 9$
2. a. $77 - 39 = 38$
- b. $57 - 20 = 37$
- c. $45 + 25 = 70$
- d. $5 \times 12 = 60$
- So, increasing order is 37, 38, 60, 70 or (b), (a), (d), (c)
3. a. $345 + 89 \boxed{>} 346 + 85$
 +1
 +4
- b. $473 - 45 \boxed{=} 472 - 44$
 -1
 +1
- c. $464 + 187 \boxed{<} 463 + 189$
 -1
 +2
- d. $224 + 345 \boxed{<} 229 + 345$
 +5
- e. $613 - 77 \boxed{<} 614 - 76$
 +1
 +1
- f. $517 - 28 \boxed{<} 507 + 10$
 -10
 +38

Assessment Time 2.2

1. a. $38 - 7 + 18 = (38 + 18) - 7 = 56 - 7 = 49$
 b. $49 - 2 \times 5 + 11 = (49 + 11) - 10 = 60 - 10 = 50$
 c. $50 - 20 + 30 = (50 + 30) - 20 = 80 - 20 = 60$
 d. $68 - 10 \times 2 + 16 = 68 - 20 + 16 = (68 + 16) - 20 = 84 - 20 = 64$
 e. $7 \times 3 - 4 \times 7 \times 5 = 21 - 140 = -119$
2. a. $79 + 31 - 10 = 110 - 10 = 100$
 b. $8 \times 12 - 16 = 96 - 16 = 80$
 c. $14 \times 6 + 2 \times 16 = 84 + 32 = 116$
 d. $15 \times 5 + 2 \times 8 = 75 + 16 = 91$
3. a. Total gold coins $= 3 \times 100 + \frac{1}{2} \times 100$
 $= 300 + 50 = 350$
4. Cost of an adult ticket = ₹ 60
 Cost of a child ticket = ₹ 40
 (i) Total cost of 5 adults and two children tickets $= 5 \times 60 + 2 \times 40$
 $= 300 + 80 = ₹ 380$
 (ii) Cost of 8 adults ticket $= 8 \times 60 = ₹ 480$

Assessment Time 2.3

1. a. $14 + (6 - 4) = 14 + 6 \boxed{-4}$
 c. $34 - (8 + 4) = 34 \boxed{-} (8 - 4)$
 b. $28 + (7 \boxed{-} 4) = 28 + 7 - 4$
 d. $44 - 8 - 4 = 44 - 8 \boxed{-4}$
2. a. $24 + (14 + 10) = 24 + 24 = 48$
 c. $24 + (14 - 10) = 24 + 4 = 28$
 b. $24 - (14 + 10) = 24 - 24 = 0$
 d. $24 - (14 - 10) = 24 - 4 = 20$
3. a. $54 - (9 + 12) = 33$
 $\Rightarrow 54 - 21 = 33$
 $\Rightarrow 33 = 33$
 b. $76 - 24 - 8 = 60$
 $\Rightarrow 76 - (24 - 8) = 60$
 $\Rightarrow 76 - 16 = 60$
 $\Rightarrow 60 = 60$
 c. $-32 - 12 + 10 + 32 = -22$
 $\Rightarrow -32 - (12 + 10) + 32 = -22$
 $\Rightarrow -32 - 22 + 32 = -22$
 $\Rightarrow -22 = -22$
4. a. $5 \times 8 - 35 \div 7 + 2$
 $= 40 - 5 + 2$
 $= 42 - 5 = 37$
 b. $24 - 6 \times 3 + 4 - 8 \div 4$
 $= 24 - 6 \times 3 + 4 - 2$
 $= 24 - 18 + 4 - 2$
 $= 28 - 20 = 8$
 c. 8 of $8 \div 4 - 3 + 5 \times 3$
 $= 8 \times 8 \div 4 - 3 + 5 \times 3$
 $= 64 \div 4 - 3 + 5 \times 3$
 $= 16 - 3 + 15$
 $= 31 - 3 = 28$
 d. $42 \div 6 - 4 + 7 \times 8 + 5 \times 4$
 $= 7 - 4 + 56 + 20$
 $= 83 - 4 = 79$

- e. $17 \times 4 - 36 \div 9 + 25 \text{ of } 3$
 $= 68 - 4 + 75$
 $= 143 - 4 = 139$
- g. $\{45 \div (4 + 5)\} - 7 \times 8$
 $= \{45 \div 9\} - 56$
 $= 5 - 56 = -51$
- i. $5 - [7 - \{8 - (3 - 7 - 4)\}]$
 $= 5 - [7 - \{8 + 8\}]$
 $= 5 - (-9) = 5 + 9 = 14$
5. a. $93 \times 18 = (100 - 7) \times 18$
 $= 100 \times 18 - 7 \times 18$
 $= 1800 - 126 = 1674$
- c. $46 \times 50 = (50 - 4) \times 50$
 $= 50 \times 50 - 4 \times 50$
 $= 2500 - 200 = 2300$
- f. $18 + (5 \times 3) - 7$
 $= 18 + 15 - 7$
 $= 33 - 7 = 26$
- h. $10 - \{3(10 - 7) - 20 \div 2\}$
 $= 10 - \{3 \times 3 - 10\}$
 $= 10 - (-1) = 10 + 1 = 11$
- b. $106 \times 25 = (100 + 6) \times 25$
 $= 100 \times 25 + 6 \times 25$
 $= 2500 + 150 = 2650$
- d. $54 \times 50 = (50 + 4) \times 50$
 $= 50 \times 50 + 4 \times 50$
 $= 2500 + 200 = 2700$

Mental Math

- Total age of 3 kids = 32
 Total age of 3 kids after 4 years = $32 + 3 \times 4$
 $= 32 + 12 = 44$
- Nitin ran everyday = 12
 So, he ran in 2 weeks (14 days) = $12 \times 14 = 168$
- Total coins of Manya and Manju = $25 + 22 = 47$
 They gave coins to her younger brother = 12
 So, left coins = $47 - 12 = 35$
- Total bones sold out = 12
 Total cookies = $12 \times (7 + 3) = 12 \times 10 = 120$
- Total stamps in both albums = $32 + 43 = 75$
 He gives 18 stamps
 So, lefts stamps = $75 - 18 = 57$
- Total cost of sandwich and pastry = ₹ $(53 + 47) = ₹ 100$
 So, total cost of 10 such items = ₹ $(10 \times 100) = ₹ 1000$
- Total mangoes supplied in one day = $(93 + 107) = 200 \text{ kg}$
 Total mangoes supplied in one week = $200 \times 7 = 1400 \text{ kg}$
- Total time taken = $(3 - 2) + (3 - 2) + (3 - 2) + (3 - 2) + (3 - 2) + (3 - 2) + (3 - 2)$
 $+ (3 - 2) + (3 - 2) + (3 - 2) + (3 - 2) + (3 - 2) + 3 = 15 \text{ m}$
 So, in 13 minutes, it will climb.

Revision Time

- a. $5 \times (6 + 7) = 5 \times 6 + 5 \times 7$
 c. $4 \times (5 + 8) = 4 \times 5 + 4 \times 8$
- b. $(8 + 3) \times 9 = 8 \times 9 + 3 \times 9$
 d. $(6 + 2) \times 4 = 6 \times 4 + 2 \times 4$

10 Key Math-07 (Brainbee)

2. a. $(8 - 3) \times 39 \square (3 - 8) \times 39 = 5 \times 39 \square (-5) \times 39$
(Positive is always greater than negative)
- b. $25 + 9 \times 18 \square (25 + 95 \times 18)$
- c. $43 \times (17 - 9) \square 43 \times 17 + 43 \times 9$
- d. $(34 - 28) \times 22 \square 34 \times 22 - 28 \times 22$
3. a. $48 - 7 + 18 = 48 + 18 - 7 = 66 - 7 = 59$
- b. $69 - 2 \times 6 + 11 = 69 - 12 + 11 = 80 - 12 = 68$
- c. $50 - 10 + 10 + 10 = 70 - 10 = 60$
- d. $78 - 20 \times 2 + 16 = 78 - 40 + 16 = 94 - 40 = 54$
4. $233 - 19 \times 2 + 15$
 $= 233 + 15 - 38$
 $= 248 - 38 = 210$
5. $56 - 9 + 2 \times 6 - 16$
 $= 56 - 9 + 12 - 16$
 $= 68 - 25 = 43$
6. Cost of 15 cup cakes = ₹ $(15 \times 30) = ₹ 450$
Cost of cup cakes after discount = ₹ $(450 - 38) = ₹ 412$
7. Cost of 18 toys = ₹ 1044
So, cost of 1toy = ₹ $(1044 \div 18) = ₹ 58$
Mehak has money = ₹ $(1044 + 152) = ₹ 1196$
8. Ianat got back = ₹ $(100 - (15 + 25)) = ₹ 60$
9. Total cost = ₹ $(4 \times 49 + 25) = ₹ (196 + 25) = ₹ 221$
10. Total packs of rice of 5 kg = $50 \div 2 = 25$
Total packs now = $25 + 10 = 35$

SDG

11. Shalini earns = ₹ 50,000
Saving of Shalini = ₹ $50,000 - (5000 + 10000 + 6000 + 12000)$
 $= ₹ (50000 - 33000) = ₹ 17000$

Critical Thinking Skills

1. Meetali can pay as = $50 \times 6 + 20 \times 1 + 10 \times 1 + 1 \times 2$
 $= 300 + 20 + 10 + 2 = 332$
6 notes of ₹ 50, 1 note of ₹ 20, 1 note of ₹ 10 and 2 coins of ₹ 1
- b. Total height of window = $3 + 2 + 5 = 10$ cm

CHAPTER-3: A PEAK BEYOND THE POINT**Assessment Time 3.1**

1. a. $4 + \frac{3}{10} + \frac{5}{100}$ b. $50 + \frac{5}{10}$
- c. $7 + \frac{6}{100}$ d. $300 + 00 + 1 + \frac{3}{100}$

2. a. $20 + 5 + \frac{4}{10} + \frac{3}{100} + \frac{5}{1000}$

b. $100 + 0 + 9 + \frac{0}{10} + \frac{2}{100} + \frac{5}{1000}$

c. $900 + 90 + 9 + \frac{9}{10} + \frac{9}{1000}$

d. $1000 + 10 + 4 + \frac{1}{1000}$

3. a. 101.11

b. 257.021

c. 809.009

d. 4999.99

e. 6780.105

4. a. $\begin{array}{r} 1.32 \\ \hline 1 = 1 \\ 3 > 2 \end{array}$

b. $\begin{array}{r} 0.088 \\ \hline 0 < 1 \end{array}$

So, $1.32 > 1.2$

So, $0.180 > 0.088$

c. $\begin{array}{r} 7.531 \\ \hline 7 = 7 \\ 5 = 5 \\ 3 < 9 \end{array}$

d. $\begin{array}{r} 45.64 \\ \hline 4 = 4 \\ 5 = 5 \\ 6 = 6 \\ 4 > 0 \end{array}$

So, $7.590 > 7.531$

So, $45.64 > 45.603$

5. a. $\begin{array}{cccc} 2.121 & < & 2.20 & < & 2.265 & < & 2.45 \\ \downarrow & & \downarrow & & \downarrow & & \downarrow \\ 1 & < & 2 & = & 2 & < & 4 \\ & & 0 & < & 6 \end{array}$

So, Ascending order of given decimals is 2.121, 2.20, 2.265, 2.45

b. $\begin{array}{cccc} 1.32 & < & 2.735 & < & 4.33 & < & 7.64 \\ \downarrow & & \downarrow & & \downarrow & & \downarrow \\ 1 & < & 2 & < & 4 & < & 7 \end{array}$

So, Ascending order of given decimals is 1.32, 2.735, 4.33, < 7.64

6. a. $\begin{array}{cccc} 9.562 & > & 9.54 & > & 9.34 & > & 9.091 \\ \downarrow & & \downarrow & & \downarrow & & \downarrow \\ 5 & = & 5 & > & 3 & > & 0 \\ \downarrow & & \downarrow & & & & \\ 6 & > & 4 \end{array}$

So, descending order of given decimals is 9.562, 9.54, 9.34, 9.091

b. $\begin{array}{cccc} 1.1 & > & 0.471 & > & 0.07 & > & 0.02 \\ \downarrow & & \downarrow & & \downarrow & & \downarrow \\ 1 & > & 0 & = & 0 & = & 0 \\ & & 4 & > & 0 & = & 0 \\ & & & & 7 & > & 2 \end{array}$

So, descending order of given decimals is 1.1, 0.471, 0.07, 0.02

7. a. $6.54 = \frac{654 \div 2}{100 \div 2} = \frac{327}{50}$

b. $3.519 = \frac{3519}{1000}$

c. $90.001 = \frac{90001}{1000}$

d. $171.04 = \frac{17104 \div 4}{100 \div 4} = \frac{4276}{25}$

e. $450.45 = \frac{45045 \div 5}{100 \div 5} = \frac{9009}{20}$

8. a. $\frac{7}{100} = 0.07$ b. $\frac{19}{1000} = 0.019$
 c. $\frac{14}{100} = 0.14$ d. $\frac{347}{1000} = 0.347$

Assessment Time 3.2

1. a. $1 \text{ p} = ₹ \frac{1}{100} = ₹ 0.01$
 $\therefore 376 \text{ p} = ₹ (376 \times 0.01) = ₹ 3.76$
 b. $₹ 8 \text{ and } 25 \text{ p} = ₹ (8 + 25 \times 0.01)$
 $= ₹ (8 + 0.25) = ₹ 8.25$
 c. $₹ 47 \text{ and } 75 \text{ p} = ₹ (47 + 75 \times 0.01)$
 $= ₹ (47 + 0.75) = ₹ 47.75$
 d. $₹ 125 \text{ and } 90 \text{ p} = ₹ (125 + 90 \times 0.01)$
 $= ₹ (125 + 0.90) = ₹ 125.90$
2. a. Since $1 \text{ mm} = 0.1 \text{ cm}$
 $\therefore 67 \text{ mm} = (67 \times 0.1) \text{ cm} = 6.7 \text{ cm}$
 b. $18 \text{ cm } 3 \text{ mm} = (18 + 3 \times 0.1) \text{ cm} = 18.3 \text{ cm}$
 c. $79 \text{ cm } 5 \text{ mm} = (79 + 5 \times 0.1) \text{ cm} = 79.5 \text{ cm}$
 d. $53 \text{ cm } 7 \text{ mm} = (53 + 7 \times 0.1) \text{ cm} = 53.7 \text{ cm}$
3. a. Since $1 \text{ cm} = 0.01 \text{ m}$
 $\therefore 877 \text{ cm} = (877 \times 0.01) \text{ m} = 8.77 \text{ m}$
 b. $2148 \text{ cm} = (2148 \times 0.01) \text{ m} = 21.48 \text{ m}$
 c. $71 \text{ m } 48 \text{ cm} = (71 + 48 \times 0.01) \text{ m} = 71.48 \text{ m}$
 d. $498 \text{ m } 84 \text{ cm} = (498 + 84 \times 0.01) \text{ m} = 498.84 \text{ m}$
4. a. Since, $1 \text{ m} = 0.001 \text{ km}$
 $\therefore 3454 \text{ m} = 3454 \times 0.001 = 3.454 \text{ km}$
 b. $8 \text{ km } 197 \text{ m} = (8 + 197 \times 0.001) \text{ km} = 8.197 \text{ km}$
 c. $34 \text{ km } 99 \text{ m} = (34 + 99 \times 0.001) \text{ km} = 34.099 \text{ km}$
 d. $518 \text{ km } 240 \text{ m} = (518 + 240 \times 0.001) \text{ km} = 518.240 \text{ km}$
5. a. Since, $1 \text{ g} = 0.001 \text{ kg}$
 $\therefore 3809 \text{ g} = (3809 \times 0.001) \text{ kg} = 3.809 \text{ kg}$
 b. $4 \text{ kg } 297 \text{ g} = (4 + 297 \times 0.001) \text{ kg} = 4.297 \text{ kg}$
 c. $82 \text{ kg } 102 \text{ g} = (82 + 102 \times 0.001) \text{ kg} = 82.102 \text{ kg}$
 d. $471 \text{ kg } 8 \text{ g} = (471 + 8 \times 0.001) \text{ kg} = 471.001 \text{ kg}$
6. a. Since, $1 \text{ mg} = 0.001 \text{ g}$
 $\therefore 825 \text{ mg} = (825 \times 0.001) \text{ g} = 0.825 \text{ g}$
 b. $6 \text{ g } 497 \text{ mg} = (6 + 497 \times 0.001) \text{ g} = 6.497 \text{ g}$
 c. $25 \text{ g } 540 \text{ mg} = (25 + 540 \times 0.001) \text{ g} = 25.540 \text{ g}$
 d. $177 \text{ g } 48 \text{ mg} = (177 + 48 \times 0.001) \text{ g} = 177.048 \text{ g}$

7. a. Since, 1 mL = 0.001 L
 $\therefore 455 \text{ mL} = (455 \times 0.001) \text{ L} = 0.455 \text{ L}$
 b. $998 \text{ mL} = (998 \times 0.001) \text{ L} = 0.998 \text{ L}$
 c. $1135 \text{ mL} = (1135 \times 0.001) \text{ L} = 1.135 \text{ L}$
 d. $6253 \text{ mL} = (6253 \times 0.001) \text{ L} = 6.253 \text{ L}$
 e. $87 \text{ L } 400 \text{ mL} = (87 + 400 \times 0.001) \text{ L} = 87.400 \text{ L}$
 f. $291 \text{ L } 720 \text{ mL} = (291 + 720 \times 0.001) \text{ L} = 291.720 \text{ L}$
8. Total money = ₹ 2128.40
 Money spent = ₹ 1845.97
 Left money = ₹ $(2128.40 - 1845.97) = ₹ 282.43$
9. Weight of potatoes = 900 g
 Weight of cabbage = 550 g
 Weight of onions = 800 g
 Weight of tomatoes = 600 g
 Weight of ginger = 100 g
 Weight of green chillies = 300 g
 Total weight of vegetables = $900 + 550 + 800 + 600 + 100 + 300$
 $= 3250 \text{ g} = 3.250 \text{ kg}$
10. Total distance travelled by Sohan = $(64.100 + 32.365 + 0.600) \text{ km}$
 $= 97.065 \text{ km}$
11. Total capacity of can = 10 L
 Quantity of oil in it = 3.035 L
 So, more quantity can be poured = $(10 - 3.035) \text{ L} = 6.965 \text{ L}$

Assessment Time 3.3

1. a.
$$\begin{array}{r} 57.21 \\ + 9.90 \\ \hline 67.11 \end{array}$$
 b.
$$\begin{array}{r} 41.591 \\ + 61.908 \\ \hline 103.499 \end{array}$$
 c.
$$\begin{array}{r} 723.73 \\ + 310.71 \\ \hline 1034.44 \end{array}$$
- d.
$$\begin{array}{r} 473.730 \\ 98.562 \\ + 119.070 \\ \hline 691.362 \end{array}$$
 e.
$$\begin{array}{r} 507.12 \\ + 80.90 \\ 31.07 \\ + 120.10 \\ \hline 739.19 \end{array}$$
2. a.
$$\begin{array}{r} 73.37 \\ - 51.71 \\ \hline 21.66 \end{array}$$
 b.
$$\begin{array}{r} 37.370 \\ - 13.071 \\ \hline 24.299 \end{array}$$
 c.
$$\begin{array}{r} 415.19 \\ - 100.10 \\ \hline 315.09 \end{array}$$
- d.
$$\begin{array}{r} 175.21 \\ - 91.07 \\ \hline 84.14 \end{array}$$
 e.
$$\begin{array}{r} 305.210 \\ - 210.102 \\ \hline 95.108 \end{array}$$
 d.
$$\begin{array}{r} 514.19 \\ - 169.08 \\ \hline 345.11 \end{array}$$

14 Key Math-07 (Brainbee)

3. Total cost of pen and pencil = ₹ (41.50 + 13.50) = ₹ 55
4. Difference = $28.980 - 10.898 = 18.082$
5. Required number = $555.59 - (151.05 + 205.87)$
 $= 555.59 - 356.92 = 198.67$
6. Required number = $8.890 - 0.898 = 7.992$
7. Sum of two numbers = 479.61
One number = 279.09
 $\therefore$ Other number = $479.61 - 279.90 = 200.52$
8. Required number = $50.9 - (15.50 + 25.87)$
 $= 50.90 - 41.37 = 9.53$
9. Difference = $200 - (51.201 + 117.9)$
 $= 200 - 166.101 = 30.899$
10. Difference of two numbers = 179.09
Bigger number = 414.16
So, other number = $414.16 - 176.09 = 238.07$
11. Total supply of milk in 6 days = 25 L
Total supply of milk in first 3 days = $(3.79 + 4.20 + 4.25)$ L = 12.24 L
So, supply of milk in last 3 days = $(25 - 12.24)$ L = 12.76 L
12. 1 km = 1000 m
and 1 = 1000 mm
So, 1 km = (1000×1000) mm = 10,00,000 mm
13. Not necessary
For example 0.5468 has 4 decimals and 0.72 has 2 decimals
but $0.72 > 0.5468$
14. Insurance for 1 person = 45 p
So, insurance for 1 lakh = ₹ 0.45
Person = ₹ $(0.45 \times 100000) = ₹ 45000$
15. a. Difference of atomic weights of oxygen and carbon = $15.9999 - 12.0107$
 $= 3.9892$
b. Difference of atomic weights of hydrogen and nitrogen = $14.0067 - 1.0080$
 $= 12.9987$
c. Difference of atomic weights of hydrogen and nitrogen = $15.99999 - 14.0067$
 $= 1.9932$

Mental Math

1. $300 + 70 + 4 + 0.5 + 0.08 = 374.58$
2. 18.200, 12.412, 31.570, 105.070 are like decimals
3. Hundredths place digit = 4
Tenths place digit = $4 - 3 = 1$
Ones place digit = 3

So, number is 3.14

4. No of tenths = $\frac{10}{\frac{1}{10}} = 100$

5. No. of thousands = $\frac{\frac{1}{10}}{\frac{1}{1000}} = 100$

6. No. of thousands = $\frac{\frac{1}{100}}{\frac{1}{1000}} = 10$

7. No. of hundredths = $\frac{10}{\frac{1}{100}} = 1000$

Revision Time

1. a. $1.75 = \frac{175 \div 25}{100 \div 25} = \frac{7}{4}$

b. $0.015 = \frac{15 \div 5}{1000 \div 5} = \frac{3}{200}$

c. $7.124 = \frac{7124 \div 4}{1000 \div 4} = \frac{1781}{250}$

d. $0.008 = \frac{8 \div 8}{1000 \div 8} = \frac{1}{125}$

2. a. $1.30 \quad < \quad 1.34$
 $\underbrace{\hspace{1cm}}_{\rightarrow} 0 < 4 \leftarrow \underbrace{\hspace{1cm}}$

b. 0.079 $\boxed{<}$ 0.910
 ↘ ←

3. a. Since, 1 p = ₹ 0.01
 $\therefore 225 \text{ p} = ₹ (225 \times 0.01)$
 $= ₹ 2.25$

b. Since, $1 \text{ cm} = 0.01 \text{ m}$
 $\therefore 97 \text{ cm} = (97 \times 0.01) \text{ m}$
 $= 0.97 \text{ m}$

c. Since, $1 \text{ mg} = 0.001 \text{ g}$
 $\therefore 250 \text{ g } 375 \text{ mg}$
 $= (250 + 375 \times 0.001) \text{ g}$
 $= 250.375 \text{ g}$

d. Since, $1 \text{ mL} = 0.001 \text{ L}$
 $\therefore 27 \text{ L } 200 \text{ mL}$
 $= (27 + 200 \times 0.001) \text{ L}$
 $= 27.200 \text{ L}$

4. a.
$$\begin{array}{r} 5.90 \\ + 11.07 \\ \hline 16.97 \end{array}$$

b.

24.43
+ 74.71
99.14

c.

157.21
+ 71.08
228.29

d.
$$\begin{array}{r} 233.340 \\ + 120.507 \\ \hline 353.847 \end{array}$$

e.

57.21
9.90
+ 19.07
86.18

f.

114.591
216.908
+ 110.010
441.509

5. a.
$$\begin{array}{r} 16.900 \\ - 4.590 \\ \hline 12.310 \end{array}$$

b.

87.87
− 39.21
48.66

c.

41.047
-17.100
23.947

d.

1 6 1 . 7 5
– 9 2 . 1 2
6 9 . 6 3

e.

157.21
-119.07
38.14

f.
$$\begin{array}{r} 400.007 \\ -217.210 \\ \hline 182.797 \end{array}$$

6. a.

32.101
+ 0.780
32.881

b.

61.891
-20.999
40.892

16 Key Math-07 (Brainbee)

c.
$$\begin{array}{r} 37.230 \\ + 1.876 \\ \hline 39.106 \end{array}$$

d.
$$\begin{array}{r} 39.106 \\ - 20.007 \\ \hline 19.099 \end{array}$$

7. Required number = $50.9 - (11.05 + 25.78)$
 $= 50.90 - 36.83 = 14.07$

8. a. $\frac{9}{10} = 0.9$

b. $\frac{28}{100} = 0.28$

c. $\frac{4123}{1000} = 4.123$

d. $11\frac{7}{100} = \frac{1107}{100} = 11.07$

e. $\frac{1}{8} = \frac{1}{8} \times \frac{125}{125} = \frac{125}{1000} = 0.125$

f. $\frac{11}{25} = \frac{11 \times 4}{25 \times 4} = \frac{44}{100} = 0.44$

g. $\frac{31}{40} = \frac{31 \times 25}{40 \times 25} = \frac{775}{1000} = 0.775$

h. $\frac{113}{125} = \frac{113 \times 8}{125 \times 8} = \frac{904}{1000} = 0.904$

9. a. $0.6 = \frac{6}{10} = \frac{3}{5}$

b. $2.4 = \frac{24}{10} = \frac{12}{5}$

c. $4.874 = \frac{4874}{1000} = \frac{2437}{500}$

d. $65.4 = \frac{654}{10} = \frac{327}{5}$

e. $771.14 = \frac{77114}{100} = \frac{38557}{50}$

f. $90.001 = \frac{9001}{1000}$

10. a. 3.7, 13.3, 4.015, 9.001; 8.74, 2.10

b. 0.03, 9.98, 2.27; 1.112, 1.245, 6.515

11. a. 2.300, 3.570, 7.927, 0.800, 1.271

b. 6.400, 105.030, 0.314, 0.110, 18.500, 1.078

12. Required number = $1000 - (315.60 + 147.87)$
 $= 1000 - 463.47 = 536.53$

13. Total distance = 3km 350 m = 3.350 km
Distance covered by bus = 2 km 700 m = 2.700km
So, left distance = $3.350 - 2.700 = 0.650$ km
 $= 650$ m

14. Total weight of vegetables = $(3.250 + 1.500 + 5.800)$ kg
 $= 10.550$ kg

15. Total weight of vegetables = $(0.240 + 0.300 + 0.500 + 0.200)$
 $= 1.240$ kg

Critical Thinking Skills

$$\begin{aligned} \text{Total length of body} &= \left(1\frac{3}{10} + 4\frac{7}{10} + 5\frac{9}{10}\right) \text{ cm} \\ &= 1 + 4 + 5 + \left(\frac{3}{10} + \frac{7}{10} + \frac{9}{10}\right) \\ &= 10 + \frac{19}{10} = 11\frac{9}{10} \text{ cm} \end{aligned}$$

CHAPTER-4: EXPRESSIONS USING LETTER-NUMBERS

Assessment Time 4.1

1. a. $\frac{1}{2}(x + y) + 9$

b. $r - \frac{p}{q}$

c. $7y^2 + 2x$

d. $4z - \frac{2}{3}x$

e. $b + (8 - a)$

f. $mn - \frac{m}{n}$

2. $2n$

3.

1	2	3	4	5	6
5	8	11	14	17	20

Pattern: $3n + 2$

4.

1	2	3	4	5	6
5	10	15	20	25	30

Pattern: $5n$

4. Gaurav reads pages in a day = 32
So, he reads pages in n day = $32n$

5. Height of Madhu = $(x + 14)$ cm

6. Brother's age = x years
So, age of Ramesh = $(2x)$ years

7. Perimeter of equilateral triangle = $3a$

8. Samar covers distance in one step = x cm
So, he cover distance in 20 steps = $20x$ cm

9. Sunita has toffees = 21
Toffees left in a day = $21 - (x + y)$
 $= 21 - x - y$

10. Ravi spends = ₹ $\frac{x}{7}$
Ravi saves in a day = ₹ y
Total earning in 30 days = ₹ $30 \left(\frac{x}{7} + y \right)$

11. Cost of 1 pen = ₹ 9
Cost of 1 pencil = ₹ 3
Total cost of 5 pens and 6 pencils = ₹ $(9 \times 5 + 3 \times 6) = ₹ 63$
Total cost of x pens and y pencils = ₹ $(9x + 3y)$

12. No. of mangoes in a box = 56
 $\therefore$ No. of mangoes in y boxes = $56y$

13. A bird flies in 1 min = 1.5 km
So, it flies in t minutes = $1.5t$ km

14. In year 2023, students planted = m plants
So, in year 2024, students planted = $(2m + 10)$ plants

15. Total numbers of bacteria after t minutes = $60t$

Assessment Time 4.2

1. a. $x^2 + 5y^2 - 6z = 1^2 + 5(-2)^2 - 6 \times 3$
 $= 1 + 20 - 18 = 21 - 18 = 3$

b. $2x^3 + 6y^3 + 12xy = 2 \times 1^3 + 6(-2)^3 + 12 \times 1 \times 3$
 $= 2 - 48 + 36$
 $= 38 - 48 = -10$

c. $-13xy + 12y^2 + 5xy = -13 \times 1 \times (-2) + 12(-2)^2 + 5 \times 1 \times (-2)$
 $= 26 + 48 - 10$
 $= 74 - 10 = 64$

d. $5x^3 + 12xz + y^3 = 5 \times 1^3 + 12 \times 1 \times 3 + (-2)^3$
 $= 5 + 36 - 8$
 $= 41 - 8 = 33$
2. a. $3a^2 - b^3 + 4c^2 = 3 \times 2^2 - (-1)^3 + 4 \times 3^2$
 $= 12 + 1 + 36 = 48$

b. $2a^3 - 3abc + c^3 = 2 \times 2^3 - 3 \times 2 \times (-1) \times 3 + 3^3$
 $= 16 + 18 + 27 = 61$

c. $4a^3 - 4b^3 + 3c^3 = 4 \times 2^3 - 4 \times (-1)^3 + 3 \times 3^3$
 $= 32 + 4 + 81 = 117$

d. $3abc^2 - 12ab^2 + 4c^3 = 3 \times 2 \times (-1) \times 3^2 - 12 \times 2 \times (-1)^2 + 4 \times 3^3$
 $= -54 - 24 + 108 = -78 + 108 = 30$
3. a. $3xy + 5xy - 6xy$
 $= (3 + 5 - 6)xy = 2xy$

b. $7m^2 + 6m^2 - 8m^2$
 $= (7 + 6 - 8)m^2 = 5m^2$

c. $6y^2 - 5y^2 - 10y^2$
 $= (6 - 5 - 10)y^2 = -9y^2$

d. $4x^2y - 3x^2y + 6yx^2$
 $= (4 - 3 + 6)x^2y = 7x^2y$
4. a. $(-5xyz + 4x^2y^2 - 10) + (5x^2y^2 - 8xyz + 8)$
 $= (-5xyz - 8xyz) + (4x^2y^2 + 5x^2y^2) + (-10 + 8)$
 $= -3xyz + 9x^2y^2 - 2$

b. $(-2x^2 + 4xy - 16) + (3x^2 + 8y^2 - 6xy + 14)$
 $= (-2x^2 + 3x^2) + (4xy - 6xy) + 8y^2 + (-16 + 14)$
 $= x^2 - 2xy + 8y^2 - 2$

c. $\left(\frac{3}{7}m^2n + \frac{4}{5}mn - 6\right) + \left(\frac{5}{14}nm^2 + \frac{7}{10}mn + 8\right)$
 $= \left(\frac{3}{7}m^2n + \frac{5}{14}m^2n\right) + \left(\frac{4}{5}mn + \frac{7}{10}mn\right) + (-6 + 8)$
 $= \frac{11}{14}m^2n + \frac{3}{2}mn + 2$

d. $\left(\frac{4}{11}xy^2 + 18x^2 - \frac{6}{13}y^2\right) + \left(\frac{5}{11}xy^2 + \frac{5}{13}y^2 - 14x^2\right)$
 $= \left(\frac{4}{11}xy^2 + \frac{5}{11}xy^2\right) + (18x^2 - 14x^2) + \left(\frac{-6}{13}y^2 + \frac{5}{13}y^2\right)$
 $= \frac{9}{11}xy^2 + 4x^2 - \frac{y^2}{13}$

5. a.

$$\begin{array}{r}
 a^2 + 3ab - 6b^2 + 7 \\
 -6a^2 + 8ab + 5b^2 + 8 \\
 \hline
 -5a^2 + 11ab - b^2 + 15
 \end{array}$$

b.

$$\begin{array}{r}
 4x^2 + 5y^2 - 6xy \\
 -8x^2 + 17y^2 + 5xy \\
 \hline
 -19x^2 + 8y^2 + 10xy \\
 -23x^2 + 30y^2 + 9xy
 \end{array}$$

c.

$$\begin{array}{r}
 19mn^2 - 6mnp + 8n^2 \\
 27mn^2 + 4mnp + 5n^2 \\
 -6mn^2 + 15mnp + 15n^2 \\
 \hline
 40mn^2 + 13mnp + 28n^2
 \end{array}$$

d.

$$\begin{array}{r}
 5lm^2 + 15lmn + 4n^2 + 8 \\
 6m^2l - 8lmn + 5n^2 \\
 -4m^2l + 23lmn + 18n^2 + 4 \\
 \hline
 7m^2l + 30lmn + 27n^2 + 12
 \end{array}$$

6. a. $6xy - 8xy = -2xy$

b. $8m^2n - (-10m^2n) = 8m^2n + 10m^2n = 18m^2n$

c. $-8x^2y^2 - (-13x^2y^2) = -8x^2y^2 + 13x^2y^2 = 5x^2y^2$

d. $0 - 5ab^2 = -5ab^2$

7. a. $(8xy - 16y^2 + 4x^2) - (5xy + 6y^2 - 3x^2)$

$= 8xy - 16y^2 + 4x^2 - 5xy - 6y^2 + 3x^2$

$= (8xy - 5xy) + (-16y^2 - 6y^2) + (4x^2 + 3x^2)$

$= 3xy - 22y^2 + 7x^2$

b. $(3m^2 - 2mn + 4n^2) - (16m^2 + 2mn + 5n^2)$

$= 3m^2 - 2mn + 4n^2 - 16m^2 - 2mn - 5n^2$

$= (3m^2 - 16m^2) + (-2mn - 2mn) + (4n^2 - 5n^2)$

$= -13m^2 - 4mn - n^2$

c. $(3x^3 + 5y^3 + 2xyz) - (x^3 - 2y^3 - 4xyz)$

$= 3x^3 + 5y^3 + 2xyz - x^3 + 2y^3 + 4xyz$

$= (3x^3 - x^3) + (5y^3 + 2y^3) + (2xyz + 4xyz)$

$= 2x^3 + 7y^3 + 6xyz$

d. $(15 - 7x) - (-x^2 - 10x + 6)$

$= 15 - 7x + x^2 + 10x - 6$

$= (15 - 6) + (-7 + 10x) + x^2$

$= 9 + 3x + x^2$

$= x^2 + 3x + 9$

8. a.

$$\begin{array}{r}
 8ab - 6a^2 - 7b^2 + 7 \\
 (-) \begin{array}{r} -6ab \quad +5a^2 \quad +8b^2 \quad +10 \\ (+) \quad (-) \quad (-) \quad (-) \end{array} \\
 \hline
 14ab - 11a^2 - 15b^2 - 3
 \end{array}$$

b.

$$\begin{array}{r}
 -2x^2 + 8xy - 6y^2 + 2 \\
 (-) \begin{array}{r} 3x^2 \quad -7xy \quad +5y^2 \quad -7 \\ (-) \quad (+) \quad (-) \quad (+) \end{array} \\
 \hline
 -5x^2 + 15xy - 11y^2 + 9
 \end{array}$$

c.

$$\begin{array}{r}
 -3xy - 16x \\
 (-) \begin{array}{r} 2xy \quad +8x \quad +6x^2y^2 \\ (-) \quad (-) \quad (-) \end{array} \\
 \hline
 -5xy - 24x - 6x^2y^2
 \end{array}$$

d.

$$\begin{array}{r}
 -a^2 + 8ab + 10 \\
 (-) \begin{array}{r} 3a^2 \quad -6ab \quad +5b^2 \\ (-) \quad (+) \quad (-) \end{array} \\
 \hline
 -4a^2 + 14ab - 5b^2 + 10
 \end{array}$$

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$$\begin{aligned} 9. \quad & (6a^2 + 4ab - 7b^2) - (a^2 + 5ab + 6b^2 - 4a^2 + 7b^2 - 7ab) \\ &= (6a^2 + 4ab - 7b^2) - (-3a^2 + 13b^2 - 2ab) \\ &= 6a^2 + 4ab - 7b^2 + 3a^2 - 13b^2 + 2ab \\ &= 9a^2 - 20b^2 + 6ab \end{aligned}$$

$$\begin{aligned} 10. & (-7xy + 2y^2 - 6x^2 + 2x^2 - 6xy + 2y^2) - (5x^2 + 6xy - 7y^2 + 3x^2 - 4xy + 4y^2) \\ &= (-13xy + 4y^2 - 4x^2) - (8x^2 + 2xy - 3y^2) \\ &= -13xy + 4y^2 - 4x^2 - 8x^2 - 2xy + 3y^2 \\ &= -15xy + 7y^2 - 12x^2 \end{aligned}$$

11. Required algebraic expression

$$= (13m^2 - 6mn + 8n^2) - (3m^2 + 4mn - 6n^2)$$

$$= 13m^2 - 6mn + 8n^2 - 3m^2 - 4mn + 6n^2$$

$$= 10m^2 - 10mn + 14n^2$$

12. Required algebraic expression

$$\begin{aligned}(7xy - 6y^2 + 4x^2) - (16y^2 - 6x^2 - 3xy) \\&= 7xy - 6y^2 + 4x^2 - 16y^2 + 6x^2 + 3xy \\&= (10xy - 22y^2 + 10x^2)\end{aligned}$$

$$\begin{aligned} \mathbf{13.} \quad 2P - 8Q &= 2(2x^2 - 3xy + 4y^2) - (3x^2 + 6xy - 5y^2) \\ &= 4x^2 - 6xy + 8y^2 - 3x^2 - 6xy + 5y^2 \\ &= x^2 - 12xy + 13y^2 \end{aligned}$$

14. A man has money = ₹ $(4x^2 + 3xy + 5y^2 + 10)$
 He saves = ₹ $(2x^2 + 2xy)$
 He gives to PM relief fund = ₹ $(4x^2 + 3xy + 5y^2 + 10) - ₹ (2x^2 + 2xy)$
 $= ₹ (4x^2 + 3xy + 5y^2 + 10 - 2x^2 - 2xy)$
 $= ₹ (2x^2 + xy + 5y^2 + 10)$

Mental Math

1. a. $2W - 5W = -3W$

b. $4a - 4a - 3a = -3a$

c. $-5n - n + 8n = 2n$

d. $5m + 3m + 6n - 8n = 8m - 2n$

e. $t + t - u + 2u = 2t + u$

f. $3a + 4a - 2c - 5c = 7a - 7c$

g. $-6x + 3x - 2y = -3x - y$

2. Alisha's age = 18 years

$$\therefore \text{Sonam's age} = (18 + 3) \text{ years} = 21 \text{ years}$$

3. Price of a coconut = ₹ x

Price of 1 kg jaggery = ₹ x

So, cost of 10 coconuts and 5 kg jaggery = ₹ (10x + 5y)

4. Total length = $(12 + k)$ m

5. No

6. Total score = $(7p - 3q) + (8p - 4q) + (6p - 2q) = 21p - 9q$

Revision Time

1. a. $z + 6$
c. $8y$
- b. $x - 9$
d. $\frac{z}{3} + 12$
2. $4(x + y) - y = 4x + 4y - y = 4x + 3y$
3. a. $(3x^2y + 5yx^2 - 3x^2y) + (-8xy^3 + 8xy^3) + 8x^2y^2$
 $= 5x^2y + 8x^2y^2$
 b. $12m^2 - 5m + 8m - 5m^2 - 16 - 4 + 12m$
 $= 7m^2 + 15m - 20$
4. a. $(6x^2 + 3xy + y^2) + (-7x^2 - 6y^2 + 8xy)$
 $= (6x^2 - 7x^2) + (3xy + 8xy) + (y^2 - 6y^2)$
 $= -x^2 + 11xy - 5y^2$
 b. $(5mn + 6m^2 - 8n^2 + 10) + (8m^2 + 5n^2 + 6mn)$
 $= (5mn + 6mn) + (6m^2 + 8m^2) + (-8n^2 + 5n^2) + 10$
 $= 11mn + 14m^2 - 3n^2 + 10$
 c. $(-2x^2 + 3xy + 5y^2 - 8) + (-9x^2 - 4xy - 9y^2 - 8)$
 $= (-2x^2 - 9x^2) + (3xy - 4xy) + (5y^2 - 9y^2) + (-8 - 8)$
 $= -11x^2 - xy - 4y^2 - 16$
 d. $(\frac{9}{2}xyz + \frac{4}{5}y^2z - 6) - (\frac{-7}{2}xyz - \frac{3}{10}y^2z + 8)$
 $= (\frac{9}{2}xyz - \frac{7}{2}xyz) + (\frac{4}{5}y^2z - \frac{3}{10}y^2z) + (-6 + 8)$
 $= xyz + \frac{1}{2}y^2z + 2$
5. a. $(-6x + 2y) - (3x + 4y)$
 $= -6x + 2y - 3x - 4y = -9x - 2y$
 b. $(-8mn - 6x^2) - (4mn + 8n^2)$
 $= 8mn - 6n^2 - 4mn - 8n^2$
 $= -12mn - 14n^2$
 c. $(15mn - 6m^2 + 8np) - (15mn - 3n^2 - 10np)$
 $= 15mn - 6m^2 + 8np - 15mn + 3n^2 + 10np$
 $= -3m^2 + 18np$
 d. $(-8x^2 - 3y^2 + 4 + 8xy) - (3x^2 - 5xy + y^2 - 6)$
 $= -8x^2 - 3y^2 + 4 + 8xy - 3x^2 + 5xy - y^2 + 6$
 $= -11x^2 - 4y^2 + 13xy + 10$
6. $(-2n^2 + 5m^2 - 6mn + 3m^2 + 8mn + 5n^2) - (3m^2 - 6mn + 4n^2 + 6m^2 - 3n^2 + 8mn)$
 $= 3n^2 + 8m^2 + 2mn - 9m^2 - 2mn - n^2$
 $= 2n^2 - m^2$
7. Required algebraic expression
 $= (-6l^2 - 3lm + 5m^2) - (l^2 + 4lm + m^2)$
 $= -6l^2 - 3lm + 5m^2 - l^2 - 4lm - m^2$
 $= -7l^2 - 7lm + 4m^2$

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8. Required algebraic expression

$$= (-3x^2 - 4xy + 5y^2 - 8) - (5x^2 + 8xy - 3y^2 + 5)$$

$$= -3x^2 - 4xy + 5y^2 - 8 - 5x^2 - 8xy + 3y^2 - 5$$

$$= -8x^2 - 12xy + 8y^2 - 13$$
9. Other expressions = Sum of two expressions – one expression

$$= (15l^2 - 3lmn + 6m^2 - 2n^2) - (3l^2 + 5m^2 + 6lmn)$$

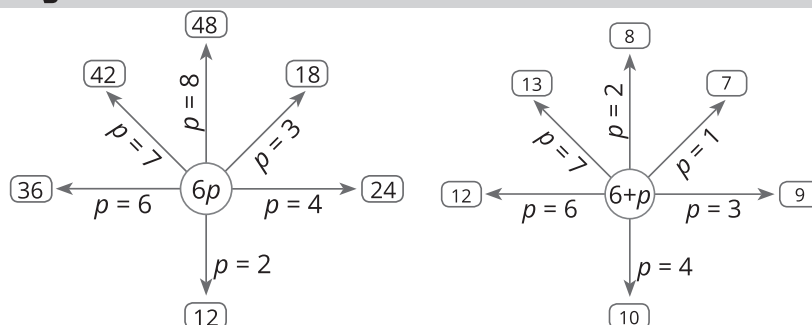
$$= 15l^2 - 3lmn + 6m^2 - 2n^2 - 3l^2 - 5m^2 - 6lmn$$

$$= 12l^2 - 9lmn + m^2 - 2n^2$$
10. Perimeter of square = $4 \times \text{side}$

$$= 4 \times (4x^2 - 5y + 4)$$

$$= (16x^2 - 20y + 16) \text{ units}$$
11. a. Perimeter of an equilateral triangle = $3 \times \text{side}$
 b. Perimeter of a regular pentagon = $5 \times \text{side}$
 c. Perimeter of a regular hexagon = $6 \times \text{side}$

Critical Thinking Skills



CHAPTER 5: PARALLEL AND INTERSECTING LINES

Assessment Time 5.1

1. a. no b. one c. not definite d. infinite lines
2. a. T b. T c. F d. T
3. a. A, B, C, D b. $\overline{BC}$
 c. $\overrightarrow{BA}, \overrightarrow{CE}, \overrightarrow{CD}, \overrightarrow{CF}, \overrightarrow{CG}$ d. AD
4. a. A, S, U, B; C, T, D; P, S, T, Q; R, T, U, S
 b. $\overrightarrow{SA}, \overrightarrow{SP}, \overrightarrow{SV}, \overrightarrow{US}$ c. $\overleftrightarrow{AB}, \overleftrightarrow{CD}, \overleftrightarrow{PQ}, \overleftrightarrow{RS}$
 d. AB, PQ; CD, RS
5. a. $65^\circ + x^\circ = 90^\circ$
 $\Rightarrow x^\circ = 90^\circ - 65^\circ = 25^\circ$
 $\Rightarrow$
 b. $130^\circ + x^\circ + 20^\circ = 180^\circ$
 $\Rightarrow x^\circ + 150^\circ = 180^\circ$
 $x^\circ = 180^\circ - 150^\circ = 30^\circ$
 c. $x^\circ + 100^\circ + 30^\circ + 90^\circ = 360^\circ$
 $\Rightarrow x^\circ + 220^\circ = 360^\circ$
 $\Rightarrow x^\circ = 360^\circ - 220^\circ = 140^\circ$

6. a. $\angle COD = \angle AOF = 90^\circ$ (VOA)
 Since, BOE is straight line
 $\therefore 40^\circ + 90^\circ + 5a = 180^\circ$
 $\Rightarrow 5a = 180^\circ - 130^\circ$
 $\Rightarrow 5a = 50$
 $\therefore a = \frac{50}{5} = 10^\circ$
- b. $b = 100^\circ$ (VOA)
 $a + 100^\circ = 180^\circ$ (straight line)
 $\Rightarrow a = 180^\circ - 100^\circ = 80^\circ$
 $c = a = 80^\circ$ (VOA)
7. a. $\angle AOD = 90^\circ$
 $\Rightarrow x + 1 + x - 1 + x - 3 = 90^\circ$
 $3x = 93^\circ$
 $x = 31^\circ$
- b. $8x + 7x + 22 + 3x - 4 = 180^\circ$
 $\Rightarrow 18x + 18 = 180^\circ$
 $\Rightarrow 18x = 162^\circ$
 $\Rightarrow x = 9^\circ$
- c. $x + 65^\circ + 2x + x + 10 + x + 5 = 360^\circ$
 $\Rightarrow 5x = 360^\circ - 80^\circ = 280^\circ$
 $\Rightarrow x = \frac{280}{5} = 56^\circ$

Assessment Time 5.2

1. $\angle 1 + \angle 2 = 180^\circ$ ($\angle P$)
 $65^\circ + \angle 2 = 180^\circ$
 $\angle 2 = 180^\circ - 65^\circ = 115^\circ$
 $\angle 3 = \angle 1 = 65^\circ$ (VOA)
 $\angle 4 = \angle 2 = 115^\circ$ (VOA)
 $\angle 5 = \angle 1 = 65^\circ$ (Corresponding angles)
 $\angle 7 = \angle 5 = 65^\circ$ (VOA)
 $\angle 6 = \angle 2 = 115^\circ$ (Corresponding angles)
 $\angle 8 = \angle 6$ (VOA)
2. a. $b = 72^\circ$ (Corresponding angles)
 $\Rightarrow a + b = 180^\circ$ (Linear pair)
 $\Rightarrow a + 72^\circ = 180^\circ$
 $\Rightarrow a = 180^\circ - 72^\circ = 108^\circ$
- b. $c + 100^\circ = 180^\circ$ ($\angle P$)
 $c = 180^\circ - 100^\circ = 80^\circ$
 $d = 100^\circ$ (corresponding angles)
3. $y^\circ = 85^\circ$ (corresponding angles)
 $x^\circ = 85^\circ$ (corresponding angles)
 $x^\circ + z^\circ = 180^\circ$ (Co-interior angles)
 $\Rightarrow 85^\circ + z^\circ = 180^\circ$
 $\Rightarrow z^\circ = 180^\circ - 85^\circ = 95^\circ$
4. $x = 70^\circ$ (alternate interior angles)
 $y = 70^\circ$ (corresponding angles)
 $z + y = 180^\circ$ ($\angle P$)
 $z = 180^\circ - 70^\circ = 110^\circ$

24 Key Math-07 (Brainbee)

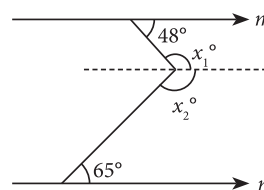
5. $x_1 + 48^\circ = 180^\circ$ (co-interior angles)

$$x_1 = 180^\circ - 48^\circ = 132^\circ$$

$$65^\circ + x_2 = 180^\circ$$

$$x_2 = 180^\circ - 65^\circ = 115^\circ$$

$$x = x_1 + x_2 = (132^\circ + 115^\circ) = 247^\circ$$



6. $\angle BAC + \angle ACD = 180^\circ$ (co-interior angles)

$$120^\circ + \angle ACD = 180^\circ$$

$$\angle ACD = 180^\circ - 120^\circ = 60^\circ$$

$$\angle FEC + \angle DCE = 180^\circ$$
 (Co-interior angles)

$$150^\circ + \angle DCE = 180^\circ$$

$$\angle DCE = 180^\circ - 150^\circ = 30^\circ$$

$$\text{So, } \angle ACE = \angle ACD + \angle DCE = 60^\circ + 30^\circ = 90^\circ$$

7. $\angle MPQ = \angle PQR = 70^\circ$ (alternative interior angles)

$$\text{Now, } \angle MPQ + x + \angle NPR = 180^\circ$$

$$\Rightarrow 70^\circ + x + 50^\circ = 180^\circ$$

$$\Rightarrow x = 180^\circ - 120^\circ = 60^\circ$$

8. $x + 125^\circ = 180^\circ$ (Co-interior angles)

$$\Rightarrow x = 180^\circ - 125^\circ = 55^\circ$$

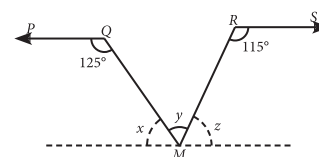
$$115^\circ + z^\circ = 180^\circ$$
 (co-interior angles)

$$\Rightarrow z^\circ = 180^\circ - 115^\circ = 65^\circ$$

$$\text{Now, } x^\circ + y^\circ + z^\circ = 180^\circ$$

$$\Rightarrow 55^\circ + y^\circ + 65^\circ = 180^\circ$$

$$\Rightarrow y^\circ = 180^\circ - 120^\circ = 60^\circ$$



9. $\angle BCD = \angle ABC$

$$\Rightarrow 35^\circ + \angle ECD = 62^\circ$$

$$\Rightarrow \angle ECD = 62^\circ - 35^\circ = 27^\circ$$

$$\text{Now, } \angle FEC + \angle ECD = 153^\circ + 27^\circ = 180^\circ$$

Since, these are co-interior angles,

So, $EF \parallel CD$ Hence Proved

10. a. $100^\circ + 80^\circ = 180^\circ$

So, $p \parallel l$

b. $78^\circ \neq 82^\circ$

Alternative interior angles are not equal.

So, $l \not\parallel p$

c. $90^\circ + 80^\circ = 170^\circ \neq 180^\circ$

No, $p \not\parallel l$

d. $110^\circ + 70^\circ = 180^\circ$

These are co-interior angles

So, $p \parallel l$

Mental Maths

1. a. T

b. T

c. F

d. F

2. a. common arm

b. 180°

c. 360°

d. 30°
g. 180°

e. 50°
h. parallel

f. 90°
i. $90^\circ, 90^\circ, 90^\circ$

Revision Time

1. a. $\angle AOC, \angle BOC$ b. $\angle AOD, \angle BOC$ c. $\angle AOD, \angle AOC$

2. $\angle AOC + \angle BOC = 180^\circ$

$\Rightarrow \angle AOC + 63^\circ = 180^\circ$

$\Rightarrow \angle AOC = 180^\circ - 63 = 117^\circ$

3. $\angle POR + \angle ROS + \angle SOQ = 180^\circ$

$\Rightarrow 50^\circ + \angle ROS + 70^\circ = 180^\circ$

$\Rightarrow \angle ROS = 180^\circ - 120^\circ = 60^\circ$

4. $40^\circ + x^\circ + 35^\circ = 180^\circ$

$\Rightarrow x^\circ = 180^\circ - 75^\circ = 105^\circ$

$y^\circ = 40^\circ$ (VOA)

$y^\circ + z^\circ = 180^\circ$

$\Rightarrow z^\circ = 180^\circ - 40^\circ = 140^\circ$

5. $\angle AOC + \angle BOC = 180^\circ$

$3x - 10 + 5x + 30 = 180^\circ$

$\Rightarrow 8x = 180^\circ - 20^\circ$

$\Rightarrow 8x = 160^\circ$

$\Rightarrow x = \frac{160}{8} = 20^\circ$

6. $2a + 4a + 3a = 180^\circ$

$\Rightarrow 9a = 180^\circ$

$\Rightarrow a = \frac{180}{9} = 20^\circ$

7. $\angle AOD + \angle DOC + \angle BOC + \angle BOE + \angle AOE = 360^\circ$

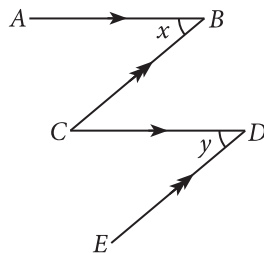
$\Rightarrow 68^\circ + \angle DOC + 28^\circ + 85^\circ + 92^\circ = 360^\circ$

$\Rightarrow \angle DOC = 360^\circ - 273^\circ = 87^\circ$

8. $x = z$ ($\because AB \parallel CD$)

$z = y$ ($\because BC \parallel DE$)

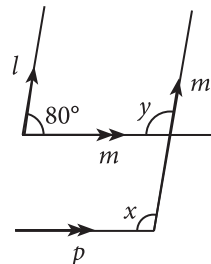
$x = y$ (Hence Proved)



9. $80^\circ + y = 180^\circ$ (Co-interior angles)

$\Rightarrow y = 180^\circ - 80^\circ = 100^\circ$

$\Rightarrow x = y = 100^\circ$ (Corresponding angles)



26 Key Math-07 (Brainbee)

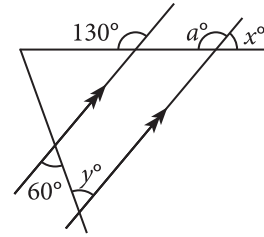
10. $y = 60^\circ$ (alternate interior angles)

$a = 130^\circ$ (corresponding angles)

$$a + x = 180$$

$$\Rightarrow 130^\circ + x = 180^\circ$$

$$\Rightarrow x = 180^\circ - 130^\circ = 50^\circ$$



CHAPTER 6: NUMBER PLAY

Assessment Time 6.1

- | | | | |
|------------|---------|---------|---------|
| 1. a. even | b. odd | c. even | d. even |
| e. odd | f. even | g. odd | h. even |
| i. odd | j. even | k. odd | l. odd |
| 2. a. even | b. even | c. even | d. odd |
| 3. a. even | b. even | c. odd | d. odd |
| 4. a. odd | b. even | c. even | d. even |

Assessment Time 6.2

1. 144, 233, 377 2. Yes

3.

32	4	24
12	20	28
16	36	8

6. a.

8	3	4
1	5	9
6	7	2

b.

4	9	2
3	5	7
8	1	6

c.

6	1	8
7	5	3
2	9	4

d.

2	7	6
9	5	1
4	3	8

7. a.

7	8	9	24
4	6	5	15
1	2	3	6

12 16 17

b.

2	2	1	5
	8		21
1			19

9 11 26

Assessment Time 6.3

1.

S O	5 0
+ S O	+ 5 0
T O O	1 0 0

$\Rightarrow$

2.

L E E	1 5 5
+ L E T	+ 1 5 6
A L L	3 1 1

$\Rightarrow$

$$\begin{array}{r}
 44 \\
 + z \\
 \hline
 ZOO
 \end{array}
 \Rightarrow
 \begin{array}{r}
 99 \\
 + 1 \\
 \hline
 100
 \end{array}$$

$$\begin{array}{r}
 COCA \\
 + COLA \\
 \hline
 OASIS
 \end{array}
 \Rightarrow
 \begin{array}{r}
 8486 \\
 + 8106 \\
 \hline
 16292
 \end{array}$$

Mental Math

- No, Sum of 3 odd numbers can not be in pairs.
For example: $3 + 5 + 7 = 15$ (odd)
- Odd
For example: $12 + 3 = 15$ (odd)
- n th term of multiple of 2 is $2n$
- 50th odd number is 99.
- 100th even number is 200.
- Bulb is **On**.
After 87 times, it will be **ON**.
- Odd

Revision Time

- Not possible, because sum of even and odd is odd while 112 is even.
- $24 \times 16 = \text{even} \times \text{even} = \text{even}$
 - $42 \times 58 = \text{even} \times \text{even} = \text{even}$
 - $235 \times 654 = \text{odd} \times \text{even} = \text{even}$
- $5n + 4$
When $n = 1$, then $5 \times 1 + 4 = 9$
When $n = 2$, then $5 \times 2 + 4 = 14$
So, would be odd or even.
- Because it is multiple of 6 and plus 2.

CHAPTER-7: A TALE OF THREE INTERSECTING LINES

Assessment Time 7.2

- AD
 - DC
 - BC
 - BD
- $5 + 7 > 8 \Rightarrow 1238$
So, triangle is possible.
 - $8 + 3.7 > 8.6 \Rightarrow 11.7 > 8.6$
So, triangle is possible
 - $9 + 10 = 19 \Rightarrow 19 = 19$
So, triangle is not possible.
 - $7 + 6 < 14 \Rightarrow 13 < 14$
So, triangle is not possible.
- Sum of sides $= 4 + 7 = 11$ cm
Difference of sides $= 7 - 4 = 3$ cm
So, third side lie between 3 cm and 11 cm.
- Sum of sides $= 8 + 12 = 20$ cm
Difference of sides $= 12 - 8 = 4$ cm
So, third side lie between 4 cm and 20 cm.

5. a. yes b. no c. yes

Assessment Time 7.3

1. a. 60° b. equal c. 180° d. equal

2. a. Sum of angles = $60^\circ + 80^\circ + 90^\circ$
 $= 230^\circ \neq 180^\circ$

So, triangle is not possible.

- b. Sum of angles = $80^\circ + 80^\circ + 20^\circ = 180^\circ$
So, triangle is possible.

- c. Sum of angles = $90^\circ + 45^\circ + 45^\circ = 180^\circ$
So, triangle is possible.

- d. Sum of angles = $120^\circ + 35^\circ + 25^\circ = 180^\circ$
So, triangle is possible.

- $$\begin{aligned} \text{3. a.} \quad & \angle A + \angle B + \angle C = 180^\circ \\ & \Rightarrow 60^\circ + x + 50^\circ = 180^\circ \\ & \Rightarrow x = 180^\circ - 110^\circ = 70^\circ \end{aligned}$$

- $$\begin{aligned} \text{b.} \quad & \angle P + \angle Q + \angle R = 180^\circ \\ \Rightarrow & y + 90^\circ + 50^\circ = 180^\circ \\ \Rightarrow & y = 180^\circ - 140^\circ = 40^\circ \end{aligned}$$

- $$\begin{aligned} \text{c.} \quad & \angle M + \angle N + \angle P = 180^\circ \\ \Rightarrow & 2x + 3x + 50^\circ = 180^\circ \\ \Rightarrow & 5x = 180 - 50^\circ = 130^\circ \\ \Rightarrow & x = \frac{130^\circ}{5} = 26^\circ \end{aligned}$$

- $$\begin{aligned} \text{d.} \quad & \angle A + \angle B + \angle C = 180^\circ \\ \Rightarrow & 30^\circ + 130^\circ + y = 180^\circ \\ \Rightarrow & y = 180^\circ - 160^\circ = 20^\circ \end{aligned}$$

- $$\begin{aligned} \text{e.} \quad & \angle P + \angle K + \angle L = 180^\circ \\ \Rightarrow & 80^\circ + x + x = 180^\circ \\ \Rightarrow & 2x = 180^\circ - 80^\circ = 100^\circ \\ \Rightarrow & x = \frac{100^\circ}{2} = 50^\circ \end{aligned}$$

- $$\begin{aligned} \text{f.} \quad & x + x + x = 180^\circ \\ \Rightarrow & 3x = 180^\circ \\ \Rightarrow & x = \frac{180^\circ}{3} = 60^\circ \end{aligned}$$

- $$\begin{aligned} 4. \quad 90^\circ + 47^\circ + x &= 180^\circ \\ x &= 180^\circ - 137^\circ = 43^\circ \end{aligned}$$

5. Let base angle be x° , then vertical angle is $2x^\circ$
 So, $2x + x + x = 180^\circ$
 $\Rightarrow 4x = 180^\circ$
 $\Rightarrow x = \frac{180^\circ}{4} = 45^\circ$

So, base angle = 45° , Vertical angle = 90°

6. Ratio of angles = 2 : 3

So, angles are $2x$, $3x$

$$\text{So, } 2x + 3x + 90^\circ = 180^\circ$$

$$5x = 180^\circ - 90^\circ = 90^\circ$$

$$x = \frac{90^\circ}{5} = 18^\circ$$

Hence, angles are 36° , 54° , 90°

8. Let $3\angle P = 6\angle Q = 2\angle R = K$

$$\therefore \angle P = \frac{K}{3}, \angle Q = \frac{K}{6}, \angle R = \frac{K}{2}$$

$$\text{So, } \angle P + \angle Q + \angle R = 180^\circ$$

$$\Rightarrow \frac{K}{3} + \frac{K}{6} + \frac{K}{2} = 180^\circ$$

$$\Rightarrow \frac{2K + K + 3K}{6} = 180^\circ$$

$$\Rightarrow \frac{6K}{6} = 180^\circ$$

$$\Rightarrow K = 180^\circ$$

$$\text{Hence, } \angle P = \frac{180}{3} = 60^\circ, \angle Q = \frac{180}{6} = 30^\circ \text{ and } \angle R = \frac{180}{2} = 90^\circ$$

9. $\angle x = \angle B = \angle C = 65^\circ$ (Corresponding angles and $\angle B = \angle C$)

$$\Rightarrow \angle A + \angle B + \angle C = 180^\circ$$

$$\Rightarrow y + 65^\circ + 65^\circ = 180^\circ$$

$$\Rightarrow y = 180^\circ - 130^\circ = 50^\circ$$

10. In $\triangle PSR$,

$$45^\circ + 90^\circ + x = 180^\circ$$

$$\Rightarrow x = 180^\circ - 135^\circ = 45^\circ$$

In $\triangle PSQ$,

$$y + 65^\circ + 90^\circ = 180^\circ$$

$$\Rightarrow y = 180^\circ - 155^\circ = 25^\circ$$

Assessment Time 7.4

1. a. $\angle A + \angle B = \angle ACD$ (exterior angle property)

$$\Rightarrow 50^\circ + x = 110^\circ$$

$$\Rightarrow x = 110^\circ - 50^\circ = 60^\circ$$

- b. $80^\circ + x = 130^\circ$

$$\Rightarrow x = 130^\circ - 80^\circ = 50^\circ$$

$$y + 130^\circ = 180^\circ$$

$$\Rightarrow y = 180^\circ - 130^\circ = 50^\circ$$

- c. $x = 60^\circ + 20^\circ = 80^\circ$

$$\begin{aligned}
 \text{d.} \quad & \angle B + 120^\circ = 180^\circ \\
 \Rightarrow & \angle B = 180^\circ - 120^\circ = 60^\circ \\
 & \angle C + 130^\circ = 180^\circ \\
 \Rightarrow & \angle C = 180^\circ - 130^\circ = 50^\circ \\
 \Rightarrow & x + \angle B + \angle C = 180^\circ \\
 \Rightarrow & x + 60^\circ + 50^\circ = 180^\circ \\
 & x = 180^\circ - 110^\circ = 70^\circ
 \end{aligned}$$

$$\begin{aligned}
 \text{e.} \quad & x = 78^\circ \text{ (VOD)} \\
 & x + 62^\circ + y = 180^\circ \\
 78^\circ + 62^\circ + y &= 180^\circ \\
 & y = 180^\circ - 140^\circ = 40^\circ
 \end{aligned}$$

$$\begin{aligned}
 \text{f.} \quad & y = 72^\circ + 63^\circ \text{ (exterior angle property)} \\
 & = 135^\circ \\
 x + y &= 180^\circ \\
 x &= 180^\circ - 135^\circ = 45^\circ
 \end{aligned}$$

2. Let interior opposite angles be $6x$ and $7x$

$$\begin{aligned}
 \text{So, } 6x + 7x &= 130^\circ \\
 \Rightarrow 13x &= 130^\circ \\
 x &= 10^\circ
 \end{aligned}$$

So, angles are $60^\circ, 70^\circ, 50^\circ$.

3. Let equal interior opposite angles be x°

$$\begin{aligned}
 \text{So, } x^\circ + x^\circ &= 110^\circ \\
 \Rightarrow 2x &= 110 \\
 x &= 55^\circ
 \end{aligned}$$

4. In $\triangle ABC$,

$$\begin{aligned}
 45^\circ + 90^\circ + y &= 180^\circ \\
 y &= 180 - 135^\circ = 45^\circ \\
 x + 110^\circ + y &= 180^\circ \\
 \Rightarrow x &= 180^\circ - 155^\circ = 25^\circ
 \end{aligned}$$

5. $\angle P = \angle Q = 63^\circ$ ($\because PR = QR$)

In $\triangle PQR$,

$$\begin{aligned}
 63^\circ + 63^\circ + x &= 180^\circ \\
 \Rightarrow x &= 180^\circ - 126^\circ = 54^\circ \\
 y + 8^\circ &= 54^\circ \text{ (exterior angles property)} \\
 \Rightarrow y &= 54^\circ - 8^\circ = 46^\circ
 \end{aligned}$$

6. $\angle P = \angle R = 58^\circ$

In $\triangle POR$,

$$\begin{aligned}
 58^\circ + 58^\circ + \angle POR &= 180^\circ \\
 \Rightarrow \angle POR &= 180^\circ - 116^\circ = 64^\circ \\
 \therefore \angle SOQ &= \angle POR = 64^\circ \\
 \angle S &= \angle Q = x \quad (\because OS = OQ)
 \end{aligned}$$

$$\therefore x + x + 64^\circ = 180^\circ$$

$$\Rightarrow 2x = 180^\circ - 64^\circ = 116^\circ$$

$$\Rightarrow x = \frac{116^\circ}{2} = 58^\circ$$

7. $\therefore AB = AC$

$$\angle B = \angle C = x$$

$$x + x = 128^\circ \text{ (exterior angle property)}$$

$$2x = 128^\circ$$

$$x = 64^\circ$$

$$y + \angle C = 180^\circ$$

$$y = 180^\circ - 64^\circ = 116^\circ$$

Critical Thinking Skills

$$x = 43^\circ + 65^\circ \text{ (exterior angles)}$$

$$= 108^\circ$$

$$\angle DEB = y \text{ } (\because DB = BE)$$

$$y + y + x = 180^\circ$$

$$2y = 180^\circ - 108^\circ = 72^\circ$$

$$y = 36^\circ$$

Revision Time

9. a. $48^\circ + 73^\circ + x = 180^\circ$

$$x = 180^\circ - 121^\circ = 59^\circ$$

b. $37^\circ + 44^\circ + y = 180^\circ$

$$y = 180^\circ - 81^\circ = 99^\circ$$

c. $x + x + 90^\circ = 180^\circ$

$$\Rightarrow 2x = 180^\circ - 90^\circ = 90^\circ$$

$$x = \frac{90}{2} = 45^\circ$$

10. a. $x + 64^\circ = 134^\circ \text{ (exterior angles)}$

$$\Rightarrow x = 134^\circ - 64^\circ = 70^\circ$$

b. $x = 45^\circ \text{ (VOA)}$

$$\angle P + \angle Q + \angle R = 180^\circ$$

$$\Rightarrow 45^\circ + y^\circ + 54^\circ = 180^\circ$$

$$\Rightarrow y = 180^\circ - 99^\circ = 81^\circ$$

c. $90^\circ + x = 145^\circ \text{ (exterior angles)}$

$$\Rightarrow x = 145^\circ - 90^\circ = 55^\circ$$

11. $\angle A + \angle B + \angle C = 180^\circ$

$$\Rightarrow 3x + 2x + x = 180^\circ$$

$$\Rightarrow 6x = 180^\circ$$

$$x = 30^\circ$$

$$\text{So, } \angle A = 3 \times 30^\circ = 90^\circ, \angle B = 2 \times 30^\circ = 60^\circ, \angle C = 30^\circ$$

32 Key Math-07 (Brainbee)

12. Let one acute angle be
- x°

So, other acute angle = $x - 18$ Now, $x + (x - 18) = 90^\circ$

$$2x = 108^\circ$$

$$x = 54^\circ$$

So, angles are $54^\circ, 36^\circ$

13. Ratio of angles =
- $4 : 2 : 4$

So, angles are $4x, 2x, 4x$

$$4x + 2x + 4x = 180^\circ$$

$$\Rightarrow 10x = 180^\circ$$

$$\Rightarrow x = \frac{180^\circ}{10} = 18^\circ$$

Hence, angles are $72^\circ, 36^\circ, 72^\circ$ isosceles triangle.

14. Let
- $2\angle A = 3\angle B = 6\angle C = K$

$$\angle A = \frac{K}{2}, \angle B = \frac{K}{3}, \angle C = \frac{K}{6}$$

So, $\angle A + \angle B + \angle C = 180^\circ$

$$\frac{K}{2} + \frac{K}{3} + \frac{K}{6} = 180^\circ \Rightarrow \frac{3K + 2K + K}{6} = 180^\circ$$

$$\frac{6K}{6} = 180^\circ \Rightarrow \angle K = 180^\circ$$

$$\text{Hence, } \angle A = \frac{180^\circ}{2} = 90^\circ, \angle B = \frac{180^\circ}{3} = 60^\circ \text{ and } \angle C = \frac{180^\circ}{6} = 30^\circ$$

15. In
- $\triangle PSR$
- ,
- $50 + x + x = 180^\circ$

$$x^\circ + 2x^\circ + 90^\circ = 180^\circ$$

$$3x^\circ = 90^\circ$$

$$x = 30^\circ$$

16. In
- $\triangle ADE$
- ,

$$\text{So, } x + x = 130^\circ$$

$$2x = 130^\circ$$

$$x = 65^\circ$$

$$y = x = 65^\circ \text{ (CPA)}$$

- 18.
- $\angle D = \angle B = 65^\circ$
- (
- $AB = AD$
-)

$$y + 65^\circ = 180^\circ$$

$$y = 180^\circ - 65^\circ = 115^\circ$$

$$x = 32^\circ + 65^\circ = 97^\circ \text{ (exterior angle)}$$

- 17.
- $x : y = 3 : 4$

$$\Rightarrow x = 3K, y = 4K$$

$$x + y = 140^\circ$$

$$3K + 4K = 140^\circ$$

$$7K = 140^\circ$$

$$K = 20^\circ$$

$$\therefore x = 3 \times 20^\circ = 60^\circ$$

$$y = 4 \times 20^\circ = 80^\circ$$

$$z = 180^\circ - 140^\circ = 40^\circ$$

19. a. Yes b. No c. Yes d. No.

CHAPTER-8: WORKING WITH FRACTIONS**Assessment Time 8.1**

- | | | | |
|-----------------------------------|-------------------|-------------------|--------------------|
| 1. a. F | b. T | c. T | d. F |
| 2. Proper — b, Improper — a, c, d | | | |
| 3. a. $4\frac{5}{8}$ | b. $8\frac{3}{5}$ | c. $9\frac{5}{6}$ | d. $8\frac{1}{10}$ |
| 4. a. $\frac{11}{4}$ | b. $\frac{55}{9}$ | c. $\frac{43}{5}$ | d. $\frac{32}{7}$ |

5. a. $\frac{3}{14} + \frac{5}{14} = \frac{3+5}{14} = \frac{8}{14} = \frac{4}{7}$ b. $\frac{6}{23} + \frac{7}{23} = \frac{6+7}{23} = \frac{13}{23}$
- c. $\frac{10}{19} + \frac{3}{19} = \frac{10+3}{19} = \frac{13}{19}$ d. $\frac{4}{37} + \frac{11}{37} = \frac{4+11}{37} = \frac{15}{37}$
6. a. $\frac{3}{7} + \frac{5}{21} = \frac{3 \times 3 + 5 \times 1}{21}$
 $= \frac{9+5}{21} = \frac{14}{21} = \frac{2}{3}$
- b. $\frac{6}{7} + \frac{9}{28} + \frac{3}{1} = \frac{6 \times 4 + 9 \times 1 + 3 \times 28}{28}$
 $= \frac{24+9+84}{28} = \frac{117}{28} = 4\frac{5}{28}$
- c. $\frac{2}{1} + \frac{3}{10} + \frac{7}{20} = \frac{2 \times 20 + 3 \times 2 + 7 \times 1}{20}$
 $= \frac{40+6+7}{20} = \frac{53}{20} = 2\frac{13}{20}$
- d. $2\frac{1}{7} + 1\frac{1}{14} + 3 = (2 + 1 + 3) + \left(\frac{1}{7} + \frac{1}{14}\right)$
 $= 6 + \left(\frac{1 \times 2 + 1}{14}\right) = 6 + \frac{3}{14} = 6\frac{3}{14}$
7. a. $\frac{6}{15} - \frac{3}{15} = \frac{6-3}{15} = \frac{3}{15} = \frac{1}{5}$ b. $\frac{12}{13} - \frac{11}{13} = \frac{12-11}{13} = \frac{1}{13}$
- c. $\frac{16}{33} - \frac{8}{33} = \frac{16-8}{33} = \frac{8}{33}$ d. $\frac{9}{17} - \frac{3}{17} = \frac{9-3}{17} = \frac{6}{17}$
8. a. $\frac{7}{13} - \frac{6}{23} = \frac{7 \times 2 - 6}{26} = \frac{14-6}{26} = \frac{8}{26} = \frac{4}{13}$
- b. $\frac{11}{18} - \frac{3}{22} = \frac{11 \times 11 - 3 \times 9}{198} = \frac{121-27}{198} = \frac{94}{198} = \frac{47}{99}$
- c. $4 - 3\frac{1}{12} = \frac{4}{1} - \frac{37}{12} = \frac{4 \times 12 - 37}{12} = \frac{48-37}{12} = \frac{11}{12}$
- d. $2\frac{3}{4} - 1\frac{1}{8} = \frac{11}{4} - \frac{9}{8} = \frac{11 \times 2 - 9}{8} = \frac{22-9}{8} = \frac{13}{8}$
9. a. $7\frac{2}{5} - 3\frac{2}{15} + 1\frac{7}{10} = (7 - 3 + 1) + \left(\frac{2}{5} - \frac{2}{15} + \frac{7}{10}\right)$
 $= 5 + \left(\frac{2 \times 6 - 2 \times 2 + 7 \times 3}{30}\right)$
 $= 5 + \left(\frac{12 - 4 + 21}{30}\right) = 5 + \left(\frac{29}{30}\right)$
 $= 5\frac{29}{30}$
- b. $\frac{12}{1} - 3\frac{1}{2} + 4\frac{1}{5} = \frac{12}{1} - \frac{7}{2} + \frac{21}{5}$
 $= \frac{12 \times 10 - 7 \times 5 + 21 \times 2}{10}$
 $= \frac{120 - 35 + 42}{10} = \frac{127}{10} = 12\frac{7}{10}$

$$\begin{aligned}
 \text{c. } 6\frac{3}{6} + 2\frac{1}{12} - 3\frac{7}{24} &= (6 + 2 - 3) + \left(\frac{3}{6} + \frac{1}{12} - \frac{7}{24}\right) \\
 &= 5 + \left(\frac{3 \times 4 + 1 \times 2 - 7}{24}\right) \\
 &= 5 + \left(\frac{12 + 2 - 7}{24}\right) = 5\frac{7}{24}
 \end{aligned}$$

$$\begin{aligned}
 10. \text{ a. } \square - \frac{3}{5} &= \frac{1}{5} \\
 \Rightarrow \square &= \frac{1}{5} + \frac{3}{5} = \frac{4}{5}
 \end{aligned}$$

$$\begin{aligned}
 \text{b. } \frac{1}{2} - \square &= \frac{1}{6} \\
 \Rightarrow \square &= \frac{1}{2} - \frac{1}{6} \\
 &= \frac{3-1}{6} = \frac{2}{6} = \frac{1}{3}
 \end{aligned}$$

$$\begin{aligned}
 \text{c. } \frac{13}{14} - \square &= \frac{5}{21} \\
 \Rightarrow \square &= \frac{13}{14} - \frac{5}{21} \\
 &= \frac{13 \times 3 - 5 \times 2}{42} \\
 &= \frac{39 - 10}{42} = \frac{29}{42}
 \end{aligned}$$

$$\begin{aligned}
 \text{d. } \frac{2}{15} - \square &= \frac{1}{10} \\
 \square &= \frac{2}{15} - \frac{1}{10} \\
 &= \frac{2 \times 2 - 3}{30} \\
 &= \frac{4 - 3}{30} = \frac{1}{30}
 \end{aligned}$$

$$\begin{aligned}
 11. \text{ Required number} &= 18\frac{3}{7} - 15 \\
 &= (18 - 15)\frac{3}{7} = 3\frac{3}{7}
 \end{aligned}$$

$$\begin{aligned}
 12. \text{ Total cost of two pens and a school bag} &= ₹ \left(25\frac{2}{5} + 52\frac{1}{4}\right) \\
 &= ₹ \left(\frac{127}{5} + \frac{209}{4}\right) = ₹ \left(\frac{127 \times 4 + 209 \times 5}{20}\right) \\
 &= ₹ (25 + 52) \left(\frac{2}{5} + \frac{1}{4}\right) \\
 &= ₹ 77 \left(\frac{8+5}{20}\right) = ₹ 77\frac{13}{20}
 \end{aligned}$$

$$\begin{aligned}
 13. \text{ Left petrol} &= 25 - 12\frac{1}{4} \\
 &= (24 - 12) \left(1 - \frac{1}{4}\right) = 12\frac{3}{4} \text{ L}
 \end{aligned}$$

$$\begin{aligned}
 14. \text{ Total weight} &= \left(25\frac{1}{5} + 15\frac{4}{10} + 40\frac{1}{4}\right) \text{ kg} \\
 &= (25 + 15 + 40) + \left(\frac{1}{5} + \frac{4}{10} + \frac{1}{4}\right) \text{ kg} \\
 &= 80 + \left(\frac{4+8+5}{20}\right) \text{ kg} \\
 &= 80\frac{17}{20} \text{ kg}
 \end{aligned}$$

Critical Thinking Skills

1. Total weight of fruits = 20 kg

$$\text{Weight of apples} = 5\frac{1}{10} \text{ kg}$$

$$\text{Weight of mangoes} = 8\frac{3}{8} \text{ kg}$$

$$\begin{aligned} \therefore \text{Weight of oranges} &= 20 - \left(5\frac{1}{10} + 8\frac{3}{8}\right) = 20 - \left(\frac{51}{10} + \frac{83}{8}\right) \\ &= 20 - \left(\frac{51 \times 4 + 83 \times 5}{40}\right) = 20 - \left(\frac{204 + 415}{40}\right) \\ &= \frac{800 - 619}{40} = \frac{181}{40} = 4\frac{21}{40} \text{ kg} \end{aligned}$$

$$\begin{aligned} 2. \text{ Total time to complete race} &= 3\frac{1}{7} \text{ min} + \frac{40}{60} \text{ min} = \frac{22}{7} + \frac{2}{3} \\ &= \frac{66 + 14}{21} = \frac{80}{21} = 3\frac{17}{21} \text{ min} \end{aligned}$$

Assessment Time 8.2

1. a. $\frac{2}{3} \times 15 = \frac{2 \times 15}{3} = \frac{30}{3} = 10$
- b. $\frac{4}{9} \times 21 = \frac{4 \times 21}{9} = \frac{84}{9} = \frac{28}{3} = 9\frac{1}{3}$
- c. $\frac{3}{4} \times \frac{5}{9} = \frac{3 \times 5}{4 \times 9} = \frac{15}{36} = \frac{5}{12}$
- d. $6\frac{1}{7} \times 5\frac{5}{6} = \frac{6 \times 7 + 1}{7} \times \frac{5 \times 6 + 5}{6}$
 $= \frac{43}{7} \times \frac{35}{6} = \frac{43 \times 5}{6} = \frac{215}{6} = 35\frac{5}{6}$
- e. $4\frac{2}{3} \times 3\frac{6}{7} = \frac{3 \times 4 + 2}{3} \times \frac{7 \times 3 + 6}{7}$
 $= \frac{12 + 2}{3} \times \frac{21 + 6}{7}$
 $= \frac{14}{3} \times \frac{27}{7} = \frac{14 \times 27}{3 \times 7} = 2 \times 9 = 18$
- f. $3\frac{1}{9} \times 27 = \frac{3 \times 9 + 1}{9} \times 27 = \frac{27 + 1}{9} \times 27$
 $= \frac{28}{9} \times 27 = 28 \times 3 = 84$
- g. $3\frac{1}{2} \times 14\frac{1}{2} = \frac{2 \times 3 + 1}{2} \times \frac{2 \times 14 + 1}{2}$
 $= \frac{6 + 1}{2} \times \frac{28 + 1}{2} = \frac{7}{2} \times \frac{29}{2} = \frac{203}{4} = 50\frac{3}{4}$

$$\begin{aligned}
 \text{h. } 5\frac{3}{5} \times 42\frac{1}{2} &= \frac{5 \times 5 + 3}{5} + \frac{2 \times 42 + 1}{2} \\
 &= \frac{25 + 3}{5} \times \frac{84 + 1}{2} = \frac{28}{5} \times \frac{85}{2} \\
 &= \frac{28 \times 85}{5 \times 2} = 14 \times 17 = 238
 \end{aligned}$$

$$2. \text{ a. } \frac{2}{3} \times \frac{6}{10} \times \frac{15}{27} = \frac{2 \times 6 \times 15}{5 \times 10 \times 27} = \frac{2}{9}$$

$$\text{b. } \frac{3}{5} \times \frac{15}{16} \times \frac{4}{7} = \frac{3 \times 15 \times 4}{5 \times 16 \times 7} = \frac{9}{28}$$

$$\text{c. } \frac{1}{2} \times \frac{7}{2} \times \frac{18}{35} = \frac{1 \times 7 \times 18}{2 \times 2 \times 35} = \frac{3}{20}$$

$$\begin{aligned}
 \text{d. } 6\frac{3}{10} \times 2\frac{1}{7} \times \frac{5}{9} &= \frac{10 \times 6 + 3}{10} \times \frac{15}{7} \times \frac{5}{9} \\
 &= \frac{63}{10} \times \frac{15}{7} \times \frac{5}{9} = \frac{63 \times 15 \times 5}{10 \times 7 \times 9} = \frac{15}{2}
 \end{aligned}$$

$$\begin{aligned}
 \text{e. } 1\frac{4}{5} \times 1\frac{1}{15} \times 1\frac{13}{22} &= \frac{7 \times 1 + 4}{5} \times \frac{15 \times 1 + 1}{15} \times \frac{22 \times 1 + 13}{22} \\
 &= \frac{11}{5} \times \frac{16}{15} \times \frac{35}{22} = \frac{11 \times 16 \times 35}{5 \times 15 \times 22} = \frac{8}{3}
 \end{aligned}$$

$$\begin{aligned}
 \text{f. } 3\frac{1}{16} \times 7\frac{3}{7} \times 1\frac{25}{39} &= \frac{16 \times 3 + 1}{16} \times \frac{7 \times 7 + 3}{7} \times \frac{39 \times 1 + 25}{39} \\
 &= \frac{49}{16} \times \frac{52}{7} \times \frac{64}{39} = \frac{49 \times 52 \times 64}{16 \times 7 \times 39} = 37\frac{1}{3}
 \end{aligned}$$

$$3. \text{ a. } \frac{3}{8} \text{ of } 40 = \frac{3}{8} \times 40 = 3 \times 5 = 15$$

$$\text{b. } \frac{6}{17} \text{ of } 68 = \frac{6}{17} \times 68 = 6 \times 4 = 24$$

$$\text{c. } \frac{7}{11} \text{ of } 220 = \frac{7}{11} \times 220 = 7 \times 20 = 140$$

$$\text{d. } \frac{6}{15} \text{ of } 90 = \frac{6}{15} \times 90 = 6 \times 6 = 36$$

$$\begin{aligned}
 \text{e. } \frac{4}{7} \text{ of week} &\Rightarrow 1 \text{ week} = 7 \text{ days} \\
 &= \frac{4}{7} \times 7 = 4
 \end{aligned}$$

$$\text{f. } \frac{9}{18} \text{ of } 144 \text{ kg} = \frac{9}{18} \times 144 = 9 \times 8 = 72 \text{ kg}$$

$$\begin{aligned}
 \text{g. } \frac{3}{15} \text{ of ₹ } 180 &= \frac{3}{15} \times 180 = \frac{3}{5} \times 60 \\
 &= 3 \times 12 = ₹ 36
 \end{aligned}$$

$$\text{h. } \frac{5}{8} \text{ of } 120 \text{ m} = \frac{5}{8} \times 120 = 5 \times 15 = 75 \text{ m}$$

4. Total number of students = 64

$$\begin{aligned}\text{Number of girls} &= \frac{7}{16} \text{ of total students} \\ &= \frac{7}{16} \times 64 = 7 \times 4 = 28\end{aligned}$$

$$\text{Number of boys} = 64 - 28 = 36$$

5. Cost of 1 L of milk = ₹ $50\frac{1}{2}$ = ₹ $\frac{101}{2}$

$$\begin{aligned}\text{Cost of } 4\frac{3}{4} \text{ L of milk} &= \frac{101}{2} \times \frac{19}{4} \\ &= \frac{1919}{8} = 239\frac{7}{8}\end{aligned}$$

6. Distance = (Distance per litre) $\times$ Total litres

$$\begin{aligned}&= 12 \times 15\frac{3}{4} = \frac{12 \times 63}{4} \\ &= \frac{756}{4} = 189 \text{ km}\end{aligned}$$

Hence, the bus will cover 189 km.

7. Total number of pages = 500

$$\text{Shanu has read} = \frac{3}{5}$$

$$\text{Pages has read} = \frac{3}{5} \times 500 = 3 \times 100 = 300 \text{ pages}$$

$$\text{Page are left unread} = 500 - 300 = 200 \text{ pages}$$

SDG-Clean Water

8. Total water = 20 L

$$\begin{aligned}\text{Water comes out} &= \frac{1}{4} \text{ of } 20 \text{ L} \\ &= \frac{1}{4} \times 20 = 5 \text{ L}\end{aligned}$$

Critical Thinking Skills

$$\text{Total water} = 2 \text{ L}$$

$$\text{Shivangi drank} = \frac{2}{5} \text{ of } 2 \text{ L}$$

$$= \frac{2}{5} \times 2 = \frac{4}{5} \text{ L}$$

$$\text{Remaining water} = 2 - \frac{4}{5} = \frac{10-4}{5} = \frac{6}{5} \text{ L}$$

$$\text{Khushali drank} = \frac{3}{5} \text{ of } \frac{6}{5} = \frac{3}{5} \times \frac{6}{5} = \frac{18}{25} \text{ L}$$

$$\text{Rashi drank} = \frac{6}{5} - \frac{18}{25} = \frac{30-18}{25} = \frac{12}{25} \text{ L}$$

Assessment Time 8.3

1. a. $\frac{1}{7} \div 4 = \frac{1}{7} \times \frac{1}{4} = \frac{1}{28}$
 b. $6 \div \frac{3}{5} = 6 \times \frac{5}{3} = 2 \times 5 = 10$
 c. $18 \div \frac{9}{25} = 18 \times \frac{25}{9} = 2 \times 25 = 50$
 d. $10 \div \frac{5}{9} = 10 \times \frac{9}{5} = 2 \times 9 = 18$
 e. $76 \div 6\frac{1}{3} = 76 \div \frac{19}{3} = 76 \times \frac{3}{19} = 4 \times 3 = 12$
 f. $9\frac{4}{5} \div 42 = \frac{49}{5} \times \frac{1}{42} = \frac{7}{30}$
 g. $7\frac{1}{2} \div 15 = \frac{15}{2} \div 15 = \frac{15}{2} \times \frac{1}{15} = \frac{1}{2}$
 h. $72 \div 2\frac{1}{4} = 72 \div \frac{9}{4} = 72 \times \frac{4}{9} = 8 \times 4 = 32$
2. a. $\frac{7}{15} \div \frac{21}{25} = \frac{7}{15} \times \frac{25}{21} = \frac{5}{9}$
 b. $\frac{11}{24} \div \frac{1}{12} = \frac{11}{24} \times 12 = \frac{11}{2} = 5\frac{1}{2}$
 c. $\frac{5}{9} \div \frac{10}{36} = \frac{5}{9} \times \frac{36}{10} = \frac{4}{2} = 2$
 d. $\frac{12}{17} \div \frac{4}{34} = \frac{12}{17} \times \frac{34}{4} = 3 \times 2 = 6$
 e. $6\frac{2}{9} \div 4\frac{2}{3} = \frac{56}{9} \div \frac{14}{3} = \frac{56}{9} \times \frac{3}{14} = \frac{4}{3}$
 f. $3\frac{3}{7} \div \frac{8}{21} = \frac{24}{7} \div \frac{8}{21} = \frac{24}{7} \times \frac{21}{8} = 3 \times 3 = 9$
 g. $7\frac{3}{4} \div 20\frac{2}{3} = \frac{31}{4} \div \frac{62}{3} = \frac{31}{4} \times \frac{3}{62} = \frac{3}{8}$
 h. $1\frac{8}{11} \div 1\frac{5}{33} = \frac{19}{11} \div \frac{38}{33} = \frac{19}{11} \times \frac{33}{38} = \frac{3}{2}$
3. a. The reciprocal of $-\frac{1}{7}$ is -7
 b. The reciprocal of $\frac{5}{17}$ is $\frac{17}{5}$
 c. The reciprocal of $\frac{19}{23}$ is $\frac{23}{19}$
 d. The reciprocal of $\frac{-63}{128}$ is $\frac{-128}{63}$
4. a. $\left[4\frac{2}{3} \times 5\frac{4}{7}\right] \times 3\frac{1}{4} = \left[\frac{14}{3} \times \frac{39}{7}\right] \times \frac{13}{4}$

$$= \frac{14 \times 39 \times 13}{3 \times 7 \times 4} = 8$$

$$\begin{aligned}
\text{b. } \frac{4}{7} \div \left[3\frac{1}{3} + 2\frac{4}{5} \right] &= \frac{4}{7} \div \left[\frac{10}{3} + \frac{14}{5} \right] \\
&= \frac{4}{7} \div \left[\frac{10 \times 5 + 3 \times 14}{15} \right] = \frac{4}{7} \div \left[\frac{50 + 42}{15} \right] \\
&= \frac{4}{7} \div \frac{92}{15} = \frac{4}{7} \times \frac{15}{92} = \frac{15}{161} \\
\text{c. } 3\frac{1}{2} \div 1\frac{3}{4} \times 2\frac{1}{4} &= \frac{2 \times 3 + 1}{2} \div \frac{4 \times 1 + 3}{4} \times \frac{2 \times 4 + 1}{4} \\
&= \frac{6 + 1}{2} \div \frac{4 + 3}{4} \times \frac{8 + 1}{4} \\
&= \frac{7}{2} \div \frac{7}{4} \times \frac{9}{4} = \frac{7}{2} \times \frac{4}{7} \times \frac{9}{4} = \frac{9}{2} \\
\text{d. } \left[5\frac{1}{4} - 2\frac{1}{3} \right] \text{ of } \left[5\frac{1}{2} \div 2\frac{1}{5} \right] &= \left[\frac{4 \times 5 + 1}{4} - \frac{2 \times 3 + 1}{3} \right] \times \left[\frac{5 \times 2 + 1}{2} \div \frac{2 \times 5 + 1}{5} \right] \\
&= \left[\frac{21}{4} - \frac{7}{3} \right] \times \left[\frac{11}{2} \times \frac{5}{11} \right] = \left[\frac{3 \times 21 - 7 \times 4}{12} \right] \times \frac{5}{2} \\
&= \left[\frac{63 - 28}{12} \right] \times \frac{5}{2} = \frac{35}{12} \times \frac{5}{2} = \frac{175}{24} = 7\frac{7}{24} \\
\text{e. } \frac{1}{2} - \left[\frac{4}{5} \times \frac{5}{6} \right] + \frac{1}{8} &= \frac{1}{2} - \left[\frac{4}{6} \right] + \frac{1}{8} \\
&= \frac{12 - 16 + 3}{24} = \frac{15 - 16}{24} = \frac{-1}{24} \\
\text{f. } \left[\frac{1}{3} + \frac{1}{2} \right] + 1\frac{5}{6} \times 12 - 2\frac{1}{3} &= \left[\frac{2 + 3}{6} \right] + \frac{11}{6} \times 12 - \frac{7}{3} \\
&= \frac{5}{6} + 22 - \frac{7}{3} = \frac{5 + 132 - 14}{6} \\
&= \frac{123}{6} = 20\frac{1}{2}
\end{aligned}$$

5. Product of numbers = 21

$$\text{One number} = \frac{25}{8}$$

$$\text{Other number} = 21 \div \frac{25}{8}$$

$$= 21 \times \frac{8}{25} = \frac{168}{25} = 6\frac{18}{25}$$

6. Let the number be x

$$\frac{42}{51} \times x = 3\frac{1}{6}$$

$$\frac{42}{51} \times x = \frac{3 \times 6 + 1}{6} \quad \Rightarrow \quad \frac{42}{51} \times x = \frac{19}{6}$$

$$x = \frac{19 \times 51}{6 \times 42} = \frac{323}{84} = 3\frac{71}{84}$$

7. Let required number be x .

$$6\frac{2}{9} \div x = 4\frac{2}{3}$$

$$\frac{9 \times 6 + 2}{9} \div x = \frac{3 \times 4 + 2}{3}$$

$$\frac{54 + 2}{9} \div x = \frac{12 + 2}{3}$$

$$\frac{56}{9} \div x = \frac{14}{3}$$

$$x = \frac{56}{9} \times \frac{14}{3} = \frac{4}{3} = 1\frac{1}{3}$$

8. Total length of rope = $17\frac{1}{2} = \frac{35}{2}$

Number of piece it cut into = 5

$$\text{Length of each piece} = \frac{35}{2} \div 5 = \frac{35}{2} \times \frac{1}{5}$$

$$= \frac{7}{2} = 3\frac{1}{2}$$

Hence, the length of each piece is $3\frac{1}{2}$ m.

9. Total cost = ₹ $148\frac{3}{4}$

$$\text{Total weight} = 9\frac{1}{2}$$

$$\text{Cost of 1 kg} = 148\frac{3}{4} \div 9\frac{1}{2}$$

$$= \left(\frac{148 \times 4 + 3}{4} \right) \div \left(\frac{2 \times 9 + 1}{4} \right)$$

$$= \left(\frac{592 + 3}{4} \right) \div \left(\frac{18 + 1}{4} \right) = \frac{595}{4} \div \frac{19}{2}$$

$$= \frac{595}{4} \times \frac{2}{19} = \frac{595 \times 2}{4 \times 19} = \frac{1190}{76}$$

$$= \frac{595}{38} = 15\frac{25}{38}$$

SEL-Helping

10. Total mangoes = 100

$$\text{He kept mangoes} = \frac{1}{4} \text{ of } 100$$

$$= \frac{1}{4} \times 100 = 25$$

$$\text{Left mangoes} = 100 - 25 = 75$$

$$\text{Each got} = \frac{75}{15} = 5$$

Critical Thinking Skills

$$\begin{aligned}\text{Total oil in drum} &= 30\frac{4}{5} \text{ L} \\ \text{Number of small containers} &= \frac{30}{5} = 6 \\ \text{Left oil} &= \frac{4}{5} \text{ L}\end{aligned}$$

Revision Time

1. a. $\frac{5}{1} - 3\frac{1}{7} + 1\frac{3}{14} = (5 - 3 + 1) + \left(\frac{1}{7} + \frac{3}{14}\right)$
 $= 3 + \left(\frac{2+3}{14}\right) = 3\frac{5}{14}$

 b. $4\frac{1}{3} + 2\frac{5}{12} - 5\frac{1}{6} = (4 + 2 - 5) + \left(\frac{1}{3} + \frac{5}{12} - \frac{1}{6}\right)$
 $= 1 + \left(\frac{4+5-2}{12}\right) = 1 + \frac{7}{12} = 1\frac{7}{12}$

 c. $3 + 2\frac{1}{6} - 1\frac{1}{12} = (3 + 2 - 1) + \left(\frac{1}{6} - \frac{1}{12}\right)$
 $= 4 + \left(\frac{2-1}{12}\right) = 4\frac{1}{12}$
2. a. $8 \times \frac{9}{16} = \frac{9}{2} = 4\frac{1}{2}$

 b. $2\frac{1}{3} \times 5\frac{2}{9} = \frac{3 \times 2 + 1}{3} \times \frac{9 \times 5 + 2}{9}$
 $= \frac{6+1}{3} \times \frac{45+2}{9} = \frac{7}{3} \times \frac{47}{9}$
 $= \frac{329}{27} = 12\frac{5}{27}$

 c. $\frac{7}{15} \times \frac{10}{14} = \frac{7 \times 10}{15 \times 14} = \frac{2}{3 \times 2} = \frac{1}{3}$

 d. $1\frac{3}{4} \times 1\frac{1}{6} = \frac{4 \times 1 + 3}{4} \times \frac{6 \times 1 + 1}{6}$
 $= \frac{7}{4} \times \frac{7}{6} = \frac{49}{24} = 2\frac{1}{24}$
3. a. $\frac{7}{25} \times 125 = 7 \times 5 = 35$

 b. $\frac{12}{15} \times 180 = \frac{12 \times 180}{15} = \frac{4 \times 180}{5} = 4 \times 36 = 144$

 c. $\frac{11}{19} \times 76 = 11 \times 4 = 44$

 d. $\frac{8}{13} \times 117 = 8 \times 9 = 72$
4. a. $\frac{4}{7} \div 16 = \frac{4}{7} \times \frac{1}{16} = \frac{1}{28}$

 b. $\frac{9}{16} \div \frac{18}{32} = \frac{9}{16} \times \frac{32}{18} = 1$

$$\begin{aligned} \text{c. } 4\frac{2}{5} \div \frac{11}{15} &= \frac{5 \times 4 + 2}{16} \div \frac{11}{15} \\ &= \frac{22}{5} \times \frac{15}{11} = 2 \times 3 = 6 \end{aligned}$$

$$\text{d. } \frac{19}{37} \div \frac{57}{74} = \frac{19}{37} \times \frac{74}{57} = \frac{2}{3}$$

$$\begin{aligned} 5. \text{ a. } 1\frac{1}{2} \times \left(1\frac{3}{10} + 3\frac{4}{5}\right) &= \frac{3}{2} \times \left(\frac{13}{10} + \frac{19}{5}\right) \\ &= \frac{3}{2} \times \left(\frac{13 + 19 \times 2}{10}\right) \\ &= \frac{3}{2} \times \left(\frac{13 + 38}{10}\right) = \frac{3}{2} \times \left(\frac{51}{10}\right) \\ &= \frac{3 \times 51}{2 \times 10} = \frac{153}{20} = 7\frac{13}{20} \end{aligned}$$

$$\begin{aligned} \text{b. } \left(2\frac{3}{4} - 1\frac{2}{3}\right) \div \frac{5}{8} &= \left(\frac{4 \times 2 + 3}{4} - \frac{3 \times 1 + 2}{3}\right) \div \frac{5}{8} \\ &= \left(\frac{8 + 3}{4} - \frac{3 + 2}{3}\right) \div \frac{5}{8} \\ &= \left(\frac{11}{4} - \frac{5}{3}\right) \div \frac{5}{8} = \left(\frac{33 - 20}{12}\right) \div \frac{5}{8} \\ &= \frac{13}{12} \div \frac{5}{8} = \frac{13}{12} \times \frac{8}{5} \\ &= \frac{104}{60} = \frac{26}{15} = 1\frac{11}{15} \end{aligned}$$

$$\begin{aligned} \text{c. } \frac{3}{4} \times \left(2\frac{1}{5} \times 5\frac{1}{3}\right) \div \frac{7}{9} &= \frac{3}{4} \times \left(\frac{5 \times 2 + 1}{5} \times \frac{3 \times 5 + 1}{3}\right) \div \frac{7}{9} \\ &= \frac{3}{4} \times \left(\frac{11}{5} \times \frac{16}{3}\right) \div \frac{7}{9} \\ &= \frac{3}{4} \times \frac{11}{5} \times \frac{16}{3} \times \frac{9}{7} = 11\frac{11}{35} \end{aligned}$$

$$\begin{aligned} \text{d. } 1\frac{4}{5} \times 1\frac{1}{4} - \frac{3}{4} \times \frac{3}{5} &= \frac{5 \times 1 + 4}{5} + \frac{4 \times 1 + 1}{4} - \frac{3}{4} \times \frac{3}{5} \\ &= \frac{9}{5} \times \frac{5}{4} - \frac{3}{4} \times \frac{3}{5} \\ &= \frac{9}{4} - \frac{9}{20} = \frac{9 \times 5 - 9}{20} \\ &= \frac{45 - 9}{20} = \frac{36}{20} = \frac{9}{5} = 1\frac{4}{5} \end{aligned}$$

6. Let the required number be x

$$6\frac{3}{8} \div x = 3\frac{4}{9}$$

$$\frac{51}{8} \div x = \frac{31}{9}$$

$$\frac{51}{8} \times \frac{1}{x} = \frac{31}{9}$$

$$x = \frac{51 \times 9}{8 \times 31} = \frac{459}{248}$$

$$x = 1\frac{211}{248}$$

Hence, the required number is $1\frac{211}{248}$.

7. Height of Sanyam = $1\frac{4}{5}$ m = $\frac{9}{5}$ m

Height of her sister = $1\frac{1}{5}$ m = $\frac{6}{5}$ m

Sanyam is taller = $\frac{9}{5} - \frac{6}{5} = \frac{3}{5}$

Sanyam is taller by $\frac{3}{5}$.

8. Guavas selling 1 per kg = ₹ $25\frac{2}{5}$

Cost of $3\frac{2}{5}$ kg of guavas = ₹ $25\frac{2}{5} \times 3\frac{2}{5}$

$$= ₹ \frac{127}{5} \times \frac{17}{5}$$

$$= ₹ \frac{2159}{5} = ₹ 86\frac{9}{25}$$

Hence, cost of $3\frac{2}{5}$ kg of guavas is ₹ $86\frac{9}{25}$.

9. Total number of students = 840

Number of girls = $\frac{3}{7} \times 840 = 3 \times 120 = 360$

Number of boys = Total number of students – number of girls
 $= 840 - 360 = 480$

Hence, the number of boys is 480.

10. Let total number of pages be x .

Manu has read = $\frac{3}{5}$ of book

Left book = $1 - \frac{3}{5} = \frac{2}{5}$

∴ $\frac{2}{5}$ of $x = 40$

⇒ $\frac{2}{5} \times x = 40$

⇒ $x = \frac{40 \times 5}{2} = 100$

So, total number of pages is 100.

44 Key Math-07 (Brainbee)

11. Monthly income = ₹ 50,000

$$\begin{aligned}\text{Money spend on education} &= \frac{1}{4} \text{ of } 50000 \\ &= ₹ \left(\frac{1}{4} \times 50000 \right) = ₹ 12,500\end{aligned}$$

12. Total length of wire = $20\frac{4}{5}$ m = $\frac{104}{5}$ m
Total number of equal parts = 13

$$\begin{aligned}\therefore \text{Length of each part} &= 20\frac{4}{5} \div 13 \\ &= \frac{104}{5} \times \frac{1}{13} = \frac{8}{5} = 1\frac{3}{5} \text{ m}\end{aligned}$$

13. Distance covered in $4\frac{1}{2}$ hours = $40\frac{3}{4}$ km

$$\begin{aligned}\text{So, distance covered in 1 hr} &= 40\frac{3}{4} \div 4\frac{1}{2} \\ &= \frac{163}{4} \div \frac{9}{2} = \frac{163}{4} \times \frac{2}{9} \\ &= \frac{163}{18} = 9\frac{1}{18} \text{ km}\end{aligned}$$

14. Let total length of journey = x

$$\text{Covered journey} = \frac{3}{5}$$

$$\text{Left journey} = 1 - \frac{3}{5} = \frac{2}{5}$$

$$\text{So, } \frac{2}{5} \text{ of } x = 20$$

$$\frac{2}{5} \times x = 20$$

$$x = \frac{20 \times 5}{2}$$

$$x = 50 \text{ km}$$

Subject Link

- a. Weight of each fibre plate = $\frac{1}{4}$ kg

$$\therefore \text{Weight of 5 fibre plate} = 5 \times \frac{1}{4} = \frac{5}{4} \text{ kg}$$

- b. Weight of 6 fibre plates = $6 \times \frac{1}{4} = \frac{6}{4}$ kg

(Since, $24 \div 4 = 6$ plates are required for an adult weight 50 kg)

CHAPTER-9 : RATIONAL NUMBERS

Assessment Time 9.1

1. a. F b. T c. F d. F e. F

2. Positive = (b) $\frac{8}{17}$

(c) $\frac{-9}{-27} = \frac{9}{27}$

Negative = (a) $\frac{-5}{7}$

(d) $\frac{18}{-285}$

3. a. $\frac{-4}{13} \times \frac{2}{2} = \frac{-8}{26}$

$\frac{-4}{13} \times \frac{3}{3} = \frac{-12}{39}$

$\frac{-4}{13} \times \frac{4}{4} = \frac{-16}{52}$

$\frac{-4}{13} \times \frac{5}{5} = \frac{-20}{65}$

Hence, the four equivalent fractions are

$\frac{-8}{26}, \frac{-12}{39}, \frac{-16}{52}$ and $\frac{-20}{65}$

b. $\frac{8}{19} \times \frac{2}{2} = \frac{16}{38}$

$\frac{8}{19} \times \frac{3}{3} = \frac{24}{57}$

$\frac{8}{19} \times \frac{4}{4} = \frac{32}{76}$

$\frac{8}{19} \times \frac{5}{5} = \frac{40}{95}$

Hence, the four equivalent fractions are

$\frac{16}{38}, \frac{24}{57}, \frac{32}{76}$ and $\frac{40}{95}$

c. $\frac{5}{-17} \times \frac{2}{2} = \frac{10}{-34}$

$\frac{5}{-17} \times \frac{3}{3} = \frac{15}{-51}$

$\frac{5}{-17} \times \frac{4}{4} = \frac{20}{-68}$

$\frac{5}{-17} \times \frac{5}{5} = \frac{25}{-85}$

Hence, the four equivalent fractions are

$\frac{10}{-34}, \frac{15}{-51}, \frac{20}{-68}$ and $\frac{25}{-85}$

d. $\frac{-6}{-15} = \frac{6}{15}$

$\frac{6}{15} \times \frac{2}{2} = \frac{12}{30}$

$\frac{6}{15} \times \frac{3}{3} = \frac{18}{45}$

$\frac{6}{15} \times \frac{4}{4} = \frac{24}{60}$

$\frac{6}{15} \times \frac{5}{5} = \frac{30}{75}$

Hence, the four equivalent fractions are

$\frac{12}{30}, \frac{18}{45}, \frac{24}{60}$ and $\frac{30}{75}$

4. a. Numerator = 21

We multiply the numerator - 7 by - 3 to make it 21 i.e. $(21 \div - 7) = - 3$

$\frac{-7}{18} \times \frac{-3}{-3} = \frac{21}{-54}$

- b Denominator = -108

We multiple the denominator by 18 to get -108 i.e. $(108 \div 18) = - 6$

$\frac{-7}{18} \times \frac{-6}{-6} = \frac{42}{-108}$

5. a. $\frac{-420}{870}$

HCF of 420 and 870 is 15

So, we will divide both numerator and denominator by – 15.

$$\frac{-420}{870} \div \frac{-15}{-15} = \frac{28}{-58}$$

b. Denominator = –58

HCF of 420 and 870 is 15

So, we will divide both numerator and denominator by – 15.

$$\frac{-420}{870} \div \frac{15}{15} = \frac{-28}{58}$$

6. a. $\frac{-12}{70}$

HCF of – 12 and 70 is 2

$$\frac{-12}{70} \div \frac{2}{2} = \frac{-6}{35}$$

The standard form is $\frac{-6}{35}$.

b. $\frac{-44}{428} \div \frac{4}{4} = \frac{-11}{107}$

HCF of 44 and 428 is 4.

$$\frac{-44}{428} \div \frac{4}{4} = \frac{-11}{107}$$

The standard form of $\frac{-44}{428}$ is $\frac{-11}{107}$

c. $\frac{-76}{490}$

HCF of 76 and 490 is 2.

$$\frac{-76}{490} \div \frac{2}{2} = \frac{-38}{245}$$

The standard form is $\frac{-38}{245}$.

d. $\frac{-1260}{1540}$

HCF of –1260 and 1540 is 140.

$$\frac{-1260}{1540} \div \frac{140}{140} = \frac{-9}{11}$$

The standard form is $\frac{-9}{11}$.

7. a. $\frac{-17}{68} = \frac{85}{\boxed{x}}$

$$\frac{-17}{68} = \frac{85}{x}$$

$$x = \frac{68 \times 85}{-17} = -340$$

b. $\frac{-7}{8} = \frac{\boxed{x}}{32} = \frac{63}{\boxed{y}}$

$$\frac{-7}{8} = \frac{x}{32}$$

(On taking first two terms)

$$x = \frac{-7 \times 32}{8} = -28$$

$$\frac{-28}{32} = \frac{63}{y}$$

(On taking las two terms)

$$y = \frac{32 \times 63}{-28} = -72$$

c. $\frac{5}{13} = \frac{\boxed{x}}{65} = \frac{-45}{\boxed{y}}$

(On taking first two terms, we get)

$$\frac{5}{13} = \frac{x}{65}$$

$$x = \frac{65 \times 5}{13} = 25$$

$$\frac{25}{65} = \frac{-45}{y}$$

(On taking last two terms, we get)

$$y = \frac{-45 \times 65}{25} = -117$$

$$\frac{5}{13} = \frac{\boxed{25}}{65} = \frac{-45}{\boxed{-117}}$$

d. $\frac{9}{-11} = \frac{-18}{\boxed{}} = \frac{\boxed{}}{66}$

(On taking first two terms, we get)

$$\frac{9}{-11} = \frac{-18}{x}$$

$$x = \frac{-18 \times -11}{9} = -2 \times -11 = 22$$

$$\frac{-18}{-22} = \frac{y}{66}$$

(On taking last two terms we get)

$$y = \frac{66 \times (-18)}{22} = 3 \times (-18) = -54$$

$$\frac{9}{-11} = \frac{-18}{\boxed{22}} = \frac{\boxed{-54}}{66}$$

8. a. $\frac{-3}{14}$ and $\frac{-5}{27}$

(On cross multiplication we get)

$$27 \times (-3) = -81 \text{ and } 14 \times (-5) = -70$$

$$\therefore 27 \times (-3) \neq 14 \times (-5)$$

Hence, $\frac{-3}{14}$ and $\frac{-5}{27}$ are not equal.

b. $\frac{-6}{15}$ and $\frac{-5}{18}$

(On cross multiplication we get)

$$-6 \times 18 = -108 \text{ and } 15 \times (-5) = -75$$

$$\therefore -6 \times 18 \neq 15 \times (-5)$$

Hence, $\frac{-6}{15}$ and $\frac{-5}{18}$ are not equal. $\therefore 2 = 1224$

$$\therefore (-12) \times (-102) = 17 \times 72$$

Hence, $\frac{-12}{17}$ and $\frac{72}{-102}$ are equal.

d. $\frac{96}{-90}$ and $\frac{65}{-450}$

(On cross multiplication we get)

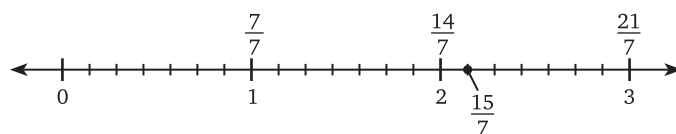
$$96 \times (-450) = -11700 \text{ and } (-90) \times 65 = -5850$$

$$\therefore -96 \times (-450) \neq (-90) \times 65$$

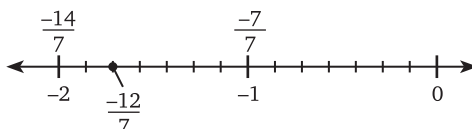
Hence, $\frac{96}{-90}$ and $\frac{65}{-450}$ are not equal.

Assessment Time 9.2

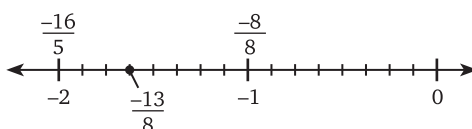
1. a. $\frac{15}{7}$ (Divide each unit into 7 equal parts).



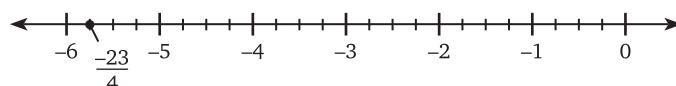
- b. $-\frac{12}{7}$ (Divide each unit into 7 equal parts).



- c. $-\frac{13}{8}$ (Divide each unit into 8 equal parts).



- d. $-\frac{23}{4} = -5\frac{3}{4}$ (Divide each unit into 7 equal parts).



2. a. $\frac{5}{6} \square \frac{-2}{5}$ LCM of 6 and 5 = $6 \times 5 = 30$

$$\frac{5}{6} \times \frac{5}{5} = \frac{25}{30} \quad \frac{-2}{5} \times \frac{6}{6} = \frac{-12}{30}$$

$$\frac{25}{30} > \frac{-12}{30} \text{ or } \frac{5}{6} \square \frac{-2}{5}$$

- b. $\frac{-3}{7} \square \frac{-2}{7}$ c. $\frac{-9}{12} \square \frac{-8}{12}$

- d. $-5 \square \frac{-4}{5}$ LCM of 1 and 5 = $1 \times 5 = 5$

$$\frac{-5}{1} \times \frac{5}{5} = \frac{-25}{5} \quad \frac{-4}{5} \times \frac{1}{1} = \frac{-4}{5}$$

$$\frac{-25}{5} < \frac{-4}{5} \quad \text{So, } -5 \square \frac{-4}{5}$$

3. a. $\frac{7}{15}$ and $\frac{-5}{12}$ (Positive number are always greater than negative)

$$\text{So, } \frac{7}{15} > \frac{-5}{12}$$

- b. $\frac{-3}{17}$ and $\frac{-5}{19}$ LCM of 17 and 19 = $17 \times 19 = 323$

$$\frac{-3}{17} \times \frac{19}{19} = \frac{-57}{323} \quad \frac{-5}{19} \times \frac{17}{17} = \frac{-85}{323}$$

$$\frac{-57}{323} > \frac{-85}{323} \quad \text{So, } \frac{-3}{17} > \frac{-5}{19}$$

- c. $\frac{-5}{6}$ and $\frac{-4}{7}$ LCM of 6 and 7 = $6 \times 7 = 42$

$$\frac{-5}{6} \times \frac{7}{7} = \frac{-35}{42} \quad \frac{-4}{7} \times \frac{6}{6} = \frac{-24}{42}$$

$$\frac{-35}{42} < \frac{-24}{42}$$

$$\text{So, } \frac{-5}{6} < \frac{-4}{7}$$

d. $\frac{-4}{9}$ and $\frac{-5}{6}$

$$\frac{-4}{9} \times \frac{2}{2} = \frac{-8}{18}$$

$$\frac{-5}{6} \times \frac{3}{3} = \frac{-15}{18}$$

$$\frac{-8}{18} > \frac{-15}{18}$$

$$\text{So, } \frac{-4}{9} > \frac{-5}{6}$$

$$\begin{array}{r|l} 3 & 9, 6 \\ \hline & 3, 2 \end{array}$$

$$\begin{aligned} &\text{LCM of 9 and 6} \\ &= 3 \times 3 \times 2 = 18 \end{aligned}$$

4. a. $\frac{5}{16}, \frac{-3}{8}, \frac{-6}{12}, \frac{-3}{4}$

LCM of 16, 8, 12 and 4 is 48

$$\frac{5}{16} \times \frac{3}{3} = \frac{15}{48}$$

$$\frac{-3}{8} \times \frac{6}{6} = \frac{-18}{48}$$

$$\frac{-6}{12} \times \frac{4}{4} = \frac{-24}{48}$$

$$\frac{-3}{4} \times \frac{12}{12} = \frac{-36}{48}$$

$$\frac{-36}{48} < \frac{-24}{48} < \frac{-18}{48} < \frac{15}{48}$$

Hence, the ascending order is $\frac{-3}{4}, \frac{-6}{12}, \frac{-18}{48}$ and $\frac{5}{16}$

b. $\frac{2}{21}, 0, \frac{-3}{7}, \frac{-5}{14}$

LCM of 21, 7 and 14 is 42

$$\frac{2}{21} \times \frac{2}{2} = \frac{4}{42}$$

$$\frac{-3}{7} \times \frac{6}{6} = \frac{-18}{42}$$

$$\frac{-5}{14} \times \frac{3}{3} = \frac{-15}{42}$$

$$\frac{-18}{42} < \frac{-15}{42} < 0 < \frac{4}{42}$$

Hence, the ascending order is $\frac{-3}{7}, \frac{-5}{14}, 0$ and $\frac{2}{21}$

c. $\frac{-5}{11}, \frac{3}{22}, \frac{-6}{33}, \frac{-5}{44}$

LCM of 11, 22, 33 and 44 is 132

$$\frac{-5}{11} \times \frac{12}{12} = \frac{-60}{132}$$

$$\frac{3}{22} \times \frac{6}{6} = \frac{18}{132}$$

$$\frac{-6}{33} \times \frac{4}{4} = \frac{-24}{132}$$

$$\frac{-5}{44} \times \frac{3}{3} = \frac{-15}{132}$$

$$\frac{-60}{132} < \frac{-24}{132} < \frac{-15}{132} < \frac{18}{132}$$

Hence, the ascending order is $\frac{-5}{11}, \frac{-6}{33}, \frac{-5}{44}$ and $\frac{3}{22}$

d. $\frac{-6}{21}, -1, \frac{-3}{14}, \frac{-5}{7}$

LCM of 21, 14 and 7 is 42

$$\frac{-6}{21} \times \frac{2}{2} = \frac{-12}{42}$$

$$\frac{-1}{1} \times \frac{42}{42} = \frac{-42}{42}$$

$$\frac{-3}{14} \times \frac{3}{3} = \frac{-9}{42}$$

$$\frac{-5}{7} \times \frac{6}{6} = \frac{-30}{42}$$

$$\frac{-42}{42} < \frac{-30}{42} < \frac{-12}{42} < \frac{-9}{42}$$

Hence, the ascending order is $-1, \frac{-5}{7}, \frac{-6}{21}$ and $\frac{-3}{14}$

5. a. $\frac{-1}{5}, \frac{2}{3}, \frac{-5}{6}, \frac{-7}{12}$

LCM of 5, 3, 6 and 12 is 60

$$\frac{-1}{5} \times \frac{12}{12} = \frac{-12}{60}$$

$$\frac{2}{3} \times \frac{20}{20} = \frac{40}{60}$$

$$\frac{-5}{6} \times \frac{10}{10} = \frac{-50}{60}$$

$$\frac{-7}{12} \times \frac{5}{5} = \frac{-35}{60}$$

$$\frac{40}{60} > \frac{-12}{60} > \frac{-35}{60} > \frac{-50}{60}$$

Hence, the ascending order is $\frac{2}{3}, \frac{-1}{5}, \frac{-7}{12}$ and $\frac{-5}{6}$

b. $\frac{3}{-5}, \frac{8}{-10}, \frac{-17}{15}, \frac{-7}{10}$

LCM of 5, 10, 15 and 10 is 30

$$\frac{3}{-5} \times \frac{-6}{-6} = \frac{-18}{30}$$

$$\frac{8}{-10} \times \frac{-3}{-3} = \frac{-24}{30}$$

$$\frac{-17}{15} \times \frac{2}{2} = \frac{-34}{30}$$

$$\frac{-7}{10} \times \frac{3}{3} = \frac{-21}{30}$$

$$\frac{-18}{30} > \frac{-21}{30} > \frac{-24}{30} > \frac{-34}{30}$$

Hence, the ascending order is $\frac{3}{-5}, \frac{-7}{10}, \frac{8}{-10}$ and $\frac{-17}{15}$

c. $\frac{-9}{6}, \frac{-4}{3}, \frac{-17}{12}, \frac{-13}{18}$

LCM of 6, 3, 12 and 18 is 36

$$\frac{-9}{6} \times \frac{6}{6} = \frac{-54}{36}$$

$$\frac{-4}{3} \times \frac{12}{12} = \frac{-48}{36}$$

$$\frac{-17}{12} \times \frac{3}{3} = \frac{-51}{36}$$

$$\frac{-13}{18} \times \frac{2}{2} = \frac{-26}{36}$$

$$\frac{-26}{36} > \frac{-48}{36} > \frac{-51}{36} > \frac{-54}{36}$$

Hence, the ascending order is $\frac{-13}{18}, \frac{-4}{3}, \frac{-17}{12}$ and $\frac{-9}{6}$

d. $\frac{-7}{18}, \frac{-4}{27}, \frac{-4}{9}, \frac{-2}{3}$

LCM of 18, 27, 9 and 3 is 54

$$\frac{-7}{18} \times \frac{3}{3} = \frac{-21}{54}$$

$$\frac{-4}{27} \times \frac{2}{2} = \frac{-8}{54}$$

$$\frac{-4}{9} \times \frac{6}{6} = \frac{-24}{54}$$

$$\frac{-2}{3} \times \frac{18}{18} = \frac{-36}{54}$$

$$\frac{-8}{54} > \frac{-21}{54} > \frac{-24}{54} > \frac{-36}{54}$$

Hence, the ascending order is $\frac{-4}{27}, \frac{-7}{18}, \frac{-4}{9}$ and $\frac{-2}{3}$

6. a. -3 and 2

The rational number between -3 and 2 is -2, -1

b. $\frac{-5}{2}$ and $\frac{0}{1}$

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

$$\frac{0}{1} \times \frac{2}{2} = \frac{0}{2}$$

The two rational number between $\frac{-5}{2}$ and 0 is $\frac{-4}{2}, \frac{-3}{2}$

c. $\frac{-6}{7}$ and $\frac{-1}{7}$

The two rational number between $\frac{-6}{7}$ and $\frac{-1}{7}$ is $\frac{-5}{7}, \frac{-4}{7}$

d. $\frac{-4}{5}$ and $\frac{1}{6}$

$$\frac{-4}{5} \times \frac{6}{6} = \frac{-24}{30}$$

$$\frac{1}{6} \times \frac{5}{5} = \frac{5}{30}$$

The two rational number between $\frac{-24}{30}$ and $\frac{5}{30}$ is $\frac{-23}{30}, \frac{-22}{30}$

7. a. $\frac{-6}{13}$ and 2

$$\frac{-6}{13} \times \frac{1}{1} = \frac{-6}{13}$$

$$\frac{2}{1} \times \frac{13}{13} = \frac{26}{13}$$

The four rational number between $\frac{-6}{13}$ and 2 are $\frac{-5}{13}, \frac{-4}{13}, \frac{-3}{13}, \frac{-2}{13}$

b. $\frac{-5}{9}$ and $\frac{-2}{7}$

$$\frac{-5}{9} \times \frac{7}{7} = \frac{-35}{63}$$

$$\frac{-2}{7} \times \frac{9}{9} = \frac{-18}{63}$$

The four rational number between $\frac{-5}{9}$ and $\frac{-2}{7}$ are $\frac{-19}{63}, \frac{-20}{63}, \frac{-21}{63}, \frac{-22}{63}$

c. $\frac{-2}{5}$ and 1

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

$$\frac{1}{1} \times \frac{5}{5} = \frac{5}{5}$$

The four rational number between $\frac{-2}{5}$ and $\frac{5}{5}$ are $\frac{-1}{5}, \frac{0}{5}, \frac{1}{5}$ and $\frac{2}{5}$

d. $\frac{-6}{17}$ and 2

$$\frac{-6}{17} \times \frac{1}{1} = \frac{-6}{17}$$

$$\frac{2}{1} \times \frac{17}{17} = \frac{34}{17}$$

The four rational number between $\frac{-6}{17}$ and 2 are $\frac{-5}{17}, \frac{-4}{17}, \frac{-3}{17}$ and $\frac{-2}{17}$

8. a. F

b. F

c. F

d. T

Critical Thinking Skills

$$\frac{5}{13} > \frac{3}{13} \text{ but } \frac{-5}{13} < \frac{-3}{13}$$

Since, $\frac{5}{13}$ comes on right side of $\frac{3}{13}$ but $\frac{-5}{13}$ comes on left side of $\frac{-3}{13}$ on number line.

Assessment Time 9.3

1. a. $\frac{6}{17}$

b. 0

c. $\frac{-18}{19}, \frac{5}{17}$

d. $\frac{-16}{23}$

2. a. F

b. T

c. F

d. F

3. a. $\frac{-9}{16} \times \frac{64}{81} = \frac{-9 \times 64}{16 \times 81} = \frac{-4}{9}$

b. $\frac{-19}{33} \times \frac{22}{57} = \frac{-19 \times 22}{33 \times 57} = \frac{-2}{9}$

- c. $-32 \times \frac{5}{16} = \frac{-32 \times 5}{16} = -10$
- d. $\frac{17}{25} \times \frac{30}{-85} = \frac{17 \times 30}{25 \times -85} = \frac{-6}{25}$
4. a. The multiplicative inverse of -8 is $-\frac{1}{8}$
- b. The multiplicative inverse of $-\frac{3}{5}$ is $-\frac{5}{3}$
- c. The multiplicative inverse of $-2\frac{1}{7} = \frac{-15}{7}$ is $-\frac{7}{15}$
- d. The multiplicative inverse of $\frac{8}{17}$ is $\frac{17}{8}$
5. a. $\frac{5}{14} + \frac{-11}{21} = \frac{15 - 22}{42} = \frac{-7}{42} = \frac{-1}{6}$
Reciprocal = -6
- b. $\frac{3}{10} + \frac{-7}{15} = \frac{3 \times 3 + (-7) \times 2}{42}$
 $= \frac{9 - 14}{42} = \frac{-5}{42} = \frac{-1}{6}$ Reciprocal = -6
- c. $\frac{5}{9} + \frac{3}{-10} = \frac{50 - 27}{90} = \frac{23}{90}$
Reciprocal = $\frac{90}{23}$
- d. $\frac{6}{13} \div \frac{-12}{39} = \frac{6}{13} \times \frac{-39}{12} = \frac{-3}{2}$
Reciprocal = $-\frac{2}{3}$
6. a. $\frac{10}{16} \times \frac{-8}{25} \times \frac{11}{37} \times \frac{-74}{77} = \frac{10 \times (-8) \times 11 \times (-74)}{16 \times 25 \times 37 \times 77} = \frac{2}{35}$
- b. $-8 \times \frac{-6}{11} \times \frac{33}{-24} \times \frac{6}{7} = \frac{-8 \times -6 \times 33 \times 6}{11 \times (-24) \times 7} = \frac{-36}{7}$
- c. $\frac{-4}{5} \times \frac{10}{-13} \times \frac{-5}{6} \times \frac{39}{-35} = \frac{-4 \times 10 \times (-5) \times 39}{5 \times (-13) \times 6 \times (-35)} = \frac{4}{7}$
7. a. $\frac{-9}{20} \div \frac{-27}{50} = \frac{-9}{20} \times \frac{50}{-27} = \frac{-9 \times 50}{20 \times (-27)} = \frac{5}{6}$
- b. $\frac{-6}{17} \div \frac{-36}{68} = \frac{-6}{17} \times \frac{68}{-36} = \frac{-6 \times 68}{17 \times (-36)} = \frac{2}{3}$
- c. $\frac{6}{31} \div \frac{12}{93} = \frac{6}{31} \times \frac{93}{12} = \frac{6 \times 93}{31 \times 12} = \frac{3}{2}$
- d. $\frac{-4}{11} \div \frac{16}{33} = \frac{-4}{11} \times \frac{33}{16} = \frac{-4 \times 33}{11 \times 16} = \frac{-3}{4}$
8. Let other number be x
According to the questions,
 $x \times \frac{5}{11} = \frac{-10}{31}$
 $x = \frac{-10}{31} \times \frac{11}{5} = \frac{-22}{31}$

Hence, the other number is $\frac{-22}{31}$

9. Let the other number be x .

According to the question,

$$\frac{-12}{77} \times x = \frac{-36}{99}$$

$$x = \frac{-36 \times 77}{99 \times (-12)} = \frac{7}{3}$$

Hence, the other number is $\frac{7}{3}$

10. Let the rational number be x

$$\frac{-4}{13} \div x = \frac{-8}{39}$$

$$\frac{-4}{13} \times \frac{1}{x} = \frac{-8}{39}$$

$$\frac{-4 \times 39}{13 \times (-8)} = x$$

$$x = \frac{3}{2}$$

Hence, the rational number is $\frac{3}{2}$.

11. Sum of number = $\frac{-5}{7} + \frac{8}{21}$

$$= \frac{(-5) \times 3 + 1 \times 8}{21} = \frac{-15 + 8}{21} = \frac{-7}{21} = \frac{-1}{3}$$

$$\text{Product of number} = \frac{-5}{7} \times \frac{8}{21} = \frac{-40}{147}$$

$$\frac{-1}{3} \div \frac{-40}{147} = \frac{-1}{3} \times \frac{147}{-40}$$

$$= \frac{-147}{-120} = \frac{49}{40}$$

Hence, the number is $\frac{49}{40} = 1 \frac{9}{40}$

SDG-Good Health

12. Hitesh Office = $\frac{5}{7} \times 35$

$$\text{Total cost} = 35 \times 2 \times \frac{36}{5} = ₹ 504$$

$$\text{Share of Hitesh} = \frac{5}{7} \times 504 = ₹ 360$$

Mental Math

1. $\frac{-21}{35}$

2. $\frac{6}{7}$

3. $\frac{-6}{17}$

4. $\frac{5}{7}$

5. $\frac{-11}{13}$

6. $\frac{1}{9}$

Revision Time

$$1. \quad a. \quad \frac{-3}{8} \times \frac{2}{2} = \frac{-6}{16},$$

$$\frac{-3}{8} \times \frac{4}{4} = \frac{-12}{32},$$

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

$$\frac{-3}{8} \times \frac{5}{5} = \frac{-15}{40}$$

Hence, the four equivalent fractions are $\frac{-6}{16}$, $\frac{-9}{24}$, $\frac{-12}{32}$ and $\frac{-15}{40}$

$$b. \quad \frac{5}{7} \times \frac{2}{2} = \frac{10}{14},$$

$$\frac{5}{7} \times \frac{3}{3} = \frac{15}{21}$$

$$\frac{5}{7} \times \frac{4}{4} = \frac{20}{28},$$

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

Hence, the four equivalent fractions are $\frac{10}{14}$, $\frac{15}{21}$, $\frac{20}{28}$ and $\frac{25}{35}$

$$c. \quad \frac{-11}{13} \times \frac{2}{2} = \frac{-22}{26},$$

$$\frac{-11}{13} \times \frac{3}{3} = \frac{-33}{39}$$

$$\frac{-11}{13} \times \frac{4}{4} = \frac{-44}{52},$$

$$\frac{-11}{13} \times \frac{5}{5} = \frac{-55}{65}$$

Hence, the four equivalent fractions are $\frac{-22}{26}$, $\frac{-33}{39}$, $\frac{-44}{52}$ and $\frac{-55}{65}$

$$d. \quad \frac{16}{-19} \times \frac{2}{2} = \frac{32}{-38},$$

$$\frac{16}{-19} \times \frac{3}{3} = \frac{48}{-57}$$

$$\frac{16}{-19} \times \frac{4}{4} = \frac{64}{-76},$$

$$\frac{16}{-19} \times \frac{5}{5} = \frac{80}{-95}$$

Hence, the four equivalent fractions are $\frac{32}{-38}$, $\frac{48}{-57}$, $\frac{64}{-76}$ and $\frac{80}{-95}$

$$2. \quad a. \quad \frac{-25}{625} \quad \text{HCF of 25 and 625 is 25}$$

$$\frac{-25 \div 25}{625 \div 25} = \frac{-1}{25}$$

Hence, the standard form is $\frac{-1}{25}$

$$b. \quad \frac{44}{-428} \quad \text{HCF of 44 and 428 is 4}$$

$$\frac{44 \div (-4)}{-428 \div (-4)} = \frac{-11}{107}$$

Hence, the standard form is $\frac{-11}{107}$

$$c. \quad \frac{252}{-1827} \quad \text{HCF of 252 and 1827 is 9}$$

$$\frac{252 \div (-9)}{-1827 \div (-9)} = \frac{-28}{203}$$

Hence, the standard form is $\frac{-28}{203} = \frac{-4}{29}$

$$d. \quad \frac{-175}{225} \quad \text{HCF of 175 and 225 is 25}$$

$$\frac{-175 \div 25}{225 \div 25} = \frac{-7}{9}$$

Hence, the standard form is $-\frac{7}{9}$

3. a. $\frac{-6}{17}$ and $\frac{5}{-18}$

On cross multiplication, we get

$$-6 \times (-18) = 108 \text{ and } 5 \times 17 = 85$$

$$-6 \times (-18) \neq 5 \times 17$$

So, $\frac{-6}{17}$ and $\frac{-5}{-18}$ are not equal.

b. $\frac{-14}{25}$ and $\frac{5}{-18}$

On cross multiplication, we get

$$-14 \times 18 = -252$$

$$\text{and } 25 \times -5 = 125$$

$$\text{So, } (-14) \times (-18) \neq 25 \times 5$$

So, $\frac{-14}{25}$ and $\frac{5}{-18}$ are not equal.

c. $\frac{17}{-25}$ and $\frac{-68}{100}$

On cross multiplication, we get

$$17 \times 100 = 1700 \text{ and } (-68) \times (-25) = 1700$$

$$17 \times 100 = (-68) \times -25$$

So, $\frac{17}{-25}$ and $\frac{-68}{100}$ are equal.

4. a. $\frac{80}{-25} = \frac{[x]}{5}$

$$x = \frac{80 \times 5}{-25} = -16$$

b. $\frac{-7}{8} = \frac{[x]}{-40}$

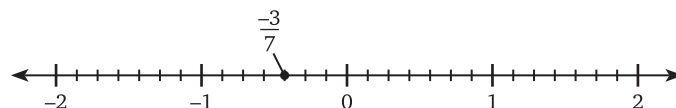
$$\frac{-7 \times (-40)}{8} = x$$

$$35 = x$$

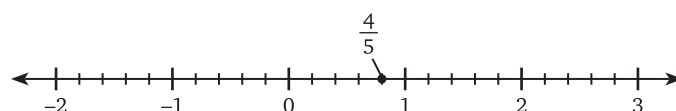
c. $\frac{6}{-13} = \frac{30}{[x]}$

$$x = \frac{-13 \times 30}{6} = -13 \times 5 = -65$$

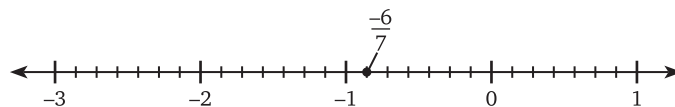
5. a. Divide each unit into 7 equal parts.



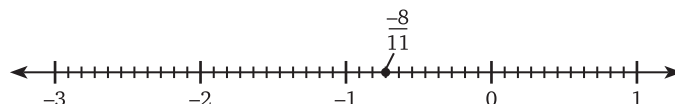
b. Divide each unit into 5 equal parts



- c. Divide each unit into 7 equal parts



- d. Divide each unit into 11 equal parts



6. a. $-\frac{6}{18}$ and $\frac{5}{7}$

Since, $-\frac{6}{18}$ is a negative rational number and $\frac{5}{7}$ positive rational number So, $-\frac{6}{18} < \frac{5}{7}$

b. $-\frac{5}{13}$ and $\frac{2}{-17}$

LCM of 17 and 13 is 221

$$-\frac{5}{13} \times \frac{17}{17} = \frac{-85}{221}$$

$$-\frac{2}{17} \times \frac{13}{13} = \frac{-26}{221}$$

$$\frac{-85}{221} < \frac{-26}{221}$$

So, $-\frac{5}{13} < \frac{2}{-17}$

c. $-\frac{6}{17}$ and $\frac{-4}{15}$

LCM of 17 and 15 is 255

$$-\frac{6}{17} \times \frac{15}{15} = \frac{-90}{255}$$

$$\frac{-4}{15} \times \frac{17}{17} = \frac{-68}{255}$$

$$\frac{-90}{255} < \frac{-68}{255}$$

So, $-\frac{6}{17} < \frac{-4}{15}$

7. a. $-\frac{7}{10}, -\frac{3}{20}, -\frac{9}{25}, -\frac{2}{15}$

LCM of 10, 20, 25 and 15 is 300

$$-\frac{7}{10} \times \frac{30}{30} = \frac{-210}{300}$$

$$-\frac{3}{20} \times \frac{15}{15} = \frac{-45}{300}$$

$$-\frac{9}{25} \times \frac{12}{12} = \frac{-108}{300}$$

$$-\frac{2}{15} \times \frac{20}{20} = \frac{-40}{300}$$

$$\frac{-40}{300} > \frac{-45}{300} > \frac{-108}{300} > \frac{-210}{300}$$

Hence, the descending order $-\frac{2}{15}, -\frac{3}{20}, -\frac{9}{25}$ and $-\frac{7}{10}$

b. LCM of 7, 21, 14, 1 is 42

$$\frac{6}{-7} \times \frac{6}{6} = \frac{36}{-42}$$

$$-\frac{8}{21} \times \frac{2}{2} = \frac{-16}{42}$$

$$-\frac{3}{14} \times \frac{3}{3} = \frac{-9}{42}$$

$$-\frac{3}{1} \times \frac{42}{42} = \frac{-126}{42}$$

$$\frac{-9}{42} > \frac{-16}{42} > \frac{-36}{42} > \frac{-126}{42}$$

Hence, the descending order $-\frac{3}{14}, -\frac{8}{21}, -\frac{6}{7}$ and -3

8. a. $-\frac{3}{7}$ and 1

$$\frac{-3}{7} \times \frac{1}{1} = \frac{-3}{14}$$

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

The four rational numbers are $\frac{-2}{7}, \frac{-1}{7}, \frac{1}{7}, \frac{2}{7}$

b. $\frac{-4}{15}$ and $\frac{-1}{12}$

$$\frac{-4}{15} \times \frac{4}{4} = \frac{-16}{60}$$

$$\frac{-1}{12} \times \frac{5}{5} = \frac{-5}{60}$$

Hence, the four rational numbers are $\frac{-15}{60}, \frac{-14}{60}, \frac{-13}{60}, \frac{-12}{60}$

c. $\frac{-4}{5}$ and 1

$$\frac{-4}{5} \times \frac{1}{1} = \frac{-4}{5}$$

$$\frac{1}{1} \times \frac{5}{5} = \frac{5}{5}$$

Hence, the four rational numbers are $\frac{-3}{5}, \frac{-2}{5}, \frac{-1}{5}, \frac{1}{5}$

9. a. $\frac{-5}{9} + \frac{3}{15} = \frac{-75 + 27}{15} = \frac{-48}{135} = \frac{-16}{45}$

b. $\frac{7}{10} + \frac{-3}{20} = \frac{14 - 3}{20} = \frac{11}{20}$

c. $\frac{6}{-7} + \frac{-5}{21} + \frac{5}{-14} = \frac{-36 - 10 - 15}{42}$
 $= \frac{-61}{42} = -1\frac{19}{42}$

10. a. $\frac{-6}{13} - \frac{-5}{26} = \frac{-12 - 5}{26} = \frac{-17}{26}$

b. $\frac{7}{10} - \frac{8}{15} = \frac{21 - 16}{30} = \frac{5}{30} = \frac{1}{6}$

c. $\frac{-13}{25} - \frac{-14}{75} = \frac{-39 + 14}{75} = \frac{-25}{75} = \frac{-1}{3}$

11. a. $\frac{-39}{15} \times \frac{20}{65} = \frac{-39 \times 20}{15 \times 65} = \frac{-4}{5}$

b. $\frac{-6}{13} \times \frac{65}{-75} = \frac{-6 \times 65}{13 \times (-75)} = \frac{2}{5}$

c. $2\frac{4}{9} \times 2\frac{3}{5} = \frac{9 \times 2 + 4}{9} \times \frac{5 \times 2 + 3}{5}$
 $= \frac{22}{9} \times \frac{13}{5} = \frac{22 \times 13}{9 \times 5} = 6\frac{16}{45}$

12. a. $\frac{63}{100} \div \frac{9}{-25} = \frac{63}{100} \times \frac{-25}{9} = \frac{63 \times (-25)}{100 \times 9} = \frac{-7}{4}$

b. $\frac{13}{-25} \div \frac{26}{75} = \frac{13}{-25} \times \frac{75}{26} = \frac{13 \times 75}{(-25) \times 26} = 1\frac{1}{2}$

c. $\frac{-5}{13} \div \frac{25}{39} = \frac{-5}{13} \times \frac{39}{25} = \frac{-5 \times 39}{13 \times 25} = \frac{-3}{5}$

13. a. $\frac{-3}{10} + \frac{-5}{18} + \frac{-6}{20} + (-3)$
 $= \frac{-3 \times 18 + (-5) \times 10 + -6 \times 9 + (-3) \times 180}{180}$
 $= \frac{-54 - 50 - 54 - 540}{180} = -3\frac{79}{90}$

$$b. \frac{6}{7} + \frac{-2}{5} + \frac{-5}{21} + \frac{4}{15}$$

$$= \frac{15 \times 6 + (-2) \times 21 + (-6) \times 5 + 4 \times 7}{105} = \frac{17}{35}$$

$$14. a. \frac{-4}{5} \times \frac{-10}{16} \times \frac{-32}{13} \times \frac{39}{-16}$$

$$= \frac{-4 \times (-10) \times (-32) \times 39}{5 \times 16 \times 13 \times (-16)} = 3$$

$$b. \left(\frac{-4}{9}\right)^{-1} \times \left(\frac{15}{16}\right)^{-1} \times \frac{-3}{5} = \frac{9}{-4} \times \frac{16}{15} \times \frac{-3}{5}$$

$$= \frac{9 \times 16 \times (-3)}{-4 \times 15 \times 5} = 1\frac{11}{25}$$

$$15. a. \frac{-3}{5} \times \frac{2}{2} = \frac{-6}{10} = -0.6$$

$$b. \frac{15}{8} = \frac{15}{8} \times \frac{25}{25} = \frac{375}{200} = 1.875$$

$$c. \frac{10}{3} = 3.33$$

$$d. \frac{66}{15} = 4.4$$

16. Let the number be x

$$\frac{-3}{17} - x = \left(\frac{-5}{34}\right)$$

$$x = \frac{-3}{17} + \frac{5}{34}$$

$$x = \frac{-6 + 5}{34} = \frac{-1}{34}$$

Hence, the number is $\frac{-1}{34}$

Multiple Choice Questions (MCQs)

1. (d) 2. (c) 3. (d) 4. (c) 5. (a)

CHAPTER 10: EXPONENTS (POWER)

Assessment Time 10.1

1. a. 3, 7 b. -5, 8 c. $\left(\frac{5}{7}\right)^2$ d. Positive

2. a. $5 \times 5 \times 5 \times 5 \times 5 = (5)^5 = 5^5$

b. $(-6) \times (-6) \times (-6) \times (-6) = (-6)^4$

c. $\left(\frac{-3}{7}\right) \times \left(\frac{-3}{7}\right) \times \left(\frac{-3}{7}\right) \times \left(\frac{-3}{7}\right) = \left(\frac{-3}{7}\right)^4$

d. $\frac{6}{7} \times \frac{6}{7} \times \frac{6}{7} \times \frac{6}{7} \times \frac{6}{7} \times \frac{6}{7} = \left(\frac{6}{7}\right)^6$

3. a. $\left(\frac{-2}{7}\right)^3 = \left(\frac{-2}{7}\right) \times \left(\frac{-2}{7}\right) \times \left(\frac{-2}{7}\right) = \left(\frac{-8}{343}\right)$

b. $\left(\frac{6}{5}\right)^4 = \left(\frac{6}{5}\right) \times \left(\frac{6}{5}\right) \times \left(\frac{6}{5}\right) \times \left(\frac{6}{5}\right) = \left(\frac{1296}{625}\right)$

c. $\left(\frac{-5}{13}\right)^5 = \left(\frac{-5}{13}\right) \times \left(\frac{-5}{13}\right) \times \left(\frac{-5}{13}\right) \times \left(\frac{-5}{13}\right) \times \left(\frac{-5}{13}\right) = \left(\frac{-3125}{371293}\right)$

$$d. \left(\frac{-13}{17}\right)^3 = \left(\frac{-13}{17}\right) \times \left(\frac{-13}{17}\right) \times \left(\frac{-13}{17}\right) = \left(\frac{-2197}{4913}\right)$$

$$4. \quad a. \quad \frac{-32}{243} = \frac{-2 \times -2 \times -2 \times -2 \times -2}{3 \times 3 \times 3 \times 3 \times 3} = \left(\frac{-2}{3}\right)^5$$

2	32
2	16
2	8
2	4
2	2
	1

3	243
3	81
3	27
3	9
3	3
	1

$$b. \quad \frac{-27}{512} = \frac{(-3) \times (-3) \times (-3)}{8 \times 8 \times 8} = \left(\frac{-3}{8}\right)^3$$

3	27
3	9
3	3
	1

8	512
8	64
8	8
	1

$$c. \quad \frac{225}{289} = \frac{15 \times 15}{17 \times 17} = \left(\frac{15}{17}\right)^2$$

15	225
15	15
	1

17	289
17	17
	1

$$d. \quad \frac{1331}{-4096} = \frac{11 \times 11 \times 11}{(-16) \times (-16) \times (-16)} = \left(\frac{11}{-16}\right)^3$$

11	1331
11	121
11	11
	1

16	4096
16	256
16	16
	1

$$5. \quad a. \quad 2^{10} = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 1024$$

$$10^2 = 10 \times 10 = 100$$

$$1024 > 100$$

$$\text{So, } 2^{10} > 10^2$$

$$b. \quad 5^3 = 5 \times 5 \times 5 = 125$$

$$3^5 = 3 \times 3 \times 3 \times 3 \times 3 = 243$$

$$125 < 243$$

$$5^3 < 3^5$$

$$c. \quad 7^3 = 7 \times 7 \times 7$$

$$3^7 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 2187$$

$$343 < 2187$$

$$7^3 < 3^7$$

$$d. \quad 3^{10} \text{ or } 10^3$$

$$3^{10} = 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 59049$$

$$10^3 = 10 \times 10 \times 10 = 1000$$

$$59049 > 1000$$

$$3^{10} > 10^3$$

6. a. $7^2 \times (-3)^4 = 49 \times 81 = 3969$

b. $(-7)^3 \times 5^4 = (-7) \times (-7) \times (-7) \times 5 \times 5 \times 5 \times 5 = -214,375$

c. $\left(\frac{-1}{2}\right)^6 \times 3^2 \times \left(\frac{2}{3}\right)^6$

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

$$= \frac{1}{64} \times 9 \times \frac{64}{729} = \frac{9}{729} = \frac{3}{243} = \frac{1}{81}$$

d. $(8^2 - 7^2) \div \frac{15}{17} = (64 - 49) \div \frac{15}{17}$

$$= 15 \div \frac{15}{17} = 15 \times \frac{17}{15} = 17$$

Critical Thinking Skill

$$\left(\frac{-1}{2}\right)^6 \times \left(\frac{3}{-4}\right)^2 \times 2^4$$

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

$$= \frac{1}{64} \times \frac{9}{16} \times 16 = \frac{9}{64}$$

Assessment Time 10.2

1. a. $3^8 \times 3^4 = 3^{(8+4)} = 3^{12}$

b. $\left(\frac{5}{7}\right)^6 \times \left(\frac{5}{7}\right)^3 = \left(\frac{5}{7}\right)^{6+3} = \left(\frac{5}{7}\right)^9$

c. $\left(\frac{3}{4}\right)^8 \div \left(\frac{3}{4}\right)^7 = \left(\frac{3}{4}\right)^{8-7} = \frac{3}{4}$

d. $\left\{\left(\frac{5}{17}\right)^2\right\}^6 = \left(\frac{5}{17}\right)^{2 \times 6} = \left(\frac{5}{17}\right)^{12}$

2. a. $2^4 \times 2^6 \times 2^{-3} = 2^{(4+6-3)} = 2^{10-3} = 2^7$

b. $4^3 \times 4^7 \times 4^5 = 4^{(3+7+5)} = 4^{15}$

c. $\left(\frac{13}{7}\right)^6 \times \left(\frac{13}{7}\right)^{-2} \times \left(\frac{13}{7}\right)^7 = \left(\frac{13}{7}\right)^{(6-2+7)} = \left(\frac{13}{7}\right)^{4+7} = \left(\frac{13}{7}\right)^{11}$

d. $\left(\frac{3}{7}\right)^7 \div \left(\frac{3}{7}\right)^4 = \left(\frac{3}{7}\right)^{7-4} = \left(\frac{3}{7}\right)^3$

3. a. $16 \times 16 \times 16 \times 16 \times 16 = 16^5$

$$16 = 2 \times 2 \times 2 \times 2$$

$$\text{So, } 16^5 = (2^4)^5 = 2^{20}$$

(Using $(a^m)^n = a^{mn}$)

b. $27 \times 27 \times 27 \times 27 \times 27 \times 27 = (27)^6$

$$27 = 3 \times 3 \times 3 = 3^3$$

$$\text{So, } (27)^6 = (3^3)^6 = 3^{18}$$

c. $64 \times 64 \times 64 \times 64 = (64)^4$

$$64 = 4 \times 4 \times 4 = 4^3$$

$$\text{So, } (64)^4 = (4^3)^4 = 4^{12}$$

d. $49 \times 49 \times 49 \times 49 \times 49 = (49)^5$

$$49 = 7 \times 7 = 7^2$$

$$\text{So, } (49)^5 = (7^2)^5 = 7^{10}$$

4. a. $4^0 - 6^0 + 5^0 = 1 - 1 + 1 = 1$ b. $3^0 + 5^0 + 6^0 = 1 + 1 + 1 = 3$
 c. $(9^0 + 7^0)(4^0 - 6^0) = (1+1)(1-1) = 1 \times 0 = 0$
 d. $(5^0 + 4^0) + (6^0 + 7^0) = (1 + 1) + (1 + 1) = 2 + 2 = 4$
5. a. $\left(\frac{15}{8}\right)^{-1} \times \left(\frac{16}{25}\right)^{-1} = \frac{8}{15} \times \frac{25}{16} = \frac{5}{3 \times 2} \quad \left(a^{-1} = \frac{1}{a}\right)$
 $= \frac{5}{6}$
 b. $\left(\frac{12}{13}\right)^{-2} \times \left(\frac{26}{72}\right)^{-1} = \left(\frac{13}{12}\right)^2 \times \left(\frac{72}{26}\right) \quad \left(a^{-1} = \frac{1}{a}\right)$
 $= \frac{13 \times 13}{12 \times 12} \times \frac{72}{26} = \frac{13}{4}$
 c. $(3 + 7)^{-1} - (5 + 4)^{-1} = (10)^{-1} - (9)^{-1} \quad \left(a^{-1} = \frac{1}{a}\right)$
 $= \frac{1}{10} - \frac{1}{9} = \frac{9-10}{90} = \frac{-1}{90}$
 d. $(-5)^{-1} \times \left(\frac{1}{5}\right)^{-1} = \frac{1}{-5} \times 5 = -1 \quad \left(a^{-1} = \frac{1}{a}\right)$
6. a. $\frac{(-4) \times (-4)}{7 \times 7} \times \frac{(-1) \times (-1) \times (-1)}{4 \times 4 \times 4} \times 7 \times 7 \times 7 \times 1 \times \frac{25}{14}$
 $= 16 \times \left(\frac{-1}{64}\right) \times 7 \times \frac{25}{14} = \frac{-25}{8}$
 b. $\left(\frac{5}{8}\right)^{-3} \times \left(\frac{3}{4}\right)^2 \times 9^{-2} \times \left(\frac{-16}{25}\right)^{-2} = \left(\frac{8}{5}\right)^3 \times \left(\frac{3}{4}\right)^2 \times \left(\frac{1}{9}\right)^2 \times \left(\frac{25}{16}\right)^2$
 $= \frac{8 \times 8 \times 8}{5 \times 5 \times 5} \times \frac{3 \times 3}{4 \times 4} \times \frac{1 \times 1}{9 \times 9} \times \frac{25 \times 25}{16 \times 16}$
 $= \frac{5}{72}$
7. a. $\frac{12^4 \times 9^2 \times 4}{6^4 \times 8^3 \times 27} = \frac{12 \times 12 \times 12 \times 12 \times 9 \times 9 \times 4}{6 \times 6 \times 6 \times 6 \times 8 \times 8 \times 8 \times 27}$
 $= \frac{2 \times 2 \times 3 \times 3 \times 4}{2 \times 2 \times 2 \times 8} = \frac{9}{4}$
 b. $\frac{5^4 \times 3^8 \times a^3}{5^2 \times 6^4 \times a^6} = \frac{5 \times 5 \times 5 \times 5 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times a \times a \times a}{5 \times 5 \times 6 \times 6 \times 6 \times 6 \times a \times a \times a \times a \times a \times a}$
 $= \frac{2025 \times a^{-3}}{16}$
 c. $\frac{9^2 \times 16^2 \times b^5}{6^4 \times 8^3 \times b^2} = \frac{9 \times 9 \times 16 \times 16 \times b \times b \times b \times b \times b}{6 \times 6 \times 6 \times 6 \times 8 \times 8 \times 8 \times b \times b}$
 $= \frac{b^3}{32}$
 d. $\frac{15^3 \times 7^3 \times c^9}{5^4 \times (21)^2 \times c^2} = \frac{15 \times 15 \times 15 \times 7 \times 7 \times 7 \times c \times c \times c \times c \times c \times c \times c \times c \times c}{5 \times 5 \times 5 \times 5 \times 21 \times 21 \times c \times c}$
 $= \frac{21c^5}{5}$
8. $\left(\frac{3}{14}\right)^{-2} \times \left(\frac{3}{14}\right)^{-5} = \left(\frac{3}{14}\right)^{-2x}$

$$\left(\frac{3}{14}\right)^{-2+(-5)} = \left(\frac{3}{14}\right)^{-2x}$$

On comparing exponents of both sides, we get

$$-2 + (-5) = -2x$$

$$-7 = -2x$$

$$x = \frac{-7}{-2} = \frac{7}{2}$$

$$\begin{aligned} 9. \quad \left(\frac{4}{15}\right)^4 \times \left(\frac{4}{15}\right)^{-10} &= \left(\frac{4}{15}\right)^{5m-1} \\ &= \left(\frac{4}{15}\right)^{4+(-10)} = \left(\frac{4}{15}\right)^{5m-1} \end{aligned}$$

On comparing exponents of both sides, we get

$$4 + (-10) = 5m - 1$$

$$-6 = 5m - 1$$

$$-6 + 1 = 5m$$

$$-5 = 5m$$

$$m = \frac{-5}{5} = -1$$

10. Let the required number be $\frac{x}{y}$

$$\begin{aligned} \left(\frac{6}{7}\right)^{-4} \times \frac{x}{y} &= \left(\frac{6}{7}\right)^8 \\ \frac{x}{y} &= \left(\frac{6}{7}\right)^8 \div \left(\frac{6}{7}\right)^{-4} \\ \frac{x}{y} &= \left(\frac{6}{7}\right)^{8-(-4)} \\ \frac{x}{y} &= \left(\frac{6}{7}\right)^{8+4} \\ \frac{x}{y} &= \left(\frac{6}{7}\right)^{12} \end{aligned}$$

Hence, required number is $\left(\frac{6}{7}\right)^{12}$.

Critical Thinking Skills

$$\begin{aligned} \frac{m}{n} &= \left(\frac{5}{4}\right)^{-3} \div \left(\frac{4}{5}\right)^2 \\ &= \left(\frac{5}{4}\right)^{-3} \times \left(\frac{5}{4}\right)^2 \\ \frac{m}{n} &= \left(\frac{4}{5}\right) \\ &= \left(\frac{5}{4}\right)^{-3+2} = \left(\frac{5}{4}\right)^{-1} = \left(\frac{4}{5}\right) \\ \left(\frac{m}{n}\right)^{-2} &= \left(\frac{4}{5}\right)^{-2} \\ &= \left(\frac{5}{4}\right)^2 = \frac{25}{16} \end{aligned}$$

Assessment Time 10.3

1. a. $672000000 = 6.72 \times 10^8$
(Since, decimal point is shifted by eight places to the left)
 - b. $517800000 = 5.178 \times 10^8$
(Since, decimal point is shifted by eight places to the left)
 - c. $37400000 = 3.74 \times 10^7$
(Since, decimal point is shifted by seven places to the left)
 - d. $0.000063 = 6.3 \times 10^{-5}$
(Since decimal point is shifted by five places to the right.)
 - e. $0.00000372 = 3.72 \times 10^{-6}$
(Since, decimal point is shifted by six places to the right)
 - f. $0.00000917 = 9.17 \times 10^{-6}$
(Since, decimal point is shifted by six place to the right)
 - g. $0.00000012 = 1.2 \times 10^{-7}$
(Since, decimal point is shifted by seven to the right)
 - h. $0.000008497 = 8.497 \times 10^{-6}$
(Since, decimal point is shifted by six place to the right)
2. a. $5.7 \times 10^4 = 57000$
 - b. $6.727 \times 10^6 = 6727000$
 - c. $3.72 \times 10^5 = 372000$
 - d. $9.762 \times 10^8 = 976200000$
 - e. $9.1 \times 10^{-3} = 0.0091$
 - f. $6.72 \times 10^{-5} = 0.0000672$
 - g. $1.42 \times 10^{-8} = 0.0000000142$
 - h. $6.72 \times 10^{-6} = 0.00000672$

Mental Math

1. $\frac{-125}{343}$
2. $\frac{-5}{7}$
3. $\frac{-17}{8}$
4. 1 5. 8.26×10^{-6}

Revision Time

1. a. $7 \times 7 \times 7 \times 7 \times 7 \times 7 \times 7 \times 7 = 7^8$
 - b. $(-3) \times (-3) \times (-3) \times (-3) \times (-3) = (-3)^5$
 - c. $4 \times 4 \times 4 \times 4 \times a \times a \times a \times a \times a = 4^4 \times a^5$
 - d. $5 \times 5 \times 5 \times b \times b \times b \times c \times c \times c \times c = 5^3 \times b^3 \times c^4$
2. a. $(-5)^4 = (-5) \times (-5) \times (-5) \times (-5) = 625$
 - b. $(-8)^5 = (-8) \times (-8) \times (-8) \times (-8) \times (-8)$
 $= -32,768$
 - c. $\left(\frac{-6}{11}\right)^3 = \frac{-6 \times -6 \times -6}{11 \times 11 \times 11} = \frac{-216}{1331}$
 - d. $\left(\frac{-13}{17}\right)^4 = \frac{(-13) \times (-13) \times (-13) \times (-13)}{17 \times 17 \times 17 \times 17} = \frac{28561}{83521}$

3. a. $\frac{-16}{2401}$
 $16 = 2 \times 2 \times 2 \times 2$
 $2401 = 7 \times 7 \times 7 \times 7$
 $\frac{-16}{2401} = -\left(\frac{2}{7}\right)^4$

2	16
2	8
2	4
2	2
	1

7	2401
7	343
7	49
7	7
	1

b. $\frac{32}{-3125}$
 $32 = 2 \times 2 \times 2 \times 2 \times 2$
 $-3125 = 5 \times 5 \times 5 \times 5 \times 5$
 $\frac{32}{-3125} = \left(\frac{2}{5}\right)^5 = \left(\frac{-2}{5}\right)^5$

2	32
2	16
2	8
2	4
2	2
	1

5	3125
5	625
5	125
5	25
5	5
	1

c. $\frac{-27}{2744}$
 $\frac{-27}{2744} = \frac{(-3) \times (-3) \times (-3)}{14 \times 14 \times 14}$
 $= \left(\frac{-3}{14}\right)^3$

3	27
3	9
3	3
	1

14	2744
14	196
14	14
	1

d. $\frac{1331}{4096}$
 $\frac{1331}{4096} = \frac{11 \times 11 \times 11}{16 \times 16 \times 16} = \left(\frac{11}{16}\right)^3$

11	1331
11	121
11	11
	1

16	4096
16	256
16	16
	1

4. a. $3^5 = 3 \times 3 \times 3 \times 3 \times 3 = 243$
 $5^3 = 5 \times 5 \times 5 = 125$
 $243 > 125$
 $3^5 > 5^3$

b. $7^2 = 7 \times 7 = 49$
 $2^7 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 128$
 $49 < 128$
 $7^2 < 2^7$

c. $10^4 = 10 \times 10 \times 10 \times 10 = 10000$
 $4^{10} = 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 = 1048576$
 $10000 < 1048576$
 $10^4 < 4^{10}$

5. a. $4 \times 10^2 \times 3^4 = 4 \times 100 \times 81 = 32400$

b. $\left(\frac{-4}{3}\right)^2 \times (-3)^4 \times \left(\frac{5}{16}\right)^2 = \left(\frac{-4}{3}\right) \times \left(\frac{-4}{3}\right) \times (-3) \times (-3) \times (-3) \times (-3) \times \left(\frac{5}{16}\right) \times \left(\frac{5}{16}\right)$
 $= \frac{-9}{250}$

c. $\left(\frac{-2}{5}\right)^3 \times \left(\frac{-5}{4}\right)^2 \times \left(\frac{3}{5}\right)^2 = \left(\frac{-2}{5}\right) \times \left(\frac{-2}{5}\right) \times \left(\frac{-2}{5}\right) \times \left(\frac{-5}{4}\right) \times \left(\frac{-5}{4}\right) \times \left(\frac{3}{5}\right) \times \left(\frac{3}{5}\right)$
 $= \frac{225}{16}$

6. a. $\left(\frac{3}{4}\right)^2 \times \left(\frac{3}{4}\right)^6 \times \left(\frac{3}{4}\right)^4 = \left(\frac{3}{4}\right)^{2+6+4} = \left(\frac{3}{4}\right)^{12}$

- b. $\left(\frac{-6}{7}\right)^8 \times \left(\frac{-6}{7}\right)^3 \times \left(\frac{-6}{7}\right)^0 = \left(\frac{-6}{7}\right)^{8+3} = \left(\frac{-6}{7}\right)^{11}$
- c. $\left(\frac{-4}{9}\right)^6 \div \left(\frac{-4}{9}\right)^3 = \left(\frac{-4}{9}\right)^{6-3} = \left(\frac{-4}{9}\right)^3$
- d. $\left\{\left(\frac{-3}{4}\right)^2\right\}^2 \div \left(\frac{-3}{4}\right)^4 = \left(\frac{-3}{4}\right)^4 \div \left(\frac{-3}{4}\right)^4$
 $= \left(\frac{-3}{4}\right)^{4-4} = \left(\frac{-3}{4}\right)^0 = 1$
7. a. $(5^0 - 6^0) + (3^0 + 4^0) = (1 - 1)(1 + 1) = 2$
- b. $(6^{-1} - 8^{-1}) + (4^{-1} + 5^{-1}) = \left(\frac{1}{6} - \frac{1}{8}\right) + \left(\frac{1}{4} + \frac{1}{5}\right)$
 $= \left(\frac{8-6}{48}\right) + \left(\frac{5+4}{20}\right) = \frac{2}{48} + \frac{9}{20}$
 $= \frac{10 + 108}{240} = \frac{118}{240}$
- c. $(7^{-1} - 8^{-1})^{-1} = \left(\frac{1}{7} - \frac{1}{8}\right)^{-1} = \left(\frac{8-7}{56}\right)^{-1} = \left(\frac{1}{56}\right)^{-1} = 56$
- d. $\{(4^{-1} - 8^{-1})^{-1}\}^{-1} = \left\{\left(\frac{1}{4} - \frac{1}{8}\right)^{-1}\right\}^{-1} = \left(\frac{2-1}{8}\right)^{(-1) \times (-1)} = \left(\frac{1}{8}\right)^1 = \frac{1}{8}$
8. a. $\left(\frac{-2}{7}\right)^{-6} \div \left(\frac{-2}{7}\right)^{-4} = \left(\frac{-2}{7}\right)^{-6+4} = \left(\frac{-2}{7}\right)^{-2}$
- b. $\left\{\left(\frac{5}{9}\right)^3 \div \left(\frac{5}{9}\right)^{-8}\right\} = \left(\frac{5}{9}\right)^{3-(-8)} = \left(\frac{5}{9}\right)^{3+8} = \left(\frac{5}{9}\right)^{11}$
- c. $\frac{6^7 \times 6^8}{6^{20}} = \frac{6^{7+8}}{6^{20}} = \frac{6^{15}}{6^{20}} = 6^{15-20} = 6^{-5}$
- d. $\frac{5^4 \times 5^3 \times 3^8}{5^5 \times 5^8} = \frac{5^{4+3} \times 3^8}{5^{5+8}} = 5^{7-13} \times 3^8 = 5^{-6} \times 3^8 = \frac{3^8}{5^6}$
9. a. $\left(\frac{-3}{7}\right)^2 \times \left(\frac{14}{27}\right)^3 \times \left(\frac{-9}{14}\right)^2 \times \left(\frac{5}{12}\right)^{-1} \times 5^0$
 $= \frac{-3}{7} \times \frac{-3}{7} \times \frac{14}{27} \times \frac{14}{27} \times \frac{14}{27} \times \frac{-9}{14} \times \frac{-9}{14} \times \frac{12}{5} \times 1$
 $= \frac{8}{315}$
- b. $\left(\frac{3}{7}\right)^{-1} \times \left(\frac{17}{27}\right)^{-1} \times \left(\frac{8}{9}\right)^2 \times \left(\frac{-9}{16}\right)^3$
 $= \frac{7}{3} \times \frac{27}{17} \times \frac{8}{9} \times \frac{8}{9} \times \frac{-9}{16} \times \frac{-9}{16} \times \frac{-9}{16} = \frac{81}{64}$
10. a. $\frac{3^7 \times 10^6 \times 2^5}{6^4 \times 5^8 \times 15}$
 $= \frac{3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 2 \times 2 \times 2 \times 2 \times 2}{6 \times 6 \times 6 \times 6 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 15}$
 $= \frac{576}{125}$
- b. $\frac{4^7 \times 5^6 \times a^8}{(16)^2 \times (10)^5 \times a^3} = \frac{4^7 \times 5^6 \times a^8}{(4^2)^2 \times (2 \times 5)^5 \times a^3} = 10a^5$

11. a. $\left(\frac{3}{5}\right)^5 \times \left(\frac{3}{5}\right)^{-8} = \left(\frac{3}{5}\right)^{-3x}$ On comparing the exponents we get

$$5 + (-8) = -3x$$

$$-x = -3x$$

$$x = \frac{-3}{-3} = 1$$

b. $\left(\frac{4}{5}\right)^{-12} \div \left(\frac{4}{5}\right)^{-3} = \left(\frac{4}{5}\right)^{2x-1}$ On comparing the exponents we get

$$-12 - (-3) = 2x - 1$$

$$-12 + 3 = 2x - 1$$

$$-9 = 2x - 1$$

$$-9 + 1 = 2x$$

$$-8 = 2x$$

$$x = \frac{-8}{2} = -4$$

12. Let the number be $\frac{x}{y}$

$$\left(\frac{-4}{5}\right)^2 \div \frac{x}{y} = \left(\frac{-5}{16}\right)^{-2}$$

$$\left(\frac{-4}{5}\right)^2 \times \left(\frac{y}{x}\right) = \left(\frac{-5}{16}\right)^{-2}$$

$$\frac{y}{x} = \left(\frac{-5}{16}\right)^{-2} \div \left(\frac{-4}{5}\right)^2 = \left(\frac{16}{-5}\right)^2 \times \left(\frac{-5}{4}\right)^2$$

$$= \frac{16 \times 16}{5 \times 5} \times \frac{5 \times 5}{4 \times 4} = 16$$

$$\frac{y}{x} = \frac{1}{16}$$

13. $\left(\frac{-5}{13}\right)^{-8} \times \frac{x}{y} = \left(\frac{-5}{13}\right)^{-4}$

$$\frac{x}{y} = \left(\frac{-5}{13}\right)^{-4} \div \left(\frac{-5}{13}\right)^{-8}$$

$$= \left(\frac{-5}{13}\right)^{-4-(-8)} = \left(\frac{-5}{13}\right)^{-4+8}$$

$$= \left(\frac{-5}{13}\right)^4$$

14. $4.8 \times 10^5 = 480000 \text{ km}$

15. $152000000 = 1.52 \times 10^8 \text{ km}$

Multiple Choice Questions

1. (b) 2. (d) 3. (b) 4. (d) 5. (c)

CHAPTER-11: VISUALISING SOLID SHAPES (3-D SHAPES)

Assessment Time 11.1

- An object that occupies space is called a **3-D shape**.
 - A cuboid has **6** faces and **8** vertices.
 - A cylinder has **2** flat faces and **1** curved face.
 - A sphere has only **one** surface.
 - Base of square pyramid is **square**.
 - A cone has **2** face and **1** edge.
- (T)
 - (F)
 - (F)
 - (T)
 - (F)
 - (T)
- Do yourself
- (ii)
 - (i)
 - (iv)
 - (iii)
- Do yourself

Assessment Time 11.2 (Do yourself)

Revision Time (Do yourself)

Mental Zone

- A **cuboid** is bounded by six rectangular faces.
- All edges of a **cube** are equal.
- A cone has **one** edge.
- A square pyramid has **four** lateral triangular faces.
- A triangular pyramid has **three** edges.

Multiple Choice Questions

- (b)
- (c)
- (c)
- (b)
- (c)

CHAPTER-12 PERIMETER AND AREA

Assessment Time 12.1

- Base (BC) = 6 cm, Height (AD) = 5 cm

 - $$\begin{aligned} \text{Area of } \triangle ABC &= \frac{1}{2} \times \text{base} \times \text{height} \\ &= \frac{1}{2} \times 6 \times 5 = 15 \text{ cm}^2 \end{aligned}$$
 - Base (QR) = 4 cm, Height (PQ) = 7 cm

$$\begin{aligned} \text{Area of } \triangle PQR &= \frac{1}{2} \times \text{base} \times \text{height} \\ &= \frac{1}{2} \times 4 \times 7 = 14 \text{ cm}^2 \end{aligned}$$
 - Base (MP) = 8 cm, Height (NP) = 3

$$\begin{aligned} \text{Area of } \triangle PNM &= \frac{1}{2} \times \text{base} \times \text{height} \\ &= \frac{1}{2} \times 8 \times 3 = 4 \times 3 = 12 \text{ cm}^2 \end{aligned}$$

2. Area of triangle = 180 cm^2

Base = 12 cm, Altitude/height = x

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$180 = \frac{1}{2} \times 12 \times x$$

$$x = \frac{180 \times 2}{12} = 30 \text{ cm}$$

Hence, the altitude is 30 cm.

3. Area of triangle = 36 cm^2

Altitude/height = 9 cm = 0.09 m

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$36 = \frac{1}{2} \times \text{base} \times 0.09$$

$$\text{Base} = \frac{36 \times 2}{0.09} = 800 \text{ m}$$

Hence, the base is 800 m

4. Let the base be $4x$ and the altitude be $9x$.

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$= 224 \text{ dm}^2 = \frac{1}{2} \times 4x \times 7x$$

$$224 \text{ dm}^2 = \frac{28x^2}{2}$$

$$224 \text{ dm}^2 = 14x^2$$

$$x^2 = \frac{224}{14} = 16$$

$$x^2 = (4)^2$$

$$x = 4 \text{ dm}$$

Base = $4x = 4 \times 4 = \text{dm} = 16 \text{ dm}$

Altitude = $7x = 7 \times 4 \text{ dm} = 28 \text{ dm}$

5. Area of $\triangle PQR = \frac{1}{2} \times PR \times QS$

$$\text{Area of } \triangle PQR = \frac{1}{2} \times 7 \times 4 = 14 \text{ cm}^2$$

$$\text{Area of } \triangle PQR = \frac{1}{2} \times PQ \times RM$$

$$14 \text{ cm}^2 = \frac{1}{2} \times 6 \times RM$$

$$RM = \frac{14 \times 2}{6} = \frac{26}{6} = 4.67 \text{ cm}$$

6. Area of $\triangle PQR = \frac{1}{2} \times \text{base} \times \text{height}$

$$= \frac{1}{2} \times QR \times PS$$

$$= \frac{1}{2} \times 5 \times 4 = 10 \text{ cm}^2$$

$$\text{Area of } \triangle PQR = \frac{1}{2} \times PR \times QM$$

$$10 = \frac{1}{2} \times 8 \times QM$$

$$QM = \frac{10 \times 2}{8} = 2.5$$

7. In $\triangle ABC$, by Pythagorus theorem, we have

$$(AC)^2 = (AB)^2 + (BC)^2$$

$$(26)^2 = (10)^2 + x^2$$

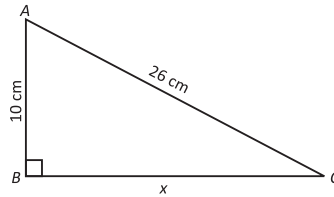
$$576 = 100 + x^2$$

$$x^2 = 676 - 100$$

$$x = \sqrt{576} = 24 \text{ cm}$$

$$\text{Area} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{2} \times 10 \times 24 = 120 \text{ cm}^2$$



Hence, the area of right angled triangle is 120 cm^2 .

8. Area of triangle = $\frac{1}{2} \times \text{base} \times \text{height}$

$$= \frac{1}{2} \times 14 \times 14 = 98 \text{ cm}^2$$

Hence, the are of triangle is 98 cm^2 .

Critical Thinking Skills

$$\text{Area of triangular field} = \frac{337.50}{25}$$

$$= 13.5 \text{ hectare} = 1,35,000 \text{ m}^2$$

Altitude = x , Base = $3x$

$$\text{Area of triangular field} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$135000 = \frac{1}{2} \times x \times 3x$$

$$2 \times 135000 = 3x^2$$

$$270000 = 3x^2$$

$$\frac{270000}{3} = x^2$$

$$90000 = x^2$$

$$x = \sqrt{90000} = 300 \text{ m}$$

Altitude = 300 m base = $3x = 3 \times 300 = 900 \text{ m}$

Assessment Time 12.2

1. a. Circumference of a circle $= 2\pi r$

$$= 2 \times \frac{22}{7} \times 7 = 44 \text{ cm}$$

b. Circumference of a circle $= 2\pi r$

$$= 2 \times \frac{22}{7} \times 10.5 = 66 \text{ cm}$$

c. Circumference of a circle $= 2\pi r$

$$= 2 \times \frac{22}{7} \times 28 = 22 \times 8 = 176 \text{ cm}$$

d. Circumference of a circle $= 2\pi r$

$$= 2 \times \frac{22}{7} \times 35 = 44 \times 5 = 220 \text{ cm}$$
2. a. Radius $= \frac{\text{Diameter}}{2} = \frac{21}{2} \text{ cm}$
Circumference of a circle $= 2\pi r$

$$= 2 \times \frac{22}{7} \times \frac{21}{2} = 66 \text{ cm}$$

b. Radius $= \frac{\text{Diameter}}{2} = \frac{56}{2} \text{ cm} = 28 \text{ cm}$
Circumference of a circle $= 2\pi r$

$$= 2 \times \frac{22}{7} \times 28 = 176 \text{ cm}$$

c. Radius $= \frac{\text{Diameter}}{2} = \frac{84}{2} \text{ cm} = 42 \text{ cm}$
Circumference of a circle $= 2\pi r$

$$= 2 \times \frac{22}{7} \times 42 = 264 \text{ dm}$$

d. Radius $= \frac{\text{Diameter}}{2} = \frac{105}{2} \text{ mm}$
Circumference of a circle $= 2\pi r$

$$= 2 \times \frac{22}{7} \times \frac{105}{2} = 330 \text{ mm}$$
3. a. Circumference of a circle $= 2\pi r$

$$2.64 = 2 \times \frac{22}{7} \times r$$

$$r = \frac{2.64 \times 7}{44} = 0.42 \text{ m}$$

b. Circumference of a circle $= 2\pi r$

$$46.2 \text{ cm} = 2 \times \frac{22}{7} \times r$$

$$r = \frac{46.2 \times 7}{44} = 7.35 \text{ cm}$$

c. Circumference of a circle $= 2\pi r$

$$63.8 = 2 \times \frac{22}{7} \times r$$

$$r = \frac{63.8 \times 7}{44} = 10.15 \text{ m}$$

d. Circumference of a circle = $2\pi r$

$$123.2 = 2 \times \frac{22}{7} \times r$$

$$r = \frac{123.2 \times 7}{44} = 19.6 \text{ cm}$$

4. Radius = 112 m

Circumference of a circle = $2\pi r$

$$= 2 \times \frac{22}{7} \times 112 = 704 \text{ m}$$

Total length = $2 \times \text{circumference}$

$$= 2 \times 704 = 1408 \text{ m}$$

Cost = Total length $\times$ Rate per metre

$$= 1408 \text{ m} \times 6.80 = 9574.40$$

The cost of fencing the circular park with the twice is 9574.40.

5. Ratio of radii of circles = 7 : 11

Then, radius of first circle be $(7x)$ units and radius of second circle be $(11x)$ units.

Ratio of their circumference = $2\pi r_1, 2\pi r_2$

$$\frac{2\pi r_1}{2\pi r_2} = \frac{r_1}{r_2} = \frac{7x}{11x} = \frac{7}{11} = 7 : 11$$

6. Ratio of circumference of a circle = 13 : 17

$$2\pi r_1 : 2\pi r_2 = \frac{13}{17}$$

$$\frac{2\pi r_1}{2\pi r_2} = \frac{13}{17}$$

Hence, the ratio of their radius 13 : 17

7. Circumference of a circle = $2\pi r$

$$= 2 \times \frac{22}{7} \times 49 = 308 \text{ cm}$$

Total distance = $308 \times 400 = 123200 \text{ cm}$

$$\text{or } \frac{123200}{100} \text{ cm} = 1232 \text{ m}$$

8. 11 km = $11 \times 1000 = 11000 \text{ m}$

$$\text{Circumference} = \frac{\text{Total Distance}}{\text{Number of revolution}}$$

$$= \frac{1100000}{5000} = 220 \text{ cm}$$

Circumference of a circle = $2\pi r$

$$220 = 2 \times \frac{22}{7} \times r$$

$$r = \frac{7 \times 220}{2 \times 22} = 35 \text{ cm}$$

$$\text{Diameter} = 2 \times r = 2 \times 35 \text{ cm} = 70$$

9. Radius = $\frac{\text{Diameter}}{2} = \frac{28}{2} = 14 \text{ cm}$

$$\begin{aligned}\text{Half the circumference of a circle} &= \frac{1}{2} \times 2\pi r \\ &= \frac{1}{2} \times 2 \times \frac{22}{7} \times 14 = 44 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Perimeter} &= \text{Curved length} + \text{Diameter} \\ &= 44 \text{ cm} + 28 \text{ cm} = 72 \text{ cm}\end{aligned}$$

Hence, the perimeter of each semi – circular part is 72 cm.

SDG-Climate Action

Let outer radius be R m

$$\text{Outer circumference} = 880 \text{ m}$$

$$2\pi R = 880$$

$$\Rightarrow R = \frac{880 \times 7}{2 \times 22} = 140 \text{ m}$$

$$\begin{aligned}\therefore \text{Inner radius} &= 140 - 8.75 \\ &= 131.25 \text{ m}\end{aligned}$$

$$\text{Inner circumference} = 2\pi r$$

$$= 2 \times \frac{22}{7} \times 131.25 = 825 \text{ m}$$

$$\begin{aligned}\text{Total length of track} &= \text{outer circumference} + \text{inner circumference} \\ &= 880 + 825 = 1705 \text{ m}\end{aligned}$$

$$\text{Distance between two plants} = 20 \text{ m}$$

$$\begin{aligned}\text{So, total plants} &= \frac{1705}{20} = 85.25 \\ &= 85\end{aligned}$$

Critical Thinking Skills

$$\text{Side of square} = 35 \text{ cm}$$

$$\text{Diameter of semicircle} = 35 \text{ cm}$$

$$\begin{aligned}\text{Perimeter of figure} &= 4 \times \pi r \\ &= 4 \times \frac{22}{7} \times \frac{35}{2} = 220 \text{ m}\end{aligned}$$

Assessment Time 12.3

1. a. Area of circle $= \pi r^2$
 $= \frac{22}{7} \times 10.5 \times 10.5 = 346.5 \text{ cm}^2$
- b. Area of circle $= \pi r^2$
 $= \frac{22}{7} \times 14 \times 14 = 616 \text{ cm}^2$
- c. Area of circle $= \pi r^2$
 $= \frac{22}{7} \times 35 \times 35 = 3850 \text{ cm}^2$
- d. Area of circle $= \pi r^2$
 $= \frac{22}{7} \times 63 \times 63 = 12474 \text{ cm}^2$

2. a. Area of circle = πr^2

$$28.26 = \frac{22}{7} \times r^2 \Rightarrow \frac{7 \times 28.26}{22} = r^2$$

$$r^2 = 9 \text{ cm}^2 \Rightarrow r = 3 \text{ cm}$$

- b. Area of circle = πr^2

$$78.50 = \frac{22}{7} \times r^2 \Rightarrow r^2 = \frac{78.50 \times 7}{22}$$

$$r^2 = 25 \text{ cm}^2 \Rightarrow r = 5 \text{ cm}$$

- c. Area of circle = πr^2

$$113.04 = \frac{22}{7} \times r^2 \Rightarrow r^2 = \frac{113.04 \times 7}{22}$$

$$r^2 = 36 \text{ mm}^2 \Rightarrow r = 6 \text{ mm}$$

- d. Area of circle = πr^2

$$452.16 = \frac{22}{7} \times r^2$$

$$r^2 = \frac{452.16 \times 7}{22}$$

$$r^2 = 144 \text{ dm}^2$$

$$r = 12 \text{ dm}$$

3. Circumference of a circle = $2\pi r$

$$264 = 2 \times \frac{22}{7} \times r$$

$$r = \frac{264 \times 7}{2 \times 22} = 42 \text{ cm}$$

4. Ratio of the radii = 4 : 7

Let the radius of first circle (r_1) be $4x$ unit

So, the radius of second circle (r_2) be $7x$ unit

$$\text{Ratio of their area} = \pi r_1^2 : \pi r_2^2$$

$$= \frac{(4x)^2}{(7x)^2} = \frac{16x^2}{49x^2} = 16 : 49$$

Hence, the ratio of their area be 16 : 49

5. Ratio of area of two circle

$$\frac{\pi r_1^2}{\pi r_2^2} = \frac{64}{121}$$

$$\left(\frac{r_1}{r_2}\right)^2 = \left(\frac{8}{11}\right)^2$$

$$\frac{r_1}{r_2} = \frac{8}{11}$$

Hence, the ratio of their radii is 8 : 11

6. Area of circle = πr^2

$$5544 \text{ m}^2 = \pi r^2$$

$$r^2 = \frac{5544 \times 7}{22}$$

$$r^2 = 1764$$

$$r = 42 \text{ m}$$

$$\text{Circumference of a circle} = 2\pi r$$

$$= 2 \times \frac{22}{7} \times 42$$

$$= 2 \times 22 \times 6 = 264 \text{ m}$$

$$\text{Cost} = \text{Circumference} \times \text{per price meter}$$

$$= 264 \times 6.55 = ₹ 1729.2$$

7. Let outer radius of park = R m

$$\text{Outer circumference} = 396 \text{ m}$$

$$2\pi R = 316$$

$$R = \frac{396 \times 7}{2 \times 22} = 63 \text{ m}$$

$$\text{Inner radius} = 63 - 7 = 56 \text{ m}$$

$$\text{Area of the path} = \pi(R^2 - r^2)$$

$$= \frac{22}{7} (63^2 - 56^2)$$

$$= \frac{22}{7} (3969 - 3136) = 2618 \text{ m}^2$$

$$\text{Cost of gravelling} = ₹ (2618 \times 9.55)$$

$$= ₹ 25,787.30$$

8. Area of the original sheet = πr^2

$$= \pi \times 14 \times 14$$

$$= 196 \times \pi$$

$$= 196\pi \text{ cm}^2$$

$$\text{Area of one smaller circle} = \pi r^2$$

$$= \pi \times 3.5 \times 3.5$$

$$= \pi \times 12.25 \text{ cm}^2$$

$$= 12.25\pi \text{ cm}^2$$

$$\text{Area of 2 small circle} = 2 \times 12.25\pi \text{ cm}^2$$

$$= 24.5\pi$$

$$\text{Area of one square} = (3 \text{ cm})^2 = 9 \text{ cm}^2$$

$$\text{Square} = 2 \times 9 \text{ cm}^2 = 18 \text{ cm}^2$$

$$\text{Area of remaining sheet} = \text{Area of original sheet} - (\text{Area of two small circle} + \text{Area of two squares})$$

$$= 196\pi \text{ cm}^2 - (24.5\pi \text{ cm}^2 + 18 \text{ cm}^2)$$

$$= 171.5 \times \frac{22}{7} - 18 = 521 \text{ cm}^2$$

9. Area covered in one hour = πr^2

$$= \pi(6)^2 = 36\pi \text{ cm}^2$$

$$\text{Area covered in four hours} = 4 \times 36\pi \text{ cm}^2 = 144\pi \text{ cm}^2$$

$$144 \times \frac{22}{7} = \frac{22 \times 144}{7} = 452.57 \text{ cm}^2$$

The minute hand cover 452.57 cm^2 in 4 hours.

$$\begin{aligned}
 10. \text{ Area grazed by one house} &= \frac{1}{4} \times \pi r^2 \\
 &= \frac{1}{4} \times \pi \times 7 \times 7 = \frac{49}{4} \pi \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{Total grazed by four horses} &= 4 \times \frac{49}{4} \pi \text{ cm}^2 = 49\pi \text{ cm}^2 \\
 &= 49 \times \frac{22}{7} = 154 \text{ cm}^2
 \end{aligned}$$

Hence, the area of the grazed field by the four horses is 154 m^2 .

Critical Thinking Skills

$$\text{Area of square} = 484 \text{ cm}^2$$

$$\text{side}^2 = 484$$

$$\text{Side} = \sqrt{484} = 22 \text{ cm}$$

$$\therefore \text{Length of wire} = 4 \times 22 = 88 \text{ cm}$$

$$\text{Circumference of circle } 2\pi r = 88$$

$$\therefore r = \frac{88 \times 7}{2 \times 22} = 14 \text{ cm}$$

$$\begin{aligned}
 \text{Area of circle so formed by wire} &= \pi r^2 \\
 &= \frac{22}{7} \times 14^2 = 616 \text{ cm}^2
 \end{aligned}$$

Mental Math

- | | |
|--|------------------------|
| 1. $\frac{1}{2} \times \text{base} \times \text{altitude}$ | 2. 40 cm^2 |
| 3. Circumference | 4. $2\pi r$ or πd |
| 5. πr^2 | |

Revision Time

1. Area of a square = Side $\times$ Side
 $= 50 \text{ cm} \times 50 \text{ cm} = 2500 \text{ cm}^2$

$$\text{Area of a triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

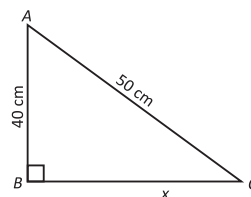
$$2500 = \frac{1}{2} \times \text{base} \times 80$$

$$\text{Base} = \frac{2500 \times 2}{80} = \frac{2500}{40} = 62.5 \text{ cm}$$

Hence, the base of the triangle is 62.5 cm .

2. Let $AB = 40 \text{ cm}$, $AC = 50 \text{ cm}$, $BC = x$
 By Pythagoras theorem, we have

$$\begin{aligned}
 (AC)^2 &= (AB)^2 + (BC)^2 \\
 \Rightarrow (50)^2 &= (40)^2 + (x)^2 \\
 \Rightarrow 2500 &= 1600 + x^2 \\
 \Rightarrow x^2 &= 2500 - 1600 \\
 \Rightarrow x^2 &= 900 \\
 \Rightarrow x^2 &= \sqrt{900} = 30 \text{ cm}
 \end{aligned}$$



$$\begin{aligned}\text{Area of the triangle} &= \frac{1}{2} \times \text{base} \times \text{height} \\ &= \frac{1}{2} \times 40 \times 30 = 600 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}3. \text{ Area of square} &= \text{side} \times \text{side} \\ &= 30 \text{ cm} \times 30 \text{ cm} = 900 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of the parallelogram} &= \text{base} \times \text{height} \\ 900 &= \text{base} \times 5 \\ \text{Base} &= \frac{900}{5} = 18 \text{ cm}\end{aligned}$$

The length of the parallelogram is 18 cm.

$$\begin{aligned}4. \text{ } BC &= 6 \text{ cm}, AC = 10 \text{ cm}, BD = 4 \text{ cm} \\ \text{Area of triangle} &= \frac{1}{2} \times AC \times BD \\ &= \frac{1}{2} \times 10 \times 4 = 20 \text{ cm}^2 \\ \text{Area of triangle} &= \frac{1}{2} \times BC \times AE \\ 20 \text{ cm}^2 &= \frac{1}{2} \times 6 \times AE \\ AE &= \frac{20 \times 2}{6} = \frac{40}{6} = 6.67 \text{ cm}\end{aligned}$$

Hence, the length of the perpendicular $AE = 6.67 \text{ cm}$

$$\begin{aligned}5. \text{ } PQ &= SR = 12 \text{ cm}, QR = PS = 10 \text{ cm} \\ \text{Area} &= QR \times PA = 10 \text{ cm} \times 8 \text{ cm} = 80 \text{ cm}^2 \\ \text{Area} &= PQ \times PB \\ 80 \text{ cm}^2 &= 12 \text{ cm} \times PB \\ PB &= \frac{80 \text{ cm}^2}{12 \text{ cm}} = 6.67\end{aligned}$$

Hence, the length of PB is 6.67 cm.

$$\begin{aligned}7. \text{ Let } x &\text{ be the altitude and base be } 3x. \\ \text{Total cost} &= ₹ 9245.50 \\ \text{Cost per hectare} &= ₹ 685 \\ \text{Area in hectares} &= \frac{\text{Total cost}}{\text{Cost per hectare}} \\ &= \frac{9245.50}{685} = 13.5 \text{ hectare}\end{aligned}$$

Area in square metre = $13.5 \times 10000 = 135000 \text{ sq meters}$

$$\begin{aligned}\text{Area of triangle} &= \frac{1}{2} \times \text{base} \times \text{height} \\ 135000 &= \frac{1}{2} \times 3x \times x \\ \frac{135000 \times 2}{3} &= x^2\end{aligned}$$

$$900 = x^2$$

$$x = \sqrt{900} = 30 \text{ m}$$

The altitude of the triangle park is 30 metres and the base is 900 metres.

$$\begin{aligned} 6. \quad \text{Area of parallelogram} &= \text{Base} \times \text{height} \\ &= 14 \times 10 = 140 \text{ cm}^2 \end{aligned}$$

$$\text{Area of triangle} = \frac{1}{2} \times 14 \times 10 = 70 \text{ cm}^2$$

$$\begin{aligned} \text{Area of shaded region} &= \text{Area of parallelogram} - \text{Area of triangle} \\ &= 140 \text{ cm}^2 - 70 \text{ cm}^2 = 70 \text{ cm}^2 \end{aligned}$$

$$8. \quad \text{Area of circle} = \pi r^2$$

$$\text{Circumference of a circle} = 2\pi r$$

$$\text{Area} = \frac{22}{7} \times 28 \times 28 = 2464 \text{ cm}^2$$

$$\text{Circumference of a circle} = 2\pi r$$

$$= 2 \times \frac{22}{7} \times 28 = 176 \text{ cm}$$

$$9. \quad \text{Outer Diameter} = 28 \text{ cm,}$$

$$\text{Outer radius (R)} = 14 \text{ cm}$$

$$\text{Inner Diameter} = 24 \text{ cm,}$$

$$\text{Inner Radius (r)} = 12 \text{ cm}$$

$$\begin{aligned} \text{Area of circular ring} &= \pi(R^2 - r^2) \\ &= \pi(14^2 - 12^2) \\ &= \pi(196 - 144) \\ &= \frac{22}{7} \times 52 = 163.42 \text{ cm}^2 \end{aligned}$$

Hence, the area of circular ring is 163.42 cm^2

$$10. \quad \text{Diameter} = 84 \text{ cm, radius} = \frac{84}{2} = 42 \text{ cm}$$

$$\text{Circumference of a circle} = 2\pi r$$

$$= 2 \times \frac{22}{7} \times 42 = 264$$

$$\text{Number of revolutions} = 600$$

$$\text{Total distance} = \text{Circumference} \times \text{Number of revolution}$$

$$= 600 \times 264 = 158400 \text{ cm}$$

$$= 1584 \text{ m}$$

The car will travel 1584 m.

$$11. \quad \text{Circumference of a circle} = 2\pi r$$

$$176 = 2 \times \frac{22}{7} \times r$$

$$r = \frac{176 \times 7}{44} = 28 \text{ cm}$$

$$\text{Area of circle} = \pi r^2$$

$$= \frac{22}{7} \times 28 \times 28$$

$$= 22 \times 28 \times 4 = 2464 \text{ cm}^2$$

12. 13.2 km = 1,320,000 cm

$$\begin{aligned}\text{Circumference} &= \frac{\text{Total distance}}{\text{Number of revolution}} \\ &= \frac{1320000}{6000} = 220 \text{ cm}\end{aligned}$$

Hence, the bus wheel has a circumference of 220 cm.

13. Ratio of radii of a circle = 5 : 9

Then radii of first circle be (5x) unit and radius of second circle be (9x) units

$$\text{Ratio of their circumference} = 2\pi r_1 : 2\pi r_2$$

$$\frac{2\pi r_1}{2\pi r_2} = \frac{2\pi(5x)}{2\pi(9x)} = \frac{5x}{9x} = 5 : 9$$

$$\text{Ratio of Area of circle} = \frac{2\pi r_1^2}{2\pi r_2^2} = \frac{2\pi(5x)^2}{2\pi(9x)^2} = \frac{25}{81} = 25 : 81$$

14. Radius of pond = $\frac{\text{Diameter}}{2} = \frac{28}{2} = 14 \text{ cm}$

$$\begin{aligned}\text{Area of garden} &= \pi r^2 \\ &= \pi \times (63)^2 \\ &= \frac{22}{7} \times 63 \times 63 = 1247 \text{ m}^2\end{aligned}$$

$$\begin{aligned}\text{Area of pond} &= \pi r^2 \\ &= \frac{22}{7} \times 14 \times 14 = 616 \text{ m}^2\end{aligned}$$

$$\begin{aligned}\text{Area of remaining land} &= \text{Area of garden} - \text{area of pond} \\ &= 1247 \text{ m}^2 - 616 \text{ m}^2 = 631 \text{ m}^2\end{aligned}$$

15. Radius = 21 cm

$$\begin{aligned}\text{Area of sheet} &= \pi r^2 \\ &= \frac{22}{7} \times 21 \times 21 = 1386 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of cut - out pieces} &= \pi r^2 \\ &= \frac{22}{7} \times 7 \times 7 = 154 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of remaining piece} &= \text{Area of sheet} - \text{Area of cut-out pieces} \\ &= 1386 - 154 = 1232 \text{ cm}^2\end{aligned}$$

16. Area of square = side × side

$$= 14 \text{ cm} \times 14 \text{ cm} = 196 \text{ cm}^2$$

$$\text{Area of quadrant} = \frac{1}{4} \times \frac{22}{7} \times 7 \times 7 = \frac{154}{4} \text{ cm}^2$$

$$\text{Area of four quadrant} = 4 \times \frac{154}{4} \text{ cm}^2 = 154 \text{ cm}^2$$

$$\begin{aligned}\text{Area of shaded region} &= \text{Area of square} - \text{Area of four quadrant} \\ &= 196 \text{ cm}^2 - 154 \text{ cm}^2 = 42 \text{ cm}^2\end{aligned}$$

Critical Thinking Skills

Radius of bigger circle

$$OA = OB = 21 \text{ cm}$$

$$\therefore OD = 21 \text{ cm}$$

$$OE = DE = \frac{21}{4} \text{ cm}$$

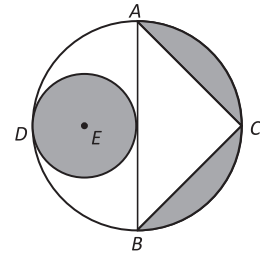
$$\text{Area of smaller circle} = \pi r^2$$

$$= \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} = 346.5 \text{ cm}^2$$

$$\begin{aligned} \text{Area of bigger semicircle} &= \frac{1}{2} \pi r^2 = \frac{1}{2} \times \frac{22}{7} \times 21 \times 21 \\ &= 693 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of } \triangle ABC &= \frac{1}{2} \times AB \times OC \\ &= \frac{1}{2} \times 42 \times 21 = 441 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{So, area of shaded region} &= 346.5(693 - 441) \\ &= 598.5 \text{ cm}^2 \end{aligned}$$

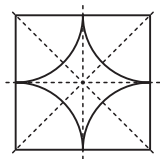
**Multiple Choice Questions**

1. (b) 2. (c) 3. (b) 4. (a) 5. (b)

CHAPTER 13: SYMMETRY (LINEAR ROTATIONAL SYMMETRY)**Assessment Time 13.1**

1. a. An equilateral triangle has **three** lines of symmetry.
 b. A square has **four** lines of symmetry.
 c. A regular pentagon has **five** lines of symmetry.
 d. A circle has **infinite** lines of symmetry.

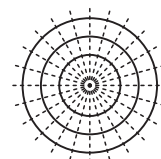
2. a.



b.



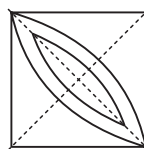
c.



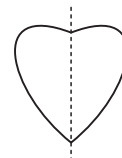
d.



e.

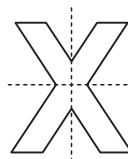


f.



3. a. No

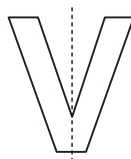
b.



c.



e.



f.

c. No

f. yes

Assessment Time 13.2

- The order of rotational symmetry in an equilateral triangle is **three**.
 - The order of rotational symmetry in a square is **four**.
 - The angle of rotation of rotational symmetry in a rhombus is **two**.
 - The angle of rotation of rotational symmetry in an equilateral triangle is **120°**.
- Four
 - one
 - two
 - four
 - two
 - four
- one
 - two
 - one
 - two
 - one
 - two
- Do yourself
- four
 - two
 - five
 - two

Mental Math

1. A regular pentagon has **five** lines of symmetry.
2. A regular octagon has **eight** lines of symmetry.
3. A rhombus has **two** lines of symmetry.
4. A rectangle has rotational symmetry of order **two**.
5. The letter H has rotational symmetry of order **two**.

Multiple Choice Questions

1. (d) 2. (c) 3. (b) 4. (a) 5. (d)

CHAPTER-14: DATA HANDLING

Assessment Time 14.1

1. First 10 natural number are 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

$$\begin{aligned}\text{Mean} &= \frac{\text{Sum}}{\text{Number of natural numbers}} \\ &= \frac{1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10}{10} = \frac{55}{10} = 5.5\end{aligned}$$

$$\begin{aligned} 2. \text{ Mean} &= \frac{\text{Sum of runs}}{\text{Number of innings}} \\ &= \frac{68 + 75 + 106 + 10 + 12 + 60 + 99 + 112 + 15 + 18}{12} \\ &= \frac{748}{12} = 62.33 \end{aligned}$$

3. a. Highest value = 160, lowest value = 128
 Range = Highest value – Lowest Value
 $= 160 - 128 = 32$
- b. Sum of the heights = $138 + 140 + 155 + 128 + 150 + 142 + 160 + 135 + 152 + 142 = 1442$
 Mean = $\frac{\text{Sum of highest}}{\text{Number of students}}$
 $= \frac{1442}{10} = 144.2$
4. a. Highest mark = 50, Lowest marks = 10
 Range = Highest value – Lowest value
 $= 50 - 10 = 40$

b.

x	f	$fixi$
10	2	20
12	3	36
15	4	60
20	6	120
25	5	125
30	2	60
36	8	288
40	5	200
42	8	336
45	5	225
50	2	100
	50	1570

$$\text{Mean} = \frac{\sum fixi}{fi} = \frac{1570}{50} = 31.4$$

- c. Total = $8 + 5 + 8 + 5 + 2 = 28$
 28 students have more marks than mean marks
- d. Total = $2 + 3 + 4 + 6 + 5 + 2 = 22$
 22 students have less marks than the mean marks.
5. a. Highest value = 15.6
 Lowest value = 3.2
 Range = Highest value – Lowest value
 $= 15.6 - 3.2 = 12.4 \text{ mm}$
- b. Mean rainfall = $\frac{\text{Total rainfall}}{\text{Number of days}}$
 $= \frac{6.2 + 5.4 + 3.7 + 8.6 + 10.9 + 15.6 + 3.2}{7}$
 $= \frac{53.6}{7} = 7.657$

6. First we arrange the data in ascending order

25, 38, 40, 42, 43, 48, 52, 56, 63, 65

Since, there are 11th weight, the middle value is the 6th one $= \left(\frac{11+1}{2}\right)^{\text{th}}$
 $= 6^{\text{th}}$ terms, Median weight = 48

7. First we arrange the data in ascending order.

0, 5, 5, 6, 10, 12, 36, 50, 62, 72, 112

Here, total number of terms $n = 11$, Which is an odd

$$\begin{aligned}\text{So, Median} &= \left(\frac{n+1}{2}\right)^{\text{th}} \text{ Observation} \\ &= \left(\frac{11+1}{2}\right)^{\text{th}} \text{ Observation} = \left(\frac{12}{2}\right)^{\text{th}} \text{ Observation} \\ &= 6^{\text{th}} \text{ observation}\end{aligned}$$

So, the median score is 12.

8. Let's arrange the wages in ascending order

120, 120, 120, 150, 150, 150, 160, 160, 160, 180, 180, 200, 200, 250, 250, 300, 350, 400, 400, 400

Here total number of terms = 20, Which is even

$$\begin{aligned}\text{Median} &= \frac{1}{2} \left\{ \text{value of } \left(\frac{n}{2}\right)^{\text{th}} \text{ observation} + \text{value of } \left(\frac{n}{2} + 1\right)^{\text{th}} \text{ observation} \right\} \\ &= \frac{1}{2} \left\{ \text{value of } \left(\frac{20}{2}\right)^{\text{th}} \text{ observation} + \text{value of } \left(\frac{20}{2} + 1\right)^{\text{th}} \text{ observation} \right\} \\ &= \frac{1}{2} \{ \text{Value of 10th observation} + \text{value of 11} \} \\ &= \frac{1}{2} (180 + 180) = 180\end{aligned}$$

The median wage is 180.

9. By arranging the given data in frequency table

Numbers	Tally Marks	Frequency
2		3
3		2
5		1
6	\\	5
8	\\	5
10		2
12		2
16		1

6 and 8 both appear 5 time. So, the modes of the given data is 6 and 8.

10. By arranging the given data in frequency table

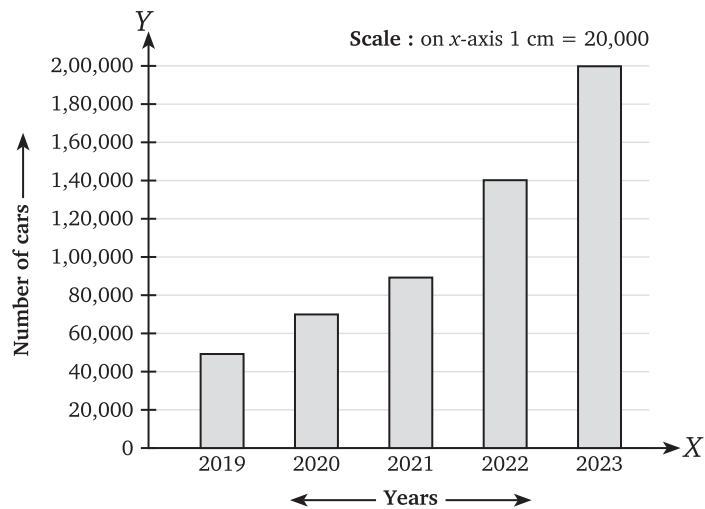
Numbers	Tally Marks	Frequency
38	\\	5

40		8
42		4
44		3
46		2
48		1

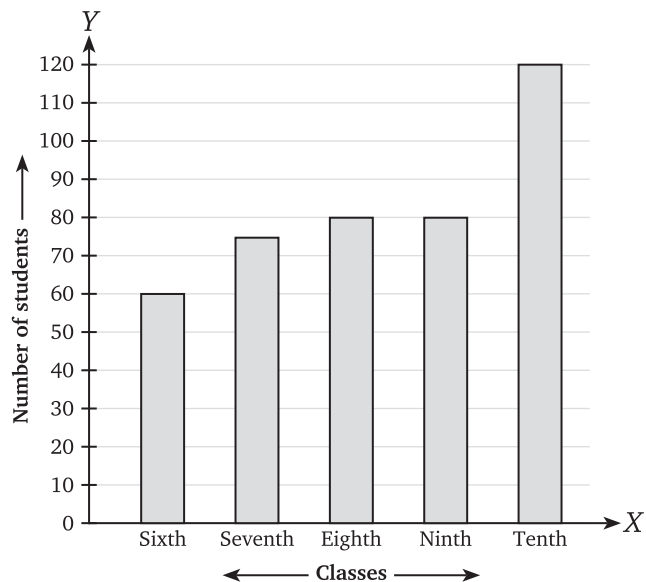
40 appears 8 times, which is the highest frequency.
So, the mode is 40.

Assessment Time 14.2

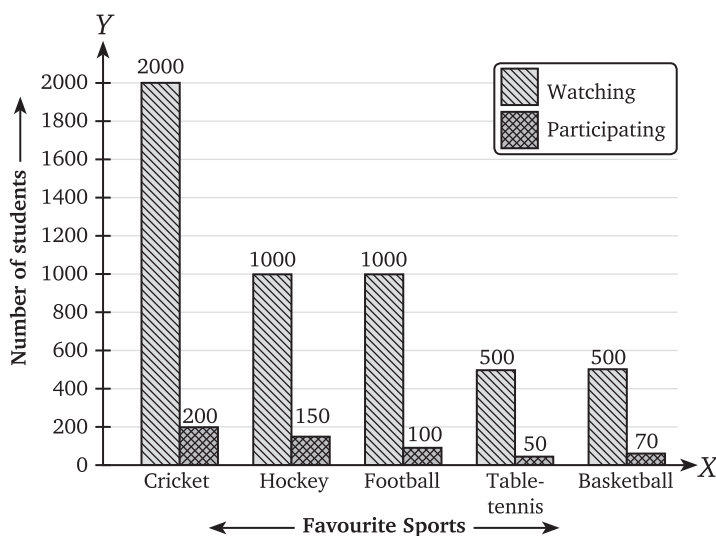
1.



2.



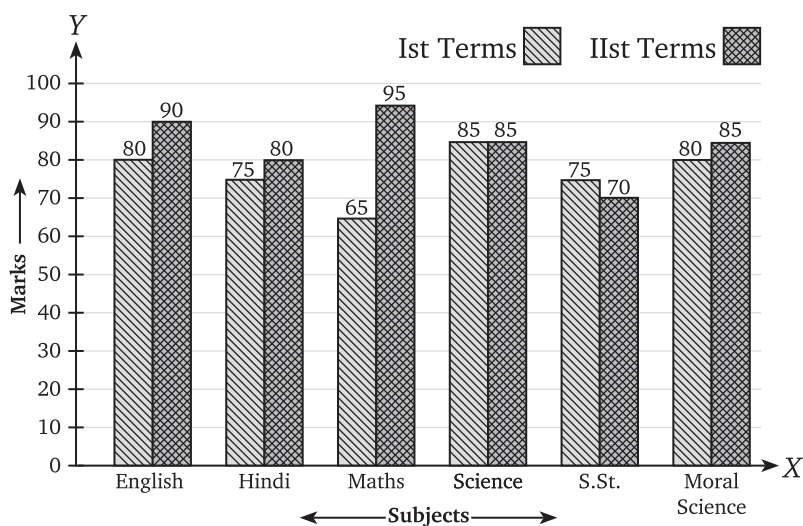
3. a.



b. Cricket

c. Table Tennis

4.



a. Maths

b. S.St.

5. a. 2013

b. 2014

c. 2011

Mental Math

1. 11.5 2. 4.5 3. 6.5 4. 9.5 5. 5

Revision Time

$$\begin{aligned}
 1. \text{ Mean} &= \frac{\text{Sum of even ten natural number}}{\text{Number of numbers}} \\
 &= \frac{2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 20}{10} \\
 &= \frac{110}{10} = 11
 \end{aligned}$$

Hence, the mean of first 10 natural number is 11.

$$\begin{aligned}
 2. \text{ Mean} &= \frac{\text{Sum of first ten prime number}}{\text{Number of numbers}} \\
 &= \frac{2 + 3 + 5 + 7 + 11 + 13 + 17 + 19 + 23 + 29}{10} \\
 &= \frac{129}{10} = 12.9
 \end{aligned}$$

Hence, the mean of first 10 prime number is 12.9.

$$\begin{aligned}
 3. \text{ Mean} &= \frac{\text{Sum of number of values}}{\text{Number of value}} \\
 &= \frac{10+10+20+5+6+10+20+25+24+20+10+12+5+6+10+20+20+25+10+24}{20} \\
 &= \frac{292}{20} = 14.6
 \end{aligned}$$

Hence, the mean is 14.6

$$\begin{aligned}
 4. \text{ Mean} &= \frac{\text{Sum of total wages}}{\text{Number of workers}} \\
 &= \frac{\text{₹ } (180+250+300+250+180+150+150+300+500+180+400+250+400+180+150)}{15} \\
 &= \frac{\text{₹ } 3820}{15} = \text{₹ } 254.67
 \end{aligned}$$

Median = Let arrange the data in ascending order

₹ 150, ₹ 150, ₹ 150, ₹ 180, ₹ 180, ₹ 180, ₹ 180, ₹ 250, ₹ 250, ₹ 250, ₹ 300, ₹ 300, ₹ 400, ₹ 400, ₹ 500

Here, total number terms $n = 15$ which is odd

$$\begin{aligned}
 \text{Median} &= \left(\frac{n+1}{2} \right)^{\text{th}} \text{ Observation} \\
 &= \left(\frac{15+1}{2} \right)^{\text{th}} \text{ Observation} = \left(\frac{16}{2} \right)^{\text{th}} \text{ Observation} \\
 &= 8^{\text{th}} \text{ observation} = \text{₹ } 250
 \end{aligned}$$

Here, the median of daily wage is ₹ 250

Mode: by arranging the given data in frequency table

Wages	Tally Marks	Frequency
₹ 150		3
₹ 180		4
₹ 250		3
₹ 300		2
₹ 400		2
₹ 500		1

There, the mode of the daily wages is ₹ 180 as it has maximum frequency 4.

5. Do yourself

6. Do yourself

7. a. June

b. August

c. April

Model Test Paper-I

1. a. 7,06,500: Seven lakh six thousand five hundred
 b. 6,45,600: Six lakh forty-five thousand six hundred
 c. 8,05,143: Eight lakh five thousand one hundred forty-three
 d. 9,79,060: Nine lakh seventy-nine thousand sixty

2.

	TC	C	TL	L	TTh	Th	H	T	O
(a)		5	1	9	6	3	2	8	5
(b)	4	0	5	9	6	3	8	2	1
(c)	9	1	6	3	2	8	5	4	1
(d)	8	1	5	6	0	2	9	4	3

Number Name

- a. 5,19,63,285: Five crore nineteen lakh sixty-three thousand two hundred eighty-five
 - b. 40,59,63,821: Forty crore fifty-nine lakh sixty-three thousand eight hundred twenty-one
 - c. 91,63,28,541: ninety-one crore sixty-three lakh twenty-eight thousand five hundred forty-one
 - d. 81,56,02,943: Eighty-one crore fifty-six lakh two thousand nine hundred forty-three
3. a. $81\boxed{6}3281 \rightarrow 8200000$
 $4\boxed{0}6237 \rightarrow 400000$
 So, $8200000 + 400000 = 86,00,000$
 c. $672\boxed{8}1694 \rightarrow 67300000$
 $71\boxed{3}7286 \rightarrow 7100000$
 So, $67300000 + 7100000 = 7,44,00,000$
 - b. $1\boxed{8}2632 \rightarrow 200000$
 $1\boxed{6}3284 \rightarrow 200000$
 So, $200000 + 200000 = 4,00,000$
 d. $41\boxed{6}3824 \rightarrow 4200000$
 $86\boxed{2}8453 \rightarrow 8600000$
 So, $4200000 + 8600000 = 1,28,00,000$
4. a. $79 + 31 - 10 = 110 - 10 = 100$
 b. $8 \times 12 - 16 = 96 - 16 = 80$
 c. $14 \times 6 + 2 \times 16 = 84 + 32 = 116$
 d. $15 \times 5 + 2 \times 8 = 75 + 16 = 91$
 5. a. $5 \times 8 - 35 \div 7 + 2$
 $= 40 - 5 + 2$
 $= 42 - 5 = 37$
 b. $24 - 6 \times 3 + 4 - 8 \div 4$
 $= 24 - 6 \times 3 + 4 - 2$
 $= 24 - 18 + 4 - 2$
 $= 28 - 20 = 8$
 6. Weight of potatoes = 900 g
 Weight of cabbage = 550 g
 Weight of onions = 800 g
 Weight of tomatoes = 600 g
 Weight of ginger = 100 g
 Weight of green chillies = 300 g
 Total weight of vegetables = $900 + 550 + 800 + 600 + 100 + 300$

$$= 3250 \text{ g} = 3.250 \text{ kg}$$

7. a. Difference of atomic weights of oxygen and carbon = $15.9999 - 12.0107$
 $= 3.9892$
- b. Difference of atomic weights of hydrogen and nitrogen = $14.0067 - 1.0080$
 $= 12.9987$
- c. Difference of atomic weights of hydrogen and nitrogen = $15.99999 - 14.0067$
 $= 1.9932$

8. In year 2023, students planted = m plants

So, in year 2024, students planted = $(2m + 10)$ plants

9. $(6a^2 + 4ab - 7b^2) - (a^2 + 5ab + 6b^2 - 4a^2 + 7b^2 - 7ab)$
 $= (6a^2 + 4ab - 7b^2) - (-3a^2 + 13b^2 - 2ab)$
 $= 6a^2 + 4ab - 7b^2 + 3a^2 - 13b^2 + 2ab$
 $= 9a^2 - 20b^2 + 6ab$

10. A man has money = ₹ $(4x^2 + 3xy + 5y^2 + 10)$

He saves = ₹ $(2x^2 + 2xy)$

He gives to PM relief fund = ₹ $(4x^2 + 3xy + 5y^2 + 10) - ₹ (2x^2 + 2xy)$
 $= ₹ (4x^2 + 3xy + 5y^2 + 10 - 2x^2 - 2xy)$
 $= ₹ (2x^2 + xy + 5y^2 + 10)$

11. a. $65^\circ + x^\circ = 90^\circ$
 $\Rightarrow x^\circ = 90^\circ - 65^\circ = 25^\circ$
 $\Rightarrow$
- b. $130^\circ + x^\circ + 20^\circ = 180^\circ$
 $\Rightarrow x^\circ + 150^\circ = 180^\circ$
 $x^\circ = 180^\circ - 150^\circ = 30^\circ$
- c. $x^\circ + 100^\circ + 30^\circ + 90^\circ = 360^\circ$
 $\Rightarrow x^\circ + 220^\circ = 360^\circ$
 $\Rightarrow x^\circ = 360^\circ - 220^\circ = 140^\circ$

12. a.

S O	5 0
+ S O	+ 5 0
T O O	1 0 0

 $\Rightarrow$

b.

L E E	1 5 5
+ L E T	+ 1 5 6
A L L	3 1 1

Model Test Paper-II

1. a. $7\frac{2}{5} - 3\frac{2}{15} + 1\frac{7}{10} = (7 - 3 + 1) + \left(\frac{2}{5} - \frac{2}{15} + \frac{7}{10}\right)$
 $= 5 + \left(\frac{2 \times 6 - 2 \times 2 + 7 \times 3}{30}\right)$
 $= 5 + \left(\frac{12 - 4 + 21}{30}\right) = 5 + \left(\frac{29}{30}\right)$
 $= 5\frac{29}{30}$
- b. $\frac{12}{1} - 3\frac{1}{2} + 4\frac{1}{5} = \frac{12}{1} - \frac{7}{2} + \frac{21}{5}$
 $= \frac{12 \times 10 - 7 \times 5 + 21 \times 2}{10}$
 $= \frac{120 - 35 + 42}{10} = \frac{127}{10} = 12\frac{7}{10}$

2. Total number of pages = 500

$$\text{Shanu has read} = \frac{3}{5}$$

$$\text{Pages has read} = \frac{3}{5} \times 500 = 3 \times 100 = 300 \text{ pages}$$

$$\text{Page are left unread} = 500 - 300 = 200 \text{ pages}$$

3. Total cost = ₹ $148\frac{3}{4}$

$$\text{Total weight} = 9\frac{1}{2}$$

$$\begin{aligned} \text{Cost of 1 kg} &= 148\frac{3}{4} \div 9\frac{1}{2} \\ &= \left(\frac{148 \times 4 + 3}{4} \right) \div \left(\frac{2 \times 9 + 1}{2} \right) \\ &= \left(\frac{592 + 3}{4} \right) \div \left(\frac{18 + 1}{2} \right) = \frac{595}{4} \div \frac{19}{2} \\ &= \frac{595}{4} \times \frac{2}{19} = \frac{595 \times 2}{4 \times 19} = \frac{1190}{76} \\ &= \frac{595}{38} = 15\frac{25}{38} \end{aligned}$$

$$\begin{aligned} 4. \quad a. \quad \frac{3}{4} \times \left(2\frac{1}{5} \times 5\frac{1}{3} \right) \div \frac{7}{9} &= \frac{3}{4} \times \left(\frac{5 \times 2 + 1}{5} \times \frac{3 \times 5 + 1}{3} \right) \div \frac{7}{9} \\ &= \frac{3}{4} \times \left(\frac{11}{5} \times \frac{16}{3} \right) \div \frac{7}{9} \\ &= \frac{3}{4} \times \frac{11}{5} \times \frac{16}{3} \times \frac{9}{7} = 11\frac{11}{35} \end{aligned}$$

$$\begin{aligned} b. \quad 1\frac{4}{5} \times 1\frac{1}{4} - \frac{3}{4} \times \frac{3}{5} &= \frac{5 \times 1 + 4}{5} + \frac{4 \times 1 + 1}{4} - \frac{3}{4} \times \frac{3}{5} \\ &= \frac{9}{5} \times \frac{5}{4} - \frac{3}{4} \times \frac{3}{5} \\ &= \frac{9}{4} - \frac{9}{20} = \frac{9 \times 5 - 9}{20} \\ &= \frac{45 - 9}{20} = \frac{36}{20} = \frac{9}{5} = 1\frac{4}{5} \end{aligned}$$

5. a. $\frac{-1}{5}, \frac{2}{3}, \frac{-5}{6}, \frac{-7}{12}$ LCM of 5, 3, 6 and 12 is 60

$$\frac{-1}{5} \times \frac{12}{12} = \frac{-12}{60}$$

$$\frac{2}{3} \times \frac{20}{20} = \frac{40}{60}$$

$$\frac{-5}{6} \times \frac{10}{10} = \frac{-50}{60}$$

$$\frac{-7}{12} \times \frac{5}{5} = \frac{-35}{60}$$

$$\frac{40}{60} > \frac{-12}{60} > \frac{-35}{60} > \frac{-50}{60}$$

Hence, the ascending order is $\frac{2}{3}, \frac{-1}{5}, \frac{-7}{12}$ and $\frac{-5}{6}$

b. $\frac{3}{-5}, \frac{8}{-10}, \frac{-17}{15}, \frac{-7}{10}$

LCM of 5, 10, 15 and 10 is 30

$$\frac{3}{-5} \times \frac{-6}{-6} = \frac{-18}{30}$$

$$\frac{8}{-10} \times \frac{-3}{-3} = \frac{-24}{30}$$

$$\frac{-17}{15} \times \frac{2}{2} = \frac{-34}{30}$$

$$\frac{-7}{10} \times \frac{3}{3} = \frac{-21}{30}$$

$$\frac{-18}{30} > \frac{-21}{30} > \frac{-24}{30} > \frac{-34}{30}$$

Hence, the ascending order is $\frac{3}{-5}, \frac{-7}{10}, \frac{8}{-10}$ and $\frac{-17}{15}$

6. a. $\frac{10}{16} \times \frac{-8}{25} \times \frac{11}{37} \times \frac{-74}{77} = \frac{10 \times (-8) \times 11 \times (-74)}{16 \times 25 \times 37 \times 77} = \frac{2}{35}$

b. $-8 \times \frac{-6}{11} \times \frac{33}{-24} \times \frac{6}{7} = \frac{-8 \times -6 \times 33 \times 6}{11 \times (-24) \times 7} = \frac{-36}{7}$

7. $\left(\frac{3}{14}\right)^{-2} \times \left(\frac{3}{14}\right)^{-5} = \left(\frac{3}{14}\right)^{-2x}$
 $\left(\frac{3}{14}\right)^{-2+(-5)} = \left(\frac{3}{14}\right)^{-2x}$

On comparing exponents of both sides, we get

$$-2 + (-5) = -2x$$

$$-7 = -2x$$

$$x = \frac{-7}{-2} = \frac{7}{2}$$

8. $152000000 = 1.52 \times 10^8 \text{ km}$

9. Area of triangle = $\frac{1}{2} \times \text{base} \times \text{height}$
 $= \frac{1}{2} \times 14 \times 14 = 98 \text{ cm}^2$

Hence, the area of triangle is 98 cm^2 .

10. $11 \text{ km} = 11 \times 1000 = 11000 \text{ m}$

$$\begin{aligned} \text{Circumference} &= \frac{\text{Total Distance}}{\text{Number of revolution}} \\ &= \frac{110000}{5000} = 220 \text{ cm} \end{aligned}$$

$$\text{Circumference of a circle} = 2\pi r$$

$$220 = 2 \times \frac{22}{7} \times r$$

$$r = \frac{7 \times 220}{2 \times 22} = 35 \text{ cm}$$

$$\text{Diameter} = 2 \times r = 2 \times 35 \text{ cm} = 70$$

11. Area of circle = r^2

$$5544 \text{ m}^2 = \pi r^2$$

$$r^2 = \frac{5544 \times 7}{22}$$

$$r^2 = 1764$$

$$r = 42 \text{ m}$$

Circumference of a circle = $2\pi r$

$$= 2 \times \frac{22}{7} \times 42$$

$$= 2 \times 22 \times 6 = 264 \text{ m}$$

$$\text{Cost} = \text{Circumference} \times \text{per price meter}$$

$$= 264 \times 6.55 = ₹ 1729.2$$

12. a. Four

b. one

c. two

13. Mean = $\frac{\text{Sum of runs}}{\text{Number of innings}}$

$$= \frac{68 + 75 + 106 + 10 + 12 + 60 + 99 + 112 + 15 + 18}{12}$$

$$= \frac{748}{12} = 62.33$$

14.

