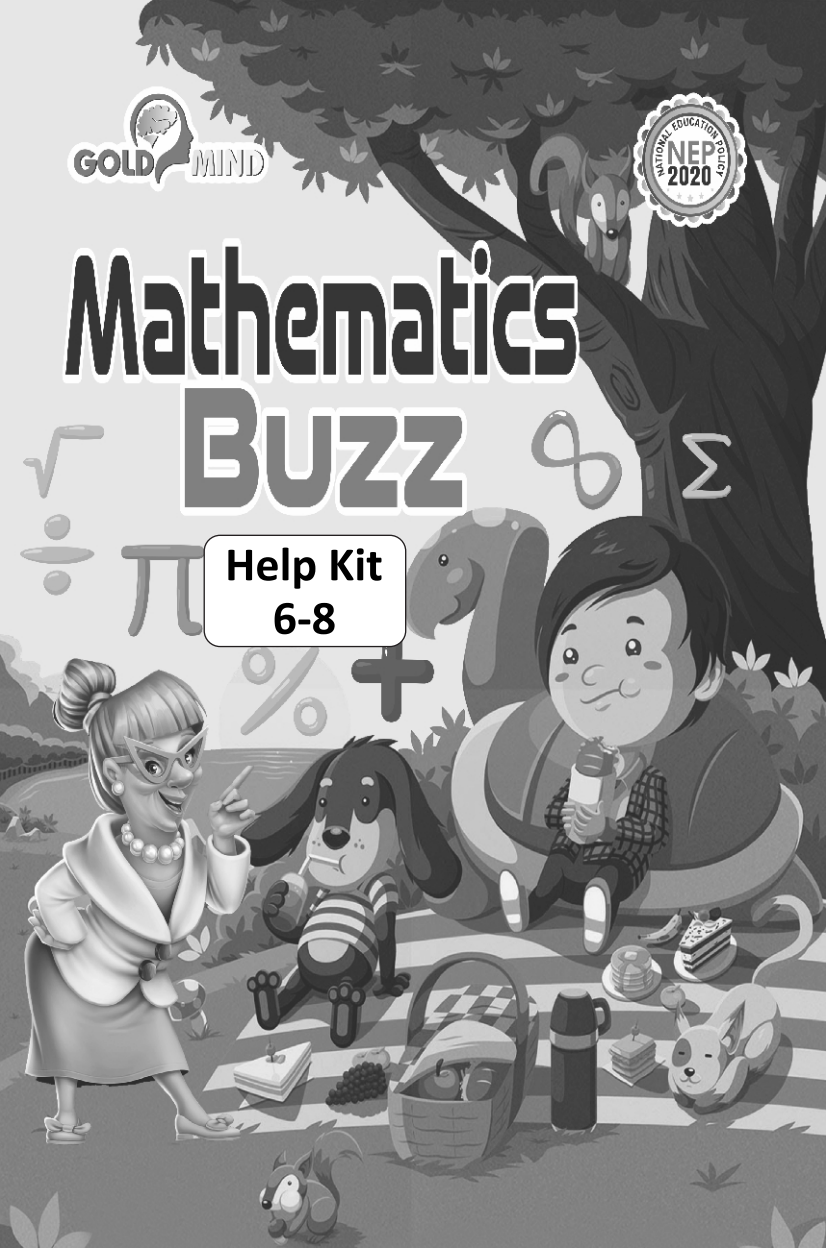
GOLD MIND

NATIONAL EDUCATION POLICY NEP 2020

Mathematics Buzz

Help Kit
6-8



Royal
MATHS
Class 6, 7 & 8

Teacher's Manual

TEACHER'S HELP BOOK
MATHS-6

Exercise 1.1

1 to **7 :** Take help of the Answer Sheet.

8. The digit 5 is at one crore's place.

Place value of 5 = 5 crore = 5,00,00,000

9, 10, 11 : Take help of the Answer Sheet.

12. (a) Writing the digits in descending order, the greatest four digit number = 8432

Writing the digits in ascending order,

the smallest four digit number = 2348

(b) Writing the digits in descending order,

the greatest four digit number = 9870

Writing the digits in ascending order : 0789 = 789

A number cannot start with 0, because it comes out to be a three digit number. So start with the second smallest digit.

The smallest four digit number = 7089

(c), (d) Solve according to (a).

13. (a) Writing the digits in descending order and writing the greatest digit 9 twice, the greatest four digit number = 9964

Writings the digits in ascending order and writing the smallest digit 4 twice, the smallest four digit number = 4469

(b) Solve according to (a).

(c) Writing the digits in descending order and writing the greatest digit 4 twice, the greatest four-digit number = 4420

Writing the digits in ascending order and repeating the smallest digit 0 after the second smallest digit 2, the smallest four digit number = 2004

14. Take help of the Answer Sheet.

15. (a) The smallest digit is 0. But using four zeroes alone does not make a four digit number.

The second smallest digit is 1.

The smallest four-digit number using only one digit - 1111

(b) The greatest digit is 9 and second greatest digit is 8.

The greatest four-digit number using two different digits = 9998

(c) Write five different digits is descending order starting from the greatest digit 9,

Greatest five-digit number with all different digits = 98765

16. The greatest 6-digit number= 999999

The smallest 6-digit number = 100000

Number of all 6-digit numbers = 999999–100000 + 1 = 9,00,000
(The smallest 6-digit is not included in the difference. To include it we add 1.)

17. Solve according to Q. 16.

18. We have three digits. To make a 8-digit number we need five more digits. So we repeat some digits.
Greatest number (Repeat the greatest digit 8) = 88888862
Smallest number (Repeat the smallest digit 2) = 22222268

19. We have four digits. To make a 8-digit number we need four more digits. So we repeat some digits.
Greatest number (Repeat the greatest digit 9) : 99999730
Smallest number (Repeat the smallest digit 0 after the second smallest digit 3) : 30000079

20 to 24 : Take help of the Answer sheet.

25. Solve according to Q.16.

26. Writing all digits in descending order starting from the greatest digit.
Greatest number using each digit only once = 9876543210

Exercise 1.2

Solve according to the examples given before the exercise and take help of the Answer sheet.

Exercise 1.3

1. 1 kilometre = 1000 metres = 1000 × 1000 millimetres = 10,00,000 millimetres

2. 14 litres = 14 × 1000 ml = 14000 ml
Quantity of soft drink in each bottle = $\frac{14000}{56}$ = 250 ml

3. 3 kilograms = 3 × 1000 grams = 3 × 1000 × 1000 milligrams = 30,00,000 milligrams

4. Add the numbers.

5. Write 1 crore in numerals ⇒ 1,00,00,000· Now subtract 65,47,371 from it.

6. The second number has 4 at ten lakhs place while first number has 3 at ten lakhs place· Hence the next year had more sale. Subtract.

7. Multiply.

8. Month of February of a leap year has 29 days. So multiply 2675 by 29.

9. 45 m = 45 × 100 cm = 4500 cm.
2 m 25 cm = 225 cm, Divide 4500 by 225 = 20
No remainder, so no cloth will remain.

10. Add the quantities.

11. Subtract.

12. Number of work days = 365 – 79 = 286
Multiply 2845 by 286.

13. Multiply.

14. Number of votes got by first candidate = 2,48,312
Number of votes got by the second condidate
= 2,48,312 + 1,43,887 = 3,92,199
Total number of votes cast = 2,48,312 + 3,92,199
= 6,40,511 (show both the additions)

15. Quantity of sugar in the godown = 5,87,02,234 kg

Quantity of sugar arrived	=	+ 4,72,35,265 kg
Total quantity of sugar	=	10,59,37,499 kg
Quantity of sugar delivered	=	– 6,43,52,789 kg
Quantity of sugar left	=	4,15,84,710 kg

16. Find the sum. Find the difference. Then subtract the difference from the sum.

17. Multiply.

18, 19 : Divide.

20 to 22 : Take help of the Answer sheet.

23. Solve according to Q.14.

24. Total number of days in the month of July and August together = 31 + 31 = 62 days. Multiply 3589 litres by 62.

Exercise 1.4

1, **3** : Take help of the Answer Sheet.

2. (a) One number has digits upto tens and another upto hundreds To be more resonable, round off the numbers to the nearest tens.

$$87 + 318 \rightarrow 90 + 320 = 410$$

(b) Both numbers have digits upto hundreds. To be reasonable, round off the numbers to the nearest hundreds.

$$898 + 785 \rightarrow 900 + 800 = 1700$$

(c) Sove according to (b).

(d) Solve according to (a).

4. (a) One number is of one digit. So we round off the other number only to its greatest places
$6 \times 232 \rightarrow 6 \times 200 = 1200$

(b) Solve according to (a).

(c) We round off each number to its greatest place and multiply.
$489 \times 362 \rightarrow 500 \times 400 = 2,00,000$

(d) We round off each number to its greatest place and multiply.
$2293 \times 486 \rightarrow 2000 \times 500 = 10,00,000$

(e) Solve according to (c).

(f), (g), (h): Solve according to (d).

5. (a) If we divide 57 by 7 we find that nearby number 56 is exactly divicible by 7.
So 573 ÷ 74 → 560 ÷ 70 = 8

(b) Nearby number 24 is divisible by 6.
2501 ÷ 63 → 2400 ÷ 6 = 40

(c) 5 is one digit number. So we can divide easily· Nearest number 470 is divisible by 5.
471 ÷ 5 → 470 ÷ 5 = 94

(d) Here 480 is divisible by 96.
4839 ÷ 96 → 4800 ÷ 96 = 50

6 to 10 : Take help of the Answer sheet.

Exercise 1.5

Take help of the Answer Sheet.

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Solve according to Q· 19 of Exercise 1·1.

2. (i) In 14,88,00,000 km, the digit just right to the crore's place is 8. So we add 1 to the digit 4 at crore's place and put 0 in place of all the digits to the right of the crore's place,
14,88,00,000 km → 15 ,00,00,000 km
(ii) Solve according to (i).

3. Solve according to Q· 17 of Exercise 1·1.

4. Take help of the Answer Sheet.

5. Write one crore in numerals → 1,00,00,000
Subtract 1 from it, we get → 99,99,999.

6. Solve according to Q. 16 of Exercise 1·3.

7. Solve according to Q. 14 of Exercise 1·3.

8. Walking both ways in six days the distance covered
= 2 × 6 × (1 km 875 m)
= 22 km 500 m

9. Nearest thousand means 501 to 999 → 1000
and 1001 to 1499 → 1000
So 11,501 to 11,999 and 12001 to 12,499 will be rounded to 12,000 to the nearest thousands.

10. Solve according to Q. 2 of Exercise 1·4.

11. (a) X (b) XLIX (c) XCIX (d) XL

12. CMXCIX + CDXCIX = 999 + 499 = 1498
= MCDXCVIII

13. CMXCIX – CDXCIX = 999 – 499 = 500 = D

Exercise 2.1

Take help of the Answer Sheet.

Exercise 2.2

1, 2 : Take help of the Answer Sheet.

3. Solve according to Example 1.

4. Solve according to Example 2.

5. Solve according to Example 4.

6. Solve according to Example 3.

7. Largest 4-digit number × largest 3-digit number

$= 9999 \times 999 = 9999 \times (1000 - 1)$

$= 9999 \times 1000 - 9999$

$= 99,99,000 - 9999 = 99,89,001$

8, **9**, **10** : Solve according to Example 5.

11. For two whole numbers 0 and 1,

Sum = 0 + 1 = 1 ; Difference = 1 – 0 = 1

For two whole numbers 1 and 2,

Sum = 1 + 2 = 3, Difference = 2 – 1 = 1

We can see in the first case the sum is not greater than the difference, though the sum is greater than the difference in the second case, So the sum of two whole numbers is not always greater than their difference.

12. Solve according to Example 7.

13. 1 × 1 = 1

Simillarly, whole number 0 × 0 = 0

14. 0 ÷ 0 is not defined.

1 ÷ 1 = 1 but 2 ÷ 2 ≠ 2

So only the whole number 1 divided by itself gives the same whole number again.

15. Solve according to Example 8.

16, 17, 18 : Solve according to Example 9.

19 to 26. Take help of the Answer Sheet.

Exercise 2.3

1. Numbers, for example, 2, 5 and 7 can be shown only as lines. They are not rectangular, square or triangular numbers.

2. 4 = 2 × 2; 9 = 3 × 3; 16 = 4 × 4; 25 = 5 × 5; 36 = 6 × 6 are squares. 4 can be shown as 2 × 2 dots and so on.

3. (a) 3 can be shown as a line of 3 × 1 dots, 3 can also be shown as a triangle of 1 dot + 2 dots

(b) 4 : line of 4 × 1 dot ; 4 : square of 2 × 2 dots

(c) 6 : line of 6 × 1 dot ; 6 : rectangle 2 × 3 dots ; 6 : triangle of 1 + 2 + 3 dots

(d) 8 : line of 8 × 1 dots ; rectangle of 4 × 2 dots

(e) 5 : line of 5 × 1 dots

(f) 10 : line of 10 × 1 dots ; rectangle of 5 × 2 dots; triangle of 1 + 2 + 3 + 4 dots

4. 15 = 5 × 3 dots

5. 20 = 5 × 4; 20 = 10 × 2 dots

6. 10 = 1 + 2 + 3 + 4; 15 = 1 + 2 + 3 + 4 + 5;
21= 1 + 2 + 3 + 4 + 5 + 6 dots

7. Left side 12, right side two 1s.
Left side 123, right side three 1s.
Left side 1234, right side four 1s.
Then left side 12345, right side five 1s. 11111 × 11111
Similarly, right side seven 1s, so left side : 1234567654321

8. Comparing left side and right side
First line, left side 2,2 ; right side 2, 2
Second line, left side 3, 3; right side 3, 3
Third line, left side 4, 4; right side 4,4
Left side 6, 6; right side 6, 6 that is

$65 \times 65 = 6 \times (6 + 1) \times 100 + 100 + 25 = 4225$

$95 \times 95 = 9 \times (9 + 1) \times 100 + 25 = 9025$

9 to **13** : Take help of the Answer Sheet.

14. Solve according to Example 10.

15. Write $9 = 10 - 1$; $99 = 100 - 1$; $999 = 1000 - 1$; $5 = \frac{10}{2}$;
$25 = \frac{100}{4}$; $125 = \frac{1000}{8}$ and calculate

16 to 18. Take help of the Answer Sheet.

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Normally the smallest even whole number is 2· But 0 is also divisible by 2 and $0 < 2$ so 0 is the smallest even whole number.

2. The numbers between 1 and 100 does not include 1 and 100.Numbers having 1 between 1 and 100 are
10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 31, 41, 51, 61, 71, 81, 91. These are 18 numbers
The digit 1 occurs twice in 11. So the digit 1 occurs 18 + 1 = 19 times between 1 and 100.

3. $3 + 4 + 5 = (3 + 4) + 5 = 7 + 5 = 12$

$3 + 4 + 5 = 3 + (4 + 5) = 3 + (5 + 4) = 3 + 9 = 12$

So $(3 + 4) + 5 = 3 + (5 + 4)$

4. Solve according to Example 6.

5. Solve according to Q. 13 of Exercise 2·2.

6. Solve according to Q· 14 of Exercise 2·2.

7. Square numbers starting from 1 : 1, 4, 9, 16, 25, 36, 49, 64 triangular numbers starting from 3

$1 + 2 = 3$; $1 + 2 + 3 = 6$; $1 + 2 + 3 + 4 = 10$;

$1 + 2 + 3 + 4 + 5 = 15$; $1 + 2 + 3 + 4 + 5 + 6 = 21$;

$1 + 2 + 3 + 4 + 5 + 6 + 7 = 28$;

$1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 = 36$;

We can see the smallest common number in both the series = 36, the smallest number that can be shown both as a square and a triangle of dots.

8. 0 is the smallest whole number.

So there is no predecessor of 0 in whole numbers.

9. $3 + 4 + 5 + 895 + 896 + 897$

$= 895 + 5 + 896 + 4 + 897 + 3$ (using associativity of addition)

$= 900 + 900 + 900 = 2700$

10. Solve according to Example 7.

Exercise 3.1

1. Take help of the Answer Sheet.

2. (a) $4 - (5 - 6 \div 3) = 4 - (5 - 2) = 4 - 3 = 1$

(b) $15 - (3 \times 4) + 6 = 15 - 12 + 6 = 15 + 6 - 12 = 21 - 12 = 9$

(c) $48 \div (5 + 7) = 48 \div 12 = 4$

(d), (e), (f), (g), (i), (j) : Solve according to Example 3

(h), (k), (m) : Solve according to Example 4.

(l) : $4 + 48 \div 12 \times 4 - 7 = 4 + 4 \times 4 - 7 = 4 + 16 - 7$
$= 20 - 7 = 13$

3. 4. Take help of the Answer Sheet.

5. $80 \div 10 \div 4 \div 2 = 8 \div 4 \div 2 = 2 \div 2 = 1$

Exercise 3.2

1. to **6** : Take help of the Answer Sheet.

7. : 6 and 28 are two examples of perfect numbers.

All the factors of 6 = 1, 2, 3, 6

$1 + 2 + 3 + 6 = 6 + 6 = 2 \times 6$ = twice the number 6.

All the factors of 28 = 1, 2, 4, 7, 14, 28

$1 + 2 + 4 + 7 + 14 + 28 = 28 + 28$ = twice the number 28.

8 to **16** : Take help of the Answer Sheet.

17 : Solve according to example 12.

Exercise 3.3

1 to **2** : Take help of the Answer Sheet.

3. Solve according to Example 13.

4. Solve according to Example 13 and 14.

5 to **8** : Take help of the Answer Sheet.

9. A square number has at least 3 factors so it is not a composite number. For example, 49 has 3 factors 1, 7 and 49

10 to **16**, **18** : Take help of the Answer Sheet.

17. The number having 5 in the one's place of a number is divisible by 5, that is, one of its factors is 5. Thus, it has at least three factors : 1, 5 and the quotient obtained by dividing the number by 5.

19 to 23. Take help of the Answer Sheet.

24. Squares of prime numbers : $4 = 1 \times 2 \times 2$, $9 = 1 \times 3 \times 3$, $25 = 1 \times 5 \times 5$, $49 = 1 \times 7 \times 7$; each has exactly three factors.

25. Writing the prime numbers between 1 and 100 in descending order : 97, 89, 83, 79, 73, 71, ... We see 89 is the greatest prime number with consecutive digits 8 and 9.

Exercise 3.4

1. Solve according to Example 17.

2. Solve according to Example 18.

3. Solve according to Example 16.

4. Solve according to Example 19.

5. (a) – 1234 : sum of digits = 1 + 2 + 3 + 4 = 10

To make the number divisible by 3, add 2 to make it 12, the next number which is divisible by 3. So the smallest digit to make the number divisible by 3 is 2.

(b) to (e) : Solve according to (a).

6. 9 – 23889 : Sum of digits = 9 + 2 + 3 + 8 + 9 = 31

To make the number divisible by 9, add 5 to 31 to make it 36, the next number which is divisible by 9.

So the smallest digit to make the number divisible by 9 is 5.

(b) to (e) : Solve according to (a).

7. Divisibility by 2 : Check if the ones digit is 0, 2, 4, 6 or 8.

Divisibility by 3 : Add the digits and check if the sum is divisible by 3.

Divisiblity by 5 : Check if the ones digits is 0 or 5.

Divisiblity by 9: Add the digits and check if the sum is divisible by 9.

Divisiblity by 11 : Add the alternate digits and the remaining digits separately· Check if the difference of these sums is 0 or divisible by 11.

Divisibility by 4 : Check whether the number formed by last two digits is divisible by 4.

Divisibility by 8 : Check whether the number formed by last three digits is divisible by 8.

8. (a) 28 is divisible by 2 but not by 3.
28 has the digit 8 at ones place which is divisible by 2, so 28 is divisible by 2.
The sum of digits = 2 + 8 = 10 which is not divisible by 3, so 28 is not divisible by 3
(b) to (e) : Solve according to (a).
(f) All the factors of 40 = 1, 2, 4, 5, 8, 10, 20, 40
2 and 8 are factors of 40 so 40 is divisible by 2 and 8·
16 is not a factor of 40 so 40 is not divisible by 16.

9. Solve according to Q. 6.

10. Take help of the Answer Sheet.

11. 25110 has 0 at ones place so it is divisible by 5.
Sum of digits = 2 + 5 + 1 + 1 + 0 = 9, so it is divisible by 9.
Thus 25110 is divisible by 5 × 9, that is , 45.

12 to 15. Take help of the Answer Sheet.

16. Total of digits of the number = 1 + 2 + 3 + 4 + 5 + 6 + 7 = 28. The numbers divisible by 3 less than 28 are 27 and 24. 24 is divisible by 3 but not by 9. So the least number = 28 – 24 = 4 that should be subtracted.

Exercise 3.5

1. Solve according to Example 23.

2. (a) all prime factors (b) factor 4 is not prime
(c) factor 9 is not prime (d) all prime factors

3. Greatest three digit number = 999

4. Smallest four digit number = 1000
Find the prime factors of Q. 3., 4. and 5. according to Example 24.

6. 1 is not a prime factor.
So 5 = 1 × 5 is not the prime factorisation of 5.

7. 8. Take help of the Answer Sheet.

Exercise 3.6

1. (a) All the factors of 18 = 1, 2, 3, 6, 9, 18
(b) All the factors of 24 = 1, 2, 3, 4, 6, 8, 12, 24
(c) All the factors of 30 = 1, 2, 3, 5, 6, 10, 15, 30
Common factors of 18, 24 and 30 are 1, 2, 3, 6,
In these common factors, 6 is the highest.
Highest common factor of 18, 24 and 30 = 60
(b) to (f) : Solve according to (a).

2. Solve according to Example 27 and 28 separately.

3. and **4** : Solve according to Example 29.

5. Solve according to Example 31 and 32.

6. Solve according to example 30.

7. 21 and 55 have no prime factor common, but they have 1 as common factor (both are divisible by 1). So HCF of 21 and 55 is 1.
0 is not a factor of either 21 or 55· So 0 is not HCF of 21 and 55.

8 to 10. Take help of the Answer Sheet.

11. 72 ÷ 8 = 9 Possible sets of different numbers whose sum is 9 is 1 + 2 + 6 = 9, 1 + 3 + 5 = 9, 2 + 3 + 4 = 9. Multiply each set by 8. Possible sets of such three numbers are 8; 16; 48 and 8; 24; 40 and 16; 24; 32

Exercise 3.7

1, **2**, and **3** Solve according to Example 33.

4. to **7.** Solve according to Example 34.

8. HCF is the greatest common divisor.

609) 957 (1
609
348) 609 (1
348
261) 348 (1
261
87) 261 (3
261
0

87 is the greatest common divisor of 609 and 957.

9. Solve according to Q. 8.

10 and **11** : Solve according to Example 35.

12. Solve according to the Hint given.

Exercise 3.8

1. Solve according to Example 36 and 37.

2. Solve according to Example 38.

3 to **5** : Solve according to Example 39.

6 and **7** : Solve according to Example 45.

8, 9, **12** : Solve according to Example 46.

10. Solve according to Example 43.

11. HCF × LCM = Product of the numbers
16 × LCM = 6400

$$\text{LCM} = \frac{6400}{16} = 400$$

13.

2	2, 3, 4, 5, 6
3	1, 3, 2, 5, 3
	1, 1, 2, 5, 1

LCM of 2, 3, 4, 5 and 6 = 2 × 3 × 2 × 5 = 60

Now divide 1000 by 60.

60) 1000 (16
60
400
360
40

Two numbers nearest to 1000, which are exactly divisible by 60 are 16 × 60 = 960 and 17 × 60 = 1020

So 960 and 1020 are exactly divisible by 2, 3, 4, 5 and 6.

14. HCF of two numbers is a factor/exact divisor of their LCM. So we divide 252 by 18.

252 ÷ 18 = 14; 252 is exactly divisible by 18, so two numbers can have 18 as their HCF and 252 as their LCM.

15. (a) 8 and 9 have no common factor so they are coprime. Their LCM is their product = 8 × 9 = 72

(b) to (d) : Solve according to (a).

(e) 30 is a multiple of 6. So 30 is the LCM.

(f) to (h) : Solve according to (e).

16 to 20. Take help of the Answer Sheet.

21. Find LCM of 8 and 12 = 24

Sixth multiple of 24 = 144

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. The squares of prime numbers have exactly three factors.

They are 2^2, 3^2, 5^2, 7^2 = 4, 9, 25, 49

2. 90, 91, 92, 93, 94, 95, 96

3. The number formed by the last three digits is 976. Dividing 976 by 8 we get 122 with no remainder. so 31795976 is divisible by 8.

4. Solve according to Example 21.

5. Smallest prime number is 2. Next smallest are 3, 5, 7. Smallest number having four different prime factors = 2 × 3 × 5 × 7 = 210

6. 6 × 9 = 2 × 3 × 3 × 3

8 × 3 = 2 × 2 × 2 × 3

12 × 5 = 2 × 2 × 3 × 5

HCF = product of common factors in all the three numbers

= 2 × 3

= 6

Exercise 4.1

1, **2**, **3**, **4**, **5**, **7**, **8**, **9**, **10 to 16** : Take help of the Answer Sheet.

3. and **6.** : Draw yourself. **17** : No, end-points different.

Exercise 4.2

1, **2**, **3**, **5**, **6**, **7**, **8**, **9**, **11**, **13 to 18** : Take help of the Answer Sheet.

4, **10**, **12, 19, 20** : Draw yourself.

Exercise 4.3

Take help of the Answer Sheet.

Exercise 4.4

1, **4**, **to 10** : Take help of the Answer Sheet.

2, **3**, Draw yourself.

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1 to **3** : Take help of the Answer Sheet.

4. Draw yourself.

Exercise 5.1

Do yourself.

Exercise 5.2 to 5.6

Take help of the Answer Sheet

Mental Maths, MCQs and HOTs

Take help of the Answer Sheet.

Exercise 6.1

Take help fo the Answer Sheet.

Exercise 6.2

1 to **4**, **7** : Take help of the Answer Sheet.

5. (a) $-48 + 48 = -(48 - 48) = 0$

(b) $-250 + 150 = -(250 - 150) = -100$

(c) $-217 + (-100) = -317$ (d) $380 + (-270) = 110$

(e) $-60 + (-150) + 180 = -210 + 180 = -180 - 30 + 180 = -30$

(f) $192 + (-15) + (-84) = 192 + (-99) = 93$

6. (a) $(-6) + (-7) + 5 + 22 = -13 + 27 = 14$

(b) $30 + (-23) + (-63) + (+55) = 30 + 55 + (-23) + (-63)$

$= 85 + (-86) = -86 + 85 = -85 - 1 + 85 = -1$

(c) $(-10) + (29) + (38) + (-15) = 29 + 38 + (-15) + (-10)$
$= 67 + (-25) = 42$

(d) $37 + (-5) + (-65) + (-7) = 37 + (-77) = -77 + 37 =$
$= -40 - 37 + 37 = -40$

8. To find the height of the ice berg from the base to the tip, we first measure upside from there base to the sea level + 990 m, then upside from the sea level to the tip = + 110 m.
Total = +990 m + 110 m = + 1100 m
Both measures are upside so positive sign is taken each time.

9. Position of Sarali's friends's house = + 100m
Position of Sarali's school = – 300 m
Distance of her school from her house = 100 m + (– 300 m)
= 100 m – 100 m – 200 m
= – 200 m
Her school is 200 m to the west of her house.

10 to 15. Take help of the Answer sheet.

16. Let two negative integers be – 3 and – 6. Their sum = – 3 + (– 6) = – 9. $-9 < -3$ and $-9 < -6$

Exercise 6.3

1. $(-10) - (-5) = -10 +$ (additive inverse of -5) $= -10 + 5 = -5$

2. $(-10) - (+10) = -10 +$ (additive inverse of $+10$)
$= -10 + (-10) = -20$

3. (a), (c), (e) : Solve according to Q. 1.
(b), (d) : Solve according to Q. 2.

4. Take help of the Answer Sheet.

5. (a) $(-4) - 5 - (-10) = -9 +$ (additive inverse of -10)
$= -9 + 10 = 1$

(b) $(-22) + 28 - 7 - 2 = (-22) - 7 - 2 + 28 = -31 + 28 = -3$

(c) $(-9) + (-7) + (-84) = -100$

(d) $30 - (-10) - (-5) = 30 +$ (additive inverse of -10) + (additive inverse of -5)
$= 30 + 10 + 5 = 45$

6. Solve according to Q. 1 and 2.

7. (a) Sum of – 40 and 70 = – 40 + 70 = 30
Subtracting 30 from – 35 we get
– 35 – (30) = – 35 + (additive inverse of 30) = – 35 – 30 = – 65

(b) Sum of 65 and – 45 = 65 + (– 45) = 20
Sum of – 38 and 75 = – 38 + 75 = 37
Subtracting 20 from 37 we get : 37 – 20 = 17

8. Position of submarine = – 40 m
The rocket rose = + 350 m
The rocket went = – 40 m + 350 m = 310 m above the sea level

9. (a) – 4 + (– 5) ☐ (– 4) – (– 5) ⇒ – 9 ☐ – 4 + 5 ⇒ – 9 ☐ 1
⇒ – 9 < 1
(b), (c); Sove according to (a).

10. (a) 15 – 155 = – (155 – 15) = – 140
(b) 365 – 515 = – (515 – 365) = – 150
(c) – 200 – (– 102) = – 200 + 102 = – 98

11. Other integer = 22 – (– 5) = 22 + 5 = 27

12. Other integer = – 23 – 12 = – 35

13 to 16. Take help of the Answer Sheet.

17. = 1 + 1 + 1 + 1 + ... 1 + 1 = 15

18. 1 – 100 = – 99

Mental Maths and MCQs (Multiple Choice Questions)

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Add 2 to – 6 = – 6 + 2 = – 4
– 4 is smaller than – 3.

2. 0 has no exact opposite integer.
The exact opposite integer of 1 = – 1

3. – 10 m < – 1 m < 200 m
So the turtle is between the other two.

4. (– 3) + (– 2) + (– 1) + 0 + 1 + 2 + 3
= (– 3) + 3 + (– 2) + 2 + (– 1) + 1 + 0 = 0
Similary, (– 100) + (– 99) + ····· + 0 ····· 99 + 100
= (– 100) + 100 + (– 99) + 99 + ····· + 0 = 0

5. 1 – 2 + 3 – 4 + 5 – 6 + ·····
We see odd numbers are positive and even numbers are negative so, the series extends to
(a) 1 – 2 + 3 – 4 + 5 – 6 + ···· + 99 + (– 100)
= (– 1) + (– 1) + (– 1) + ···· (– 1) = – 50 [100÷2 terms]
(b) 1 – 2 + 3 – 4 + 5 – 6 + ···· + 99 + (– 100) + 101
= (– 1) + (– 1) – (– 1) + ···· (– 1) + 101 = – 50 + 101 = 51

6. A drop of 2°C = – 2°C
So the expression for the situation = – 3°C – 2°C – 2°C = – 7°C

7. Image of every negative integer is the positive integer of the same absolute value on the number line.

So the image of – 1001 = + 1001 or 1001

8. (a) lose 3 degrees = – 3°C

At noon the temperature = – 3°C – 3°C = – 6°C

(b) 7 degrees below zero = – 7°C

drop of 2°C = – 2°C

The temperature in the morning = – 7°C – 2°C = – 9°C

(c) Position of the rocket in the submarine = – 10 m

But it rose upwards so positive = + 500 m

Final position of the rocket = – 10 m + 500 m = + 490 m (above sea level)

Exercise 7.1

1. Take help of the Answer Sheet.

2. Shade yourself.

3. 1 day = 24 hours so 6 hours = $\frac{6}{24} = \frac{1}{4}$ of a day

4. 1 hour = 60 minutes so 15 minutes = $\frac{15}{60} = \frac{1}{4}$ of an hour

5. Numbers between 1 and 12 do not include 1 and 12 :

2, 3, 4, 5, 6, 7, 8, 9, 10, 11 (ten)

Prime numbers are 2, 3, 5, 7, 11 (five)

Fraction of prime numbers = $\frac{5}{10} = \frac{1}{2}$

6, **8, 9**, **10, 11, 12** : Take help of the Answer Sheet.

7. (a) The two parts are not equal, so the shaded part is not $\frac{1}{2}$.

(b) The four parts are not equal, so the shaded part is not $\frac{1}{4}$.

(c) Total number of equal parts is 9, so one part is $\frac{1}{9}$ (and not $\frac{1}{8}$).

Shaded part is $\frac{8}{9}$ and unshaded part is $\frac{1}{9}$.

13. Natural numbers are 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,..... Odd numbers are 1, 3, 5, 7, 9, ... Obviously odd numbers are $\frac{5}{10} = \frac{1}{2}$ of the natural numbers.

Exercise 7.2

1. (a) Mark 5 equal distances/parts on number line. Take them $\frac{1}{5}, \frac{2}{5}$ .....

$\frac{5}{5}$. Mark 5 more equal distances/parts. Take them $\frac{6}{5}$, $\frac{7}{5}$ ..... $\frac{10}{5}$,

Now mark the given fractions.

(b), (c) : Solve according to (a).

2. (a) $2\frac{4}{5} = \frac{2 \times 5 + 4}{5} = \frac{10 + 4}{5} = \frac{14}{5}$

(b) to (e) : Solve according to (a).

3. (a) $\frac{31}{14} = 31 \div 4 =$ Quotient = 7, Remainder = 3

So $\frac{31}{4} = 7\frac{3}{4}$

(b) to (e) : Solve according to (a).

4. Solve according to 2 (a).

5. (a) $1 + \frac{1}{2} = 1\frac{1}{2}$ (b) $1 + \frac{2}{3} = 1\frac{2}{3}$ (c) $1 + \frac{1}{4} = 1\frac{1}{4}$

6. 7. Take help of the Answer Sheet.

Exercise 7.3

1. Take help of the Answer Sheet.

2. Solve according to Example 6.

3. Solve according to Example 7.

4. (a) $\frac{30}{75}$ has numerator 30 and denominator 75.

HCF of 30 and 75 = $3 \times 5 = 15$

Now $\frac{30}{75} = \frac{30 \div 15}{75 \div 15} = \frac{2}{5}$

(b) to (e) : Solve according to (a).

5. Solve according to Example 8.

6. (a) and (c) : Solve according to Example 10.
(b) and (d) Solve according to Example 9.

7. (a), (c) : Solve according to Example 11.

(b) We have $\frac{45}{105} = \frac{\square}{7}$; $105 \div 7 = 15$

Divide 45 and 105 both by 15 to get equivalent fraction,

$\frac{45}{105} = \frac{45 \div 15}{105 \div 15} = \frac{3}{7}$

(d) Solve according to (b).

8. (a) We have $\frac{26}{78}$ and $\frac{4}{13}$

Numerator of the first fraction × denominator of the second = 26 × 13 = 338

Numerator of the second fraction × denominator of the first = 4 × 78 = 312

The products are different, so $\frac{26}{78}$ and $\frac{4}{13}$ are not equivalent fractions.

(b) We have $\frac{16}{20}$ and $\frac{20}{25}$

Numerator of the first fraction × denominator of the second = 16 × 25 = 400

Numerator of the second fraction × denominator of the first = 20 × 20 = 400

The products are equal, so $\frac{16}{20}$ and $\frac{20}{25}$ are equivalent fractions.

(c) Solve according to (a)

(d) Solve according to (b)

9. Solve according to Q. 6. and 7.

10. Fractions = $\frac{6}{8}, \frac{9}{12}, \frac{15}{20}$

If we simplify the fractions, we get,

$\frac{6}{8} = \frac{6 \div 2}{8 \div 2} = \frac{3}{4}; \frac{9}{12} = \frac{9 \div 3}{12 \div 3} = \frac{3}{4}, \frac{15}{20} = \frac{15 \div 5}{20 \div 5} = \frac{3}{4}$

So the fractions are equivalent.

(We can check the equivalence as in Q. 8.)

We can see that the size of the quadrilateral does not make a difference for the fractions in being equivalent.

11 to 13. Take help of the Answer Sheet.

14. $\frac{1}{4} = \frac{1 \times 2}{4 \times 2} = \frac{2}{8}$ (equivalent fraction). Each can take $\frac{1}{8}$ of the cake.

Exercise 7.4

1. Take help of the Answer Sheet and Example 12,

2. (a) Denominators are equal, so the fraction with a greater numerator is greater, so $\frac{7}{5} > \frac{3}{5}$

(b) Numerators are equal, so the fraction with a smaller denominator is greater, $\frac{1}{3} > \frac{1}{5}$

(c) Solve according to (b).

(d) Numerators are equal, so the fractions with a greater denominator is smaller, so $\frac{7}{15} < \frac{7}{13}$.

3, **4.** (a) : Solve according to Example 12.

(b), (c) : Solve according to Example 13.

5, **6**, **7** : Solve according to Example 15.

8. In $\frac{1}{4}$ and $\frac{1}{5}$, numerators are the same, so the fraction having smaller denominator is greater, Thus $\frac{1}{4} > \frac{1}{5}$

Sonia drank more juice.

9. Mohit read $\frac{32}{64} = \frac{1}{2}$ fraction of the book.

Sheela read $\frac{3}{8}$ part (fraction) of the book.

By making denominators same,

$8 \div 2 = 4$, $\frac{1}{2} = \frac{1 \times 4}{2 \times 4} = \frac{4}{8}$

$\frac{4}{8} > \frac{3}{8}$ or $\frac{1}{2} > \frac{3}{8}$ so Mohit read more.

10. We have $\frac{2}{3}$ and $\frac{3}{5}$ part of the cake.

By cross multiplication,

$$\frac{2}{3} \times \frac{3}{5}$$

$$2 \times 5 = 10 \qquad 3 \times 3 = 9$$

$$10 > 9$$

So $\frac{2}{3} > \frac{3}{5}$ or $\frac{3}{5} < \frac{2}{3}$

Monu ate less.

11. $2\frac{1}{7} = \frac{7 \times 2 + 1}{7} = \frac{14 + 1}{7} = \frac{15}{7}$ Obviously $\frac{16}{7}$ lies between $\frac{15}{7}$ and $\frac{17}{7}$

Exercise 7.5

1, **2** : Take help of the Answer Sheet.

3. Solve according to Example 16.

4. Solve according to Example 17.

5. Solve according to Example 18.

6. Solve according to Example 19.

7. Fraction of apples left in the basket $= 1 - \frac{2}{7} = \frac{1}{1} - \frac{2}{7}$

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

8. Add according to Example 16.

9, **15** : Add according to Example 18.

10, **12**, **13** : Subtract according to Example 17.

11. One piece of the cake $= \frac{1}{5}$ of the whole cake

Cake taken by Seema and her brother $= \frac{1}{5} + \frac{1}{5} = \frac{2}{5}$

Cake left $= 1 - \frac{2}{5} = \frac{5}{5} - \frac{2}{5} = \frac{3}{5}$

14. Add according to example 18.

16. Fraction of boys = two-third $= \frac{2}{3}$

Fraction of girls $= 1 - \frac{2}{3} = \frac{3}{3} - \frac{2}{3} = \frac{1}{3}$

17. Subtract according to Example 19.

18. Distance travelled on scooter and bicycle $= 10\frac{1}{2} + 2\frac{1}{5}$

$= \frac{21}{2} + \frac{11}{5} = \frac{21 \times 5 + 11 \times 2}{10} = \frac{105 + 22}{10} = \frac{127}{10}$ km

Total distance travelled $= 13\frac{3}{4}$ km $= \frac{55}{4}$ km

Distance travelled on foot $= \frac{55}{4} - \frac{127}{10}$

$= \frac{55 \times 5 - 127 \times 2}{20} = \frac{275 - 254}{20} = \frac{21}{20} = 1\frac{1}{20}$ km

19. 20 . Take help of the Answer Sheet.

21. Solve according to Q. 18.

Mental Maths & MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Fraction of total foffees eaten

$= \frac{\text{Number of tofees eaten}}{\text{Number of total toffees}} = \frac{2}{4} = \frac{1}{2}$

2. Even numbers are divisible by 2, Every second number is even. So $\frac{1}{2}$

(half) of the natural numbers are even numbers.

3. To divide $\frac{1}{3}$ bread into two children, multiply the numerator and denominator each by two :

$\frac{1}{3} = \frac{1 \times 2}{3 \times 2} = \frac{2}{6} = \frac{1}{6} + \frac{1}{6}$

So each of the children will get $\frac{1}{6}$ bread.

4. Solve according to Example 14 (alternate short method)

5. Solve according to Q. 10 of Exercise 7·4.

6. Lengh of the thread left $= 15\frac{2}{5}$ m $- 9\frac{3}{5}$ m

$= \frac{15 \times 5 + 2}{5}$ m $- \frac{9 \times 5 + 3}{5}$ m $= \frac{77}{5}$ m $- \frac{48}{5}$ m

$= \frac{77 - 48}{5}$ m $= \frac{29}{5}$ m $= 5\frac{4}{5}$ m

Exercise 8.1

1, 2 : Take help of the Answer Sheet.

3. Shade yourself.

4. (a) 1 hundreds 3 tens 2 ones 1 tenth

(b) 1 hundreds 3 tens 1 ones 2 tenths

5. Length of Ravi's pencil = 83 mm $= \frac{83}{10}$ cm = 8·3 cm

Length of Sonia's pencil = 77 mm $= \frac{77}{10}$ cm = 7·7 cm

6. Length of my notebook = 21 cm 5 mm = 21 cm $\frac{5}{10}$ cm

= 21 cm + ·5 cm = 21·5 cm

7. (a) $\frac{7}{10} = \cdot 7 = 0 \cdot 7$ (b) $4 + \frac{3}{10} = 4 + \cdot 3 = 4 \cdot 3$

(c) $\frac{72}{10} = \frac{70 + 2}{10} = \frac{70}{10} + \frac{2}{10} = 7 + \frac{2}{10} = 7 \cdot 2$

(d) $5\frac{7}{10} = 5 \cdot 7$ (e) $54\frac{6}{10} = 54 \cdot 6$

(f) $\frac{3}{2} = \frac{3 \times 5}{2 \times 5} = \frac{15}{10} = \frac{10 + 5}{10} = \frac{10}{10} + \frac{5}{10} = 1 + \frac{5}{10} = 1 \cdot 5$

(g) $\frac{3}{5} = \frac{3 \times 2}{5 \times 2} = \frac{6}{10} = \cdot 6 = 0 \cdot 6$

(h) $3\frac{1}{2} = 3 + \frac{1}{2} = 3 + \frac{1 \times 5}{2 \times 5} = 3 + \frac{5}{10} = 3 \cdot 5$

(i) $4\frac{2}{5} = 4 + \frac{2}{5} = 4 + \frac{2 \times 2}{5 \times 2} = 4 + \frac{4}{10} = 4{\cdot}4$

(j) $\frac{13}{5} = \frac{10 + 3}{5} = \frac{10}{5} + \frac{3}{5} = 2 + \frac{3}{5} = 2 + \frac{3 \times 2}{5 \times 2} = 2 + \frac{6}{10} = 2{\cdot}6$

(k) $300 + 80 + 9 + \frac{3}{10} = 389 + \frac{3}{10} = 389{\cdot}3$

(l) $600 + 50 + 4 + \frac{7}{10} = 654 + \frac{7}{10} = 654{\cdot}7$

8. Do yourself.

9. P is at 7th mark out of 10 marks (1 divided into 10 marks)

P → 0·7 ; Q → 1·6 ; R → 2·3 ; S → 2·8

10. (a) $1{\cdot}6 = \frac{16}{10} = \frac{16 \div 2}{10 \div 2} = \frac{8}{5} = 1\frac{3}{5}$

(b) $0{\cdot}5 = \frac{16}{10} = \frac{5 \div 5}{10 \div 5} = \frac{1}{2}$

(c), (d), (e) : Solve according to (a).

11. (a) 15 mm = $\frac{15}{10}$ cm = 1·5 cm

(b) 4 mm = $\frac{4}{10}$ cm = ·4 cm = 0·4 cm

(c) 94 mm = $\frac{94}{10}$ cm = 9·4 cm

(d) 127 mm = $\frac{127}{10}$ cm = 12·7 cm

(e) 40 cm 3 mm = 40 cm + ·3 cm = 40·3 cm

12. Take help of the Answer Sheet.

13. Write in the place value table as shown in Example 2.

Exercise 8.2

1. (a) $\frac{17}{100} = {\cdot}17 = 0{\cdot}17$ (b) $\frac{25}{100} = \frac{25 \div 25}{100 \div 25} = \frac{1}{4}$; $\frac{25}{100} = {\cdot}25 = 0{\cdot}25$

(c) $\frac{36}{100} = \frac{36 \div 4}{100 \div 4} = \frac{9}{25}$; $\frac{36}{100} = {\cdot}36 = 0{\cdot}36$

(d) $\frac{35}{100} = \frac{35 \div 5}{100 \div 5} = \frac{7}{20}$; $\frac{35}{100} = {\cdot}35 = 0{\cdot}35$

2. Take help of the Answer Sheet.

3. (a) $\frac{3}{10} = 0{\cdot}3$ (b) $\frac{7}{10} = 0{\cdot}7$ (c) $\frac{18}{10} = 1{\cdot}8$ (d) $\frac{23}{10} = 2{\cdot}3$

(e) $1\frac{2}{10} = 1{\cdot}2$ (f) 9·7 (g) $\frac{3}{100} = 0{\cdot}03$ (h) $\frac{9}{100} = 0{\cdot}09$

(i) $\frac{21}{100}$ = 0·21 (j), (k), (l) : Solve according to (i)

(m) $\frac{2}{1000}$ = 0·002 (n) $\frac{13}{1000}$ = 0·013 (o) $\frac{75}{1000}$ = 0·075

(p) $\frac{227}{1000}$ = 0·227 (q) $\frac{575}{1000}$ = 0·575 (r) $2\frac{373}{1000}$ = 2·373

4. Take help of the Answer Sheet.

5. Solve according to the place value table given before Exercise 8·2 in the text book.

6. Take help of the Answer Sheet.

7. (a) 0·03 lies between 0 and 0·10

(b) 0·17 lies between 0·10 and 0·20

(c) 0·43 lies between 0·40 and 0·50

(d) 0·55 lies between 0·50 and 0·60

(e) 0·94 lies between 0·90 and 1·00

8. (a) $243 + \frac{7}{100} = 243 + \frac{0}{10} + \frac{7}{100} = 243{\cdot}07$

(b) $40 + 5 + \frac{3}{10} = 45 + {\cdot}3 = 45{\cdot}3$

(c) $500 + 60 + 4 + \frac{9}{100} = 564 + \frac{0}{10} + \frac{9}{100} = 564{\cdot}09$

(d) $\frac{7}{10} + \frac{9}{100} + \frac{3}{1000} = {\cdot}793 = 0{\cdot}793$

(e) $56 + \frac{6}{10} + \frac{8}{1000} = 56 + \frac{6}{10} + \frac{0}{100} + \frac{8}{1000} = 56{\cdot}608$

9. (a) $0{\cdot}50 = \frac{50}{100} = \frac{1}{2}$ (b) $0{\cdot}25 = \frac{25}{100} = \frac{25 \div 25}{100 \div 25} = \frac{1}{4}$

(c) $0{\cdot}75 = \frac{75}{100} = \frac{75 \div 25}{100 \div 25} = \frac{3}{4}$ (d) $0{\cdot}125 = \frac{125 \div 125}{1000 \div 125} = \frac{1}{8}$

(e) $21{\cdot}48 = 21 + {\cdot}48 = 21 + \frac{48}{100} = 21 + \frac{48 \div 4}{100 \div 4} = 21 + \frac{24}{25} = 21\frac{24}{25}$

10 to 13. Take help of the Answer Sheet.

14. $1000 \div 8 = 125$; $\frac{1}{8} = \frac{1 \times 125}{8 \times 125} = \frac{125}{1000} = 0{\cdot}125$

15. Solve according to Example 11.

Exercise 8.3

1. Colour yourself.

2. Solve according to Example 15.

3 and **4** : Take help of the Example 15 and rules before it.

5. (a) 7 paise = ₹ $\frac{7}{100} = \frac{0}{10} + \frac{7}{100}$ = ₹ 0·07

(b) 30 paise = ₹ $\frac{30}{100}$ = ₹ 0·30

(c) 1 rupee 50 paise = 1 rupee + $\frac{50}{100}$ rupee = ₹ 1·50

(d) 2 rupees 5 paise = ₹ 2 + ₹$\frac{5}{100}$ = ₹$\left(2 + \frac{0}{10} + \frac{5}{100}\right)$ = ₹ 2·05

(e) 1 rupee 50 paise = ₹ 1 + ₹$\frac{50}{100}$ = ₹ 1·50

(f) 9 rupee 8 paise = ₹ 9 + ₹$\frac{8}{100}$ = ₹ $\left(9 + \frac{0}{10} + \frac{8}{100}\right)$ = ₹ 9·08

6. (a) 5 mm = $\frac{5}{10}$ cm = 0·5 cm

(b) 96 mm = $\frac{96}{10}$ cm = 9·6 cm

(c) 50 mm = $\frac{50}{10}$ cm = 5·0 cm = 5 cm

(d) 186 mm = $\frac{186}{10}$ cm = 18·6 cm

(e) 9 cm 4 mm = 9 cm + $\frac{4}{10}$ cm = 9·4 cm

7 to **13** : Take help of the Answer Sheet.

14. 0·4 = 0·40, So 0·40 > 0·35

Exercise 8.4

1. Solve according to Example 16.

2. Solve according to Example 17.

3. Solve according to Example 18 and 19.

4. (a)
$$\begin{array}{r} 8{\cdot}356 \\ -\ 5{\cdot}280 \\ \hline 3{\cdot}076 \end{array}$$

(b)
$$\begin{array}{r} 10{\cdot}500 \\ -\ 8{\cdot}784 \\ \hline 1{\cdot}716 \end{array}$$

5 to **8** : Solve according to Example 16 and 17.

9. Solve according to Example 18.

10.

Weight of potatoes = 2 kg 500 g	= 2·500 kg
Weight of onions = 1 kg 75 g	= 1·075 kg
Weight of both	= 3·575 kg
Total weight of vegetables = 5 kg	= 5·000 kg
Weight of potatoes and onions	= 3·575 kg
Weight of tomatoes	= 1·425 kg

11. Value of note = ₹ 50 = ₹ 50·00 m
Cost of book = ₹ 27·75
Money returned to Nancy = ₹ 22·25

12. Height of Sam = 1·3 cm = 1·30 m
Height of Tina = 1·25 m
Difference = 0·05 m
Tenth digit in 1·3 is 3 and in 1·25 is 2.
3 > 2 so 1·3 > 1·25
Thus Sam is taller by 0·05 m.

13, **15, 19** : Solve according to Q. 10.

14. Solve according to Example 17.

16. 17. Take help of the Answer Sheet.

18. Place the numbers with decimal one above the other and add.

Mental Maths & MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Write 2·0 and 3·0 with 2 decimal places.
2·0 = 2·00 and 3·0 = 3·00.
Decimal fractions between 2·00 and 3·00 having digit 8 are 2·08, 2·18, 2·28, 2·38. 2·48, 2·58, 2·68, 2·78, 2·80, 2·81, 2·82, 2·83, 2·84, 2·85, 2·86, 2·87, 2·88, 2·89, 2·98
Number of these decimal fractions = 19

2. The tenths digit in 0·5 is greater than the tenths digit 2 in 0·27.
So 0·5 is greater than 0·27.

3. 1 m 5 cm = 1 m + $\frac{5}{100}$ m = 1 m + $\frac{0}{10}$ m + $\frac{5}{100}$ m = 1·05 m

4. $\frac{7}{100} = \frac{0}{10} + \frac{7}{100}$ = 0·07 (7 at hundredths place)

5. There is no method for this type of questions, only trial and error.
We put decimal point just after 1 digit starting from the leftmost digit and add.

2·340
7·024
8·530
1·269
19·163

2·34 + 7·024 + 8·53 + 1·269 = 19·163
19·163 is between 10 and 20.

Exercise 9.1

1, **2**, **3** : Solve according to Example 1.

4 to **8** : Solve according to Example 2 and 3.

Exercise 9.2

1 to **5** : Solve according to Example 4.

Exercise 9.3

1 to **5** : Solve according to Example 6. and 7.

Exercise 9.4

1 to **6** : Solve according to Example 8. and 9.

Exercise 10.1

1. Solve according to Example 1.

2. Length = 150 cm breadth = 1 m

Change 150 cm to m → 150 cm = $\frac{150}{100}$ m = 1·50 m = 1·5 m

Perimeter = 2 (length + breadth) = 2(1·5 + 1) = 2 × 2·5 = 5·0 = 5 m

3. Solve according to Example 3.

4, **5** : Solve according to Example 4.

6. Perimeter of the square park = 4 × side = 4 × 75 m = 300 m
Distance covered in 3 rounds = 3 × 300 m = 900 m

7. A regular hexagon has six equal sides.
Perimeter of the regular hexagon = 6 × 12 m = 72 m

8. Perimeter of a regular pentagon = 5 × side = 75 m
Its side = 75 m ÷ 5 = 15 m

9. (a) Perimeter of an equilateral triangle = 3 × side = 24 cm
Its side = 24 cm ÷ 3 = 8 cm
(b) Perimeter of a square = 4 × side = 24 cm
Its side = 24 cm ÷ 4 = 6 cm
(c) Perimeter of regular hexagon = 6 × side = 24 cm
Its side = 24 cm ÷ 6 = 4 cm

10. Solve according to Example 10.

11. Length of wooden strip = 20 × perimeter
= 20 × 2 (40 cm + 30 cm) = 40 × 70 cm = 2800 cm = 28 m

12. Quilt is rectangular. So the length of the border = perimeter = 2 × (length + breadth) = 2 × (2·50 + 1·40) m = 2 × 3·90 m = 7·80 m = 7·8 m

13. Double of breadth = length = 120 cm
⇒ 2 × breadth = 120 cm ⇒ breadth = 120 cm ÷ 2 = 60 cm
Perimeter of the rectangle = 2 × (length + breadth)
= 2 (120 + 60) cm = 2 × 180 cm = 360 cm

14. Number of possible rectangles = Numbers of possible pairs of its sides.
Solve according to Example 9.

15. Length of the fence = perimeter of the garden
= 2 × (length + breadth)
= 2 × (100 + 80) m
= 2 × 180 m = 360 m

Number of posts = 360 m ÷ 5 m = 72

Total length of the pipe for the posts = 72 × 2 m = 144 m

16. Solve according to Example 9.

17. 18. Take help of the Answer Sheet.

19. 15 = 3 × 5 and 10 = 2 × 5 Thus 15 m × 10 m is cut into 3 × 2 = 6 equal squares of 5 m × 5 m. Perimeter of each = 4 × 5 m = 20 m

20. Wire required to make rectangle = 2 × (8 + 4) cm = 2 × 12 = 24 cm.
Remaining wire = 45 cm – 24 cm = 21 cm

Side of the regular heptagon = 21 cm ÷ 7 = 3 cm.

21. Begin like Example 10.

Exercise 10.2

1, **2** : Solve according to Example 11.

3. Solve according to Example 12.

Exercise 10.3

1. Area of the table top = length × breadth = 4 m × (2 m 50 cm) = 4 m × 2·50 m = 10·00 m^2 = 10 m^2

2. Solve according to Q. 1.

3. Area of the square plot = side × side = 20 m × 20 m=400 m^2

4. Solve according to Example 14.

5. Solve according to Example 16.

6. Find area in each case and compare.

7. Area of a rectangle = length × breadth

breadth = area ÷ length

$$= \frac{2400\ m^2}{60\ m} = 40\ m$$

8. Area of the floor = length × breadth = 12 m × 10 m=120 m^2

Area of the carpet = length × breadth = 120 m^2

$\Rightarrow$ length × 75 cm = 120 m^2

$$\Rightarrow \text{ length} = \frac{120\ m^2}{75\ cm} = \frac{120\ m^2}{0{\cdot}75\ m} = \frac{120 \times 100}{75}\ m = 160\ m$$

9, **10** : Solve accrding to Example 16.

11. Area of the square plot = 250 m × 250 m = 62,500 m^2

Cost of levelling = ₹ 2 × 62,500 = ₹ 1,25,000

12. Area of the rectangle = Area of the square = side × side

= 80 cm × 80 cm

Length × breadth = length × 20 cm = 80 cm × 80 cm

$$\text{Length} = \frac{80\ cm \times 80\ cm}{20\ cm} = 320\ cm$$

13. Solve according to Example 17.

14. Solve according to Example 16.

15. 3 m 57 cm = 357 cm, 5 m 4 cm = 504 cm. Find their HCF to find the size. Solve the rest according to Example 16.

16. Solve according to Example 18.

17 to **19 :** Take help of the Answer Sheet.

20. (a) Let the side be x m. New side = 2x New area = $2x \times 2x = 4x^2$ Thus the area becomes 4 times

(b) (c) Solve according to (a)

21. Solve according to Q. 15.

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Perimeter of the equilateral triangle = 3 × side = 3 × 8 cm = 24 cm
Perimeter of the regular octagon = 8 × side
Now 8 × side = 24 cm ⇒ side = 24 cm ÷ 8 = 3 cm

2. Let the sides of the rectangle are a and b cm
Perimeter of the rectangle = 2 (a + b) = 100 cm

Each side is halved ⇒ the new length and breadth are $\frac{a}{2}$ and $\frac{b}{2}$.

New perimeter of the rectangle $= 2\left(\frac{a}{2}+\frac{b}{2}\right) = 2 \times \frac{1}{2}(a+b)$

$= (a+b)$

$2(a + b) = 100$ cm ⇒ $(a + b) = 100$ cm ÷ 2 = 50 cm

The perimeter now is 50 cm.

3. Let the side of the square = x
Area of the square = $x \times x = x^2$

(a) if its side is doubled ⇒ $2x$
New area of the square = $2x \times 2x = 4x^2 = 4 \times$ original area.
Thus the area becomes four times the original area

(b) If its side is halved ⇒ $\frac{x}{2}$
New area of the square = $\frac{x}{2} \times \frac{x}{2} = \frac{x^2}{4} = \frac{\text{Original area}}{4}$

Thus the area becomes one fourth of the original area.

4. Area = length × breadth = 24 cm²
Considering only whole number lengths of the sides
Possible pairs of its sides are pairs of factors :

$1 \times 24, 2 \times 12, 3 \times 8, 4 \times 6,$

Four rectangles are possible.

Perimeter of these four rectangles are

$2(1 + 24), 2(2 + 12), 2(3 + 8), 2(4 + 6)$

$= 50$ cm, 28 cm, 22 cm, 20 cm

(a) The rectangle with sides 1 cm and 24 cm has the greatest perimeter.

(b) The rectangle with sides 4 cm and 6 cm has the least perimeter.

5. Length (height) of the whole door = 2 m 5 cm = 2·05 m

Breadth of the whole door = 1·2 m

Area of the whole door = length × breadth

$= 2{\cdot}05 \text{ m} \times 1{\cdot}2 \text{ m} = 2{\cdot}460 \text{ m}^2$

$= 2{\cdot}46 \text{ m}^2$

Area of each pane = length × breadth

$= 35 \text{ cm} \times 20 \text{ cm} = 0{\cdot}35 \text{ m} \times 0{\cdot}20 \text{ m}$

$= 0{\cdot}0700 \text{ m}^2 = 0{\cdot}07 \text{ m}^2$

Area of four panes $= 4 \times 0{\cdot}07 \text{ m}^2 = 0{\cdot}28 \text{ m}^2$

Area of the wood = Area of the whole door – Area of four panes

$= 2{\cdot}46 \text{ m}^2 - 0{\cdot}28 \text{ m}^2 = 2{\cdot}18 \text{ m}^2$

Exercise 11.1

1. (a) Number of matchsticks required = $2n$

(b) Number of matchsticks required = $3n$

(c) Number of matchsticks required = $4n$

(d) Number of matchsticks required = $5n$

2. Observe the pattern in terms of the number of squares. First find the rule which helps to find the next term, that we see, add 3.

Number of squares	**Number of match sticks**		**Pattern**
1	4	=	$3 \times 1 + 1$
2	7	=	$3 \times 2 + 1$
3	10	=	$3 \times 3 + 1$
4	13	=	$3 \times 4 + 1$
n	?	=	$3 \times n + 1$

Therefore, the general term $= 3n + 1$

The number of matchsticks to form a number of squares (n) $= 3n + 1$

(b), (c), (d) : Solve according to (a).

3. (a) Solve according to 2 (a).

(b) The given pattern is 5, 9, 13, 17, 21, 25

We see the number increases by 4 each time.

So the pattern is $4 \times 1 + 1$, $4 \times 2 + 1$, $4 \times 3 + 1$, $4 \times 4 + 1$, $4 \times 5 + 1$, $4 \times 6 + 1$

Therefore the general term = $4 \times n + 1 = 4n + 1$

4 to **6** : Take help of the Answer Sheet.

7. Sonia's age = x years; younger means less age.
Sarita's age = Sonia's age – 3 years = $(x - 3)$ years

8, 9 : Take help of the Answer Sheet.

10. Sonia is 4 years younger than Maria.
Then Maria is elder than Sonia by 4 years.
Elder means more age.
Let Sonia's age is y years.
Maria's age = Sonia's age + 4 years
= $(y + 4)$ years

11, 12. Take help of the Answer Sheet.

Exercise 11.2

Take help of the Answer Sheet.

Exercise 11.3

1, **2**, **4**, **5**, **6** : Take help of the Answer Sheet.

3. $pq = p \times q = 2 \times 6 = 12$

7. (a) $a + b = 10 + 7 = 17$

(b) $a - b = 10 - 7 = 3$

(c) $ab = a \times b = 10 \times 7 = 70$

(d) $\frac{a}{b} = \frac{10}{7} = 1\frac{3}{7}$

8. We add, subtract, multiply q and 3 in different orders and divide q by 3 and divide 3 by q :

$$q + 3,\ q - 3,\ 3 - q,\ 3q,\ \frac{q}{3},\ \frac{3}{q}$$

9. We do the different operations with x, 4 and 9, not more than one operation of addition or subtraction and one operation of multiplication or division at one time:

$$x + 4,\ x + 9,\ x - 4,\ x - 9,\ 4 - x,\ 9 - x,\ 4x,\ 9x,$$

$$\frac{x}{4},\ \frac{x}{9},\ \frac{4}{x},\ \frac{9}{x},\ 4x + 9,\ 9x + 4,\ 4x - 9,\ 9x - 4,$$

$$\frac{x}{4} + 9,\ \frac{x}{9} + 4,\ \frac{x}{4} - 9,\ \frac{x}{9} - 4,\ \frac{4}{x} + 9,\ \frac{9}{x} + 4,\ \frac{4}{x} - 9,\ \frac{9}{x} - 4$$

Exercise 11.4

1. Price of oil per litre = 4 times the price of rice per kg
= $4 \times (₹\ p) = ₹\ 4p$

2. (a) Susan's age 6 years from now = (present age + 6) years
= $(y + 6)$ years

(b) Susan's age 4 years back = (present age – 4) years
= (y – 4) years

(c) Susan's mother's present age = 3 times Susan's age + 9 years
= (3y + 9) years

3. Length of the hall = 4 times its breadth – 5 m = (4b – 5) m

4. Distance travelled in hours = 3 × s km = 3 s km
Distance from Dehradun to Delhi = 3 s + 15 km

5. Let John's age = y years
John's uncle's age = 3 times older than John
= 3 × y = 3y years
John's aunt's age = 2 years younger than his uncle
= (3y – 2) years

6. Johny is at step x
Tony is 10 steps ahead = at (x + 10) steps.
Anthony is 10 steps behind = at (x – 10) steps
Total number of steps = 20 more than 3 times what Johny has reached
= 20 more than 3 × x = 3x + 20

7 to 9. Take help of the Answer Sheet.

Exercise 11.5

1. Take help of the Answer Sheet.

2. (a) For x = 15, LHS = x + 10 = 15 + 10 = 25 which is not equal to RHS.

So x = 15 does not satisfy the equation·

(b) For p = 10, LHS = p – 3 = 10 – 3 = 7 which is equal to RHS so p = 15 satisfies the equation.

(c) to (g) solve according to (a) or (b)·

(h) For l = 5, LHS = 2 l + 3 = 2 × 5 + 3 = 10 + 3 = 13 which is not equal to RHS. So l = 5 does not satisfy the equation.

3. Solve according to Example 14.

4. Solve according to Example 15.

5. (a) to (e). Solve according to Example 16.

(f) 3 x + 2 = 14

$\Rightarrow$ $3x + 2 - 2 = 14 - 2$ (Subtracting 2 from each side)

$\Rightarrow$ $3x = 12$

$\Rightarrow$ $\frac{3x}{3} = \frac{12}{3}$ (Dividing both sides by 3)

$\Rightarrow \quad x = 4$

(g) $5x - 3 = 12$

$\Rightarrow \quad 5x - 3 + 3 = 12 + 3$ (Adding 3 on both sides)

$\Rightarrow \quad 5x = 15$

$\Rightarrow \quad \frac{5x}{5} = \frac{15}{5}$ (Dividing both sides by 5)

$\Rightarrow \quad x = 3$

(h) Solve according to Example 16 (d).

6. 7. Take help of the Answer Sheet.

MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

(a) Counting every corner of square gives 4.

Thrice going round the square gives $3 \times 4 = 12$

Let the required number be x.

x + count = 34

$x + 12 = 34$

$\Rightarrow \quad x + 12 - 12 = 34 - 12$

$\Rightarrow \quad x = 22$

(b) A cricket team has 11 players.

Let the number be x.

$x - 6 = 11$

$\Rightarrow \quad x - 6 + 6 = 11 + 6$

$\Rightarrow \quad x = 17$

Exercise 12.1

1. Ratio of the length of the room to the breadth of the room = 30 m to 20 m $= \frac{30 \text{ m}}{20 \text{ m}} = \frac{30 \div 10}{20 \div 10} = \frac{3}{2} = 3 : 2$

2. (a) 72 to 96 $= \frac{72}{96} = \frac{72 \div 24}{96 \div 24} = \frac{3}{4} = 3 : 4$

(b) 121 to 66 $= \frac{121}{66} = \frac{121 \div 11}{66 \div 11} = \frac{11}{6} = 11 : 6$

(c) 50 cm to 2 m = 50 cm to 200 cm $= \frac{50 \text{ cm}}{200 \text{ cm}}$

$= \frac{50 \div 50}{200 \div 50} = \frac{1}{4} = 1 : 4$

(d) 75 paise to ₹ 1 = 75 paise to 100 paise = $\frac{75 \text{ paise}}{100 \text{ paise}}$

$= \frac{75 \div 25}{100 \div 25} = \frac{3}{4} = 3 : 4$

(e) 1·5 hours = $\frac{15}{10}$ hours = $\frac{15}{10} \times 60$ minutes = 90 minutes

= 45 minutes to 1·5 hours

= 45 minutes to 90 minutes

$= \frac{45 \text{ minutes}}{90 \text{ minutes}} = \frac{45 \div 45}{90 \div 45} = \frac{1}{2} = 1 : 2$

(f) 500 *ml* to 3 litres = 500 *ml* to 3000 *ml*

$= \frac{500 \text{ ml}}{3000 \text{ ml}} = \frac{500 \div 500}{3000 \div 500} = \frac{1}{6} = 1 : 6$

3. Solve according to Q. 1.

4. Cost of a pen = ₹ 168 ÷ 12 = ₹ 14

Cost of a ball pen = ₹ 56 ÷ 8 = ₹ 7

Ratio of the cost of a pen to the cost of a ball pen

$= ₹ 14 \text{ to } ₹ 7 = \frac{₹ 14}{₹ 7} = \frac{14 \div 7}{7 \div 7} = \frac{2}{1} = 2 : 1$

5. (a) $250 : 300 = \frac{250}{300} = \frac{250 \div 50}{300 \div 50} = \frac{5}{6} = 5 : 6$

(b) Solve according to (a).

(c) a dozen to a score = 12 to 20 = $\frac{12}{20} = \frac{12 \div 4}{20 \div 4} = \frac{3}{5} = 3 : 5$

6. (a) Ratio of the games lost to the games won

$= 3 \text{ games to } 6 \text{ games} = \frac{3}{6} = \frac{3 \div 3}{6 \div 3} = \frac{1}{2} = 1 : 2$

(b) Number of games played = 6 + 3 = 9

Ratio of the games won to the games played

$= 6 \text{ games to } 9 \text{ games} = \frac{6}{9} = \frac{6 \div 3}{9 \div 3} = \frac{2}{3} = 2 : 3$

7. Solve according to Example 3.

8. (a) Ratio of the number of boys to that of girls = 450 to 300 = $\frac{450}{300}$

$= \frac{450 \div 150}{300 \div 150} = \frac{3}{2} = 3 : 2$

(b) Ratio of the number of girls to that of boys = 300 to 450 = $\frac{300}{450}$

$$= \frac{300 \div 150}{450 \div 150} = \frac{2}{3} = 2 : 3$$

9. Take help of the Answer Sheet·

10. Speed of the bullock cart $= \frac{24 \text{ km}}{3 \text{ hours}} = 8$ km per hour

Speed of the train $= \frac{120 \text{ km}}{2 \text{ hours}} = 60$ km per hour

Ratio of the speed of the bullock cart to the speed of the train

= 8 km per hour to 60 km per hour $= \frac{8}{60} = \frac{8 \div 4}{60 \div 4} = \frac{2}{15}$

$= 2 : 15$

11. Solve according to Example 5.

12. Number of students who pass out of every 10 students

$= 10 - 2 = 8$

Ratio of the number of pass students to the number of total students in the class = 8 to 10 $= \frac{8}{10} = \frac{8 \div 2}{10 \div 2} = \frac{4}{5}$

Let the actual number of pass students = x

Actual number of total students = 50

Ratio of the actual number of pass students to actual number of total students = x to 50 $= \frac{x}{50}$

Both the ratios are equivalent.

$$\frac{x}{50} = \frac{4}{5}$$

$$50 = 5 \times 10$$

$$x = 4 \times 10 = 40$$

The number of pass students = 40

13. Solve according to Q. 12.

14. Solve according to Example 4.

15, 17 : Solve according to Example 7.

16. Number of students opting table tennis = 2100 – 750 – 900

= 450

(a) Ratio of the number of students who opted cricket to the number of students opting football = 900 to 750

$$= \frac{900}{750} = \frac{900 \div 150}{750 \div 150}$$

$$= \frac{6}{5} = 6 : 5$$

(b) Ratio of the number of students who opted football to the number of students who opted table tennis

$= 750 \text{ to } 450 = \frac{750}{450} = \frac{750 \div 150}{450 \div 150} = \frac{5}{3} = 5 : 3$

(c) Ratio of the number of students who opted cricket to the total number of students = 900 to 2100

$= \frac{900}{2100} = \frac{900 \div 300}{2100 \div 300} = \frac{3}{7} = 3 : 7$

18. Solve according to Q. 16.

19. (a) The age of the mother after 8 years = 40 years + 8 years
= 48 years

The age of the daughter after 8 years = 12 years + 8 years
= 20 years

Ratio of the age of the mother after 8 years to the age of the daughter after 8 years

$= 48 \text{ years to } 20 \text{ years} = \frac{48}{20} = \frac{48 \div 4}{20 \div 4}$

$= \frac{12}{5} = 12 : 5$

(b) The daughter was 8 years old before 12 – 8 = 4 years
Age of the mother before 4 years = 40 – 4 = 36 years

Ratio of the age of the mother to the age of the daughter when the daughter was 8 years old = 36 years to 8 years $= \frac{36}{8} = \frac{36 \div 4}{8 \div 4} = \frac{9}{2} = 9 : 2$

20. 10 : 15 = 10 × 2 : 15 × 2 = 20 : 30
10 : 15 = 10 × 3 : 15 × 3 = 30 : 45

21 to 24. Take help of the Answer Sheet.

Exercise 12.2

1, **2**, **3** : Solve according to Example 8.

4. (a) $8 : 3 :: \square : 24 \Rightarrow \frac{8}{3} = \frac{\square}{24}$
$24 = 3 \times 8$

$\square = 8 \times 8 = 64$

(b), (c) : Solve according to (a).

5, **6** : Solve according to **4.** (a).

7 to **10** : Solve according to Example 8.

11, **12** : Solve according to Example 10.

Exercise 12.3

1. We put the required quantity in the end.

In 5 hours the train covers 280 km

In 1 hour the train covers $\frac{280}{5}$ km

In 8 hours the train covers $\frac{280}{5} \times 8$ km = 448 km

2. 1 year = 12 months

The rent for 4 months = ₹ 4800

The rent for 1 month = ₹ $\frac{4800}{4}$

The rent for 12 months = ₹ $\frac{4800}{4} \times 12$ = ₹ 14,400

3. The train covers a distance of 85 km in $1\frac{1}{2} = \frac{3}{2}$ hours

The train cover a distance of 1 km is $\frac{3}{2} \times \frac{1}{85}$ hours

The train comes a distance of 340 km in $\frac{3}{2} \times \frac{1}{85} \times 340$ hours

= 6 hours

4. Solve according to Q. 3.

5. Cost of 6 cans of juice = ₹ 210

Cost of 1 can of juice = ₹ $\frac{210}{6}$

Cost of 4 cans of juice = ₹ $\frac{210}{6} \times 4$ = ₹ 140

6. Solve according to Q. 5.

7. Solve according to Example 14.

8. (a) Solve according to Q. 5.
(b) Solve according to Example 14.

9. Solve according to Example 12.

10. (a) Solve according to Q. 3.
(b) Solve according to Q. 1.

11. In 7 overs Peter made 56 runs

In 1 over Peter made $\frac{56}{7}$ = 8 runs

In 6 overs David made 42 runs

In 1 over David made $\frac{42}{6}$ = 7 runs

Thus Peter made more runs per (in unit) over.

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Sum of the terms of the ratio = 5 + 12 +3 = 20

Total weight of the vegetables = 4 kg

Tomatoes is 5 parts out of total 20 parts, that is, $\frac{5}{20}$

$\therefore$ Weight of tomatoes = $\frac{5}{20} \times 4$ kg = 1 kg

Potatoes is 12 parts out of total 20 parts, that is, $\frac{12}{20}$

$\therefore$ Weight of potatoes = $\frac{12}{20} \times 4$ kg = $\frac{12}{5} = 2\frac{2}{5}$ kg

Onions is 3 parts out of total 20 parts, that is, $\frac{3}{20}$

$\therefore$ Weight of onions = $\frac{3}{20} \times 4$ kg = $\frac{3}{5}$ kg

2. At present, age of the son = 10 years

The son will be 20 years old after 20 – 10 = 10 years

The age of father after 10 years = 30 + 10 = 40 years

Ratio of the father's age to the son's age then

= 40 years to 10 years = $\frac{40}{10} = \frac{4}{1} = 4 : 1$

3. The ratio in section A = $\frac{6}{25}$

The ratio in section B = $\frac{1}{4}$

LCM of denominators 25 and 4 = 25 × 4 = 100

To make equivalent fractions,

Section A : 100 ÷ 25 = 4 ; $\frac{6 \times 4}{25 \times 4} = \frac{24}{100}$

Section B : 100 ÷ 4 = 25 ; $\frac{1 \times 25}{4 \times 25} = \frac{25}{100}$

Comparing the two ratios, section B has a better record of first class marks.

4. Solve according to Example 12.

Exercise 13.1

1, 2 : Take help of the Answer Sheet.

3. Draw the rough sketches of figures and lines of symmetry yourself.

(a) 3 lines of symmetry possible (b) 4 lines of symmetry possible

(c) 5 lines of symmetry possible (d) 6 lines of symmetry possible

(e) 2 lines of symmetry possible (f) 1 line of symmetry possible

4. First figure : Draw 1 horizontal and 1 vertical line of symmetry· Second, and third figures : Draw 1 vertical line of symmetry in each.

5. Draw the same shape below the line of symmetry.

6 to 8. Take help of the Answer Sheet.

Exercise 13.2

1, 2, 3 : Take help of the Answer Sheet.

4. Draw the shape on the other side of the vertical dotted line of symmetry

5. (a) The extended sides made the shape unsymmetrical.

$\Rightarrow$ No line of symmetry.

(b) One vertical line of symmetry

(c) One vertical and one horizontal lines of symmetry

6. (a) No symmetry (b) one vertical line of symmetry

(c) four lines of symmetry (d) four lines of symmetry

(e) four lines of symmetry (f) three lines of symmetry

(g) three lines of symmetry (h) one vertical line of symmetry

(i) three lines of symmetry (j) one vertical line of symmetry

(k) one vertical line of symmetry (l) 2 : one vertical, one horizontal line of symmetry

7. (a) One horizontal line of symmety ; if colours are not considered, one vertical line of symmetry also

(b) Two : one horizontal and one vertical line of symmetry

(c) No ; if colours are not considered, one horizontal and one vertical line of symmetry

(d) Two : one horizontal and one vertical line of symmetry

(e) One vertical line of symmetry ; if colours are not considered one horizontal line of symmetry also.

(f) Two : one horizontal and one vertical line of symmetry

Exercise 13.3

1. Draw same shape on the other sides of the lines of symmetry. according to Example 5.

2. (a) 1, vertical (b) 1, vertical (c) 2 : one horizontal, one vertical

(d) 2 : one horizontal, one vertical (e) 4 lines of symmetry

(f) 2 lines of symmetry

3. (a) 1, vertical (b) 4 lines of symmetry
(c) 1, vertical (d) 3 lines of symmetry
(e) 4 lines of symmetry
(f) 4 lines of symmetry

MCQs

Take help of the Answer Sheet.

Exercise 14.1 to 14.6

Draw yourself.

Formative Assessements and Summative Assessments : Questions have been selected from the Exercises, Mental Maths, MCQs and HOTS.

TEACHER'S HELP BOOK
MATHS-7

Exercise 1.1

1. (a) $|+7| = 7$ (b) $|-8| = 8$ (c) $|-100| = 100$ (d) $|+91| = 91$

2. Visualising the integers on the number line,
(a) $(-4) < (-1)$ (b) $-5 < 1$ (c) $0 > (-3)$ (d) $-1 > (-91)$

3. Solve according to Example 2.

4. (a) Move 3 units to the right of (– 6) on the number line.
(b) Move 4 units to the left of 4.
(c) Move 2 units to the left of 8.
(d) Move 4 units to the left of (– 3).

5. (a) Move 6 units to the left from 3.
(b) Move 2 units to the right from (– 5).
(c) Move 3 units to the right from 4.
(d) Move 5 units to the left from (– 1).

6. (a) $17 + 23 = 40$ (b) $(-10) + 3 = -(10 - 3) = -7$
(c) $27 + (-27) = 0$ (d) $(-20) + 0 = -20$
(e) $(-80) + (-24) = -104$
(f) $19 + (-25) = -25 + 19 = -(25 - 19) = -6$
(g) $0 + (-5) = -5$ (h) $(-50) + 0 = -50$.

7. (a) $7 - 9 = 7 + (-9) = -2$ (b) $(-19) - 0 = -19$
(c) $(-50) - (-40) = -50 + 40 = -10$.
(d), (f), (h), : Solve according to (c).
(e) $(-8) - 14 = (-8) + (-14) = -22$
(g) $0 - (5) = 0 + (-5) = -5$

8. Take help of the Answer Sheet.

9. (a) $13 + (-15) \square (-27) \Rightarrow (-2) \square (-27) \Rightarrow (-2) > (-27)$
(b) LHS $= 42 - 24 - 33 = 42 - 57 = -15$
RHS $= 72 - 20 - 45 = 72 - 65 = 7$
$\because (-15) < 7 \therefore (42 - 24 - 33) > (72 - 20 - 45)$

10. (a) $-72 - (-216) - 200 + 324 = -72 + 216 - 200 + 324$
$= 216 + 324 - 72 - 200 = 540 - 272 = 268$
(b) Solve according to (a)

11. Jessica's score at the end $= 40 + (-13) + 22 + 25 + (-8)$
$= 40 + 22 + 25 + (-13) + (-8) = 87 - 21 = 66$

12. If the distance towards east is represented by a positive integer, then the distance towards west is represented by a negative integer.
Distance from P to Q $= +5$ km
Distance from Q to the final position $= -8$ km

Thus final position from P is represented by the integer
$= + 5 + (- 8) = - 3$ km

13. (a) Temperature of Srinagar = 1 unit to the left from (– 10)
$= - 10 - 1 = - 10 + (-1) = - 11°C$
Temperature of Shimla = 1 unit to the right of – 5
$= - 5 + 1 + - 4°C$
Temperature of New Delhi = 3 units to the right of 0
$= 0 + 3 = 3°C$
Temperature of Bhopal = 4 units to the right of 5
$= 5 + 4 = 9°C$
Temperature of Nagpur = 2 units to the right of 10
$= 10 + 2 = 12°C$

(b) Temperature of the hottest place = 9°C
Temperature of the coldest place = – 11°C
Difference = 9°C – (– 11°C) = 9°C + 11°C =20°C

(c) Difference of temperature between Srinagar and Shimla.
$= - 4°C - (- 11°C) = - 4°C + 11°C = 7°C$

14. (a) Sum of the integers along the diagonal $= 1 + (-3) + (-7)$
$= 1 - 10 = 1 + (-10) = - 9$
Integer in the second column (vertically) $= - 9 - (- 3 + 4)$
$= - 9 - 1 = - 10$
Find the integers in other columns and rows accordingly.

(b) Solve according to (a).

15. Add each row, column and diagonal separately and find whether the sum is the same.

16 to 19. Take help of the Answer Sheet.

20. Solve according to Example 4.

21. Solve according to Q. 12.

Exercise 1.2

1, **2** : Take help of the Answer Sheet.

3. $9 + (-9) + 9 + (- 9) + 9 + (- 9) +$ --------

Odd terms is positive and even term is negative. $9 + (-9) = 0$ So two terms sum up to 0, Similarly 4, 6 --- terms sum up to 0. Number of even terms sum up to 0.

(a) Thus if the number of terms = 42, the sum is 0.

(b) Sum of the number of 43 terms

= Sum of 42 terms + 43rd term

$= 0 + 9 = 9$

4 to 7 : Take help of the Answer Sheet.

Exercise 1.3

1. (a) – 1 multiplied by positive integer gives negative product.
(b) – 1 multiplied by negative integer gives positive product.
(c) 0 is neither negative nor positive.

2. (a) 17 negative integers × 3 positive integers.
Number of negative integers is odd, so their product is negative. Product of positive integers is positive, whatever be their number.
So 17 negative integers × 3 positive integers
= negative × positive
= negative

(b) If the number of negative integers is even, their product is positive. The product of positive integers is positive whatever be their number.
So 8 negative integers × 5 positive integers
= positive × positive
= positive

3, 4 : Take help of the Answer Sheet.

5. (a) $(-20) \times (-2) \times (-5) \times 7 = 40 \times (-35) = -1400$

6, 8 : Solve according to Example 11.

7. $-1 \times 4 = -4$
$-1 \times 3 = -3 = (-4 + 1)$
$-1 \times 2 = -2 = (-3 + 1)$
$-1 \times 1 = -1 = (-2 + 1)$
$-1 \times 0 = 0 = (-1 + 1)$
$-1 \times (-1) = (0 + 1) = 1$

9. Change of temperature over the whole week
$= -2\,°C \times 7 = -14\,°C$ where negative sign represents fall.

10. Incorrect questions attempted by Laxmi = 50 – 40 = 10
Total score of Laxmi = $40 \times 2 + 10 \times (-1) = 80 - 10 = 70$
Incorrect questions attemped by her friend = 50 – 20 = 30
Total score of her friend = $20 \times 2 + 30 \times (-1) = 40 - 30 = 10$

11. (a) Half an hour = 30 minutes
Position after half an hour = $30 \times (-10)$ metres
$= -300$ metres
(that is, 300 metres bolow sea level)

(b) Beginning position = – 100 m
Distance covered in 15 minutes = $15 \times (-10)$ m
$= -150$ m

Position after 15 minutes = – 100 m + (– 150) m
= – 250 m

12 to 15. Take help of the Answer Sheet.

16. Solve according to Q. 10.

Exercise 1.4

1. (a) $10 \div (-1) = -10$ (b) $0 \div (-1) = 0$
(c) $-5 \div (-1) = 5$ (d) $a \div (-1) = -a$

2. (a) $72 \div (-8) = -9$ (b) $(-20) \div 5 = -4$
(c) $(-21) \div (-7) = 3$ (b) $144 \div (-16) = -9$

3. (a) $(-48) \div 8 = -6$ (b) to (e) : Solve according to (a).
(f) $42 \div [(-3) + 2] = 42 \div (-1) = -42$
(g) $[(-45) \div 15] \div 3 = (-3) \div 3 = -1$
(h) $(-47) \div [(-40) + (-7) = (-47) \div (-47) = 1$

4. Solve according to Q. 2.

5. Solve according to Q. 3 (h).

6. $(a \div b) \div c = (-20 \div 10) \div (-2) = (-2) \div (-2) = 1$
$a \div (b \div c) = -20 \div [10 \div (-2)] = -20 \div (-5) = 4$
So $(a \div b) \div c \neq a \div (b \div c)$

7. $a \div (b + c) = 20 \div [(-4) + 2] = 20 \div (-2) = -10$
$(a \div b) + (a \div c) = 20 \div (-4) + (20 \div 2) = -5 + 10 = 5$
So $a \div (b \div c) \neq (a \div b) + (a \div c)$

8. Take help of the Answer Sheet.

9. (a) Marks for 12 correct answers $= 4 \times 12 = 48$
But Sonia's score = 32 marks
Marks obtained for incorrect answers $= 32 - 48 = -16$
Marks given for one incorrect answer $= -2$
Number of incorrect answers $= (-16) \div (-2) = 8$

(b) Marks for 6 correct answers $= 4 \times 6 = 24$
But Maya scored $= (-4)$ marks
Marks obtained for incorrect answers $= -4 - 24 = -28$
Marks given for one incorrect answer $= -2$ marks
Number of incorrect answers $= (-28) \div (-2) = 14$

10 to 13. Take help of the Answer Sheet.

Mental Maths & MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Solve according to Q. 12 of Exercise 1·1.

2. Take help of the Answer Sheet.

3. Solve according to Q. 11 of Exercise 1·1.

4. Difference between the temperature 8°C above zero and 10°C below zero = 8°C – (– 10°C) = 8°C + 10°C = 18°C

Time for this decrease = $\frac{18°C}{2°C}$ = 9 hours

So, the temperature was 10°C below zero at (2 + 9) hours = 11 p.m.

Exercise 2.1

1. (a) $1 - \frac{4}{7} = \frac{7}{7} - \frac{4}{7} = \frac{3}{7}$

(b) $2 + \frac{4}{5} = \frac{2}{1} + \frac{4}{5} = \frac{2 \times 5}{1 \times 5} + \frac{4}{5} = \frac{10}{5} + \frac{4}{5} = \frac{14}{5}$

(c) $\frac{2}{5} + \frac{3}{7} = \frac{2 \times 7}{5 \times 7} + \frac{3 \times 5}{7 \times 5} = \frac{14}{35} + \frac{15}{35} = \frac{29}{35}$

(d) to (f) : Solve according to Example 4.

2 : Solve according to Example 3.

3 : (a) $\frac{3}{4} = \frac{3 \times 2}{4 \times 2} = \frac{6}{8}$; 6 > 3 so $\frac{6}{8} > \frac{3}{8}$ or $\frac{3}{4} > \frac{3}{8}$

4, 7 : Convert to improper fractions. Then take LCM of denominators, convert to equivalent fractions and add.

5. Solve according to guideline Q.4.

6, 8, 9 : Convert to improper fractions. Then take LCM of denominators.

Convert to equivalent fractions and subtract.

10. Length of the wire left = 10 m – $4\frac{3}{5}$ m = $\frac{10}{1}$m – $\frac{23}{5}$ m

= $\frac{10 \times 5}{1 \times 5} - \frac{23}{5} = \frac{50}{5} - \frac{23}{5} = \frac{27}{5} = 5\frac{2}{5}$ m

Exercise 2.2

1. (a) $9 \times \frac{4}{7} = \frac{36}{7} = 5\frac{1}{7}$ (b) to (h) : Solve according to (a).

2. (a) $\frac{1}{2}$ of 12 = $\frac{1}{2} \times 12 = 1 \times 6 = 6$ (b) to (f): Solve according to (a).

3. (a) Shade $\frac{1}{3}$ of the 12 triangles = $\frac{1}{3} \times$ 12 triangles = 1 × 4=4 triangles

(b) Shade $\frac{3}{4}$ of 16 squares $= \frac{3}{4} \times 16 = 3 \times 4 = 12$ squares

(c) Shade $\frac{2}{5}$ of 20 circles $= \frac{2}{5} \times 20 = 2 \times 4 = 8$ circles

4. (a) $4 \times 3\frac{3}{5} = 4 \times \frac{18}{5} = \frac{72}{5} = 14\frac{2}{5}$ (b) $6 \times 3\frac{1}{4} = 6 \times \frac{13}{4} = \frac{3 \times 13}{2} = \frac{39}{2} = 19\frac{1}{2}$ (c) to (f) : Solve according to (b).

5. (a) $\frac{1}{2}$ of $2\frac{5}{6} = \frac{1}{2} \times \frac{17}{6} = \frac{17}{12} = 1\frac{5}{12}$ (b) $\frac{2}{3}$ of $9\frac{2}{3} = \frac{2}{3} \times \frac{29}{3} = \frac{58}{9} = 6\frac{4}{9}$ (c) $\frac{7}{11}$ of $3\frac{13}{14} = \frac{7}{11} \times \frac{55}{14} = \frac{1 \times 5}{1 \times 2} = \frac{5}{2} = 2\frac{1}{2}$

6. (a) Number of students who like to study Mathematics most $= \frac{2}{9}$ of $45 = \frac{2}{9} \times 45 = 2 \times 5 = 10$

(b) Number of students who like to study English most $= \frac{4}{9}$ of $45 = \frac{4}{9} \times 45 = 4 \times 5 = 20$

(c) Fraction of total number of students who like to study science most $= 1 - \frac{2}{9} - \frac{4}{9} = \frac{9}{9} - \frac{2}{9} - \frac{4}{9} = \frac{9-2-4}{9}$

$= \frac{9-6}{9} = \frac{3}{9} = \frac{1}{3}$

7. Fraction of passengers travelling on the upper deck

$= 1 - \frac{5}{9} = \frac{9}{9} - \frac{5}{9} = \frac{4}{9}$

Number of passengers travelling on the upper deck

$= \frac{4}{9}$ of $108 = \frac{4}{9} \times 108 = 4 \times 12 = 48$

8. Cost of $2\frac{1}{2}$ kg of sugar $= ₹\ 16\frac{1}{2} \times 2\frac{1}{2} = ₹\ \frac{33}{2} \times \frac{5}{2} = ₹\ \frac{165}{4} = ₹\ 41\frac{1}{4}$

9. Area of the square floor = side × side $= 3\frac{3}{4}$ m $\times 3\frac{3}{4}$ m

$= \frac{19}{4} \times \frac{19}{4}$ m^2 $= \frac{361}{16} = 22\frac{9}{16}$ m^2

10. (a) $\frac{2}{3}$ of a day $= \frac{2}{3}$ of 24 hours $= \frac{2}{3} \times 24 = 2 \times 8 = 16$ hours (b) to (d) : Solve according to (a)

11 to 13. Take help of the Answer Sheet.

Exercise 2.3

1. $\frac{2}{4} \times 1\frac{3}{4} = \frac{2}{4} \times \frac{7}{4} = \frac{1}{2} \times \frac{7}{4} = \frac{7}{8}$ (b), (c) Solve according to (a).

(d) $\frac{3}{15} \times \frac{25}{8} = \frac{3 \times 25}{15 \times 8} = \frac{1 \times 5}{1 \times 8} = \frac{5}{8}$ (e) to (l) : Solve according to (d). **2.** (e) $\frac{3}{10}$ of $\frac{8}{3} = \frac{3}{10} \times \frac{8}{3} = \frac{3 \times 8}{10 \times 3} = \frac{1 \times 4}{5 \times 1} = \frac{4}{5}$

(a) to (d), (f) : Solve according to (e).

3. (a) Numerator in the box = 15 ÷ 3 = 5

Denominator in the box = 40 ÷ 4 = 10

Fraction in the box = $\frac{5}{10}$

(b) Simplest form of the number in the box = $\frac{5 \div 5}{10 \div 5} = \frac{1}{2}$

4. (a) $\frac{3}{5}$ of $\frac{6}{7} = \frac{3}{5} \times \frac{6}{7} = \frac{18}{35}$,

$\frac{2}{3}$ of $\frac{4}{7} = \frac{2}{3} \times \frac{4}{7} = \frac{8}{21}$

LCM of 35 and 21 = 105

$\frac{18}{35} = \frac{18 \times 3}{35 \times 3} = \frac{54}{105}$

$\frac{8}{21} = \frac{8 \times 5}{21 \times 5} = \frac{40}{105}$

$\frac{54}{105} > \frac{40}{105}$

$\Rightarrow \frac{3}{5}$ of $\frac{6}{7} > \frac{2}{3}$ of $\frac{4}{7}$ (b) Solve according to (a).

5. Take help of the Answer Sheet.

6. Area of the rectangle = length × breadth

$= 1\frac{2}{3}$ m $\times \frac{4}{5}$ m $= \frac{5}{3} \times \frac{4}{5} = \frac{5 \times 4}{3 \times 5} = \frac{4}{3} = 1\frac{1}{3}$

7. Multiply.

8. Fraction of tea left $= 1 - \frac{3}{5} = \frac{5}{5} - \frac{3}{5} = \frac{5-3}{5} = \frac{2}{5}$

Quantity of tea left $= \frac{2}{5}$ of 50 g $= \frac{2}{5} \times 50$ g $= 2 \times 10 = 20$ g

9. Number of buffaloes $= \frac{3}{4}$ of $\frac{11}{12}$ of $240 = \frac{3}{4} \times \frac{11}{12} \times 240$

$= 3 \times 11 \times 5 = 165$

10. Fraction of good apples $= 1 - \frac{3}{17} = \frac{17}{17} - \frac{3}{17} = \frac{14}{17}$

Number of good apples $= \frac{14}{17}$ of $425 = \frac{14}{17} \times 425 = 14 \times 25$

$= 350$

Total price of good apples $= ₹\ 7\frac{3}{5} \times 350 = ₹\ \frac{38}{5} \times 350$

$= ₹\ 38 \times 70 = ₹\ 2660$

11 to 14. Take help of the Answer Sheet.

15. Solve according to Q. 6.

Exercise 2.4

1. Take help of the Answer Sheet.

2. (a) $5 \div \frac{10}{3} = 5 \times \frac{3}{10} = \frac{3}{2} = 1\frac{1}{2}$

(b) to (f) : Solve according to (a).

3. (a) $1\frac{1}{2} \div 3 = \frac{3}{2} \div 3 = \frac{3}{2} \times \frac{1}{3} = \frac{1}{2}$

(b) to (f) : Solve according to (a).

4. (a) $\frac{1}{7} \div \frac{2}{7} = \frac{1}{7} \times \frac{7}{2} = \frac{1}{2}$

(b), (c) : Solve according to (a).

(d) $3\frac{1}{5} \div 1\frac{2}{5} = \frac{16}{5} \div \frac{7}{5} = \frac{16}{5} \times \frac{5}{7} = \frac{16}{7} = 2\frac{2}{7}$

5. Quantity of icecream got by each person.

$2\frac{1}{2} \div (3 + 1) = \frac{5}{2} \div 4 = \frac{5}{2} \times \frac{1}{4} = \frac{5}{8}$ cup

6. Number of children $= \frac{3}{4} \div \frac{1}{8} = \frac{3}{4} \times \frac{8}{1} = 3 \times 2 = 6$

7. Number of pieces $= 10\text{ m} \div 1\frac{1}{4}\text{ m} = 10 \div \frac{5}{4} = 10 \times \frac{4}{5}$

$= 2 \times 4 = 8$

8. Fraction of more water required to fill the tank $= 1 - \frac{3}{5}$

$= \frac{5}{5} - \frac{3}{5} = \frac{2}{5}$

Total capacity of the tank $= 250 \div \frac{2}{5} = 250 \times \frac{5}{2} = 125 \times 5 = 625$ litres

9. Solve according to Q. 7

10. Fraction of girls $= 1 - \frac{5}{9} = \frac{9}{9} - \frac{5}{9} = \frac{4}{9}$

Total number of students $= 800 \div \frac{4}{9} = 800 \times \frac{9}{4} = 1800$

Number of boys $= \frac{5}{9}$ of $1800 = \frac{5}{9} \times 1800 = 5 \times 200 = 1000$

11 to 13. Take help of the Answer sheet.

14. $\frac{2}{3} + \frac{3}{4} = \frac{2 \times 4}{3 \times 4} + \frac{3 \times 3}{4 \times 3} = \frac{8}{12} + \frac{9}{12} = \frac{17}{12}$. The fraction asked $= \frac{17}{12} \times \frac{4}{5} = \frac{17}{15} = 1\frac{2}{15}$

Exercise 2.5

1. (a) Place value of 5 in 3·58 = 5 tenths $= \frac{5}{10} = 0{\cdot}5$

(b) Place value of 5 in 5·74 = 5 ones $= 5 \times 1 = 5$

(c) Place value of 5 in 0·157 = 5 hundredths $= \frac{5}{100} = 0{\cdot}05$

(d) Place value of 5 in 0·015 = 5 thousandths $= \frac{5}{1000} = 0{\cdot}005$

2. (a) $500 + 30 + 4 + \frac{1}{10} + \frac{8}{100} + \frac{9}{1000}$

$= 500 + 30 + 4 + 0{\cdot}1 + 0{\cdot}08 + 0{\cdot}009$

3 to 6 : Take help of the Answer Sheet.

7, 8, 9, 10 : Write the decimal numbers such that their decimal points come one over the other. Then add or subtract them as whole numbers keeping the decimal point in its place.

11 to 13 : Take help of the Answer Sheet.

14. 66 mm = 6·6 cm

0·06 cm < 6·6 cm < 60 cm

0·06 cm < 66 mm < 60 cm

Exercise 2.6

1. (a) $0{\cdot}2 \times 0{\cdot}4 = 0{\cdot}08$

Count 1 + 1 = 2 digits from the right of the product 8 and put the decimal point, writing 0 for a place having no digit.

(b) to (g) Solve according to Q.1 (a).

2. (a) Perimeter of the equilateral triangle $= 3 \times$ side
$= 3 \times 3{\cdot}5$ cm
$= 10{\cdot}5$ cm

3. Area of the rectangle = $4{\cdot}2$ cm $\times$ $2{\cdot}5$ cm = $10{\cdot}50$ cm^2.

4. Take help of the Answer Sheet.

5. Distance covered in 5 litres of petrol $= 5 \times 32{\cdot}5$ km
$= 162{\cdot}5$ km.

6. Solve according to Q.1 (a).

7. (a) Area of the square = side $\times$ side = $4{\cdot}4$ cm $\times$ $4{\cdot}4$ cm
$= 17{\cdot}76$ cm

(b) Perimeter of the square = $4 \times$ side = $4 \times 4{\cdot}4$ cm = $17{\cdot}6$ cm

8. Total quantity of cold drinks in 22 bottles
= $22 \times 0{\cdot}250$ litres = $5{\cdot}500$ litres = $5{\cdot}5$ litres

9 to 11. Take the help of the Answer Sheet.

12. Total number of decimal places = 1 + 2 + 3 = 6

Multiply the 4s and count six places from the right. $4 \times 0{\cdot}4 \times 0{\cdot}04 \times 0{\cdot}004 = 0{\cdot}000256$

Exercise 2.7

1, 2, 3, : Take help of the Answer Sheet.

4. (a) $0{\cdot}6 \div 3 = \frac{0{\cdot}6}{3} = 0{\cdot}2$

(b) $0{\cdot}45 \div 9 = \frac{0{\cdot}45}{9} = 0{\cdot}05$

(c) to (h) : Solve according to (a) and (b).

5. to 10, 14 : Move decimal point of the divisor to the right until it becomes a whole number. Next move the decimal point of the dividend the same number of places to the right, adding zeroes for places having no digit.

5. (a) : $6 \div 0{\cdot}3 = \frac{6}{0{\cdot}3} = \frac{6{\cdot}0}{0{\cdot}3} = \frac{60}{3} = 20$

(b) : $2.25 \div 0{\cdot}5 = \frac{2.25}{0{\cdot}5} = \frac{225}{50} = \frac{225}{50} = \frac{9}{2} = 4.5$

(c) : 76. 5 ÷ 0·15 $= \frac{76.5}{0{\cdot}15} = \frac{76.50}{0{\cdot}15} = \frac{7650}{15} = 510$

Mental Maths & MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. $1\frac{4}{15} \times \left(\frac{1}{2} \times \frac{5}{6}\right) = \frac{19}{15} \times \frac{1}{2} \times \frac{5}{6} = \frac{19 \times 1 \times 1}{3 \times 2 \times 6} = \frac{19}{36}$

2. Quantity of ice cream got by each person $= 3\frac{1}{2} \div (1 + 6)$

$= \frac{7}{2} \div 7 = \frac{7}{2} \times \frac{1}{7} = \frac{1}{2}$ cup

3. (a) Cost of 1 kg sugar = ₹ 72 ÷ $2\frac{1}{4}$ = ₹ 72 ÷ $\frac{9}{4}$

= ₹ 72 × $\frac{4}{9}$ = ₹ 8 × 4 = ₹ 32

(b) Cost of $3\frac{1}{2}$ kg sugar = ₹ 32 × $3\frac{1}{2}$ = ₹ 32 × $\frac{7}{2}$

= ₹ 16 × 7 = ₹ 112

4. 55 mm = 5·5 cm

Compaing the tens, ones, tenths and hundredths places in 5·5 cm, 0·05 cm and 50 cm,

50 cm > 5·5 am > 0·05 cm

5. 3 × 0·3 × 0·03 × 0·003 = 0·000081

Total number of decimal places = 1 + 2 + 3 = 6

Put decimal point after 6 places from the right most.

6, 7 : Solve according to Q.5.

Exercise 3.1

1. Mean of the first five natual numbers

$= \frac{1 + 2 + 3 + 4 + 5}{5} = \frac{15}{5} = 3$

2. Mean of the first seven whole numbers

$= \frac{0 + 1 + 2 + 3 + 4 + 5 + 6}{7} = \frac{21}{7} = 3$

3. Mean runs scored by him in an inning

$= \frac{\text{Sum of all observations}}{\text{Number of observations}} = \frac{36 + 35 + 50 + 46 + 60 + 55}{6}$

$= \frac{282}{6} = 47$

4, 5 : Solve according to Q. 3.

6. (a) Height of the tallest girl = 151 cm

Height of the shortest girl = 128 cm

(b) Range of the data = 151 cm — 128 cm = 23 cm

(c) Mean of the data = $\frac{\text{Sum of all observations}}{\text{Number of observations}}$

$= \frac{135+150+139+128+151+132+146+149+143+141}{10}$

$= \frac{1414}{10} = 141{\cdot}4$ cm

(d) 5 girls have heights more than the mean height.

7, 8, 10 : Solve according to Q. 6.

9, 11 to 13. Take help of the Answer Sheet.

14. Total of 5 numbers = Mean x number of numbers = $22 \times 5 = 110$ Total of new set of 6 numbers = $24 \times 6 = 144$

Included number = 144 – 110 = 34

Exercise 3.2

1. Solve according to Example 7 and 11.

2. Sove according to Example 8.

3. Solve according to Example 4., 7. and 11.

4. Arranging the data in ascending order, we get

19, 25, 30, 31, 32, 32, 35, 48, 51, 59

The number of observations is 10 which is exen.

So the median = mean of the two middle observations.

= mean of the 5th and 6th observations

$= \frac{32 + 32}{2} = 32$

If we replace 25 by 52, the new ascending order will be

19, 30, 31, 32, 32, 35, 48, 51, 52, 59

Now the median = mean of the 5th and 6th observations

$= \frac{32 + 35}{2} = \frac{67}{2} = 33{\cdot}5$

5. Take help of the Answer Sheet.

6. Solve according to Example 7 and 11.

7. Shoe size 8 occurs the highest number of times 40, so 8 is the mode.

8. Find the mean, mode and median according to Example 4, 6 and 10. Here two observations 57 and 59 are very high observations. The mean becomes very high and so it really does not represent the

data. Also the mode is very low observation. So it also really does not represent the data. Thus the median (middle observation) is the appropriate representative value, that is, the best average. (Here average includes all the three; mean, mode and median)

Exercise 3.3

1, 2, 3, 8, 10, 11 : Take help of the Answer Sheet.

4, 5, 6, 7, 9 : Solve according to Example 13 and 14.

Exercise 3.4

Solve according to Example 15 and 16 and take help of the Answer Sheet.

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Solve according to Q. 4 of Exercise 3.2.

2. There are ten square numbers from 1 to 100.

So the probability of drawing a square number

$= \frac{10}{100} = \frac{1}{10}$

3. Solve according to Q. 6 of Exercise 3·2.

4. Solve according to Q. 8 of Exercise 3·2.

5. Take help of the Answer Sheet.

6. (a) Number of red cards in a pack of 52 cards is 26.

Probability of the top card to be a red card $= \frac{26}{52} = \frac{1}{2}$

(c) Number cards in a pack of 52 cards $= 4 \times 10 = 40$

Probability of the top card to be a number card $= \frac{40}{52} = \frac{10}{13}$

7. Total number of packs $= 3 + 1 + 2 + 2 = 8$

Chance or probability to pick a

(a) masala $= \frac{3}{8}$ (b) cheese and onion $= \frac{2}{8} = \frac{1}{4}$

(c) plain salted $= \frac{2}{8} = \frac{1}{4}$ (d) pudina $= \frac{1}{8}$

Exercise 4.1

1, 2, 3 , 7 to 9 : Take help of the Answer Sheet.

4, 6 : Solve according to Example 4.

5. Solve according to Example 5.

Exercise 4.2

1. Solve according to relevant example from Examples 6 to 9.

2. Solve according to relevant example from Example 10 or 11.

Exercise 4.3

1. Solve according to Example 12.

2. Solve according to Example 13.

3. Solve according to Example 15.

4. $x = 5 \Rightarrow x \times 3 = 5 \times 3 \Rightarrow 3x = 15$

$\Rightarrow 3x - 2 = 15 - 2 \Rightarrow 3x - 2 = 13$

Do different operations with $x = 5$ with different numbers and make more equations.

5. Solve according to Q. 1 and 2.

6. 7 : Take help of the Answer Sheet.

Exercise 4.4

1. Let the number be x.

According to the question,

one-sixth of the number minus 3 = 5

$$\frac{1}{6}x - 3 = 5$$

$$\Rightarrow \quad \frac{1}{6}x \times 6 - 3 \times 6 = 5 \times 6$$

$$\Rightarrow \quad x - 18 = 30 \Rightarrow x = 30 + 18 \Rightarrow x = 48$$

2. Make and Solve the quation : $3x + 11 = 32$

3. Solve : $3x - 5 = 13$

4. Solve : $5 + \frac{x}{3} = 8$

5. Solve : $\frac{x}{4} = 7 + 3$

6. Solve : $5x - 7 = 63$

7. Solve : $6x - 5 = 7$

8. Solve : $x + (x + 1) = 53$

9. Let the lowest score be x.

Highest score = twice the lowest marks + 9

$= 2x + 9 = 91$

$\Rightarrow 2x = 91 - 9 \Rightarrow 2x = 82 \Rightarrow x = 82 \div 2 = 41$

10. Let the number be x.
Number multiplied by 5 = increased by 80
$x \times 5 = x + 80$

$\Rightarrow 5x - x = 80 \Rightarrow 4x = 80 \quad \Rightarrow x = 80 \div 4 = 20$

11. Let the runs scored by B be x.
Runs scored by A = $2x$
Together their runs = two short of a double century.
$x + 2x = 2 \times 100 - 2$

$\Rightarrow 3x = 200 - 2 \Rightarrow 3x = 198 \Rightarrow x = 198 \div 3 \Rightarrow x = 66$

Run scored by B = 66

Run scored by A = $2 \times 66 = 132$

12. Solve : $2(3x + x) = 44$

13. Solve : $3x + 5 = 44$

14. Solve : $x + (3x + 2) = 102$

15. Let the age of Shikha be x years.
Shikha's mother's age = $3 \times x = 3x$ years
Anita's age = three years younger than Shikha
$= (x - 3)$ years
Shikha's mother's age = four times as Anita's age
$3x = 4(x - 3)$
$\Rightarrow 3x = 4x - 12 \Rightarrow 3x - 4x \Rightarrow -12 \Rightarrow -x = -12 \Rightarrow x = 12$
Shikha's age = 12 years
Anita's age = $12 - 3 = 9$ years
Shikha's mother's age = $3 \times 12 = 36$ years

16. 17. Take help of the Answer Sheet.

18. Solve : $(x - 8) \div 12 = 11$

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Let the either base angle be x degrees.
Then vertex angle = twice = $2x$ degrees
Now Sum of the angles of a triangle = 180°
$x + x + 2x = 180°$

2. $x = -3 \Rightarrow x \times 2 = (-3) \times 2 \Rightarrow 2x = -6$
$\Rightarrow 2x + 5 \Rightarrow -6 + 5 \Rightarrow 2x + 5 = -1$

3. Solve according to Example 16.

4. Solve according to Q. 10 of Exercise 4·4.

5. Solve according to Q· 11 of Exercise 4·4.

Exercise 5.1

1 to 3 : Take help of the Answer Sheet.

4. Let the angle be of x degrees.

Supplement = equal = x degrees

$x + x = 180° \Rightarrow 2x = 180°$

$\Rightarrow x = 180° \div 2 \qquad \Rightarrow x = 90°$

5. If an angle is x° greater than 90°.

Thus 90° + x° + its supplement = 180°.

$\Rightarrow$ its supplements = 180° – 90° – x° = 90° – x

Thus, its supplement is less than 90°.

6, 9, 10, 11, 12, 13, 14, 15, 17 : Take help of the Answer Sheet.

7. Angle = 90° – its complement = 90° – 36° = 54°

Its supplement = 180° – 54° = 126°

8. Angle = 180° – its supplement = 180° – 85° = 95°

As the complementary angles sum up to 90° and given angle is not less than 90°, its complement does not exist.

12. Draw EF parallel to AB Co-interior angles 120° + AEF = 180°; 130° + $\angle$ FEC = 180° Adding, 120° + 130° + $\angle$ AEF + $\angle$ FEC = 180° + 180° $\Rightarrow$ 250° + x° = 360° $\Rightarrow$ x° = 360° – 250° = 110°

16. Let the smaller angle = x°

Larger angle = 20° more than the smaller = x° + 20°

$x° + x° + 20° = 90° \Rightarrow 2x° = 90° – 20° \Rightarrow 2x° = 70°$

$\Rightarrow \quad x° = 70° \div 2 \Rightarrow x° = 35°$

Smaller angle = 35°, Larger angle = 35° + 20° = 55°

18, 19. Take help of the Answer Sheet.

20. Sum of the supplementary angles = 180° Vertically opposite angles are equal. Each of the equal angles = 180° ÷ 2 = 90°

21. Angle whose complement is 58° = 90° – 58° = 32°

Supplement of 32° = 180° – 32° = 148°

Exercise 5.2

Take help of the Answer Sheet.

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. (a) No, one arm is not common.

(b) No, vertex is not common.

(c) No, vertex is not common.

2. Let the smaller angle be $x°$.

Larger angle = $x° + 40°$

$x° + x° + 40° = 180°$

$\Rightarrow 2x° = 180° - 40° \Rightarrow 2x° = 140°$

$\Rightarrow x° = 140° \div 2 \Rightarrow x° = 70°$

Smaller angle = 70°, Larger angle = 70° + 40° = 110°

3. Solve according to Q· 5 of Exercise 5·1.

4. Draw PEQ paraller to AB. It divides the angle $x°$ into two parts $x_1°$ and $x_2°$.

AB || PEQ and AE is transversal.

$x_1° = 50°$ (alternate angles)

CD || PEQ and AE is transversal

$x_2° = 50°$ (alternate angles)

$x° = x_1° + x_2° = 50° + 50° = 100°$

Exercise 6.1

1 to 4 : Draw youself

5 to 8. Take help of the Answer Sheet.

Exercise 6.2

1. Draw youself.

2. (a) Exterior angle x = sum of the opposite interior angles
= 90° + 40° = 130°

(b) to (f) : Solve according to (a).

3. (a) One interior angle = exterior angle – other interior angle
= 90° – 30° = 60°

(b) to (f) : Solve according to (a).

4. Exterior angle = sum of interior oppsite angles which are complementary in this question = 90° (sum of complementary angles is 90°.)

5. If the exterior angle of a triangle be a straight angle, that is, 180°, then the sum of the two opposite interior angles will become 180° which is impossible because then the third interior angle of the triangle will be 180° – 180° = 0°.

6. $x° + 40° = 180°$ (linear pair)

$x° = 180° - 40° = 140°$

$y° + 90° = 140°$ (exterior angle)

$y° = 140° - 90° = 50°$

7. $x° = 180° - 120°$ (linear pair)

$= 60°$

50° + third angle of the trianlge = 120°

third angle of the triangle = 120° – 50° = 70°
$y°$ = 180° – 70° (linear pair)
= 110°

Exercise 6.3

1. (a) Sum of the three angles of the triangle = 180°
$x° + 90° + 60° = 180°$
$\Rightarrow x° + 150° = 180° \Rightarrow x° = 180° - 150° = 30°$
(b) Solve according to (a).
(c) $x° + x° + 40° = 180° \Rightarrow 2x° = 180° - 40° = 140°$
$x = 140° \div 2 = 70°$
(d) (e), (f) : Solve according to (c).

2. (a) $x° + 50° + 65° = 180° \Rightarrow x° + 115° = 180°$
$\Rightarrow x° = 180° - 115° = 65°$
$y° = 65° + x° = 65° + 65° = 130°$
(b) $y° = 85°$ (vertically opposite angles)
$x° + 45° + 85° = 180° \Rightarrow x° + 130° = 180°$
$\Rightarrow x° = 180° - 130° = 50°$
(c) Solve according to (b).

3. One angle of right triangle = 90°.
One of the acute angles = 58° (given)
Let the other acute angle = $x°$
$x° + 90° + 58° = 180° \Rightarrow x° + 148° = 180°$
$x° = 180° - 148° = 32°$

4. Sum of the terms of the ratio 1 : 2 : 3= 1 + 2 + 3 = 6
Sum of the three angles of the triangle = 180°
So the angles are,
$\frac{1}{6} \times 180°, \frac{2}{6} \times 180°, \frac{3}{6} \times 180°,$
that is, 30°, 60°, 90°,

5. (a) No, because then the third angle will be 180° – 180° = 0°
(b) No, because then the sum of three angles will be more than 180° which is impossible.
(c),(d) : Yes, because then the three angles may sum up to 180°.
(e) If each angle is greater than 60°, then three angles will sum up to more than 180°, which is impossible.
(f) If each angle is less than 60°, then three angles will sum up to less than 180°, which is impossible.

6. Let the third angle be $x°$.
Then each of the two equal angles = $2x°$ (according to the question)

$2x° + 2x° + x° = 180° \Rightarrow 5x° = 180°$

$\Rightarrow \quad x° = 180° \div 5 = 36°$

Third angle = 36°, each of the two equal angles = $2 \times 36 = 72°$

7. (a) Sum of the angles = 64° + 47° + 72° = 183°

Sum of the three angles of a triangle must be exactly 180°.

So in this case the given angles cannot possibly be those of a triangle.

(b) Sum of the angles = 49° + 68° + 63° = 180°

Sum of the three angles of a triangle must be exactly 180°.

So in this case the given angles can possibly be those of a triangle.

8 to 10. Take help of the Answer Sheet.

Exercise 6.4

1. (a) Two sides are equal· So the angles opposite them are equal.

$x° + x° + 100° = 180° \Rightarrow 2x° + 100° = 180°$

$\Rightarrow 2x° = 180° - 100° \Rightarrow 2x° = 80° \Rightarrow x° = 80° \div 2$

$\Rightarrow x° = 40°$

(b) Angles opposite to equal sides are equal.

Each opposite interior angle is $x°$.

$x° + x° = 110° \Rightarrow \ 2x° = 110° \Rightarrow x° = 110° \div 2 = 55°$

(c) Solve according to (a).

2. Solve according to Q. 1.

3, 4, 5 : Take help of the Answer Sheet.

6. Solve according to Example 10.

7. Solve according to Example 11.

Exercise 6.5

1. $3^2 + 4^2 = 25 \neq 6^2$

So the given triangle is not a right triangle.

2. Solve according to Q .1.

3. $AC^2 = AB^2 + BC^2 = 8^2 + 15^2 = 64 + 225 = 289 = 17^2$

So AC = 17 cm

4. Solve according to Example 12.

5. Solve according to Example 13.

6. The leadder along with the wall and floor makes a right triangle, ladder makes the hypotenuse

(Length of the ladder)$^2 = 5^2 + 12^2 = 25 + 144 = 169 = 13^2$

Length of the ladder = 13 cm

7. Width of the Street = distance of foot of the ladder from one wall + distance of foot of the ladder from the the other wall.

$= \sqrt{15^2 - 9^2} + \sqrt{15^2 - 12^2}$

$= \sqrt{225 - 81} + \sqrt{225 - 144}$

$= \sqrt{144} + \sqrt{81} = 12 + 9 = 21$ m

8. Distance form the starting point $= \sqrt{40^2 + 9^2} = \sqrt{1600 + 81} = \sqrt{1681} = 41$ m

9. Solve according to Example 14.

10. Let the length of each leg = x m

$x^2 + x^2 = 50 \Rightarrow 2x^2 = 50 \Rightarrow x^2 = 50 \div 2$

$\Rightarrow x^2 = 25 \Rightarrow x^2 = 5^2 \Rightarrow x = 5$

11. In a rectangle, $(\text{length})^2 + (\text{breadth})^2 = (\text{diagonal})^2$

$(40)^2 + b^2 = (41)^2$

$\Rightarrow b^2 = 41^2 - 40^2 = 1681 - 1600 = 81 = 9^2$

$\Rightarrow b = 9\ m$

12 to 14 : Take help of the Answer Sheet.

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1 to 3 : Take help of the Answer Sheet.

4. Solve according to Q. 6 of Exercise 6·3.

5. Solve according to Example 10.

6. Solve according to Q. 7 Exercise 6·5.

Exercise 7.1 to 7.6

Take help of the Answer Sheet and Solved Examples.

Exercise 8.1

1. (a) 3 km to 300 m = 3 × 1000 m to 300 m

= 3000 m : 300 m = 10 : 1

(b) to (d) : Solve according to (a).

2. ∵ 12 bowls cost ₹ 156

∴ 1 bowl costs ₹ $\frac{156}{12}$

∴ 20 bowls cost ₹ $\frac{156}{12} \times 20$ = ₹ 260

3. Solve according to Example 2.

4. Solve according to Example 3·

5. Solve acccording to Example 5.

6. $5 : 4 = \frac{5}{4} = \frac{5 \times 3}{4 \times 3} = \frac{15}{12}$

$7 : 6 = \frac{7}{6} = \frac{7 \times 2}{6 \times 2} = \frac{14}{12}$

$\frac{15}{12} > \frac{14}{12}$ So 5 : 4 is greater.

7. (a) Product of the means = Product of the extremes

$10 \times x = 15 \times 8 \Rightarrow x = \frac{15 \times 8}{10} = 12$

(b) $\frac{\square}{4} = \frac{15}{10} \Rightarrow \square : 4 : : 15 : 10$

Product of the extremes = Product of the means

$10 \times x = 4 \times 15 \Rightarrow x = \frac{4 \times 15}{10} = 6$

8, to 10 : Solve according to Example 4.

11, 12. : Take help of the Answer sheet.

13 . Ratio $\frac{1}{4} : \frac{1}{5} : \frac{1}{6} = \frac{15 : 12 : 10}{60} = 15 : 12 : 10$

Divide 296 cm in the ratio 15 : 12 : 10

14 . Solve according to Example 4.

Exercise 8.2

1. Solve according to Example 11.

2. Solve according to Example 13.

3. Solve according to Example 8.

4. (a) $20\% = \frac{20}{100} = \frac{20 \div 20}{100 \div 20} = \frac{1}{5}$

$20\% = 0{\cdot}20 = 0{\cdot}2$

(b), (c) : Solve according to (a).

(d) $5\% = \frac{5}{100} = \frac{5 \div 5}{100 \div 5} = \frac{1}{20}$

$5\% = 0{\cdot}05$

5. (a) Shaded part $= \frac{3}{4} = \frac{3}{4} \times 100\% = 75\%$

(b) Shaded part $= \frac{1}{2} = \frac{1}{2} \times 100\% = 50\%$

(c) Shaded part $= \frac{5}{8} = \frac{5}{8} \times 100\% = \frac{125}{2}\% = 62\frac{1}{2}\%$

6. Percentage of nickel $= 100\% - (50\% + 30\%)$

$= 100\% - 80\% = 20\%$

7. (a) 5% of ₹ 240 $= \frac{5}{100} \times 240 =$ ₹ 12

(b) 25% pf 1 kg $= \frac{25}{100} \times 1000$ g $= 250$ g

(c) 15% of 1 hour $= \frac{15}{100} \times 60$ minutes $= 9$ minutes

8. Solve according to Example 16.

9. Percentage of voters who did not vote $= 100\% - 72\% = 28\%$

Actual number of voters who did not vote = 28% of 26,000

$= \frac{28}{100} \times 26{,}000$

$= 7280$

10. Solve according to Q. 9.

11. Solve according to Example 15.

12. Let the price of the sweater before discount be ₹ x.

25% of $x =$ ₹ 20

1% of $x =$ ₹ $\frac{20}{25}$

100% of $x =$ ₹ $\frac{20}{25} \times 100 =$ ₹ 80

13. Solve according to Example 16.

14 to 16. Take help of the Answer Sheet.

17. Percentage $= (\frac{1}{55} \div \frac{2}{11}) \times 100\% = \frac{1}{55} \times \frac{11}{2} \times 100\% = 10\%$

18. Solve according to Q. 12.

Exercise 8.3

1. (d) Sum of the parts = 1 + 2 + 5 = 8

Percentage of each ratio : $\frac{1}{8} \times 100\%, \frac{2}{8} \times 100\%, \frac{5}{8} \times 100\%$

$12\frac{1}{2}\%, 25\%, 62\frac{1}{2}\%$

(a) to (c) : Solve according to (d)

2. Percentage of green marbles = $\frac{7}{7+8+5} \times 100\%$

$= \frac{7}{20} \times 100\% = 35\%$

3. Increase = ₹ 450 – ₹ 400 = ₹ 50

Per cent increase = $\frac{50}{400} \times 100 = \frac{25}{2} = 12\frac{1}{2}\%$

4, 5 : Solve according to Q. 3.

6. Gain = ₹ 450 – ₹ 400 = ₹ 50

Gain percentage = $\frac{50}{400} \times 100\% = \frac{25}{2} = 12\frac{1}{2}\%$.

7, 8 : Solve according to Example 22.

9. Solve according to Example 20.

10, 15 : Solve according to Example 23.

11. Discount = 7% of ₹ 8900 = $\frac{7}{100} \times 8900$ = ₹ 623

Net price = ₹ 8900 – ₹ 623 = ₹ 8277

12. Total cost price = ₹ 4450 + ₹ 150 + ₹ 400 = ₹ 5000

Saler price = ₹ 6200

Profit = ₹ 6200 – ₹ 5000 = ₹ 1200

Profit per cent = $\frac{1200}{5000} \times 100 = 24\%$

13. Let $12 \times 10 = 120$ oranges purchased.

Cost price of 120 oranges = ₹ $\frac{120}{12}$ = ₹ 10

Sales price of 120 oranges = ₹ $\frac{120}{10}$ = ₹ 12

Gain = ₹ 12 – ₹ 10 = ₹ 2

Gain per cent = $\frac{2}{10} \times 100 = 20\%$

14. Let the cost price of each ball be ₹ 1.

Cost of 5 balls = ₹ 5

Selling price of 4 balls = ₹ 5

Selling price of 1 ball = ₹ $\frac{5}{4}$

Profit = ₹ $\frac{5}{4}$ – ₹ 1 = ₹ $\frac{5}{4} - \frac{4}{4}$ = ₹ $\frac{1}{4}$

Profit per cent = $\frac{\frac{1}{4}}{1} \times 100 = 25\%$

16, 17 : Solve according to Example 27.

18, 19, 20 : Solve according to Example 28.

21 to 24 : Take help of the Answer Sheet.

25. Solve according to Example 22.

26. Solve according to Example 28.

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Let the three numbers be $2x$, $3x$ and $4x$.

$(2x)^2 + (3x)^2 + (4x)^2 = 725$

$\Rightarrow 4x^2 + 9x^2 + 16x^2 = 725 \Rightarrow 29x^2 = 725$

$\Rightarrow x^2 = 725 \div 29$

$\Rightarrow x^2 = 25 = 5^2 \Rightarrow x = 5$

Numbers are 2×5, 3×5, 4×5 that is, 10, 15 and 20

2. Let the number be x.

40% of $x + 5$ = 25% of 60

$\frac{40}{100} x + 5 = \frac{25}{100} \times 60$

$\Rightarrow \frac{40}{100} x \times 100 + 5 \times 100 = \frac{25}{100} \times 60 \times 100$

$\Rightarrow 40x + 500 = 1500$

$\Rightarrow 40x = 1500 - 500$

$\Rightarrow 40x = 1000 \Rightarrow x = 1000 \div 40$

$\Rightarrow x = 25$

3. 10% more than $125 = \frac{110}{100} \times 125$

10% less than means $\frac{90}{100}$

So $x = \frac{90}{100}$ of $\frac{110}{100} \times 125 = \frac{99 \times 5}{4} \times \frac{495}{4} = 123\frac{3}{4}$

4.

Cost price of 120 stools	= ₹ 125 × 120	= ₹ 15000
Octroi	= ₹ 2 × 120	= ₹ 240
Transport		= ₹ 350
Labour		= ₹ 250
Total cost price		= ₹ 15,840

Profit = 25% of ₹ 15,840

$= \frac{25}{100} \times 15840 = ₹\ 3960$

Total Sales price = ₹ 15,840 + ₹ 3960

= ₹ 19,800

Sales price of 1 stool = $\frac{₹\ 19800}{120}$ = ₹ 165

5. 20% loss means if SP is (100 – 20) = 80, CP = 100

if SP is 1, CP = $\frac{100}{80}$

if SP is 480, CP = $\frac{100}{80} \times 480$ = ₹ 600

20% gain means if CP is 100, SP = 100 + 20 = 120

if CP is 1, SP = $\frac{120}{100}$

if CP is 600, SP = $\frac{120}{100} \times 600$ = ₹ 720

6. (4 – 3) = 1 year's interest = ₹ 42 Solve according to Example 28.

Exercise 9.1

1. (a) $\frac{-3}{1}$ (b) $\frac{-1}{1}$ (c) $\frac{1}{1}$ (d) $\frac{2}{1}$

2. Solve according to Example 1.

3. (a) 7 (b) – 4 (c) – 5 (d) – 4

4. (a) Positive (b) negative (c) negative (d) $\frac{-3}{-7} = \frac{3}{7}$ therefore positive

5. (a) Draw number line, mark unit distances $\left(\frac{1}{4}\right)$ on the right side of 0.

(b) Draw number line, mark unit distances $\left(\frac{1}{5}\right)$ on the left side of 0.

(c), (d) : Solve according to (b).

6. Solve according to Example 3.

7, 8 : Solve according to Example 4.

9. (a) and (b) : Solve according to Example 6.

(c) and (d) : Solve according to Example 7.

10. Solve according to Example 8.

11, 12 : Solve according to Example 4.

13. Take help of the Answer Sheet.

14. Solve according to Example 8.

Exercise 9.2

1. Solve according to Example 9.

2. Solve according to Example 10.

3. (b) $\frac{-11}{3} \times \frac{-9}{-44} = -\frac{1 \times 3}{1 \times 4} = -\frac{3}{4}$

(a), (c) to (f) : Solve according to (b).

4. $\frac{3}{13} \div \frac{-4}{65} = \frac{3}{13} \times \frac{65}{-4} = \frac{3 \times 5}{1 \times (-4)} = \frac{15}{-4} = \frac{-15}{4} = -3\frac{3}{4}$

5 to 7. Take help of the Answer Sheet.

8. $-3\frac{1}{5} + 2\frac{3}{4} = -\frac{16}{5} + \frac{11}{4} = \frac{-64 + 55}{20} = \frac{-9}{20}$

$3\frac{1}{5} \times 2\frac{3}{4} = -\frac{16}{5} \times \frac{11}{4} = -\frac{44}{5}$

$\frac{-9}{20} \div \frac{-44}{5} = \frac{9}{20} \times \frac{5}{44} = \frac{9}{176}$

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. We can do operations on an in-equality like $\frac{x}{y} < 1$ like equations :

$\Rightarrow \frac{x}{y} \times y < 1 \times y \Rightarrow x < y \Rightarrow \frac{x}{x} < \frac{y}{x}$

$\Rightarrow 1 < \frac{y}{x}$ or $\frac{y}{x} > 1$

2. Numerators are equal in each rational number.

Arranging the denominators greatest to least,

8, 5, 2, 1, – 4, – 6, – 8

So the rational numbers should be from the least to the greatest,

$\frac{3}{8}, \frac{3}{5}, \frac{3}{2}, \frac{3}{1}, \frac{3}{-4}, \frac{3}{-6}, \frac{3}{-8}$

[The rational number with the least denominator should be the greatest] But the case with the negative numbers is reverse : $\frac{3}{-8} < \frac{3}{-6}$

$< \frac{3}{-4}$

Thus $\frac{3}{-8} < \frac{3}{-6} < \frac{3}{-4} < \frac{3}{8} < \frac{3}{5} < \frac{3}{1}$

3. $-3\frac{1}{7} - \left(-3\frac{4}{28}\right) = -3\frac{1}{7} + 3\frac{4}{28}$

$-3\frac{1}{7} + 3\frac{1}{7} = 0$ which is neither positive nor negative.

So the given number is neither positive nor negative.

4. $\left(\frac{-8}{7} + \frac{15}{14}\right) \div \left(\frac{-8}{7} \times \frac{15}{14}\right)$

$= \left(\frac{-8 \times 2}{7 \times 2} + \frac{5}{14}\right) \div \left(\frac{-4 \times 5}{7 \times 7}\right)$

$= \left(\frac{-16}{14} + \frac{5}{14}\right) \div \left(\frac{-20}{49}\right)$

$= \frac{-11}{14} \times \frac{49}{-20} = \frac{-77}{-40} = \frac{77}{40} = 1\frac{37}{40}$

Exercise 10.1 to 10.5

Solve according to the solved examples.

Exercise 11.1

1. (a) Area = length × breadth = 20 m × 15 m = 300 m^2

Cost = ₹ 3500 × 300 = ₹ 10,50,000

2. Solve according to Example 3.

3. Area of the black board = 5·50 m × 4·40 m = 24·2000 m^2 = 24·2 m^2

Cost of painting = ₹ 10 × 24·2 = ₹ 242

4. Solve according to Example 4.

5. Side of the square = 48 m ÷ 4 = 12 m

Area of the square = 12 m × 12 m = 144 m ^{2}

Let the breadth of the rectangle = x m

Area of the rectangle = Area of this square – 6 m^2

$23 \times x = 144 - 6$

$\Rightarrow \quad 23x = 138$

$\Rightarrow \quad x = 138 \div 23 = 6$

6, 7 : Solve according to Example 5.

8, 9, 10 : Solve according to Example 6.

11. Area of the square = 40 cm × 40 cm = 1600 cm^2.

Area of the rectangle = 1600 cm^2

Length of the rectangle $= \dfrac{\text{Area of the rectangle}}{\text{Breadth of the rectangle}}$

$= \dfrac{1600}{25} = 64$ cm

Perimeter of the rectangle = 2 (length + breadth)

$= 2 \times (64 + 25)$

$= 2 \times 89 = 178$ cm

12. Solve according to Q. 11.

13. Area of the wall $= 10 \text{ m} \times 5 \text{ m} = 50 \text{ m}^2$

Area of the door frame $= 3 \text{ m} \times 2 \text{ m} = 6 \text{ m}^2$

Area of painting the wall $= 50 \text{ m}^2 - 6 \text{ m}^2 = 44 \text{ m}^2$

Cost of painting $= ₹ 12 \times 44 = ₹ 528$

14. Solve according to Q. 13.

15. Area of rectangular floor $= 25 \text{ m} \times 10 \text{ m}$

$= 25 \times 100 \text{ cm} \times 10 \times 100 \text{ cm}$

Area of one square $= 5 \text{ cm} \times 5 \text{ cm}$

Number of squares $= \dfrac{25 \times 100 \text{ cm} \times 10 \times 100 \text{ cm}}{5 \text{ cm} \times 5 \text{ cm}}$

$= 1,00,000$

16, 17, 18 : Solve according to Q. 15.

19, 20, 21 : Take help of the Answer Sheet.

22. Solve according to Q. 10.

Exercise 11.2

1. (a) Area of the parallelogram = base × height

$= 2{\cdot}5 \text{ cm} \times 3{\cdot}5 \text{ cm} = 8{\cdot}75 \text{ cm}^2$

(b), (c) : Solve according to (a)

2. (a) Area of the triangle $= \dfrac{1}{2} \times$ base × height

$= \dfrac{1}{2} \times 6 \text{ cm} \times 3{\cdot}5 \text{ cm} = 10{\cdot}5 \text{ cm}^2$

(b), (c) : Solve according to (a)

3. $\dfrac{1}{2} \times BC \times AD =$ Area

$\dfrac{1}{2} \times BC \times 3 \text{ cm} = 36 \text{ cm}^2$

$BC = \dfrac{36 \times 2}{3} = 24$ cm

4. Solve according to Example 10.

5, 8, 9 : Solve according to Example 7.

6. Solve according to Q. 1. (a).

7. Height $= \frac{\text{Area of the parallelogram}}{\text{Base of the parallelogram}} = \frac{26 \text{ cm}^2}{6{\cdot}5 \text{ cm}} = 4 \text{ cm}$

10. Solve according to Example 7.

11. $\frac{1}{2} \times \text{base} \times \text{height} = \text{area}$

$\frac{1}{2} \times 15 \text{ cm} \times \text{height} = 85 \text{ cm}^2$

$\text{height} = \frac{85 \times 2}{15} = \frac{34}{3} = 11\frac{1}{3} \text{ cm}$

12. $\frac{1}{2} \times \text{base} \times \text{height} = \text{area}$

$\frac{1}{2} \times \text{base} \times 200 \text{ cm} = 0{\cdot}5 \text{ m}^2 = 0{\cdot}5 \times 100 \times 100 \text{ cm}^2$

$\text{base} = \frac{0{\cdot}5 \times 100 \times 100 \times 2}{200} = 50 \text{ cm}$

13. Let the other side be of x cm.

$x^2 + 12^2 = 13^2 \qquad \Rightarrow x^2 + 144 = 169$

$\Rightarrow x^2 = 169 - 144 \qquad \Rightarrow x^2 = 25 = 5^2$

$\Rightarrow x = 5$

Area of the right triangle $= \frac{1}{2} \times 5 \times 12 = 30 \text{ cm}^2$

14. (a) Length of the rectangle $= 4 + 4 = 8$ cm.

Breadth of the rectangle $= 2{\cdot}5 + 2{\cdot}5 = 5$ cm

Area of the shaded part

= Area of the rectangle – area of the three unshaded triangles

$= 8 \times 5 - \frac{1}{2} \times 2{\cdot}5 \times 8 - \frac{1}{2} \times 2{\cdot}5 \times 4 - \frac{1}{2} \times 4 \times 5$

$= 40 - 10 - 5 - 10 = 15 \text{ cm}^2$

(b) Solve according to (a).

15. (a) Area of the shape = Sum of the area of the two equal triangles

$= 2 \times \frac{1}{2} \times 8{\cdot}5 \times 6$

$= 51{\cdot}0 = 51 \text{ cm}^2$

(b) Base of each triangle $= 2 + 6{\cdot}5 + 2 = 10{\cdot}5$ cm

Area of the shape = Sum of the area of the two equal triangles

$= 2 \times \frac{1}{2} \times 10{\cdot}5 \times 6 = 63 \text{ cm}^2$

16 to 18. Take help of the Answer Sheet.

19. Let the base and height of the triangle are 3x and 4x. Its Area = $\frac{\text{base} \times \text{height}}{2} = \frac{3x \times 4x}{2} = 6x^2 = 96 \text{ cm}^2 \Rightarrow x^2 = \frac{96}{6} = 16 \Rightarrow$

$x^2 = 4^2 \Rightarrow x = 4$

Base = $3x = 3 \times 4 = 12$ cm

Height = $4x = 4 \times 4 = 16$ cm

20. Side of the rhombus = $24 \div 4 = 6$ m

Rhombus is also a parallelogram. Its Height = $\frac{\text{Area}}{\text{Base}} = \frac{30}{6} = 5$ m

Exercise 11.3

1. Solve according to Example 12.

2. (a) Area of the circle = $\pi r^2 = \frac{22}{7} \times 14 \text{ m} \times 14 \text{ m} = 616 \text{ m}^2$
(b), (c) : Solve according to (a).

3. Solve according to Example 19.

4. Area of the remaining sheet
= Area of the circular sheet – Area of the off circle cut
$= 3{\cdot}14 \times 5 \times 5 - 3{\cdot}14 \times 2 \times 2$
$= 3{\cdot}14 \times 25 - 3{\cdot}14 \times 4 = 3{\cdot}14 \times (25 - 4)$
$= 3{\cdot}14 \times 21 = 65{\cdot}94 \text{ cm}^2$

5. (a) Area of the larger circle = $3{\cdot}14 \times 10 \times 10 = 314 \text{ cm}^2$
(b) Area of the smaller circle = $3{\cdot}14 \times 4 \times 4 = 50{\cdot}24 \text{ cm}^2$
(c) Area of the shaded area between two circles = $314 - 50{\cdot}24 = 263{\cdot}76 \text{ cm}^2$

6. Solve according to Example 21.

7. Solve according to Q. 4.

8. Radius of the garden = $\frac{21}{2}$ m
Length of the 2 rounds of fence = 2 × circumference
$= 2 \times 2\pi r = 2 \times 2 \times \frac{22}{7} \times \frac{21}{2} \text{ m} = 132 \text{ m}$
Cost = ₹ 12×132 = ₹ 1584

9. Solve according to Example 17.

10. Solve according to Example 14.

11. Radii of the two plates = $\frac{10 \text{ cm}}{2} = 5$ cm and $\frac{24 \text{ cm}}{2} = 12$ cm respectively.
Combined area = $\pi \times 5^2 + \pi \times 12^2 = 25\pi + 144\pi = 169\pi$
Let the radius of the plate having area equal to the combined area be *r*.

Its area = $\pi r^2 = 169\pi$

$\Rightarrow \pi r^2 = \pi \times 13^2 \Rightarrow r = 13$ cm

Diameter = $2 \times 13 = 26$ cm

12. Circumference of the circle = length of the wire

$2\pi r = 66$

$\Rightarrow 2 \times \frac{22}{7} r = 66 \qquad \Rightarrow r = \frac{66 \times 7}{2 \times 22} = \frac{21}{2}$

Area of the circle = $r^2 = \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} = \frac{693}{2} = 346{\cdot}5$ cm^2

Side of the square = perimeter $\div$ 4 = 66 cm $\div$ 4 = 16·5 cm

Area of the square = 16·5 × 16·5 = 272·25 cm^2

Area of the circle is greater.

13. Area of the square = (side)^2 = 484 cm^2 = (22)^2 cm^2

Side = 22 cm

Perimeter of the square = 4 × side = 4 × 22 = 88 cm.

Bent in the form of a circle $2\pi r$ = 88 cm

$2 \times \frac{22}{7} \times r = 88$

$\Rightarrow r = \frac{88 \times 77}{2 \times 22} = 14$ cm

Area of the circle = $\pi r^2 = \frac{22}{7} \times 14 \times 14 = 616$ cm^2

14. Solve according to Example 19.

15. Biggest possible circular sheet will be of diameter equal to the side 30 cm.

Radius = $\frac{30}{2} = 15$ cm

Area of the remaining sheet

= Area of the rectangular sheet – Area of the circular sheet

= 30 cm × 40 cm – 3·14 × 15 cm × 15 cm

= 1200 cm^2 – 706·5 cm^2 = 493·5 cm^2

16. Area of the remaining sheet

$= \frac{22}{7} \times 14 \times 14 - 2 \times \frac{22}{7} \times 3{\cdot}5 \times 3{\cdot}5 - 3 \times 1$ Calculate.

17. $2 \times \frac{22}{7} \times r = 220 \Rightarrow r = \frac{220 \times 7}{2 \times 22} = 35$ m

Outer radius = 35 + 7 = 42 cm; outer circumference = $2 \times \frac{22}{7} \times 42 =$ 264 m Cost = 10 × 264 = ₹ 2640

18 to 20 : Take help of the Answer Sheet.

21. Solve according to Example 21.

22. Area of the remaining sheet = Area of the square – Area of the circle
= 10 cm × 10 cm – 3·14 × 4 cm × 4 cm
= 100 – 50·24 = 49·76 cm^2

23. (a) Area of the shaded part = Area of the big circle – Area of the small circle
= 3·14 × 20 × 20 – 3·14 × 10 × 10 cm^2

(b) Two semi circles make a whole circle of radius $\frac{50 \text{ cm}}{2}$

= 25 cm

(c) Four quarter circles make a whole circle of radius = $\frac{40 \text{ cm}}{2}$ = 20 cm Calculate further in each case.

Exercise 11.4

1. (side of the square)^2 = 256 = 16^2 : side = 16 cm
Length of the wire = 4 × perimeter of the square
= 4 × (4 × 16) = 4 × 64 = 256 m

2, 3, 5 : Solve according to Example 26.

4. Area of the park = side × side = 100 m × 100 m = 10,000 m^2
Side of the inner square = 100 m – 5 m – 5 m = 90 m
Area of the inner square = 90 m × 90 m = 8100 m^2
Area of the path = Area of the square – Area of the inner square
= 10,000 m^2 – 8100 m^2 = 1900 m^2

6. Area of the card board = 8 cm × 5 cm = 40 cm^2
Length of the picture = 8 cm – 0·5 cm – 0·5 cm = 7 cm
Breadth of the picture = 5 cm – 0·5 cm – 0·5 cm = 4 cm
Area of the picture = 7 cn × 4 cm = 28 cm^2
Area of the margin = 40 cm^2 – 28 cm^2 = 12 cm^2

7, 8 : Solve according to Example 27.

9. Area of the lawn excluding the area of flower bed

= 20 m × 15 m – $\frac{22}{7}$ × 7 m × 7 m = 300 m^2 – 154 m^2
= 146 m^2

10. Length of the cord = circumference of the circle = $2\pi r$
= 2 × 3·14 × 4 cm = 25·12 cm
Perimeter of the square = 4 × side = 4 × 4 cm = 16 cm
Cord left = 25·12 cm – 16 cm = 9·12 cm

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Side of the square = perimeter ÷ 4 = 48 cm ÷ 4 = 12 cm

Area of the square = 12 cm × 12 cm = 144 cm^2

Area of the rectangle = 144 cm^2 – 4 cm^2 – 140 cm^2

Breadth of the rectangle = $\frac{\text{Area}}{\text{length}} = \frac{140\ cm^2}{14\ cm} = 10$ cm

Perimeter of the rectangle = 2 (length + breadth)

= 2 (14 + 10) = 2 × 24 = 48 cm

2. Let the breadth be x cm.

Then the leugth is 15% more = $\frac{115}{100} \times x$

Area = length × breadth = $\frac{115}{100} \times x \times x = 460$

$\Rightarrow x^2 = \frac{460 \times 100}{115} = 400 = 20^2$

$\Rightarrow x = 20$ cm

3. Let the base is x cm. Altitude = 2 *x*

Area = base × altitude = x × 2x = 72

$\Rightarrow 2x^2 = 72 \Rightarrow x^2 = 72 \div 2 = 36 = 6^2$

$\Rightarrow x = 6$

4. Let the altitude of the triangle be *h* and common base be *b*.

Area of the parallelogram = $b \times 12{\cdot}5$

Area of the triangle = $\frac{1}{2} \times b \times h$

$\frac{1}{2} \times b \times h = b \times 12{\cdot}5$ (given)

$h = \frac{b \times 12{\cdot}5 \times 2}{b \times 1}$

Altitude of the triangle = 25 cm

5. Let the heights and bases of the two triangles be h_1, h_2, and b_1, b_2.

$\frac{\text{Area of the first triangle}}{\text{Area of the second triangle}} = \frac{\frac{1}{2} b_1 h_1}{\frac{1}{2} b_2 h_2} = \frac{4}{3}$, given

$\frac{b_1 h_1}{b_2 h_2} = \frac{4}{3} \Rightarrow \frac{b_1}{b_2} \times \frac{h_1}{h_2} = \frac{4}{3}$

$\Rightarrow \frac{b_1}{b_2} \times \frac{3}{4} = \frac{4}{3} \Rightarrow \frac{b_1}{b_2} = \frac{4}{3} \times \frac{4}{3} = \frac{16}{3}$

Ratio of their bases = 16 : 9

6. Area of the square = $(\text{side})^2 = 49\ \text{cm}^2 = (7\ \text{cm})^2$

Side of the square = 7 cm

Length of the wire = perimeter of the square

= 4 × side = 4 × 7 cm = 28 cm

Circumference of the semi circle = r

= Length of the wire = 28 cm

7. Area of the new bigger circular park

= Sum of the areas of two small circular parks

$= \pi \times 40^2 + \pi \times 30^2 = 1600\pi + 900\pi = 2500\pi$

$\Rightarrow \pi r^2 = 2500\pi$

$\Rightarrow r^2 = 2500 = 50^2$

$r = 50$

Radius of the new park = 50 m

Exercise 12.1

Take help of the Answer Sheet.

Exercise 12.2

1. (a) $3xy + (-4xy) + 6xy$

$= \{3 + (-4) + 6\}\, xy = (9 - 4)\, xy = 5xy$

(b) $x^2 + (-3x^2) + 2x^2$

$= \{1 + (-3) + 2\}\, x^2 = (1 + 2 - 3)\, x^2 = 0 \times x^2 = 0$

(c) to (f) : Solve according to (a).

2. $\frac{1}{2}ab + \frac{1}{3}ab + \frac{1}{4}ab + \frac{1}{5}ab$

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

Take LCM of 2, 3, 4, 5 = 60

$= \frac{30 + 20 + 15 + 12}{60}ab$

$= \frac{77\,ab}{60}$.

3. (a) $8x^2y^3 - 6x^2y^3 = 2x^2y^3$

(b) $-7xyz - (-2xyz) = -7xyz + 2xyz = -5xyz$

(c) $y^2 - (-5y^2) = y^2 + 5y^2 = (1 + 5)\, y^2 = 6y^2$

(d) $-12xy - 6xy = -18xy$

4. Solve according to Example 4.

5. Solve according to Example 3, 4.

6. Solve according to Example 5.

7. (a) $3p^2q^2 - 4pq + 5$

$10p^2q^2 + 3$

$7p^2q^2 + 9pq + 15$

$20p^2q^2 + 5pq + 23$

(b) to (e) : Solve according to (a).

8. Solve according to Example 6.

9. Solve according to Example 8.

10. $a^3 - 4a^2 + 5a - 6$

$a^2 - 2a + 1$

$- \quad + \quad -$

$a^3 - 5a^2 + 7a - 7$

11. Subtract $a^2 - 2a + 1$ from $a^3 - 4a^2 + 5a - 6$

12, 13, 14 : Solve according to Example 7.

15. Solve according to Q. 7 (a).

16 to 18. Take help of the Answer Sheet.

19. Perimeter of the rectangle = 2 (length + breadth)

$= 2(x^2 - x + x - 5) = 2(x^2 - 5)$.

20. Sum of two sides $= 2x - 3 + x + 5 = 2x + x - 3 + 5 = 3x + 2$

Third side = Perimeter – Sum of two sides

$= 4x - 9 - (3x + 2) \quad = 4x - 9 - 3x - 2$

$= 4x - 3x - 9 - 2 \quad = x - 11$

Exercise 12.3

1, 3 : Solve according to Example 13.

2, 4 : Solve according to Example 14.

5. Solve according to Example 15.

6. (a) $y^2 + xy + 2 = (0)^2 + (-1) \times 0 + 2 \quad = 0 + 0 + 2 = 2$

(b) $2 \times (0)^2 + (-1)^2 + 1 = 0 + 1 + 1 = 2$

(c) $2 \times (0)^2 \times (-1) + 2 \times (-1) \times (0)^2 + (-1) \times 0 = 0 + 0 + 0 = 0$

7. (a) $4a + 7 - 5a + 2 = 4a - 5a + 7 + 2 = -a + 9$

$= -(-3) + 9 = 3 + 9 = 12$

(b) $2 - 8a + 4a + 6 = -8a + 4a + 6 + 2 = -4a + 8$

$= -4 \times (-3) + 8 = 12 + 8 = 20$

(c) $2(a^2 + ab) + 3 - ab = 2a^2 + 2ab + 3 - ab$

$= 2a^2 + 2ab - ab + 3 = 2a^2 + ab + 3$

$= 2 \times (-3) \times (-3) + (-3) \times (-5) + 3 = 18 + 15 + 3 = 36$

8. Solve according to Q. 5.

9, 10 : Take help of the Answer Sheet.

11, 12 : Solve according to Example 15.

13. (a) $x - [4y - \{2x + (3y - 3x)\}]$

$= x - [4y - \{2x + 3y - 3x\}]$

$= x - [4y - \{3y - x\}]$

$= x - [4y - 3y + x]$

$= x - [y + x] = x - y - x$

$= x - x - y = -y$

(b) Solve according to (a).

Exercise 12.4

1. (a) Put n = 5 :

$3n + 1 = 3 \times 5 + 1 = 15 + 1 = 16$

(b) Put $n = 10$:

$3n + 1 = 3 \times 10 + 1 = 30 + 1 = 31$

(c) Put $n = 20$:

$3n + 1 = 3 \times 20 + 1 = 60 + 1 = 61$

2. To find a pattern divide 16 by 3 :

$16 = 5 \times 3 + 1$

$11 = 5 \times 2 + 1$

$6 = 5 \times 1 + 1$

We get an algebraic expression for the number of matchsticks (based on the pattern) $= 5n + 1$

3. Solve according to Q. 1.

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Expression having x in the denominator is not a polynomial.

2. $0 - (-a^2 - ab + 7b^2) = 0 + a^2 + ab - 7b^2 = a^2 + ab - 7b^2$

Thus 0 is greater than $(-a^2 - ab + 7b^2)$ *by* $a^2 + ab - 7b^2$

3. Polynomial $6 = 6 \times 1 = 6 \times x^0$

Degree of $x^0 = 0$

4. L.H.S. $= (ay^2 + 3xy - 9x^2) - (-4y^2 + 8xy + bx^2)$

$= ay^2 + 3xy - 9x^2 + 4y^2 - 8xy - bx^2$

$= ay^2 + 4y^2 + 3xy - 8xy - 9x^2 - bx^2$

$= (a + 4)\, y^2 - 5xy - (9 + b)\, x^2$

R.H.S. $= 10\, y^2 - 5xy - 10\, x^2$

Comparing the coefficients of y^2, xy and x^2 in both the sides,

$(a + 4) = 10$; $-5 = -5$; $-(9 + b) = -10$

$a = 10 - 4 = 6$; $-5 = -5$; $9 + b = 10$ or $b = 10 - 9 = 1$

Thus, the statement is true for a $= 6$ and $b = 1$

5. (a) $3x + 5y - 6z = 3x - (-5y + 6z)$

(b) $ax - by + cz = ax - (by - cz)$.

6. $2a + 3 = -13 \Rightarrow 2a = -13 - 3 \Rightarrow 2a = -16 \Rightarrow a = -16 \div 2$

$\Rightarrow a = -8$

Now $6a^2 + 3a - 5 = 6 \times (-8) \times (-8) + 3 \times (-8) - 5$

$= 384 - 24 - 5 = 384 - 29 = 355$

7. $3y - 3 = 6 \Rightarrow 3y = 6 + 3 \Rightarrow 3y = 9$

$\Rightarrow y = 9 \div 3 \Rightarrow y = 3$

$0{\cdot}03x = 0{\cdot}12 \Rightarrow x = 0{\cdot}12 \div 0{\cdot}03$

$\Rightarrow x = 4$

Now $x^2 - y^2 = (4)^2 - (3)^2 = 16 - 9 = 7$

Exercise 13.1

1. Solve according to Example 1.

2. (a) $2^3 = 2 \times 2 \times 2 = 8$

$3^2 = 3 \times 3 = 9$

$9 > 8$ so $3^2 > 2^3$

(b), (c) : Solve according to (a).

3. (a), (b) : Solve according to Example 3.

(c) $6 \times 6 \times 6 \times 6 \times 6 = 2 \times 3 \times 2 \times 3 \times 2 \times 3 \times 2 \times 3 \times 2 \times 3$

$= 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3$

$= 2^5 \times 3^5$.

4. (a) $10{,}000 = 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 5 = 2^4 \times 5^4$

(Show prime factorisation of 10,000).

(b), (c) : Solve according to (a).

5. Solve according to Example 5.

6. (c) $3 \times 4^4 = 3 \times 4 \times 4 \times 4 \times 4 = 768$

(a), (b) : Solve according to (c).

7. (b) $(-2)^3 \times (-3)^2 = (-2) \times (-2) \times (-2) \times (-3) \times (-3) = -72$

(a), (c) : Solve according to (b).

8. (a) The powers of 10 are the same in both the numbers.

$13{\cdot}5 > 2{\cdot}7$ so $13{\cdot}5 \times 10^7 > 2{\cdot}7 \times 10^7$.

(b) Solve according to (a).

Exercise 13.2

1. (a) $768 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 = 2^8 \times 3$
(Show prime factorisation).

(b) $64 \times 729 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$
$= 2^6 \times 3^6 = (2 \times 3)^6 = 6^6$
(Show prime factorisation).

(c) Solve according to (b).

2. (a) $a^5 \times a^7 = a^{5+7} = a^{12}$

(b) $5^m \times 5^n = 5^{m+n}$

(c) $(2^3)^5 \times (2^7)^2 = 2^{3\times5} \times 2^{7\times2}$
$= 2^{15} \times 2^{14} = 2^{15+14} = 2^{29}$

(d) $7^y \div 7^3 = 7^{y-3}$

(e) $(5^2)^3 \div 5^4 = 5^{2\times3} \times 5^4 = 5^6 \times 5^4 = 5^{6+4} = 5^{10}$

(f) $25^4 \div 5^6 = (5 \times 5)^4 \div 5^6 = 5^4 \times 5^4 \div 5^6$
$= 5^{4+4} \div 5^6 = 5^8 \div 5^6 = 5^{8-6} = 5^2$

3. (a) $1° = 1$ and $(100)° = 1$
So $1° = (100)°$

(b) $10 \times 10^5 = 10^{1+5} = 10^6$
$100^5 = (10 \times 10)^5 = 10^5 \times 10^5 = 10^{5+5} = 10^{10}$
So $10^6 \neq 100^5$

(c) $6^5 = (2 \times 3)^5 = 2^5 \times 3^5$
So $2^2 \times 3^3 \neq 6^5$

4. (a) $5° \times 6° \times 7° = 1 \times 1 \times 1 = 1$

(b) $(8° + 9°) \times 10° = (1 + 1) \times 1 = 2 \times 1 = 2$

(c) $(2^3 \times 2)^2 = (2^{3+1})^2 = (2^4)^2 = (2)^{4\times2} = 2^8$

(d) $11° + 12° + 13° = 1 + 1 + 1 = 3$

(e) $\left(\frac{a^5}{b^3}\right) \times a^8 = \frac{a^{5+8}}{b^3} = \frac{a^{13}}{b^3}$

(f) $(6^2 \times 6^4) \div 6^3 = 6^{2+4} \div 6^3 = 6^6 \div 6^3$
$= 6^{6-3} = 6^3$

5. (a), (b), (c), (f) : Solve according to Example 13.

(d) $\left(\frac{4}{7}\right)^3 \left(\frac{4}{7}\right)^4 \left(\frac{4}{7}\right)^{10} = \left(\frac{4}{7}\right)^{3+4+10} = \left(\frac{4}{7}\right)^{17}$

(e) $\left\{\left[\left(\frac{-3}{5}\right)^2 \times \left(\frac{3}{5}\right)^4\right]^3\right\}$

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

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

$$= \left\{\left(\frac{3}{5}\right)^6\right\}^3 = \left(\frac{3}{5}\right)^{6\times3} = \left(\frac{3}{5}\right)^{18}$$

6 to 9. Take help of the Answer Sheet.

10. $6^n = 216 = 6^3 \Rightarrow n = 3$

$7^{2n-3} = 7^{2\times3-3} = 7^{6-3} = 7^3 = 343$

11. $(625^3 \div 625) \div 25^4 = 625^{3-1} \div 25^4 = 625^2 \div 25^4$

$(25^2)^2 \div 25^4 = 25^4 \div 25^4 = 1$

Exercise 13.3

1. Solve according to Example 14.

2, 4 : Solve according to Example 15.

3. (a) $4{\cdot}001 \times 10^9$

Multiplying 10^9 means moving 9 places to the right adding zeroes if required.

$\Rightarrow$ 4001000000

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

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

$$\frac{(-2)^4}{3^4} \times \frac{(-3)^3}{(2\times2)^3} = \frac{2^4\times(-1)\times3^3}{3^4\times2^3\times2^3} = \frac{-2^4\times3^3}{3^4\times2^{3+3}} = \frac{-2^4\times3^2}{3^4\times2^6}$$

Reciprocal of $\frac{-2^4\times3^2}{3^4\times2^6}$ is $\frac{3^4\times2^6}{-2^4\times3^3} = -3^{4-3}\times2^{6-4} = -3^1\times2^2$

$= -3\times2\times2 = -12$

2. $\{(-2)^2\}^4 = (-2)^{2\times4} = (-2)^8 = (-1\times2)^8 = (-1)^8\times2^8$

$= 1\times2^8\times2^8 = 256$

3. $(243^3 \div 243) \div 3^8 = 243^{3-1} \div 3^8$

$= 243^2 \div 3^8 = (3\times3\times3\times3\times3)^2 \div 3^8 = (3^5)^2 \div 3^8$

$= 3^{5\times2} \div 3^8 = 3^{10-8} = 3^2 = 9$

4. $8^x = 512 = 8\times8\times8 = 8^3$

$x = 3$

$48^{2x-6} = 48^{2x3-6} = 48^{6-6} = 48^{\circ} = 1$

5. (a) $(-3)^{x-1} = 729 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 3^6$

$x - 1 = 6$ $\{3^6 = (-3)^6\}$

$x = 6 + 1 = 7$

(b) $(6)^5 \div (6)^{3-x} = (6)^4$

$\Rightarrow 6^{5-(3-x)} = 6^4$

$\Rightarrow 5 - (3-x) = 4$

$\Rightarrow 5 - 3 + x = 4 \Rightarrow 2 + x = 4 \Rightarrow x = 4 - 2 = 2$

6. Solve according to Example 15.

7. $56897 = 50{,}000 + 6000 + 800 + 90 + 7 = 5 \times 10^4 + 6 \times 10^3 + 8 \times 10^2 + 9 \times 10^1 + 7$

8. $6 \times 10^4 + 7 \times 10^3 + 8 \times 10^2 + 9 \times 10 + 3 \times 1$

$= 6 \times 10000 + 7 \times 1000 + 8 \times 100 + 9 \times 10 + 3 \times 1$

$= 60000 + 7000 + 800 + 90 + 3 = 67893$

Exercise 14.1

1. Take help of the Answer Sheet.

2. Draw according to Example 1, 2.

3. Draw according to Example 2.

4. Draw according to Example 3.

5. Draw according to Example 4.

6 to 8, 10 , 12 to 16 : Take help of the Answer Sheet.

9. (a) Draw horizontal line of symmetry.

(b) Draw horizontal line of symmetry.

(c) Draw one horizontal and one vertical line of symmetry.

(d) Draw horizontal line of symmetry.

(i) Draw diagonally symmetrical lines.

(e) to (g), (j) to (l) : Take help of the Answer Sheet.

11. Draw youself

(a) 1, horizontal (b) 1, horizontal (c) 1, horizontal (d) 1, horizontal (e) 1, vertical (f) 1, vertical (g) 1, horizontal (h) 1, horizontal.

Exercise 14.2

Take help of the Answer Sheet.

Excercise 14.3

1 to 4, 7, 8, 9, 10, 13 to 15 : Take help of the Answer Sheet.

5, 6 : Draw yourself.

9. Take help of tables before Exercise 14·2, before Exercise 14·3 in the text book.

11. Scalene triangle, ordinary quadrilateral.

12. Semi-circle, isosceles triangle.

16. After every multiple of 72° upto 360° : 72° × 2, 72° × 3, 72° × 4, 72° × 5 = 144°, 216°, 288°, 360°

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. After every multiple of 60° : 2 × 60° ; 3 × 60° ; 4 × 60°;
5 × 60°; 6 × 60°
= 120°; 180°; 240°; 300°; 360°

2. Take help of the Answer Sheet and draw.

3. A rectangle has 2 lines of symmetry, but if any special rectangle has 4 lines of symmetry, then it is a square as a square has 4 lines of symmetry.

Exercise 15.1

1. Do yourself.

2. Take help of the Answer Sheet.

3. Complete yourself.

4 to 7 : Take help of the Answer Sheet.

Exercise 15.2

1, 2, 3 : Take help of the Answer Sheet.

4 to 7 : Draw yourself.

Exercise 15.3

Take help of the Answer Sheet.

Exercise 15.4

1, 2 : Do yourself·

3, 4 : Take help of the Answer Sheet.

Exercise 15.5

1, 3, 4 : Take help of the Answer Sheet.

2. Draw with the help of the figures given before the Exercise in the text book.

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1 to 4. Take help of the Answer Sheet.

5. Draw yourself.

TEACHER'S HELP BOOK
MATHS-8

Exercise 1.1

1, 2. Take help of the Answer Sheet.

3. $\frac{5}{17} \times$ reciprocal of $\frac{-7}{16} = \frac{5}{17} \times \frac{16}{-7} = \frac{80}{-119} = \frac{-80}{119}$

4. Solve according to Example 4.

5. Solve according to Example 3.

6. Solve according to Example 1.

7. Solve according to Example 2.

8, 9. Solve according to Example 5.

10 to 15. Take help of the Answer Sheet.

16. $\frac{-2}{3} \times \frac{-9}{11} = \frac{6}{11}$

Multiplicative Inverse of $\frac{6}{11} = \frac{11}{6}$

17. Solve according to Example 5.

Exercise 1.2

1. (a) A rational number between 1 and 2 $= \frac{1+2}{2} = \frac{3}{2}$

(b) A rational number between – 3 and 2 $= \frac{-3+2}{2} = \frac{-1}{2}$

(c) A rational number between – 5 and – 4 $= \frac{-5+(-4)}{2}$

$= \frac{-9}{2}$

(d) A rational number between $\frac{-8}{9}$ and $\frac{-7}{9}$

$= \left(\frac{-8}{9} + \frac{-7}{9}\right) \div 2 = \frac{-15}{9} \div 2$

$= \frac{-15}{9} \times \frac{1}{2} = \frac{-5 \times 1}{3 \times 2} = \frac{-5}{6}$

(e) A rational number between $\frac{-5}{6}$ and $\frac{-6}{5}$

$= \left(\frac{-5}{6} + \frac{-6}{5}\right) \div 2 = \frac{-5 \times 5 + (-6) \times 6}{30} \div 2$

$= \frac{-25 + (-36)}{30} \div 2 = \frac{-61}{30} \div 2 = \frac{-61}{30} \times \frac{1}{2} = \frac{-61}{60}$

(f) Solve according to (d).

(g), (h) : Solve according to (e).

2 to 6, 8 to 10 : Solve according to Example 11 and 12.

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. $a + (b + c) = \frac{-3}{4} + (\frac{5}{6} + \frac{7}{8}) = \frac{-3}{4} + \frac{20 + 21}{24} = \frac{-3}{4} + \frac{41}{24}$

$= \frac{-18 + 41}{24} = \frac{23}{24}$

$(a + b) + c = (\frac{-3}{4} + \frac{5}{6}) + \frac{7}{8} = \frac{-9 + 10}{12} + \frac{7}{8} = \frac{1}{12} + \frac{7}{8}$

$= \frac{2 + 21}{24} = \frac{23}{24}$

2. Solve according to Example 1.

3. Multiplicative inverse of $\frac{8}{9} = \frac{9}{8} = 1\frac{1}{8}$

So $\left(-1\frac{1}{8}\right)$ is not the multiplicative inverse of $\frac{8}{9}$.

4. Multiplicative inverse of 0 is not defined.

5. Reciprocal of $\frac{1}{1}$ is $\frac{1}{1}$.

Reciprocal of $\frac{-1}{1}$ is $\frac{1}{-1} = \frac{-1}{1}$.

6. Solve according to Exercise 1.2 Q. 4 (d).

Exercise 2.1

Solve according to Examples.

Exercise 2.2

1. Let the smaller number be x.

Greater number exceeds by $12 = x + 12$

$x + x + 12 = 72 \Rightarrow 2x + 12 = 72 \Rightarrow 2x = 72 - 12$

$\Rightarrow 2x = 60 \Rightarrow x = 60 \div 2 = 30$

Smaller number = 30, greater number = 30 + 12 = 42

2. Let the consecutive integers be x, $(x + 1)$, $(x + 2)$

$x + (x + 1) + (x + 2) = 42$. Solve this equation.

3. Solve according to Example 5.

4. Let their present ages be $3x$ and $5x$.
Four years later the sum of ages $= (3x + 4) + (5x + 4) = 48$
$\Rightarrow 8x + 8 = 48 \quad \Rightarrow 8x = 48 - 8 = 40$
$\Rightarrow x = 40 \div 8 = 5$
Their ages are $3 \times 5 = 15$ and $5 \times 5 = 25$ years.

5. Let the numbers be $7x$ and $4x$.
Difference $= 7x - 4x = 21$. Solve further

6. Let the number of boys and girls be $5x$ and $6x$.
$5x = 6x - 5$
$\Rightarrow 5x - 6x = -5 \Rightarrow -x = -5 \Rightarrow x = 5$
Total number of students $= 5 \times 5 + 6 \times 5 = 25 + 30 = 55$

7. Solve : $x + 20 = 3x$

8. Let the age of Sonia be x years.
Sonia's father's age $= (x + 25)$ years
Sonia's grandfather's age $= (x + 25 + 24)$ years
$x + (x + 25) + (x + 25 + 24) = 104$
$\Rightarrow 3x + 74 = 104 \Rightarrow 3x = 104 - 74 = 30$
$\Rightarrow x = 30 \div 3 = 10$
Sonia's age = 10 years, Her father's age $= 10 + 25 = 35$ years
Her grandfather's age $= 35 + 24 = 59$ years

9. Let the breadth be x m.
Length $= (2x - 3)$ m
Walk = Perimeter = 2 (length + breadth)
$= 2 (2x - 3 + x) = 282$. Solve this equation.

10. : Solve according to Example 5.

11, **15** : Solve according to Example 9.

12 to 14 : Take help of the Answer Sheet.

16. $(x - \frac{1}{2}) \times \frac{1}{2} = \frac{1}{8}$

Exercise 2.3

1. Solve according to Example 11, 12 and 13.

Exercise 2.4

1. Let the smaller number be x.
The greater number $= x + 10$
Sum $= x + x + 10 = 64 \Rightarrow 2x = 64 - 10 = 54$
$\Rightarrow x = 54 \div 2 = 27$ Greater number $= 27 + 10 = 37$

2. Solve according to Example 14.

3. Let Sonu's age be x years now.

Sonu's father's age = 4 x years

In twenty years, $4x + 20 = 2(x + 20)$

$\Rightarrow 4x + 20 = 2x + 40 \Rightarrow 4x - 2x = 40 - 20$

$\Rightarrow 2x = 20 \Rightarrow x = 20 \div 2 = 10$

: Sonu's present age = 10 years, father's present age = 40 years

4, 6 : Solve according to Q. 3.

5. Let the ages be $4x$ and $3x$ years

20 years before, $4x - 20 = 2(3x - 20)$

$\Rightarrow 4x - 20 = 6x - 40 \qquad \Rightarrow 4x - 6x = -40 + 20$

$\Rightarrow -2x = -20$

$\Rightarrow x = (-20) \div (-2) = 10$

Present Ages are $4 \times 10 = 40$ years and $3 \times 10 = 30$ years

7. Let Sheela thought the number as x.

$\left(x - \frac{5}{2}\right) \times 8 = 3x$. Solve this equation.

8. Let the Smaller number be x.

Greater number = $5x$

$(5x + 21) = 2(x + 21)$. Solve this equation.

9. Solve according to Example 14.

10. Let the digit at ones place be x.

Digit at the tens place = $x + 3$

Number formed = 10 × digit at tens place + digit at ones place

$= 10(x + 3) + x = 10x + 30 + x = 11x + 30$

Interchanging the digit, tens digit = x and ones digit = $x + 3$

Now the number formed = 10 × tens digits + ones digit

$= 10 \times x + x + 3 = 11x + 3$

Sum of the two numbers $= 11x + 30 + 11x + 3 = 143$

$\Rightarrow 22x + 33 = 143 \Rightarrow 22x = 143 - 33 = 110$

$\Rightarrow x = 110 \div 22 = 5$

Ones digit of the original number = 5, tens digit = 5 + 3 = 8 Original number = 85

Note : If the digit at tens place is 3 less than the digit at ones place, the number would be 58.

11. Solve according to Q. 10.

12. Let the number of bees was x.

Bees on Kadamba = $\frac{x}{5}$

Bees on Silindheri = $\frac{x}{3}$

Difference $= \frac{x}{3} - \frac{x}{5} = \frac{5x - 2x}{15} = \frac{2x}{15}$

Bees on Kutaja $= 3 \times \frac{2x}{15} = \frac{2x}{5}$

Total of bees on the three trees + 10 = Total number in the swarm

$\frac{x}{5} + \frac{x}{3} + \frac{2x}{5} + 10 = x$

$\Rightarrow \frac{x}{5} \times 15 + \frac{x}{3} \times 15 + \frac{2x}{5} \times 15 + 10 \times 15 = x \times 15$

$\Rightarrow 3x + 5x + 6x + 150 = 15x$

$\Rightarrow 14x - 15x = -150 \Rightarrow -x = -150 \Rightarrow x = 150$

Exercise 2.5

Solve according to Example 17 and 18.

Exercise 2.6

1. Solve according to Example 19.

2, **4** : Solve accoding to Example 20.

3. Let the numerator be x.

Then the denominator $= x + 5$

New number $= \frac{\text{numerator} + 6}{\text{denominator} - 4} = \frac{x + 6}{x + 5 - 4} = \frac{3}{2}$

$\Rightarrow \frac{x + 6}{x + 1} = \frac{3}{2}$

Multiplying both sides by $(x + 1) \times 2$,

$\frac{x + 6}{x + 1} \times (x + 1) \times 2 = \frac{3}{2} \times (x + 1) \times 2$

$\Rightarrow (x + 6) \times 2 = 3 \times (x + 1)$

$\Rightarrow 2x + 12 = 3x + 3 \Rightarrow 2x - 3x = 3 - 12$

$\Rightarrow -x = -9 \Rightarrow x = 9$

The original rational number $= \frac{\text{numerator}}{\text{denominator}} = \frac{9}{9 + 5} = \frac{9}{14}$

5. Solve : $\frac{x - 5}{x - 4 + 6} = \frac{5}{2}$

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Let x be the number of plates.

Number of *puris* $= 4 \times (x - 1)$

Number of *puris* in anothe way $= 3 \times x + 1$

$4 \times (x - 1) = 3 \times x + 1$

$4x - 4 = 3x + 1$

$\Rightarrow 4x - 3x = 1 + 4 \Rightarrow x = 5$

Number of plates = 5

Number of *puris* = $4 \times (5 - 1) = 4 \times 4 = 16$

2. Solve according to Q. 8 of Exercise 2·2.

3. Solve according to Q. 12 of Exercise 2·4.

Exercise 3.1

1. Sum of the measures of a quadrilateral = 360°

Sum of the given angles = 68° + 85° + 93° = 246°

Fourth angle = 360° – 246° = 114°

2. Let each of the equal angles be x.

$65° + 65° + x° + x° = 360° \Rightarrow 130° + 2x° = 360°$

$\Rightarrow 2x° = 360° - 130° = 230° \Rightarrow x° = 230° \div 2 = 115°$

3. Sum of the terms of the ratio = 1 + 2 + 3 + 4 = 10

The angles are $\frac{1}{10} \times 360, \frac{2}{10} \times 360, \frac{3}{10} \times 360, \frac{4}{10} \times 360$

= 36° ; 72° ; 108° and 144°

4. (a) Sum of the angles = 125° + 65° + 105° + 75° = 370°, not the angles of a quadrilateral

(b) Sum of the angles = 185° + 50° + 110° + 15° = 360°, can be the angles of a quadrilateral.

Note : In (b) an angle is 185°. It is a case of concave quadrilateral.

5. Sum of the other three angles = 360° – 105° = 255° As each of the three angles are equal, each angle = 255° ÷ 3 = 85°

6. Sum of the given angles = 28° + 90° + 90° = 208°

$\angle MAN = 360° - 208° = 152°$

7. $\angle DAB + \angle 1 + \angle ABC + \angle 2 + \angle BCD + \angle 3 + \angle CDA + \angle 4$
$= 180° \times 4$

$\Rightarrow \angle DAB + \angle ABC + \angle BCD + \angle CDA + \angle 1 + \angle 2 + \angle 3 + \angle 4 = 720°$

$\Rightarrow 360° + \angle 1 + \angle 2 + \angle 3 + \angle 4 = 720°$

$\Rightarrow \angle 1 + \angle 2 + \angle 3 + \angle 4 = 720° - 360° = 360°$

8. $\angle P + \angle S = 180° \Rightarrow 40° + \angle S = 180° \Rightarrow \angle S = 180° - 40° = 140°$

$\angle Q + \angle R = 180° \Rightarrow 50° + \angle R = 180° \Rightarrow \angle R = 180° - 50° = 130°$

9. Take help of the Answer Sheet.

10. (a) Angle sum = $(n - 2) \times 180° = (7 - 2) \times 180°$
$= 5 \times 180° = 900°$

(b) Angle sum = $(n - 2) \times 180° = (9 - 2) \times 180° = 7 \times 180° = 1260°$

11. (a) Angle sum = $(n - 2) \times 180° = (5 - 2) \times 180° = 3 \times 180°$

Measure of each angle = $\frac{3 \times 180°}{5} = 108°$

(b) Angle sum = $(n - 2) \times 180° = (6 - 2) \times 180° = 4 \times 180°$

Measure of each angle = $\frac{4 \times 180°}{6} = 120°$

12 to 14. Take help of the Answer Sheet.

15. Total of angle measures of a pentagon = $(5 - 2) \times 180° = 540°$

Adjacent angle of $70° = 180° - 70° = 110°$

Adjacent angle of $60° = 180° - 60° = 120°$

Now $x + x + 110 + 120 + 50 = 540$

Exercise 3.2

1. (a) Sum of all the exterior angles = 360°

Sum of two exterior angles = 110° + 120° = 230°

x = Third exterior angle = 360° – 230° = 130°

(b) Sum of all the exterior angles = 360°

Sum of three exterior angles = 95° + 105° + 90° = 290°

x = fourth exterior angle = 360° – 290° = 70°

(c) Solve according to (b).

2. Measure of each exterior angle =

(a) $\frac{360°}{3} = 120°$ (b) $\frac{360°}{4} = 90°$ (c) $\frac{360°}{9} = 40°$

3. Total measure of all exterior angles of a polygon = 360°

Number of exterior angles = $\frac{360°}{24°} = 15$

Number of sides = Number of angles = 15

4. Measure of each exterior angle of a regular pentagon = $\frac{360°}{5}$

$= 72°$

Measure of each interior angle = 180° – 72°

$= 108°$

5. Each interior angle = 162°

Each interior angle + its adjacent exterior angle = 180° (linear pair)

Each exterior angle = 180° – 162° = 18°

Number of exterior angles = $\frac{360°}{18°} = 20$

Number of sides = Number of angles = 20

6 to 9. Take help of the Answer Sheet.

10. Solve according to Example 11.

Exercise 3.3

1. Measure of the opposite angle of 115° is also 115° in the parallelogram.
Sum of two interior angles on the same side of a transversal = 180°
Third angle = 180° – 115° = 65°
Measure of the opposite angle of 65° is also 65° in the parallelogram.

2. These lines represent diagonals of a parallelogram which bisect each other, so the figure is a parallelogram.

3. The diagonals of a parallelogram bisect each other, that is, divide in the ratio 1 : 1 so the given quadrilateral is not a parallelogram.

4. The sum of two adjacent angles of a parallelogram = 180°

5. Let the greater angle be of $x°$
Smaller angle = x – 30°
$x° + x° - 30° = 180°$ (Sum of adjacent angles of a parallelogram)
$\Rightarrow 2x° = 180° + 30° \Rightarrow 2x° = 210° \Rightarrow x° = 210° \div 2 = 105°$
Greater angle = 105°, smaller angle = 105° – 30° = 75°

6. Sum of the two adjacent (interior angles on the same side of a transversal) angles of the parallelogram = 180°
Sum of the terms of the ratio 1 : 3 = 1 + 3 = 4
Angles are $\frac{1}{4} \times 180°$ and $\frac{3}{4} \times 180°$, that is, 45° and 135°

7. $\angle A + \angle B = 180°$ (adjacent angles of a parallelogram)
$\frac{1}{2}(\angle A + \angle B) = \frac{180°}{2} = 90°$
Sum of the three angles of $\Delta APB = 180°$
$\angle APB = 180° - \frac{1}{2}(\angle A + \angle B) = 180° - 90° = 90°$

8. $OA = \frac{1}{2} AC = \frac{1}{2} \times 10 \text{ cm} = 5 \text{ cm}$
$OB = \frac{1}{2} BD = \frac{1}{2} \times 8 \text{ cm} = 4 \text{ cm}$

9. In the two triangles thus formed,
pair of opposite sides are equal.
Diagonal is common in both the triangles.
So the two triangles are congruent under *SSS* congruence condition.

10. If the measure of an angle in a parallelogram = 90°
Measure of its opposite angle is equal = 90°

Sum of the rest two angles = 360° – 90° – 90° = 180°
They are opposite so equal, measure of each = 180° ÷ 2 = 90°

11. In triangles PYS and RXC,
SP = QR (opposite sides of a parallelogram)
YS = XC (half of the opposite sides of a parallelogram)
$\angle S = \angle Q$ (opposite angles of a parallelogram)
$\Delta PYS \cong \Delta RXC$ (SAS congruence condition)
$\angle PYS = \angle RXC$
But $\angle PYS = \angle YPX$ (PQ 11 RS, PY transversal)
Thus $\angle YPX = \angle RXC$
But these ar corresponding angles.
So YP || RX
Also PX || YR
So PXRY is a parallelogram.

12. $\angle C = \angle A = 110°$
In the Δ BDC,
$\angle BDC + \angle BCD + \angle DBC = 180°$
$\angle BDC + 110° + 30° = 180°$
$\Rightarrow \angle BDC = 180° - 110° - 30° = 40°$
Now AD || BC and BD is transversal.
$\angle ADB = \angle CBD = 30°$ (alternate angles)

13. to **18.** : Take help of the Answer Sheet.

19. $PR - QS = 4 \Rightarrow \frac{PR}{2} - \frac{QS}{2} = \frac{4}{2} = 2$

$\Rightarrow OP - OS = 2 \Rightarrow 8 - OS = 2 \Rightarrow OS = 8 - 2 = 6$

Exercise 3.4

1. (a) Diagonals of a rectangle are equal.
So half diagonals are equal.
So opposite angles are equal = $x°$ each
vertically opposite angles at O = 44°
$44° + x° + x° = 180° \Rightarrow 2x° = 180° - 44° = 136°$
$\Rightarrow x° = 136° \div 2 = 68°$

(b) Sides of the rhombus are equal.
So opposite angles are equal = $x°$ each
Opposite angle of 110° in the rhombus = 110°
$110° + x° + x° = 180° \Rightarrow 2x° = 180° - 110° = 70°$
$\Rightarrow x° = 70° \div 2 = 35$

(c) Solve according to (b)

$54° + 54° + x° = 180°$

$\Rightarrow x° = 180° - 54° - 54° = 72°$

2. In Δ ABC and Δ CAD,

AC = CA, CB = AD, BA = DC

Δ ACB $\cong \Delta$ CAD (SSS conguence condition)

3. $(\text{diagonal})^2 = 6^2 + 8^2 = 36 + 64 = 100 = 10^2$

diagonal = 10 cm

4. Diagonals of a rhombus bisect at right angles.

So half diagonals make a right angle and right triangle with the side of the rhombus.

$(\text{side of the rhombus})^2 = \left(\frac{16}{2}\right)^2 + \left(\frac{12}{2}\right)^2 = 8^2 + 6^2 = 64 + 36$

$= 100 = 10^2$

Side of the rhombus = 10 cm

5. When one diagonal of a rhombus is equal to one of its sides it makes an equilateral triangle with two equal sides of the rhombus. So each angle of the triangle is 60°.

Opposite angle = 60°, other angles = 180° – 60° = 120° each.

6. $AC^2 = AB^2 + BC^2$; $BD^2 = BA^2 + AD^2$

AB = BA and BC = AD (opposite equal sides)

So $AB^2 + BC^2 = BA^2 + AD^2$ So $AC^2 = BD^2$ or AC = BD

7. In Δ BOC and Δ DOC,

BC = DC (equal opposite sides)

BO = DO (diagonals bisect)

OC = OC (common)

Δ BOC $\cong \Delta$ DOC

$\therefore \angle$ OCD = $\angle$ OCB

8 to **21** : Take help of the Answer Sheet.

22 : Solve according to Q. 7.

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. When the number of sides of a regular polygon increases, the measure of their interior angle increases.

Minimum number of sides of a regular polygon, that is, 3, that is of an equilateral triangle.

Each angle of an equilateral triangle = 60°

Thus, minimum interior angle possible for a regular polygon = 60°

2. Exterior angle and its adjacent interior angle add up to 180°. For the minimum interior angle (as in Q.1) maximum exterior angle possible

$= 180° - 60° = 120°$

3, **4** : Take help of the Answer Sheet.

5. Solve according to Q.4. of Exercise 3.4.

Exercise 4.1 to 4.3

Construct according to Examples 1 to 8.

Exercise 5.1 and 5.2

Solve according to Examples 1 to 7 and Take help of the Answer Sheet.

Exercise 6.1

1 to **4** : Take help of the Answer Sheet

5. Solve according to Example 3.

6. Solve according to Example 4.

Exercise 6.2

Take help of the Answer Sheet.

MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1, **2** : Take help of the Answer Sheet

3. Solve according to Example 4.

Exercise 7.1

1. (a) $37^2 = \cdots\cdots 9$ ($7 \times 7 = 49$, put 9 and carry 4.)

$= \cdots\cdots 69$ (Twice of $3 \times 7 = 42$, add carry 4 = 46. Put 6 and carry 4)

$= 1369$ (3×3 + carry 4 = 13)

(b) $304^2 = \cdots\cdots 6$ ($4 \times 4 = 16$, put 6 and carry 1.)

$= \cdots\cdots 16$ (Twice of 30×4, add carry 1 = 241. Put 1 and carry 24)

$= 92416$ ($30 \times 30 = 900$ + carry 24 = 924)

(c) Solve according to (a) and put decimal after 2 places from the rightmost place.

(d) $\left(\frac{-3}{13}\right)^2 = \frac{(-3)^2}{13^2} = \frac{9}{169}$

2, **4** : Solve according to Example 1 and 2.

3. Squares of even numbers end in even digits at ones place. So 196 and 484 are squares of even numbers.

5. Solve according to Example 3 or 4.

6. Solve according to Example 8.

7. Solve according to Example 9.

8. Solve according to Example 10.

9. (a) $10^2 + 13^2 = 100 + 169 = 269$

$17^2 = 289$

So $10^2 + 13^2 \neq 289$, not Pythagorean triplet.

(b) $5^2 + 12^2 = 25 + 144 = 169 = 13^2$

So 5, 12, 13 is a Pythagorean triplet.

(c), (d) : Solve accordingly

10. Triangular numbers are formed as follows.

$1 + 2 = 3$, $1 + 2 + 3 = 6$; $1 + 2 + 3 + 4 = 10$;

$1 + 2 + 3 + 4 + 5 = 15$;

$1 + 2 + 3 + 4 + 5 + 6 = 21$; $1 + 2 + 3 + 4 + 5 + 6 + 7 = 28$;

$1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 = 36$

$7^2 = 49 = 21 + 28$

$8^2 = 64 = 28 + 36$

11. $(2m)^2 + (m^2 - 1)^2 = (m^2 + 1)^2$ So, $2m$, $(m^2 - 1)$ and $(m^2 + 1)$ form a Pythagorean triplet.

If $2m = 18$; $m = 9$

$m^2 - 1 = 9^2 - 1 = 81 - 1 = 80$; $m^2 + 1 = 9^2 + 1 = 82$

$18^2 + 80^2 = 324 + 6400 = 6724 = 82^2$

So the required triplet is 18, 80 and 82 of which 18 is the smallest number.

12 to 17. Take help of the Answer Sheet.

18. Solve according to Example 5.

19. Comparing the two columns,

$1 \Rightarrow 12$; $10 \Rightarrow 1020$; $100 \Rightarrow 100200$

$\therefore$ $10000 \Rightarrow$ 1000020000 and $1000000 \Rightarrow$ 10000002000000

Exercise 7.2

1. Solve according to Example 12.

2. (a) Square root of $\frac{81}{121} = \frac{\sqrt{81}}{\sqrt{121}} = \frac{9}{11}$

(b) Take square root of 196 and 625 separately.

$$\sqrt{\frac{196}{625}} = \sqrt{\frac{196}{625}} = \frac{14}{25}$$

(Show prime factorisation of 196 and 625 separately)

3. When we find the square root of a decimal number, the number of places after decimal point becomes half·

(a) $\sqrt{0{\cdot}09}$ = 0·3 (half of two places)

(b) $\sqrt{0{\cdot}000004}$ = 0·002 (half of six places)

(c) $\sqrt{0{\cdot}0625}$ = 0·25 (half of four places)

(d) $\sqrt{0{\cdot}001764}$ = 0·042 (half of *six* places)

4, 5 : Solve according to Example 14.

6. Find prime factorisation of 2304.

$\sqrt{2304}$ = 48

There are 48 rows in the auditorium.

7. $75\frac{46}{49} = \frac{75 \times 49 + 46}{49} = \frac{3675 + 46}{49} = \frac{3721}{49} = \frac{61^2}{7^2}$

$75\frac{46}{49} = \frac{61}{7} = 8\frac{5}{7}$ m

8. Find prime factors of 2704

$\sqrt{2704}$ = 52

9. Third side = $\sqrt{17^2 - 15^2} = \sqrt{289 - 225} = \sqrt{64}$ = 8 cm

10. Solve according to Example 19.

11 to 15. Take help of the Answer Sheet

16. $\sqrt{4 + \sqrt{20} + \sqrt{25}} = \sqrt{4 + \sqrt{20} + 5} = \sqrt{4 + \sqrt{25}} = \sqrt{4 + 5}$

$= \sqrt{9} = 3$

17. Solve according to Example 15.

Exercise 7.3

1. Take help of the Answer Sheet.

2. (a) to (p) : Solve according to Example 20.

(q) to (*x*) : Solve according to Example 21.

3. Solve according to Example 23.

4. Solve according to Example 22.

5. Least number of 4 digits = 1000

$$\begin{array}{r|l} & 31 \\ 3 & \overline{1000} \\ & 9 \\ \hline 61 & 100 \\ & 61 \\ \hline \end{array} \qquad \begin{array}{r|l} & 32 \\ 3 & \overline{1000} \\ & 9 \\ \hline 62 & 100 \\ & 124 \\ \hline \end{array}$$

$31^2 = 961$ is number of 3 digits

So $32^2 = 1024$ is the least square number of 4 digits.

{We needed 124 – 100 = 24 more to make square of 62.}

6. Greatest number of 4 digits = 9999

$$\begin{array}{r|l} & 99 \\ 9 & \overline{99\,99} \\ & 81 \\ \hline 189 & 1899 \\ & 1701 \\ \hline & 198 \end{array}$$

So, the number 9999 – 198 = 9801 is he greatest number of 4 digits which is a perfect square.

7. Total number of flowers = $8 \times 1250 = 10{,}000$

Number of temples = $\sqrt{10000} = 100$

8, **9**, **10** : Find the square root by division method according to Example 20 or 21.

11 to 13 : Take help of the Answer Sheet.

14. Find the square root of 99999 and subtract the remainder from 99999.

Exercise 7.4

1. (a) $\frac{80}{405} = \frac{80 \div 5}{405 \div 5} = \frac{16}{81}$

Square root of $\frac{16}{81} = \frac{\sqrt{16}}{\sqrt{81}} = \frac{4}{9}$

(b) Find the square roots of the numerators and denominators separately

(c) : $\frac{243}{363} = \frac{243 \div 3}{363 \div 3} = \frac{81}{121}$

$\sqrt{\frac{81}{121}} = \frac{\sqrt{81}}{\sqrt{121}} = \frac{9}{11}$

(d) $3\frac{13}{36} = \frac{36 \times 3 + 13}{36} = \frac{108 + 13}{36} = \frac{121}{36}$

$\sqrt{\frac{121}{36}} = \frac{11}{6} = 1\frac{5}{6}$

(e) to (j) : Solve accordingly.

(k) to (t) : Solve according to Example 24.

2, **3** : Solve according to Example 24.

Exercise 7.5

1. Solve according to Example 26 and 27.

2. Diagonal of the rectangle = $\sqrt{8^2 + 5^2}$ = $\sqrt{64 + 25}$ = $\sqrt{89}$

Find the square root of 89·000000.

Mental Maths & MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. 135^2 = (13 × 14) hundreds + 25 = 18200 + 25 = 18225

2. Number of odd numbers starting from 1 is 12. So the sum = 12^2 = 144

3. Solve according to the Example 15.

4. Solve according to Example 19.

Exercise 8.1

1. (a) $11^3 = 11 \times 11 \times 11 = 1331$

(b) $16^3 = 16 \times 16 \times 16 = 4096$

(c) $1{\cdot}5^3 = 1{\cdot}5 \times 1{\cdot}5 \times 1{\cdot}5 = 3{\cdot}375$ (Total number of decimal places = 3)

(e) $\left(\frac{-6}{13}\right)^3 = \left(\frac{-6}{13}\right) \times \left(\frac{-6}{13}\right) \times \left(\frac{-6}{13}\right) = -\frac{216}{2197}$

(g) $(2\frac{1}{4})^3 = (\frac{9}{4})^3 = \frac{9}{4} \times \frac{9}{4} \times \frac{9}{4} = \frac{729}{64} = 11\frac{25}{64}$

(h) $(500)^3 = 500 \times 500 \times 500 = 125000000$

2. Solve according to Example 1 and 2.

3. Cubes of even numbers are even : 64 ; 1728

4. Cubes of odd numbers are odd : 27 ; 1331

5. Solve according to Example 3.

6. $1125 = 3 \times 3 \times 5 \times 5 \times 5$

3×3 is not a triplet of equal factors.

Dividing 1125 by $3 \times 3 = 9$ we have $5 \times 5 \times 5$ which is a perfect cube.

7. 6 is a multiple of 3 and cube of 6 = 216 is a multiple of 27 (27×8) ; 15 is a multiple of 3 and cube of 15 = 3375 is a multiple of 27 = (125×27).

8. 10 is a multiple of 5 and cube of 10 = 1000 is a multiple of 125 (125×8).

9 to 14. Take help of the Answer Sheet.

15. 7^3 is equal to the sum of 7 odd numbers (given)

8^3 is equal to the sum of the next 8 odd numbers (given)

9^3 = sum of the next 9 odd numbers

= 73 + 75 + 77+ 79 + 81 + 83 + 85 + 87 + 89

10^3 = sum of the next 10 odd numbers

= 91 + 93 + 95 + 97 + 99 + 101 + 103 + 105 + 107 + 109

16. Solve according to Example 8.

Exercise 8.2

1. Solve according to Example 10.

2. Solve according to the Maths Lab Activity· before Exercise 8·2 in the text book.

3. (a) to (d), (i), (l) : Solve according to Example 11.

(e) $-4\frac{17}{27} = -\frac{27 \times 4 + 17}{27} = -\frac{108 + 17}{27} = -\frac{125}{27}$

$125 = 5 \times 5 \times 5$;

$\sqrt[3]{125} = 5$; $\sqrt[3]{-125} = -5$

$27 = 3 \times 3 \times 3$; $\sqrt[3]{27} = 3$

Cube root of $\frac{-125}{27} = -\frac{5}{3} = -1\frac{2}{3}$

(f), (g) : Solve according to (e).

(j), (k) : Solve according to Example 12.

4. Length of the edge of the cubical box

= Cube root of the volume 17576 cm^3 = 26 cm

(Show factorisation of 17576)

5 to 8. Take help of the Answer Sheet.

9. First find the square root of 46656 and then find the cube root of this square root.

10. Solve according to the hint.

Mental Maths & MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. We know cube of $1 = 1 \times 1 \times 1 = 1$

Square of $1 = 1 \times 1 = 1$

No other natural number is equal to its cube. $2^3 \neq 2$

The cube of the number $(-1) = (-1) \times (-1) \times (-1) = -1$

Square of the number $(-1) = (-1) \times (-1) = 1$

Thus (-1) is equal to its cube $= -1$ but not equal to its square 1.

2. Solve according to Maths Lab Activity before Exercise 8·2 in the text book

3. Cube root of 1 is 1.

Number of decimal places in 0·000001 is six. Number of decimal places in its cube root = one third of six $= 6 \div 3 = 2$ We put decimal point two places to the left starting from 1 (Put one zero to make two places) = 0·01

4. Solve according to the topic 'More closer estimation of cube root' given after Exercise 8·2 in the text book.

Exercise 9.1

1. (a) $48\% = \frac{48}{100} = \frac{48 \div 4}{100 \div 4} = \frac{12}{25}$

(b) $72\% = \frac{72}{100} = \frac{72 \div 4}{100 \div 4} = \frac{18}{25} = 18 : 25$

(c) $0.55 = 0{\cdot}55 \times 100\% = 55\%$

(d) $12\% = \frac{12}{100} = 0{\cdot}12$

(e) $\frac{4}{5} = \frac{4}{5} \times 100\% = 4 \times 20\% = 80\%$

(f) $7 : 20 = \frac{7}{20} = \frac{7}{20} \times 100\% = 7 \times 5\% = 35\%$

2. (a) 20% of 8 kg $= \frac{20}{100} \times 8000$ g $= 1600$ g $= 1{\cdot}6$ kg

(b) $2\frac{1}{2}\%$ of 500 km $= \frac{5}{2} \times \frac{1}{100} \times 500$ km $= \frac{25}{2}$ km $= 12\frac{1}{2}$ km

(c) 25% of ₹ 780 $=$ ₹ $\frac{25}{100} \times 780 =$ ₹ 195

(d) $1\frac{1}{4}\%$ of 5000 litres $= \frac{5}{4} \times \frac{1}{100} \times 5000 = \frac{125}{2} = 62\frac{1}{2}$ litres

3. Percentage of nickel $= 100\% - (30\% + 20\%)$

$= 100\% - 50\% = 50\%$

Quantity of nickel = 50% of 2·56 kg $= \frac{50}{100} \times 2{\cdot}56 = 1{\cdot}28$ kg

4. Milk is 17 litres in $17 + 3 = 20$ litres of the mixture.

Percentage of milk $= \frac{17}{20} \times 100\% = 85\%$

5. 10% increase means if the salary is ₹ 100, it increased to ₹ 110. If the salary after increase is ₹ 110, salary before increase = ₹ 100

If the salary after increase is ₹ 1, salary before increase = ₹ $\frac{100}{110}$

If the salary after increase is ₹ 14355, Salary before increase

= ₹ $\frac{100}{110} \times 14355$ = ₹ 13050

6. Percentage of girls = 100% – 55% = 45%

Let the total number be x.

45% of x = 270

$\Rightarrow \frac{45}{100} \times x = 270$

$\Rightarrow x = \frac{270 \times 100}{45} = 600$

7. 86% of x = 645. Solve further.

8. Increase = 11385 – 11000 = 385

Increase per cent = $\frac{385}{11000} \times 100\% = 3.5\%$

9. Solve according to Example 4.

10. Increase in February = 10% of ₹ 10500 = $\frac{10}{100} \times 10500$

= ₹ 1050

Income in February = ₹ 10500 + ₹ 1050 = ₹ 11550

Increase in February = 12% of ₹ 11550 = $\frac{12}{100} \times 11550$

= 6 × 231 = 1386

Income in March = ₹ 11550 + ₹ 1386 = ₹ 12936

11. Solve according to Q. 3

12. Percentage of children = 100% – (40% + 35%)

= 100% – 75% = 25%

If the number of children is 25, number of men is 40

If the number of children is 1, number of men is $\frac{40}{25}$

If the number of children is 20,000, number of men is $\frac{40}{25} \times 20{,}000 = 32000$

13. Solve according to Example 4.

14. Per cent of concentration of sugar $= \frac{20}{60 + 20} \times 100\%$

$= \frac{20}{80} \times 100\% = 25\%$

40% solution mean 40 g sugar in 100 g of mixture (solution)

Water = 100 g – 40 g = 60 g

We have 60 g of water. So 40 g sugar will make a 40% solution.

More sugar to be added = 40 g – 20 g = 20 g

15. Solve according to Example 5.

16. Percentage of persons who did not vote

= 100% – (48% + 22%) = 100% – 70% = 30%

48% represents 15,744 votes

1% represents $\frac{15744}{48}$ votes

30% represents $\frac{15,744}{48} \times 30 = 9840$ votes

Note : Q. 16 can also be solved according to Q. 12 and Q. 12 can also be solved as Q. 16.

17, **24** : Solve according to Q. 5.

18. Percentage of remaining passengers after station A

= 100% – 36% = 64%

Percentage of passengers got down at the next station

$= 50\%$ of $64\% = \frac{50}{100} \times 64\% = 32\%$

Percentage of remaining passengers at the next station

= 64% – 32% = 32%

32% represents 768 passengers

1% represents $\frac{768}{32}$ passengers

100% represents $\frac{768}{32} \times 100 = 2400$ passengers before station A.

19 to 23 : Take help of the Answer Sheet.

25. Price of 50 g chips = ₹ 15

Increase in price = 20% of ₹ 15 = $\frac{20}{100} \times 15$ = ₹ 3
New price ₹ 15 + ₹ 3 = ₹ 18

Decrease in the amount of chips= 20% of 50 g = $\frac{20}{100} \times 50$ g
= 10 g
New amount of chips is the bag = 50 g – 10 g = 40 g
New price of 40 g chips = ₹ 15

New price of 1 g chips = ₹ $\frac{15}{40}$

New price of 50 g chips = ₹ $\frac{15}{40} \times 50 = \frac{75}{4}$ = ₹ 18·75

Thus, reducing chips is better.

Exercise 9.2

1. Use formula according to Example 11.

2, **3**, **4** : Use formula according to Example 12.

5. Profit (gain) = ₹ 1080 – ₹ 900 = ₹ 180

Profit (gain) per cent = $\frac{\text{Profit}}{\text{CP}} \times 100\% = \frac{180}{900} \times 100\%$
= 20%

6. CP of 1 orange = ₹ $\frac{36}{12}$ = ₹ 3

SP of 1 orange = ₹ $\frac{40}{10}$ = ₹ 4

Profit = ₹ 4 – ₹ 3 = ₹ 1

Profit per cent = $\frac{\text{Profit}}{\text{CP}} \times 100\% = \frac{1}{3} \times 100\% = 33\frac{1}{3}\%$

7. Solve according to Example 15.

8. SP = $\frac{100 + \text{Profit \%}}{100} \times \text{CP} = \frac{100 + 8}{100} \times 250$

$= \frac{108}{100} \times 250$ = ₹ 270

Good apples = 200 – 20 = 180

Price of 180 apples = ₹ 270

Price of 1 apple = ₹ $\frac{270}{180}$ = ₹ $\frac{3}{2}$ = ₹ 1·50

9. C.P. $= \frac{100}{100-10} \times 450 = \frac{100}{90} \times 450 = ₹\ 500$

S.P. at a gain $= \frac{100+10}{100} \times 500 = \frac{110}{100} \times 500 = ₹\ 550$

10. Solve according to Q. 9.

11. Cost of 1 banana $= ₹\ \frac{10}{12}$

$SP = \frac{100+50}{100} \times \frac{10}{12} = \frac{150}{100} \times \frac{10}{12} = \frac{3}{2} \times \frac{5}{6} = \frac{5}{4} = ₹\ 1\frac{4}{4} = ₹\ 1{\cdot}25$

12. Solve according to Example 15.

13. Solve according to Example 17.

14. $CP = \frac{100}{100 - \text{loss}\%} \times SP = \frac{100}{100-17} \times 415 = \frac{100}{83} \times 415$

$= ₹\ 500$

Now SP = ₹ 600, CP = ₹ 500, gain = ₹ 600 – ₹ 500 = ₹ 100

gain per cent $= \frac{\text{gain}}{CP} \times 100\% = \frac{100}{500} \times 100\% = 20\%$

15. S.P. of 300 apples = CP of 300 apples – S.P. of 25 apples

S.P. of (300 + 25) apples = CP of 300 apples

S.P. of 325 apples = CP of 300 apples = ₹ 390

S.P. of 1 apple $= ₹\ \frac{390}{325} = \frac{78}{65} = ₹\ \frac{6}{5} = ₹\ 1\frac{1}{5} = ₹\ 1{\cdot}20$

C.P. of 1 apple $= ₹\ \frac{390}{300} = \frac{13}{10} = ₹\ 1{\cdot}30$

Loss = CP – SP = ₹ 1·30 – ₹ 1·20 = ₹ 0·10

Loss per cent $= \frac{\text{Loss}}{CP} \times 100\% = \frac{0{\cdot}10}{1{\cdot}30} \times 100\% = \frac{100}{13} = 7\frac{9}{13}\%$

16. SP for Rajan $= \frac{100+10}{100} \times 480 = \frac{110}{100} \times 480 = ₹\ 528$

SP for Vinaya $= \frac{100+10}{100} \times 528 = ₹\ \frac{110}{100} \times 528 = ₹\ 580{\cdot}80$

17. Solve according to Example 15.

18. CP for the retail dealer $= \frac{100}{100+25} \times 1265 = \frac{100}{125} \times 1265$

$= 4 \times 253 = ₹\ 1012$

CP for the wholesale dealer $= \frac{100}{100 + 15} \times 1012$

$= \frac{100}{115} \times 1012 = 20 \times 44 = ₹\ 880$

CP for the manufacturer $= \frac{100}{100 + 10} \times 880 = \frac{100}{110} \times 880$

$= ₹\ 800$

19 to 21 : Take help of the Answer Sheet.

22. Solve according to Example 12 or Q. 9.

23. Solve according to Example 16.

24. CP = ₹ 3200

SP = ₹ 5 × 600 + ₹ 3 × 200 = ₹ 3000 + ₹ 600 = ₹ 3600

Gain = ₹ 3600 – ₹ 3200 = ₹ 400

Gain per cent $= \frac{400}{3200} \times 100\% = \frac{25}{2}\% = 12\frac{1}{2}\%$

25. SP of the whole with 15% gain $= \frac{100 + 15}{100} \times 5000$

$= \frac{115}{100} \times 5000 = ₹\ 5750$

CP of one half = ₹ 5000 ÷ 2 = ₹ 2500

SP of first one half $= \frac{100 + 10}{100} \times 2500 = \frac{110}{100} \times 2500$

$= ₹\ 2750$

SP of second one half = ₹ 5750 – ₹ 2750 = ₹ 3000

CP of second half = ₹ 2500

gain = ₹ 3000 – ₹ 2500 = ₹ 500

gain per cent $= \frac{500}{2500} \times 100\% = 20\%$

The remaining sugar must be sold at a gain of 20%

Exercise 9.3

1. Solve according to Example 18.

2, **5** : Solve according to Example 19.

3. : Solve according to Example 20.

4. SP = ₹ 140 – ₹ 8 = ₹ 132

$$CP = \frac{100}{100 + \text{gain\%}} \times SP = \frac{100}{100 + 10\%} \times 132 = \frac{100}{110} \times 132$$

= ₹ 120

6, **7**, **8** : Solve according to Example 22.

9. Solve according to Example 20.

10. Solve according to Example 23.

11. Solve according to Example 24.

12. Let the cost price be ₹ 100.

Marked price = ₹ 100 + ₹ 60 = ₹ 160

Discount = 25% of ₹ 160 = $\frac{25}{100} \times 160$ = ₹ 40

SP = ₹ 160 – ₹ 40 = ₹ 120

Gain = ₹ 120 – ₹ 100 = ₹ 20

Gain per cent = 20%

13. Let the cost price be ₹ 100.

SP = ₹ 100 + ₹ 20 = ₹ 120

$$\text{M.P.} = \frac{100}{100 - \text{Discount \%}} \times \text{S.P.}$$

$$= \frac{100}{100 - 25\%} \times 120 = \frac{100}{75} \times 120 = 4 \times 40 = ₹\ 160$$

If Gain is ₹ 20, then MP = ₹ 160

If gain is ₹ 1, then MP = ₹ $\frac{160}{20}$

If gain is ₹ 360, then MP = ₹ $\frac{160}{20} \times 360$ = ₹ 2880

14. Solve according to Example 24.

[4% commission ≅ 4% discount

Price told to the agent ≅ Marked price]

15. Solve according to Example 27.

16. If the original selling price (without tax) is ₹ 100, the charged price is

₹ (100 + 8) = ₹ 108

Thus if charged price is ₹ 108, then selling price (without tax) is ₹ 100

If charged price is ₹ 621, then selling price (withou tax) is

$₹ \frac{100}{108} \times 621 = ₹ 25 \times 23 = ₹ 575$

17. Solve according to Example 27.

18. Solve according to Example 27.

19. Let the C.P. be ₹ 100.

SP = ₹ 100 + ₹ 50 = ₹ 150

$MP = \frac{100}{100 - \text{Discount\%}} \times \text{S.P.} = \frac{100}{100 - 25} \times 150$

$= \frac{100}{75} \times 150 = ₹ 200$

$\frac{CP}{MP} = \frac{100}{200} = \frac{1}{2} = 1 : 2$

20. $MP = \frac{100}{100 - \text{Discount\%}} \times \text{S.P.} = \frac{100}{100 - 5} \times 1064$

$= \frac{100}{95} \times 1064 = ₹ 20 \times 56 = ₹ 1120$

Marking goods at 40% above the cost price means

If MP is ₹ 140, CP =₹ 100

If MP is ₹ 1, CP = $₹ \frac{100}{140}$

If MP is ₹ 1120, CP = $\frac{100}{140} \times 1120 = ₹ 800$

Actual Profit = SP – CP = ₹ 1064 – ₹ 800 = ₹ 264

21. $CP = \frac{100}{100 + \text{profit\%}} \times \text{S.P.} = \frac{100}{100 + 20} \times 240 = \frac{100}{120} \times 240 = ₹ 200$

SP to gain 10% = $\frac{100 + 10}{100} \times 200 = \frac{110}{100} \times 200 = ₹ 220$

22. Solve according to Example 24.

Mental Maths & MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Solve according to Example 4.
2. Solve according to Example 9.
3. Solve according to Q. 5 of Exercise 9·1.
4. Solve according to Example 16.
5. Solve according to Example 23.
6. Solve according to Example 26.

Exercise 10.1

1. 3 months $= \frac{3}{12} = \frac{1}{4}$ year Simple interest $= \frac{PTR}{100} = \frac{9600 \times 1 \times 3{\cdot}5}{4 \times 100}$

$= ₹\ 84$

2. Simple interest = ₹ 6240 – ₹ 4800 = ₹ 1440

Rate of Interest $= \frac{S{\cdot}I \times 100}{P \times T} = \frac{1440 \times 100}{4800 \times 3} = 10\%$

3. Solve according to Example 1.

4, **8**, **9** : Solve according to Example 3.

5. Let the Principal be ₹ 100.

Then the Amount = ₹ 200

Interest = ₹ 200 – ₹ 100 = ₹ 100

Rate of simple interest $= \frac{S.I. \times 100}{P \times T} = \frac{100 \times 100}{100 \times 10} = 10\%$

Now Amount = ₹ 300 (triple)

Interest = ₹ 300 – ₹ 100 = ₹ 200

Rate = 10%

Time $= \frac{S.I. \times 100}{P \times R} = \frac{200 \times 100}{100 \times 10} = 20$ years

6. Time = 146 days $= \frac{146}{365}$ year $= \frac{2}{5}$ year

Amount $= P(1 + \frac{RT}{100})$

$936 = P\ (1 + \frac{10 \times 2}{100 \times 5})$

$936 = P(1 + \frac{1}{25}) = P \times \frac{26}{25}$

$$\frac{936 \times 25}{26} = P$$

$P = 36 \times 25 = ₹\ 900$

7. Let the Principal be ₹ 100.

Amount = triple = ₹ 300

Interest = ₹ 300 – ₹ 100 = ₹ 200

Time = 16 years

$$R = \frac{S.I. \times 100}{P \times T} = \frac{200 \times 100}{100 \times 16} = \frac{25}{2} = 12\frac{1}{2}\%$$

10. Solve according to Example 5.

11 to 13. Take help of the Answer Sheet.

Exercise 10.2

1 to **5** : Solve according to Example 7.

6 to **8** : Solve according to Example 8.

9 to **11** : Solve according to Example 9.

12, 13, 17 : Solve according to Example 10.

14 to 16 : Take help of the Answer Sheet.

18. Solve according to Hint.

Amount = $20,000\ (1 + \frac{3}{100})^3$ Calculate further·

Exercise 10.3

1 to **3** : Solve according to Example 11.

4 to **6** : Solve according to Example 12.

7 to **9** : Solve according to Example 13.

10. Amount = ₹ 2000 + ₹ 163,20

= ₹ 2163·20

$$2163{\cdot}20 = 2000\left(1 + \frac{4}{100}\right)^T$$

$$\frac{2163{\cdot}20}{2000} = \left(1 + \frac{1}{25}\right)^T = \left(\frac{26}{25}\right)^T$$

$$\Rightarrow \frac{216320}{200000} = \left(\frac{26}{25}\right)^T \Rightarrow \frac{676}{625} = \left(\frac{26}{25}\right)^T$$

$$\Rightarrow \frac{26 \times 26}{25 \times 25} = \left(\frac{26}{25}\right)^2 = \left(\frac{26}{25}\right)^T$$

$\Rightarrow$ T = 2

Time period = 2 years

Exercise 10.4

1 to **6** : Solve according to Example 14.

7 : Solve according to Example 16.

8. Cost of TV set after 2 years = $7500\left(1+\frac{5}{100}\right)\left(1-\frac{4}{100}\right)$
Calculate further.

9, **12**, **13**, **15** : Solve according to Example 17.

10, **11** : Solve according to Example 15.

14 : Increase = 13375 – 12500 = 875

Rate of growth = $\frac{875}{12500} \times 100 = 7\%$

16. Solve according to Example 16.

17. Solve according to Example 17.

18, **19** : Solve according to Example 14.

Mental Maths & MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Solve according to Example 3.

2. Solve according to Q. 5 of Exercise 10·1.

3. Solve according to Example 9.

4. Solve according to Example 10.

5. Solve according to Example 16.

Exercise 11.1

1 to **5** : Take help of the Answer Sheet.

6. Solve according to Example 1.

7. Solve according to Example 2.

8. (a) $(4x - 2y + 3z) - (3x - 4y - 2z)$
$= (4x - 2y + 3z - 3x + 4y + 2z)$
$= 4x - 3x - 2y + 4y + 3z + 2z$
$= x + 2y + 5z$

(b) $(3x^2 - x + 1) - (4 - 5x - 2x^2)$
$= 3x^2 - x + 1 - 4 + 5x + 2x^2$
$= 3x^2 + 2x^2 - x + 5x + 1 - 4$
$= 5x^2 + 4x - 3$

9. $(x + y - z) + (-4x + 7y - 9z) = x + y - z - 4x + 7y - 9z$
$= x - 4x + y + 7y - z - 9z = -3x + 8y - 10z$
$(7x - 2y - 3z) + (-x + y - 2z) = 7x - 2y - 3z - x + y - 2z$
$= 7x - x - 2y + y - 3z - 2z = 6x - y - 5z$
Now $(-3x + 8y - 10z) - (6x - y - 5z)$
$= -3x + 8y - 10z - 6x + y + 5z$
$= -3x - 6x + 8y + y - 10z + 5z$
$= -9x + 9y - 5z$

Exercise 11.2

1 to **4** : Solve according to Example 3.

5. (f) $(p^2 - pq) \times (-3p^2) = p^2 \times (-3p^2) - pq \times (-3p^2)$
$= -3p^4 + 3p^3q$

(a) to (e) : Solve according to (f).

6, **8** : Solve according to Example 6.

7. (b) $-2ab^2 (3a^2 - ab - 4b^2)$
$= -2ab^2 \times 9a^2 - 2ab^2 \times (-ab) - 2ab^2 \times (-4b^2)$
$= -6a^3b^2 + 2a^2b^3 + 8ab^4$

(a), (c), (d) : Solve according to (b).

9. (a) $5xy (3x^2 - 2x + 1) - 2x^2 (xy - 5y)$
$= 5xy \times 3x^2 + 5xy \times (-2x) + 5xy \times 1 - 2x^2 \times xy - 2x^2 \times (-5y)$
$= 15x^3y - 10x^2y + 5xy - 2x^3y + 10x^2y$
$= 15x^3y - 2x^3y - 10x^2y + 10x^2y + 5xy$
$= 13x^3y + 5xy$

(b), (c) : Solve according to (a)

10. Solve according to Example 4.

11. Solve according to Example 5.

12 to 14. Take help of the Answer Sheet.

Exercise 11.3

1, **2** : Solve according to Example 7.

3 to **5** : Solve according to Example 8.

Exercise 11.4

1. (g), (h), (i) : Solve according to Example 11 (a).
(j), (k), (l) : Solve according to Example 12 (a).
(m), (n), (o) : Solve according to Example 13.
(a), (b), (c), (d), (e), (f) : Solve according to Example 9.

2. (a), (c), (g) : Solve according to Example 11 (b).
(b), (h) : Solve according to Example 12 (b).
(d) $105 \times 95 = (100 + 5)(100 - 5) = 100^2 - 5^2 = 10000 - 25 = 9975$

(e) Solve according to (d).

(f) $4{\cdot}73 \times 4{\cdot}73 - 2{\cdot}27 \times 2{\cdot}27 = 4{\cdot}73^2 - 2{\cdot}27^2$

$= (4{\cdot}73 + 2{\cdot}27)\,(4{\cdot}73 - 2{\cdot}27) = 7{\cdot}00 \times 2{\cdot}46$

$= 7 \times 2{\cdot}46 = 17{\cdot}22$

(i) Solve according to (f).

3. (a) Solve according to Example 15.

(b) $49a^2 - 112ab + 64b^2 = 49a^2 + 64b^2 - 112ab$

$= (7a)^2 + (8b)^2 - 2 \times 7a \times 8b = (7a - 8b)^2$

$= (7 \times 5 - 8 \times 3)^2 = (35 - 24)^2 = 11^2 = 121$

4. $x + \frac{1}{x} = 7 \Rightarrow \left(x + \frac{1}{x}\right)^2 = 7^2 \Rightarrow x^2 + \frac{1}{x^2} + 2 \times x \times \frac{1}{x} = 49$

$\Rightarrow x^2 + \frac{1}{x^2} + 2 = 49 \Rightarrow x^2 + \frac{1}{x^2} = 49 - 2 = 47$

5. Solve according to Example 16.

6. (a) $(2x^2y + 3xy^2)^2 = (2x^2y)^2 + (3xy^2)^2 + 2 \times 2x^2y \times 3xy^2$

$= 2x^2y \times 2x^2y + 3xy^2 \times 3xy^2 + 12x^3y^3$

$= 4x^4y^2 + 9x^2y^4 + 12x^3y^3$

(b) : $(3x^2 - 2y^2)^2 = (3x^2)^2 + (2y^2)^2 - 2 \times 3x^2 \times 2y^2$

$= 3x^2 \times 3x^2 + 2y^2 \times 2y^2 - 12x^2y^2$

$= 9x^4 + 4y^4 - 12x^2y^2$

(c) Solve according to (b).

7. (a) $(a - b)\,(a + b)\,(a^2 + b^2) = (a^2 - b^2)(a^2 + b^2)$

$= (a^2)^2 - (b^2)^2 = a^4 - b^4$

(a), (c) : Solve according to (a)

(d) $(a^2 - 1)\,(a^2 + 1)\,(a^4 + 1)$

$= \{(a^2)^2 - 1^2\}\,\{a^4 + 1\} = (a^4 - 1)\,(a^4 + 1)$

$= (a^4)^2 - 1^2 = a^8 - 1$

8. Solve according to Example 14.

9. (a) $53 \times 54 = (50 + 3)\,(50 + 4)$

$= (50)^2 + (3 + 4) \times 50 + 3 \times 4$

$= 2500 + 7 \times 50 + 12 = 2500 + 350 + 12 = 2862$

(b) $5{\cdot}2 \times 5{\cdot}3 = (5 + 0{\cdot}2)\,(5 + 0{\cdot}3)$

$= 5^2 + (0{\cdot}2 + 0{\cdot}3) \times 5 + 0{\cdot}2 \times 0{\cdot}3$

$= 25 + 0{\cdot}5 \times 5 + 0{\cdot}06 = 25 + 2{\cdot}5 + 0{\cdot}06 = 27{\cdot}56$

(c) Solve according to Example 10.

10 to 12. Take help of the Answer Sheet.

Exercise 11.5

1. Solve according to Example 18.

2. Solve according to Example 19.

3. (a) to (i) : Solve according to Example 20.
(j) to (m) : Solve according to Example 21.

4 to 6. Take help of the Answer Sheet.

7. Divide according to Example 20.

Exercise 11.6

1. (a) $3x = 3 \times 5 = 15$ (b) $3 - x = 3 - 5 = -2$
(c) $5x^2 = 5 \times x \times x = 5 \times 5 \times 5 = 125$
(d) $-5 + x^2 = -5 + 5 \times 5 = -5 + 25 = 20$

2, **3** : Take help of the Answer Sheet.

4. (a) $3x + 5x + x + 2x = (3 + 5 + 1 + 2)x = 11x$
(b) $-3x + x + 2x + x = (-3 + 1 + 2 + 1)\, x = x$
(c) $5x - x + 3x - x = (5 - 1 + 3 - 1)\, x = 6x$
(d) $4x - 7x - x - x = (4 - 7 - 1 - 1)\, x = (4 - 9)\, x = -5x$

5. (a) $3xy = 3 \times (-3) \times (-2) = 18$
(b) $4x^2y = 4 \times (-3) \times (-3) \times (-2) = -72$
(c) $-xy = -(-3) \times (-2) = -6$
(d) $-xy^2 = -(-3) \times (-2) \times (-2) = -12$

6. (a) $(4x)^2 = 4x \times 4x = 16x^2$
(b) $(2x^2)^3 = 2x^2 \times 2x^2 \times 2x^2 = 8x^6$
(c) $(-3x)^3 = (-3x) \times (-3x) \times (-3x) = -27x^3$
(d) $(-5x^2)^2 = (-5x^2) \times (-5x^2) = 25x^4$

7. (a) 1 (b) 0 (c) 1 (d) 0

8. (a) $\dfrac{3a+4}{3a} = \dfrac{3a}{3a} + \dfrac{4}{3a} = 1 + \dfrac{4}{3a}$

(b) $\dfrac{3a-4}{3a} = \dfrac{3a}{3a} - \dfrac{4}{3a} = 1 - \dfrac{4}{3a}$

(c) $\dfrac{3a+4}{a} = \dfrac{3a}{a} + \dfrac{4}{a} = 3 + \dfrac{4}{a}$

(d) $\dfrac{3a-4}{4} = \dfrac{3a}{4} - \dfrac{4}{4} = \dfrac{3a}{4} - 1$

9. (a) $(2x + 3)\,(2x + 3)$
$= 2x \times (2x + 3) + 3\,(2x + 3)$
$= 2x \times 2x + 2x \times 3 + 3 \times 2x + 3 \times 3$
$= 4x^2 + 6x + 6x + 9 = 4x^2 + 12x + 9$

(b) (c) Solve according to (a)

10 to 13. Take help of the Answer Sheet.

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Solve according to Example 6.

2. Solve according to Example 9 (b).

3. Solve according to Example 16.

4. (a) Solve according to Example 17 (b).

(b) Solve according to Example 10.

5. $(x-5)^2 = x^2 + 5^2 - 2 \times x \times 5 = x^2 + 25 - 10x$

To write $(x-5)^2 = x^2 - 25$ is wrong.

Exercise 12.1

1 to **5** : Take help of the Answer Sheet.

6. $f + v = e + 2 \Rightarrow 6 + v = 12 + 2$

$\Rightarrow v = 14 - 6 = 8$

7. $f + v = e + 2 \Rightarrow f + 20 = 30 + 2$

$\Rightarrow f = 32 - 20 = 12$

8, **10 to 16** : Take help of the Answer Sheet.

9. $f + v = 8 + 16 = 24$

$e + 2 = 19 + 2 = 21$

$f + v \neq e + 2$

So a polyhedron cannot have 8 faces, 16 edges and 19 vertices.

Exercise 12.2

1, **3**, **6**, **7** : Take help of the Answer Sheet.

2, **4**, **5** : Draw yourself

Exercise 12.3

1., **2.** : Take help of the Answer Sheet.

3. Draw yourself

Exercise 12.4

Take help of the Answer Sheet.

Exercise 12.5

1, **7** : Draw yourself.

2 to **6** : Take help of the Answer Sheet.

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. $f + v = 10 + 20 = 30$

$e + 2 = 15 + 2 = 17$

$30 \neq 17$ No, a polyhedron cannot have 10 faces, 20 vertices and 15 edges.

2 to **5** : Take help of the Answer Sheet.

6, 7 : Draw yourself.

Exercise 13.1

1. Area of the tile = b × h = 25 cm × 10 cm

Area of the floor = 100 m^2 = 100 m × m

= 100 × 100 cm × 100 cm

Number of tiles required = $\frac{100 \times 100 \text{ cm} \times 100 \text{ cm}}{25 \text{ cm} \times 10 \text{ cm}} = 4000$

2. Outer length of the (plot + garden) = 20 m + 5 m + 5 m

= 30 *m*

Outer breadth of the (plot + garden) = 15 m + 5 m + 5 m = 25 m

Area of the garden = Area of (plot + garden) – Area of the plot

= 30 m × 25 m – 20 m × 15 m = 750 m^2 – 300 m^2 = 450 m^2

Cost = ₹ 64 × 450 = ₹ 28,800

3. Perimeter of the square field = 4 × side = 4 × 50 m = 200 m

Perimeter of the rectangular field = 2 (length + breadth)

= 2 × (80 + breadth)

= 200 m

⇒ 80 + breadth = 200 ÷ 2 = 100

breadth = 100 – 80 = 20 m

Area of the square field = side × side = 50 m × 50 m

= 2500 m^2

Area of the rectangular field = length × breadth

= 80 m × 20 m = 1600 m^2

Square field has more area.

4. Inner length = 100 m – 2 m – 2 m = 96 m

Inner breadth = 50 m – 2 m – 2 m = 46 m

Area of the way = outer area – inner area

= 100 m × 50 m – 96 m × 46 m

= 5000 m^2 – 4416 m^2 = 584 m^2

Cost = ₹ 100 × 584 = ₹ 58,400

5. Radius of the semicircle = $\frac{\text{diameter}}{2} = \frac{7\text{m}}{2}$ = 3·5 m

Length of the rectangle = (35 m – 3·5 m – 3·5 m) = 28 m

Breadth of the rectangle = 7 m

Area of the garden = Area of the rectangle + twice the area of the semicircle

= Area of the rectangle + Area of full circle

$= 28 \text{ m} \times 7 \text{ m} + \frac{22}{7} \times 3{\cdot}5 \text{ m} \times 3{\cdot}5 \text{ m}$

$= 196 \text{ m}^2 + 38{\cdot}5 \text{ m}^2 = 234{\cdot}5 \text{ m}^2$

Perimeter of the garden = 2 × length of the rectangle + Twice the ciramference of the semicircle

= 2 × length of the rectangle + circumference of full circle

$= 2 \times 28 \text{ m} + 2 \times \frac{22}{7} \times 3{\cdot}5 \text{ m} = 56 \text{ m} + 22 \text{ m} = 78 \text{ m}$

6 to 9. Take help of the Answer Sheet.

Exercise 13.2

1. Area of the trapezium $= \frac{1}{2}(a + b)h = \frac{1}{2}(32 + 20) \times 15$

$= \frac{1}{2} \times 52 \times 15 = 26 \times 15 = 390 \text{ cm}^2$

2. $\frac{1}{2} \times (a + b) \times \text{h} = 440 \Rightarrow \frac{1}{2}(30 + 14) \times \text{h} = 440$

$\Rightarrow \frac{1}{2} \times 44 \times \text{h} = 440 \Rightarrow 22 \text{ h} = 440 \Rightarrow \text{h} = \frac{440}{22} = 20 \text{ cm}$

3. Solve according to Example 1.

4. Let the parallel sides are $2x$ and x cm.

$\frac{1}{2}(\text{a} + \text{b}) \text{ h} = 540 \Rightarrow \frac{1}{2}(2x + x) \times 20 = 540$

$\Rightarrow 3x \times 10 = 540 \Rightarrow 30x = 540 \Rightarrow x = 540 \div 30 = 18$

Parallel sides are 2 × 18 = 36 cm and 18 cm.

5. Solve according to Q. 1.

6. PS = Perimeter – (PQ + QR + RS) = 80 – (15 + 28 + 17) = 80 – 60 = 20 m

Area of the trapezium $= \frac{1}{2}(a + b)\, h = \frac{1}{2} \times (\text{PS} + \text{QR}) \times \text{PQ}$

$= \frac{1}{2} \times (20 + 28) \times 15 = \frac{1}{2} \times 48 \times 15 = 24 \times 15 = 360 \text{ m}^2$

7. Area of the Quadrilateral $= \frac{1}{2} \times d\,(h_1 + h_2)$

$= \frac{1}{2} \times 20 \times (5 + 11) = 10 \times 16 = 160 \text{ m}^2$

8. Solve according to Example 2.

9. Solve according to Example 3.

10. Solve according to Example 4.

11. Solve according to Q. 7.

12. Area of the rhombus shaped tile $= \frac{1}{2} \times d_2 \times d_2 = \frac{1}{2} \times 25 \text{ cm} \times 15 \text{ cm}$

Area of the floor = Area of 1000 tiles

$= 1000 \times \frac{1}{2} \times 25 \text{ cm} \times 15 \text{ cm}$

$= 1000 \times \frac{1}{2} \times \frac{25}{100} \text{ m} \times \frac{15}{100} \text{ m}$

$= \frac{75}{4} \text{ m}^2$

Cost $= ₹\ 9 \times \frac{75}{4} = ₹\ \frac{675}{4} = ₹\ 168\frac{3}{4} = ₹\ 168{\cdot}75$

13 to 15. Take help of the Answer Sheet.

16. In a rhombus, $\left(\frac{d_1}{2}\right)^2 + \left(\frac{d_2}{2}\right)^2 = \text{side}^2$

$\left(\frac{16}{2}\right)^2 + \left(\frac{d_2}{2}\right)^2 = 17^2 \Rightarrow \left(\frac{d_2}{2}\right)^2 = 17^2 - 8^2 = 225 = 15^2$

$\frac{d_2}{2} = 15 \Rightarrow d_2 = 15 \times 2 = 30$

Area of the rhombus

$= \frac{1}{2} d_1 \times d_2 = \frac{1}{2} \times 16 \times 30$

$= 240 \text{ cm}^2$

Exercise 13.3

1. The frame is divided into 4 trapeziums (2 pairs of equal trapeziums).

The altitude (height) of each trapezium = width of the frame

$= \frac{32 - 20}{2} = \frac{12}{2} = 6 \text{ cm}$; $\frac{36 - 24}{2} = \frac{12}{2} = 6 \text{ cm}$

Area of each long section $= \frac{1}{2} (a + b)\ h = \frac{1}{2} (36 + 24) \times 6$

$= \frac{1}{2} \times 60 \times 6 = 180 \text{ cm}^2$

Area of each wide section $= \frac{1}{2} (a + b)h = \frac{1}{2} (32 + 20) \times 6$

$= \frac{1}{2} \times 52 \times 6 = 156 \text{ cm}^2$

2. Solve according to Example 5.

3. (a) Area of the shape = Sum of the areas of the two trapeziums
(b) Divide the shape into one rectangle and one trapezium.
(c) Divide the shape into one rectangle and two trapeziums.

4. Solve according to Example 6.

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Solve according to Q. 4 of Exercise 13· 1

2. Solve according to Q. 4 of Exercise 13·2.

3. Let the side of the square be x

Area $= x + x = x^2$

Numerically, $x^2 < 6x \Rightarrow \frac{x^2}{x} < \frac{6x}{x}$

$\Rightarrow x < 6$

So the side of the square may be less than 6, that is, 1, 2, 3, 4 or 5 units.

4. Let the side of the square be x units.

Area of the square $= x \times x = x^2$ sq units

Perimeter of the square $= 4 \times x = 4x$ units

Numerically, $x^2 = 4x \Rightarrow \frac{x^2}{x} = \frac{4x}{x}$

$\Rightarrow x = 4$

Number of units of the side of the square = 4

Exercise 14.1

1. Change to same units : l = 3·75 m, b = 2m, h = 0·40 m

Volume of the cuboid $= l\ b\ h$ = 3·75 m × 2 m × 0·40 m

$= 3 \text{ m}^3$

2. Solve according to Example 1.

3. Number of cubes $= \frac{\text{Volume of the cuboid}}{\text{Volume of one cube}}$

$= \frac{64 \text{ cm} \times 54 \text{ cm} \times 30 \text{ cm}}{6 \text{ cm} \times 6 \text{ cm} \times 6 \text{ cm}}$

$= 32 \times 3 \times 5 = 480$

4, **5**, **7** : Solve according to Example 4.

6. Let the breadth = x m

So the length = $3x$

Volume = l b h = $3x \times x \times 5 = 60$

$\Rightarrow 15x^2 = 60 \Rightarrow x^2 = 60 \div 15 = 4 = 2^2$

$\Rightarrow x = 2$

Breadth = 2 m, length = $3 \times 2 = 6$ m

8. Outer dimensions of the closed box = 22 – 2 = 20 cm, 17 – 2 = 15 cm, 11 – 2 = 9 cm

Volume of the wood = outer volume – inner volume

= 22 cm × 17 cm × 11 cm – 20 cm × 15 cm × 9 cm

= 4114 cm^3 – 2700 cm^3 = 1414 cm^3

9. Depth = 50 cm = 0·50 = 0·5 m

Volume of water = $l\ b\ h$ = 2 m × 1 m × 0·5 m = 1 m^3 = 1000 litres

10. Area of the field = 6 hectare = $6 \times 100 \times 100$ m^2

Height of water = 50 mm = $\frac{50}{1000}$ m

Volume of water = $6 \times 100 \times 100 \times \frac{50}{1000}$ m^3 = 3000 m^3

= 3000 kilolitres

11. Number of cubes cut out = $\frac{\text{Volume of one big cube}}{\text{Volume of one small cube}}$

$= \frac{20 \text{ cm} \times 20 \text{ cm} \times 20 \text{ cm}}{5 \text{ cm} \times 5 \text{ cm} \times 5 \text{ cm}} = 4 \times 4 \times 4 = 64$

12. Length of the cubical block = 50 cm = $\frac{50}{100}$ m = 0·5 m

Volume of the cubical block = 0·5 m × 0·5 m × 0·5 m = 0·125 m^3

Weight of the cubical bolck = 0·125 × 900 kg = 112·500 kg

= 112·5 kg

13. Height = $\frac{\text{Volume}}{\text{base area}} = \frac{3078}{90 \times 60} = \frac{57}{100}$ m = 0·57 m

14. Solve according to Example 2.

15. Volume of milk = $\pi r^2 h = \frac{22}{7} \times 1{\cdot}5 \text{ m} \times 1{\cdot}5 \text{ m} \times 7 \text{ m} = 49{\cdot}5 \text{ m}^3$

= 49·5 kilolitres

16. Radius of the base = 140 ÷ 2 = 70 cm = 0·70 m = 0·7 m

Area of the base = $\pi r^2 h = \frac{22}{7} \times 0{\cdot}7 \times 0{\cdot}7 = 1{\cdot}54$ m^2

Height of the cylinder = $\frac{\text{Volume}}{\text{Area of the base}} = \frac{1{\cdot}54 \text{ m}^3}{1{\cdot}54 \text{ m}^2} = 1$ m

17. External radius = 8 cm + 2 cm = 10 cm

Volume of the External cylinder = $\pi r^2 h$

$= \frac{22}{7} \times 10 \times 10 \times 21 = 6600 \text{ cm}^3$

Volume of the Internal cylinder = $\frac{22}{7} \times 8 \times 8 \times 21$

$= 4224 \text{ cm}^3$

Volume of the metal

= Volume of the External cylinder – Volume of the Internal cylinder

$= 6600 \text{ cm}^3 - 4224 \text{ cm}^3 = 2376 \text{ cm}^3$

18. Let the height of rain water on the roof = h m

Volume of rain water = area of the base × height

$= 5000 \times h = 5000\, h \text{ metre}^3$

Radius of the cylindrical tanic = $\frac{14 \text{ m}}{2} = 7 \text{ m}$

Volume of water = capacity of the cylindrical tank

$= \pi r^2 h = \frac{22}{7} \times 7 \text{ m} \times 7 \text{ m} \times 10 \text{ m} = 1540 \text{ m}^3$

So $5000\, h = 1540 \Rightarrow h = \frac{1540}{5000} = 0{\cdot}308 \text{ m}$

19 to 23 : Take help of the Answer Sheet.

24. Solve according to Q. 17.

25. Solve according to Example 7 (b).

26. Solve according to Q. 11.

27. Volume of water in the rectangular vessel

$= 22 \text{ cm} \times 10 \text{ cm} \times 8 \text{ cm} = 1760 \text{ cm}^3$

Volume of water in the cylindrical tank

$= \pi r^2 h = \frac{22}{7} \times 10 \times 10 \times h$

$\frac{22}{7} \times 10 \times 10 \times h = 1760$

$h = \frac{1760 \times 7}{22 \times 10 \times 10} = \frac{56}{10} = 5{\cdot}6 \text{ cm}$

Exercise 14.2

1. (d) : Surface area of the cube = $6l^2$
$= 6 \times 0{\cdot}5 \times 0{\cdot}5 = 1{\cdot}50\ cm^3 = 1{\cdot}5\ cm^3$
(a), (b), (c) : Solve according to (d).

2. Solve according to Example 9.

3. Length = 0·25 m = 0·25 × 100 cm = 25 cm
Now solve according to Example 9.

4. Area of cementing = area of the floor + area of the walls
$= l \times b + 2\ (l + b)h$
$= 20 \times 15 + 2\ (20 + 15)4$
$= 300 + 280 = 580\ m^2$
Cost = ₹ 21 × 580 = ₹ 12,180

5. Perimeter = 2 (l + b) = 250 m
Area of the walls = $2\ (l + b)\ h$
= 250 m × 6 m = $1500\ m^2$
Cost = ₹ 8·50 × 1500 = 12750·00
= ₹ 12,750

6. Surface area = $6l^2 = 600$
$\Rightarrow l^2 = 600 \div 6 = 100 = 10^2 \Rightarrow l = 10$ cm

7. Area of the cloth for one suitcase
$= 2(55 \times 35 + 35 \times 12 + 12 \times 55)$
$= 2(1925 + 420 + 660) = 2 \times 3005 = 6010\ cm^2$
Area of tarpaulin cloth for 140 suitcases = $140 \times 6010\ cm^2$
Length of tarpaulin cloth = $\frac{\text{Area}}{\text{Width}} = \frac{140 \times 6010}{70}$
= 12020 cm = 120·20 m

8, **9** : Solve according to Example 11.

10. For cover (lateral surface area) $l = 3{\cdot}5$ cm, $b = 1{\cdot}5$ cm, $h = 5$ cm
Area of the cover = $2(l + b)h = 2(3{\cdot}5 + 1{\cdot}5) \times 5 = 2 \times 5 \times 5$
$= 50\ cm^2$
For inside box, $l = 5$ cm, $b = 3{\cdot}5$ cm, $h = 1{\cdot}5$ cm
Area of the inside box = base area + lateral surface area
$= l \times b + 2\ (l + b)\ h = 5 \times 3{\cdot}5 + 2\ (5 + 3{\cdot}5) \times 1{\cdot}5$
$= 17{\cdot}5 + 12{\cdot}75 = 30{\cdot}25\ cm^2$
Area of thick paper to make cover and inside box
$= 50 + 30{\cdot}25 = 80{\cdot}25\ cm^2$

11. Solve according to Example 12.

12. Radius $= \frac{\text{diameter}}{2} = \frac{0{\cdot}35}{2}$ cm

Curved surface area of the cylindrical rod

$= 2\pi r\, h = 2 \times \frac{22}{7} \times \frac{0{\cdot}35}{2} \times h = 132$

$\Rightarrow 1{\cdot}10\ h = 132 \Rightarrow h = \frac{132}{1{\cdot}10} = 120$ cm

13. Area of tin-plating = curved surface area + base area

$= 2\pi r\, h + \pi r^2$

$= 2 \times \frac{22}{7} \times 10 \times 14 + \frac{22}{7} \times 10 \times 10$

$= \left(880 + \frac{2200}{7}\right) \text{cm}^2$

$\text{Cost} = ₹\ \frac{7}{100} \times \left(880 + \frac{2200}{7}\right) = ₹\ \left(\frac{7 \times 880}{100} + \frac{7 \times 2200}{100 \times 7}\right)$

$= ₹\ (61{\cdot}6 + 22) = ₹\ 83{\cdot}6$

$= ₹\ 83{\cdot}60$

14. Area of the ground levelled in 1 revolution

= lateral surface area of the roller

$= 2\pi r\ h = 2 \times \frac{22}{7} \times 42 \times 120 = 31680\ \text{cm}^2$

Total area of the playground = Area of the ground levelled in 500 revolutions

$= 500 \times 31680\ \text{cm}^2 = \frac{500 \times 31680}{100 \times 100}\ \text{m}^2 = 1584\ \text{m}^2$

15. In rolling a rectangular sheet along its breadth, the breadth becomes the circumsference of the base of the cylinder.

$2\pi r = 22 \Rightarrow 2 \times \frac{22}{7} \times r = 22 \Rightarrow r = \frac{22 \times 7}{2 \times 22} = \frac{7}{2}$ cm

Volume of the cylinder $= \pi r^2 h = \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 28$

$= 22 \times 7 \times 7 = 1078\ \text{cm}^3$

16. Radius = 50 cm ÷ 2 = 25 cm = 0·25 m

Cruved surface area of the cylinder

$= 2\pi rh = 2 \times \frac{22}{7} \times 0{\cdot}25\ \text{m} \times 3{\cdot}5\ \text{m} = 5{\cdot}5\ \text{m}$

Cost of white washing = ₹ 2 × 5·5 = ₹ 11

17. Total lateral surface area of the cylinder $= 2\pi rh$
$= 2 \times 3{\cdot}14 \times 4 \times 13 = 3{\cdot}14 \times 104 = 326{\cdot}56 \text{ cm}^2$

18. Let the edge of the cube be l.
Its surface area $= 6l^2$

(a) When the edge is halved $= \frac{l}{2}$,
Its surface area $= 6 \times (\frac{l}{2})^2 = \frac{6l^2}{4}$.
We see that the surface area becomes one-fourth.

(b) If the edge is doubled $= 2l$,
Its surface area $= 6 \times (2l)^2$
$= 6 \times 4l^2 = 4 \times 6l^2$
We see that the surface area becomes four times.

19 to 22. Take help of the Answer Sheet.

23. 1000 litre $= 1\ m^3$

$2{\cdot}8 \times 10^5$ litre $= 2{\cdot}8 \times 10^2 \times 10^3$ litre $= 2{\cdot}8 \times 10^2\ m^3 = 280\ m^3$

Height of water $= \frac{\text{Volume}}{\text{Area of the base}} = \frac{280\ m^3}{80\ m^2} = \frac{7}{2}\ m = 3{\cdot}5\ m$

24. Radius of the base $= \frac{\text{diameter}}{2} = \frac{8{\cdot}4 \text{ cm}}{2} = 4{\cdot}2 \text{ cm}$

Height of the label $= 12{\cdot}5 \text{ cm} - 1{\cdot}5 \text{ cm} - 1{\cdot}5 \text{ cm} = 9{\cdot}5 \text{ cm}$

Surface area of the label = Curved surface area of the container under the label

$= 2\ \pi rh = 2 \times \frac{22}{7} \times 4{\cdot}2 \times 9{\cdot}5 = 250{\cdot}8 \text{ cm}^2$

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Solve according to Example 3.

2. External radius $= \frac{\text{diameter}}{2} = \frac{6 \text{ cm}}{2} = 3 \text{ cm}$

Internal radius $= 3 \text{ cm} - 0{\cdot}5 \text{ cm} = 2{\cdot}5 \text{ cm}$

Volume of the metal = External volume – Internal volume

$= 3{\cdot}14 \times 3 \times 3 \times 10 - 3{\cdot}14 \times 2{\cdot}5 \times 2{\cdot}5 \times 10$

$= 3{\cdot}14 \times 10\ (9 - 6{\cdot}25) = 31{\cdot}4 \times 2{\cdot}75 = 86{\cdot}35 \text{ cm}^3$

3. Solve according to Example 10.

4. If the volume of a right circular cylinder = curved surface area of it then numerically $\pi r^2 h = 2\pi r h$

$\Rightarrow \frac{\pi r^2 h}{\pi r h} = \frac{2\pi r h}{\pi r h} \Rightarrow r = 2$

It is possible where the radius of the base is 2 units.

Exercise 15.1

1. (a) $\left(\frac{-1}{2}\right) \times \left(\frac{-1}{2}\right) \times \left(\frac{-1}{2}\right) \times \left(\frac{-1}{2}\right) \times \left(\frac{-1}{2}\right) = \left(\frac{-1}{2}\right)^5$

(b) $\left(\frac{-125}{243}\right) \times \left(\frac{-125}{243}\right) \times \left(\frac{-125}{243}\right) \times \left(\frac{-125}{243}\right) = \left(\frac{-125}{243}\right)^4$

2. Solve according to Example 3.

3. Solve according to Example 2.

4. Solve according to Example 3.

5. Solve according to Example 4.

6, **7** : Solve according to Example 5 and 6.

8. (a) True, as $(-1)^{40} = 1$

(b) Reriprocal of $\frac{-4}{9} = \frac{9}{-4} = \frac{-4}{9}$

(c) $(10^{10})^{10} = 10^{10\times10} = 10^{100}$

$(100)^{10} = (10^2)^{10} = 10^{2\times10} = 10^{20}$

(d) $(5 + 5)^5 = 10^5 = (2 \times 5)^5 = 2^5 \times 5^5$

$5^5 + 5^5 = 2 \times 5^5$

(e) $(2^3)^4 = 2^{3\times4} = 2^{12}$

$(2^4)^3 = 2^{4\times3} = 2^{12}$

(f) $(-7)^5 = (-7) \times (-7) \times (-7) \times (-7) \times (-7)$

$= -7 \times 7 \times 7 \times 7 \times 7$

Also take help of the Answer Sheet.

Exercise 15.2

1. Solve according to Example 7.

2. Solve according to Example 11.

3. Solve according to Example 12.

4, **5**, **11** : Solve according to Example 13.

6. (a) $\left(\frac{3}{4}\right)^0 + \left(\frac{3}{4}\right)^{-2} = 1 + \left(\frac{4}{3}\right)^2 = 1 + \frac{16}{9} = 1 + 1\frac{7}{9} = 2\frac{7}{9}$

(b) $\left(\frac{-5}{6}\right)^0 + \left(\frac{-4}{5}\right)^{-2} = 1 + \left(\frac{5}{-4}\right)^2 = 1 \times \frac{25}{16} = \frac{25}{16} = 1\frac{9}{16}$

7. $\frac{p}{q} = \left(\frac{5}{3}\right)^{-2} \div \left(\frac{17}{19}\right)^0 = \left(\frac{3}{5}\right)^2 \div 1 = \left(\frac{3}{5}\right)^2$

$\left(\frac{p}{q}\right)^{-3} = \left\{\left(\frac{3}{5}\right)^2\right\}^{-3} = \left(\frac{3}{5}\right)^{2 \times (-3)} = \left(\frac{3}{5}\right)^{-6} = \left(\frac{5}{3}\right)^6 = \frac{15625}{729}$

8. $\left(\frac{1}{2}\right)^{-2} \div \left(\frac{2}{3}\right)^0 = \left(\frac{1}{2}\right)^{-2} \div 1 = \left(\frac{1}{2}\right)^{-2} = \frac{1^{-2}}{2^{-2}} = \frac{1}{2^{-2}}$

9. (a) $6^{-1} \times 8^{-1} \div \left(\frac{2}{3}\right)^{-2} = \frac{1}{6} \times \frac{1}{8} \times \left(\frac{3}{2}\right)^{-2} = \frac{1}{6} \times \frac{1}{8} \times \left(\frac{2}{3}\right)^2$

$= \frac{1 \times 1 \times 2 \times 2}{6 \times 8 \times 3 \times 3} = \frac{1}{108}$

(b) $\left[\left\{\left(\frac{3}{4}\right)^3\right\}^2 \times \left(\frac{1}{4}\right)^{-3} \times \frac{1}{8} \times 4^{-1}\right] = \left(\frac{3}{4}\right)^{3 \times 2} \times \left(\frac{4}{1}\right)^3 \times \frac{1}{8} \times \frac{1}{4}$

$= \left(\frac{3}{4}\right)^6 \times \left(\frac{4}{1}\right)^3 \times \frac{1}{8} \times \frac{1}{4}$

$= \frac{3^6 \times 4^3}{46 \times 8 \times 4} = \frac{3^6}{4^{6-3} \times 8 \times 4} = \frac{3^6}{4^3 \times 8 \times 4} = \frac{729}{2048}$

10. Solve according to Example 10.

12 to 15 . Take help of the Answer Sheet.

16. Solve according to Example 14.

Exercise 15.3

1. Solve according to Example 15.

2. Solve according to Example 16.

3. Solve according to Example 17.

4. $\frac{\text{diameter of the Sun}}{\text{diameter of the Earth}} = \frac{1{\cdot}4 \times 10^9 \text{ m}}{1{\cdot}2756 \times 10^7 \text{ m}} = \frac{1{\cdot}4 \times 10^2 \times 10^7}{1{\cdot}2756 \times 10^7}$

$= \frac{10^2}{1} = \frac{100}{1} = 100 : 1$ (approximately)

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Solve according to Example 2.
2. Solve according to Example 4 (d).
3. Solve according to Example 7.
4. Solve according to Example 11.
5. Solve according to Q. 8 of Exercise 15·2.
6. Solve according to Example 17.

Exercise 16.1

1. Take help of the Answer Sheet.

2, 3 : Solve according to Example 2.

4, 16 : Solve according to Example 3.

5. More the height of the pole, more the length of the shadow, therefore, it is a case of direct variation.

Let x be the height of the pole for a shadow 15 m long.

Ratio of the heights of the poles = Ratio of the corresponding lengths of the shadows

24 m : x : : 20 m : 15 m

Product of the Means = product of the Extremes

$$x \times 20 = 15 \times 24$$

$$\Rightarrow x = \frac{15 \times 24}{20} = 18 \text{ m}$$

6. Solve according to Example 4.

7 to **15** : Solve according to Q. 5.

17. Let the speed of the other train = x

48 : x : : 4 : 5

$4 \times x = 48 \times 5$

$$\Rightarrow x = \frac{48 \times 5}{4} = 60 \text{ km/h}$$

18, **22** : Solve according to Q. 5.

19 to 21. Take help of the Answer Sheet.

23. Solve according to Example 5.

Exercise 16.2

1. Greater the speed, lesser would be the time taken, so it is a case of inverse variation.

Let the speed of the cycle be x km/h to cover the same distance in 15 minutes.

Speed	12 km/h	x
Time	20 minutes	15 minutes

Ratio of speeds = Inverse ratio of minutes

$12 : x :: 15 : 20$

$15x = 20 \times 12$

$x = \frac{20 \times 12}{15} = 16$

Speed = 16 km/h

2. Let x cycles would he be able to buy at increased cost.

Greater the cost, less number of cycles can be bought with the same amount of money, so it is a case of inverse variation.

Number of Cycles	52	x
Cost	₹ 525	₹ 525 + ₹ 21 = ₹ 546

Ratio of cycles = Inverse ratio of costs

$52 : x :: ₹\ 546 : ₹\ 525$

$546 \times x = 52 \times 525$

$\Rightarrow x = \frac{52 \times 525}{546} = 50$

3. Solve according to Example 6.

$40 : (40 + 20) :: x : 30$

4. $x \times y = 8 \times 5 = 40$

First column : $y = 40 \div 4 = 10$

Third column : $y = 40 \div 20 = 2$

Fourth column : $x = 40 \div 40 = 1$ and so on.

5, **6** : Solve according to Example 6.

7, **14** : Solve according to Example 8.

8. 3 munutes late means she took 9 + 3 = 12 minutes.

$4 : x :: 12 : 9$

9. Solve according to Example 7.

10 to **13** : Solve according to Q. 1.

15. Solve according to Q. 1.

Exercise 16.3

1 to **4** : Solve according to Example 9.

5. : Solve according to Example 10.

6. : Solve according to Example 11.

7, **9** : Solve according to Example 13.

8. One hour's work of the three pumps $= \frac{1}{3} + \frac{1}{4} + \frac{1}{6}$

$= \frac{4 + 3 + 2}{12} = \frac{9}{12} = \frac{3}{4}$

$\frac{3}{4}$ work is done by all in 1 hour

1 work is done by all in $1 \div \frac{3}{4} = \frac{4}{3}$ hours $= 1\frac{1}{3}$ hours

10. A's 15 days' work $= \frac{1}{3}$

A's one day's work $= \frac{1}{3} \times \frac{1}{15} = \frac{1}{45}$

(A + B)'s one day's work $= \frac{1}{25}$

B's one day's work $= \frac{1}{25} - \frac{1}{45} = \frac{9 - 5}{225} = \frac{4}{225}$

B alone can polish the floors in $\frac{225}{4}$ days $= 56\frac{1}{4}$ days

11. (A + B)'s 1 day's work $= \frac{1}{25} + \frac{1}{20} = \frac{4 + 5}{100} = \frac{9}{100}$

(A + B + C)'s 1 day's work $= \frac{1}{8}$

C's 1 day's work $= \frac{1}{8} - \frac{9}{100} = \frac{25 - 18}{200} = \frac{7}{200}$

C alone will finish the work in $\frac{200}{7} = 28\frac{4}{7}$ days

12. Solve according to the given hint.

13. Pipe A's 1 hour's work $= \frac{1}{5}$

Pipe B's 1 hour's work $= -\frac{1}{6}$

Pipe A and B's 1 hour's work $= \frac{1}{5} - \frac{1}{6} = \frac{6 - 5}{30} = \frac{1}{30}$

If both are opened at the same time, the tank will be filled in 30 hours.

14. Solve according to the Hint given and Q. 13.

15. 1 minute's work of both $= \frac{1}{20} + \frac{1}{25} = \frac{5 + 4}{100} = \frac{9}{100}$

5 minute's work of both $= 5 \times \frac{9}{100} = \frac{9}{20}$

Remaining work $= 1 - \frac{9}{20} = \frac{11}{20}$

$\frac{1}{20}$ work is done by Asheesh in 1 minute

1 work is done by Asheesh in $\frac{20}{1}$ minutes

$\frac{11}{20}$ work is done by Asheesh in $\frac{20}{1} \times \frac{11}{20}$ = 11 minutes

16. Solve according to Q. 15.

Exercise 16.4

Solve according to Examples 14, 15 and 16.

Exercise 16.5

1. Solve according to Example 17.

2. Solve according to Example 17 (a).

3, **4** : Solve according to Example 17 (b).

5, **6** : Solve according to Example 19.

7. Speed = $\frac{\text{Distance}}{\text{Time}} = \frac{376 \text{ km}}{8 \text{ h}}$ = 47 km/h

Distance travelled in 8 hours with the speed 48 km/h

= speed × time = 48 × 8 = 384 km

8. 40·5 km/h = 40·5 × $\frac{5}{18}$ m/s = $\frac{4{\cdot}5 \times 5}{2}$ m/s

Time = $\frac{\text{distance}}{\text{speed}} = \frac{270}{\frac{25}{2}} = \frac{270 \times 2}{4{\cdot}5 \times 5} = \frac{270 \times 2 \times 10}{45 \times 5}$

= 24 seconds

9. 72 km/h = 72 × $\frac{5}{18}$ m/s = 4 × 5 = 20 m/s

length of the train = distance = speed × time

= 20 × 12·5 = 250 m

10. 45 km/ h = 45 × $\frac{5}{18}$ m/s = $\frac{25}{2}$ m/s

Time = $\frac{\text{distance}}{\text{speed}} = \frac{171 + 229}{} = \frac{400 \times 2}{25}$

= 16 × 2 = 32 seconds

11. Speed = $\frac{\text{Distance}}{\text{Time}} = \frac{(225 + 275) \text{ m}}{60\text{s}} = \frac{500}{60} = \frac{25}{3}$ m/s

= $\frac{25}{3} \times \frac{18}{5}$ km/ h = 30 km/ h

12. Solve according to Example 21.

13. 1·7 km = 1·7 × 1000 m = 1700·0 = 1700 m

Speed $= \frac{\text{distance}}{\text{time}} = \frac{1700 \text{ m}}{5 \text{ s}} = 340$ m/s

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. Solve according to Example 5.

2. Solve according to Example 8.

3. Work done by the three taps in 1 hour

$= \frac{1}{4} + \frac{1}{6} - \frac{1}{8} = \frac{6 + 4 - 3}{24} = \frac{7}{24}$

The three taps together will fill the tank in $\frac{24}{7} = 3\frac{3}{7}$ hours

4. Solve according to Example 16.

5. Solve according to Example 21.

Exercise 17.1

1, 2 : Solve according to Example 1 and 2.

3. Solve according to Example 3.

4. Solve according to Example 4, 5 and 6.

5 to 8. Take help of the Answer Sheet.

Exercise 17.2

1. Solve according to Example 7 and 8.

2. Solve according to Example 10.

3. (a) $27x^3 - 3x = 3x\,(9x^2 - 1)$

$= 3x\,\{(3x)^2 - 1\} = 3x\,(3x - 1)\,(3x + 1)$

(b), (c) : Solve according to (a).

(d), (f), (g) : Solve according to Example 9.

(e) $16 - y^4 = 4^2 - (y^2)^2 = (4 - y^2)\,(4 + y^2)$

$= (2^2 - y^2)\,(4 + y^2) = (2 - y)\,(2 + y)\,(4 + y^2)$

(h) $\frac{1}{25}x^2y^2 - \frac{49}{81}y^2z^2 = y^2\left[\frac{1}{5^2}x^2 - \frac{7^2}{9^2}z^2\right]$

$= y^2\left(\frac{1}{5}x - \frac{7}{9}z\right)\left(\frac{1}{5}x + \frac{7}{9}z\right)$

(i) $a^2 + 9b^2 - 6ab - 4c^2$

$= a^2 + (3b)^2 - 2 \times a \times 3b - (2c)^2$

$= (a - 3b)^2 - (2c)^2$

$= (a - 3b - 2c)\,(a - 3b + 2c)$

4 to 7. Take help of the Answer Sheet.

8. $4x^2 - 20xy + 25y^2 = (2x)^2 - 2 \times 2x \times 5y + (5y)^2$

$= (2x - 5y)^2 = [2 \times 3 - 5 \times (-2)]^2 = (6 + 10)^2 = 16^2 = 256$

9. $14{\cdot}5^2 - 5{\cdot}5^2 = (14{\cdot}5 + 5{\cdot}5)\,(14{\cdot}5 - 5{\cdot}5) = 20 \times 9 = 180$

10. $\dfrac{3{\cdot}64^2 - 1{\cdot}36^2}{3{\cdot}64 - 1{\cdot}36} = \dfrac{(3{\cdot}64 + 1{\cdot}36)\,(3{\cdot}64 - 1{\cdot}36)}{3{\cdot}64 - 1{\cdot}36} = 5$

Exercise 17.3

1. (a) Sum of various pairs of factors of 10 are $10 + 1 = 11$,
$5 + 2 = 7$

(b), (c) : Solve according to (a).

(d) Sum of various pairs of factors of -21 are
$-21 + 1 = -20$, $21 - 1 = 20$
$-3 + 7 = 4$, $3 - 7 = -4$

(e) to (i) : Solve accordingly.

2. Solve according to Example 11 to 14.

3, **4** : Solve according to Example 16.

5. (a) $y^2 + 6y + 5 = y^2 + 5y + y + 5$

$= y\,(y + 5) + 1\,(y + 5) = (y + 1)\,(y + 5)$

Now $\dfrac{y^2 + 6y + 5}{y + 5} = \dfrac{(y + 1)\,(y + 5)}{y + 5} = y + 1$

(b), (c) : Solve according to (a).

(d) $3m^2 - 27n^2 = 3(m^2 - 9n^2) = 3\{m^2 - (3n)^2\} = 3(m - 3n)\,(m + 3n)\}$

Now $\dfrac{3m^2 - 27n^2}{m + 3n} = \dfrac{3(m - 3n)\,(m + 3n)}{m + 3n}$

$= 3\,(m - 3n)$

Mental Maths and MCQs :

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

1. $1 + p + q + r + pq + qr + pr + pqr$

$= 1 + p + q + pq + r + pr + qr + pqr$

$= 1 + (1 + p) + q(1 + p) + r(1 + p) + qr(1 + p)$

$= (1 + p)\,(1 + q + r + qr)$

$= (1 + p)\,\{1\,(1 + q) + r\,(1 + q)\}$

$= (1 + p)\,(1 + q)\,(1 + r)$

2. $x^2 + x + \dfrac{1}{4} = x^2 + 2 \times x \times \dfrac{1}{2} + \left(\dfrac{1}{2}\right)^2 = \left(x + \dfrac{1}{2}\right)^2$

3. $\left(x - \dfrac{1}{x}\right)^2 = x^2 - 2 \times x \times \dfrac{1}{x} + \left(\dfrac{1}{2}\right)^2 = x^2 - 2 + \dfrac{1}{x^2}$

Comparing it with $x^2 + a + \dfrac{1}{x^2}$, we have
$a = -2$

4. $x^4 - (x-y)^4 = (x^2)^2 - \{(x-y)^2\}^2$
$= \{x^2 - (x-y)^2\}\{x^2 + (x-y)^2\}$
$= \{x^2 - (x-y)\}\{x + (x-y)\}\{x^2 + (x-y)^2\}$
$= (x - x + y)(x + x - y)(x^2 + x^2 - 2xy + y^2)$
$= y(2x - y)(2x^2 - 2xy + y^2)$

5. $4x^2 + 17xy + 15y^2$
Two factors of $4 \times 15 = 60$ whse sum is 17 are 12 and 5.
So $4x^2 + 17xy + 15y^2 = 4x^2 + 12xy + 5xy + 15y^2$
$= 4x(x + 3y) + 5y(x + 3y)$
$= (4x + 5y)(x + 3y)$

Exercise 18.1

1, **3**, **5**, **7 to 13** : Take help of the Answer Sheet.
2., **4.**, **6.** : Draw yourself.

Exercise 18.2

Draw yourself according to given Examples and take help of the Answer Sheet.

MCQs and HOTS

Take help of the Answer Sheet.

Exercise 19.1

1. Solve according to Example 1 and 2 and take help of the Answer Sheet.

2. Let the number be $10a + b$ where $a(\neq 0)$ and b are whole numbers.
Ones digit $b = 2 \times$ tens digit a
$\Rightarrow b = 2a$
$10a + b = (a + b) + 18$
Putting $b = 2a$, we have
$10a + 2a = (a + 2a) + 18$
$\Rightarrow 12a = 3a + 18 \Rightarrow 12a - 3a = 18$
$\Rightarrow 9a = 18 \Rightarrow a = 18 \div 9 = 2$
$b = 2 \times a = 2 \times 2 = 4$
So the number is $10a + b = 10 \times 2 + 4 = 24$

3. As the number decreases when the digits are reversed, the tens digit is greater than the ones digit.
$10a + b = 10b + a + 27$
$a + b = 9$ or $b = 9 - a$
$10a + 9 - a = 10(9 - a) + a + 27$
$\Rightarrow 9a + 9 = 90 - 10a + a + 27$
$\Rightarrow 9a + 9a = 90 + 27 - 9$
$\Rightarrow 18a = 108 \Rightarrow a = 108 \div 18 = 6$
So $b = 9 - 6 = 3$, Number is 63.

4. When the digits are interchanged the number increases, so the ones digit is greater than the tens digit.
$10a + b + 18 = 10b + a$
$a + b = 8$, putting $b = 8 - a$, we have
$10a + 8 - a + 18 = 10(8 - a) + a$

$\Rightarrow 9a + 8 - a + 18 = 10\,(8 - a) + a$

$\Rightarrow 9a + 26 = 80 - 10a + a$

$\Rightarrow 9a + 9b = 80 - 26 \Rightarrow 18a = 54$

$\Rightarrow a = 54 \div 18 = 3$

$b = 8 - a = 8 - 3 = 5$ Number = 35

5. Solve according to Example 4.

6 to 9 : Take help of the Answer Sheet.

Exercise 19.2

Solve according to Example 5, 6, 7, 8.

Exercise 19.3

1. Solve according to Example 9.

2. Solve according to Example 10.

2, 4 : Solve according to Maths Lab Activities.

Exercise 19.4

1, **2**, : Solve according to Example 11.

3. Solve according to Example 12.

4. Solve according to Example 13.

5, 10 to 12 : Take help of the Answer Sheet.

6. (a) Add the alternate digits of 1089275 separately

1 + 8 + 2 + 5 = 16

0 + 9 + 7 = 16

As the sum of the alternate digits separately is equal, the given number is divisible by 11.

(a), (b), (c) : Solve According to (a).

7. The number formed by the tens and ones digit is

(a) 94, not divisible by 4, So the number is not divisible by 4.

(b) 78, not divisible by 4, So the number is not divisible by 4.

(c) 00, divisible by 4, So the number is divisible by 4.

(d) 56, divisible by 4, So the number is divisible by 4.

8. A number is divisible by 4 if the number formed by its tens and ones digit is divisible by 4. A is at tens place. Giving values 0 to 9 to A we find 08, 28, 48, 68, 88 are divisible by 4. So possible values of A are 0, 2, 4, 6 and 8.

9. Sum of Alternative digits = 1 + 8 + 0 + A + 9 and 4 + 1 + 1 + 0 + 5 = 18 + A and 11

Difference of 18 + A and 11 should be 0 or 11 to be divisible by 11. 18 + A – 11 = 11 $\Rightarrow$ A = 11 + 11 – 18 = 4

Mental Maths and MCQs

Take help of the Answer Sheet.

HOTS (High Order Thinking Skills)

Take help of the Answer Sheet.