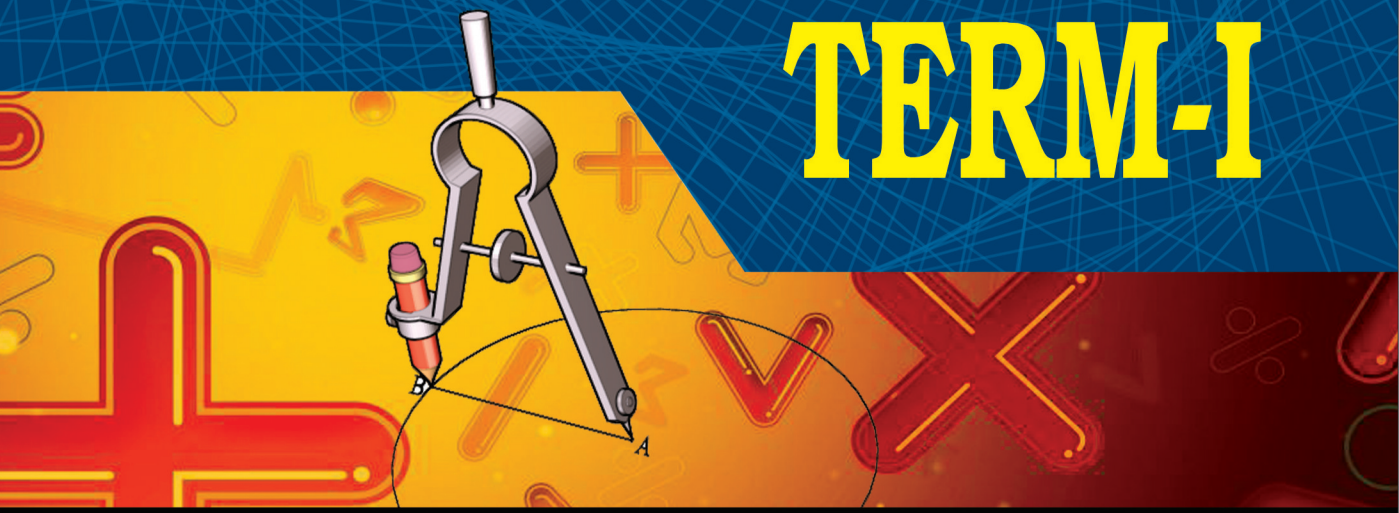
SURA'S SUPER GUIDE

2019-20 EDITION

SURA'S MATHEMATICS TERM-I



New Syllabus 2019-20

- Term-wise Guide as per the New Syllabus for the year 2019-20, for Term - I
- Complete Solutions to Textbook Exercises.
- Exhaustive Additional Questions in all Units.
- Chapter-wise Unit Tests with Answers.

7th Std.

SURA'S

Mathematics

7th Standard

Based on the New Textbook & New Syllabus for 2019-20

Term - I

Salient Features :

- Term-wise Guide as per the New Textbook for the year 2019-20, for Term - I
- Complete Solutions to Textbook Exercises.
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NOTE FROM PUBLISHER

It gives me great pride and pleasure in bringing to you **Sura's Mathematics Guide** for **7th Standard Term - I**. It is prepared as per the New Syllabus and New Textbook for Term-I for the year 2019-20.

This guide encompasses all the requirements of the students to comprehend the text and the evaluation of the textbook.

- Additional questions have been provided exhaustively for clear understanding of the units under study.
- Chapter-wise Unit Test are given.

In order to learn effectively, I advise students to learn the subject section-wise and practice the exercises given. It will be a teaching companion to teachers and a learning companion to students.

Though these salient features are available in this Guide, I cannot negate the indispensable role of the teachers in assisting the student to understand the subject thoroughly.

I sincerely believe this guide satisfies the needs of the students and bolsters the teaching methodologies of the teachers.

I pray the almighty to bless the students for consummate success in their examinations.

Subash Raj, B.E., M.S.
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CONTENTS

CHAPTER 1

NUMBER SYSTEM

IMPORTANT POINTS

INTEGERS :

- Collection of the natural numbers, zero and the negative numbers gives integers. The collection of integers are denoted by Z.
- Negative integers are represented on the number line to the left of zero and the positive integers to the right of zero.
- Every integers on the number line is placed in an increasing order from left to right.

ADDITION OF INTEGERS :

- The sum of two positive integers is positive.
  E.g: (+5) + (+4) = +9
- The sum of two negative integers is negative.
  E.g: (–2) + (–5) = –7
- The sum of a positive and a negative integer is the difference of the two numbers in value and has the sign of the greater integer.
  E.g: (–3) + (+5) = +2
  (+3) + (–5) = –2

PROPERTIES OF ADDITION :

Closure Property:

- The sum of two integers is always an integer i.e. for any two integers a and b; $a + b$ is also an integer. This property is known as 'closure property' of integers on addition.

Commutative Property:

- For any two integers a and b; $a + b = b + a$. This property is known as 'commutative property' of integers.

Associative Property:

- For any three integers a, b, and c; $a + (b + c) = (a + b) + c$. This property is known as Associative property of integers under addition.

Additive Identity:

- When '0' is added to an integer, we get the same integer.
  i.e. For any integer a, $a + 0 = a = 0 + a$
  Due to this property zero is called the additive identity.

Additive Inverse

- When opposites are added together always give the value zero.

  E.g. $(-5) + (+5) = 0$

  In this case either of the pair of opposites is known as the additive inverse of the other.

  i.e. For any integer a, $-a$ is the additive inverse.

  $a + (-a) = 0 = (-a) + a$

Subtraction of Integers:

- To subtract an integer from another, we add the additive inverse of the integer which is to be subtracted.

E.g. (i) $7 - (-5) = 7 + (+5)$
$= 12$

(ii) $(-7) - (+5) = (-7) + (-5)$
$= -12$

- Every subtraction statement has a corresponding addition statement.

  E.g. $8 - 5 = 3$; Subtraction statement.

  $3 + 5 = 8$; Addition statement.

Unit 1

Properties of Subtraction :

- The difference of two integers is always an integer.

  i.e. For any two integers a, b; $a - b$ is also an integer. Closure property is true for integers on subtraction.

- For any two integers a, b; $a - b \neq b - a$. ∴ Commutative property does not hold for subtraction of integers.

E.g. $3 - (-1) = 3 + 1 = 4$
$(-1) - (3) = -1 + (-3) = -4$
$3 - (-1) \neq (-1) - 3$

TRY THESE

(Text book Page No. 1)

1. Write the following integers in ascending order: –5, 0, 2, 4, –6, 10, –10

Sol : Plotting the points on the number line, we get

The numbers are placed in an increasing order from left to right.

∴ Ascending order: $-10 < -6 < -5 < 0 < 2 < 4 < 10$

2. If the integers –15, 12, –17, 5, –1, –5, 6 are marked on the number line then the integer on the extreme left is _____.

Sol : The least number will be on the extreme left.

∴ –17 will be on the extreme left.

3. **Complete the following pattern:**

50, __, 30, 20, __, 0, –10, __, __, –40, __, __.

Sol : The difference between the consecutive number is 10.

50, 40, 30, 20, 10, 0, –10, –20, –30, –40, –50, –60

4. **Compare the given numbers and write "<", ">" or "=" in the boxes.**

(a) –65 ☐ 65 **(b)** 0 ☐ 1000 **(c)** –2018 ☐ –2018

Sol : **(a)** –65 [<] 65, A positive number is greater than a negative number.

(b) 0 [<] 1000, 0 is less than all positive integers.

(c) –2018 [=] –2018

5. **Write the given integers in descending order, –27, 19, 0, 12, –4, –22, 47, 3, –9, –35.**

Sol : Separating positive and the negative integers, we get –27, –4, –22, –9, –35

Arranging the numbers in descending order –4 > –9 > –22 > –27 > –35

The positive numbers are 19, 12, 47, 3

Arranging in descending order, we get 47 > 19 > 12 > 3

0 stands in the middle.

∴ Descending order: 47 > 19 > 12 > 3 > 0 > –4 > –9 > –22 > –27 > –35

TRY THIS

(Text book Page No. 3)

1. **Find the value of the following using the number line activity.**

(i) **(–4) + (+3)** **(ii)** **(–4) + (–3)** **(iii)** **(+4) + (–3)**

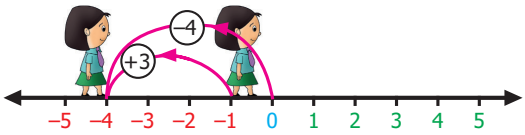
Sol : **(i)** **(–4) + (+3)**

To find the sum of (–4) and (+3), we start at zero facing positive direction continuing in the same direction and move 4 units backward to represent (–4).

Since the operation is addition we maintain the same direction and move three units forward to represent (+3)

We land at –1

So (–4) + (+3) = –1



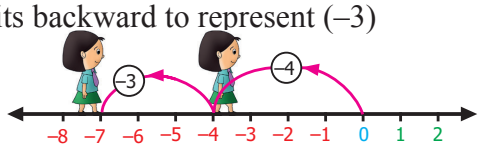
(ii) **(–4) + (–3)**

From zero move 4 steps backward to represent (–4)

From the same direction again move 3 units backward to represent (–3)

We land at –7

So (–4) + (–3) = –7



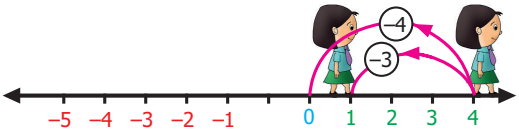
(iii) **(+4) + (–3)**

We start at zero facing positive direction and move 4 steps forward to represent (+4)

Since the operation is addition we maintain the same direction and move three units backward to represent (–3).

We land at +1.

So (+4) + (–3) = +1



PROPERTIES OF ADDITION

(Text book Page No. 6)

1. Complete the given table and check whether the sum of two integers is an integer or not?

(i)	7 + (–5)	= **(+2)**	(ii)	(–6) + (–13)	= **(–19)**
(iii)	25 + 9	= **34**	(iv)	(–12) + 4	= **–8**
(v)	41 + 32	= **73**	(vi)	(–19) + (–15)	= **(–34)**
(vii)	52 + (–15)	= **(+37)**	(viii)	(–7) + 0	= **(–7)**
(ix)	0 + 12	= **12**	(x)	14 + 0	= **14**
(xi)	(–6) + (–6)	= **(–12)**	(xii)	(–27) + 0	= **–27**

Sol : ∴ The sum of two integers is an integer.

TRY THESE

(Text book Page No. 7)

1. Fill in the blanks:

(i) 20 + (–11) = **– (11)** + 20 [∵ Addition is commutative]

(ii) (–5) + (–8) = (–8) + **(–5)** [∵ Addition is commutative]

(iii) (–3) + 12 = **12** + (–3) [∵ Addition is commutative]

2. Say True or False.

(i) (–11) + (–8) = (–8) + (–11) - **True,** because addition is commutative for integers.

(ii) –7 + 2 = 2 + (–7) - **True,** by commutative property on integers.

(iii) (–33) + 8 = 8 + (–33) - **True,** by commutative property on integers.

3. Verify the following.

(i) [(–2) + (–9)] + 6 = (–2) + [(–9) + 6]

(ii) [7 + (–8)] + (–5) = 7 + [(–8) + (–5)]

(iii) [(–11) + 5] + (–14) = (–11) + [5 + (–14)]

(iv) (–5) + [(–32) + (–2)] = [(–5) + (–32)] + (–2)

Sol : (i) [(–2) + (–9)] + 6 = (–2) + [(–9) + 6]

[(–2) + (–9)] + 6 = (–11) + 6 = –5

Also (–2) + [(–9) + 6] = (–2) + (–3) = –5

Both the cases the sum is –5.

∴ [(–2) + (–9)] + 6 = (–2) + [(–9) + 6]

(ii) [7 + (–8)] + (–5) = 7 + [(–8) + (–5)]

Here [7 + (–8)] + (–5) = (–1) + (–5) = – 6

Also 7 + [(–8) + (–5)] = 7 + (–13) = 7 – 13 = – 6

In both the cases the sum is –6.

∴ [7 + (–8)] + (–5) = 7 + [(–8) + (–5)]

(iii) [(–11) + 5] + (–14) = (–11) + [5 + (–14)]

Here [(–11) + 5] + (–14) = (–6) + (–14) = (–20)

(–11) + [5 + (–14)] = (–11) + (–9) = (–20)

In both the cases the sum is –20.

$\therefore [(-11) + 5] + (-14) = (-11) + [5 + (-14)]$

(iv) $(-5) + [(-32) + (-2)] = [(-5) + (-32)] + (-2)$

$(-5) + [(-32) + (-2)] = (-5) + (-34) = -39$

Also $[(-5) + (-32)] + (-2) = (-37) + (-2) = -39$

In both the cases the sum is –39.

$\therefore (-5) + [(-32) + (-2)] = [(-5) + (-32)] + (-2)$

4. Find the missing integers:

(i) $0 + (-95) = \underline{-95}$

(ii) $-611 + \underline{0} = -611$

(iii) ___ + 0 = ___ **Any integer; the same integer**

(iv) $0 + (-140) = \underline{-140}$

5. Complete the following:

(i) $-603 + 603 = \underline{0}$

(ii) $9847 + (-9847) = \underline{0}$

(iii) $1652 + (-1652) = \underline{0}$

(iv) $-777 + \underline{777} = 0$

(v) $\underline{-5281} + 5281 = 0$

Exercise 1.1

1. Fill in the blanks:

(i) $(-30) +$ ___ $= 60$ **[Ans: 90]**

(ii) $(-5) +$ ___ $= -100$ **[Ans: –95]**

(iii) $(-52) + (-52) =$ ___ **[Ans: –104]**

(iv) ___ $+ (-22) = 0$ **[Ans: 22]**

(v) ___ $+ (-70) = 70$ **[Ans: 140]**

(vi) $20 + 80 +$ ___ $= 0$ **[Ans: –100]**

(vii) $75 + (-25) =$ ___ **[Ans: 50]**

(viii) $171 +$ ___ $= 0$ **[Ans: –171]**

(ix) $[(-3) + (-12)] + (-77) =$ ___ $+ [(-12) + (-77)]$ **[Ans: –3]**

(x) $(-42) +$ [___ $+ (-23)] =$ [___ $+ 15] +$ ___ **[Ans: +15; –42; –23]**

2. Say True or False.

(i) The additive inverse of (–32) is –32 **[Ans: False]**

(ii) $(-90) + (-30) = 60$ **[Ans: False]**

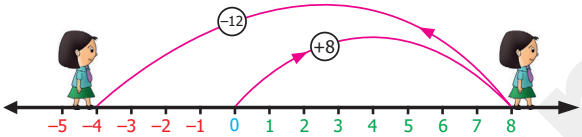
(iii) $(-125) + 25 = -100$ **[Ans: True]**

3. Add the following.

(i) 8 and –12 using number line.

Sol : Starting at zero on the number line facing positive direction and move 8 steps forward reaching 8.

Then we move 12 steps backward to represent –12 and reach at –4.

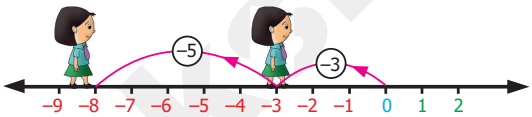


$\therefore 8 + (-12) = -4$

(ii) (–3) and (–5) using number line.

Sol : Starting at zero on the number line facing positive direction and move 3 steps backward reaching –3.

Then we move 5 steps backward to represent –5 and reach –8.



$\therefore (-3) + (-5) = -8$

(iii) (–100) + (–10) **Sol :** $(-100) + (-10) = -100 - 10 = -110$

(iv) 20 + (–72) **Sol :** $20 + (-72) = 20 - 72 = -52$

(v) 82 + (–75) **Sol :** $82 + (-75) = 82 - 75 = 7$

(vi) –48 + (–15) **Sol :** $-48 + (-15) = -48 - 15 = -63$

(vii) –225 + (–63) **Sol :** $-225 + (-63) = -225 - 63 = -288$

4. Thenmalar appeared for competitive exam which has negative scoring of 1 mark for each incorrect answers. In paper I she answered 25 question incorrectly and in paper II 13 questions incorrectly. Find the total reduction of marks.

Sol : For each incorrect question the score $= -1$

In paper I, score for 25 incorrect questions $= 25 \times (-1) = -25$

In paper II, for 13 incorrect question the score $= 13 \times (-1) = -13$

The total marks get reduced $= (-25) + (-13) = -38$

–38 marks will be reduced.

5. In a quiz competition, Team A scored +30, –20, 0 and team B scored –20, 0,+30 in three successive rounds. Which team will win? Can we say that we can add integers in any order?

Sol : Total score of team A = $[(+30) + (-20)] + 0 = (+10) + 0 = 10$

Total score of team B = $[(-20) + 0] + (+30)$

= $-20 + 30 = +10$

Score of team A = Score of team B.

Yes, we say that we can add integers in any order.

6. Are (11 + 7) + 10 and 11 + (7 + 10) equal? Mention the property.

Sol : First we take (11 + 7) + 10 = 18 + 10 = 28

Now 11 + (7 + 10) = 11 +17 = 28

In both the cases the sum is 28. ∴ (11 + 7) + 10 = 11 + (7 + 10)

This property is known as associative property of integers under addition.

7. Find 5 pairs of integers that added to 2.

Sol : 0 + 2 = 2

1 + 1 = 2

–1 + 3 = 2

–2 + 4 = 2

–3 + 5 = 2 (and many more.)

Objective Type Questions

8. The temperature at 12 noon at a certain place was 18° above zero. If it decreases at the rate of 3° per hour at what time if would be 12° below zero?

(i) 12 mid night (ii) 12 noon

(iii) 10 am (iv) 10 pm **[Ans : (iv) 10 pm]**

Sol : Temperature at 12 noon = 18° above zero = +18°

Rate of decrease per hour = –3°

Temperature 12° below zero = –12°

–12 is 30 units to the left of +18°

Time at which it reach –12° = $\frac{30}{3}$ = 10 h

10 hrs after 12 noon = 10 pm

9. Identify the problem with negative numbers as its answer.

(i) –9 + (–5) + 6 (ii) 8 + (–12) – 6

(iii) –4 + 2 + 10 (iv) 10 + (–4) + 8

Sol : (i) –9 + (–5) + 6 = –14 + 6 = –8

(ii) 8 + (–12) + 6 = –4 + 6 = +2

(iii) –4 + 2 + 10 = –2 + 10 = 8

(iv) 10 + (–4) + 8 = 6 + 8 = 14 **[Ans : (i) –9 + (–5) + 6]**

10. (–10) + (+7) = ____

(i) +3 (ii) –3 (iii) –17 (iv) +17 **[Ans : (ii) –3]**

11. (–8) + 10 + (–2) = ____

(i) 2 (ii) 8 (iii) 0 (iv) 20 **[Ans : (iii) 0]**

12. 20 + (–9) + 9 = ___

(i) 20 (ii) 29 (iii) 11 (iv) 38 **[Ans : (i) 20]**

Additional Questions

1. When Malar woke up her temperature was 102°F. Two hours later it was 3° lower, what was her temperature then?

Sol : Initially Malar's temperature = 102°F

After two hours it lowered 3° ⇒ –3°F

∴ Here present temperature = 102° + (–3°) = 99°F

2. An elevator is on the twentieth floor. It goes down 11 floors and then up 5 floors. What floor is the elevator on now?

Sol : Present location of the elevator = 20th floor

If it goes down 11 floor ⇒ (– 11)

= 20 + (–11) = 9th floor

If it goes up 5 floor ⇒ 9 + 5

= 14th floor

3. 16 + __ = 16. The property expressed here is _____.

Sol : 16 + 0 = 16.

0 is the additive identity on integers.

Subtraction of Integers

TRY THESE

(Text book Page No. 11)

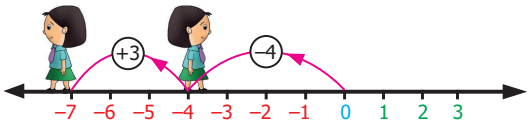
1. Do the following by using number line.

(i) (–4) – (+3)

Sol : We start at zero facing positive direction move 4 units backward to represent (–4). Then turn towards negative side and move 3 units forward.

We reach –7.

∴ (–4) – (+3) = –7.

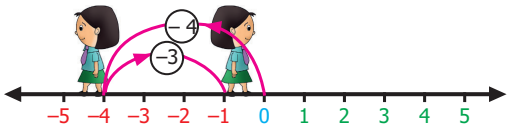


(ii) (–4) – (–3)

Sol : We start at zero facing positive direction. Move 4 units backward to represent –4. Then turn towards the negative side and move 3 units backwards.

We reach at –1.

∴ (–4) – (–3) = –1.



2. Find the values and compare the answers.

(i) (–6) – (–2) and (–6) + 2

Sol : (–6) – (–2) = –6 + (Additive inverse of –2)

= –6 + (+2) = –4

Also (–6) + 2 = –4

∴ (–6) – (–2) = (–6) + 2

(ii) 35 – (–7) and 35 + 7.

Sol : 35 – (–7) = 35 + (Additive inverse of –7) = 35 + (+7) = 42

Also 35 + 7 = 42 ; 35 – (–7) = 35 + 7

(iii) 26 – (+10) and 26 + (–10)

Sol : 26 – (+10) = 26 + (Additive inverse of +10) = 26 + (–10) = 16

Also 26 + (–10) = 16 ; 26 – (+10) = 26 + (–10)

3. Put the suitable symbol <, > or = in the boxes.

(i) –10 – 8 [<] –10 + 8 **Sol :** –10 – 8 = –18 & –10 + 8 = –2

(ii) (–20) + 10 [=] (–20) – (–10) **Sol :** (–20) + 10 = –10 & (–20) – (–10) = –10

(iii) (–70) – (–50) [>] (–70) – 50 **Sol :** –70 – 50 = (–70) + (–50) = –120

(iv) 100 – (+100) [<] 100 – (–100) **Sol :** 100 – (+100) = 0 & 100 – (–100) = 100 + (+100) = 200

(v) –50 – 30 [=] –100 + 20 **Sol :** –50 – 30 = –50 + (–30) = –80

Also –100 + 20 = –80

TRY THESE

(Text book Page No. 14)

1. Fill in the blanks.

(i) (–7) – (–15) = +8 –7 – (–15) = –7 + (Additive inverse of –15) = –7 + 15 = +8

(ii) 12 – (–7) = 19 12 – (–7) = 19

(iii) –4 – (–5) = 1

2. Find the values and compare the answers.

(i) 15 – 12 and 12 – 15 (ii) –21 – 32 and –32 – (–21)

Sol : (i) 15 – 12 = 3 & 12 – 15 = 12 + (–15) = –3

15 – 12 [>] 12 – 15

(ii) –21 – 32 = (–21) + (–32) = –53

Also –32 –(–21) = (–32) + (+21) = –11 ; –53 < –11

–21 – 32 [<] (–32) – (–21)

Think

(Text book Page No. 14)

1. Is associative property true for subtraction of integers. Take any three examples and check.

Sol : Consider the numbers 1, 2 and 3. Now (1–2) – 3 = –1 – 3 = –4

Also 1 – (2 –3) = 1 – (–1) = 1 + 1 = 2

∴ (1 – 2) – 3 ≠ 1 – (2 – 3)

∴ Associative property is not true for subtraction of integers.

Exercise 1.2

1. Fill in the blanks.

(i) $-44 + \_\_\_ = -88$ **[Ans: –44]**

(ii) $\_\_ - 75 = -45$ **[Ans: 30]**

(iii) $\_\_ - (+50) = -80$ **[Ans: –30]**

2. Say True or False.

(i) $(-675) - (-400) = -1075$ **[Ans: False]**

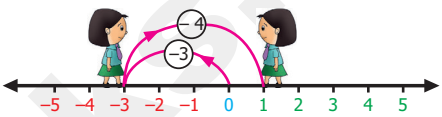
(ii) $15 - (-18)$ is the same as $15 + 18$ **[Ans: True]**

(iii) $(-45) - (-8) = (-8) - (-45)$ **[Ans: False]**

3. Find the value of the following.

(i) $-3 - (-4)$ using number line.

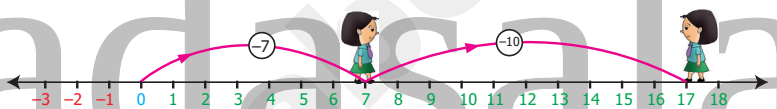
Sol : We start at zero facing positive direction. Move 3 units backward to represent (–3). Then turn towards the negative side and move 4 units backwards. We reach +1.



$\therefore (-3) - (-4) = +1.$

(ii) $7 - (-10)$ using number line

Sol :



We start at zero facing positive direction. Move 7 units forward to represent (+7). Then turn towards the negative side and move 10 units backwards. We reach +17

$\therefore 7 - (-10) = +17$

(iii) $35 - (-64)$

Sol : $35 - (-64) = 35 + (\text{Additive inverse of } -64) = 35 + (+64) = 99$

$\therefore 35 - (-64) = 99$

(iv) $-200 - (+100)$

Sol : $-200 - (+100) = -200 + (\text{Additive inverse of } +100) = -200 + (-100) = -300$

$-200 - (+100) = -300$

4. Kabilan was having 10 pencils with him. He gave 2 pencils to senthil and 3 to Karthick. Next day his father gave him 6 more pencils, from that he gave 8 to his sister. How many pencils are left with him?

Sol :

Total pencils Kabilan had = 10

No. of pencils given to Senthil = 2

No. of pencils given to Karthick = 3.

Now number of pencils left with Kabilan = $10 - 2 - 3 = 8 - 3 = 5$

Number of pencils got from his father = 6

No. total pencils Kabilan had = $5 + 6 = 11$

Number of pencils given to his sister = 8

Number of pencils left with Kabilan = $11 - 8 = 3$

5. **A lift is on the ground floor. If it goes 5 floors down and then moves up to 10 floors from there, then in which floor will the lift be?**

Sol : Initially the lift will be in the ground floor representing '0'

It goes to 5 floors down $\Rightarrow -5$

Then it moves 10 floors up $\Rightarrow +10$.

Now the lift will be $= 0 - 5 + 10 = -5 + 10$

$= 5^{th}$ floor (above the ground floor)

6. **When Kala woke up, her body temperature was 102°F. She took medicine for fever. After 2 hours it was 2°F lower. What was her temperature then?**

Sol : Kala's temperature initially = 102°F

After two hours the temperature decreased = –2°F

Now the final temperature = 102°F – 2°F = 100°F

7. **What number should be added to (–17) to get –19?**

Sol : According to the problem = –17 + A number = –19

The number = –19 + 17 = –2

$\therefore$ –2 should be added to –17 to get –19

8. **A student was asked to subtract (–12) from –47. He got –30. Is he correct? Justify.**

Sol : Subtracting –12 from –47, we get

–47 – (–12) = –47 + (Additive inverse of –12)

= –47 + (+12) = –35

But the students answer is –30.

So he is not correct.

Objective Type Questions

9. **(–5) – (–18)**

(i) 23 (ii) –13 (iii) 13 (iv) –23 **[Ans : (iii) 13]**

10. **(–100) – 0 + 100 = ____**

(i) 200 (ii) 0 (iii) 100 (iv) –200 **[Ans : (ii) 0]**

ADDITIONAL QUESTIONS

1. **Roman civilization began in 509 BC and ended in 476 AD. How long did Romans civilization last.**

Sol : From the start of common era no. of years upto 476 AD = 476

From 509 BC to start of common era years = 509

Total years Roman civilization last = 476 + 509 = 985 years.

2. **A submarine was situated 450 feet below sea level. If it descends 300 feet. What is its new position?**

Sol : Position of submarine = –450 ft.

Again it descends 300 feet $\Rightarrow$ –300 feet

$\therefore$ New position = –450 + (–300) = –750 ft.

$\therefore$ It was 750 feet below sea level.

3. In January the high temperature recorded was 90°F and the low temperature was –2°F. Find the difference between the high and the low temperatures?

Sol : The high temperature recorded = 90°F
The low temperature recorded = –2°F
Difference = 90°F – (–2°F)
= 90°F + (Additive inverse of –2°F)
= 90°F + (+2°F) = 92°F

Multiplication Of Integers

TRY THESE

(Text book Page No. 16)

1. Find the product of the following

(i) (–20) × (–45) = **+900** [As we know the product of two negative integers is positive, the answer is +900.]

(ii) (–9) × (–8) = **72** [∵ Product of two negative integers is positive]

(iii) (–30) × 40 × (–1) = **(+1200)** [Product of two integers with opposite sings is negative integer.
(–30) × 40 × (–1) = (–1200) × (–1) = +1200)]

(iv) (–50) × 2 × (–10) = **+1000** [Product of two integers with opposite signs is negative.
(+50) × 2 × (–10) = 100 × (–10) = –1000)]

2. Complete the following table by multiplying the integers in the corresponding row and column headers.

X	–3	–2	–1	0	1	2	3
–3							
–2							
–1							
0							
1							
2							
3							

Sol : We know that (i) product of two positive integers is positive
(ii) product of two negative integers is positive
(iii) product of integers with opposite sign is negative.

∴ The table will be as follows:

X	–3	–2	–1	0	1	2	3
–3	+9	+6	+3	0	–3	–6	–9
–2	+6	+4	+2	0	–2	–4	–6
–1	+3	+2	+1	0	–1	–2	–3
0	0	0	0	0	0	0	0
1	–3	–2	–1	0	1	2	3
2	–6	–4	–2	0	2	4	6
3	–9	–6	–3	0	3	6	9

3. Which of the following is incorrect?

(i) $(-55) \times (-22) \times (-33) < 0$ (ii) $(-1521) \times 2511 < 0$

(iii) $2512 - 1525 < 0$ (iv) $(1981) \times (+2000) < 0$

Sol : (iii) and (iv) are incorrect because $2512 - 1252$ is a positive integer.

Also $(+1981) \times (+2000)$ is a positive integer.

TRY THESE

(Text book Page No. 18)

1. Find the product and check for equality

(i) $18 \times (-5)$ and $(-5) \times 18$

Sol : Here $18 \times (-5) = -90$ Also $(-5) \times 18 = -90$

$\therefore 18 \times (-5) = (-5) \times 18$

(ii) $31 \times (-6)$ and $(-6) \times 31$

Sol : Here $31 \times (-6) = -186$ Also $(-6) \times 31 = -186$

$\therefore 31 \times (-6) = (-6) \times 31$

(iii) 4×51 and 51×4

Sol : Here $4 \times 51 = 204$ Also $51 \times 4 = 204$

$\therefore 4 \times 51 = 51 \times 4$

2. Prove the following.

(i) $(-20) \times (13 \times 4) = [(-20) \times 13] \times 4$

Sol : LHS $= (-20) \times (13 \times 4) = (-20) \times 52 = -1040$

RHS $= [(-20) \times 13] \times 4 = (-260) \times 4 = -1040$

LHS = RHS

$\therefore (-20) \times (13 \times 4) = [(-20) \times 13] \times 4$

(ii) $[(-50) \times (-2)] \times (-3) = (-50) \times [(-2) \times (-3)]$

Sol : LHS $= [(-50) \times (-2)] \times (-3) = 100 \times (-3) = -300$

RHS $= (-50) \times [(-2) \times (-3)] = (-50) \times 6 = -300$

LHS = RHS

$\therefore [(-50) \times (-2)] \times (-3) = (-50) \times [-2) \times (-3)]$

(iii) $[(-4) \times (-3)] \times (-5) = (-4) \times [(-3) \times (-5)]$

Sol : LHS $= [(-4) \times (-3)] \times (-5) = 12 \times (-5) = -60$

RHS $= (-4) \times [(-3) \times (-5)] = (-4) \times 15 = -60$

LHS = RHS

$\therefore [(-4) \times (-3)] \times (-5) = (-4) \times [(-3) \times (-5)]$

TRY THESE

(Text book Page No. 19)

1. Find the values of the following and check for equality:

(i) $(-6) \times (4 + (-5))$ and $((-6) \times 4) + ((-6) \times (-5))$

Sol :

$(-6) \times (4 + (-5)) = (-6) \times (-1) = 6$

$((-6) \times 4) + ((-6) \times (-5)) = (-24) + 30 = 6$

Hence $(-6) \times (4 + (-5)) = ((-6) \times 4) + ((-6) \times (-5))$

(ii) $(-3) \times [2 + (-8)]$ and $[(-3) \times 2] + [(-3) \times 8]$

Sol :

$(-3) \times [2 + (-8)] = (-3) \times (-6) = 18$

Also $[(-3) \times 2] + [(-3) \times 8] = (-6) + (-24) = -30$

$(-3) \times [2 + (-8)] \neq [(-3) \times 2] + [(-3) \times 8]$

2. Prove the following.

(i) $(-5) \times [(-76) + 8] = [(-5) \times (-76)] + [(-5) \times 8]$

Sol :

LHS $= (-5) \times [(-76) + 8] = (-5) \times (-68)$

$= +340$

RHS $= [(-5) \times (-76)] + [(-5) \times 8]$

$= +380 + (-40) = +380 - 40$

$= +340$

LHS = RHS

$\therefore (-5) \times [(-76) + 8] = [(-5) \times (-76)] + [(-5) \times 8]$

(ii) $42 \times [7 + (-3)] = (42 \times 7) + [42 \times (-3)]$

Sol :

LHS $= 42 \times [7 + (-3)]$

$= 168$

RHS $= (42 \times 7) + [42 \times (-3)] = 294 - 126$

$= 168$

LHS = RHS

$\therefore 42 \times [7 + (-3)] = (42 \times 7) + [42 \times (-3)]$

(iii) $(-3) \times [(-4) + (-5)] = [(-3) \times (-4)] + [(-3) \times (-5)]$

Sol :

LHS $= (-3) \times [(-4) + (-5)] = (-3) \times (-9)$

$= +27$

RHS $= [(-3) \times (-4)] + [(-3) \times (-5)] = 12 + 15 = 27$

LHS = RHS

$\therefore (-3) \times [(-4) + (-5)] = [(-3) \times (-4)] + [(-3) \times (-5)]$

(iv) $103 \times 25 = (100 + 3) \times 25 = (100 \times 25) + (3 \times 25)$

Sol :

First consider $103 \times 25 = 2575$

Now $(100 + 3) \times 25 = 103 \times 25 = 2575$

Also $(100 \times 25) + (3 \times 25) = 2500 + 75$

$= 2575$

All the three are same.

$\therefore 103 \times 25 = (100 + 3) \times 25 = (100 \times 25) + (3 \times 25)$

Exercise 1.3

1. Fill in the blanks.

(i) $-80 \times \_\_ = -80$ **[Ans: 1]**

(ii) $(-10) \times \_\_ = 20$ **[Ans: –2]**

(iii) $100 \times \_\_ = -500$ **[Ans: –5]**

(iv) $\_\_ \times (-9) = -45$ **[Ans: 5]**

(v) $\_\_ \times 75 = 0$ **[Ans: 0]**

2. Say True or False:

(i) $(-15) \times 5 = 75$ **[Ans: False]**

(ii) $(-100) \times 0 \times 20 = 0$ **[Ans: True]**

(iii) $8 \times (-4) = 32$ **[Ans: False]**

3. What will be the sign of the product of the following:

(i) 16 times of negative integers.

(ii) 29 times of negative integers.

Sol : (i) 16 is an even interger.

If negative integers are multiplied even number of times, the product is a positive integer.

∴ 16 times a negative integer is a positive integer.

(ii) 29 times negative integer.

If negative integers are multiplied odd number of times, the product is a negative integer. 29 is odd.

∴ 29 times negative integers is a negative integer.

4. Find the product of

(i) $(-35) \times 22$ **Sol :** $-35 \times 22 = -770$

(ii) $(-10) \times 12 \times (-9)$ **Sol :** $(-10) \times 12 \times (-9) = (-120) \times (-9) = +1080$

(iii) $(-9) \times (-8) \times (-7) \times (-6)$

Sol : $(-9) \times (-8) \times (-7) \times (-6) = (+72) \times (-7) \times (-6)$

$= (-504) \times (-6) \quad = +3024$

(iv) $(-25) \times 0 \times 45 \times 90$ **Sol :** $(-25) \times 0 \times 45 \times 90 = 0 \times 45 \times 90 = 0 \times 90 = 0$

(v) $(-2) \times (+50) \times (-25) \times 4$ **Sol :** $(-2) \times (+50) \times (-25) \times 4 = (-100) \times -25 \times 4$

$= 2500 \times 4 = 10{,}000$

5. Check the following for equality and if they are equal, mention the property.

(i) $(8 - 13) \times 7$ and $8 - (13 \times 7)$

Sol : Consider $(8 - 13) \times 7 = (-5) \times 7 = -35$

Now $8 - (13 \times 7) = 8 - 91 = -83$

∴ $(8 - 13) \times 7 \neq 8 - (13 \times 7)$

(ii) $[(-6)-(+8)]\times(-4)$ and $(-6)-[8\times(-4)]$

Sol : $[(-6)-(+8)]\times(-4) = [(-6)+(-8)]\times(-4) = (-14)\times(-4) = +56$

Now $(-6)-[8\times(-4)] = (-6)-(-32) = (-6)+(+32) = +26$

$\therefore\ [(-6)-(+8)]\times(-4) \neq (-6)-[8\times(-4)]$

(iii) $3\times[(-4)+(-10)]$ and $[3\times(-4)+3\times(-10)]$

Sol : Consider $3\times[(-4)+(-10)] = 3\times-14 = -42$

Now $[3\times(-4)+3\times(-10)] = (-12)+(-30) = -42$

Here $3\times[(-4)+(-10)] = [3\times(-4)+3\times(-10)]$

It is the distributive property of multiplication over addition.

6. During summer, the level of the water in a pond decreases by 2 inches every week due to evaporation. What is the change in the level of the water over a period of 6 weeks?

Sol : Level of water decreases a week = 2 inches.

Level of water decreases in 6 weeks = $6\times2 = 12$ inches

7. Find all possible pairs of integers that give a product of –50.

Sol : Factor of 50 are 1, 2, 5, 10, 25, 50.

2	50
5	25
	5

Possible pairs of integers that gives product –50:

$(-1\times50), (1\times(-50)), (-2\times25), (2\times(-25)), (-5\times10), (5\times(-10))$

Objective Type Questions

8. Which of the following expressions is equal to –30.

(i) $-20-(-5\times2)$ (ii) $(6\times10)-(6\times5)$

(iii) $(2\times5)+(4\times5)$ (iv) $(-6)\times(+5)$ **[Ans : (iv) $(-6)\times(+5)$]**

Hint: (i) $-20+(10) = -10$ (ii) $60-30 = 30$

(iii) $10+20 = 30$ (iv) $(-6)\times(+5) = -30$

9. Which property is illustrated by the equation: $(5\times2)+(5\times5) = 5\times(2+5)$

(i) commutative (ii) closure

(iii) distributive (iv) associative **[Ans : (iii) distributive]**

10. $11\times(-1) =$ _____

(i) –1 (ii) 0 (iii) +1 (iv) –11 **[Ans : (iv) –11]**

11. $(-12)\times(-9) =$ _____

(i) 108 (ii) –108 (iii) +1 (iv) –1 **[Ans : (i) 108]**

Additional Questions

1. Ani is scuba diving. She descends 5 feet below sea level. She descends the same distance 4 more times. What is Anis final elevation?

Sol : Ani descends 5 feet below sea level once she descends 4 more times

$\therefore$ She descends $(5\times4)+5$ feet in total $= 20+5 = 25$ feet below sea level

2. **The price of a plant reduced ₹ 6 per week for 7 weeks. By how much did the price of the plant change over the 7 weeks?**

Sol : The price of plant reduced in a week = ₹ 6

$\therefore$ The price reduced in 7 weeks = $7 \times 6 = 42$

3. **The product of three integers is –3. Determine all of the possible values for the three factors?**

Sol : Product of three integers = –3

Possible factors are $(1 \times -1 \times 3)$, $(-1 \times -1 \times -3)$, $(1 \times 1 \times -3)$

Division of Integers

TRY THESE (Text book Page No. 22)

(i) $(-32) \div 4 =$ _____ [Ans: –8]

(ii) $(-50) \div 50 =$ _____ [Ans: –1]

(iii) $30 \div 15 =$ _____ [Ans: 2]

(iv) $-200 \div 10 =$ _____ [Ans: –20]

(v) $-48 \div 6 =$ _____ [Ans: –8]

Exercise 1.4

1. **Fill in the blanks.**

(i) $(-40) \div$ ____ $= 40$ [Ans: –1]

(ii) $25 \div$ ____ $= -5$ [Ans: –5]

(iii) ____ $\div (-4) = 9$ [Ans: –36]

(iv) $(-62) \div (-62) =$ ____ [Ans: 1]

2. **Say True or False:**

(i) $(-30) \div (-6) = -6$ [Ans: False]

(ii) $(-64) \div (-64)$ is 0 [Ans: False]

3. **Find the values of the following.**

(i) $(-75) \div 5$ **Sol :** $\frac{-75}{5} = -15$

(ii) $(-100) \div (-20)$ **Sol :** $\frac{-100}{-20} = 5$

(iii) $45 \div (-9)$ **Sol :** $\frac{45}{-9} = -5$

(iv) $(-82) \div 82$ **Sol :** $\frac{-82}{82} = -1$

4. **The product of two integers is –135. If one number is –15. Find the other integer.**

Sol : Given the product of two integers = –135

One of them = –15

$\therefore$ $-15 \times$ Another number = –135

Other number = $\frac{-135}{-15} = 9$

$\therefore$ The other number = 9.

Number System

5. **In 8 hours duration, with uniform decrease in temperature, the temperature dropped 24°C. How many degrees did the temperature drop each hour?**

Sol : In 8 hours the drop in temperature = 24

In 1 hour the drop in temperature = $\frac{24}{8}$ = 3°

The temperature dropped 3°C every hour.

6. **An elevator descends into a mine shaft at the rate of 5 m/min. If the descent starts from 15 m above the ground level, how long will it take to reach –250 m?**

Sol : The elevator's position = 15 m above ground level = +15 m

It should reach = –250 m

The distance to be travelled = 15 – (–250) m = 15 + (+250) m = 265 m

Time taken to descend 5 m = 1 min

∴ Time required to descend 265 m = $\frac{265 \text{ m}}{5 \text{ m}}$ = 53 min

7. **A person lost 4800 calories in 30 days. If the calory loss is uniform, calculate the loss of calory per day.**

Sol : Loss of calory in 30 days = 4800

∴ Loss of calory in 1 day = $\frac{4800}{30}$ = 160 calories

∴ 160 calories lost per day.

8. **Given 168 × 32 = 5376 then find (–5376) ÷ (–32).**

Sol : Given 168 × 32 = 5376

∴ $\frac{5376}{32}$ = 168

Also $\frac{-5376}{-32}$ = 168

9. **How many –4's are there is (–20)?** **Sol:** Number of –4's in (–20) = $\frac{-20}{-4}$ = 5

10. **(–400) divided into 10 equal parts gives _____** **Sol :** $\frac{-400}{10}$ = –40

Objective Type Questions

11. **Which of the following does not represent an integer?**

(i) 0 ÷ (–7) (ii) 20 ÷ (–4) (iii) (–9) ÷ 3 (iv) 12 ÷ 5

[Ans: (iv) 12 ÷ 5]

12. **(–16) ÷ 4 is the same as**

(i) – (–16 ÷ 4) (ii) –(16) ÷ (–4) (iii) 16 ÷ (–4) (iv) –4 ÷ 16

[Ans: (iii) 16 ÷ (–4)]

13. **(–200) ÷ 10 is**

(i) 20 (ii) –20 (iii) –190 (iv) 210 **[Ans: (ii) –20]**

14. **The set of integers is not closed under**

(i) Addition (ii) Subtraction (iii) Multiplication (iv) Division

[Ans: (iv) Division]

Statement Problems on Integers using all Fundamental Operation

Exercise 1.5

1. One night in Kashmir, the temperature is –5°C. Next day the temperature is 9°C. What is the increase in temperature?

Sol : Temperature in the first day = –5°C

Temperature in the next day = 9°C

∴ Increase in temperature = 9°C – (–5°C)

= 9°C + (+5°C) = 14°C

2. An atom can contain protons which have a positive charge (+) and electrons which have a negative charge (–). When an electron and a proton pair up, they become neutral (0) and cancel the charge at. Now determine the net charge:

(i) 5 electrons and 3 protons → –5 + 3 = –2 that is 2 electrons ⊖⊖

(ii) 6 protons and 6 electrons →

(iii) 9 protons and 12 electrons →

(iv) 4 protons and 8 electrons →

(v) 7 protons and 6 electrons →

Sol : (ii) 6 protons and 6 electrons → (+6) + (–6) = 0

(iii) 9 protons and 12 electrons → (+9) + (–12) = 9 – 12 = – 3 ⇒ 3 electrons ⊖⊖⊖

(iv) 4 protons and 8 electrons → (+4) + (–8) = +4 – 8 = –4 ⇒ 4 electrons ⊖⊖⊖⊖

(v) 7 protons and 6 electrons → (+7) + (–6) = +1 ⇒ 1 proton ⊕

3. Scientists use the Kelvin scale (K) as an alternative temperature scale to degrees celsius (°C) by the relation T°C = (T + 273)K. Convert the following to Kelvin:

(i) –275°C (ii) 45°C (iii) –400°C (iv) – 273°C

Sol : (i) –275°C = (–275 + 273)K = –2K

(ii) 45°C = (45 + 273)K = 318 K

(iii) –400°C = (–400 + 273) K = –127 K

(iv) –273°C = (–273 + 273) K = 0K.

4. Find the amount that is left in the student's bank account, if he has made the following transaction in a month. His initial balance is ₹ 690.

(i) Deposit (+) of ₹ 485

(ii) Withdrawal (–) of ₹ 500

(iii) Withdrawal (–) of ₹ 350

(iv) Deposit (+) of ₹ 89

(v) If another ₹ 300 was withdrawn, what would the balance be?

Sol : (i) Initial balance of student's account = ₹ 690

Deposited amount = ₹ 485 (+)

∴ Amount left in the account = ₹ 690 + ₹ 485 = ₹ 1175

(ii) Balance in the account = ₹ 1175
Amount withdrawn = ₹ 500 (–)
Amount left = ₹ 1175 – ₹ 500 = ₹ 675

(iii) Balance in the account = ₹ 675
Amount withdrawn = ₹ 350 (–)
Amount left = ₹ 675 – ₹ 350 = ₹ 325

(iv) Balance in the account = ₹ 325
Amount deposited = ₹ 89(+)
Amount left = ₹ 325 + ₹ 89 = ₹ 414

(v) Balance in the account = ₹ 414
Amount withdrawn = ₹ 300 (–)
Amount left = ₹ 414 – ₹ 300 = ₹ 114

5. A poet Tamizh Nambi lost 35 pages of his 'lyrics' when his file had got wet in the rain. Use integers, to determine the following.

(i) If Tamil Nambi wrote 5 pages per day, how many day's work did he lose?

(ii) If four pages contained 1800 characters, (letters) how many characters were lost?

(iii) If Tamil Nambi is paid ₹ 250 for each page produced, how much money did he lose?

(iv) If Kavimaan helps Tamizh Nambi and they are able to produce 7 pages per day, how many days will it take to recreate the work lost?

(v) Tamizh Nambi pays Kavimann ₹ 100 per page for his help. How much money does Kavimaan receive?

Sol : (i) Total pages lost = 35
One day work = 5 page
35 pages = $\frac{35}{5}$ = 7 days work
∴ 7 day's work he lost.

(ii) Number of characters in four pages = 1800
Number of characters in one page = $\frac{1800}{4}$ = 450
∴ Number of characters in 35 pages = 450 × 35
= 15,750 characters

(iii) Payment for one page = ₹ 250
∴ Payment for 35 pages = ₹ 250 × ₹ 35
= ₹ 8,750

(iv) Number of pages recreated a day = 7
∴ To recreate 35 pages day's needed = $\frac{35}{7}$ = 5 days

(v) Payment of Kavimaan = ₹ 100 per page
∴ for 35 pages payment = ₹ 100 × 35 = ₹ 3,500

6. Add 2 to me. Then multiply by 5 and subtract 10 and divide new by 4 and I will give you 15! Who am I?

Sol : According to the problem $\{[(I + 2) \times 5] - 10\} \div 4 = 15$

$\{[(I + 2) \times 5] - 10\} = 15 \times 4 = 60$ | $(I + 2) \times 5 = 60 + 10 = 70$

$I + 2 = \frac{70}{5} = 14$ | $I = 14 - 2 \; ; \; I = 12$

7. Kamatchi, a fruit vendor sells 30 apples and 50 pomegranates. If she makes a profit of ₹ 8 per apple and loss ₹ 5 per pomegranate. What will be her overall profit or loss?

Sol :
Number of apples Kamatchi sold = 30
Profit per apple = ₹ 8(+)
∴ Profit for 30 apples = $30 \times 8 = ₹ 240$
Number of pomegranates sold 50
Loss per pomegranate = ₹ 5(–)
Loss on selling 50 pomegranates = $50 \times (-5) = ₹ -250$
Overall loss = $-250 + 240 = ₹ -10$

i.e. loss ₹ 10.

8. During a drought, the water level in a dam fell 3 inches per week for 6 consecutive weeks. What was the change in the water level in the dam at the end of this period?

Sol : Water level fall per week = –3 inches

∴ Water level decrease for 6 weeks = $6 \times (-3) = -18$ inches

∴ decrease of 18 inches of water level.

9. Buddha was born in 563 BC (BCE) and died in 483 BC (BCE). Was he alive in 500 BC (BCE)? and find his life time. (Source: Compton's Encyclopedia)

Sol : Years in BCC (BCE) are taken as negative integers.

Buddha was born in –563

and died in –483

So he was alive in 500 BC (BCE)

Life time = $-483 - (-563) = -483 + 563 = +80$

Buddha's life time = 80 years.

Exercise 1.6

Miscellaneous Practice Problems

1. What should be added to –1 to get 10?

Sol : (–1) + a number = 10

∴ The number = $10 + 1 = 11$

2. $-70 + 20 = \square - 10$

Sol : LHS $= -70 + 20 = -50$

RHS $= \square - 10 \Rightarrow \square = -50 + 10 = -40$

$-70 + 20 = \boxed{-40} - 10$

3. **Substract 94860 from (–86945)**

Sol : $-86945 - (94860) = -86945 + (\text{Additive inverse of } 94860)$

$= -86945 + (-94860) = -1,81,805$

4. **Find the value of (–25) + 60 + (–95) + (–385)**

Sol : $(-25) + 60 + (-95) + (-385) = 35 + (-95) + (-385) = -60 + (-385) = -445$

5. **Find the sum of (–9999) (–2001) and (–5999).**

Sol : $(-9999) + (-2001) + (-5999) = -12,000 + (-5999) = -17,999$

6. **Find the product of (–30) × (–70) × 15.**

Sol : $(-30) \times (-70) \times 15 = (+2100) \times 15 = 31,500$

7. **Divide –72 by 8.**

Sol : $\frac{-72}{8} = -9$

8. **Find two pairs of integers whose product is +15.**

Sol : (i) $(+3) \times (+5)$ (ii) $(-3) \times (-5)$

9. **Check the following for equality.**

(i) $(11 + 7) + 10$ and $11 + (7 + 10)$

(ii) $(8 - 13) \times 7$ and $8 - (13 \times 7)$

(iii) $[(-6) - (+8)] \times (-4)$ and $(-6) - [8 \times (-4)]$

(iv) $3 \times [(-4) + (-10)]$ and $[3 \times (-4) + 3 \times (-10)]$

Sol : (i) LHS $= (11 + 7) + 10 = 18 + 10 = 28$

RHS $= 11 + (7 + 10) = 11 + (17) = 28$

LHS = RHS

$\therefore (11 + 7) + 10 = 11 + (7 + 10)$

(ii) LHS $= (8 - 13) \times 7 = -5 \times 7 = -35$

RHS $= 8 - (13 \times 7) = 8 - 91 = -83$

LHS $\neq$ RHS

$\therefore (8 - 13) \times 7 \neq 8 - (13 \times 7)$

(iii) LHS $= [(-6) - (+8)] \times (-4) = [(-6) + (-8)] \times (-4) = (-14) \times (-4) = +56$

RHS $= (-6) - [8 \times (-4)] = -6 - (-32) = -6 + (+32) = +26$

LHS $\neq$ RHS

$\therefore [(-6) - (+8)] \times (-4) \neq (-6) - [8 \times (-4)]$

(iv) LHS = $3 \times [(-4) + (-10)] = 3 \times (-14) = -42$

RHS = $[3 \times (-4) + 3 \times (-10)] = (-12) + (-30) = -42$

LHS = RHS

$3 \times [(-4) + (-10)] = [3 \times (-4) + 3 \times (-10)]$

10. Kalaivani had ₹ 5000 in her bank account on 01.01.2018. She deposited ₹ 2000 in January and withdrew ₹ 700 in February. What was Kalaivani's bank balance on 01.04.2018, if she deposited ₹ 1000 and withdraw ₹ 500 in March.

Sol : Initial bank balance = ₹ 5000 ; Total deposits: January : ₹ 2000 ; March : ₹ 1000

Total deposits upto March = ₹ 5000 + ₹ 2000 + ₹ 1000 = ₹ 8000

Amount withdrawn: February : ₹ 700 (–)

March : ₹ 500 (–)

∴ Total amount withdrawn = (–700) + (–500) = ₹ –1200

Net bank balance = ₹ 8000 – ₹ 1200 = ₹ 6800

11. The price of an item *x* increases by ₹ 10 every year and an item *y* decreases by ₹ 15 every year. If in 2018, the price of *x* is ₹ 50 and *y* is ₹ 90, then which item will be costlier in the year 2020?

Sol : Amount increases for *x* every year = ₹ 10.

Price of *x* in 2018 = ₹ 50 ; Price of *x* in 2019 = ₹ 50 + ₹ 10 = ₹ 60

Price of *x* in 2020 = ₹ 60 + ₹ 10 = ₹ 70 Amount decreases for *y* per year = ₹ 15

Price of *y* in 2018 = ₹ 90

Price of *y* in 2019 = ₹ 90 – ₹ 15 = ₹ 75

Price of *y* in 2020 = ₹ 75 – ₹ 15 = ₹ 60

Here 70 > 60. ∴ Item *x* will costlier in year 2020.

12. Match the statements in Column A and Column B.

S.No.	A	B
(i)	For any two integers 72 and 108, 72 + 108 is also an integer	(a) Distributive property of multiplication over addition.
(ii)	For any three integers 68, 25 and 99 $68 \times (25 + 99) = (68 \times 25) + (68 \times 99)$	(b) Multiplicative identity
(iii)	$0 + (-138) = (-138) = (-138) + 0$	(c) Commutative property under multiplication.
(iv)	For any two integers (–5) and 10 $(-5) \times 10 = 10 \times (-5)$	(d) Closed under addition
(v)	$1 \times (-1098) = (-1098) = (-1098) \times 1$	(e) Additive identify.

[Ans: i - d, ii - a, iii - e, iv - c, v - b]

Challenge Problems

13. **Say True or False.**

(i) The sum of a positive integer and a negative integer is always a positive integer. **[Ans: False]**

(ii) The sum of two integers can never be zero **[Ans: False]**

(iii) The product of two negative integers is a positive integer. **[Ans: True]**

(iv) The quotient of two integers having opposite sign is a negative integer. **[Ans: True]**

(v) The smallest negative integer is –1. **[Ans: False]**

14. **An integer divided by 7 gives a result –3. What is that integer?**

Sol : According to the problem $\frac{\text{An integer}}{7} = -3$

$\therefore$ The integer $= -3 \times 7$

The required integer $= -21$.

15. **Replace the question mark with suitable integer in the equation.**

$72 + (-5) - \boxed{?} = 72$

Sol :

$72 + (-5) - \boxed{?} = 72$

$67 - \boxed{?} = 72$

$- \boxed{?} = 72 - 67 = 5$

$\boxed{?} = -5$

$\therefore \quad 72 + (-5) - \boxed{-5} = 72$

16. **Can you give 10 pairs of single digit integers whose sum is zero?**

Sol : $1 + (-1) + 2 + (-2) + 3 + (-3) + 4 + (-4) + 5 + (-5) = 0$

17. **If P = –15 and Q = 5 find (P – Q) ÷ (P + Q).**

Sol : Given P = 15 ; Q = 5

$$(P - Q) \div (P + Q) = \frac{(-15) - 5}{(-15) + 5} = \frac{(-15) + (-5)}{-10} = \frac{-20}{-10} = 2$$

18. **If the letters in the English alphabets A to M represent the number from 1 to 13 respectively and N represents 0 and the letters O to Z correspond from –1 to –12, find the sum of integers for the names given below. For example,**

MATH → Sum → 13 + 1 – 6 + 8 = 16

(i) YOUR NAME (ii) SUCCESS

Sol : Given

A	B	C	D	E	F	G	H	I	J	K	L	M
1	2	3	4	5	6	7	8	9	10	11	12	13
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
0	–1	–2	–3	–4	–5	–6	–7	–8	–9	–10	–11	–12

(i) My name LEENA → 12 + 5 + 5 + 0 +1 = 23

(ii) SUCCESS → (–5) + (–7) + 3 + 3 + 5 + (–5) + (–5)

= –12 + 6 + 5 + (–10) = –6 + 5 + (–10) = (–1) + (–10)

= –11

19. From a water tank 100 litres of water is used every day. After 10 days there is 2000 litres of water in the tank. How much water was there in the tank before 10 days?

Sol : Water used for one day = 100 litres.

Water used for 10 days = 100 × 10 = 1000 litres.

After 10 days water left in the tank = 2000 litres

∴ Initially amount of water will be = 2000 + 1000 = 3000 litres

20. A dog is climbing down into a well to drink water. In each jump it goes down 4 steps. The water level is in 20th step. How many jumps does the dog take to reach the water level?

Sol : The water in the well is at 20th step.

For each jump the dog goes low 4 steps.

∴ Number of jumps the dog to reach the water = $\frac{\overset{5}{\cancel{20}}}{\cancel{4}}$ = 5 jumps

21. Kannan has a fruit shop. He sells 1 dozen banana at a loss of ₹ 2 each because it may get rotten next day. What is his loss?

Sol : 1 dozen = 12 bananas

For 1 banana loss = ₹ 2

∴ For 12 bananas loss = ₹ 2 × 12 = ₹ 24

22. A submarine was situated at 650 feet below the sea level. If it descends 200 feet, what is its new position?

Sol : Position of submarine = 650 feet below sea level = –650 feet

Again the depth it descends = 200 feet below = – 200 feet

∴ Position of submarine = (–650) + (–200) = –850 feet

The submarine will be 850 feet below the sea level.

23. In a magic square given below each row, column and diagonal should have the same sum. Find the values of *x*, *y*, and *z*.

1	–10	*x*
y	–3	–2
–6	4	*z*

Sol : Column total = Row total = diagonal total

$\therefore 1 + y + (-6) = (-10) + (-3) + 4$

$y + (-5) = -13 + 4$

$y = -9 + 5$

$y = -4$

$$\begin{aligned}
\text{So } 1 + (-10) + x &= y + (-3) + (-2)\\
-9 + x &= (-4) + (-3) + (-2)\\
-9 + x &= -9\\
x &= -9 + 9\\
x &= 0\\
\text{Now } x + (-2) + z &= (-10) + (-3) + 4\\
0 + (-2) + z &= (-13) + 4\\
-2 + z &= -9\\
z &= -9 + 2 = -7\\
z &= -7
\end{aligned}$$

$\therefore x = 0, y = -4, z = -7$

Additional Questions

1. Simplify the following using suitable properties.

(a) $(-1650) \times (-2) + (-1650) \times (-98)$ **(b) $(9150 \times 405) - (8150 \times 405)$**

Sol : (a) $(-1650) \times (-2) + (-1650) \times (-98)$

$= 1650\,[(-1) \times (-2) + (-1) \times -98] = 1650\,(2 + 98)$ [Distributive property]

$= 1650 \times 100 = 1,65,000$

(b) $(9150 \times 405) - (8150 \times 405)$

$= 405\,(9150 - 8150) = 405 \times 1000$

$= 4,05,000$

2. Which is greater: $(9 + 7) \times 1000$ or $9 + 7 \times 1000$?

Sol : $(9 + 7) \times 1000 = 16 \times 1000 = 16,000$

$9 + 7 \times 1000 = 9 + 7000 = 7,009$

$16,000 > 7009$

$\therefore \quad (9 + 7) \times 1000 > [9 + 7 \times 1000]$

3. Simiplify: $80 \div [240 \div (-24)] + 7$

Sol : We have

$$80 \div [240 \div (-24)] + 7$$

$$= 80 \div \left[\frac{240}{-24}\right] + 7$$

$$= 80 \div (-10) + 7 = -\left[\frac{80}{10}\right] + 7 = (-8) + 7 = -1$$

Unit Text

Time: 1 hrs **Max Marks : 25**

I. Choose the best answer from the options given below. **5 × 1 = 5**

1. The additive identity for integers is

(a) –1 (b) 0 (c) 1 (d) None of these

2. When 5 is multiplied by 0 we get

(a) 5 (b) –5 (c) 10 (d) 0

3. What is the quotient when zero is divided by a non-zero integer?

(a) 1 (b) –1 (c) 0 (d) The integer itself

4. Name the property which says that "if two integers are added or subtracted, the answer is always an integer".

(a) Closure property (b) Associative property

(c) Distributive property (d) Identity

5. The product of 5 and –3 is

(a) 0 (b) 15 (c) –15 (d) 8

II. Fill in the blanks **5 × 1 = 5**

6. The additive inverse of 0 is _____

7. 300 + (–300) = _____

8. 2 + 0 + (–15) = _____ + 0 + 2

9. 50 × _____ = 0

10. The product of _____ and –1 is –15.

III. Answer the following question **5 × 2 = 10**

11. If the product of two integers is –84. One of them is –6, then what is the other integer?

12. Find the product of (–1) × (–1) × (–2) × (–2)

13. Use >, < or = in the boxes.

(a) (–5) + (–3) ☐ (–5) – (–3) (b) (–3) + 7 – (19) ☐ 15 – 8 + (–9)

14. Write a negative integer and a positive integer whose difference is –4?

15. Write a pair of integers whose sum is smaller than both the integers.

IV. Answer the following **1 × 5 = 5**

16. (a) An elevator descends into a mine shaft at the rate of 6m/min. If the descend starts from 10 m above the ground level. How long will it take to reach –350 m?

(or)

(b) Write five pairs of integers a, b such that $\frac{a}{b} = -3$

Answers

I.

1. (b) 0
2. (d) 0
3. (c) 0
4. (a) closure property
5. (c) –15

II.

6. 0
7. 0
8. –15
9. 0
10. 15

III.

11. 14
12. 4
13. (a) < (b) <
14. –2, 2
15. –25, 3

IV.

16. (a) 1 hour
(b) (9, –3), (–3, 1), (–18, 6) (6, –2) (–15, 5)

CHAPTER 2

MEASUREMENTS

IMPORTANT POINTS

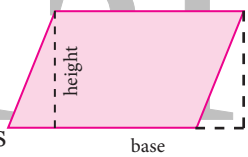
- SI unit of Distance is metre.
- SI unit of Weight is gram.
- SI unit of Time is second.
- International system of units were introduced in the year1971.
- Perimeter is the distance around.
- Area is the region occupied by the closed shape.

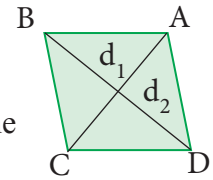
PARALLELOGRAM :

- A parallelogram is a four sided closed shape in which opposite sides are both parallel and equal.
- Area of the parallelogram = $b \times h$ sq. units, where b = base; h = height.
- The perimeter of a parallelogram is the sum of the lengths of the four sides.

RHOMBUS :

- In a parallelogram if all the sides are equal then it is called a rhombus.
- In a rhombus (i) all the sides are equal
  (ii) opposite sides are parallel
  (iii) diagonals divide the rhombus into 4 right angles triangles of equal area.
  (iv) the diagonals bisect each other at right angles.

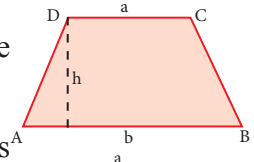


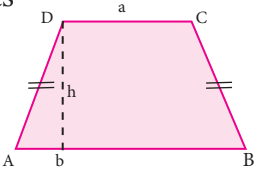


- Area of the rhombus = (base × height) sq. units
- Area of the rhombus = $\frac{1}{2}(d_1 \times d_2)$ sq. units. Where d_1 and d_2 are the diagonals.

TRAPEZIUM :

- A parallelogram with one pair of non-parallel sides is known as a Trapezium.
- Area of the Trapezium = $\frac{1}{2} \times h(a+b)$ sq. units. Where a and b are lengths of parallel sides.
- If the non-parallel sides of Trapezium are equal then it is known as an isosceles Trapezium.





PARALLELOGRAM

TRY THESE

(Text book Page No. 33)

1. Find the missing values for the following:

S.No.	Length	Breadth	Area	Perimeter	
(i)	12 m	8 m			**Hint :** The perimeter of a rectangle = 2 ($l + b$) units. Area of a rectangle = $l \times b$ sq. units l – length b – breadth of a rectangle.
(ii)	15 cm		90 sq. cm		
(iii)		50 mm		300 mm	
(iv)	12 cm			44 cm	

Sol : (i) Given Length $l = 12$ m ; Breadth $b = 8$ cm

$\therefore$ Area of rectangle = $l \times b$ sq. units $= 12 \times 8$ m^2 $= 96$ m^2

Perimeter of the rectangle = $2 \times (l + b)$ units = $2 \times (12 + 8)$ m = $2 \times 20 = 40$ m

(ii) Given Length $l = 15$ cm ; Area of the rectangle = 90 sq. cm

$l \times b = 90$; $15 \times b = 90$; $b = \frac{90}{15} = 6$ cm

Perimeter of the rectangle = $2 \times (l + b)$ units = $2 \times (15 + 6)$ cm = 2×21 cm = 42 cm

(iii) Given Breadth of rectangle = 50 mm ; Perimeter of the rectangle = 300 mm

$$2 \times (l + b) = 300$$
$$2 \times (l + 50) = 300$$
$$l + 50 = \frac{300}{2} = 150$$
$$l = 150 - 50$$
$$l = 100 \text{ mm}$$

Area = $l \times b$ sq. units = 100×50 mm^2 $= 5000$ mm^2

(iv) Length of the rectangle = 12 cm ; Perimeter = 44 cm

$2(l + b) = 44$

$2(12 + b) = 44$

$12 + b = \frac{44}{2}$

$12 + b = 22$; $b = 22 - 12$; $b = 10$ cm

Area $= l \times b$ sq. units

$= 12 \times 10$ cm^2 $= 120$ cm^2

S.No.	Length	Breadth	Area	Perimeter
(i)	12 m	8 m	96 m^2	40 m
(ii)	15 cm	6 cm	90 sq. cm	42 cm
(iii)	100 mm	50 mm	5000sq.mm	300 mm
(iv)	12 cm	10 cm	120 cm^2	44 cm

2.

S.No.	Side	Area	Perimeter	
(i)	60 m			**Hint :**
(ii)		64 sq. m		Perimeter of a square = $4 \times a$ units.
(iii)			100 mm	Area of a square = $a \times a$ sq. units
				a – is the side of square.

Sol : (i) Given side $a = 60$ cm

Area of the square = $a \times a$ sq.units = 60×60 cm^2 = 3600 cm^2

Perimeter of the square = $4 \times a$ units = 4×60 cm = 240 cm

(ii) Given area of a square = 64 sq. m

$a \times a = 64$

$a \times a = 8 \times 8$

$a = 8$ m

Perimeter = $4 \times a$

$= 4 \times 8$

$= 32$ m

(iii) Given perimeter of the square = 100 mm

$4 \times a = 100$

$a = \frac{100}{4}$ mm

$a = 25$ mm

Area = $a \times a$ sq. units

$= 25 \times 25$ mm^2

$= 625$ mm^2

S.No.	Side	Area	Perimeter
(i)	60 cm	3600 cm^2	240 cm
(ii)	8 m	64 sq. m	32 m
(iii)	25 mm	625 mm^2	100 mm

3.

S.No.	Base	Height	Area	
(i)	13 m	5 m		**Hint :**
(ii)	16 cm		240 sq. cm	Area of the right angled triangle = $\frac{1}{2}(b \times h)$ sq. unit
(iii)		6 mm	84 sq. mm	(b – base; h – height)

Sol : (i) Given base of the right angled triangle = 13 m ; height = 5 m

Area = $\frac{1}{2} \times (b \times h)$ sq. units = $\frac{1}{2} \times (13 \times 5)$ m^2 = $\frac{65}{2}$ m^2 = 32.5 m^2

(ii) Base = 16 cm ; Area = 240 sq. cm ; $\frac{1}{2} \times b \times h = 240$

$\frac{1}{\cancel{2}} \times \cancel{16}^{8} \times h = 240$; $h = \frac{240}{8}$; $h = 30$ cm

(iii) Given height $h = 6$ mm ; Area = 84 sq. mm

$\frac{1}{2} \times b \times h = 84$; $\frac{1}{2} \times b \times 6 = 84$

$b = \frac{84^{28} \times 2}{6_{3}}$; $b = 28$ mm

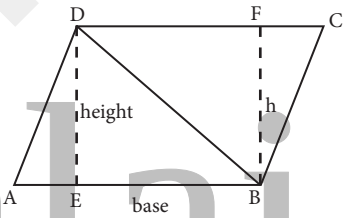
S.No.	Base	Height	Area
(i)	13 m	5 m	32.5 m^2
(ii)	16 cm	30 cm	240 sq. cm
(iii)	28 mm	6 mm	84 sq. mm

Think

(Text book Page No. 35)

1. Explain the area of the parallelogram as sum of the areas of the two triangles.

Sol : ABCD is a parallelogram. It can be divided into two triangles of equal area by drawing the diagonal BD.



Area of the parallelogram ABCD = base × height

$= AB \times DE$

But area of the triangle ABD $= \frac{1}{2} \times$ base × height

$= \frac{1}{2} \times AB \times DE$

Area of triangle CDB $= \frac{1}{2} \times DC \times BF$ [$\because AB = DC, DE = BF$]

$= \frac{1}{2} \times AB \times DE$

Area of parallelogram ABCD $= \frac{1}{2} \times AB \times DE + \frac{1}{2} \times AB \times DE$

= Area of ΔABD + Area of ΔCDB

2. A rectangle is a parallelogram but a parallelogram is not a rectangle. Why?

Sol : For both rectangle and parallelogram

(i) opposite sides are equal and parallel.

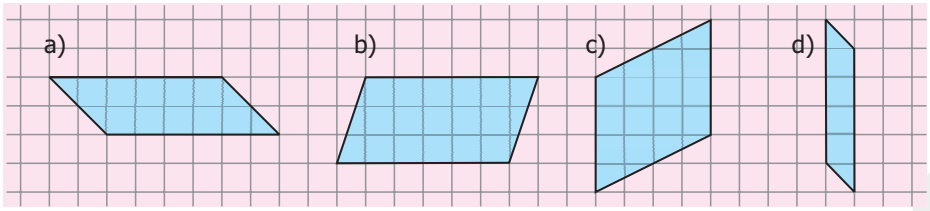
(ii) For rectangle all angles equal to 90°. But for parallelogram opposite angles are equal.

$\therefore$ All rectangles are parallelograms. But all parallelograms are not rectangles as their angles need not be equal to 90°.

TRY THESE

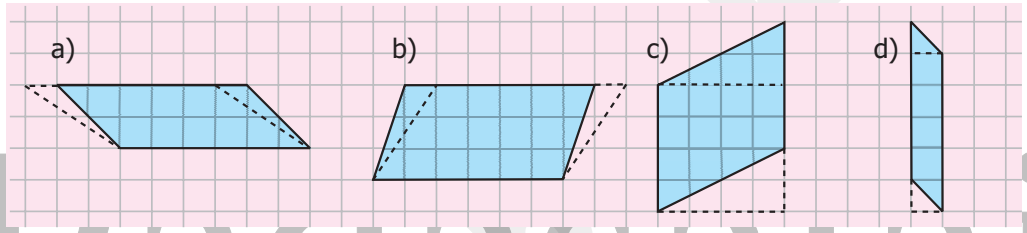
(Text book Page No. 36)

1. Count the squares and find the area of the following parallelograms by converting those into rectangles of the same area. (Without changing the base and height).



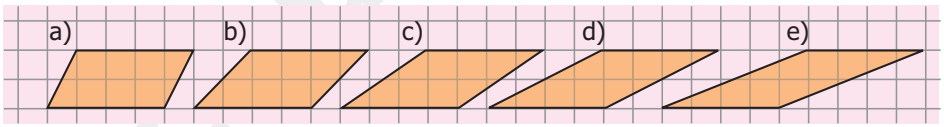
(a) _____ sq. units (b) _____ sq. units
(c) _____ sq. units (d) _____ sq. units

Sol : Converting the given parallelograms into rectangles we get.



(a) 10 sq. units (b) 18 sq. units
(c) 16 sq. units (d) 5 sq. units

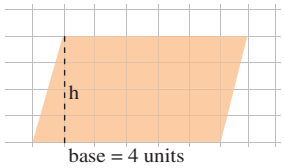
2. Draw the heights for the given parallelograms and mark the measure of their bases and find the area. Analyse your result.



Sol : (a) Area of the parallelogram = $b \times h$ sq. units

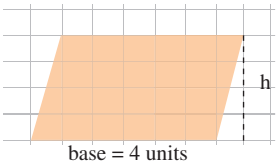
$= 4 \times 2$ sq. units

$= 8$ sq. units



By counting the small squares also we get number of full squares + number of square more than half = 6 + 2 = 8 sq. units.

(b) Area of the parallelogram = base × height = 4 × 2 = 8 sq. units

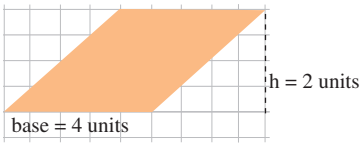


Also area = Number of full squares + $\frac{1}{2}$ [Number of half squares]

$= 6 + \frac{1}{2}(4) = 6 + 2 = 8$ sq. units

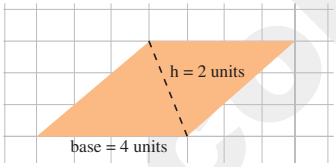
Measurements

(c) Area of the parallelogram = base × height = 4 × 2 = 8 sq. units

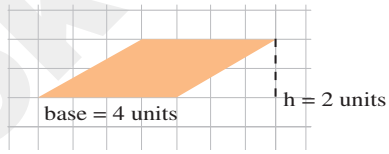


Also area = Number of full squares + Number of squares more than half + $\frac{1}{2}$ Number of half squares = 4 + 4 = 8 sq. units

(d) Area of the parallelogram = (base × height) sq. units
= 4 × 2 sq. units = 8 sq. units
Also area of the parallelogram
= Number of full squares + $\frac{1}{2}$ [Number of half squares] + Number of squares more than half = 4 + 0 + 4 = 8 sq. units

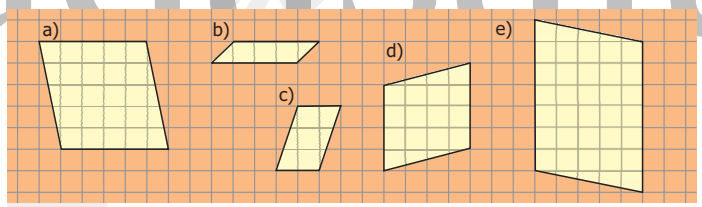


(e) Area of the parallelogram = (base × height) sq. units
= 4 × 2 = 8 sq. units
Also area of the parallelogram = Number of full squares + Number of squares more than half + $\frac{1}{2}$ [Number of half squares] = 2 + 6 = 8 sq. units



Unit 2

3. Find the area of the following parallelograms by measuring their base and height, using formula.



(a) ____ sq. units (b) ____ sq. units (c) ____ sq. units
(d) ____ sq. units (e) ____ sq. units

Sol : (a) Area of the rectangle = (base × height) sq. units
base = 5 units
height = 5 units
∴ Area = (5 × 5) sq. units = 25 sq. units

(b) Area of the rectangle = (base × height) sq. units
base = 4 units
height = 1 unit
∴ Area = 4 × 1 sq. units = 4 sq. units

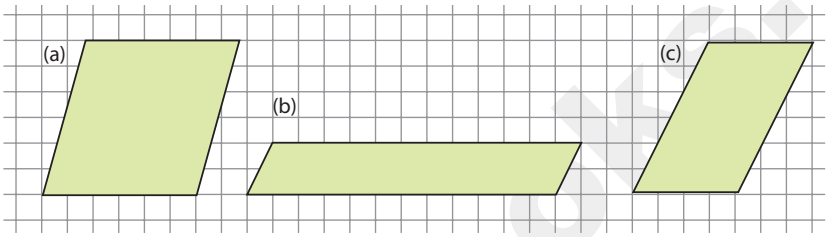
(c) Area of the rectangle = (base × height) sq. units
base = 2 units
height = 3 units
∴ Area = 2 × 3 sq. units = 6 sq. units

(d) Area of the rectangle = (base × height) sq. units
base = 4 units
height = 4 units
∴ Area = 4 × 4 sq. units = 16 sq. units

(e) Area of the parallelogram = (base × height) sq. units
base = 7 units
height = 5 units
∴ Area = 7 × 5 sq. units = 35 sq. units

4. Draw as many parallelograms as possible in a grid sheet with the area 20 square units each.

Sol :

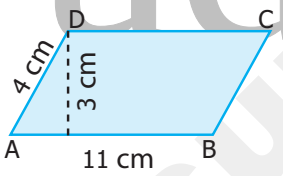


Area of the parallelogram (a), (b) or (c) = 20 sq. units

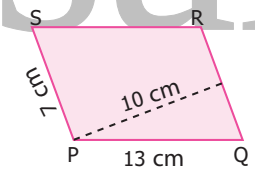
Exercise 2.1

1. Find the area and perimeter of the following parallelograms.

(i)



(ii)



Sol : (i) Given base b = 11 cm ; height h = 3 cm

Area of the parallelogram = $b \times h$ sq. units = 11×3 cm^2
= 33 cm^2

Also perimeter of a parallelogram = Sum of 4 sides
= 11 cm + 4 cm + 11 cm + 4 cm = 30 cm

Area = 33 cm^2; Perimeter = 30 cm.

(ii) Given base b = 7 cm [$\because$ PS = PQ]
height h = 10 cm
Area of the parallelogram = $b \times h$ sq. units
= 7×10 cm^2 = 70 cm^2
Perimeter = Sum of four sides
= 13 cm + 7 cm + 13 cm + 7 cm
= 40 cm

Area = 70 cm^2, Perimeter = 40 cm

2. Find the missing values.

S.No.	Base	Height	Area
(i)	18 cm	5 cm	
(ii)	8 m		56 sq. m
(iii)		17 mm	221 sq. mm

Sol : (i) Given Base $b = 18$ cm ; Height $h = 5$ cm

$\therefore$ Area of the parallelogram $= b \times h$ sq. units

$= 18 \times 5$ cm^2

$= 90$ cm^2

(ii) Base $b = 8$ m ; Area of the parallelogram = 56 sq. m

$$b \times h = 56$$

$$8 \times h = 56$$

$$h = \frac{56}{8}$$

$$h = 7 \text{ m}$$

(iii) Given Height h = 17 mm

Area of the parallelogram = 221 sq. mm

$$b \times h = 221$$

$$b \times 17 = 221$$

$$b = \frac{221}{17}$$

$$b = 13 \text{ m}$$

Tabulating the results, we get

S.No.	Base	Height	Area
(i)	18 cm	5 cm	90 sq. cm
(ii)	8 m	7 m	56 sq. m
(iii)	13 mm	17 mm	221 sq. mm

3. Suresh on a parallelogram shaped trophy in a state level chess tournament. He knows that the area of the trophy is 735 sq. cm and its base is 21 cm. What is the height of that trophy?

Sol :

Given base $b = 21$ cm

Area of parallelogram = 735 sq. cm

$$b \times h = 735$$

$$21 \times h = 735$$

$$h = \frac{735}{21}$$

$$h = 35 \text{ cm}$$

$\therefore$ Height of the trophy = 35 cm

4. **Janaki has a piece of fabric in the shape of a parallelogram. Its height is 12 m and its base is 18 m. She cuts the fabric into four equal parallelograms by cutting the parallel sides through its mid-points. Find the area of each new parallelogram.**

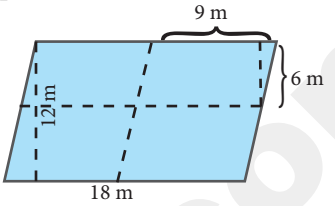
Sol : Area of a parallelogram = (base × height) sq. units

$$\text{Base length} = \frac{18}{2} = 9 \text{ m}$$

$$\text{Height} = \frac{12}{2} = 6 \text{ m}$$

$$\text{Area} = 9 \times 6 = 54 \text{ m}^2$$

Area of each parallelogram = 54 m^2

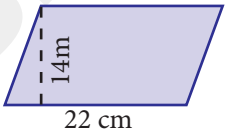


5. **A ground is in the shape of parallelogram. The height of the parallelogram is 14 metres and the corresponding base is 8 metres longer than its height. Find the cost of levelling the ground at the rate of ₹ 15 per sq. m.**

Sol : Height of the parallelogram h = 14 m

Base = 8 m longer than height

= (14 + 8) m = 22 m



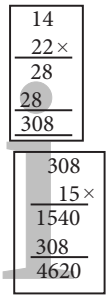
Area of the parallelogram = (base × height) sq. units

= (22 × 14)m^2 = 308 m^2

Cost of levelling 1 m^2 = ₹ 15

Cost of levelling 308 m^2 = 308 × 15 = ₹ 4,620

Cost of levelling the ground = ₹ 4,620



Objective Type Questions

6. **The perimeter of a parallelogram whose adjacent sides are 6 cm and 5 cm is**

(i) 12 cm (ii) 10 cm (iii) 24 cm (iv) 22 cm **[Ans : (iv) 22 cm]**

Hint : = 2(6 + 5) = 2 × 11 = 22 cm

7. **The area of parallelogram whose base 10 m and height 7 m is**

(i) 70 sq. m (ii) 35 sq. m (iii) 7 sq. m (iv) 10 sq. m **[Ans : (i) 70 sq. m]**

Hint : = base × height = 10m × 7m = 70 sq.m

8. **The base of the parallelogram with area is 52 sq. cm and height 4 cm is**

(i) 48 cm (ii) 104 cm (iii) 13 cm (iv) 26 cm **[Ans : (iii) 13 Cm]**

Hint : $\text{base} = \frac{\text{area}}{\text{height}} = \frac{52\text{sq.cm}}{4\text{cm}} = 13\text{cm}$

9. **What happens to the area of the parallelogram if the base is increased 2 times and the height is halved?**

(i) Decreases to half (ii) Remains the same

(iii) Increase by two times (iv) None **[Ans : (ii) Remains the same]**

Hint : Area = $b \times h$ sq. units

New base = 2 × old base

New height = $\frac{1}{2}$ × old height

$\therefore$ New Area = New base × New height = $(2 \times b)\frac{1}{2} \times h = bh$, = old Area

10. In a parallelogram the base is three times its height. If the height is 8 cm then the area is

(i) 64 sq. cm (ii) 192 sq. cm (iii) 32 sq. cm (iv) 72 sq. cm

[Ans : (ii) 192 sq. cm]

Hint : Given $b = 3 \times h$; $h = 8$ cm

Area = $b \times h = 3h \times 8 = 3 \times 8 \times 8 = 192$ cm^2

Additional Questions

1. In the following figure, PQRS is a parallelogram find x and y.

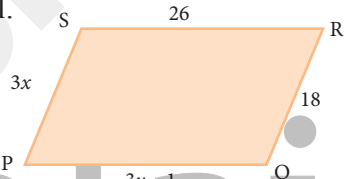
Sol : We know that in a parallelogram opposite sides are equal.

$\therefore 3x = 18$ and $3y - 1 = 26$

$x = \frac{18}{3}$ $3y = 26 + 1 = 27$

$x = 6$ $y = \frac{27}{3}$

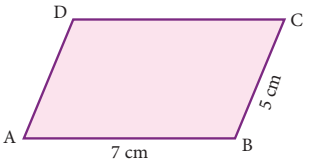
$y = 9$



2. Two adjacent sides of a parallelogram are 5 cm and 7 cm respectively. Find its perimeter.

Sol : Perimeter = AB + BC + CD + AD [$\because$ AB = DC & AD = BC]

= 7 cm + 5 cm + 7 cm + 5 cm = 24 cm

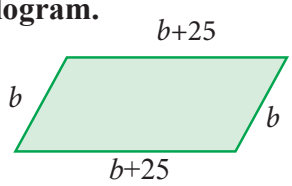


3. The perimeter of a parallelogram is 150 cm. One of its sides is greater than the other by 25 cm. Find the length of the sides of the parallelogram.

Sol : Given perimeter = 150 cm

Let one side of the parallelogram be 'b' cm

Then the other side = $b + 25$ cm



$b + (b + 25) + b + (b + 25) = 150$

$b + b + 25 + b + b + 25 = 150$

$4b + 50 = 150$ $= 4b = 100$

$b = \frac{\cancel{100}^{25}}{\cancel{4}} = 25$

$\therefore$ One side $b = 25$ cm

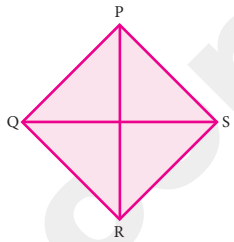
Other side $b + 25 = 50$ cm

RHOMBUS

TRY THESE

(Text book Page No. 41)

1. Observe the figure and answer the following questions.



(i) Name two pairs of opposite sides.

(ii) Name two pairs of adjacent sides.

(iii) Name the two diagonals.

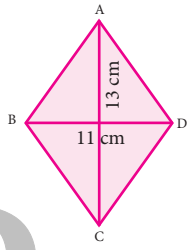
Sol : (i) (a) PQ and RS (b) QR and PS

(ii) (a) PQ and QR (b) PS and RS

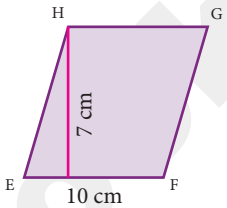
(iii) (a) PR and QS are diagonals.

2. Find the area of the rhombus given in (i) and (ii).

(i)



(ii)



Sol :

(i) Area of the rhombus $= \frac{1}{2}(d_1 + d_2)$ $= \frac{1}{2}(11+13)$ sq. units $= \frac{1}{2} \times (24)$ cm^2

$= 12\ cm^2$

(ii) Base = 10 cm ; Height = 7 cm

Area of the rhombus = $b \times h$ sq. units = $10 \times 7\ cm^2 = 70\ cm^2$

Think

(Text book Page No. 41)

1. Can you find the perimeter of the rhombus?

Sol : If we know the length of one side we can find the perimeter using 4 × side units.

2. Can diagonals of a rhombus be of the same length?

Sol : When the diagonals of a rhombus become equal it become a square.

3. A square is a rhombus but a rhombus is not a square. Why?

Sol : In a square (i) all sides are equal.

(ii) opposite sides are parallel

(iii) diagonals divides the square into 4 right angled triangles of equal area

(iv) the diagonals bisect each other at right angles.

So it become a rhombus also.

But in a rhombus (i) each angle need not equal to 90°.

(ii) the length of the diagonals need not be equal.

Therefore it does not become a square.

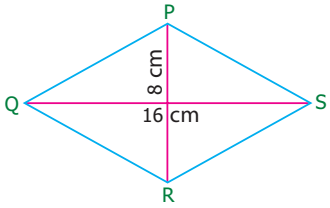
4. Can you draw a rhombus in such a way that the side is equal to the diagonal.

Sol : Yes, we can draw a rhombus with one of its diagonals equal to its side length. In such case the diagonal will divide the rhombus into two congruent equilateral triangles.

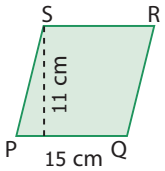
EXERCISE 2.2

1. Find the area of rhombus PQRS shown in the following figures.

(i)



(ii)



Sol : (i) Given the diagonals $d_1 = 16$ cm ; $d_2 = 8$ cm

Area of the rhombus $= \frac{1}{2}(d_1 \times d_2)$ sq. units

$$= \frac{1}{\cancel{2}} \times 16 \times \cancel{8}^{4} \text{ cm}^2 = 64 \text{ cm}^2$$

Area of the rhombus = 64 cm^2

(ii) Given base $b = 15$ cm ; Height $h = 11$ cm

Area of the rhombus = (base × height) sq. units

$= 15 \times 11$ cm^2 $= 165$ cm^2

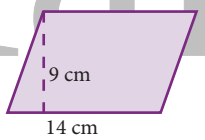
Area of the rhombus = 165 cm^2

2. Find the area of a rhombus whose base is 14 cm and height is 9 cm.

Sol : Given base $b = 14$ cm ; Height $h = 9$ cm

Area of the rhombus $= b \times h$ sq. units

$= 14 \times 9$ cm^2 $= 126$ cm^2



3. Find the missing value.

S.No.	Diagonal (d_1)	Diagonal (d_2)	Area
(i)	19 cm	16 cm	
(ii)	26 m		468 sq. m
(iii)		12 mm	180 sq. mm

Sol : (i) Given diagonal $d_1 = 19$ cm ; $d_2 = 16$ cm

Area of the rhombus $= \frac{1}{2}(d_1 \times d_2)$ sq. units $= \frac{1}{\cancel{2}_1} \times 19 \times \cancel{16}^{8}$

$= 152$ cm^2

(ii) Given diagonal $d_1 = 26$ m ; Area of the rhombus = 468 sq. m

$\frac{1}{2} \times (d_1 \times d_2) = 468$; $(26 \times d_2) = 468 \times 2$

$$d_2 = \frac{\overset{36}{\cancel{468}} \times \cancel{2}}{\cancel{26}_{13}} = d_2 = 36 \text{ m}$$

(iii) Given the diagonal $d_2 = 12$ mm ; Area of the rhombus = 180 sq. mm

$$\frac{1}{2} \times (d_1 \times d_2) = 180$$

$$\frac{1}{2}(d_1 \times 12) = 180$$

$$d_1 \times 12 = 180 \times 2$$

$$d_1 = \frac{\overset{15}{\cancel{180}} \times 2}{\cancel{12}}$$

$$d_1 = 30 \text{ mm}$$

Diagonal $d_1 = 30$ mm

Tabulating the results we have

S.No.	Diagonal (d_1)	Diagonal (d_2)	Area
(i)	19 cm	16 cm	152 sq. cm
(ii)	26 m	36 m	468 sq. m
(iii)	30 mm	12 mm	180 sq. mm

4. The area of a rhombus is 100 sq. cm and length of one of its diagonals is 8 cm. Find the length of the other diagonal.

Sol : Given the length of one diagonal $d_1 = 8$ cm ; Area of the rhombus = 100 sq. cm

$$\frac{1}{2}(d_1 \times d_2) = 100$$

$$\frac{1}{2} \times 8 \times d_2 = 100$$

$$8 \times d_2 = 100 \times 2$$

$$d_2 = \frac{\overset{25}{\cancel{100}} \times \cancel{2}}{\cancel{8}_4} = 25 \text{ cm}$$

Length of the other diagonal $d_2 = 25$ cm

5. A sweet is in the shape of rhombus whose diagonals are given as 4 cm and 5 cm. The surface of the sweet should be covered by an aluminum foil. Find the cost of aluminum foil used for 400 such sweets at the rate of ₹ 7 per 100 sq. cm.

Sol : Diagonals $d_1 = 4$ cm and $d_2 = 5$ cm

Area of one rhombus shaped sweet $= \frac{1}{2} \times (d_1 \times d_2)$ sq. units $= \frac{1}{\cancel{2}} \times \overset{2}{\cancel{4}} \times 5$ cm^2 $= 10$ cm^2

Aluminum foil used to cover 1 sweet = 10 cm^2

$\therefore$ Aluminum foil used to cover 400 sweets $= 400 \times 10 = 4000$ cm^2

Cost of aluminum foil for 100 cm^2 = ₹ 7

$\therefore$ Cost of aluminum foil for 4000 cm^2 $= \frac{\cancel{4000}}{\cancel{100}} \times 7 =$ ₹ 280

$\therefore$ Cost of aluminum foil used = ₹ 280.

Objective Type Questions

6. **The area of the rhombus with side 4 cm and height 3 cm is**

(i) 7 sq. cm (ii) 24 sq. cm (iii) 12 sq. cm (iv) 10 sq. cm

[Ans : (iii) 12 sq. cm]

Hint : Area = Base × Height = $4 \times 3 = 12$ cm^2

7. **The area of the rhombus when both diagonals measuring 8 cm is**

(i) 64 sq. cm (ii) 32 sq. cm (iii) 30 sq. cm (iv) 16 sq. cm

[Ans : (ii) 32 sq. cm]

Hint : Area $= \frac{1}{2} \times (d_1 \times d_2) = \frac{1}{2} \times 8 \times 8 = 32$

8. **The area of the rhombus is 128 sq. cm. and the length of one diagonal is 32 cm. The length of the other diagonal is**

(i) 12 cm (ii) 8 cm (iii) 4 cm (iv) 20 cm

[Ans : (ii) 8 cm]

Hint : $\frac{1}{2} \times d_1 \times d_2 = 128 \Rightarrow d_2 = \frac{\cancel{128} \times 2}{\cancel{32}} = 8$ cm

9. **The height of the rhombus whose area 96 sq. m and side 24 m is**

(i) 8 m (ii) 10 m (iii) 2 m (iv) 4 m **[Ans : (iv) 4 m]**

Hint : Area = Base × height = $96 \Rightarrow$ height $= \frac{96}{24} = 4$

10. **The angle between the diagonals of a rhombus is**

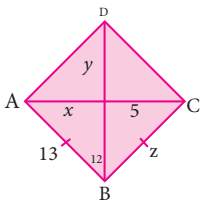
(i) 120° (ii) 180° (iii) 90° (iv) 100° **[Ans : (iii) 90°]**

Hint : Angles of a rhombus bisect at right angles.

Unit 2

Additional Questions

1. **ABCD is a rhombus. Find *x*, *y*, and *z*.**



Sol : We know that all sides of rhombus are equal and its diagonals bisect each other.

$\therefore x = 5, y = 12$ and $z = 13$.

2. **Find the altitude of the rhombus whose area is 315 cm^2 and its perimeter is 180 cm.**

Sol : Given perimeter of the rhombus = 180 cm

$\therefore$ One side of the rhombus $= \frac{180}{4} = 45$ cm

Given area of the rhombus = 315 cm^2

$b \times h = 315$

$45 \times h = 315 = \frac{315}{45}$

$h = 7$cm

Altitude of the rhombus = 7 cm

3. The floor of a building consists of 2000 tiles which are rhombus shaped and each of its diagonals are 40 cm and 25 cm. Find the total cost of polishing the floor, if the cost per m^2 = ₹ 5.

Sol : Area of each tile $= \frac{1}{2} \times d_1 \times d_2$ sq. units

$= \frac{1}{\cancel{2}} \times \cancel{40}^{20} \times 25 \text{ cm}^2 = 500 \text{ cm}^2$

$\therefore$ Area of 2000 tiles $= 500 \times 2000 = 10{,}00{,}000 \text{ cm}^2 = 100 \text{ m}^2$

Cost of polishing 1 m^2 = ₹ 5

$\therefore$ Cost of polishing 100 $m^2 = 5 \times 100$ = ₹ 500

Think

(Text book Page No. 46)

1. Can you find the perimeter of the trapezium? Discuss.

Sol : If all sides are given, then by adding all the four lengths we can find the perimeter of a trapezium.

2. In which case a trapezium can be divided into two equal triangles?

Sol : If two parallel sides are equal in length. Then it can be divided into two equal triangles.

3. Mention any three life situations where the isosceles trapeziums are used?

Sol : (i) Glass of a car windows.
(ii) Eye glass (glass in spectacles)
(iii) Some bridge supports.
(iv) Sides of handbags.

Exercise 2.3

1. Find the missing values.

S.No.	Height '*h*'	Parallel side '*a*'	Parallel side '*b*'	Area
(i)	10 m	12 m	20 m	
(ii)		13 cm	28 cm	492 sq. cm
(iii)	19 m		16 m	323 sq. m
(iv)	16 cm	15 cm		360 sq. cm

Solution :

(i) Given Height $h = 10$ m ; Parallel sides $a = 12$ m ; $b = 20$ m

Area of the Trapezium $= \frac{1}{2} h(a+b)$ sq. units $= \frac{1}{\cancel{2}} \times \cancel{10}^{5} \times (12+20) \text{m}^2$

$= (5 \times 32) \text{ m}^2 = 160 \text{ m}^2$

(ii) Given the parallel sides $a = 13$ cm ; $b = 28$ cm

Area of the trapezium = 492 sq. cm

$$\frac{1}{2} \times h(a+b) = 492$$

$$\frac{1}{2} \times h \times (13+28) = 492$$

$$h \times 41 = 492 \times 2$$

$$h = \frac{\cancel{492}^{12} \times 2}{\cancel{41}_{1}}$$

$$h = 24 \text{ cm}$$

(iii) Given height 'h' = 19 m ; Parallel sides b = 16 m

Area of the trapezium = 323 sq. m

$$\frac{1}{2} \times h \times (a+b) = 323$$

$$\frac{1}{2} \times 19 \times (a+16) = 323$$

$$a + 16 = \frac{\cancel{323}^{17} \times 2}{\cancel{19}^{1}} = 34$$

$$a = 34 - 16 = 18 \text{ m}$$

$$a = 18 \text{ m}$$

(iv) Given the height h = 16 cm ; Parallel sides a = 15 cm

Area of the trapezium = 360 sq. cm

$$\frac{1}{2} \times h \times (a+b) = 360$$

$$\frac{1}{\cancel{2}} \times \cancel{16}^{8} \times (15+b) = 360$$

$$15 + b = \frac{\overset{45}{\cancel{360}}}{8} = 45$$

$$b = 45 - 15 = 30$$

$$b = 30 \text{ cm}$$

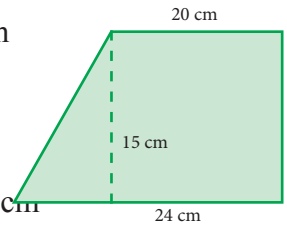
Tabulating the results we get

S.No.	Height 'h'	Parallel side 'a'	Parallel side 'b'	Area
(i)	10 cm	12 m	20 m	160 m^2
(ii)	24 cm	13 cm	28 cm	492 sq. cm
(iii)	19 m	18 m	16 m	323 sq. m
(iv)	16 cm	15 cm	30 cm	360 sq. cm

2. Find the area of a trapezium whose parallel sides are 24 cm and 20 cm and the distance between them is 15 cm.

Sol : Given the parallel sides a = 24 cm; b = 20 cm

Distance between a and b is 'h' = 15 cm



$$\text{Area of the trapezium} = \frac{1}{2} \times h \times (a+b)$$

$$= \frac{1}{2} \times 15 \times (24+20) \text{ cm}$$

$$= \frac{1}{\cancel{2}_{1}} \times 15 \times \cancel{44}^{22} = 330 \text{ cm}^2$$

Area of the trapezium = 330 cm^2

3. The area of a trapezium is 1586 sq. cm. The distance between its parallel sides is 26 cm. If one of the parallel sides is 84 cm then find the other side.

Sol : Given one parallel side = 84 cm. Let the other parallel side be 'b' cm.

Distance between a and b is h = 26 cm.

Area of the trapezium = 1586 sq. cm.

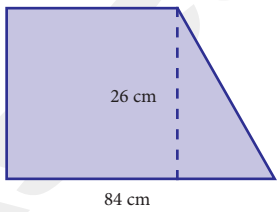
$$\frac{1}{2}\times h\times(a+b) = 1586$$

$$\frac{1}{\cancel{2}}\times \cancel{26}^{13}\times(84+b) = 1586$$

$$84 + b = \frac{\cancel{1586}^{122}}{\cancel{13}_{1}}$$

$$84 + b = 122$$

$$b = 122 - 84 = 38 \text{ cm}$$



$\therefore$ The other parallel side = 38 cm.

4. The area of a trapezium is 1080 sq. cm. If the lengths of its parallel sides are 55.6 cm and 34.4 cm. Find the distance between them.

Sol : Length of the parallel sides a = 55.6 cm ; b = 34.4 cm

Area of the trapezium = 1080 sq. cm

$$\frac{1}{2}\times h\times(a+b) = 1080$$

$$\frac{1}{2}\times h\times(55.6+34.4) = 1080$$

$$\frac{1}{\cancel{2}}\times h\times \cancel{90.0}^{45} = 1080$$

$$h = \frac{\cancel{1080}^{24}}{\cancel{45}} = 24 \text{ cm}$$

Distance between parallel sides = 24 cm.

5. The area of a trapezium is 180 sq. cm and its height is 9 cm. If one of the parallel sides is longer than the other by 6 cm. Find the length of the parallel sides.

Sol : Let one of the parallel side be 'a' cm. Given one parallel sides is longer than the other by 6 cm.

i.e. $b = a + 6$ cm

Also given height 'h' = 9 cm

Area of the trapezium = 180 sq. cm

$$\frac{1}{2}\times h\times(a+b) = 180 \text{ cm}^2$$

$$\frac{1}{2}\times 9\times(a+a+6) = 180$$

$$\frac{1}{2}\times 9\times(2a+6) = 180$$

Measurements

$$2a + 6 = \frac{\overset{20}{\cancel{180} \times 2}}{\cancel{9}} = 20 \times 2$$

$$2a + 6 = 40$$

$$2a = 40 - 6 = 34$$

$$a = \frac{34}{2} = 17 \text{ cm}$$

$$b = a + 6 = 17 + 6 = 23 \text{ cm}$$

$\therefore$ The parallel sides are $a = 17$ cm and $b = 23$ cm

6. The sunshade of a window is in the form of isoceles trapezium whose parallel sides are 81 cm and 64 cm and the distance between them is 6 cm. Find the cost of painting the surface at the rate of ₹ 2 per sq. cm.

Sol : Given the parallel sides $a = 81$ cm ; $b = 64$ cm

Distance between 'a' and 'b' is height $h = 6$ cm

$$\text{Area of the trapezium} = \frac{1}{2} \times h(a+b) \text{ sq. units}$$

$$= \frac{1}{\cancel{2}} \times \cancel{6}^{3} \times (81+64) = 3 \times 145 \text{ cm}^2 = 435 \text{ cm}^2$$

Cost of painting 1 cm^2 = ₹ 2

Cost of painting 435 cm^2 = ₹ 435×2 = ₹ 870

$\therefore$ Cost of painting = ₹ 870

7. A window is in the form of trapezium whose parallel sides are 105 cm and 50 cm respectively and the distance between the parallel sides is 60 cm. Find the cost of the glass used to cover the window at the rate of ₹ 15 per 100 sq. cm.

Sol : Given the parallel sides $a = 105$ cm ; $b = 50$ cm ; Height = 60 cm

$$\text{Area of the trapezium} = \frac{1}{2} \times h \times (a+b) \text{ sq. units} = \frac{1}{\cancel{2}} \times \overset{30}{\cancel{60}} \times (105+50) \text{ cm}^2$$

$$= 30 \times 155 \text{ cm}^2 = 4650 \text{ cm}^2$$

For 100 cm^2 cost of glass used = ₹ 15

$\therefore$ For 4650 cm^2 cost of glass = ₹ $\frac{4650}{100} \times 15$ = ₹ 697.50

Cost of the glass used = ₹ 697.50

Objective Type Questions

8. The area of the trapezium, if the parallel sides are measuring 8 cm and 10 cm and the height 5 cm is

(i) 45 sq. cm (ii) 40 sq. cm (iii) 18 sq. cm (iv) 50 sq. cm

[Ans: (i) 45 sq. cm]

Hint : $\frac{1}{2} \times h \times (a+b) = \frac{1}{2} \times 5 \times (10+8) = 45$

9. **In a trapezium if the sum of the parallel sides is 10 m and the area is 140 sq.m, then the height is**

(i) 7 cm (ii) 40 cm (iii) 14 cm (iv) 28 cm

[Ans: (iv) 28 cm]

Hint : Area $= \frac{1}{2} \times h \times (a + b) \Rightarrow 140 = \frac{1}{2} \times h \times 10 \Rightarrow h = 28$

10. **When the non-parallel sides of a trapezium are equal then it is known as**

(i) a square (ii) a rectangle

(iii) an isoceles trapezium (iv) a parallelogram

[Ans: (iii) an isoceles trapezium]

Exercise 2.4

Miscellaneous Practice Problems

1. **The base of the parallelogram is 16 cm and the height is 7 cm less than its base. Find the area of the parallelogram.**

Sol : In a parallelogram

Given base $b = 16$ cm ; height h = base – 7 cm = 16 – 7 = 9 cm

Area of the parallelogram = (base × height) sq. units

$= 16 \times 9 \text{ cm}^2 = 144 \text{ cm}^2$

Area of the parallelogram = 144 cm^2

2. **An agricultural field is in the form of a parallelogram, whose area is 68.75 sq. hm. The distance between the parallel sides is 6.25 cm. Find the length of the base.**

Sol : Height of the parallelogram = 6.25 hm

Area of the parallelogram = 68.75 sq. hm

$b \times h = 68.75$

$b \times 6.25 = 68.75$

$b = \frac{68.75}{6.25} = \frac{6875}{625} = 11$ km

$\frac{6875^{275^{11}}}{625_{25_1}}$

Length of the base = 11 km.

3. **A square and a parallelogram have the same area. If the side of the square is 48m and the height of the parallelogram is 18 m. Find the length of the base of the parallelogram.**

Sol : Given side of the square is 48 m

Area of the square = (side × side) sq. unit $= 48 \times 48 \text{ m}^2$

Height of the parallelogram = 18 m

Area of the parallelogram = 'bh' sq. units = $b \times 18 \text{ m}^2$

Also area of the parallelogram = Area of the square

$b \times 18 = 48 \times 48$

$b = \frac{48^{24^{8}} \times 48^{16}}{18_{9_{3}}} = 8 \times 16 = 128$ m

Base of the parallelogram = 128 m

Measurements

4. The height of the parallelogram is one fourth of its base. If the area of the parallelogram is 676 sq. cm, find the height and the base.

Sol : Let the base of the parallelogram be 'b' cm

4	676
13	169
	13

Given height = $\frac{1}{4}\times$ base ; Area of the parallelogram = 676 sq. cm

$$b \times h = 676$$
$$b \times \frac{1}{4}b = 676$$
$$b \times b = 676 \times 4$$
$$b \times b = 13 \times 13 \times 4 \times 4$$
$$b = 13 \times 4 \text{ cm} = 52 \text{ cm}$$
$$\text{Height} = \frac{1}{4}\times 52 \text{ cm} = 13 \text{ cm}$$

Height = 13 cm, Base = 52 cm

5. The area of the rhombus is 576 sq. cm and the length of one of its diagonal is half of the length of the other diagonal then find the length of the diagonal.

Sol : Let one diagonal of the rhombus = d_1 cm

The other diagonal $d_2 = \frac{1}{2}\times d_1$ cm

Area of the rhombus = 576 sq. cm

$$\frac{1}{2}\times(d_1 \times d_2) = 576$$
$$\frac{1}{2}\times(d_1 \times \frac{1}{2}d_1) = 576$$
$$d_1 \times d_1 = 576 \times 2 \times 2 = 6 \times 6 \times 4 \times 4 \times 2 \times 2$$
$$d_1 \times d_1 = \underline{6 \times 4 \times 2} \times \underline{6 \times 4 \times 2}$$
$$d_1 = 6 \times 4 \times 2$$
$$d_1 = 48 \text{ cm}$$
$$d_2 = \frac{1}{2}\times 48 = 24 \text{ cm}$$

$\therefore$ Length of the diagonals $d_1 = 48$ cm and $d_2 = 24$ cm.

6. A ground is in the form of isoceles trapezium with parallel sides measuring 42 m and 36 m long. The distance between the parallel sides is 30 m. Find the cost of levelling it at the rate of ₹ 135 per sq. m.

Sol : Parallel sides of the trapezium $a = 42$ m ; $b = 36$ m

Also height $h = 30$ m

$$\text{Area of the trapezium} = \frac{1}{2}\times h \times (a+b) \text{ sq. unit}$$
$$= \frac{1}{2}\times 30 \times (42+36) \text{ m}^2$$

$$= \frac{1}{\cancel{2}_1} \times 30 \times \cancel{78}^{39} \text{ m}^2$$

1170
135
5850
3510
1170
1,57,950

Area = 1,170 m^2

Cost of levelling 1 m^2 = ₹ 135

∴ Cost of levelling 1170 m^2 = ₹ 1170 × 135 = ₹ 1,57,950

Cost of levelling the ground = ₹ 1,57,950

Challenge Problems

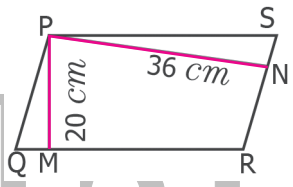
7. In a parallelogram PQRS (See the diagram) PM and PN are the heights corresponding to the sides QR and RS respectively. If the area of the parallelogram is 900 sq. cm and the length of PM and PN are 20 cm and 36 cm respectively, find the length of the sides QR and SR.

Sol : Considering QR as base of the parallelogram height h_1 = 20 cm

Area of the parallelogram = 900 cm^2

$b_1 \times h_1 = 900$; $b_1 \times 20 = 900$

$$b_1 = \frac{\cancel{900}^{45}}{\cancel{20}} = 45 \text{ cm}$$



Again considering SR as base

height = 36 cm ; Area = 900 cm^2

$b_2 \times h_2 = 900$; $b_2 \times 36 = 900$

$$b_2 = \frac{900}{36}$$

b_2 = 25 cm

SR = 25 cm ; QR = 45 cm ; SR = 25 cm

8. If the base and height of a parallelogram are in the ratio 7:3 and the height is 45 cm, then fixed the area of the parallelogram.

Sol :

Given base ; height = 7:3

Let base = $7x$ cm

height = $3x$ cm

also given height = 45 cm

$3x$ = 45 cm

$x = \frac{45}{3} = 15$

Now base = $7x$ cm = 7 × 15 cm = 105 cm

Area of the parallelogram = $b \times h$ sq. unit

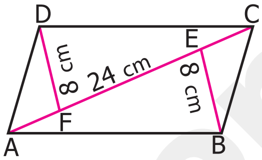
= 105 × 45 = 4725 cm^2

Area of the parallelogram = 4725 cm^2

9. Find the area of the parallelogram ABCD if AC is 24 cm and BE = DF = 8 cm.

Sol : Area of the parallelogram ABCD = Area of the triangle ABC + Area of the triangle ADC

Area of the triangle $= \frac{1}{2} \times$ (base × height) sq. units

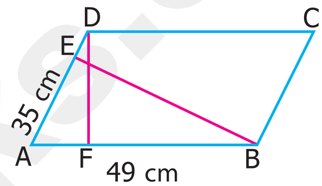


Area of ΔABC $= \frac{1}{\not{2}} \times \overset{12}{\not{24}} \times 8\ cm^2 = 96\ cm^2$

Area of ΔADC $= \frac{1}{\not{2}} \times \overset{12}{\not{24}} \times 8\ cm^2 = 96\ cm^2$

Area of the parallelogram ABCD = 96 + 96 = 192 cm^2

10. The area of the parallelogram ABCD is 1470 sq. cm. If AB = 49 cm and AD = 35 cm then, find the height, DF and BE.



Sol : Area of the parallelogram = 1470 sq. cm

Considering AB = base = 49 cm

height = DF

Area = base × height

49 × DF = 1470

$DF = \frac{1470}{49}$ $\qquad \frac{\not{1470}\ \not{210}\ 30}{\not{49}\ \not{7}\ 1}$

DF = 30 cm

Now considering AD as base

Base = AD = 35 cm ; height = BE

Base × Height = 1470

$35 \times BE = 1470$; $BE = \frac{1470}{35}$ $\qquad \frac{\not{1470}\ \not{210}\ 42}{\not{35}\ \not{5}\ 1}$

BE = 42 cm ; DF = 30 cm ; BE = 42 cm

11. One of the diagonals of a rhombus is thrice as the other. If the sum of the length of the diagonals is 24 cm, then find the area of the rhombus.

Sol : Let one of the diagonals of rhombus be 'd_1' cm and the other be d_2 cm.

Give $d_1 = 3 \times d_2$

Also $d_1 + d_2 = 24$ cm

$\Rightarrow 3d_2 + d_2 = 24$

$4d_2 = 24$

$d_2 = \frac{\overset{6}{\not{24}}}{\not{4}}$

$d_2 = 6$ cm

$d_1 = 3 \times d_2 = 3 \times 6$

$d_1 = 18$ cm

∴ Area of the rhombus $= \frac{1}{2} \times d_1 \times d_2$ sq. units

$= \frac{1}{2} \times 18 \times 6\ cm^2 = 54\ cm^2$

Area of the rhombus $= 54\ cm^2$

12. A man has to build a rhombus shaped swimming pool. One of the diagonal is 13 m and the other is twice the first one. Then find the area of the swimming pool and also find the cost of cementing the floor at the rate of ₹ 15 per sq. cm.

Sol :

Let the first diagonal d_1 = 13 m

d_2 = 2 × 13 m = 26 m

Area of the rhombus = $\frac{1}{2} \times d_1 \times d_2$ sq. units

= $\frac{1}{\cancel{2}} \times 13 \times \cancel{26}^{13}$ m^2 = 169 m^2

Cost of cementing 1 m^2 = ₹15

Cost of cementing 169 m^2 = ₹ 169 × 15 = ₹ 2,535

Cost of cementing = ₹ 2,535

13. Find the height of the parallelogram whose base is four times the height and whose area is 576 sq. cm.

Sol : Let the height be 'h' and base be 'b' units

Given b = $4 \times h$

Area of the parallelogram = 576 sq. cm

$b \times h$ = 576

$4h \times h$ = 576

$h \times h$ = $\frac{576}{4}$ = 144

$h \times h$ = 12×12

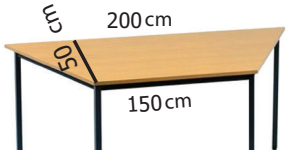
h = 12 cm

$\cancel{576}^{144}$ / $\cancel{4}1_1$

Height = 12 cm; base = 4 × 12 = 48 cm

14. The table top is in the shape of a trapezium with measurements given in the figure. Find the cost of the glass used to cover the table at the rate of ₹ 6 per 10 sq. cm.

Sol :



Length of the parallel sides a = 200 cm

b = 150 cm

Height h = 50 cm

Area of the trapezium = $\frac{1}{2} \times h\,(a + b)$ sq. units

= $\frac{1}{2} \times 50\ (200 + 150)$ cm^2

= $\frac{1}{2} \times 50 \times 350$ cm^2 = 8750 cm^2

Cost for 10 sq. cm glass = ₹ 68

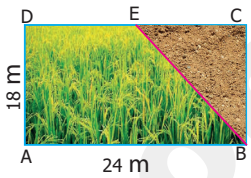
∴ Cost of 8750 cm^2 glass = $\frac{8750}{10} \times 6$

= ₹ 5250

Cost of glass used = ₹ 5,250

15. Arivu has a land ABCD with the measurements given in the figure. If a portion ABED is used for cultivation (where E is the midpoint of DC). Find the cultivated area.

Sol : From the figure given ABED is a trapazium with height



h = 18 m

One of the parallel side a = 24 m

Since E is the midpoint of D.

Other parallel side b = $\frac{24}{2}$ = 12 m

$\therefore$ Area of the cultivated ADEB = $\frac{1}{2} \times h(a+b)\ m^2$ = $\frac{1}{\cancel{2}} \times \overset{9}{\cancel{18}}(24+12)$

= $9 \times 36\ m^2 = 324\ m^2$

Area of cultivation = $324\ m^2$

Unit Test

Time: 1 hrs **Section A** **Max Marks : 25**

I. Choose the best answer from the options given below. **5 × 1 = 5**

1. The height of the parallelogram whose area is 246 cm^2 and base 20 cm.
(a) 1.23 cm (b) 13.2 cm (c) 12.3 cm (d) 1.32 cm

2. Area of the trapezium with height 10 cm, top 4 cm and bottom 6 cm is
(a) 40 cm^2 (b) 50 cm^2 (c) 35 cm^2 (d) 20 cm^2

3. If the parallel sides of a parallelogram are 2 cm apart and their sum is 10 cm, then its area is
(a) 20 cm^2 (b) 5 cm^2 (c) 10 cm^2 (d) none

4. If length = 4 cm and height is 3 cm area of the parallelogram is
(a) 14 cm^2 (b) 7 cm^2 (c) 10 cm^2 (d) 12 cm^2

5. Find the height if area of the parallelogram is 564 cm^2 and its base is 30 cm.
(a) 56.4 cm^2 (b) 94 cm^2 (c) 18.8 cm^2 (d) 188 cm^2

II. Fill in the blanks. **5 × 1 = 5**

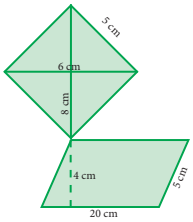
6. A parallelogram with one pair of _____ is known as a trapezium.
7. The distance between the parallel sides is _____ of the trapezium.
8. If the non parallel sides are equal then it is an _____ trapezium.
9. The diagonals of the rhombus divide it into four _____ of equal area.
10. In rhombus the diagonal bisect each other at _____.

III. Answer the following question **5 × 2 = 10**

11. The area of a trapezium is 960 cm^2. If the parallel sides are 34 cm and 46 cm find the distance between them.
12. Find the area of trapezium whose parallel sides are 10 cm and 15 cm and are at a distance of 6 cm from each other.
13. Find the sum of the lengths of the bases of a trapezium whose area is 4.2 m^2 and whose height is 280 cm.
14. Given the base is 15 cm, height is 8 cm, other parallel side is 9 cm. Find the area.
15. Find the area of the trapezium, whose parallel sides are 16 cm, and 22 cm and height is 12 cm.

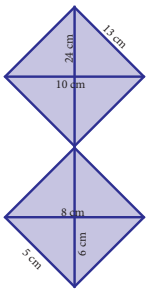
IV. Answer the following question $1 \times 5 = 5$

16. (a) Find the area and perimeter of the following.



(or)

(b) Find the area and perimeter of the following.



Unit 2

ANSWERS

1. (a) 12.3 cm
2. (b) 50 cm^2
3. (c) 10 cm^2
4. (d) 12 cm^2
5. (c) 18.8 cm^2

II.
6. non parallel sides
7. height
8. isoceles
9. right angled triangles
10. right angle

III.
11. 24 cm
12. 75 cm^2
13. 3 m
14. 96 cm^2
15. 2.28 cm

IV.
16. (a) 10.4 cm^2, 70 cm
(b) 144 cm^2, 72 cm

CHAPTER 3

ALGEBRA

IMPORTANT POINTS

VARIABLE AND CONSTANT :

- A variable takes different values which is represented by $x, y, z, \ldots$
- Constant has numerical values such as 31, –7, $\frac{3}{10}$ etc.
- Algebraic statements are also known as algebraic expressions.

TERMS AND COEFFICIENTS

- Variables and constants are combined by the operations addition and subtraction to construct an algebraic expression.

  Eg: In the algebraic expression $6x + 1$
  $6x$ and 1 are **terms**
  The term $6x$ is **variable term** and the term 1 is the **constant term.**
  In the term $6x$, 6 and x are **factors**

- A term may be
  (i) a constant such as 8, –11, 7, ...
  (ii) a variable such as $p, y, x, \ldots$
  (iii) a product of two or more variables such as $xy, pq, abc, \ldots$
  (iv) a product of constant and a variable/variables such as $5x, -7pq, 3abc, \ldots$

POLYNOMIALS

- An algebraic expression with one term is called a monomial.

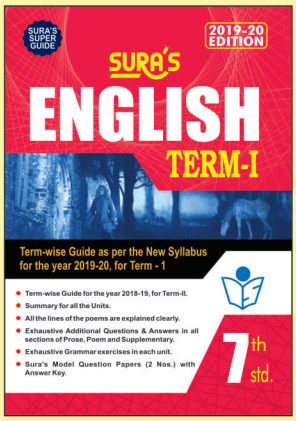
  Eg: $2x$
- An expression with two terms is called a **binomial** Eg: $2x + 3y$.
- An expression with three terms is a **trinomial.**

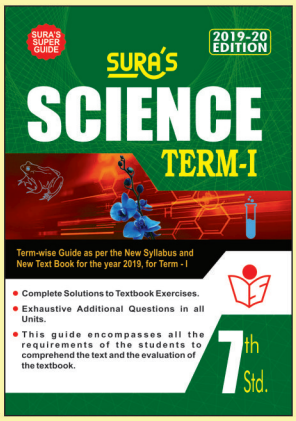
  Eg: $2x + 3y + 4z$.
- An expression with one or more terms is called a **Polynomial** i.e. All the above expressions are polynomials.
- A **term** of an algebraic expression is a product of factors.
- Each factor or product of factors is called the **co-efficient** of the remaining product of factors.

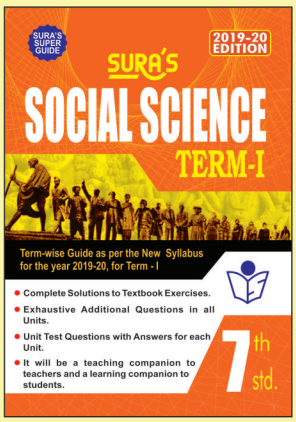
  Eg: In the term $5xy$, 5 is the co-efficient of the remaining factor product xy. Similarly x is the co-efficient of $5y$.
- The constant 5 is called the **numerical co-efficient.**
- A co-efficient can either be a numerical factor or an algebraic factor or product of both.
- If no numerical co-efficient appears in the term, then the co-efficient is understood to be 1.

Our other Guides for 7th Std.

T2-9-T







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