



# Mathematics

## 7<sup>th</sup> STANDARD

FULL  
YEAR  
GUIDE


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TERM II

TERM III

Based on the Updated New Textbook

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## NOTE FROM PUBLISHER

It gives me great pride and pleasure in bringing to you **Sura's Mathematics Guide** for **7<sup>th</sup> Standard [Term-I+II+III]**. It is prepared as per the updated Textbook.

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 Tests with Answers.

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.**  
- Publisher  
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*All the Best*

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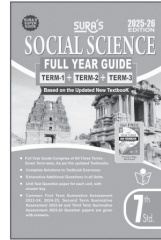
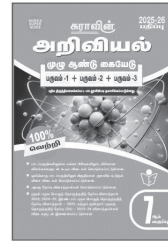
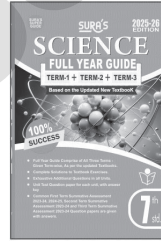
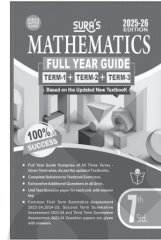
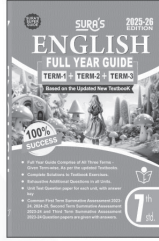
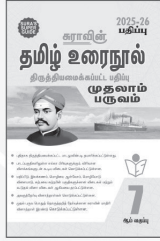
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# TERM



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## 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.

### 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  $a, b$ ;  $a - b \neq b - a$ .  $\therefore$  Commutative property does not hold for subtraction of integers.

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

$$(-1) - (3) = -1 + (-3) = -4$$

$$3 - (-1) \neq (-1) - 3$$

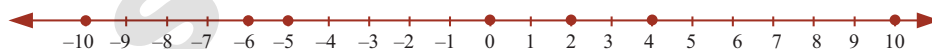


### TRY THESE

(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.

$\therefore$  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.

$\therefore$   $-17$  will be on the extreme left.

3. Complete the following pattern:

\_\_\_\_,  $-40$ , \_\_\_\_, \_\_\_\_,  $-10$ ,  $0$ , \_\_\_\_,  $20$ ,  $30$ , \_\_\_\_,  $50$ .

**Sol :** The difference between the consecutive number is  $10$ .

So the pattern is  $-50$ ,  $-40$ ,  $-30$ ,  $-20$ ,  $-10$ ,  $0$ ,  $10$ ,  $20$ ,  $30$ ,  $40$ ,  $50$



4. Compare the given numbers and write “<”, “>” or “=” in the boxes.

- (a)  $65 \square -65$  (b)  $0 \square 1000$  (c)  $-2018 \square -2018$

**Sol :** (a)  $65 \square > -65$ , A positive number is greater than a negative number.

(b)  $0 \square < 1000$ , 0 is less than all positive integers.

(c)  $-2018 \square = -2018$

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.

$\therefore$  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)  $(+4) + (-3)$

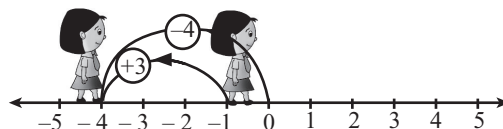
**Sol :** (i)  $(-4) + (+3)$

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  $(-4) + (+3) = -1$



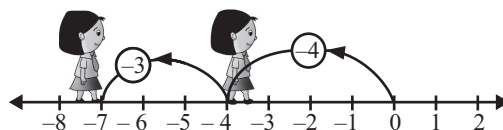
(ii)  $(-4) + (-3)$

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  $(-4) + (-3) = -7$



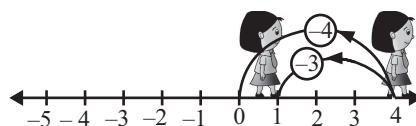
(iii)  $(+4) + (-3)$

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 :**  $\therefore$  The sum of two integers is an integer.

**TRY THESE**

(Text book Page No. 7)

1. Fill in the blanks:

- (i)  $20 + (-11) = - (11) + 20$  [ $\because$  Addition is commutative]  
 (ii)  $(-5) + (-8) = (-8) + (-5)$  [ $\because$  Addition is commutative]  
 (iii)  $(-3) + 12 = 12 + (-3)$  [ $\because$  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  $-5$ .

$\therefore [(-2) + (-9)] + 6 = (-2) + [(-9) + 6]$

- (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  $-6$ .

$\therefore [7 + (-8)] + (-5) = 7 + [(-8) + (-5)]$

- (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  $-20$ .

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

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

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

$$\text{Also } [(-5) + (-32)] + (-2) = (-37) + (-2) = -39$$

In both the cases the sum is  $-39$ .

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

#### 4. Find the missing integers:

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

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

$$(iii) \underline{\text{Any Integer}} + 0 = \underline{\text{same integer}}$$

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

#### 5. Complete the following:

$$(i) -603 + 603 = \underline{0} \quad (ii) 9847 + (-9847) = \underline{0}$$

$$(iii) 1652 + \underline{(-1652)} = 0 \quad (iv) -777 + \underline{777} = 0$$

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

### EXERCISE 1.1

#### 1. Fill in the blanks:

$$(i) (-30) + \underline{\quad} = 60$$

[Ans: 90]

$$(ii) (-5) + \underline{\quad} = -100$$

[Ans: -95]

$$(iii) (-52) + (-52) = \underline{\quad}$$

[Ans: -104]

$$(iv) \underline{\quad} + (-22) = 0$$

[Ans: 22]

$$(v) \underline{\quad} + (-70) = 70$$

[Ans: 140]

$$(vi) 20 + 80 + \underline{\quad} = 0$$

[Ans: -100]

$$(vii) 75 + (-25) = \underline{\quad}$$

[Ans: 50]

$$(viii) 171 + \underline{\quad} = 0$$

[Ans: -171]

$$(ix) [(-3) + (-12)] + (-77) = \underline{\quad} + [(-12) + (-77)]$$

[Ans: -3]

$$(x) (-42) + [\underline{\quad} + (-23)] = [\underline{\quad} + 15] + \underline{\quad}$$

[Ans: +15; -42; -23]

#### 2. Say True or False.

$$(i) \text{ The additive inverse of } (-32) \text{ is } -32$$

[Ans: False]

$$(ii) (-90) + (-30) = 60$$

[Ans: False]

$$(iii) (-125) + 25 = -100$$

[Ans: True]

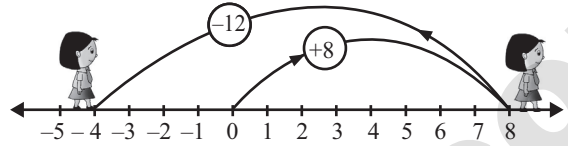
**3. Add the following.**

(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.

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

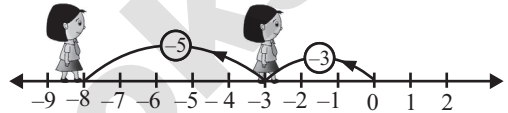


(ii) (-3) and (-5) using number line.

**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)  $(-100) + (-10)$ 

$$\text{Sol : } (-100) + (-10) = -100 - 10 = -110$$

(iv)  $20 + (-72)$ 

$$\text{Sol : } 20 + (-72) = 20 - 72 = -52$$

(v)  $82 + (-75)$ 

$$\text{Sol : } 82 + (-75) = 82 - 75 = 7$$

(vi)  $-48 + (-15)$ 

$$\text{Sol : } -48 + (-15) = -48 - 15 = -63$$

(vii)  $-225 + (-63)$ 

$$\text{Sol : } -225 + (-63) = -225 - 63 = -288$$

**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  $(11 + 7) + 10 = 18 + 10 = 28$

$$\text{Now } 11 + (7 + 10) = 11 + 17 = 28$$

In both the cases the sum is 28.  $\therefore (11 + 7) + 10 = 11 + (7 + 10)$

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

**7. Find 5 pairs of integers that add upto 2.**

**Sol :**  $0 + 2 = 2$

$$1 + 1 = 2$$

$$-1 + 3 = 2$$

$$-2 + 4 = 2$$

$$-3 + 5 = 2 \text{ (and many more.)}$$

### OBJECTIVE TYPE QUESTIONS

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

(i) 12 mid night

(ii) 12 noon

(iii) 10 am

(iv) 10 pm

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

**Sol :** Temperature at 12 noon  $= 18^\circ$  above zero  $= +18^\circ$

Rate of decrease per hour  $= -3^\circ$

Temperature  $12^\circ$  below zero  $= -12^\circ$

( $\because -12$  is 30 units to the left of  $+18^\circ$ )

$$\text{Time at which it reach } -12^\circ = \frac{30}{3} = 10 \text{ h}$$

( $\because$  10 hrs after 12 noon  $=$  10 pm)

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

(i)  $-9 + (-5) + 6$

(ii)  $18 + (-12) - 6$

(iii)  $-4 + 2 + 10$

(iv)  $10 + (-4) + 8$

**Sol :** (i)  $-9 + (-5) + 6 = -14 + 6 = -8$

(ii)  $18 + (-12) - 6 = -6 - 6 = 0$

(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  $102^{\circ}\text{F}$ . Two hours later it was  $3^{\circ}$  lower, what was her temperature then?

**Sol :** Initially Malar's temperature =  $102^{\circ}\text{F}$   
 After two hours it lowered  $3^{\circ} \Rightarrow -3^{\circ}\text{F}$   
 $\therefore$  Here present temperature =  $102^{\circ} + (-3^{\circ}) = 99^{\circ}\text{F}$

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  $\Rightarrow (-11) = 20 + (-11) = 9\text{th floor}$   
 If it goes up 5 floor  $\Rightarrow 9 + 5 = 14\text{th floor}$

3.  $16 + \underline{\quad} = 16$ . 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  $-7$ .

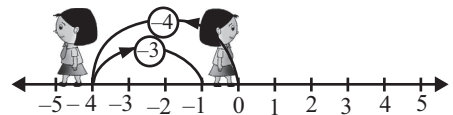
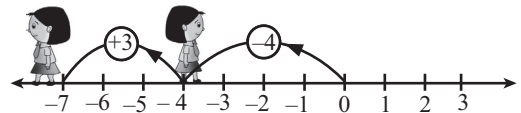
$\therefore (-4) - (+3) = -7$ .

(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  $-1$ .

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



2. Find the values and compare the answers.

(i)  $(-6) - (-2)$  and  $(-6) + 2$

**Sol :**  $(-6) - (-2) = -6 + (\text{Additive inverse of } -2)$   
 $= -6 + (+2) = -4$

Also  $(-6) + 2 = -4$

$\therefore (-6) - (-2) \boxed{=} (-6) + 2$

(ii)  $35 - (-7)$  and  $35 + 7$ .

**Sol :**  $35 - (-7) = 35 + (\text{Additive inverse of } -7) = 35 + (+7) = 42$   
 Also  $35 + 7 = 42 \Rightarrow 35 - (-7) = 35 + 7$

(iii)  $26 - (+10)$  and  $26 + (-10)$ 

**Sol :**  $26 - (+10) = 26 + (\text{Additive inverse of } +10) = 26 + (-10) = 16$   
 Also  $26 + (-10) = 16 \Rightarrow 26 - (+10) = 26 + (-10)$

**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 :**  $-70 + 50 = -20$  &  $-70 - 50 = -120$ (iv)  $100 - (+100)$    $100 - (-100)$ **Sol :**  $100 - (+100) = 0$  &  $100 - (-100) = 100 + (+100) = 200$ (v)  $-50 - 30$    $-100 + 20$ **Sol :**  $-50 - 30 = -80$  &  $-50 + (-30) = -80$ Also  $-100 + 20 = -80$ **TRY THESE**

(Text book Page No. 14)

**1. Fill in the blanks.**(i)  $(-7) - (-15)$    $= +8$   $-7 - (-15) = -7 + (\text{Additive inverse of } -15)$   
 $= -7 + 15 = +8$ (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  $1 - (2-3) = 1 - (-1) = 1 + 1 = 2$  $\therefore (1-2) - 3 \neq 1 - (2-3)$  $\therefore$  Associative property is not true for subtraction of integers.



## EXERCISE 1.2

## 1. Fill in the blanks.

(i)  $-44 + \underline{\hspace{1cm}} = -88$

[Ans: -44]

(ii)  $\underline{\hspace{1cm}} - 75 = -45$

[Ans: 30]

(iii)  $\underline{\hspace{1cm}} - (+50) = -80$

[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]

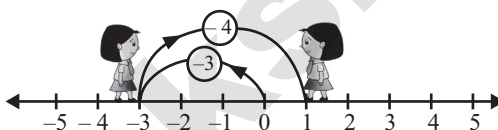
## 3. Find the value of the following.

(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 Karthik. 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 Karthik = 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  $= 0 - 5 + 10 = -5 + 10$

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

6. When Kala woke up, her body temperature was  $102^{\circ}\text{F}$ . She took medicine for fever. After 2 hours it was  $2^{\circ}\text{F}$  lower. What was her temperature then?

**Sol :** Kala's temperature initially  $= 102^{\circ}\text{F}$

After two hours the temperature decreased  $= -2^{\circ}\text{F}$

Now the final temperature  $= 102^{\circ}\text{F} - 2^{\circ}\text{F} = 100^{\circ}\text{F}$

7. What number should be added to  $(-17)$  to get  $-19$ ?

**Sol :** According to the problem  $= -17 + \text{A number} = -19$

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

$-47 - (-12) = -47 + (\text{Additive inverse of } -12) = -47 + (+12) = -35$

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.  $(-100) - 0 + 100 = \underline{\hspace{2cm}}$

(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  $90^{\circ}\text{F}$  and the low temperature was  $-2^{\circ}\text{F}$ . Find the difference between the high and the low temperatures?

**Sol :** The high temperature recorded =  $90^{\circ}\text{F}$   
 The low temperature recorded =  $-2^{\circ}\text{F}$   
 Difference =  $90^{\circ}\text{F} - (-2^{\circ}\text{F})$   
 $= 90^{\circ}\text{F} + (\text{Additive inverse of } -2^{\circ}\text{F})$   
 $= 90^{\circ}\text{F} + (+2^{\circ}\text{F}) = 92^{\circ}\text{F}$

### MULTIPLICATION OF INTEGERS



#### TRY THESE

(Text book Page No. 16)

1. Find the product of the following

(i)  $(-20) \times (-45) = \underline{+900}$  [As we know the product of two negative integers is positive, the answer is +900.]

(ii)  $(-9) \times (-8) = \underline{72}$  [ $\because$  Product of two negative integers is positive]

(iii)  $(-30) \times 40 \times (-1) = \underline{+1200}$  [Product of two integers with opposite signs is negative integer.

$$(-30) \times 40 \times (-1) = (-1200) \times (-1) = +1200]$$

(iv)  $(+50) \times 2 \times (-10) = \underline{-1000}$  [Product of two integers with opposite signs is negative.

$$(+50) \times 2 \times (-10) = 100 \times (-10) = -1000]$$

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.

$\therefore$  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 are incorrect?

- (i)  $(-55) \times (-22) \times (-33) < 0$       (ii)  $(-1521) \times 2511 < 0$   
 (iii)  $2512 - 1252 < 0$       (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)  $4 \times 51$  and  $51 \times 4$

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



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

**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:**

$$(i) \quad (-6) \times (4 + (-5)) \text{ and } ((-6) \times 4) + ((-6) \times (-5))$$

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

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

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

$$(ii) \quad (-3) \times [2 + (-8)] \text{ and } [(-3) \times 2] + [(-3) \times 8]$$

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

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

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

**2. Prove the following.**

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

**Sol :**  $LHS = (-5) \times [(-76) + 8] = (-5) \times (-68)$   
 $= +340$

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

$$= +380 + (-40) = +380 - 40 = +340$$

$$LHS = RHS$$

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

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

**Sol :**  $LHS = 42 \times [7 + (-3)] = 168$

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

$$= 168$$

$$LHS = RHS$$

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

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

**Sol :**  $LHS = (-3) \times [(-4) + (-5)] = (-3) \times (-9)$   
 $= +27$

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

$$LHS = RHS$$

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





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

**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)  $-80 \times \underline{\quad} = -80$

[Ans: 1]

(ii)  $(-10) \times \underline{\quad} = 20$

[Ans: -2]

(iii)  $100 \times \underline{\quad} = -500$

[Ans: -5]

(iv)  $\underline{\quad} \times (-9) = -45$

[Ans: 5]

(v)  $\underline{\quad} \times 75 = 0$

$\otimes$  [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 integer.

(ii) 29 times of negative integer.

**Sol :** (i) 16 is an even integer.

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

$\therefore$  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.

$\therefore$  29 times negative integers is a negative integer.

#### 4. Find the product of

(i)  $(-35) \times 22$

**Sol :**  $-35 \times 22 = -770$

(ii)  $(-10) \times 12 \times (-9) \otimes$

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

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

**Sol :**  $(-9) \times (-8) \times (-7) \times (-6) = (+72) \times (-7) \times (-6)$   
 $= (-504) \times (-6) = +3024$



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

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

(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 =  $6 \times 2 = 12$  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.

Possible pairs of integers that gives product -50:

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

$$\begin{array}{r} 2 \overline{) 50} \\ 5 \overline{) 25} \\ 5 \end{array}$$

**OBJECTIVE TYPE QUESTIONS****8. Which of the following expressions is equal to -30?**

(i)  $-20 - (-5 \times 2)$

(ii)  $(6 \times 10) - (6 \times 5)$

(iii)  $(2 \times 5) + (4 \times 5)$

(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:  $(5 \times 2) + (5 \times 5) = 5 \times (2 + 5)$    
 (i) commutative (ii) closure  
 (iii) distributive (iv) associative [Ans : (iii) distributive]
10.  $11 \times (-1) = \underline{\hspace{2cm}}$   
 (i) -1 (ii) 0 (iii) +1 (iv) -11  
 [Ans : (iv) -11]
11.  $(-12) \times (-9) = \underline{\hspace{2cm}}$   
 (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  $(5 \times 4) + 5$  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)  $(-32) \div 4 = \underline{\hspace{2cm}}$  [Ans: -8]  
 (ii)  $(-50) \div 50 = \underline{\hspace{2cm}}$  [Ans: -1]  
 (iii)  $30 \div 15 = \underline{\hspace{2cm}}$  [Ans: 2]  
 (iv)  $-200 \div 10 = \underline{\hspace{2cm}}$  [Ans: -20]  
 (v)  $-48 \div 6 = \underline{\hspace{2cm}}$  [Ans: -8]

### EXERCISE 1.4

1. Fill in the blanks.  
 (i)  $(-40) \div \underline{\hspace{2cm}} = 40$  [Ans: -1]  
 (ii)  $25 \div \underline{\hspace{2cm}} = -5$  [Ans: -5]  
 (iii)  $\underline{\hspace{2cm}} \div (-4) = 9$  [Ans: -36]  
 (iv)  $(-62) \div (-62) = \underline{\hspace{2cm}}$  [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

$\therefore -15 \times \text{Another number} = -135$

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

$\therefore$  The other number = 9.

**5. In 8 hours duration, with uniform decrease in temperature, the temperature dropped  $24^\circ$ . 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 =  $\frac{24}{8} = 3^\circ$

The temperature dropped  $3^\circ$  every hour.**6. An elevator descends into a mine shaft at the rate of 5 m/sec. 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 =  $15 - (250) \text{ m} = 15 - (250) \text{ m} = 235 \text{ m}$

Time taken to descend 5 m = 1 sec

$\therefore$  Time required to descend 235 m =  $\frac{235 \text{ m}}{5 \text{ m}} = 47 \text{ sec.}$

**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

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

$\therefore$  160 calories lost per day.



8. Given  $168 \times 32 = 5376$  then find  $(-5376) \div (-32)$ .

**Sol :** Given  $168 \times 32 = 5376$

$$\therefore \frac{5376}{32} = 168$$

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

9. How many  $(-4)$ 's are there in  $(-20)$ ? **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)  $0 \div (-7)$  (ii)  $20 \div (-4)$  (iii)  $(-9) \div 3$  (iv)  $(12) \div 5$

[Ans: (iv)  $12 \div 5$ ]

12.  $(-16) \div 4$  is the same as

(i)  $-(-16 \div 4)$  (ii)  $(-16) \div (-4)$  (iii)  $16 \div (-4)$  (iv)  $-4 \div 16$

[Ans: (iii)  $16 \div (-4)$ ]

13.  $(-200) \div 10$  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  $-5^{\circ}\text{C}$ . Next day the temperature is  $9^{\circ}\text{C}$ . What is the increase in temperature?

**Sol :** Temperature in the first day =  $-5^{\circ}\text{C}$

Temperature in the next day =  $9^{\circ}\text{C}$

$$\therefore \text{Increase in temperature} = 9^{\circ}\text{C} - (-5^{\circ}\text{C}) \\ = 9^{\circ}\text{C} + (+5^{\circ}\text{C}) = 14^{\circ}\text{C}$$

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 out. Now determine the net charge:

(i) 5 electrons and 3 protons  $\rightarrow -5 + 3 = -2$  that is 2 electrons  $\ominus\ominus$

(ii) 6 protons and 6 electrons  $\rightarrow$

(iii) 9 protons and 12 electrons  $\rightarrow$

(iv) 4 protons and 8 electrons  $\rightarrow$

(v) 7 protons and 6 electrons  $\rightarrow$



- Sol :** (ii) 6 protons and 6 electrons  $\rightarrow (+6) + (-6) = 0$   
 (iii) 9 protons and 12 electrons  $\rightarrow (+9) + (-12) = 9 - 12 = -3 \Rightarrow 3$  electrons  
 $\ominus \ominus \ominus$   
 (iv) 4 protons and 8 electrons  $\rightarrow (+4) + (-8) = +4 - 8 = -4 \Rightarrow 4$  electrons  
 $\ominus \ominus \ominus \ominus$   
 (v) 7 protons and 6 electrons  $\rightarrow (+7) + (-6) = +1 \Rightarrow 1$  proton  $\oplus$

- 3. Scientists use the Kelvin Scale (K) as an alternative temperature scale to degrees Celsius ( $^{\circ}\text{C}$ ) by the relation  $T^{\circ}\text{C} = (T + 273)\text{K}$ . Convert the following to Kelvin:**

- (i)  $-275^{\circ}\text{C}$       (ii)  $45^{\circ}\text{C}$       (iii)  $-400^{\circ}\text{C}$       (iv)  $-273^{\circ}\text{C}$

- Sol :** (i)  $-275^{\circ}\text{C} = (-275 + 273)\text{K} = -2\text{K}$   
 (ii)  $45^{\circ}\text{C} = (45 + 273)\text{K} = 318\text{K}$   
 (iii)  $-400^{\circ}\text{C} = (-400 + 273)\text{K} = -127\text{K}$   
 (iv)  $-273^{\circ}\text{C} = (-273 + 273)\text{K} = 0\text{K}$ .

- 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 (+)

$\therefore$  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.**

- If Tamil Nambi wrote 5 page per day, how many day's work did he lose?
- If four pages contained 1800 characters, (letters) how many characters were lost?
- If Tamil Nambi is paid ₹ 250 for each page produced, how much money did he lose?
- 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?
- Tamizh Nambi pays Kavimann ₹ 100 per page for his help. How much money does Kavimaan receive?

**Sol :** (i)

$$\text{Total pages lost} = 35$$

$$\text{One day work} = 5 \text{ page}$$

$$35 \text{ pages} = \frac{35}{5} = 7 \text{ days work}$$

∴ 7 day's work he lost.

$$(ii) \quad \text{Number of characters in four pages} = 1800$$

$$\text{Number of characters in one page} = \frac{1800}{4} = 450$$

$$\begin{aligned} \therefore \text{Number of characters in 35 pages} &= 450 \times 35 \\ &= 15,750 \text{ characters} \end{aligned}$$

$$(iii) \quad \text{Payment for one page} = ₹ 250$$

$$\therefore \text{Payment for 35 pages} = ₹ 250 \times ₹ 35 = ₹ 8,750$$

$$(iv) \quad \text{Number of pages recreated a day} = 7$$

$$\therefore \text{To recreate 35 pages day's needed} = \frac{35}{7} = 5 \text{ days}$$

$$(v) \quad \text{Payment of Kavimaan} = ₹ 100 \text{ per page}$$

$$\therefore \text{For 35 pages payment} = ₹ 100 \times 35 = ₹ 3,500$$

**6. Add 2 to me. Then multiply by 5 and subtract 10 and divide now 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

$$\text{Profit per apple} = ₹ 8(+)$$

$$\therefore \text{Profit for 30 apples} = 30 \times 8 = ₹ 240$$



$$\text{Number of pomegranates sold} = 50$$

$$\text{Loss per pomegranate} = ₹ 5(-)$$

$$\text{Loss on selling 50 pomegranates} = 50 \times (-5) = ₹ -250$$

$$\text{Overall loss} = -250 + 240 = ₹ -10$$

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 :**

$$\text{Water level fall per week} = -3 \text{ inches}$$

$$\therefore \text{Water level decrease for 6 weeks} = 6 \times (-3) = -18 \text{ inches}$$

$$\therefore \text{Decrease of 18 inches of water level.}$$

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)

$$\text{Life time} = -483 - (-563) = -483 + 563 = +80$$

Buddha's life time = 80 years.



## EXERCISE 1.6

### Miscellaneous Practice problems

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

**Sol :**  $(-1) + \text{a number} = 10$

$$\therefore \text{The number} = 10 + 1 = 11$$

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

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

$$\text{RHS} = \square - 10 \Rightarrow \square = -50 + 10 = -40$$

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

3. Subtract 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  $(-30) \times (-70) \times 15$ .**

**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 withdrew ₹ 500 in March.

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

$$\text{Total deposits upto March} = ₹ 5000 + ₹ 2000 + ₹ 1000 = ₹ 8000$$

$$\text{Amount withdrawn: February : ₹ 700 (-)}$$

$$\text{March : ₹ 500 (-)}$$

$$\therefore \text{Total amount withdrawn} = (-700) + (-500) = ₹ -1200$$

$$\text{Net bank balance} = ₹ 8000 - ₹ 1200 = ₹ 6800$$

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.

$$\text{Price of } x \text{ in 2018} = ₹ 50 ; \text{Price of } x \text{ in 2019} = ₹ 50 + ₹ 10 = ₹ 60$$

$$\text{Price of } x \text{ in 2020} = ₹ 60 + ₹ 10 = ₹ 70$$

$$\text{Amount decreases for } y \text{ per year} = ₹ 15$$

$$\text{Price of } y \text{ in 2018} = ₹ 90$$

$$\text{Price of } y \text{ in 2019} = ₹ 90 - ₹ 15 = ₹ 75$$

$$\text{Price of } y \text{ in 2020} = ₹ 75 - ₹ 15 = ₹ 60$$

Here  $70 > 60$ .  $\therefore$  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 quotient  $-3$ . 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 :**

$$\begin{aligned} 72 + (-5) - \boxed{?} &= 72 \\ 67 - \boxed{?} &= 72 \\ - \boxed{?} &= 72 - 67 = 5 \\ \boxed{?} &= -5 \\ \therefore 72 + (-5) - \boxed{-5} &= 72 \end{aligned}$$

**16. Can you give 5 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  $(P - Q) \div (P + Q)$ .**



**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  $\rightarrow$  Sum  $\rightarrow 13 + 1 - 6 + 8 = 16$

(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  $\rightarrow 12 + 5 + 5 + 0 + 1 = 23$

(ii) SUCCESS  $\rightarrow (-5) + (-7) + 3 + 3 + 5 + (-5) + (-5)$

$$= -12 + 6 + 5 + (-10) = -6 + 5 + (-10) = (-1) + (-10) = -11$$



- 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 =  $100 \times 10 = 1000$  litres.

After 10 days water left in the tank = 2000 litres

$\therefore$  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.

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

$\therefore$  For 12 bananas loss =  $\text{₹ } 2 \times 12 = \text{₹ } 24$

- 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

$\therefore$  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

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

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

$$y = -9 + 5$$

$$y = -4$$

$$\text{So } 1 + (-10) + x = y + (-3) + (-2)$$

$$-9 + x = (-4) + (-3) + (-2)$$

$$-9 + x = -9$$

$$x = -9 + 9$$



$$x = 0$$

$$\text{Now } x + (-2) + z = (-10) + (-3) + 4$$

$$0 + (-2) + z = (-13) + 4$$

$$-2 + z = -9$$

$$z = -9 + 2 = -7$$

$$z = -7$$

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

### 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)  $(-1650) \times (-2) + (-1650) \times (-98)$

$$= 1650 [(-1) \times (-2) + (-1) \times (-98)] = 1650 (2 + 98) \quad [\text{Distributive property}]$$

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

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

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

$$16,000 > 7009$$

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

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

**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 TEST

Time: 1 hr

Max Marks : 25

**I. Choose the best answer from the options given below.**

$5 \times 1 = 5$

- The additive identity for integers is  
(a) -1 (b) 0  
(c) 1 (d) None of these
- When 5 is multiplied by 0 we get  
(a) 5 (b) -5  
(c) 10 (d) 0
- What is the quotient when zero is divided by a non-zero integer?  
(a) 1 (b) -1  
(c) 0 (d) The integer itself
- 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
- The product of 5 and -3 is  
(a) 0 (b) 15  
(c) -15 (d) 8

**II. Fill in the blanks**

$5 \times 1 = 5$

- The additive inverse of 0 is \_\_\_\_\_
- $300 + (-300) =$  \_\_\_\_\_
- $2 + 0 + (-15) =$  \_\_\_\_\_ + 0 + 2
- $50 \times$  \_\_\_\_\_ = 0
- The product of \_\_\_\_\_ and -1 is -15.

**III. Answer the following question**

$5 \times 2 = 10$

- If the product of two integers is -84. One of them is -6, then what is the other integer?
- Find the product of  $(-1) \times (-1) \times (-2) \times (-2)$
- Use  $>$ ,  $<$  or  $=$  in the boxes.  
(a)  $(-5) + (-3) \square (-5) - (-3)$   
(b)  $(-3) + 7 - (19) \square 15 - 8 + (-9)$

- Write a negative integer and a positive integer whose difference is -4?

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

**IV. Answer the following**

$1 \times 5 = 5$

- (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.**

- (b) 0
- (d) 0
- (c) 0
- (a) closure property
- (c) -15

**II.**

- 0
- 15
- 15
- 0
- 0

**III.**

- 14
- 25, 3
- (a)  $<$  (b)  $<$
- 2, 2

**IV.**

- (a) 1 hour
- (b) (9, -3), (-3, 1), (-18, 6) (6, -2) (-15, 5)

