1. Integers

Learn and Remember

1. Integers. The collection of whole numbers and their negatives.

2. Represent the integers on number line in descending order:

3. Every positive integers is greater than every negative integers.

4. Zero is less than every positive integers and greater than every negative integers.

5. Integers are **closed** under addition, subtraction and **multiplication.**

6. Integers are commutative and associative under addition and multiplication.

i.e., $\quad a + b = b + a$

$\quad a + (b + c) = (a + b) + c$

i.e., $\quad a \times b = b \times a$

$\quad a \times (b \times c) = (a \times b) \times c$ for all integer a, b and c.

7. Distributivity of multiplication over addition and subtraction holds goods for integers,

i.e., $a \times (b + c) = a \times b + a \times c$

$a \times (b - c) = a \times b - a \times c$ for any three integers a, b and c.

8. Zero (0) is **additive identity** of integers i.e., $a + 0 = a$ for any integer a.

9. An integer and its opposite is called **additive inverse** of each other i.e., $a + (- a) = 0$ for any integer a.

10. 1 is **multiplicative identity** of integers i.e., $a \times 1 = a$ for any integer a.

11. Operation perform on integers.

Let a and b be any integers.

S.No.	Case	Integer		Operation	Sign	Condition
		a	b			
1.	Add	Positive	Positive	Addition	Plus (+)	
		Positive	Negative	Subtraction	Plus (+)	$a > b$
					Minus (–)	$b > a$
		Negative	Negative	Addition	Minus (–)	
2.	Subtract	Positive	Positive	Subtraction	Plus (+)	
		Negative	Negative	Addition	Minus (–)	$a > b$
					Plus (+)	$b < a$
3.	Multiply	Positive	Negative	Product	Minus (–)	
		Negative	Negative	Product	Plus (+)	
4.	Divide	Positive	Negative	Division	Minus (–)	
		Negative	Negative	Division	Plus (+)	

12. Product of even number of negative integers is positive, whereas the product of odd number of negative integers is negative.
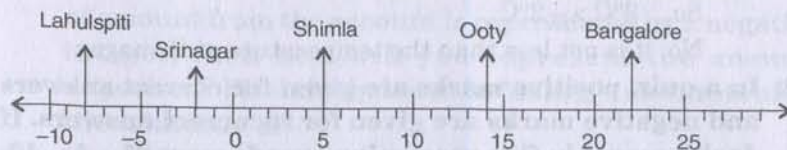
13. For any integer a, we have

(a) $a \div 0$ is not defined.   (b) $a \div 1 = a$.

TEXTBOOK QUESTIONS SOLVED

Exercise 1.1 *(Page No. 4-5)*

Q1. Following number line shows the temperature in degree celsius (°C) at different places on a particular day.

(a) **Observe this number line and write the temperature of the places marked on it.**

(b) **What is the temperature difference between the hottest and the coldest places among the above?**

(c) **What is the temperature difference between Lahulspiti and Srinagar?**

(d) **Can we say temperature of Srinagar and Shimla taken together is less than the temperature at Shimla? Is it also less than the temperature at Srinagar?**

Sol. By observing the number line, answers may be followed as:

(a) The temperature of the places marked on it is:

Places	Temperature
Bangalore	22°C
Ooty	14°C
Shimla	5°C
Srinagar	– 2°C
Lahulspiti	– 8°C

(b) The temperature of the hottest place Bangalore = 22°C.

The temperature of the coldest place Lahulspiti = – 8°C.

Difference = 22°C – (– 8°C) = (22 + 8)°C

        = 30°C

(c) The temperature of Srinagar = – 2°C

and the temperature of Lahulspiti = – 8°C

Difference = – 2°C – (– 8°C) = (– 2 + 8)°C

        = 6°C

(d) The temperature of Srinagar and Shimla

        = 5°C + (– 2)°C = (5 – 2)°C

        = 3°C

And the temperature at Shimla = 5°C

So, 3°C < 5°C.

Thus, we can say temperature of Srinagar and Shimla taken together is less than the temperature at Shimla.

Temperature at Srinagar = – 2°C

So,   3°C > – 2°C

No, it is not less than the temperature at Srinagar.

Q2. In a quiz, positive marks are given for correct answers and negative marks are given for incorrect answers. If Jack's scores in five successive rounds were 25, – 5, – 10, 15 and 10, what was his total at the end?

Sol. Jack's scores in five successive rounds are 25, – 5, – 10, 15 and 10.

Total marks got by Jack = 25 + (– 5) + (– 10) + 15 + 10

$$= 25 – 15 + 25 = 35.$$

Thus, 35 marks are got by Jack in a quiz.

Q3. At Srinagar temperature was – 5°C on Monday and then it dropped by 2°C on Tuesday. What was the temperature of Srinagar on Tuesday? On Wednesday, it rose by 4°C. What was the temperature on this day?

Sol. On Monday, temperature at Srinagar = – 5°C

On Tuesday, temperature dropped = 2°C

Temperature on Tuesday = (– 5°C) – 2°C

$$= (– 5 – 2)°C = – 7°C$$

On Wednesday, temperature rose up = 4°C

Now, temperature on Wednesday = (– 7°C) + 4°C

$$= (– 7 + 4)°C = – 3°C.$$

Thus, temperatures on Tuesday and Wednesday – 7°C and – 3°C respectively.

Q4. A plane is flying at the height of 5000 m above the sea level. At a particular point, it is exactly above a submarine floating 1200 m below the sea level. What is the vertical distance between them?
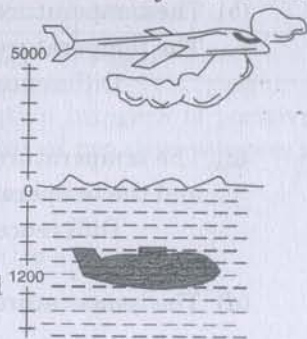
Sol. Height of a plane above the sea level

$$= 5000 \text{ m}$$

Floating a submarine below the sea level

$$= 1200 \text{ m}$$

The vertical distance between the plane and the submarine

$$= 5000 \text{ m} + 1200 \text{ m} = 6200 \text{ m}$$

Thus, the vertical distance between them is 6200 m.

Q5. Mohan deposits ₹ 2,000 in his bank account and withdraws ₹ 1,642 from it, the next day. If withdrawal of amount from the account is represented by a negative integer, then how will you represent the amount deposited? Find the balance in Mohan's accounts after the withdrawal?

Sol. Deposite amount = ₹ 2,000

Withdrawal amount = ₹ 1,642

Balance = Deposited amount – Withdrawal amount

$$= ₹ (2,000 – 1,642) = ₹ 358$$

Thus, the balance in Mohan's account after withdrawal is ₹ 358.

Q6. Rita goes 20 km towards east from a point A to the point B. From B, she moves 30 km towards west along the same road. If the distance towards east is represented by a positive integer then, how will you represent the distance travelled towards west? By which integer will you represent her final position from A?

Sol. West ←————————●——|——●———●————→ East
                              C   O   A   B

According to the number line, Rita move towards east is represented by a positive integer. But she moves in opposite direction means Rita moves west, is represented by a **negative integer.**

Distance from A to B = 20 km

Distance from B to C = 30 km

Distance from A to C = (20 – 30) km = – 10 km.

Thus, Rita is at final position from A to C is – 10 km.

Q7. In a magic square each row, column and diagonal have the same sum. Check which of the following is a magic square.

5	– 1	– 4
– 5	– 2	7
0	3	– 3

(i)

1	– 10	0
– 4	– 3	– 2
– 6	4	– 7

(ii)

Sol. In (i) box

Take row: $5 + (-1) + (-4) = 5 - 5 = 0$

$\qquad\qquad\qquad (-5) + (-2) + 7 = -7 + 7 = 0$

$\qquad\qquad\qquad 0 + 3 + (-3) = 3 - 3 = 0$

Take column: $5 + (-5) + 0 = 5 - 5 = 0$

$\qquad\qquad\qquad (-1) + (-2) + 3 = -3 + 3 = 0$

$\qquad\qquad\qquad (-4) + 7 + (-3) = 7 - 7 = 0$

Take diagonal: $5 + (-2) + (-3) = 5 - 5 = 0$

$\qquad\qquad\qquad (-4) + (-2) + 0 = -6$

In (ii) box

Take row: $1 + (-10) + 0 = 1 - 10 = -9$

$\qquad\qquad\qquad (-4) + (-3) + (-2) = -7 - 2 = -9$

$\qquad\qquad\qquad (-6) + 4 + (-7) = -2 - 7 = -9$

Take column: $1 + (-4) + (-6) = 1 - 10 = -9$

$\qquad\qquad\qquad (-10) + (-3) + 4 = -13 + 4 = -9$

$\qquad\qquad\qquad (0) + (-2) + (-7) = 0 - 9 = -9$

Take diagonal: $1 + (-3) + (-7) = 1 - 10 = -9$

$\qquad\qquad\qquad 0 + (-3) + (-6) = -9.$

(i) box is not a magic square box because all the sums are not equal.

(ii) box is a magic square box because all the sums are equal.

Q8. Verify $a - (-b) = a + b$ for the following values of a and b:

$\qquad$ (i) $a = 21, b = 18$ $\qquad\qquad$ (ii) $a = 118, b = 125$

$\qquad$ (iii) $a = 75, b = 84$ $\qquad\qquad$ (iv) $a = 28, b = 11$

Sol. (i) Given that $a = 21, b = 18$

$\qquad$ We have, $a - (-b) = a + b$

$\qquad$ On putting values in L.H.S. $= a - (-b)$

$\qquad\qquad\qquad\qquad\qquad = 21 - (-18) = 21 + 18 = 39$

$\qquad$ On putting values in R.H.S. $= a + b$

$\qquad\qquad\qquad\qquad\qquad = 21 + 18 = 39$

$\qquad$ Thus, L.H.S. = R.H.S.

(ii) Given that $a = 118, b = 125$

$\qquad$ We have, $a - (-b) = a + b$

$\qquad$ On putting values in L.H.S. $= a - (-b)$

$\qquad\qquad\qquad\qquad\qquad = 118 - (-125) = 118 + 125$

$\qquad\qquad\qquad\qquad\qquad = 243$

$\qquad$ On putting values in R.H.S. $= a + b$

$\qquad\qquad\qquad\qquad\qquad = 118 + 125 = 243$

$\qquad$ Thus, L.H.S. = R.H.S.

(iii) Given that $a = 75, b = 84$

$\qquad$ We have, $a - (-b) = a + b$

$\qquad$ On putting values in L.H.S. $= a - (-b)$

$\qquad\qquad\qquad\qquad\qquad = 75 - (-84) = 75 + 84 = 159$

$\qquad$ On putting values in R.H.S. $= a + b$

$\qquad\qquad\qquad\qquad\qquad = 75 + 84 = 159$

$\qquad$ Thus, L.H.S. = R.H.S.

(iv) Given that $a = 28, b = 11$

$\qquad$ We have, $a - (-b) = a + b$

$\qquad$ On putting values in L.H.S. $= a - (-b)$

$\qquad\qquad\qquad\qquad\qquad = 28 - (-11) = 39$

$\qquad$ On putting values in R.H.S. $= a + b$

$\qquad\qquad\qquad\qquad\qquad = 28 + 11 = 39$

$\qquad$ Thus, L.H.S. = R.H.S. **Hence verified.**

Q9. Use the sign of >, < or = in the box to make the statements true.

$\qquad$ (a) $(-8) + (-4) \boxed{\phantom{<}} (-8) - (-4)$

$\qquad$ (b) $(-3) + 7 - (19) \boxed{\phantom{<}} 15 - 8 + (-9)$

$\qquad$ (c) $23 - 41 + 11 \boxed{\phantom{<}} 23 - 41 - 11$

$\qquad$ (d) $39 + (-24) - (15) \boxed{\phantom{<}} 36 + (-52) - (-36)$

$\qquad$ (e) $(-231) + 79 + 51 \boxed{\phantom{<}} (-399) + 159 + 81.$

Sol. Solving the terms, then comparing:

$\qquad$ (a) $(-8) + (-4) \boxed{\phantom{<}} (-8) - (-4)$

$\qquad\qquad\qquad -8 - 4 \boxed{\phantom{<}} -8 + 4$

$\qquad\qquad\qquad -12 \boxed{<} -4.$

$\qquad$ (b) $(-3) + 7 - (19) \boxed{\phantom{<}} 15 - 8 + (-9)$

$\qquad\qquad\qquad -3 + 7 - 19 \boxed{\phantom{<}} 15 - 8 - 9$

$\qquad\qquad\qquad 4 - 19 \boxed{\phantom{<}} 15 - 17$

$\qquad\qquad\qquad -15 \boxed{<} -2.$

(c) $23 - 41 + 11 \boxed{} 23 - 41 - 11$

$-18 + 11 \boxed{} 23 - 52$

$-7 \boxed{>} -29.$

(d) $39 + (-24) - (15) \boxed{} 36 + (-52) - (-36)$

$39 - 24 - 15 \boxed{} 36 - 52 + 36$

$39 - 39 \boxed{} 36 + (-52) + 36$

$0 \boxed{<} 20.$

(e) $(-231) + 79 + 51 \boxed{} (-399) + 159 + 81$

$-231 + 130 \boxed{} -399 + 240$

$-101 \boxed{>} -159.$

Q10. A water tank has steps inside it. A monkey is sitting on the topmost step (*i.e.*, the first step). The water level is at the ninth step:

(i) He jumps 3 steps down and then jumps back 2 steps up. In how many jumps will he reach the water level?

(ii) After drinking water, he wants to go back. For this, he jumps 4 steps up and then jumps back 2 steps down in every move. In how many jumps will he reach back the top step?

(iii) If the number of steps moved down is represented by negative integers and the number of steps move up by positive integers, represent his moves in part (i) and (ii) by completing the following:

(a) $-3 + 2 - \ldots\ldots = -8$

(b) $4 - 2 + \ldots\ldots = 8.$

In (a) the sum (– 8) represent going down by eight steps. So, what will the sum 8 in (b) represent?

Sol. (i) He jumps 3 steps down and jumps back 2 steps up. Now, following number ray shows the jumps of monkey:
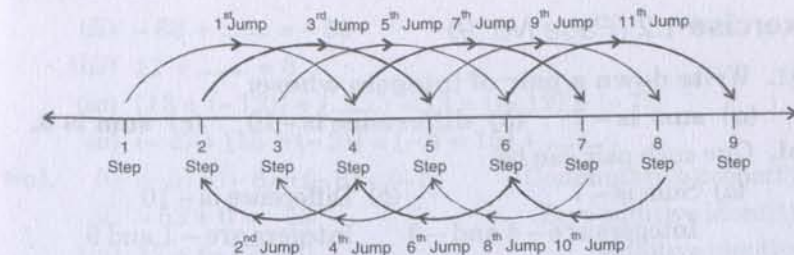
Alternative Method

The monkey wants to reach ninth step. He jumps 3 steps forward and 2 steps backward.

In first jump = $1 + 3 = 4$ step Second jump = $4 - 2 = 2$ step

Third jump = $2 + 3 = 5$ step Fourth jump = $5 - 2 = 3$ step

Fifth jump = $3 + 3 = 6$ step Sixth jump = $6 - 2 = 4$ step

Seventh jump = $4 + 3 = 7$ step Eighth jump = $7 - 2 = 5$ step

Ninth jump = $5 + 3 = 8$ step Tenth jump = $8 - 2 = 6$ step

Eleventh jump = $6 + 3 = 9$ step

He will reach ninth steps in 11 jumps.

Thus, monkey reach on the ninth steps in eleventh jumps.

(ii) He jumps up 4 steps and then jumps down 2 steps. Now, following number ray shows the jumps of monkey:
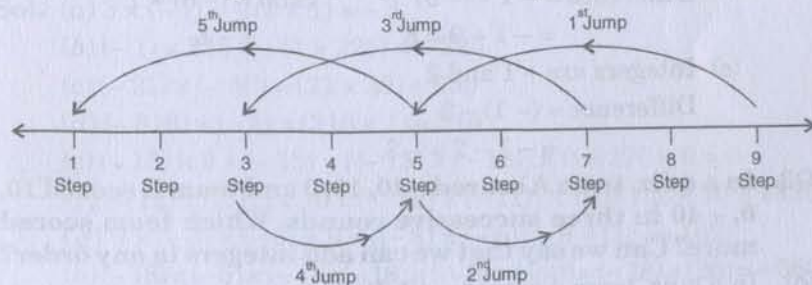
Thus, monkey reach back on the first step in fifth jump.

(iii) (a) $-3 + 2 - 3 + 2 - 3 + 2 - 3 + 2 - 3 + 2 - 3 + 2 - 3 + 2$

$-3 + 2 = -8$

(b) $4 - 2 + 4 - 2 + 4 - 2 + 4 - 2 = 8$

The sum 8 in (b) represents going up by eighth steps.

Exercise 1.2 *(Page No. 9)*

Q1. Write down a pair of integers whose:

　(a) sum is – 7　　**(b) difference is – 10**　　**(c) sum is 0.**

Sol. One such pair can be:

　(a) Sum is – 7　　　　　　　(b) Difference is – 10

　　Integers are – 4 and – 3　　Integers are – 1 and 9

　　Sum = – 4 + (– 3) = – 7.　　Difference = – 1 – 9 = – 1 – 9

　　　　　　　　　　　　　　　　　　　　= – 10.

　(c) Sum is 0

　　Integers are – 1 and 1

　　Sum = – 1 + 1 = 0.

Q2. (a) Write a pair of negative integers whose difference gives 8.

　　(b) Write a negative integer and a positive integer whose sum is – 5.

　　(c) Write a negative integer and a positive integer whose difference is – 3.

Sol. One such pair can be:

　(a) Integers are – 1 and – 9　　(b) Integers are – 6 and 1

　　Difference = – 1 – (– 9)　　　　Sum = (– 6) + 1

　　　　　　= – 1 + 9 = 8.　　　　　　= – 5.

　(c) Integers are – 1 and 2

　　Difference = (– 1) – 2

　　　　　　= – 1 – 2 = – 3.

Q3. In a quiz, team A scored – 40, 10, 0 and team B scored 10, 0, – 40 in three successive rounds. Which team scored more? Can we say that we can add integers in any order?

Sol. In a quiz, team A scored – 40, 10, 0

　Sum = (– 40) + 10 + 0 = – 40 + 10 = – 30.

　Team B scored 10, 0 and – 40

　Sum = 10 + 0 + (– 40) = 10 – 40 = – 30.

　Thus, scores of both teams are same means – 30.

　Yes, we can add integers in any order due to commutative property.

Q4. Fill in the blanks to make the following statements true:

　(i) (– 5) + (– 8) = (– 8) + (.......)

　(ii) – 53 + ... = – 53

　(iii) 17 + ... = 0

　(iv) [13 + (– 12)] + (.......) = 13 + [(– 12) + (– 7)]

　(v) (– 4) + [15 + (– 3)] = [– 4 + 15] + ...

Sol.　(i) (– 5) + (– 8) = (– 8) + (– 5)　　　(Commutative property)

　　(ii) – 53 + 0 = – 53　　　　　　　　(Zero additive identity)

　　(iii) 17 + (– 17) = 0　　　　　　　　　(Additive identity)

　　(iv) [13 + (– 12)] + (– 7) = 13 + [(– 12) + (– 7)]

　　　　　　　　　　　　　　　　　　(Associative property)

　　(v) (– 4) + [15 + (– 3)] = [– 4 + 15] + (– 3).

　　　　　　　　　　　　　　　　　　(Associative property)

Exercise 1.3 *(Page No. 21-22)*

Q1. Find the each of the following products:

　(a) $3 \times (– 1)$　　　　　　　　(b) $(– 1) \times 225$

　(c) $(– 21) \times (– 30)$　　　　　(d) $(– 316) \times (– 1)$

　(e) $(– 15) \times 0 \times (– 18)$　　(f) $(– 12) \times (– 11) \times (10)$

　(g) $9 \times (– 3) \times (– 6)$　　　(h) $(– 18) \times (– 5) \times (– 4)$

　(i) $(– 1) \times (– 2) \times (– 3) \times 4$　(j) $(– 3) \times (– 6) \times (– 2) \times (– 1)$.

Sol. (a) $3 \times (– 1) = – (3 \times 1) = – 3$

　　(b) $(– 1) \times 225 = – (1 \times 225) = – 225$

　　(c) $(– 21) \times (– 30) = (21 \times 30) = 630$

　　(d) $(– 316) \times (– 1) = (316 \times 1) = 316$

　　(e) $(– 15) \times 0 \times (– 18) = [(– 15) \times (– 18)] \times 0 = 270 \times 0 = 0$

　　(f) $(– 12) \times (– 11) \times 10 = [(– 12) \times (– 11)] \times 10 = 132 \times 10 = 1320$

　　(g) $9 \times (– 3) \times (– 6) = 9 \times [(– 3) \times (– 6)] = 9 \times (18) = 162$

　　(h) $(– 18) \times (– 5) \times (– 4) = (– 18) \times [(– 5) \times (– 4)] = (– 18) \times (20) = – 360$

　　(i) $(– 1) \times (– 2) \times (– 3) \times 4 = [(– 1) \times (– 2)] \times [(– 3) \times 4]$

　　　　　　　　　　　　$= 2 \times (– 12) = – (2 \times 12) = – 24$

　　(j) $(– 3) \times (– 6) \times (– 2) \times (– 1) = [(– 3) \times (– 6)] \times [(– 2) \times (– 1)]$

　　　　　　　　　　　　$= 18 \times 2 = 36$.

Q2. Verify the following:

　(a) $18 \times [7 + (– 3)] = [18 \times 7] + [18 \times (– 3)]$

　(b) $(– 21) \times [(– 4) + (– 6)] = [(– 21) \times (– 4)] + [(– 21) \times (– 6)]$.

Sol. We have,

　(a) $18 \times [7 + (– 3)] = [18 \times 7] + [18 \times (– 3)]$

Take L.H.S. $= 18 \times [7 + (-3)]$
$$= 18 \times 4 = 72$$
Take R.H.S. $= [18 \times 7] + [18 \times (-3)]$
$$= 126 + (-54) = 126 - 54 = 72$$
Thus, L.H.S. = R.H.S.

(b) $(-21) \times [(-4) + (-6)] = [(-21) \times (-4)] + [(-21) \times (-6)]$
Take L.H.S. $= (-21) \times [(-4) + (-6)]$
$$= (-21) \times (-10) = 210$$
Take R.H.S. $= [(-21) \times (-4)] + [(-21) \times (-6)]$
$$= 84 + 126 = 210$$
Thus, L.H.S. = R.H.S.

Q3. (i) **For any integer a, what is $(-1) \times a$ equal to?**

(ii) **Determine the integer whose product with (-1) is**

     (a) -22   **(b) 37**   **(c) 0.**

Sol. (i) $(-1) \times a = -(1 \times a) = -a$, where a is any integer.

(ii) (a) $(-1) \times (-22) = (1 \times 22) = 22$

(b) $(-1) \times (37) = -(1 \times 37) = -37$

(c) $(-1) \times 0 = -(1 \times 0) = 0.$

Q4. **Starting from $(-1) \times 5$, write various products showing some pattern to show $(-1) \times (-1) = 1$.**

Sol. We have started on the basis of given pattern:

Now, $(-1) \times 5 = -5$ $(-1) \times 2 = -2$

           $(-1) \times 4 = -4$ $(-1) \times 1 = -1$

           $(-1) \times 3 = -3$ $(-1) \times 0 = 0$

                        $(-1) \times (-1) = 1$

Thus, this pattern shows the product of one negative integer and one positive integer is negative integer whereas the product of two negative integers is a positive integer.

Q5. **Find the product, using suitable properties:**

(a) $26 \times (-48) + (-48) \times (-36)$ (b) $8 \times 53 \times (-125)$

(c) $15 \times (-25) \times (-4) \times (-10)$ (d) $(-41) \times (102)$

(e) $625 \times (-35) + (-625) \times 65$ (f) $7 \times (50 - 2)$

(g) $(-17) \times (-29)$ (h) $(-57) \times (-19) + 57.$

Sol. (a) $26 \times (-48) + (-48) \times (-36)$
$$= (-48) \times [26 + (-36)] \text{ (distributive roperty)}$$
$$= (-48) \times (-10) = (48 \times 10)$$
$$= 480$$

(b) $8 \times 53 \times (-125)$
$$= 53 \times [8 \times (-125)] \text{ (commutative property)}$$
$$= 53 \times (-1,000)$$
$$= -(53 \times 1,000)$$
$$= -53,000$$

(c) $15 \times (-25) \times (-4) \times (-10)$
$$= 15 \times [(-25) \times (-4) \times (-10)]$$
$$= 15 \times [100 \times (-10)]$$
$$= 15 \times (-1,000) = -(15 \times 1,000)$$
$$= -15,000$$

(d) $(-41) \times (102)$
$$= (-41) \times [100 + 2] \text{ (distributive property)}$$
$$= [(-41) \times 100] + [(-41) \times 2]$$
$$= (-4,100) + (-82) = -4,100 - 82$$
$$= -4,182$$

OR
$$= [-40 + (-1)] \times (102) \text{ (distributive property)}$$
$$= [(-40) \times 102] + [(-1) \times 102]$$
$$= -4,080 - 102$$
$$= -4,182$$

(e) $625 \times (-35) + (-625) \times 65$
$$= 625 \times (-35) + (625) \times (-65)$$
$$= 625 \times [(-35) + (-65)]$$
$$= 625 \times [-35 - 65] = 625 \times (-100)$$
$$= -62,500$$

(f) $7 \times (50 - 2)$
$$= 7 \times 50 - 7 \times 2 \qquad \text{(distributive property)}$$
$$= 350 - 14$$
$$= 336$$

(g) $(-17) \times (-29)$
$$= (-17) \times [(-30) + 1]$$
$$= (-17) \times (-30) + (-17) \times (1)$$
$$\text{(distributive property)}$$
$$= 510 + (-17) = 510 - 17$$
$$= 493$$

(h) $(-57) \times (-19) + 57$
$$= (-57) \times (-19) + 57 \times 1$$
$$= 57 \times 19 + 57 \times 1$$
$$= 57 \times (19 + 1) = 57 \times (20)$$
$$= 1,140.$$

Q6. A certain freezing process requires that room temperature be lowered from 40°C at the rate of 5°C every hour. What will be the room temperature 10 hours after the process begins?

Sol. Given, present room temperature = 40°C

Decreasing the temperature every hour = 5°C

Room temperature after 10 hours = 40°C + 10 × (– 5°C)

$$= 40°C - 50°C$$

$$= -10°C$$

Thus, the room temperature after 10 hours is – 10°C after the process begins.

Q7. In a class test containing 10 questions, 5 marks are awarded for every correct answer and (– 2) marks are awarded for every incorrect answer and 0 for questions not attempted.

(*i*) Mohan gets four correct and six incorrect answers. What is his score?

(*ii*) Reshma gets five correct answers and five incorrect answers, what is her score?

(*iii*) Heena gets two correct and five incorrect answers out of seven questions she attempts. What is her score?

Sol. (*i*) Mohan gets marks for four correct questions = 4 × 5 = 20.

He gets marks for six incorrect questions = 6 × (– 2) = – 12.

He attempts total 10 questions so, he does not get 0 marks.

So, total score of Mohan = (4 × 5) + [6 × (– 2)]

$$= 20 + (-12)$$

$$= 20 - 12$$

$$= 8$$

Thus, Mohan gets 8 marks in a class test.

(*ii*) Reshma gets marks for five correct questions = 5 × 5 = 25.

She gets marks for five incorrect questions = 5 × (– 2) = – 10.

She attempts total 10 questions so, she does not get 0 marks.

So, Reshma's total score = (5 × 5) + [5 × (– 2)]

$$= 25 - 10$$

$$= 15.$$

Thus, Reshma gets 15 marks in a class test.

(*iii*) Heena gets marks for two correct questions = 2 × 5 = 10.

She gets marks for five incorrect questions = 5 × (– 2) = – 10.

She attempts total seven questions out of ten questions so, she leave three questions for 0 marks = 3 × 0.

So, Heena's total score = (2 × 5) + [5 × (– 2)] + (3 × 0)

$$= 10 + (-10) + 0$$

$$= (10 - 10)$$

$$= 0.$$

Thus, Heena gets 0 marks in a class test.

Q8. A cement company earns a profit of ₹ 8 per bag of white cement sold and a loss of ₹ 5 per bag of grey cement sold.

(*a*) The company sells 3,000 bags of white cement and 5,000 bags of grey cement in a month. What is its profit or loss?

(*b*) What is the number of white cement bags it must sell to have neither profit nor loss, if the number of grey bags sold is 6,400 bags.

Sol. Given: Profit on per bag of white cement = ₹ 8.

and loss on per bag of grey cement = ₹ 5.

(*a*) Profit on selling 3000 bags of white cement

$$= 3000 × ₹ 8$$

$$= ₹ (3000 × 8) = ₹ 24,000.$$

Loss on selling 5000 bags of grey cement

$$= 5000 × ₹ 5$$

$$= ₹ 25,000$$

∵ Profit < Loss.

So, his total loss on selling the grey cement bags

$$= Loss - Profit$$

$$= ₹ (5,000 × 5) - ₹ (3,000 × 8)$$

$$= ₹ 25,000 - ₹ 24,000$$

$$= ₹ (25,000 - 24,000)$$

$$= ₹ 1,000$$

Thus, he has lost of ₹ 1,000 on selling the grey cement bags.

(*b*) Let the number of bags of white cement be x.

According to given condition,

Loss = Profit

$5 \times 6{,}400 = x \times$ Rs. 8

$x = \dfrac{5 \times 6400}{8} = 5 \times 800 = 4000$ bags.

Thus, he must sell 4,000 white cement bags to have neither profit nor loss.

Q9. Replace the blank with an integer to make it a true statement:

(a) $(-3) \times \underline{\hspace{1cm}} = 27$ (b) $5 \times \underline{\hspace{1cm}} = -35$

(c) $\underline{\hspace{1cm}} \times (-8) = -56$ (d) $\underline{\hspace{1cm}} \times (-12) = 132$

Sol. (a) $(-3) \times \underline{(-9)} = 27$ (b) $5 \times \underline{(-7)} = -35$

(c) $\underline{7} \times (-8) = -56$ (d) $\underline{(-11)} \times (-12) = 132$

Exercise 1.4 *(Page No. 26)*

Q1. Evaluate each of the following:

(a) $(-30) \div 10$ (b) $50 \div (-5)$

(c) $(-36) \div (-9)$ (d) $(-49) \div 49$

(e) $13 \div [(-2) + 1]$ (f) $0 \div (-12)$

(g) $(-31) \div [(-30) + (-1)]$ (h) $[(-36) \div 12] \div 3$

(i) $[(-6) + 5] \div [(-2) + 1]$

Sol. (a) $(-30) \div 10 = (-30) \times \dfrac{1}{10} = \dfrac{-30}{10} = -3$

(b) $50 \div (-5) = 50 \times \left(\dfrac{-1}{5}\right) = \dfrac{-50}{5} = -10$

(c) $(-36) \div (-9) = (-36) \times \left(\dfrac{-1}{9}\right) = \dfrac{-36}{-9} = 4$

(d) $(-49) \div 49 = (-49) \times \left(\dfrac{1}{49}\right) = \dfrac{-49}{49} = -1$

(e) $13 \div [(-2) + 1] = 13 \div (-1) = 13 \times \left(\dfrac{-1}{1}\right) = -13$

(f) $0 \div (-12) = 0 \times \left(\dfrac{-1}{12}\right) = \dfrac{0}{12} = 0$

(g) $(-31) \div [(-30) + (-1)] = (-31) \div (-30 - 1)$

$= (-31) \div (-31) = -31 \times \left(\dfrac{-1}{31}\right)$

$= \dfrac{-31}{-31} = 1$

(h) $[(-36) \div 12] \div 3 = \left[(-36) \times \dfrac{1}{12}\right] \times \dfrac{1}{3} = \left(\dfrac{-36}{12}\right) \times \left(\dfrac{1}{3}\right)$

$= (-3) \times \left(\dfrac{1}{3}\right) = \dfrac{-3}{3} = -1$

(i) $[(-6) + 5] \div [(-2) + 1] = (-6 + 5) \div (-2 + 1)$

$= (-1) \div (-1) = -1 \times \dfrac{-1}{1} = 1.$

Q2. Verify that $a \div (b + c) \ne (a \div b) + (a \div c)$ for each of the following values of a, b and c.

(a) $a = 12,\ b = -4,\ c = 2$ (b) $a = (-10),\ b = 1,\ c = 1.$

Sol. (a) We have, $a \div (b + c) \ne (a \div b) + (a \div c)$

Putting the values $a = 12$, $b = -4$ and $c = 2$ in L.H.S.,

$a \div (b + c) = 12 \div (-4 + 2)$

$= 12 \div (-2) = 12 \times \left(\dfrac{-1}{2}\right) = -6$

Again, putting the values $a = 12$, $b = -4$ and $c = 2$ in R.H.S.,

$(a \div b) + (a \div c) = [12 \div (-4)] + (12 \div 2)$

$= \left[12 \times \left(\dfrac{-1}{4}\right)\right] + \left(12 \times \dfrac{1}{2}\right) = \left(\dfrac{-12}{4}\right) + \left(\dfrac{12}{2}\right)$

$= -3 + 6 = 3$

Therefore, L.H.S. $\ne$ R.H.S. **Hence verified.**

(b) We have, $a \div (b + c) \ne (a \div b) + (a \div c)$

Putting the values $a = (-10)$, $b = 1$ and $c = 1$ in L.H.S.,

$a \div (b + c) = (-10) \div (1 + 1) = (-10) \div (2)$

$= (-10) \times \left(\dfrac{1}{2}\right) = \dfrac{-10}{2} = -5$

Again, putting the values $a = (-10)$, $b = 1$ and $c = 1$ in R.H.S.,

$(a \div b) + (a \div c) = [(-10) \div 1] + [(-10) \div 1]$

$= (-10 \times 1) + (-10 \times 1)$

$= -10 - 10 = -20$

Therefore, L.H.S. $\ne$ R.H.S. **Hence verified.**

Q3. Fill in the blanks:

(a) $369 \div \underline{\quad} = 369$

(b) $(-75) \div \underline{\quad} = (-1)$

(c) $(-206) \div \underline{\quad} = 1$

(d) $(-87) \div \underline{\quad} = 87$

(e) $\underline{\quad} \div 1 = -87$

(f) $\underline{\quad} \div 48 = -1$

(g) $20 \div \underline{\quad} = -2$

(h) $\underline{\quad} \div (4) = -3.$

Sol. (a) $369 \div \underline{1} = 369$

(b) $(-75) \div \underline{75} = (-1)$

(c) $(-206) \div \underline{(-206)} = 1$

(d) $(-87) \div \underline{(-1)} = 87$

(e) $\underline{(-87)} \div 1 = -87$

(f) $\underline{(-48)} \div 48 = -1$

(g) $20 \div \underline{(-10)} = -2$

(h) $\underline{(-12)} \div (4) = -3.$

Q4. Write five pairs of integers (a, b) such that $a \div b = -3$. One such pair is $(6, -2)$ because $6 \div (-2) = (-3)$.

Sol. Given $a \div b = -3$.

Let us take few more pairs of integers:

(i) $(-6) \div 2 = -3$
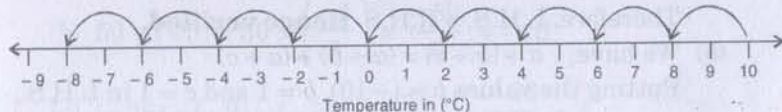
(ii) $(-9) \div 3 = -3$

(iii) $9 \div (-3) = -3$

(iv) $(-12) \div 4 = -3$

(v) $12 \div (-4) = -3.$

Thus, the pairs are $(-6, 2)$, $(-9, 3)$, $(9, -3)$, $(-12, 4)$ and $(12, -4)$. There can many such pairs.

Q5. The temperature at 12 noon was 10°C above zero. If it decreases at the rate of 2°C per hour until mid-night, at what time would the temperature be 8°C below zero? What would be the temperature at mid-night?

Sol. Let us represent the temperatures on the number line:

Temperature in (°C)

The temperature decreases 2°C = 1 hour

The temperature decreases 1°C = $1 \div 2$ hour = $\frac{1}{2}$ hour

The temperature decreases 18°C = $\frac{1}{2} \times 18° = 9$ hour

Total time = 12 noon + 9 hour

= 21 hour

= $(21 - 12) = 9$ p.m.

Thus, at 9 p.m. the temperature would be 8°C below 0°C.

Q6. In a class test (+ 3) marks are given for every correct answer and (– 2) marks are given for every incorrect answer and no marks for not attempting any question.

(i) **Radhika scored 20 marks. If she has got 12 correct answers, how many questions has she attempted incorrectly?**

(ii) **Mohini scores (– 5) marks in this test, though she has got 7 correct answers. How many questions has she attempted incorrectly?**

Sol. (i) Marks given for one correct answer = 3

So, marks given for 12 correct answers = $12 \times 3 = 36$

Radhika scored marks = 20

Marks obtained for incorrect answers = $20 - 36 = -16$

Marks given for one incorrect answer = -2

Therefore, number of incorrect answers = $(-16) \div (-2) = 8$.

Thus, she has attempted 8 incorrect questions.

(ii) Marks given for 7 correct answer = $7 \times 3 = 21$

Mohini score marks = -5

Marks obtained for incorrect answers = $-5 - 21 = -26$

Mark given for one incorrect answer = -2

Therefore, number of incorrect answers = $(-26) \div (-2) = 13$

Thus, Mohini has attempted 13 incorrect questions.

Q7. An elevator descends into a mine shaft at the rate of 6 m/min. If the descent starts from 10 m above the ground level, how long will it take to reach – 350 m.

Sol. Starting position of mine shaft is 10 m above the ground but it move in opposite direction so it travel the distance (– 350) m below the ground.

So, total distance covered by mine shaft = 10 m – (– 350) m

= (10 + 350) m = 360 m

Now, time taken to cover a distance of 6 m by it = 1 min.

time taken to cover a distance of 1 m = $\frac{1}{6}$ min.

Therefore, time taken to cover a distance of 360 m = $(360 \div 6)$ min

= 60 min = 1 hour

Thus, in one hour the mine shaft reaches – 350 m below the ground.