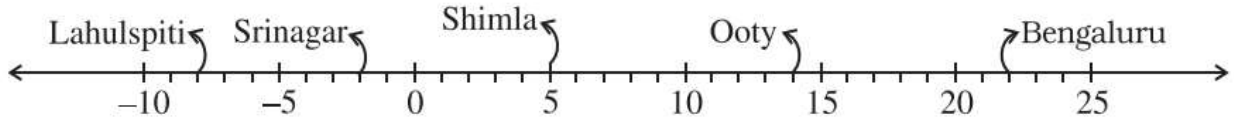
Integers: Exercise 1.1

Q.1 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: **(a)**The temperature of the places marked on number line:
Lahulspiti: -8°C
Srinagar: -2°C
Shimla: 5°C
Ooty: 14°C
Bengaluru: 22°C

(b) From the number line,
The hottest place is Bengaluru and its temperature = 22°C
The coldest place is Lahulspiti and its temperature = -8°C
Thus temperature difference between hottest and coldest place = 22°C – (-8°C)
= 22°C + 8°C
= 30°C

(c) From the number line,
The temperature at the Lahulspiti = -8°C
The temperature at the Srinagar = -2°C
Thus, the temperature difference between Lahulspiti and Srinagar = -2°C – (-8°C)
= – 2°C + 8°C
= 6°C

(d) From the number line,
The temperature at Srinagar = -2°C
The temperature at Shimla = 5°C
Since, temperature of Srinagar and Shimla taken together = – 2°C + 5°C
= 3°C
Therefore, temp. at Shimla i.e. 5°C > temp. at Srinagar and Shimla taken together i.e. 3°C
Then,
Temp. at Srinagar and Shimla taken together i.e. 3° > temp. at Srinagar i.e. -2°.
So, the temperature of Srinagar and Shimla taken together is not less than the temperature of Srinagar.

Q.2 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:
Mark scored by Jack in five successive rounds = 25, -5, -10, 15 and 10
The total score of Jack at the end = 25 + (-5) + (-10) + 15 + 10

= 25 – 5 – 10 + 15 + 10
= 50 – 15
= 35

Thus, total scored by Jack at the end = 35

Q.3 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: **Given:** Temperature on Monday at Srinagar = -5°C

Since, temperature on Tuesday at Srinagar is dropped by 2°C.

So, temperature on Tuesday = Temperature on Monday – 2°C

= -5°C – 2°C

= -7°C

Since, temperature on Wednesday at Srinagar is rose by 4°C.

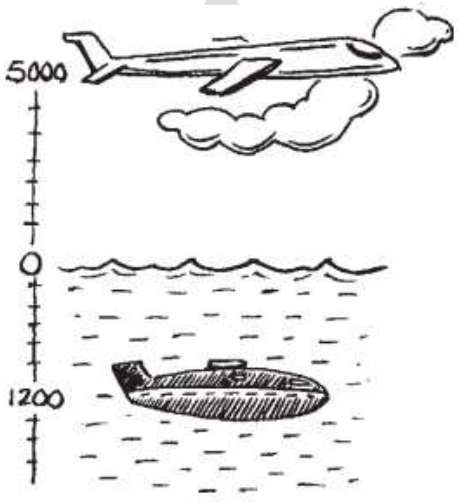
So, temperature on Wednesday = Temperature on Tuesday + 4°C

= -7°C + 4°C

= -3°C

Thus, the temperature on Tuesday was -7°C and Wednesday was -3°C.

Q.4 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: **Given:** Plane is flying at the height from the sea level= 5000 m

Depth of Submarine from the sea level = -1200 m

So, vertical distance between plane and submarine = 5000 m – (- 1200) m

= 5000 m + 1200 m

= 6200 m

Q.5 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 account after the withdrawal.

Sol: Since, withdrawal of amount from the account is represented by a negative integer. So, deposit of amount to the account is represented by the opposite sign i.e. positive integer.

Given: Total amount deposited in bank account = ₹ 2000

Total amount withdrawn from the bank account = – ₹ 1642

Therefore, balance in Mohan's bank account after the withdrawal = amount deposited + amount withdrawn

= ₹ 2000 + (-₹ 1642)

= ₹ 2000 – ₹ 1642

= ₹ 358

Thus, the balance in Mohan's bank account after the withdrawal = ₹ 358

Q.6 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: Since, distance towards east is represented by a positive integer.

So, distance travelled towards the west will be represented by opposite sign integer i.e. negative integer.

Given: Rita covers a distance in east direction = 20 km

Then, she covers a distance in west direction = – 30 km

So, distance covered from point A = 20 + (- 30)

= 20 – 30

= -10 km

Thus, we will represent the distance covered by Rita from point A by a negative integer, i.e. – 10 km.

Q.7 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: Firstly, we consider the square (i)

On adding the numbers in each rows,

1st row = 5 + (- 1) + (- 4) = 5 – 1 – 4 = 5 – 5 = 0

2nd row = -5 + (-2) + 7 = – 5 – 2 + 7 = -7 + 7 = 0

3rd row = 0 + 3 + (-3) = 3 – 3 = 0

On adding the numbers in each columns,

1st column = 5 + (- 5) + 0 = 5 – 5 = 0

2nd column = (-1) + (-2) + 3 = -1 – 2 + 3 = -3 + 3 = 0

3rd column = -4 + 7 + (-3) = -4 + 7 – 3 = -7 + 7 = 0
On adding the numbers in diagonals,
1st diagonal = 5 + (-2) + (-3) = 5 – 2 – 3 = 5 – 5 = 0
2nd diagonal = -4 + (-2) + 0 = – 4 – 2 = -6
Because sum of 1st diagonal is not equal to zero,
Therefore, square-(i) is not a magic square.

Now, we consider the square-(ii)
On adding the numbers in each rows,
1st row = 1 + (-10) + 0 = 1 – 10 + 0 = -9
2nd row = (-4) + (-3) + (-2) = -4 – 3 – 2 = -9
3rd row = (-6) + 4 + (-7) = -6 + 4 – 7 = -13 + 4 = -9
By adding the numbers in each columns,
1st column = 1 + (-4) + (-6) = 1 – 4 – 6 = 1 – 10 = -9
2nd column = (-10) + (-3) + 4 = -10 – 3 + 4 = -13 + 4 = -9
3rd column = 0 + (-2) + (-7) = 0 – 2 – 7 = -9
By adding the numbers in diagonals,
1st diagonal = 1 + (-3) + (-7) = 1 – 3 – 7 = 1 – 10 = -9
2nd diagonal = 0 + (-3) + (-6) = 0 – 3 – 6 = -9

Since, sum of each row, each column and diagonal is equal to -9. Therefore, square-(ii) is a magic square.

Q.8 Verify a – (– b) = a + b for the following values of a and b.
(i) a = 21, b = 18 **(ii) a = 118, b = 125**
(iii) a = 75, b = 84 **(iv) a = 28, b = 11**
Sol: Verification of a – (– b) = a + b:
(i) Given: a = 21, b = 18
To verify: a – (- b) = a + b
On putting the value of a and b in given equation,
21 - (-18) = 21 + 18
21 + 18 = 21 +18
39 = 39
From above calculation,
LHS = RHS
Thus, the value of a = 21 and b = 18 verify the a– (– b) = a + b.

(ii) Given: a = 118, b = 125
To verify: a – (- b) = a + b
On putting the value of a and b in given equation,
118 - (-125) = 118 + 125
118 + 125 = 118 +125
243 = 243
From above calculation,
LHS = RHS
Thus, the value of a = 118 and b = 125 verify the a– (– b) = a + b.

(iii) Given: a = 75, b = 84
To verify: a – (- b) = a + b
On putting the value of a and b in given equation,
75 - (-84) = 75 + 84
75 + 84 = 75 + 84

159 = 159
From above calculation,
LHS = RHS
Thus, the value of a = 75 and b = 84 verify the a– (– b) = a + b.

(iv) Given: a = 28, b = 11
To verify: a – (- b) = a + b
On putting the value of a and b in given equation,
28 - (-11) = 28 + 11
28 + 11 = 28 + 11
39 = 39
From above calculation,
LHS = RHS
Thus, the value of a = 28 and b = 11 verify the a– (– b) = a + b.

Q.9 Use the sign of >, < or = in the box to make the statements true.

(a) (– 8) + (– 4) ☐ (–8) – (– 4)

(b) (– 3) + 7 – (19) ☐ 15 – 8 + (– 9)

(c) 23 – 41 + 11 ☐ 23 – 41 – 11

(d) 39 + (– 24) – (15) ☐ 36 + (– 52) – (– 36)

(e) – 231 + 79 + 51 ☐ –399 + 159 + 81

Sol:

(a) Given: (– 8) + (– 4) ☐ (–8) – (– 4)
Firstly, by taking LHS,
= (-8) + (-4)
= - 8 - 4
= -12
Now, by taking RHS,
= (-8) - (-4)
= -8+4
= -4
From above calculation, -12 < -4
Thus, (– 8) + (– 4) [<] (–8) – (– 4)

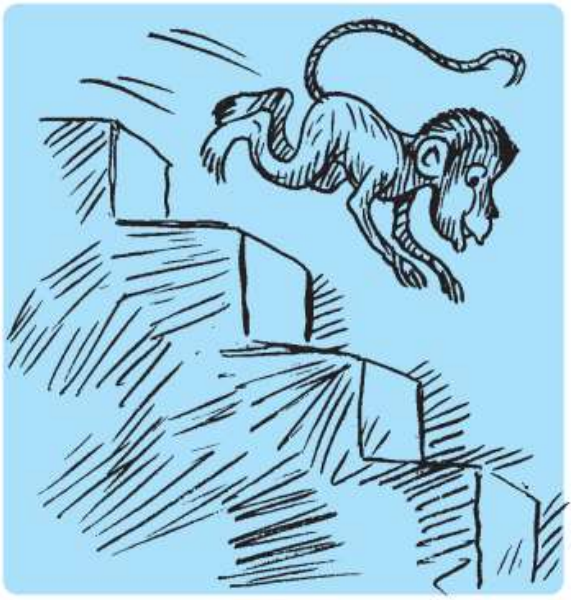
(b) Given: (b) (– 3) + 7 – (19) ☐ 15 – 8 + (– 9)
Firstly, by taking LHS,
= (– 3) + 7 – (19)
= -3+7-19
= -22+7
= -15
Now, by taking RHS,
= 15 – 8 + (– 9)
= 15-8-9
= 15-17
= -2
From above calculation, -15 < -2

Thus, (– 3) + 7 – (19) [<] 15 – 8 + (– 9)

(c) Given: 23 – 41 + 11 ☐ 23 – 41 – 11
Firstly, by taking LHS,
= 23 – 41 + 11
= 34 - 41
= -7
Now, by taking RHS,
= 23 – 41 – 11
= 23 - 52
= -29
From above calculation, -7 > -29
Thus, 23 – 41 + 11 [>] 23 – 41 – 11

(d) Given: 39 + (– 24) – (15) ☐ 36 + (– 52) – (– 36)
Firstly, by taking LHS,
= 39 + (– 24) – (15)
= 39 - 39
= 0
Now, by taking RHS,
= 36 + (– 52) – (– 36)
= 36 – 52 + 36
= 72-52
= 20
From above calculation, 0 < 20
Thus, 39 + (– 24) – (15) [<] 36 + (– 52) – (– 36)

Q.10 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 moved up by positive integers, represent his moves in part (i) and (ii) by completing the following; (a) – 3 + 2 – ... = – 8
(b) 4 – 2 + ... = 8. In (a) the sum (– 8) represents going down by eight steps. So, what will the sum 8 in (b) represent?

Sol: We consider that the steps moved down are represented by positive integers and the steps moved up are represented by negative integers.
(i) Since, initially monkey is sitting on the top most step i.e., first step
In 1st jump monkey will be at = 1 + 3 = 4 steps
In 2nd jump monkey will be at = 4 + (-2) = 2 steps
In 3rd jump monkey will be at = 2 + 3 = 5 steps
In 4th jump monkey will be at = 5 + (-2) = 3 steps
In 5th jump monkey will be at = 3 + 3 = 6 steps
In 6th jump monkey will be at = 6 + (-2) = 4 steps
In 7th jump monkey will be at = 4 + 3 = 7 steps
In 8th jump monkey will be at = 7 + (-2) = 5 steps
In 9th jump monkey will be at = 5 + 3 = 8 steps
In 10th jump monkey will be at = 8 + (-2) = 6 steps
In 11th jump monkey will be at = 6 + 3 = 9 steps
Thus, monkey took 11 jumps for reaching the 9th step or water level.

(ii) Since, in this case, monkey is sitting on the ninth step (or at the water level).
In 1st jump monkey will be at step = 9 + (-4) = 5 steps
In 2nd jump monkey will be at step = 5 + 2 = 7 steps
In 3rd jump monkey will be at step = 7 + (-4) = 3 steps
In 4th jump monkey will be at step = 3 + 2 = 5 steps
In 5th jump monkey will be at step = 5 + (-4) = 1 step
Thus, monkey took 5 jumps to reach the top step (or first step).

(iii) Given: If the number of steps moved down is represented by negative integers and the number of steps moved up by positive integers.
Then, monkey moves in part (i)
$-3 + 2 - \ldots\ldots\ldots = -8$
LHS = $-3 + 2 - 3 + 2 - 3 + 2 - 3 + 2 - 3 + 2 - 3$
$= -18 + 10$
$= -8$
RHS = -8
Thus, monkey's moves in part (i) represents monkey is going down 8 steps. Because it is negative integer.
Now, monkey moves in part (ii)
$4 - 2 + \ldots\ldots\ldots = 8$
LHS = $4 - 2 + 4 - 2 + 4$
$= 12 - 4$
$= 8$
RHS = 8
Thus, monkey's moves in part (ii) represents monkey is going up 8 steps. Because it is positive integer.