Class 7 Chapter 1 – Integers

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.

Solution:-

By observing the number line, we can find the temperature of the cities as follows:

The temperature in Lahulspiti is -8°C

The temperature in Srinagar is -2°C

The temperature in Shimla is 5°C

The temperature in Ooty is 14°C

The temperature in Bengaluru is 22°C

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

Solution:-

From the number line, we observe that

The temperature at the hottest place, i.e., Bengaluru, is 22°C

The temperature at the coldest place, i.e., Lahulspiti, is -8°C

Temperature difference between hottest and coldest place is = 22°C – (-8°C)

= 22°C + 8°C

= 30°C

Hence, the temperature difference between the hottest and the coldest place is $30^{\circ}C$.

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

Solution:-

From the given number line,

The temperature in Lahulspiti is $-8^{\circ}C$

The temperature in Srinagar is $-2^{\circ}C$

$\therefore$ The temperature difference between Lahulspiti and Srinagar is = $-2^{\circ}C - (8^{\circ}C)$

$= -2^{\circ}C + 8^{\circ}C$

$= 6^{\circ}C$

(d) Can we say the temperature of Srinagar and Shimla, taken together, is less than the

temperature in Shimla? Is it also less than the temperature in Srinagar?

Solution:-

From the given number line,

The temperature in Srinagar $=-2^{\circ}C$

The temperature in Shimla = $5^{\circ}C$

The temperature of Srinagar and Shimla, taken together, is = $-2^{\circ}C + 5^{\circ}C$

$= 3^{\circ}C$

$\therefore 5^{\circ}C > 3^{\circ}C$

So, the temperature of Srinagar and Shimla, taken together, is less than the temperature at Shimla.

Then,

$3^{\circ} > -2^{\circ}$

No, the temperature of Srinagar and Shimla, taken together, is not less than the temperature of Srinagar.

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?

Solution:-

From the question,

Jack's score in five successive rounds are 25, -5, -10, 15 and 10

The total score of Jack at the end will be = 25 + (-5) + (-10) + 15 + 10

= 25 – 5 – 10 + 15 + 10

= 50 – 15

= 35

∴ Jack's total score at the end is 35.

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?

Solution:-

From the question,

The temperature on Monday in Srinagar = $-5^{\circ}C$

The temperature on Tuesday in Srinagar dropped by $2^{\circ}C$ = Temperature on Monday – $2^{\circ}C$

= $-5^{\circ}C - 2^{\circ}C$

= $-7^{\circ}C$

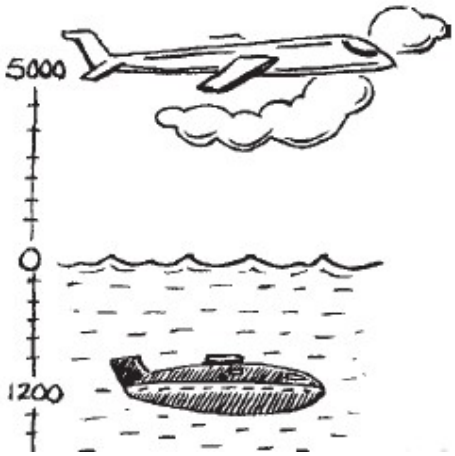
The temperature on Wednesday in Srinagar rose by 4°C = Temperature on Tuesday + 4°C

= -7°C + 4°C

= -3°C

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

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



Solution:-

From the question,

The plane is flying at a height = 5000 m

Depth of submarine = -1200 m

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

= 5000 m + 1200 m

= 6200 m

5. Mohan deposits ₹ 2,000 in his bank account and withdraws ₹ 1,642 from it the next day. If the withdrawal of the 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.

Solution:-

Withdrawal of the amount from the account is represented by a negative integer.

Then, the deposit of the amount to the account is represented by a positive integer.

From the question,

Total amount deposited in bank account by the Mohan = ₹ 2000

The total amount withdrawn from the bank account by the Mohan = – ₹ 1642

Balance in Mohan's account after the withdrawal = amount deposited + amount withdrawn

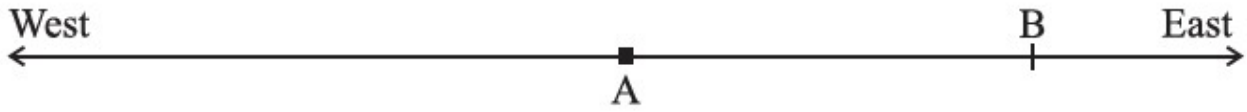
= ₹ 2000 + (-₹ 1642)

= ₹ 2000 – ₹ 1642

= ₹ 358

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

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



Solution:-

From the question, it is given that

A positive integer represents the distance towards the east.

Then, the distance travelled towards the west will be represented by a negative integer.

Rita travels a distance in the east direction = 20 km

Rita travels a distance in the west direction = – 30 km

∴ Distance travelled from A = 20 + (- 30)

= 20 – 30

= -10 km

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

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)

Solution:-

First, we consider the square (i)

By adding the numbers in each row, we get

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

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

= 0 + 3 + (-3) = 3 – 3 = 0

By adding the numbers in each column, we get

= 5 + (- 5) + 0 = 5 – 5 = 0

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

= -4 + 7 + (-3) = -4 + 7 – 3 = -7 + 7 = 0

By adding the numbers in diagonals, we get

= 5 + (-2) + (-3) = 5 – 2 – 3 = 5 – 5 = 0

= -4 + (-2) + 0 = – 4 – 2 = -6

Because the sum of one diagonal is not equal to zero.

So, (i) is not a magic square

Now, we consider the square (ii)

By adding the numbers in each row, we get

= 1 + (-10) + 0 = 1 – 10 + 0 = -9

= (-4) + (-3) + (-2) = -4 – 3 – 2 = -9

= (-6) + 4 + (-7) = -6 + 4 – 7 = -13 + 4 = -9

By adding the numbers in each column, we get

= 1 + (-4) + (-6) = 1 – 4 – 6 = 1 – 10 = -9

= (-10) + (-3) + 4 = -10 – 3 + 4 = -13 + 4

= 0 + (-2) + (-7) = 0 – 2 – 7 = -9

By adding the numbers in diagonals, we get

= 1 + (-3) + (-7) = 1 – 3 – 7 = 1 – 10 = -9

= 0 + (-3) + (-6) = 0 – 3 – 6 = -9

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

8. Verify a – (– b) = a + b for the following values of a and b.

(i) a = 21, b = 18

Solution:-

From the question,

a = 21 and b = 18

To verify a – (- b) = a + b

Let us take Left Hand Side (LHS) = a – (- b)

= 21 – (- 18)

= 21 + 18

= 39

Now, Right Hand Side (RHS) = a + b

= 21 + 18

= 39

By comparing LHS and RHS

LHS = RHS

39 = 39

Hence, the value of a and b is verified.

(ii) a = 118, b = 125

Solution:-

From the question,

a = 118 and b = 125

To verify a – (- b) = a + b

Let us take Left Hand Side (LHS) = a – (- b)

= 118 – (- 125)

= 118 + 125

= 243

Now, Right Hand Side (RHS) = a + b

= 118 + 125

= 243

By comparing LHS and RHS,

LHS = RHS

243 = 243

Hence, the value of a and b is verified.

(iii) a = 75, b = 84

Solution:-

From the question,

a = 75 and b = 84

To verify a – (- b) = a + b

Let us take Left Hand Side (LHS) = a – (- b)

= 75 – (- 84)

= 75 + 84

= 159

Now, Right Hand Side (RHS) = a + b

= 75 + 84

= 159

By comparing LHS and RHS,

LHS = RHS

159 = 159

Hence, the value of a and b is verified.

(iv) a = 28, b = 11

Solution:-

From the question,

a = 28 and b = 11

To verify a – (- b) = a + b

Let us take Left Hand Side (LHS) = a – (- b)

= 28 – (- 11)

= 28 + 11

= 39

Now, Right Hand Side (RHS) = a + b

= 28 + 11

= 39

By comparing LHS and RHS,

LHS = RHS

39 = 39

Hence, the value of a and b is verified.

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

(a) (-8) + (-4) [ ] (-8) – (-4)

Solution:-

Let us take Left Hand Side (LHS) = (-8) + (-4)

= -8 – 4

= -12

Now, Right Hand Side (RHS) = (-8) – (-4)

= -8 + 4

= -4

By comparing LHS and RHS,

LHS < RHS

-12 < -4

∴ (-8) + (-4) [<] (-8) – (-4)

(b) (-3) + 7 – (19) [ ] 15 – 8 + (-9)

Solution:-

Let us take Left Hand Side (LHS) = (-3) + 7 – 19

= -3 + 7 – 19

= -22 + 7

= -15

Now, Right Hand Side (RHS) = 15 – 8 + (-9)

= 15 – 8 – 9

= 15 – 17

= -2

By comparing LHS and RHS,

LHS < RHS

-15 < -2

∴ (-3) + 7 – (19) [<] 15 – 8 + (-9)

(c) 23 – 41 + 11 [ ] 23 – 41 – 11

Solution:-

Let us take Left Hand Side (LHS) = 23 – 41 + 11

= 34 – 41

= – 7

Now, Right Hand Side (RHS) = 23 – 41 – 11

= 23 – 52

= – 29

By comparing LHS and RHS,

LHS > RHS

– 7 > -29

∴ 23 – 41 + 11 [>] 23 – 41 – 11

(d) 39 + (-24) – (15) [ ] 36 + (-52) – (- 36)

Solution:-

Let us take Left Hand Side (LHS) = 39 + (-24) – 15

= 39 – 24 – 15

= 39 – 39

= 0

Now, Right Hand Side (RHS) = 36 + (-52) – (- 36)

= 36 – 52 + 36

= 72 – 52

= 20

By comparing LHS and RHS,

LHS < RHS

0 < 20

∴ 39 + (-24) – (15) [<] 36 + (-52) – (- 36)

(e) – 231 + 79 + 51 [ ] -399 + 159 + 81

Solution:-

Let us take Left Hand Side (LHS) = – 231 + 79 + 51

= – 231 + 130

= -101

Now, Right Hand Side (RHS) = – 399 + 159 + 81

= – 399 + 240

= – 159

By comparing LHS and RHS,

LHS > RHS

-101 > -159

∴ – 231 + 79 + 51 [>] -399 + 159 + 81

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?

Solution:-

Let us consider steps moved down are represented by positive integers, and then steps moved up are represented by negative integers.

Initially, the monkey is sitting on the topmost step, i.e., the first step

In 1st jump, the monkey will be at step = 1 + 3 = 4 steps

In 2nd jump, the monkey will be at step = 4 + (-2) = 4 – 2 = 2 steps

In 3rd jump, the monkey will be at step = 2 + 3 = 5 steps

In 4th jump, the monkey will be at step = 5 + (-2) = 5 – 2 = 3 steps

In 5th jump, the monkey will be at step = 3 + 3 = 6 steps

In 6th jump, the monkey will be at step = 6 + (-2) = 6 – 2 = 4 steps

In 7th jump, the monkey will be at step = 4 + 3 = 7 steps

In 8th jump, the monkey will be at step = 7 + (-2) = 7 – 2 = 5 steps

In 9th jump, the monkey will be at step = 5 + 3 = 8 steps

In 10th jump, the monkey will be at step = 8 + (-2) = 8 – 2 = 6 steps

In 11th jump, the monkey will be at step = 6 + 3 = 9 steps

∴ The monkey took 11 jumps (i.e., the 9th step) to 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 with every move. In how many jumps will he reach back to the top step?

Solution:-

Let us consider steps moved down are represented by positive integers, and then steps moved up are represented by negative integers.

Initially, the monkey is sitting on the ninth step, i.e., at the water level,

In 1st jump, the monkey will be at step = 9 + (-4) = 9 – 4 = 5 steps

In 2nd jump, the monkey will be at step = 5 + 2 = 7 steps

In 3rd jump, the monkey will be at step = 7 + (-4) = 7 – 4 = 3 steps

In 4th jump, the monkey will be at step = 3 + 2 = 5 steps

In 5th jump, the monkey will be at step = 5 + (-4) = 5 – 4 = 1 step

∴ The monkey took 5 jumps to reach back to the top step, i.e., the first 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 parts (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?

Solution:-

From the question, it is given that

The number of steps moved down is represented by negative integers, and the number of steps moved up by positive integers.

Monkey moves in part (i)

= – 3 + 2 – …….. = – 8

Then, LHS = – 3 + 2 – 3 + 2 – 3 + 2 – 3 + 2 – 3 + 2 – 3

= – 18 + 10

= – 8

RHS = -8

∴ Moves in part (i) represent the monkey going down 8 steps because it's a negative integer.

Now,

Monkey moves in part (ii)

= 4 – 2 + …….. = 8

Then, LHS = 4 – 2 + 4 – 2 + 4

= 12 – 4

= 8

RHS = 8

∴ Moves in part (ii) represent the monkey going up 8 steps because it's a positive integer.