CHAPTER1 - INTEGERS

(Students as you all are aware of the situation because of COVID-19 we are providing online study material. So that our students can utilise the time properly at home.BE SAFE AND TAKE CARE)

NOTES AND EXERCISES OF LESSON 1 (INTEGERS)

When we talk about integers the first thing that comes in our mind is " WHAT ARE INTEGERS?" Let us know exactly what are integers.

Integers are a bigger collection of numbers which is formed by whole numbers and their negatives.so integers will have positive numbers, negative numbers and remember zero (0) is also an integer.

Eg: -4, -3,-2, -1, 0 , 1, 2, 3, 4 …

TEST FOR YOU….

1. Represent the following as integers with the proper sign:
   a. Loan of Rs. 5000 from the market
   b. Gain of 8Kg of mangoes
2. Arrange in descending order:
   -30, -25, -15, 5, 0, -5

3. complete the pattern:

   a. 7, 3, -1, -5, _, _, _

   b. -2 -4 -6 -8 _, _, _

   c. -11 -8 -5 -2 _, _, _

   4. Rajesh and Satish had a cycle race . The race was conducted in six sections . In first section Satish gained 10 seconds after that he gained 20 seconds then lost 1 minute , gained 15 seconds, lost 27 seconds and finally gained 41 seconds over his friend Rajesh. Who lost the race.

   Now we start with the first exercise 1.1

1. Following number line shows the temperature in degree celsius (c°) at different places on a particular day.
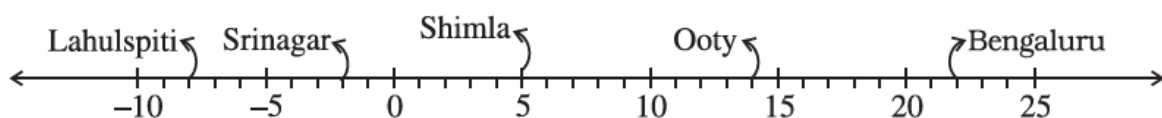
(a) Observe this number line and write the temperature of the places marked on it.

Solution:-

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

Temperature at the Lahulspiti is -8°C

Temperature at the Srinagar is -2°C

Temperature at the Shimla is 5°C

Temperature at the Ooty is 14°C

Temperature at the 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°C.

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

Solution:-

From the given number line,

The temperature at the Lahulspiti is -8°C

The temperature at the Srinagar is -2°C

∴The temperature difference between Lahulspiti and Srinagar is = -2°C – (8°C)

= – 2°C + 8°C

= 6°C

(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?

Solution:-

From the given number line,

The temperature at Srinagar =-2°C

The temperature at Shimla = 5°C

The temperature of Srinagar and Shimla taken together is = – 2°C + 5°C

= 3°C

∴ 5°C > 3°C

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

Then,

3° > -2°

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,

Temperature on Monday at Srinagar = -5°C

Temperature on Tuesday at Srinagar is dropped by 2°C = Temperature on Monday – 2°C

= -5°C – 2°C

= -7°C

Temperature on Wednesday at Srinagar is 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 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?
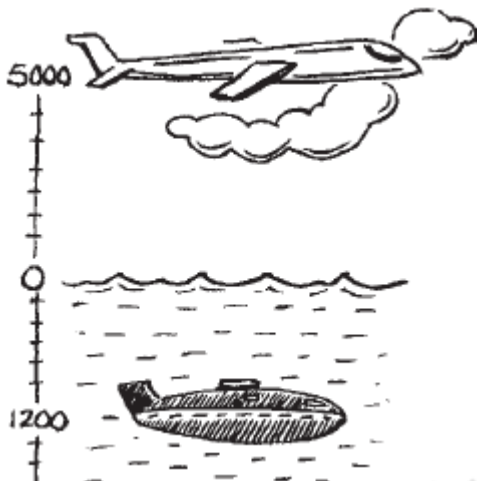
Solution:-

From the question,

Plane is flying at the 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 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.

Solution:-

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

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

From the question,

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

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 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?

Solution:-

From the question, it is given that

A positive integer represents the distance towards the east.

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

Rita travels a distance in east direction = 20 km

Rita travels a distance in 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 rows 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 columns 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 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 rows 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 columns 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

This (ii) square is a magic square, because sum of each row, each column and 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

Topic: Properties of addition and subtraction of Integers

1. Closure under addition

When we add two integers tye result should be an integer. Let us check it with few examples:

5 + 2 = 7(integer)

-7 + 5 = -2(integer)

see in both these cases we get our result as an integer.

So for any two integers a and b , a + b is an integer.

2. Closure under subtraction

Let us check whether subtraction is closure

we will understand this with some examples

17 - 4 = 13 (integer)

-5 - 9 = 14 (integer)

These results show that for any two integers a and b , a - b is an integer.

3. Commutative Property

Addition

If the result of the addition of two integers remains same if the order is reversed then it is said to be commutative.

Let us understand with eg:

4+ 5 =9

5+ 4= 9

so addition is commutative for integers

a+ b= b+ a

Subtraction

Now for the case of subtraction the result varies

eg: 7 - 5= 2

    5 -7 = -2

so we conclude that subtraction is not commutative for integers.

4. Associative Property

Let us take three integers a = -3 ,b = -9 and c = -4

 lets group in different ways (-3 + (-9)) + (-4) = -16

-3+(-9+(-4)) = -16

 so we conclude that addition is associative but in subtraction the answer will not be the same here students will check by doing it themself.

so subtraction is not associative in integers.

a+(b+c)=(a +b)+ c

5. Additive Identity

If we add 0 to any integer we will get an integer

eg: 7+0= 7

-9 + 0= -9

a + 0= a = 0+a

Learn and practice all the properties by taking some different examples

1. Write down a pair of integers whose:

(a) sum is -7

Solution:-

= – 4 + (-3)

= – 4 – 3 … [∵ (+ × – = -)]

= – 7

(b) difference is – 10

Solution:-

= -25 – (-15)

= – 25 + 15 … [∵ (- × – = +)]

= -10

(c) sum is 0

Solution:-

= 4 + (-4)

= 4 – 4

= 0

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

Solution:-

= (-5) – (- 13)

= -5 + 13 … [∵ (- × – = +)]

= 8

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

Solution:-

= -25 + 20

= -5

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

Solution:-

= – 6 – (-3)

= – 6 + 3 … [∵ (- × – = +)]

= – 3

3. 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?

Solution:-

From the question, it is given that

Score of team A = -40, 10, 0

Total score obtained by team A = – 40 + 10 + 0

= – 30

Score of team B = 10, 0, -40

Total score obtained by team B = 10 + 0 + (-40)

= 10 + 0 – 40

= – 30

Thus, the score of the both A team and B team is same.

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

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

(i) (–5) + (– 8) = (– 8) + (…………)

Solution:-

Let us assume the missing integer be x,

Then,

= (–5) + (– 8) = (– 8) + (x)

= – 5 – 8 = – 8 + x

= – 13 = – 8 + x

By sending – 8 from RHS to LHS it becomes 8,

= – 13 + 8 = x

= x = – 5

Now substitute the x value in the blank place,

(–5) + (– 8) = (– 8) + (- 5) … [This equation is in the form of Commutative law of Addition]

(ii) –53 + ………… = –53

Solution:-

Let us assume the missing integer be x,

Then,

= –53 + x = –53

By sending – 53 from LHS to RHS it becomes 53,

= x = -53 + 53

= x = 0

Now substitute the x value in the blank place,

= –53 + 0 = –53 … [This equation is in the form of Closure property of Addition]

(iii) 17 + ………… = 0

Solution:-

Let us assume the missing integer be x,

Then,

= 17 + x = 0

By sending 17 from LHS to RHS it becomes -17,

= x = 0 – 17

= x = – 17

Now substitute the x value in the blank place,

= 17 + (-17) = 0 … [This equation is in the form of Closure property of Addition]

= 17 – 17 = 0

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

Solution:-

Let us assume the missing integer be x,

Then,

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

= [13 – 12] + (x) = 13 + [–12 –7]

= [1] + (x) = 13 + [-19]

= 1 + (x) = 13 – 19

= 1 + (x) = -6

By sending 1 from LHS to RHS it becomes -1,

= x = -6 – 1

= x = -7

Now substitute the x value in the blank place,

= [13 + (– 12)] + (-7) = 13 + [(–12) + (–7)] … [This equation is in the form of Associative property of Addition]

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

Solution:-

Let us assume the missing integer be x,

Then,

= (– 4) + [15 + (–3)] = [– 4 + 15] + x

= (– 4) + [15 – 3] = [– 4 + 15] + x

= (-4) + [12] = [11] + x

= 8 = 11 + x

By sending 11 from RHS to LHS it becomes -11,

= 8 – 11 = x

= x = -3

Now substitute the x value in the blank place,

= (– 4) + [15 + (–3)] = [– 4 + 15] + -3 … [This equation is in the form of Associative property of Addition]
<u>THAT'S ALL FOR THIS WEEK PREPARE THESE TWO EXERCISES AND STAY SAFE.</u>