

NOTES

CLASS 6

MATHS

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INTEGERS

The numbers $+1, +2, +3, +4, \dots$ are referred to as **positive integers**.

The numbers $0, +1, +2, +3, \dots$ are called **non-negative integers**.

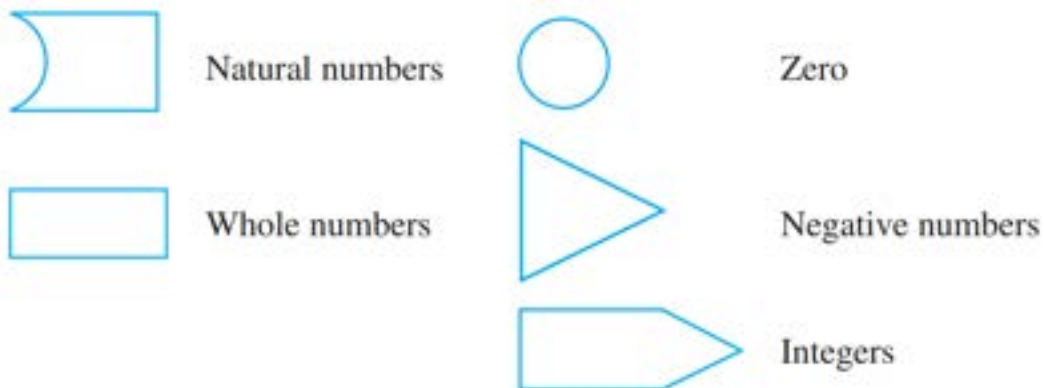
NEGATIVE NUMBERS:

Numbers with a negative sign and are less than zero.



The numbers $-1, -2, -3, -4, \dots$ are referred to as **negative integers**.

INTEGERS: Let us suppose that the figures represent the collection of numbers written against them.



Then the collection of integers can be understood by the following diagram in which all the earlier collections are included:

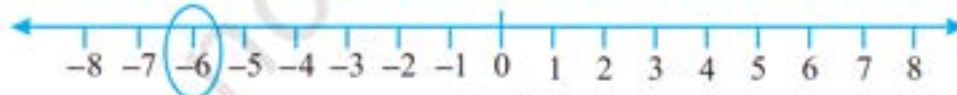


The collection of numbers $0, +1, -1, +2, -2, +3, -3, \dots$ is called **integers**.

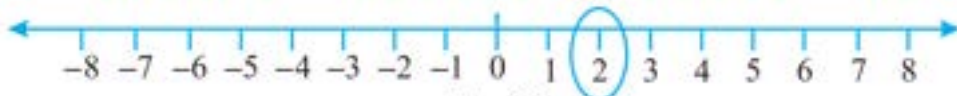
Representation of integers on a number line:



In order to mark -6 and $+2$ on this line, we move 6 points to the left of zero.



In order to mark $+2$ on the number line, we move 2 points to the right of zero.



Ordering of integers:

Let us once again observe the integers which are represented on the number line.



We know that $7 > 4$ and from the number line shown above, we observe that 7 is to the right of 4. Similarly, $4 > 0$ and 4 is to the right of 0. Now, since 0 is to the right of -3 so, $0 > -3$. Again, -3 is to the right of -8 so, $-3 > -8$.

Addition of Integers:

$$(+5) + (+3) = +8, (-6) + (-2) = -8,$$

$$(-5) + (+12) = +7, \quad (-8) + (+5) = -3$$

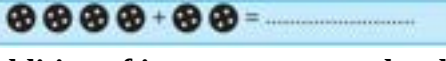
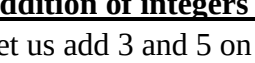
$$(+7) + (-10) = -3$$

Addition of integers are shown with the help of coloured buttons:

Let us denote one white button by $(+1)$ and one black button by (-1) . A pair of one white button $(+1)$ and one black button (-1) will denote zero i.e. $[1 + (-1) = 0]$

Coloured Button	Integers
	5
	-3
	0

Let us perform additions with the help of the coloured buttons. Observe the following table and complete it.

	$(+3) + (+2) = +5$
	$(-2) + (-1) = -3$
	
	

Addition of integers on a number line:

Let us add 3 and 5 on number line:



Let us add 3 and -3 . We first move from 0 to $+3$ and then from $+3$, we move 3 points to the left. Where do we reach ultimately?



Numbers such as 3 and -3 , 2 and -2 , when added to each other give the sum zero. They are called **additive inverse** of each other.

Subtraction of Integers with the help of a Number Line:

We also saw that to add 6 and (-2) on a number line we can start from 6 and then move 2 steps to the left of 6. We reach at 4. So, we have, $6 + (-2) = 4$.



Let us now find the value of $-5 - (-4)$ using a number line. We can say that this is the same as $-5 + (4)$, as the additive inverse of -4 is 4. We move 4 steps to the right on the number line starting from -5 .



Some Important Illustration /Examples:

MCQ:

Q1: 1. Every integer less than 0 has the sign

(A) + (B) – (C) $\times$ (D) $\div$ 2.

ANSWER: Negative Sign (B) -

Q2. The integer '5 units to the right of 0 on the number line' is

(A) +5 (B) –5 (C) +4 (D) –4

ANSWER: (A) +5

Q3. The predecessor of the integer –1 is

(A) 0 (B) 2 (C) –2 (D) 1

ANSWER: (C) –2

Q4. Number of integers lying between –1 and 1 is

(A) 1 (B) 2 (C) 3 (D) 0

ANSWER: (D) 0

SHORT ANSWER QUESTION:

Q1: Represent the following using integers with proper sign:

(a) 3 km above sea level

(b) A loss of Rs 500

Solution: (a)+3

(b) –500

Q2: Subtract: (i) 3 from –4

(ii) –3 from –4

Solution: (a) The additive inverse of 3 is –3. So, $-4 - 3 = -4 + (-3) = -(4 + 3) = -7$

(b) The additive inverse of –3 is +3. So, $-4 - (-3) = -4 + (+3) = -1$

Q3: How many integers are there between –9 and –2 ?

Solution: The integers –8, –7, –6, –5, –4 and –3 lie between –9 and –2. So, there are six integers between –9 and –2.

Q4: The sum of two integers is 47. If one of the integers is –24, find the other.

Solution: As the sum is 47, the other integer is obtained by subtracting –24 from 47. So, the required integer = $47 - (-24) = 47 + 24 = 71$.

LONG ANSWER QUESTION:

Q1: Write five distinct integers whose sum is 5.

Solution: As the required sum is 5, keep 5 as one of the integers and write two pairs of integers which are additive inverses of each other.

For example, $5 + [2 + (-2)] + [3 + (-3)] = 5$. Thus, the required five integers are 5, 2, –2, 3, –3 There can be many combinations of five integers, such as 5, 3, –3, 6, –6 or 4, 2, 3, –3, –1 etc., whose sum is 5.

Q2: Temperature of a place at 12:00 noon was +5°C. Temperature increased by 3°C in first hour and decreased by 1°C in the second hour. What was the temperature at 2:00 pm?

Solution: Temperature of a place at 12:00 noon = +5°C

Change in Temperature in first hour = +3°C

Change in Temperature in second hour = –1°C

So, Temperature at 2:00 pm = +5°C + (+3) + (–1) = 5 + 3 – 1 = +7°C



QUESTION FOR PRACTICE:

MCQ:

- Q1. Number of whole numbers lying between -5 and 5 is
(A) 10 (B) 3 (C) 4 (D) 5
- Q2. The greatest integer lying between -10 and -15 is
(A) -10 (B) -11 (C) -15 (D) -14
- Q3. The least integer lying between -10 and -15 is
(A) -10 (B) -11 (C) -15 (D) -14
- Q4. On the number line, the integer 5 is located
(A) to the left of 0 (B) to the right of 0 (C) to the left of 1 (D) to the left of -2
- Q5. In which of the following pairs of integers, the first integer is not on the left of the other integer on the number line? (A) $(-1, 10)$ (B) $(-3, -5)$ (C) $(-5, -3)$ (D) $(-6, 0)$
- Q6. The integer with negative sign $(-)$ is always less than
(A) 0 (B) -3 (C) -1 (D) -2
- Q7. An integer with positive sign $(+)$ is always greater than
(A) 0 (B) 1 (C) 2 (D) 3
- Q8. The successor of the predecessor of -50 is
(A) -48 (B) -49 (C) -50 (D) -51
- Q9. When a negative integer is subtracted from another negative integer, the sign of the result
(A) is always negative (B) is always positive
(C) is never negative (D) depends on the numerical value of the integers
- Q10. Amulya and Amar visited two places A and B respectively in Kashmir and recorded the minimum temperatures on a particular day as -4°C at A and -1°C at B. Which of the following statement is true?
(A) A is cooler than B (B) B is cooler than A
(C) There is a difference of 2°C in the temperature (D) The temperature at A is 4°C higher than that at B.



SHORT ANSWER TYPE QUESTIONS:

- Q1. On the number line, -15 is to the _____ of zero
- Q2. On the number line, 10 is to the _____ of zero.
- Q3. The additive inverse of 14 is _____.
- Q4. Compute: $70 + (-20) + (-30)$
- Q5. If we denote the height of a place above sea level by a positive integer and depth below the sea level by a negative integer, write the following using integers with the appropriate signs:
(a) 200 m above sea level (b) 100 m below sea level
- Q6. Write the opposite of each of the following
(a) Decrease in size (b) Failure (c) Profit of Rs.10 (d) 1000 A.D.
- Q7. Write the integer which is 4 more than its additive inverse.
- Q8. Write the integer which is 2 less than its additive inverse.
- Q9. Sum of two integers is -80 . If one of the integers is -90 , then find the other.
- Q10. Subtract -5308 from the sum $[(-2100) + (-2001)]$

LONG ANSWER QUESTIONS

- Q1. Using the number line, write the integer which is (a) 4 more than -5 (b) 3 less than 2 (c) 2 less than -2 .
- Q2. Match the items of Column I with that of Column II:

Column I	Column II
(i) The additive inverse of +2	(A) 0
(ii) The greatest negative integer	(B) -2
(iii) The greatest negative even integer	(C) 2
(iv) The smallest integer greater than every negative integer	(D) 1
(v) Sum of predecessor and successor of -1	(E) -1

Q3. Write five distinct integers whose sum is 5.

Q4. If we are at 8 on the number line, in which direction should we move to reach the integer

(a) -5 (b) 11 (c) 0?

Q5. The temperature on a certain morning is -11°C at 5 a. m. If the temperature drops 3 degree at 6 a.m. and rises 5 degree at 8 a.m. and again drops 3 degree at 9 a.m. What is the temperature at 9 a.m.?

Q6. Write the opposite of each of the following:

(a) 20°C rise in temperature. (b) 60 km south (c) Depositing Rs.100 in the Bank account

(d) 20 m below the danger mark of the river Brahmaputra (e) Winning by a margin of 2000 votes

ANSWERS:

MCQ

Q1: D Q2: A Q3: C Q4: B Q5: B Q6: A Q7: A
Q8: C Q9: D Q10: A

SHORT ANSWER TYPE QUESTIONS:

Q1: LEFT Q2: RIGHT Q3: -14 Q4: 50 Q5: (a) +200m (b) -100m
Q6: (a) Increase in size (b) Pass (c) Loss of Rs.10 (d) 1000 B. C. Q7: 0
Q8: -1 or +1 Q9: -2 or +2 Q10: 1207



LONG ANSWER QUESTIONS

Q1. (a) -1 (b). -1 (c). 0

Q2. (i) $\rightarrow (B) - 2$ (ii) $\rightarrow (E) - 1$ (iii) $\rightarrow ((B) - 2$

(iv) $\rightarrow (A) 0$ (v) $\rightarrow (B) - 2$

Q3. There can be many combinations of five integers, such as 5, 3, -3, 6, -6 OR 4, 2, 3, -3, -1 etc., whose sum is 5.

Q4. (a) Left Side (West) (b) Right Side (East) (c) Left Side (West)

Q5. -12°C

Q6.

(a) 20°C fall in temperature.

(b) 60 km north

(c) Withdraw Rs.100 in the Bank account

(d) 20 m above the danger mark of the river Brahmaputra

(e) Lost by a margin of 2000 votes

Chapter Test-1 (20 Marks)

Q1. Write the integer which is 2 less than its additive inverse. (2)

Q2. Arrange the following integers in the ascending order : -2, 1, 0, -3, +4, -5 (2)

Q3. The sum of two integers is 30. If one of the integers is -42, then find the other. (2)

Q4. Write five integers which are less than -100 but greater than -150. (2)

Q5. Find the value of $49 - (-40) - (-3) + 69$ (2)

Q6. Find the sum of -2 and -3 , using the number line. (2)

Q7. Compute each of the following: (3)

(a) $30 + (-25) + (-10)$ (b) $-50 + (-60) + 50$ (c) $0 - (-6) - (+6)$

Q8. Case study-based question: (5)

The faces of two dice are marked $+1, +2, +3, +4, +5, +6$ and $-1, -2, -3, -4, -5, -6$, respectively. Two players throw the pair of dice alternately and record the sum of the numbers that turn up each time and keep adding their scores separately. The player whose score reaches 20 or more first, wins the game.

(i) What can be the possible scores in a single throw of the pair of dice?

(ii) What is the maximum score?

(iii) What is the minimum score?

(iv) A player gets his score 20 as follows: $(5) + (-4) + (6) + (2) + (+5) + (4) + (2)$ Is he a winner?

(v) What is the minimum number of throws needed to win the game?

Chapter Test-2 (30 Marks)

Q1. Write two integers whose sum is less than both the integers. (2)

Q2. The sum of two integers is 47. If one of the integers is -24 , find the other. (2)

Q3. Fill in the blanks with $>$, $<$ or $=$ sign.

(a) $45 - (-11)$ _____ $57 + (-4)$ (b) $(-25) - (-42)$ _____ $(-42) - (-25)$ (2)

Q4. Using the number line, subtract -4 from 9. (2)

Q5. Calculate: $1 - 2 + 3 - 4 + 5 - 6 + 7 - 8 + 9 - 10$ (2)

Q6. Write the opposite of each of the following: (3)

(a) 20 m below the danger mark of the river Brahmaputra (b) Depositing Rs.500 in the Bank account

(c) An aeroplane is flying at a height two thousand metre above the ground.

Q7. Temperature of a place at 12:00 noon was $+10^{\circ}\text{C}$. Temperature increased by 4°C in first hour and decreased by 2°C in the second hour. What was the temperature at 2:00 pm? (3)

Q8. Find the sum: (a) $(-7) + (-9) + 4 + 16$ (b) $(37) + (-2) + (-65) + (-8)$ (4)

Q9. Find the value of the following using number line:

(a) $-8 - (-10)$ (b) $-5 + (-6)$ (4)

Q10. Compare the following pairs of numbers using $>$ or $<$ (6)

0 _____ -8 ; -1 _____ -15 ; 5 _____ -5 ; 11 _____ 15 ; 0 _____ 6 ; -20 _____ 2

From the above exercise, Rohini arrived at the following conclusions:

(a) Every positive integer is larger than every negative integer.

(b) Zero is larger than every negative integer.

(c) Zero is neither a negative integer nor a positive integer.

(d) Farther a number from zero on the right, larger is its value.

(e) Farther a number from zero on the left, smaller is its value.

(f) Zero is less than every positive integer.

Do you agree with her? Give examples.





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