

## EXERCISE 1.1

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1. Following number line shows the temperature in degree celsius ( $^{\circ}\text{C}$ ) 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  $-8^{\circ}\text{C}$

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

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

The temperature in Ooty is  $14^{\circ}\text{C}$

The temperature in Bengaluru is  $22^{\circ}\text{C}$

(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  $22^{\circ}\text{C}$

The temperature at the coldest place, i.e., Lahulspiti, is  $-8^{\circ}\text{C}$

Temperature difference between hottest and coldest place is  $= 22^{\circ}\text{C} - (-8^{\circ}\text{C})$

$= 22^{\circ}\text{C} + 8^{\circ}\text{C}$

$= 30^{\circ}\text{C}$

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

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

**Solution:-**

From the given number line,

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

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

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

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

$$= 6^{\circ}\text{C}$$

**(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  $= -2^{\circ}\text{C}$

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

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

$$= 3^{\circ}\text{C}$$

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

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  $-5^{\circ}\text{C}$  on Monday, and then it dropped by  $2^{\circ}\text{C}$  on Tuesday. What was the temperature of Srinagar on Tuesday? On Wednesday, it rose by  $4^{\circ}\text{C}$ . What was the temperature on this day?**

**Solution:-**

From the question,

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

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

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

$$= -7^{\circ}\text{C}$$

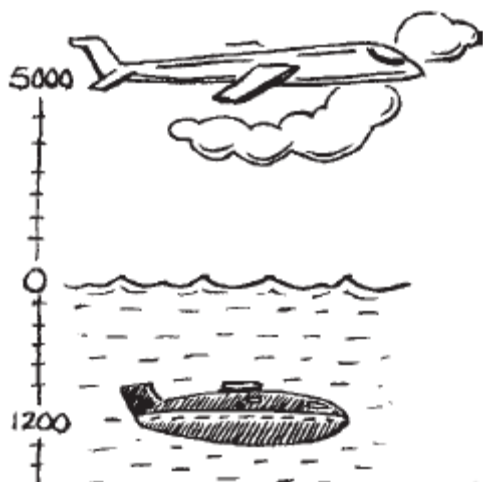
The temperature on Wednesday in Srinagar rose by  $4^{\circ}\text{C}$  = Temperature on Tuesday  $+ 4^{\circ}\text{C}$

$$= -7^{\circ}\text{C} + 4^{\circ}\text{C}$$

$$= -3^{\circ}\text{C}$$

Thus, the temperature on Tuesday and Wednesday was  $-7^{\circ}\text{C}$  and  $-3^{\circ}\text{C}$ , 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 =  $5000 \text{ m} - (-1200) \text{ m}$

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

= 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,

$$a = 21 \text{ and } b = 18$$

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

$$\text{LHS} = \text{RHS}$$

$$39 = 39$$

Hence, the value of  $a$  and  $b$  is verified.

**(ii)  $a = 118$ ,  $b = 125$**

**Solution:-**

From the question,

$$a = 118 \text{ and } b = 125$$

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,

$$\text{LHS} = \text{RHS}$$

$$243 = 243$$

Hence, the value of a and b is verified.

**(iii)  $a = 75$ ,  $b = 84$**

**Solution:-**

From the question,

$$a = 75 \text{ and } b = 84$$

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,

$$\text{LHS} = \text{RHS}$$

$$159 = 159$$

Hence, the value of a and b is verified.

**(iv)  $a = 28$ ,  $b = 11$**

**Solution:-**

From the question,

$$a = 28 \text{ and } b = 11$$



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,

$$\text{LHS} = \text{RHS}$$

$$39 = 39$$

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,

$$\text{LHS} < \text{RHS}$$

$$-12 < -4$$

$$\therefore (-8) + (-4) [<] (-8) - (-4)$$

**(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,

$$\text{LHS} < \text{RHS}$$

$$-15 < -2$$

$$\therefore (-3) + 7 - (19) [<] 15 - 8 + (-9)$$

$$\text{(c) } 23 - 41 + 11 [ ] 23 - 41 - 11$$

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,

$$\text{LHS} > \text{RHS}$$

$$-7 > -29$$

$$\therefore 23 - 41 + 11 [>] 23 - 41 - 11$$

$$\text{(d) } 39 + (-24) - (15) [ ] 36 + (-52) - (-36)$$

**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,

$$\text{LHS} < \text{RHS}$$

$$0 < 20$$

$$\therefore 39 + (-24) - (15) [<] 36 + (-52) - (-36)$$

$$\text{(e) } -231 + 79 + 51 [ ] -399 + 159 + 81$$

**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,

$$\text{LHS} > \text{RHS}$$

$$-101 > -159$$

$$\therefore -231 + 79 + 51 [>] -399 + 159 + 81$$

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 1<sup>st</sup> jump, the monkey will be at step =  $1 + 3 = 4$  steps

In 2<sup>nd</sup> jump, the monkey will be at step =  $4 + (-2) = 4 - 2 = 2$  steps

In 3<sup>rd</sup> jump, the monkey will be at step =  $2 + 3 = 5$  steps

In 4<sup>th</sup> jump, the monkey will be at step =  $5 + (-2) = 5 - 2 = 3$  steps

In 5<sup>th</sup> jump, the monkey will be at step =  $3 + 3 = 6$  steps

In 6<sup>th</sup> jump, the monkey will be at step =  $6 + (-2) = 6 - 2 = 4$  steps

In 7<sup>th</sup> jump, the monkey will be at step =  $4 + 3 = 7$  steps

In 8<sup>th</sup> jump, the monkey will be at step =  $7 + (-2) = 7 - 2 = 5$  steps

In 9<sup>th</sup> jump, the monkey will be at step =  $5 + 3 = 8$  steps

In 10<sup>th</sup> jump, the monkey will be at step =  $8 + (-2) = 8 - 2 = 6$  steps

In 11<sup>th</sup> jump, the monkey will be at step =  $6 + 3 = 9$  steps

∴ The monkey took 11 jumps (i.e., the 9<sup>th</sup> 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 1<sup>st</sup> jump, the monkey will be at step =  $9 + (-4) = 9 - 4 = 5$  steps

In 2<sup>nd</sup> jump, the monkey will be at step =  $5 + 2 = 7$  steps

In 3<sup>rd</sup> jump, the monkey will be at step =  $7 + (-4) = 7 - 4 = 3$  steps

In 4<sup>th</sup> jump, the monkey will be at step =  $3 + 2 = 5$  steps

In 5<sup>th</sup> 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)  $-3 + 2 - \dots = -8$  (b)  $4 - 2 + \dots = 8$ . 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)

$$= -3 + 2 - \dots = -8$$

$$\text{Then, LHS} = -3 + 2 - 3 + 2 - 3 + 2 - 3 + 2 - 3 + 2 - 3$$

$$= -18 + 10$$

$$= -8$$

$$\text{RHS} = -8$$

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

Now,

Monkey moves in part (ii)

$$= 4 - 2 + \dots\dots\dots = 8$$

$$\text{Then, LHS} = 4 - 2 + 4 - 2 + 4$$

$$= 12 - 4$$

$$= 8$$

$$\text{RHS} = 8$$

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

## EXERCISE 1.2

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1. Write down a pair of integers whose:

(a) sum is -7

Solution:-

$$= -4 + (-3)$$

$$= -4 - 3 \dots [\because (+ \times - = -)]$$

$$= -7$$

(b) the difference is - 10

Solution:-

$$= -25 - (-15)$$

$$= -25 + 15 \dots [\because (- \times - = +)]$$

$$= -10$$

(c) sum is 0

Solution:-

$$= 4 + (-4)$$

$$= 4 - 4$$

$$= 0$$

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

Solution:-

$$= (-5) - (-13)$$

$$= -5 + 13 \dots [\because (- \times - = +)]$$

$$= 8$$

(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:-**

$$= -2 - (1)$$

$$= -2 - 1$$

$$= -3$$

**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

The score of team A =  $-40, 10, 0$

Total score obtained by team A =  $-40 + 10 + 0$

$$= -30$$

The score of team B =  $10, 0, -40$

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

$$= 10 + 0 - 40$$

$$= -30$$

Thus, the score of both the A team and B team is the 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)  $(-5) + (-8) = (-8) + (\dots\dots\dots)$**

**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.

$$(-5) + (-8) = (-8) + (-5) \dots \text{[This equation is in the form of the Commutative Law of Addition]}$$

**(ii)  $-53 + \dots = -53$**

**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.

$$= -53 + 0 = -53 \dots \text{[This equation is in the form of the Closure Property of Addition]}$$

**(iii)  $17 + \dots = 0$**

**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.

$$= 17 + (-17) = 0 \dots \text{[This equation is in the form of Closure Property of Addition]}$$

$$= 17 - 17 = 0$$

$$\text{(iv) } [13 + (-12)] + (\dots\dots\dots) = 13 + [(-12) + (-7)]$$

**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.

$$= [13 + (-12)] + (-7) = 13 + [(-12) + (-7)] \dots \text{[This equation is in the form of Associative Property of Addition]}$$

$$\text{(v) } (-4) + [15 + (-3)] = [-4 + 15] + \dots\dots\dots$$

**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.

$$= (-4) + [15 + (-3)] = [-4 + 15] + -3 \dots \text{[This equation is in the form of Associative Property of Addition]}$$



## EXERCISE 1.3

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1. Find each of the following products:

(a)  $3 \times (-1)$

**Solution:-**

By the rule of Multiplication of integers,

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

$$= -3 \dots [\because (+ \times - = -)]$$

(b)  $(-1) \times 225$

**Solution:-**

By the rule of Multiplication of integers,

$$= (-1) \times 225$$

$$= -225 \dots [\because (- \times + = -)]$$

(c)  $(-21) \times (-30)$

**Solution:-**

By the rule of Multiplication of integers,

$$= (-21) \times (-30)$$

$$= 630 \dots [\because (- \times - = +)]$$

(d)  $(-316) \times (-1)$

**Solution:-**

By the rule of Multiplication of integers,

$$= (-316) \times (-1)$$

$$= 316 \dots [\because (- \times - = +)]$$

(e)  $(-15) \times 0 \times (-18)$

**Solution:-**

By the rule of Multiplication of integers,

$$= (-15) \times 0 \times (-18)$$

$$= 0$$

$\therefore$  If any integer is multiplied by zero, the answer is zero itself.

**(f)  $(-12) \times (-11) \times (10)$**

**Solution:-**

By the rule of Multiplication of integers,

$$= (-12) \times (-11) \times (10)$$

First, multiply the two numbers having the same sign.

$$= 132 \times 10 \dots [\because (- \times - = +)]$$

$$= 1320$$

**(g)  $9 \times (-3) \times (-6)$**

**Solution:-**

By the rule of Multiplication of integers,

$$= 9 \times (-3) \times (-6)$$

First, multiply the two numbers having the same sign.

$$= 9 \times 18 \dots [\because (- \times - = +)]$$

$$= 162$$

**(h)  $(-18) \times (-5) \times (-4)$**

**Solution:-**

By the rule of Multiplication of integers,

$$= (-18) \times (-5) \times (-4)$$

First, multiply the two numbers having the same sign.

$$= 90 \times -4 \dots [\because (- \times - = +)]$$

$$= -360 \dots [\because (+ \times - = -)]$$

**(i)  $(-1) \times (-2) \times (-3) \times 4$**

**Solution:-**

By the rule of Multiplication of integers,

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

$$= 2 \times (-12) \dots [\because (- \times - = +), (- \times + = -)]$$

$$= -24$$

**(j)  $(-3) \times (-6) \times (-2) \times (-1)$**

**Solution:-**

By the rule of Multiplication of integers,

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

First, multiply the two numbers having the same sign.

$$= 18 \times 2 \dots [\because (- \times - = +)]$$

$$= 36$$

**2. Verify the following:**

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

**Solution:-**

From the given equation,

Let us consider the Left Hand Side (LHS) first  $= 18 \times [7 + (-3)]$

$$= 18 \times [7 - 3]$$

$$= 18 \times 4$$

$$= 72$$

Now, consider the Right Hand Side (RHS)  $= [18 \times 7] + [18 \times (-3)]$

$$= [126] + [-54]$$

$$= 126 - 54$$

$$= 72$$

By comparing LHS and RHS,

$$72 = 72$$

$$\text{LHS} = \text{RHS}$$

Hence, the given equation is verified.

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

**Solution:-**

From the given equation,

$$\text{Let us consider the Left Hand Side (LHS) first} = (-21) \times [(-4) + (-6)]$$

$$= (-21) \times [-4 - 6]$$

$$= (-21) \times [-10]$$

$$= 210$$

$$\text{Now, consider the Right Hand Side (RHS)} = [(-21) \times (-4)] + [(-21) \times (-6)]$$

$$= [84] + [126]$$

$$= 210$$

By comparing LHS and RHS,

$$210 = 210$$

$$\text{LHS} = \text{RHS}$$

Hence, the given equation is verified.

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

**Solution:-**

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

When we multiply any integer  $a$  with  $-1$ , then we get the additive inverse of that integer.

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

**(a)  $-22$**

**Solution:-**

Now, multiply  $-22$  with  $(-1)$ , and we get

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

$$= 22$$

When we multiply integer -22 with -1, then we get the additive inverse of that integer.

**(b) 37**

**Solution:-**

Now, multiply 37 with (-1), and we get

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

$$= -37$$

When we multiply integer 37 with -1, then we get the additive inverse of that integer.

**(c) 0**

**Solution:-**

Now, multiply 0 by (-1), and we get

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

$$= 0$$

Because the product of negative integers and zero gives zero only.

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

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

**Solution:-**

The various products are,

$$= -1 \times 5 = -5$$

$$= -1 \times 4 = -4$$

$$= -1 \times 3 = -3$$

$$= -1 \times 2 = -2$$

$$= -1 \times 1 = -1$$

$$= -1 \times 0 = 0$$

$$= -1 \times -1 = 1$$

We concluded that the product of one negative integer and one positive integer is a negative integer. Then, the product of two negative integers is a positive integer.



5. Find the product using suitable properties:

(a)  $26 \times (-48) + (-48) \times (-36)$

**Solution:-**

The given equation is in the form of the Distributive Law of Multiplication over Addition.

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

Let,  $a = -48$ ,  $b = 26$ ,  $c = -36$

Now,

$$= 26 \times (-48) + (-48) \times (-36)$$

$$= -48 \times (26 + (-36))$$

$$= -48 \times (26 - 36)$$

$$= -48 \times (-10)$$

$$= 480 \dots [\because (- \times - = +)]$$

(b)  $8 \times 53 \times (-125)$

**Solution:-**

The given equation is in the form of the Commutative Law of Multiplication.

$$= a \times b = b \times a$$

Then,

$$= 8 \times [53 \times (-125)]$$

$$= 8 \times [(-125) \times 53]$$

$$= [8 \times (-125)] \times 53$$

$$= [-1000] \times 53$$

$$= -53000$$

(c)  $15 \times (-25) \times (-4) \times (-10)$

**Solution:-**

The given equation is in the form of the Commutative Law of Multiplication.

$$= a \times b = b \times a$$

Then,

$$= 15 \times [(-25) \times (-4)] \times (-10)$$

$$= 15 \times [100] \times (-10)$$

$$= 15 \times [-1000]$$

$$= -15000$$

**(d)  $(-41) \times 102$**

**Solution:-**

The given equation is in the form of the Distributive Law of Multiplication over Addition.

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

$$= (-41) \times (100 + 2)$$

$$= (-41) \times 100 + (-41) \times 2$$

$$= -4100 - 82$$

$$= -4182$$

**(e)  $625 \times (-35) + (-625) \times 65$**

**Solution:-**

The given equation is in the form of the Distributive Law of Multiplication over Addition.

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

$$= 625 \times [(-35) + (-65)]$$

$$= 625 \times [-100]$$

$$= -62500$$

**(f)  $7 \times (50 - 2)$**

**Solution:-**

The given equation is in the form of the Distributive Law of Multiplication over Subtraction.

$$= a \times (b - c) = (a \times b) - (a \times c)$$

$$= (7 \times 50) - (7 \times 2)$$

$$= 350 - 14$$

$$= 336$$

**(g)  $(-17) \times (-29)$**

**Solution:-**

The given equation is in the form of the Distributive Law of Multiplication over Addition.

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

$$= (-17) \times [-30 + 1]$$

$$= [(-17) \times (-30)] + [(-17) \times 1]$$

$$= [510] + [-17]$$

$$= 493$$

**(h)  $(-57) \times (-19) + 57$**

**Solution:-**

The given equation is in the form of the Distributive Law of Multiplication over Addition.

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

$$= (57 \times 19) + (57 \times 1)$$

$$= 57 [19 + 1]$$

$$= 57 \times 20$$

$$= 1140$$

**6. A certain freezing process requires that room temperature be lowered from  $40^{\circ}\text{C}$  at the rate of  $5^{\circ}\text{C}$  every hour. What will be the room temperature 10 hours after the process begins?**

**Solution:-**

From the question,

Let us take the lowered temperature as negative.

Initial temperature =  $40^{\circ}\text{C}$

Change in temperature per hour =  $-5^{\circ}\text{C}$

Change in temperature after 10 hours =  $(-5) \times 10 = -50^{\circ}\text{C}$

$\therefore$  The final room temperature after 10 hours of freezing process =  $40^{\circ}\text{C} + (-50^{\circ}\text{C})$

$$= -10^{\circ}\text{C}$$

7. 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?

**Solution:-**

From the question,

Marks awarded for 1 correct answer = 5

Then,

Total marks awarded for 4 correct answer =  $4 \times 5 = 20$

Marks awarded for 1 wrong answer = -2

Then,

Total marks awarded for 6 wrong answer =  $6 \times -2 = -12$

$\therefore$  Total score obtained by Mohan =  $20 + (-12)$

$$= 20 - 12$$

$$= 8$$

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

**Solution:-**

From the question,

Marks awarded for 1 correct answer = 5

Then,

Total marks awarded for 5 correct answer =  $5 \times 5 = 25$

Marks awarded for 1 wrong answer = -2

Then,

Total marks awarded for 5 wrong answer =  $5 \times -2 = -10$

$\therefore$  Total score obtained by Reshma =  $25 + (-10)$

$$= 25 - 10$$

$$= 15$$

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

**Solution:-**

From the question,

Marks awarded for 1 correct answer = 5

Then,

Total marks awarded for 2 correct answer =  $2 \times 5 = 10$

Marks awarded for 1 wrong answer = -2

Then,

Total marks awarded for 5 wrong answer =  $5 \times -2 = -10$

Marks awarded for questions not attempted is = 0

$\therefore$  Total score obtained by Heena =  $10 + (-10)$

$$= 10 - 10$$

$$= 0$$

**8. 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?**

**Solution:-**

We denote profit in a positive integer and loss in a negative integer,

From the question,

The cement company earns a profit on selling 1 bag of white cement = ₹ 8 per bag

Then,

The cement company earns a profit on selling 3000 bags of white cement =  $3000 \times ₹ 8$

$$= ₹ 24000$$

Loss on selling 1 bag of grey cement = - ₹ 5 per bag

Then,

$$\text{Loss on selling 5000 bags of grey cement} = 5000 \times - ₹ 5$$

$$= - ₹ 25000$$

$$\text{Total loss or profit earned by the cement company} = \text{profit} + \text{loss}$$

$$= 24000 + (-25000)$$

$$= - ₹ 1000$$

Thus, a loss of ₹ 1000 will be incurred by the company.

**(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?**

**Solution:-**

We denote profit in a positive integer and loss in a negative integer,

From the question,

The cement company earns a profit on selling 1 bag of white cement = ₹ 8 per bag

Let the number of white cement bags be  $x$ .

Then,

$$\text{Cement company earns a profit on selling } x \text{ bags of white cement} = (x) \times ₹ 8$$

$$= ₹ 8x$$

$$\text{Loss on selling 1 bag of grey cement} = - ₹ 5 \text{ per bag}$$

Then,

$$\text{Loss on selling 6400 bags of grey cement} = 6400 \times - ₹ 5$$

$$= - ₹ 32000$$

According to the question,

The company must sell to have neither profit nor loss.

$$= \text{profit} + \text{loss} = 0$$

$$= 8x + (-32000) = 0$$

By sending -32000 from LHS to RHS, it becomes 32000

$$= 8x = 32000$$

$$= x = 32000/8$$

$$= x = 4000$$

Hence, the 4000 bags of white cement have neither profit nor loss.

**9. Replace the blank with an integer to make it a true statement.**

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

**Solution:-**

Let us assume the missing integer be x,

Then,

$$= (-3) \times (x) = 27$$

$$= x = -(27/3)$$

$$= x = -9$$

Let us substitute the value of x in the place of blank,

$$= (-3) \times (-9) = 27 \dots [\because (- \times - = +)]$$

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

**Solution:-**

Let us assume the missing integer be x.

Then,

$$= (5) \times (x) = -35$$

$$= x = -(-35/5)$$

$$= x = -7$$

Let us substitute the value of x in the place of the blank.

$$= (5) \times (-7) = -35 \dots [\because (+ \times - = -)]$$

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

**Solution:-**

Let us assume the missing integer be x.

Then,

$$= (x) \times (-8) = -56$$

$$= x = (-56/-8)$$

$$= x = 7$$

Let us substitute the value of x in the place of the blank.

$$= (7) \times (-8) = -56 \dots [\because (+ \times - = -)]$$

**(d) \_\_\_\_\_  $\times$  (-12) = 132**

**Solution:-**

Let us assume the missing integer be x.

Then,

$$= (x) \times (-12) = 132$$

$$= x = - (132/12)$$

$$= x = - 11$$

Let us substitute the value of x in the place of the blank.

$$= (-11) \times (-12) = 132 \dots [\because (- \times - = +)]$$





## EXERCISE 1.4

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1. Evaluate each of the following.

(a)  $(-30) \div 10$

**Solution:-**

$$= (-30) \div 10$$

$$= -3$$

When we divide a negative integer by a positive integer, we first divide them as whole numbers and then put the minus sign (-) before the quotient.

(b)  $50 \div (-5)$

**Solution:-**

$$= (50) \div (-5)$$

$$= -10$$

When we divide a positive integer by a negative integer, we first divide them as whole numbers and then put the minus sign (-) before the quotient.

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

**Solution:-**

$$= (-36) \div (-9)$$

$$= 4$$

When we divide a negative integer by a negative integer, we first divide them as whole numbers and then put the positive sign (+) before the quotient.

(d)  $(-49) \div (49)$

**Solution:-**

$$= (-49) \div 49$$

$$= -1$$

When we divide a negative integer by a positive integer, we first divide them as whole numbers and then put the minus sign (-) before the quotient.

**(e)  $13 \div [(-2) + 1]$**

**Solution:-**

$$= 13 \div [(-2) + 1]$$

$$= 13 \div (-1)$$

$$= -13$$

When we divide a positive integer by a negative integer, we first divide them as whole numbers and then put the minus sign (-) before the quotient.

**(f)  $0 \div (-12)$**

**Solution:-**

$$= 0 \div (-12)$$

$$= 0$$

When we divide zero by a negative integer, it gives zero.

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

**Solution:-**

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

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

$$= (-31) \div (-31)$$

$$= 1$$

When we divide a negative integer by a negative integer, we first divide them as whole numbers and then put the positive sign (+) before the quotient.

**(h)  $[(-36) \div 12] \div 3$**

**Solution:-**

First, we have to solve the integers within the bracket.

$$= [(-36) \div 12]$$

$$= (-36) \div 12$$

$$= -3$$

Then,

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

$$= -1$$

When we divide a negative integer by a positive integer, we first divide them as whole numbers and then put the minus sign (-) before the quotient.

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

**Solution:-**

The given question can be written as,

$$= [-1] \div [-1]$$

$$= 1$$

When we divide a negative integer by a negative integer, we first divide them as whole numbers and then put the positive sign (+) before the quotient.

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

$$(a) a = 12, b = -4, c = 2$$

**Solution:-**

From the question,  $a \div (b + c) \neq (a \div b) + (a \div c)$

$$\text{Given, } a = 12, b = -4, c = 2$$

Now, consider LHS =  $a \div (b + c)$

$$= 12 \div (-4 + 2)$$

$$= 12 \div (-2)$$

$$= -6$$

When we divide a positive integer by a negative integer, we first divide them as whole numbers and then put the minus sign (-) before the quotient.

Then, consider RHS =  $(a \div b) + (a \div c)$

$$= (12 \div (-4)) + (12 \div 2)$$

$$= (-3) + (6)$$

$$= 3$$

By comparing LHS and RHS,

$$= -6 \neq 3$$

$$= \text{LHS} \neq \text{RHS}$$

Hence, the given values are verified.

$$(b) a = (-10), b = 1, c = 1$$

**Solution:-**

From the question,  $a \div (b + c) \neq (a \div b) + (a \div c)$

$$\text{Given, } a = (-10), b = 1, c = 1$$

$$\text{Now, consider LHS} = a \div (b + c)$$

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

$$= (-10) \div (2)$$

$$= -5$$

When we divide a negative integer by a positive integer, we first divide them as whole numbers and then put the minus sign (-) before the quotient.

$$\text{Then, consider RHS} = (a \div b) + (a \div c)$$

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

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

$$= -10 - 10$$

$$= -20$$

By comparing LHS and RHS,

$$= -5 \neq -20$$

$$= \text{LHS} \neq \text{RHS}$$

Hence, the given values are verified.

**3. Fill in the blanks:**

$$(a) 369 \div \underline{\hspace{1cm}} = 369$$

**Solution:-**

Let us assume the missing integer be x,

Then,

$$= 369 \div x = 369$$

$$= x = (369/369)$$

$$= x = 1$$

Now, put the value of x in the blank.

$$= 369 \div 1 = 369$$

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

**Solution:-**

Let us assume the missing integer be x.

Then,

$$= (-75) \div x = -1$$

$$= x = (-75/-1)$$

$$= x = 75$$

Now, put the value of x in the blank.

$$= (-75) \div 75 = -1$$

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

**Solution:-**

Let us assume the missing integer be x.

Then,

$$= (-206) \div x = 1$$

$$= x = (-206/1)$$

$$= x = -206$$

Now, put the value of x in the blank.

$$= (-206) \div (-206) = 1$$

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

**Solution:-**

Let us assume the missing integer be x.

Then,

$$= (-87) \div x = 87$$

$$= x = (-87)/87$$

$$= x = -1$$

Now, put the value of x in the blank.

$$= (-87) \div (-1) = 87$$

**(e) \_\_\_\_\_  $\div$  1 = - 87**

**Solution:-**

Let us assume the missing integer be x.

Then,

$$= (x) \div 1 = -87$$

$$= x = (-87) \times 1$$

$$= x = -87$$

Now, put the value of x in the blank.

$$= (-87) \div 1 = -87$$

**(f) \_\_\_\_\_  $\div$  48 = -1**

**Solution:-**

Let us assume the missing integer be x.

Then,

$$= (x) \div 48 = -1$$

$$= x = (-1) \times 48$$

$$= x = -48$$

Now, put the value of x in the blank.

$$= (-48) \div 48 = -1$$

**(g) 20  $\div$  \_\_\_\_\_ = -2**

**Solution:-**

Let us assume the missing integer be x.

Then,

$$= 20 \div x = -2$$

$$= x = (20) / (-2)$$

$$= x = -10$$

Now, put the value of x in the blank.

$$= (20) \div (-10) = -2$$

$$(h) \text{ \_\_\_\_\_\_ } \div (4) = -3$$

**Solution:-**

Let us assume the missing integer be x.

Then,

$$= (x) \div 4 = -3$$

$$= x = (-3) \times 4$$

$$= x = -12$$

Now, put the value of x in the blank.

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

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

**Solution:-**

$$(i) (15, -5)$$

$$\text{Because, } 15 \div (-5) = (-3)$$

$$(ii) (-15, 5)$$

$$\text{Because, } (-15) \div (5) = (-3)$$

$$(iii) (18, -6)$$

$$\text{Because, } 18 \div (-6) = (-3)$$

(iv)  $(-18, 6)$

Because,  $(-18) \div 6 = (-3)$

(v)  $(21, -7)$

Because,  $21 \div (-7) = (-3)$

**5. The temperature at 12 noon was  $10^{\circ}\text{C}$  above zero. If it decreases at the rate of  $2^{\circ}\text{C}$  per hour until midnight, at what time would the temperature be  $8^{\circ}\text{C}$  below zero? What would be the temperature at midnight?**

**Solution:-**

From the question, it is given,

The temperature at the beginning, i.e., at 12 noon =  $10^{\circ}\text{C}$

Rate of change of temperature =  $-2^{\circ}\text{C}$  per hour

Then,

Temperature at 1 PM =  $10 + (-2) = 10 - 2 = 8^{\circ}\text{C}$

Temperature at 2 PM =  $8 + (-2) = 8 - 2 = 6^{\circ}\text{C}$

Temperature at 3 PM =  $6 + (-2) = 6 - 2 = 4^{\circ}\text{C}$

Temperature at 4 PM =  $4 + (-2) = 4 - 2 = 2^{\circ}\text{C}$

Temperature at 5 PM =  $2 + (-2) = 2 - 2 = 0^{\circ}\text{C}$

Temperature at 6 PM =  $0 + (-2) = 0 - 2 = -2^{\circ}\text{C}$

Temperature at 7 PM =  $-2 + (-2) = -2 - 2 = -4^{\circ}\text{C}$

Temperature at 8 PM =  $-4 + (-2) = -4 - 2 = -6^{\circ}\text{C}$

Temperature at 9 PM =  $-6 + (-2) = -6 - 2 = -8^{\circ}\text{C}$

$\therefore$  At 9 PM, the temperature will be  $8^{\circ}\text{C}$  below zero.

Then,

The temperature at midnight, i.e., at 12 AM

Change in temperature in 12 hours =  $-2^{\circ}\text{C} \times 12 = -24^{\circ}\text{C}$

So, at midnight temperature will be =  $10 + (-24)$

=  $-14^{\circ}\text{C}$



So, at midnight, the temperature will be  $14^{\circ}\text{C}$  below 0.

**6. 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 scored – 5 marks on this test, though she got 7 correct answers. How many questions has she attempted incorrectly?**

**Solution:-**

From the question,

Marks awarded for 1 correct answer = + 3

Marks awarded for 1 wrong answer = -2

(i) Radhika scored 20 marks.

Then,

Total marks awarded for 12 correct answers =  $12 \times 3 = 36$

Marks awarded for incorrect answers = Total score – Total marks awarded for 12 correct

Answers

$$= 20 - 36$$

$$= -16$$

So, the number of incorrect answers made by Radhika =  $(-16) \div (-2)$

$$= 8$$

(ii) Mohini scored -5 marks.

Then,

Total marks awarded for 7 correct answers =  $7 \times 3 = 21$

Marks awarded for incorrect answers = Total score – Total marks awarded for 12 correct

Answers

$$= -5 - 21$$

$$= -26$$

So, the number of incorrect answers made by Mohini =  $(-26) \div (-2)$

$$= 13$$

7. 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?

**Solution:-**

From the question,

The initial height of the elevator = 10 m

The final depth of the elevator = – 350 m ... [ $\because$  distance descended is denoted by a negative integer]

The total distance to descended by the elevator =  $(-350) - (10)$

= – 360 m

Then,

Time taken by the elevator to descend -6 m = 1 min

So, the time taken by the elevator to descend – 360 m =  $(-360) \div (-6)$

= 60 minutes

= 1 hour

