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Knowing the Numbers

Recall what we have learnt in previous class about integers. We studied that integers comprise of **whole numbers** and **negative numbers**. We also learnt about the representation of integers on the number line, their comparative values, absolute value of an integer, addition and subtraction of integers. Let's briefly revise the main points again.



Integers

A combined set of negative numbers and whole numbers i.e., $\{\dots\dots -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, \dots\dots\}$.

[In this set, all the natural numbers are **positive integers** and others are **negative integers** except '0'. 0 (zero) is neither positive nor negative.]

Absolute Value of an Integer

The absolute value of an integer is the magnitude of the numerical value of an integer regardless of its sign (direction). It is denoted by the symbol ' $|$ '. The absolute value of an integer is always positive or 0 (zero).

Example : $|-5| = 5$
 $|-6 + 4| = |-2| = 2$
 $|7 - 3 - 4| = |0| = 0$

Also, the corresponding positive and negative integers have the same absolute value.

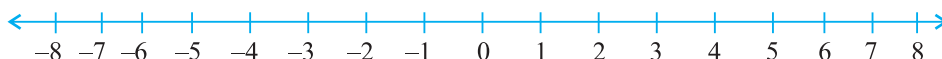
Example : $|25| = 25$ and $|-25| = 25$



Ordering of Integers

Integers and whole numbers obey the same rule in their ordering when represented on a number line, i.e. an integer represented to the right of any integer is greater than that integer and vice-versa.

Examples : $8 > 6, 5 > 3, 3 > 1, -1 > -3, -3 > -5, -7 > -8$



1. For every positive integer placed to the right of zero, there is a negative integer to the left of zero placed at the same distance from zero.
2. Zero is greater than every negative integer and less than every positive integer.
3. Every positive integer is greater than every negative integer.



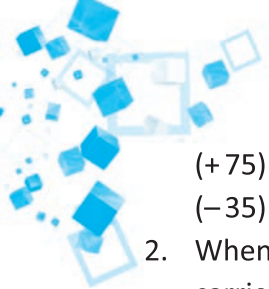
Facts to Know

- The beginning of integers dates back to Babylonia around 4000 years back.
- The first evidence of the use of negative integers had been found in China around 300 BC.



Addition and Subtraction of Integers

1. When two integers with the same sign (either positive or negative) are added, their absolute values are added and the common sign is assigned to their sum.



$$(+75) + (+25) = 100$$

$$(-35) + (-15) = -50$$

2. When two integers with different signs are added, first the difference of their absolute values is found and it carries the sign of the integer having greater absolute value.

$$(+30) + (-12) = 18$$

$$(-30) + (12) = -18$$

$$(+12) + (-30) = -18$$

$$(-12) + (+30) = 18$$

3. When we have to subtract two integers, we change the integer to be subtracted into its corresponding opposite integer and then the two integers are simply added.

$$(+18) - (+13) = (+18) + (-13) = 5$$

$$(-18) - (-13) = (-18) + (+13) = -5$$

$$(+13) - (+18) = (+13) + (-18) = -5$$

$$(-13) - (-18) = (-13) + (+18) = 5$$

$$(+18) - (-13) = (+18) + (+13) = 31$$

$$(-18) - (+13) = (-18) + (-13) = -31$$

$$(+13) - (-18) = (+13) + (+18) = 31$$

$$(-13) - (+18) = (-13) + (-18) = -31$$

Example 1 : Add the following :

(a) (-30) and (-15)

(b) (-6) and 18

(c) 4 and (-12)

(d) (-52) and 25

Solution : (a) (-30) and (-15)

$$= (-30) + (-15)$$

$$= -45$$

(b) (-6) and 18

$$= (-6) + 18$$

$$= 12$$

(c) 4 and (-12)

$$= 4 + (-12)$$

$$= -8$$

(d) (-52) and 25

$$= (-52) + 25$$

$$= (-27)$$

Example 2 : Subtract the following :

(a) $(-8) - (-8)$

(b) $17 - (-33)$

(c) $(-21) - (-8)$

(d) $20 - (-14)$

Solution : (a) $(-8) - (-8)$

$$= -8 + 8 = 0$$

(b) $17 - (-33)$

$$= 17 + 33 = 50$$

(c) $(-21) - (-8)$

$$= -21 + 8$$

$$= -13$$

(d) $20 - (-14)$

$$= 20 + 14$$

$$= 34$$



Exercise 1.1

1. Arrange the following integers in ascending order :

(a) $-28, 7, 1, 3, -7, -12, -1$

(b) $11, -4, 8, 3, -5, 1, 6$

2. Arrange the following integers in descending order :

(a) $-12, 15, 6, -14, -10, 3, -7, 9$

(b) $-16, 14, 2, 6, -8, -10, 0, 8, 13$

3. Write the absolute value of the following :

(a) $|-27 + 68|$

(b) $|21 - 18|$

(c) $|-83 + 0|$

(d) $|72 - 99|$

4. Add the following :

(a) $33 + (-17)$

(b) $-180 + 212$

(c) $0 + (-919)$

(d) $(-815) + (-913)$

5. Subtract the following :

(a) $-32 - (-48)$

(b) $(-45) - (+92)$

(c) $-8 - (-15)$

(d) $165 - (-319)$

6. Which value is higher ?

(a) -4°C or 7°C

(b) 0°F or -4°F

(c) -17°C or -14°C

(d) 44°F or 0°F

7. Complete the following sequences :

(a) $-15, -12, -9, -6, -3, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}$

(b) $45, 51, 57, 63, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}$

8. Write the opposites of the following integers :

(a) -15 +17

(b) -220 -110

(c) -11 +227

(d) 0 +1

(e) -1000 +1

(f) -99 -88





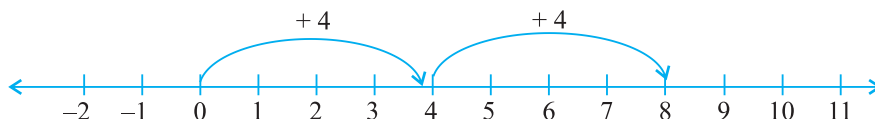
Multiplication of Integers

In previous classes, we have learnt that multiplication is nothing but repeated addition. Therefore, we can find the product of any two integers using repeated addition method.

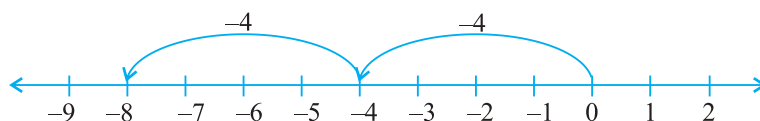
Example : $(+4) \times (+2) = (+4) \times 2 = (+4) + (+4) = 8$

$(-4) \times (+2) = (-4) \times 2 = (-4) + (-4) = -8$

On the number line, $(+4) \times (+2)$ means moving to the right of zero 2 times in steps of 4.



Similarly, $(-4) \times (+2)$ means moving to the left of zero 2 times in steps of 4.



Multiplication of Two Negative Numbers

Observe the following patterns :

$(-5) \times 4 = (-20)$

$(-5) \times 3 = (-15)$

$(-5) \times 2 = (-10)$

$(-5) \times 1 = (-5)$

$(-5) \times 0 = 0$

Here, we observe that when the multiplier is decreased by 1, the product increases by 5. Using this fact, we can proceed like this:

$(-5) \times (-1) = 5$

$(-5) \times (-2) = 10$

$(-5) \times (-3) = 15$

$(-5) \times (-4) = 20$

From the above given examples, we conclude that the product of two integers is the product of their absolute values and their signs are as follows :

- (i) The product of two positive integers carries positive sign.

$(+9) \times (+8) = 72$

$(+12) \times (+7) = 84$

- (ii) The product of two negative integers carries positive sign.

$(-15) \times (-6) = 90$

$(-9) \times (-8) = 72$

- (iii) The product of two integers with opposite signs carries negative sign.

$(-17) \times (+4) = -68$

$(-7) \times (+13) = -91$



Facts to Know

- For multiplying integers we use the following rules :
 - (i) Product of two positive integers is positive (i.e. $++=+$)
 - (ii) Product of two integers with opposite sign is negative (i.e. $+ \times - = -$ or $- \times + = -$)
 - (iii) Product of two negative integers is positive (i.e. $--=+$)



Example 3 : Find the product of the following :

(a) $(-13) \times 9$ (b) $(-15) \times (-15)$ (c) $(+17) \times 5$ (d) $(+6) \times (-19)$

Solution : (a) $(-13) \times 9 = -117$ (minus $\times$ plus = minus)
 (b) $(-15) \times (-15) = 225$ (minus $\times$ minus = plus)
 (c) $(+17) \times 5 = 85$ (plus $\times$ plus = plus)
 (d) $(+6) \times (-19) = -114$ (plus $\times$ minus = minus)

Example 4 : Find the value of the following :

(a) $(-12 + 7) \times 5$ (b) $(-2) \times (-4) \times 4$ (c) $(-4 - 5) \times (-5)$ (d) $(-6 + 11) \times (-2 + 3)$

Solution : (a) $(-12 + 7) \times 5$
 $= (-5) \times 5$
 $= -25$ [$- \times + = -$]

(b) $(-2) \times (-4) \times 4$
 first we multiply -2 and -4
 $(-2) \times (-4) = 8$ [$- \times - = +$]
 Now, multiply
 $8 \times 4 = 32$

(c) $(-4 - 5) \times (-5)$
 $= (-9) \times (-5)$
 $= 45$ [$- \times - = +$]

(d) $(-6 + 11) \times (-2 + 3)$
 $= 5 \times 1$
 $= 5$ [$+ \times + = +$]



Division of Integers

It is well known that **division** is the inverse operation of **multiplication**. When we write $8 \times 4 = 32$, we can say $32 \div 4 = 8$ and $32 \div 8 = 4$. It means, for each multiplication statement there are two division statements.

So, when $(-7) \times 8 = -56$, then
 $(-56) \div (-7) = 8$ and $(-56) \div 8 = -7$

Also, when $(-4) \times (-7) = 28$, then
 $28 \div (-7) = -4$ and $28 \div (-4) = -7$

Some more examples :

$(-5) \times 8 = (-40)$ So, $(-40) \div (-5) = 8$ and $(-40) \div 8 = (-5)$
 $(-14) \times (-3) = 42$ So, $42 \div (-14) = -3$ and $42 \div (-3) = (-14)$
 $(-6) \times 8 = (-48)$ So, $(-48) \div (-6) = 8$ and $(-48) \div 8 = (-6)$
 $4 \times (-17) = (-68)$ So $(-68) \div 4 = -17$ and $(-68) \div (-17) = 4$

From the above examples, we can draw the following conclusions :

- When dividend and the divisor have the same sign (either both positive or both negative), the quotient carries a positive sign.
- When dividend and divisor have different signs (one positive and other negative), the quotient carries a negative sign.



Facts to Know

For dividing integers we use the following rules:

- (i) $- \div - = +$ (ii) $+ \div + = +$ (iii) $- \div + = -$ (iv) $+ \div - = -$

Example 5 : Determine the quotient for the following :

(a) $(-76) \div (-19)$ (b) $75 \div (-15)$ (c) $(-69) \div 23$ (d) $(-48) \div (-4)$





Solution : (a) $(-76) \div (-19)$

$$= \frac{-76}{-19} = 4 \quad [\therefore - \div - = +]$$

(c) $(-69) \div 23$

$$= \frac{-69}{23} = (-3) \quad [\therefore - \div + = -]$$

(b) $75 \div (-15)$

$$= \frac{75}{-15} = (-5) \quad [\therefore + \div - = -]$$

(d) $(-48) \div (-4)$

$$= \frac{-48}{-4} = 12 \quad [\therefore - \div - = +]$$

Example 6 : Find the integer which gives (-54) when multiplied by (-6) .

Solution : Let the unknown integer be x ,

According to the question,

$$x \times (-6) = (-54)$$

$$\Rightarrow x = \frac{-54}{-6} = 9 \quad [- \div - = +]$$



Exercise 1.2

1. Multiply the following :

(a) 21 and 0

(b) (-12) and (-12)

(c) (-192) and 0

(d) (-11) and (-12)

(e) (-7) and 11

(f) $(-24) \times 5$

2. Find the product of each of the following :

(a) $16 \times (-5)$

(b) $(-6) \times (-3) \times (-3)$

(c) $5 \times 4 \times 3 \times 2 \times 0$

(d) $(-15) \times (-6)$

(e) $(-10) \times (-9) \times 5 \times 4$

(f) $(-10) \times (-10) \times 10$

(g) $(-2) \times (-5) \times (-6) \times 0$

(h) $2 \times 3 \times 4 \times (-5) \times (-5)$

3. Fill in the boxes for the following :

(a) $(-12) \times (-2) \times (-4) = \square$

(b) $(-2) \times (-2) \times 2 \times 2 = \square$

(c) $80 \div (-8) = \square$

(d) $\square \div (-25) = (-3)$

(e) $(-24) \div \square = (-6)$

(f) $123 \div \square = (-41)$

(g) $66 \div \square = (-11)$

(h) $84 \div (-12) = \square$

(i) $[(-2) \times \square] \div 6 = -1$

(j) $(-5) \times (-2) \times 10 = \square$

4. Determine the quotient for each of the following :

(a) $(-20) \div (-1)$

(b) $(-72) \div 6$

(c) $(-26) \div 13$

(d) $36 \div (-3)$

(e) $(-126) \div 6$

(f) $(-111) \div (-3)$

(g) $(-117) \div (-13)$

(h) $(-14) \div (-14)$

(i) $(-81) \div 9$

(j) $(-100) \div (-10)$

5. Simplify and find the absolute value of the following :

(a) $|(-5 + 6 - 5) \times (-3)|$

(b) $|(-18) \div 3|$

(c) $| \{(-8) - (-4)\} \div (-2) |$

(d) $|(-5) \times (-5) \times (-2) \times 2|$

6. Find the integer which gives (-51) when it is multiplied by (-17) .

7. Find the quotient when divisor and dividend are (-4) and (-48) respectively.

8. An integer when divided by -7 gives 12. Find the integer.





Properties of Integers

Properties of Addition

Closure Property : If a and b are two integers, then $a + b$ will always be an integer.

Examples : $(-7) + (-8) = -15$

$$(-2) + 4 = 2$$

$$18 + (-12) = 6$$

$$(-16) + (-12) = -28$$

Commutative Property : If a and b are two integers, then their sum remains the same, irrespective of the order, i.e. $a + b = b + a$

Examples : $(-12) + (-16) = (-16) + (-12) = (-28)$

$$(-5) + 47 = 47 + (-5) = 42$$

$$10 + (-65) = (-65) + 10 = (-55)$$

$$(-17) + (-18) = (-18) + (-17) = -35$$

Associative Property : If a , b and c are three integers, then $a + (b + c) = (a + b) + c$. While adding these integers it is not necessary to add it in a particular order of their occurrence. We can do it by grouping them as per our convenience.

Examples : $[(-8) + 7] + (-15) = (-8) + [7 + (-15)]$

$$\Rightarrow (-1) + (-15) = (-8) + (-8)$$

$$\Rightarrow (-16) = (-16)$$

Let's see another example :

$$[(-7) + (-8)] + (-11) = (-7) + [(-8) + (-11)]$$

$$\Rightarrow (-15) + (-11) = (-7) + (-19)$$

$$\Rightarrow (-26) = (-26)$$

Additive Identity : If 0 (zero) is added to any integer, its value remains same. Thus, for an integer ' a ', $a + 0 = 0 + a = a$

Examples : $(-29) + 0 = (-29)$

$$0 + (-35) = (-35)$$

Additive Inverse : The sum of an integer and its opposite is always zero. If ' a ' is an integer, then $(-a)$ is its opposite and vice versa such that $a + (-a) = 0 = (-a) + a$

Examples : $29 + (-29) = 0 = (-29) + 29$

$$(-18) + 18 = 0 = 18 + (-18)$$

$$(-95) + 95 = 0 = 95 + (-95)$$

In the above given examples, the integers of each pair, i.e. $(29, -29)$, $(18, -18)$ and $(95, -95)$ are additive inverse of each other.

Property of 1 : If 1 is added to any integers, it gives its successor.

Examples : $11 + 1 = 12$

So, 12 is the successor of 11.

Also,

$$(-7) + 1 = (-6) \text{ So, } -6 \text{ is the successor of } (-7).$$





Properties of Subtraction

Closure Property : If a and b are two integers, then $a - b$ will always be an integer.

Examples : $(-4) - (-8) = 4$
 $(-8) - 12 = (-20)$
 $4 - 11 = (-7)$
 $(-17) - (-14) = (-3)$

Commutative Property : If a and b are two integers, then, $a - b \neq b - a$. It means commutative property is not applicable for the subtraction of integers.

Examples : $(-7) - (-4) = (-3)$ but $(-4) - (-7) = 3$
 $11 - (-17) = 28$ but $(-17) - 11 = (-28)$
 $(-4) - 18 = (-22)$ but $18 - (-4) = 22$

Associative Property : If a , b and c are three integers, then $(a - b) - c \neq a - (b - c)$. It means associative property is not applicable for the subtraction of integers.

Examples : $[(-2) - 4] - (-7) \neq (-2) - [4 - (-7)]$
 $\Rightarrow (-6) - (-7) \neq (-2) - 11$
 $\Rightarrow 1 \neq -13$

Property of Zero : If 0 (zero) is subtracted from any integer, its value remains same. Thus, for an integer ' a ', $a - 0 = a$

Examples : $(-32) - 0 = (-32)$
 $(-75) - 0 = (-75)$
 $99 - 0 = 99$

Property of 1 : If 1 is subtracted from any integer, it gives its predecessor.

Examples : $(-23) - 1 = (-24)$
 $83 - 1 = 82$
 $(-87) - 1 = (-88)$

In the above given examples, the integers (-24) , 82 and (-88) are predecessors of (-23) , 83 and (-87) respectively.

Properties of Multiplication

Closure Property : If a and b are two integers, then $a \times b$ will always be an integer.

Examples : $(-7) \times (-8) = 56$
 $(-8) \times 4 = (-32)$
 $7 \times (-3) = (-21)$
 $11 \times 12 = 132$

Commutative Property : If a and b are two integers, then their multiples remains the same, irrespective of the order, i.e. $a \times b = b \times a$

Examples : $(-7) \times (-12) = 84 = (-12) \times (-7)$
 $4 \times (-9) = (-36) = (-9) \times 4$
 $(-13) \times 6 = (-78) = 6 \times (-13)$
 $17 \times 5 = 85 = 5 \times 17$

Associative Property : If a , b and c are three integers, then $a \times (b \times c) = (a \times b) \times c$. While multiplying these integers it is not necessary to multiply it as a particular order of their occurrence. We can do it by grouping them as per our convenience.





Examples : $[(-5) \times 6] \times (-7) = (-5) \times [6 \times (-7)]$

$$(-30) \times (-7) = (-5) \times (-42)$$

$$\Rightarrow 210 = 210$$

Let's see another example :

$$[(-12) \times (-5)] \times (-2) = (-12) \times [(-5) \times (-2)]$$

$$\Rightarrow 60 \times (-2) = (-12) \times 10$$

$$\Rightarrow -120 = -120$$

Multiplicative Identity : If 1 is multiplied to any integer, its value remains same. Thus, for an integer 'a'

$$a \times 1 = 1 \times a = a$$

Examples : $(-87) \times 1 = 1 \times (-87) = (-87)$

$$43 \times 1 = 1 \times 43 = 43$$

$$(-27) \times 1 = 1 \times (-27) = (-27)$$

Multiplicative Inverse : The multiple of an integer and its multiplicative inverse is always 1. If 'a' is an integer, then $(\frac{1}{a})$ is its multiplicative inverse and vice-versa such that

$$a \times \frac{1}{a} = 1 = \frac{1}{a} \times a$$

Examples : $(-15) \times \frac{1}{(-15)} = 1 = \frac{1}{(-15)} \times (-15)$

$$(-43) \times \frac{1}{(-43)} = 1 = \frac{1}{(-43)} \times (-43)$$

Distributive Property : If a, b and c are three integers, then

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

It means multiplication distributes over addition.

Examples : $(-7) \times [4 + (-8)] = [(-7 \times 4)] + [(-7) \times (-8)]$

$$\Rightarrow (-7) \times (-4) = -28 + 56$$

$$\Rightarrow 28 = 28$$



Facts to Know

- 1 and -1 are the only two integers whose respective multiplicative inverse remains same.

Properties of Division

Closure Property : If a and b are two integers, thus $a \div b$ will not always be an integer.

Examples : $(-2) \div 5 = -0.4$

$$2 \div 3 = 0.\bar{6}$$

$$(-4) \div 0 = \text{not defined}$$

$$(-7) \div (-28) = 0.25$$

Commutative Property : If a and b are two integers, then $a \div b \neq b \div a$. It means commutative property is not applicable for the division of integer.

Examples : $(-4) \div (8) \neq 8 \div (-4)$

$$\Rightarrow -0.5 \neq -2$$



Let's see another example:

$$(-12) \div (-4) \neq (-4) \div (-12)$$

$$\Rightarrow 3 \neq 0.\bar{3}$$

Associative Property : If a, b and c are three integers, then $(a \div b) \div c \neq a \div (b \div c)$. It means associative property is not applicable for the division of integers.

Examples : $[(-16) \div 4] \div (-2) \neq (-16) \div [4 \div (-2)]$

$$\Rightarrow (-4) \div (-2) \neq (-16) \div (-2)$$

$$\Rightarrow 2 \neq 8$$

Let's see another example:

$$[(-24) \div (-4)] \div 6 \neq (-24) \div [(-4) \div 6]$$

$$\Rightarrow 6 \div 6 \neq (-24) \div \left(\frac{-4}{6}\right)$$

$$\Rightarrow 1 \neq 36$$

Property of 1 : If we divide any integer by 1, it gives the same integer as quotient. For any integer 'a', $a \div 1 = a$

Examples : $(-29) \div 1 = (-29)$

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

Property of 0 (zero) : If we divide zero by any integer, the result is always zero. For any integer 'a',

$$0 \div a = 0$$

Example : $0 \div -92 = 0$

$$0 \div 345 = 0$$

$$0 \div 645 = 0$$



Facts to Know

- Zero divided by an integer is always zero.
- Any integer divided by zero is not defined.

Example 7 : Sum of two integers is (-73) . If one of the integers is 46, find the other integer. Also verify the answer.

Solution : Let the required integer be 'x'

According to the question,

$$x + 46 = (-73)$$

$$\Rightarrow x = (-73) - 46$$

$$\Rightarrow x = -119$$

Hence, the required integer is (-119)

Verification :

$$-119 + 46 = -73$$

$$\Rightarrow -73 = -73$$

Example 8 : Subtract the sum of (-75) and (-47) from the multiple of (-8) and (-12) .

Solution : Sum of (-75) and (-47)

$$= (-75) + (-47)$$

$$= -122$$



Multiple of (-8) and (-12)

$$= (-8) \times (-12) = 96$$

$$\therefore \text{The required difference} = 96 - (-122) = 218$$

Example 9 : Subtract the sum of 16, 14 and (-7) from the sum of 7, 19 and the additive inverse of 16.

Solution : Sum of 16, 14 and (-7)

$$= 16 + 14 + (-7) = 23$$

Additive inverse of 16 is (-16) ,

Sum of 7, 19 and (-16)

$$= 7 + 19 + (-16) = 10$$

$$\therefore \text{The required difference} = 10 - 23 = (-13)$$

Example 10 : In a quiz competition, Rahul scored 70, (-20) and 40, whereas Saurav scored 50, 0 and 20 in three successive rounds. Who won the quiz competition and by what margin?

Solution : Rahul's total score $= 70 + (-20) + 40 = 90$

$$\text{Saurav's total score} = 50 + 0 + 20 = 70$$

Rahul's score is 90 and Saurav's score is 70.

So, Rahul won by the margin of $90 - 70 = 20$.

Example 11 : Evaluate the following using distributive property :

(a) $(-6) \times 97$

(b) $(-7) \times 1002$

Solution : (a) $(-6) \times 97 = (-6) \times (100 - 3)$

$$= [(-6) \times 100] - [(-6) \times 3] \text{ (by distributive property)}$$

$$= (-600) - (-18)$$

$$= (-600) + 18 = (-582)$$

(b) $(-7) \times 1002 = (-7) \times (1000 + 2)$

$$= [(-7) \times 1000] + [(-7) \times 2]$$

$$= (-7000) + (-14) = (-7014)$$

Example 12 : A submarine descends into sea water at the rate of 12 km per minute. What will be its position after 15 minutes?

Solution : Since the submarine is going down, so the distance covered by it will be represented by negative integer.

$$\text{Change in position of the submarine in one minutes} = (-12) \text{ km}$$

$$\text{Position of the submarine after 15 minutes} = (-12) \times 15 = (-180) \text{ km}$$

It means, after 15 minutes the submarine will be 180 km below the surface of sea water.

Example 13 : A room heater starts raising the temperature at the rate of 2°C per minute. Ankit feels comfortable at 34°C . In how much time will Ankit be happy? [If current temperature is 0°C]

Solution : Times taken by room heater to reach at $34^\circ\text{C} = \frac{34}{2} = 17 \text{ min}$

Hence, after 17 minutes the temperature of the room will reach at 34°C that will make Ankit happy.





Exercise 1.3

1. Fill in the blanks :

(a) $20 \div \square = -1$

(b) $\square \div 25 = -1$

(c) $\square \div 6 = 0$

(d) $13 - (-13) = \square$

(e) $(-17) \times \square = 16 \times (-17)$

(f) $(-243) \times 0 =$

(g) $(-5) \times \frac{1}{\square} = 1$

(h) $(-10) \times [(-5) + 7] = [(-10) \times \square] + [(\square) \times 7]$

(i) $\square \times [3 + (-4)] = [(-8) \times 3] + [(-8) \times \square]$

(j) $[10 \times \square] \times (-6) = 10 \times [(-5) \times (-6)]$

2. Write T for True and F for False for the following statements :

(a) $(-5) \times 7 = -35$

(b) $(-5) \times (-4) \times 2 = 5 \times 2 \times (-4)$

(c) $(-4) - (-8) = -12$

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

(e) $(-8) \times (-14) \times 0 = 0$

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

3. Calculate the following using suitable arrangements:

(a) $(127 \times 8) + (127 \times 12)$

(b) 105×7

(c) $(-125) + (-75) + 188 + (-38) + 25$

4. Prove the validity of the following using property of multiplication:

(a) $[57 \times (-127)] + [(-23) \times 57]$

(b) $(-8) \times [(-12) + (-16)]$

(c) $[(-21) \times [(-5) + (-7)]]$

(d) $[(-105) \times 91] + [5 \times 91]$

5. Evaluate the following using distributive property:

(a) 18×102

(b) $(-5) \times 1003$

(c) 89×14

(d) $(-37) \times 97$

6. An integer divided by (-13) gives 9. Find the integer.

7. Find an integer which when multiplied with (-8) gives 72.

8. Tanya throws a stone 52 m vertically up in the air which later settled on the bottom of a lake 60 m deep. Find the total distance covered by stone.

Points to Remember

- ❖ Integers are the combined sets of negative numbers and whole numbers.
- ❖ The absolute value of an integer is the right magnitude of the value of an integer regardless of its sign.
- ❖ On a number line, every integer to the right of zero is greater than the integers to its left and vice versa.
- ❖ 0 is neither negative nor positive.
- ❖ Addition of integers follow closure, commutative and associative property i.e.,
 - (a) The value of sum of two integers a and b is integer. (b) $a + b = b + a$
 - (c) $(a + b) + c = a + (b + c)$
- ❖ Subtraction of integers follow only closure property. The value of subtraction of two integers a and b is integer.
- ❖ Multiplication of integers follow closure, commutative and associative property i.e.,
 - (a) The product of two integers a and b is integer. (b) $a \times b = b \times a$ (c) $(a \times b) \times c = a \times (b \times c)$
- ❖ Integers follow distributive property, i.e. for any three integers a, b and c,

$$a \times (b + c) = (a \times b) + (a \times c)$$
- ❖ For division of integers
 - (a) The quotient carries a positive sign when dividend and divisor have same sign (either positive or negative).
 - (b) The quotient carries a negative signs when dividend and divisor have different signs (one positive and other negative).
- ❖ For any integer 'a',
 - (a) $a \div 0$ is not defined (b) $0 \div a = 0$ and (c) $a \div 1 = a$



EXERCISE

1. MULTIPLE CHOICE QUESTIONS (MCQs):

Tick (✓) the correct options :

(a) Which of the following is correct ?

(i) $a \div 0 = 0$

☐

(ii) $0 \div a = \text{not defined}$

☐

(iii) $0 \div a = 0$

☐

(iv) $1 \div a = a$

☐

(b) The smallest positive integer is :

(i) 0

☐

(ii) 1

☐

(iii) 99

☐

(iv) 1000

☐

(c) The additive inverse of (-7) is :

(i) $\frac{1}{7}$

☐

(ii) $-\frac{1}{7}$

☐

(iii) 7

☐

(iv) None of these

☐

(d) The multiplicative inverse of $7x$ is :

(i) $\frac{1}{7x}$

☐

(ii) $\frac{7}{x}$

☐

(iii) $\frac{7x}{1}$

☐

(iv) $(-7x)$

☐

(e) Which of the following relation is correct ?

(i) $(-24) \div (-4) = (-6)$

☐

(ii) $(-72) \div 8 = (-9)$

☐

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

☐

(iv) $(-30) \div (-3) = -27$

☐

(f) What is the value of expression:

$\{(-15) + 4 + (-7)\} \div \{(-3) - 9 + 18\}$

(i) 2

☐

(ii) -3

☐

(iii) 4

☐

(iv) 6

☐

(g) The expression $103 \times (-35)$ can be re-written as which of the following expression ?

(i) $10300 - 105$

☐

(ii) $-10300 + 105$

☐

(iii) $3500 + 105$

☐

(iv) $-3500 - 105$

☐

2. Find the product of the following :

(a) $(-13) \times (-11)$

(b) $(-4) \times 16$

(c) $(-6) \times (-15)$

(d) $(-125) \times 8$

3. Find the quotient :

(a) $(-64) \div (-16)$

(b) $(-84) \div 4$

(c) $0 \div (-7)$

(d) $168 \div (-8)$

(e) $(-216) \div (-6)$

(f) $120 \div (-15)$

4. Simplify :

(a) $\{(-80) \div 16\} \times (-2) + 6$

(b)

$\{[(-3) - (-4)] \times \{(-6) + (-8)\}\}$

(c) $\{(-7) \times (-5) \times (-6)\} \div (-15)$

(d)

$[24 \div \{(-6 + 18) - 6\}]$

5. Find the product using suitable properties as:

(a) $(-17) \times 29$

(b) $(-51) \times 13$

(c) $\{(-47) \times 21\} + (-47)$

(d) $[(-24) \times 37] + [(-24) + 13]$

(e) $(99 \times 17) + (17 \times 101)$

(f) $(-12) \times 25 \times 6 \times (-4)$

6. A monkey is trying to reach at the top of vertical slippery pole 25 m high. In one jump he goes up by 3 m but slips by 1 m. In how many moves he will reach at the top?

7. Rinku gets ₹ 1500 as pocket money per month. He spends ₹ 750 eating outside and ₹ 300 as donation to a charity organisation. Find out Rinku's saving at the end of the year.





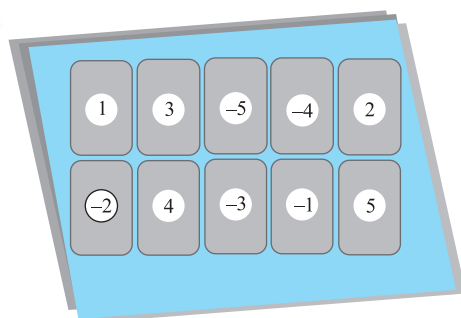
Every floor of a 20 storey building is 5 m high. If a lift moves 2 metres every second, how long will it take to move from 3rd floor to 15th floor.



Objective

Materials Required

- To comprehend the operation of multiplication through a game.
- 10 square-shaped one coloured cards with integers from -5 to 5 mentioned on it, square paper sketch pens and different coloured counters.



- Procedure :** The game is to be played ideally among 2 to 4 players.
- Step 1 :** Take a white coloured chart paper. Cut it in squared shape.
Take a chart paper and draw a 9×9 grid on it using sketch pen.

32	33	34	35	36	37	38	39	40
31	30	29	28	27	26	25	24	23
14	15	16	17	18	19	20	21	22
13	12	11	10	9	8	7	6	5
-4	-3	-2	-1	0	1	2	3	4
-5	-6	-7	-8	-9	-10	-11	-12	-13
-22	-21	-20	-19	-18	-17	-16	-15	-14
-23	-24	-25	-26	-27	-28	-29	-30	-31
-40	-39	-38	-37	-36	-35	-34	-33	-32

- Step 2 :** Write the integers starting from -40 to 40 as shown.
- Step 3 :** Keep the counters at 0. [Each player will play with only counter].
- Step 4 :** Rules to be followed:
Each player will choose two cards from the pack of 10 cards randomly. (Integers hidden on other side)
The player has to multiply the integers shown on the card. For example, the appearing numbers are (-4) and 5 . So, $(-4) \times 5 = (-20)$. The player will put his counter at (-20) on the board.
- Step 5 :** Now its turn of the next player sitting next to the first player.
- Step 6 :** If the product is positive, the counter will move towards 40. If the product is negative it will move towards (-40) .
- Step 7 :** Each player gets another chance to choose two cards after the completion of the first round.
- Step 8 :** The player whose counter crosses 40 first is the winner.

