ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

Sub: Arithmetic **Class: 7** **Date: 09.05.20**

STUDY MATERIAL: INTEGERS

Important Formulae and Concepts

Introduction to Integers

Introduction to Numbers

Natural Numbers : The collection of all the counting numbers is called set of natural numbers. It is denoted by **N = {1,2,3,4….}**

Whole Numbers: The collection of natural numbers along with zero is called a set of whole numbers. It is denoted by **W = { 0, 1, 2, 3, 4, 5, … }**

Properties of Addition and Subtraction of Integers

Closure under Addition and subtraction
For every integer a and b, a+b and a–b are integers.

Commutativity Property for addition
for every integer a and b, a+b=b+a

Associativity Property for addition
for every integer a,b and c, (a+b)+c=a+(b+c)

Additive Identity & Additive Inverse

Additive Identity
For every integer a, a+0=0+a=a here **0** is Additive Identity, since adding 0 to a number leaves it unchanged.
Example : For an integer 2, 2+0 = 0+2 = 2.

Additive inverse
For every integer a, a+(−a)=0 Here, −a is additive inverse of a and a is the additive inverse of-a.
Example : For an integer 2, (– 2) is additive inverse and for (– 2), additive inverse is 2. [Since + 2 – 2 = 0]

Properties of Multiplication of Integers

Properties of Multiplication of Integers

Closure under Multiplication
For every integer a and b, a×b=Integer

Commutative Property of Multiplication
For every integer a and b, a×b=b×a

Multiplication by Zero
For every integer a, a×0=0×a=0

Multiplicative Identity
For every integer a, $a \times 1 = 1 \times a = a$. Here 1 is the multiplicative identity for integers.

Associative property of Multiplication
For every integer a, b and c, $(a \times b) \times c = a \times (b \times c)$

Distributive Property of Integers
Under addition and multiplication, integers show the distributive property.
i.e., For every integer a, b and c, $a \times (b + c) = a \times b + a \times c$

These properties make calculations easier.

Division of Integers

Division of Integers

When a **positive integer** is divided by a **positive integer**, the quotient obtained is a **positive integer**.
Example: $+6 \div 3 = +2$

When a **negative integer** is divided by a **negative integer**, the quotient obtained is a **positive integer.**
Example: $-6 \div -3 = +2$

When a **positive integer** is divided by a **negative integer** or **negative integer** is divided by a **positive integer**, the quotient obtained is a **negative integer.**
Example: $-6 \div 3 = -2$ and Example: $+6 \div -3 = -2$

The Number Line

Number Line

Representation of integers on a number line

On a number line when we

(i) add a positive integer for a given integer, we move to the right.
Example : When we add +2 to +3, move 2 places from +3 towards right to get +5

(ii) add a negative integer for a given integer, we move to the left.
Example : When we add -2 to +3, move 2 places from +3 towards left to get +1

(iii) subtract a positive integer from a given integer, we move to the left.
Example: When we subtract +2 from -3, move 2 places from -3 towards left to get -5

(iv) subtract a negative integer from a given integer, we move to the right
Example: When we subtract -2 from -3, move 2 places from -3 towards right to get 1

Addition and Subtraction of Integers

The absolute value of +7 (a positive integer) is 7
The absolute value of -7 (negative integer) is 7 (its corresponding positive integer)

Addition of two **positive integers** gives a **positive** integer.
Example : +3+4=+7

Addition of two **negative integers** gives a **negative** integer.
Example : (−3)+(−4)=−3−4=−7

When **one positive** and **one negative** integers are **added,** we take their **difference** and place the sign of the **bigger integer**.
Example : (−7)+(2)=−5

For **subtraction**, we add the **additive inverse** of the integer that is being subtracted, to the other integer.
Example : 56–(–73)=56+73=129

Introduction to Zero

Integers

Integers are the collection of numbers which is formed by **whole numbers** and **their negatives.**
The set of Integers is denoted by **Z** or **I. I =** { …, -4, -3, -2, -1, 0, 1, 2, 3, 4,… }

Properties of Division of Integers

Properties of Division of Integers

For every integer a,
(a) a0 is not defined
(b) a1=a

Note: Integers are **not** closed under division
Example :(– 9) ÷ (– 3) = 2. Result is an integer.
and (−3)÷(−9)=−3−9=13. Result is not an integer.

Multiplication of Integers

Multiplication of Integers

Product of **two positive** integers is a **positive integer.**
Example : (+2)×(+3)=+6

Product of **two negative** integers is a **positive integer.**
Example :(−2)×(−3)=+6

Product of a **positive** and a **negative** integer is a **negative integer.**
Example :(+2)×(−3)=−6 and (−2)×(+3)=−6

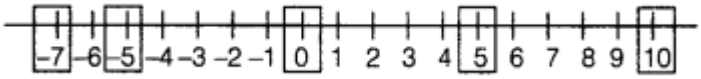
Product of **even number** of **negative** integers is **positive** and **product** of **odd number** of **negative** integers is **negative.**
These properties make calculations easier.

SOLVED NUMERICALS
Question 1:

When the integers 10, 0, 5, -5,-7 are arranged in descending or ascending order, then find out which of the following integers always remains in the middle of the arrangement.
(a) 0 **(b)** 5 **(c)** – 7 **(d)** -5

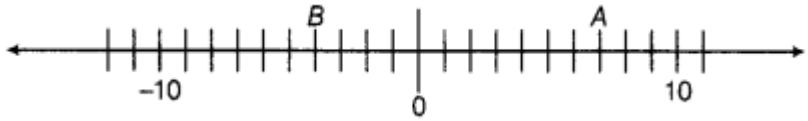
Solution:

(a) To arrange these integers in ascending or descending order, first we locate these points on number line.



As we know, if a point or number lies on the right side to the other number, then the number is greater. Then,
Ascending order -7, – 5,0, 5,10
Middle term = 0
Descending order → 10, 5, 0, – 5, – 7
Middle term = 0
Hence, zero always remains in the middle of the arrangement.

Question 2:
By observing the number line, state which of the following statements is not true?



(a) B is greater than -10 **(b)** A is greater than 0 **(c)** B is greater than A **(d)** 6 is smaller than 0

Solution:

(c) As we know that, if a point or number lies on the right side to the other number, then the number is greater.

Here, B is greater than -10 but smaller than 0 and A is greater than 0 but smaller than 10. Also, 6 is smaller than A.

Question 3:

By observing the above number line, state which of the following statements is true?

(a) B is 2 **(b)** A is – 4 **(c)** S is -13 **(d)** B is – 4

Solution:

(d) Since, 8 lies at the left side of 0, so it will be negative and it is at 4th place.
So, 8 =-4
Similarly, A lies at the right side of 0, so it will be positive and it is at 7th place.
So, A = 7. Hence, the value of A – 7 and value of 8 = – 4.

Question 4:

Next three consecutive numbers in the pattern 11, 8, 5, 2,_____ ,__ ,__ are
(a) 0, – 3, – 6 (b)-1,-5,-8 (c) – 2, — 5, – 8 (d)-1,-4,-7

Solution:

(d) By observing the series, difference between two consecutive numbers is 3,

i.e. $11 - 8 = 3$

$8 - 5 = 3$

$5 - 2 = 3$

So, next number will be

$2 - 3 = -1$

Similarly, next two numbers are

$-1 - 3 = -4$

$-4 - 3 = -7$

Question 5:

The next number in the pattern – 62,- 37,- 12 is_____ .

(a) 25 **(b)** 13 **(c)** 0 **(d)** -13

Solution:

(b) By observing the series, difference between two consecutive numbers is 25, i.e.

-37 -(-62) = -37 + 62 =25
– 12 – (- 37) = -12 + 37 =25

So, next number will be
-12 + 25 = 13

Question 6:

Which of the following statements is not true? ;

(a) When two positive integers are added, we always get a positive integer.
(b) When two negative integers are added, we always get a negative integer.
(c) When a positive integer and a negative integer are added, we always get a negative integer.
(d) Additive inverse of an integer 2 is (-2) and additive inverse of (-2) is 2.

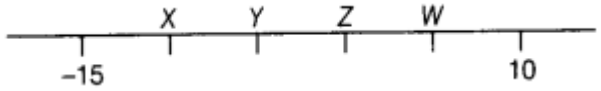
Solution:

(c)
(a) True, when two positive integers are added, the resultant number is also a positive integer.

(b) True, while adding integers, if both the numbers have same sign, the resultant number also get that sign.
(c) False, while adding the integers of different signs, the resultant number get the sign of greater number.
(d) True, additive inverse of an integer is the same integer value, with opposite sign.

Question 7:

On the following number line value, 'zero' is shown by the point



(a) X **(b)** Y **(c)** Z **(d)** W

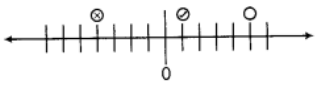
Solution:

(c) All the points are equally spaced.
One division = 5 units

So, X = -15 + 5 = -10
Y=-10+ 5 = – 5
Z=- 5 +5 = 0
Hence, zero is shown by the point Z.

Question 8:

8 If ⊗, ○, ⊘ and • represent some integers on number line, then descending order of these numbers is



(a) •, ⊗, ⊘, ○ (b) ⊗, •, ⊘, ○ (c) ○, ⊘, ⊗, • (d) ○, •, ⊗, ⊘

Solution:

(c) Descending order in number line, is from right to left.
Accordingly,

○ comes first ⊘ comes second
⊗ comes third • comes fourth

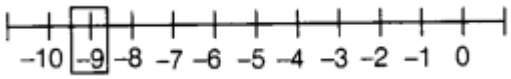
Hence, descending order is ○, ⊘, ⊗, •.

Question 9:

On the number line, the value of (-3) x 3 lies on right hand side of
(a) -10 **(b)** – 4 **(c)** 0 **(d)** 9

Solution:

(a) (-3) x 3 equals to – 9.
On the number line, it is shown as



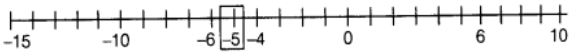
So, as we can see – 9 lies on the right hand side of -10.

Question 10:

The value of 5 + (- 1) does not lie between
(a) 0 and -10 **(b)** 0 and 10 **(c)** – 4 and -15 **(d)** – 6 and 6

Solution:

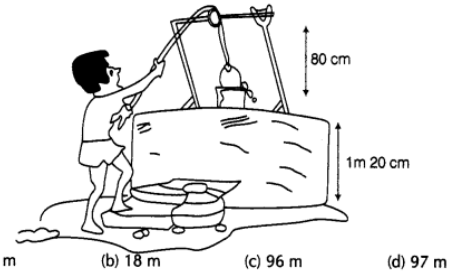
(b) 5 ÷ (-1) equals to – 5.
On the number line, it is placed as



Now, as we can see, -5 lies between (0 and -10) , (-4 and -15) and (-6 and 6). But it does not lie between 0 and 10.

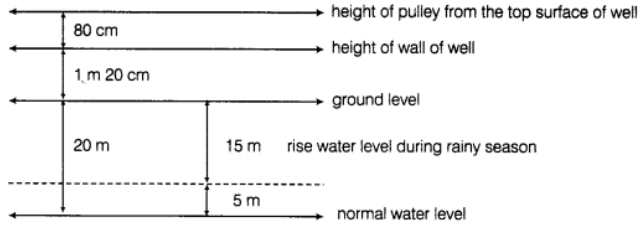
Question 11:

Water level in a well was 20 m below ground level. During rainy season, rainwater collected in different water tanks was drained into the well and the water level rises 5 m above the previous level. The wall of the well is lm 20cm high and a pulley afixed at a height of 80 cm. Raghu wants to draw water from the well. The minimum length of the rope, that he can use is



(a) 17 m (b) 18 m (c) 96 m (d) 97 m

Solution:(a) Details given in the question, can be described in the figure shown below



From the above figure, it is clear that,
Minimum length of the rope required to draw the water during the rainy season
= Distance between pulley and wall of well + Height of wall of well + Distance between water level during rainy season and ground level
= 80 cm + 1m 20 cm + 15m
$= (0.8 + 1.2 + 15)\,\text{m}\left[\because 1\,\text{cm} = \frac{1}{100}\,\text{m} \Rightarrow 80\,\text{cm} = \frac{80}{100}\,\text{m} = 0.80\,\text{m and } 1\,\text{m}\,20\,\text{cm} = 1.20\,\text{m}\right]$
= 17m

Question 12:

(-11) x 7 is not equal to
(a) 11 x (-7) **(b)** -(11 x 7) **(c)** (- 11) x (- 7) **(d)** 7 x (-11)

Solution:

(c) (— 11) x 7 = (-77) (we know, in multiplication, if sign of both numbers are different, then the sign of the resultant is negative and if sign of both numbers are same, then the sign of the resultant is positive.)

Option (a), 11 x (-7) =-77
Option (b), – (11 x 7) = – 77
Option (c), (-11) x (- 7) = 77
Option (d),7 x(-11) = -77

Question 13:

(- 10) x (- 5) + (- 7) is equal to
(a) -57 **(b)** 57 **(c)** -43 **(d)** 43

Solution:

(d) (-10) x (- 5) + (- 7) = {(- 10) x (- 5)} + (- 7)= 50 + (- 7) = 50- 7 = 43

Question 14:

Which of the following is not the additive inverse of a?

(a) – (-a) **(b)** a x (-1) **(c)** — a **(d)** a + (-1)

Solution:

(a) Additive inverse of a is (- a).

[additive inverse of an integer is the same integer value, with opposite sign]

So,
Option (a), – (- a) = a
Option (b),ax(-1) = -a
Option (c), – a
Option (d), a + (-1) = – a

Question 15:

Which of the following is the multiplicative identity for an integer o?
(a) a **(b)** 1 **(c)** 0 **(d)** -1

Solution:

(b) Multiplicative identity for an integer a is 1.
[∵ a multiplicative identity is that identity in which any number is multiplied by that identity, it gives out the same number.]

Question 16:

[(- 8) x (- 3)] x (- 4)] is not equal to

(a) (- 8) x [(- 3) x (- 4)] **(b)** [(- 8) x (- 4)] x (- 3)
(c) [(- 3) x (- 8)] x (- 4) **(d)** (- 8) x (- 3) – (- 8) x (- 4)

Solution:

(d) $[(-8)\times(-3)]\times(-4) = [(-3)\times(-8)]\times(-4)$
[∵ as multiplication is commutative, i.e. $a \times b = b \times a$]
$= (-3)\times[(-8)\times(-4)]$ [∵ as multiplication is associative, i.e. $a\times(b\times c) = (a\times b)\times c$]
$= [(-8)\times(-4)]\times(-3)$
$= (-8)\times[(-4)\times(-3)]$
$= (-8)\times[(-3)\times(-4)]$
Hence, $[-(8)\times(-3)]\times(-4)$ is not equal to $(-8)\times(-3) - (-8)\times(-4)$.

Question 17:

(- 25) x [6 + 4] is not same as
(a) (-25) x 10 **(b)** (-25) x 6 + (- 25) x 4
(c) -25 x 6 x 4 **(d)** – 250

Solution:

(c) (- 25) x [6 + 4] = (- 25) x 10
Also, (- 25) x [6 + 4] = – 25 x 6 + (- 25) x 4
[using distributive property, i.e. ax(b + c) = axb + axc] = -150-100=-250
Hence, (-25) x (6 + 4) is not same as -25 x 6 x 4.

Question 18:

– 35 x 107 is not same as
(a) – 35 x (100 + 7) **(b)** (- 35) x 7 + (- 35) x 100
(c) – 35 x 7 + 100 **(d)** (-30 -5) x 107

Solution:

(c) – 35 x 107 =-35 x (100+7)= (- 35) x 100 + (- 35) x 7 [using distributive property, i.e. a x (b + c) = a x b + a x c]
= (- 35) x 7 + (- 35) x 100 [as addition is commutative, i.e. a + b = b + a)
Also, – 35 x 107 =(- 30 – 5) x 107 [∴ (-30 – 5) = (- 35)]
Hence, – 35 x 107 is not same as -35 x 7 + 100.

Question 19:

(- 43) x (- 99)+ 43 is equal to
(a) 4300 **(b)** – 4300 **(c)** 425 **(d)** -4214

Solution:

(a) (- 43) x (- 99) + 43 = (- 1) (43) x (- 99) + 43
= 43 {-(- 99) + 1} [taking 43 as common]
= 43 (99 + 1)= 43 x 100= 4300

Question 20:

(- 16) ÷ 4 is not same as
(a) (-4) ÷ 16 **(b)** -(16 ÷ 4) **(c)** 16 ÷ (-4) **(d)** – 4

Solution:

(a) $(-16) \div 4 = -(16 \div 4) = 16 \div (-4) = \frac{16}{-4} = -4$

But division is not commutative, hence

$-16 \div 4 \neq (-4) \div 16.$

Question 21:

Which of the following does not represent an integer?

(a) 0 ÷ (- 7) **(b)** 20 ÷ (- 4) **(c)** (-9) ÷ 3 **(d)** (-12) ÷ 5

Solution:

(d) An integer is a whole number (not a fractional number) that can be positive, negative or zero. So,

(a) $\frac{0}{-7} = 0$ (b) $\frac{20}{-4} = -5$

(c) $\frac{-9}{3} = -3$ (d) $\frac{-12}{5}$ (not an integer)

Question 22:

Which of the following is different from the others?
(a) 20 + (-25) **(b)** (-37) -(-32)
(c) (-5) x (— 1) **(d)** 45 ÷ (- 9)

Solution:

(c) Option (a), 20 + (- 25) = 20 – 25 = – 5
Option (b), (- 37) – (- 32)= – 37 + 32 = – 5
Option (c), (- 5) x (- 1)= 5
Option (d), (45) ÷ (- 9)= 45/-9 = – 5

Question 23:

Which of the following shows the maximum rise in temperature?
(a) 23° to 32° **(b)**-10°to 1°
(c) -18° to-11° **(d)** -5° to 5°

Solution:

(b) Rise in temperature,

(a) 32° – 23° = 9° (b) 1°-(-10)° = 1° + 10° = 11° (maximum)
(c) -11°-(-18)°=-11°+18° = 7° (d) 5° -(-5°) = 5° + 5° = 10°

Question 24:

If a and b are two integers, then which of the following may not be an integer?

(a) a+b **(b)** a-b **(c)** a x b **(d)** a+b

Solution:

(d) Addition, subtraction and multiplication of two or more integers is always an integer. But, division of integers may or may not be an integer.
e.g. 2 + 3 = 2⁄3 (not an integer)
3 + 3 = 1 (integer)

Question 25:

For a non-zero integer a, which of the following is not defined?

(a) a ÷ 0 **(b)** 0 ÷ a **(c)** a ÷1 **(d)** 1 ÷ a

Solution:

(a) Division of any number by zero is not defined,
a + 0 = not defined

In questions 26 to 30, encircle the odd one of the following:

Question 26:

(a) (-3,3)

(b) (-5,5)

(c) (-6,1)

(d) (-8,8)

Solution:

(c) By observation, we can say that both the values are same in options (a), (b) and (d).
So, odd one is option (c).

Question 27:

(a) (-1,-2)

(b) (-5,2)

(c) (- 4,1)

(d) (- 9,7)

Solution:

(d) By observation, we can say that the sum of both values are same in options (a), (b) and (c).
So, odd one is option (d).

Question 28:

(a) (- 9) x 5 x 6 x (- 3)
(b) 9 x (-5) x 6 x (-3)
(c) (- 9) x (- 5) x (- 6) x 3
(d) 9 x (- 5) x (- 6) x 3

Solution:

(c) (a) $(-9) \times 5 \times 6 \times (-3) = (-45) \times (-18) = 810$

(b) $9 \times (-5) \times 6 \times (-3) = (-45) \times (-18) = 810$

(c) $(-9) \times (-5) \times (-6) \times 3 = 45 \times (-18) = -810$

(d) $9 \times (-5) \times (-6) \times 3 = (-45) \times (-18) = 810$

So, odd one is option (c).

Question 29:

(a) (-100)+ 5 **(b)** (-81)+ 9
(c) (- 75) + 5 **(d)** (-32)+ 9

Solution:

(d) (a) $\frac{-100}{5} = -20$ (b) $\frac{-81}{9} = -9$

(c) $\frac{-75}{5} = -15$ (d) $\frac{-32}{9}$

Here, option (a), (b) and (c) are the negative integers, but option (d) is not the negative integer. So, odd one is option (d).

Question 30:

(a) (- 1) x (- l)
(b) (- 1) x (- l) x (- 1)
(c) (-1) x (-1) x (-1) x (-1)
(d) (-1) x (-1) x (-1) x (-1) x (-1) x (-1)

Solution:

(a) (-1) x (-1) = 1
(b) (- 1)x(-1)x(-1) = — 1
(c) (- 1) x (- 1) x (- 1) x (- 1) = 1
(d) (-1) x (-1) x (-1) x (- 1) x {-1) x(-1) = 1
Hence, value of options (a), (c), (d) are same but value of option (b) is different.

Fill in the Blanks

In questions 31 to 71, fill in the blanks to make the statements true.

Question 31 :

(- a) + b = b + additive inverse of ___ .

Solution:

Additive inverse is the negation of a number.
As we know, addition is commutative for integers, i.e. – a + b = b + (-a)
Now '- a' is the additive inverse of a. So, **a** will be the answer.

Question 32:

_____ ÷ (- 10) = 0

Solution:

Division of 0 by any number, results as zero. So, the answer is 0.

Question 33:

(- 157) x (— 19) + 157 =_____ .

Solution:

(-157) x (-19) + 157 = (-1) x (157) x (-19) + 157
= 157 {- (-19) + 1} [taking 157 as common]
= 157 {19+1} = 157 x20= 3140

Question 34:

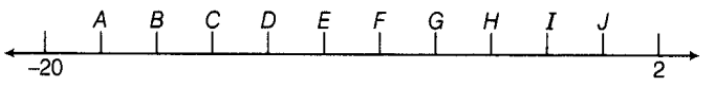
[(- 8)+ ___]+ ___ = ___ + [(-3) + ___] = – 3

Solution:

[(- 8) + (- 3)] + 8 = (- 8) + [(- 3) + 8]
[∵ addition is associative, i.e. a + (to + c) = (a + b) +c]
= – 8 + 5 = – 3

Question 35:

On the following number line, (- 4) x 3 is represented by the point_____ .



Solution:

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

On the number line, each division has equal spacing of 2 units.

So, $A = -20 + 2 = -18$

$B = -18 + 2 = -16$

$C = -16 + 2 = -14$

$D = -14 + 2 = -12$

Hence, $(-4) \times 3$ is represented by the point **D**.

Question 36:

If x, y and z are integers, then (x +____) + z =____ + (y +____)

Solution:

Addition is associative for integers, i.e. (a + b) + c = a + (b + c)

=> (x + y) + z = x + (y + z)

Question 37:

(-43)+ _____ =(-43)

Solution:

Zero (0) is an additive identity for integers, i.e. a+0 = 0+ a = afor any integer a.
So, (- 43) + 0 = – 43

Question 38:

(- 8) + (- 8) + (- 8) =_____ x (- 8)

Solution:

Let x be the missing number.

Let x be the missing number.

Then, $-8-8-8 = x \times (-8)$

$\Rightarrow$ $-24 = x \times (-8)$ $[\because -8-8-8 = -24]$

$\Rightarrow$ $\frac{-24}{-8} = x$

$\Rightarrow$ $x = 3$

Hence, $(-8)+(-8)+(-8) = \mathbf{3} \times (-8)$

Question 39:

11 x (- 5) = – (_____ x____) =_____

Solution:

We can write the equation as,
11 x (-5) =-(11×5) = -55

Question 40:

40 (- 9) x 20 =_____

Solution:

(-9) x 20 = -180 [∵ in multiplication of integers, if both the numbers have different signs, then the result is a negative number]

Question 41:

(- 23) x (42) = (- 42) x_____

Solution:

(- 23) x (42)= (- 1) x (23) x (42)= (- 1) x (42) x (23)

[∵multiplication is commutative, i.e. a x b = b x a] = (- 42) x (23)

Question 42:

While multiplying a positive integer and a negative integer, we multiply them as ___ numbers and put a ___ sign before the product.

Solution:

When multiplying a positive integer and a negative integer, we multiply them as whole numbers and put a negative sign before the product.

Question 43:

If we multiply___ number of negative integers, then the resulting integer is positive.

Solution:

If we multiply **even** numbers of negative integers, then the resulting integer is positive

Question 44:

If we multiply six negative integers and six positive integers, then the resulting integer is___ .

Solution:

If we multiply six negative integers and six positive integers, then the resulting integer is positive, because even numbers of negative integers, in multiplication becomes positive.

Question 45:

If we multiply five positive integers and one negative integer, then the resulting integer is ___ .

Solution:

If we multiply 5 positive integers and one negative integer, then the resulting integer is **negative.**

Question 46:

_____ is the multiplicative identity for integers.

Solution:

1 is the multiplicative identity for integers, i.e. a x 1 = 1 x a = a for any integer a.

Question 47:

We get additive inverse of an integer **a,** when we multiply it by ___ .

Solution:

Additive inverse of an integer is the same integer value, with opposite sign. So, we get additive inverse of integer a, when we multiply it by (**– 1**).

Question 48:

(- 25) x (- 2) =_____.

Solution:

Two negative integers make the resultant integer, positive.
(- 25) x (- 2) = 50

Question 49:

(- 5) x (- 6) x (- 7) =_____.

Solution:

Odd negative integers make the resultant integer, negative.
(- 5) x (- 6) x (- 7) = 30 x (- 7) = – 210

Question 50:

3 x (- 1) x (- 15) =_____.

Solution:

Two negative integers and one positive integer make the resultant integer, positive.
3 x (-1) x (-15) = (-3) x (– 15)= 45c

Question 51:

[12 x (- 7)] x 5 =_____ x [(- 7) x ____]

Solution:

Multiplication is associative for integers, i.e.
(a x b) x c = a x (b x c)
So, [12 x (- 7)] x 5 = **12** x [(- 7) x 5]

Question 52:

23 x (- 99) = ____ x (- 100 + ____) = 23 x ____ + 23 x ____

Solution:

We can write the equation as,
23 x (- 99) = 23 x (- 100 + 1)= 23 x (- 100) + 23 x 1

[∵ integers show distributive property of multiplication over addition, i.e. a x (b + c) = a x b + a x c]

Question 53:

35 x (- 1) = – 35

Solution:

– 35 x (-1) = – 35 $\left[\because \left(\frac{-35}{-1}\right) = 35\right]$

Question 54:

____ x (- 1) = 47

Solution:

(- 47) x (- 1) = 47 $\left[\because \quad \frac{47}{-1} = (-47)\right]$

Question 55:

88 x ____ = – 88

Solution:

88 x (- 1) = – 88 $\left[\because \frac{-88}{88} = (-1)\right]$

Question 56:

____ x (- 93) = 93

Solution:

(- 1) X (- 93) = 93 $\left[\because \frac{93}{-93} = (-1)\right]$

Question 57:

(- 40} x ___ =80

Solution:

(- 40) x (-2) = 80 $\left[\because \frac{93}{-40} = (-2)\right]$

Question 58:

____ x (-23) = – 920

Solution:

(40) x (-23) = – 920 $\left[\because \left(\frac{-920}{-23}\right) = 40\right]$

Question 59:

When we divide a negative integer by a positive integer, we divide them as whole numbers and put a ____ sign before quotient.

Solution:

When we divide a negative integer by a positive integer or a positive integer by a negative integer, we divide them as whole numbers and put a negative sign before quotient.

Question 60:

When (-16) is divided by ____ the quotient is 4.

Solution:

When (-16) is divided by negative integer, i.e. -4 the quotient is 4 as both signs are cancelled out.

Question 61:

Division is the inverse operation of ____ .

Solution:

Division is the inverse operation of **multiplication.**

Question 62:

65 ÷ (- 13) =_____.

Solution:

65 ÷ (-13) = 65 x $\frac{1}{(-13)}$ [∵ division is inverse of multiplication]
= **-5**

Question 63:

(-100) ÷ (-10) =_____.

Solution:

(-100) ÷ (-10) = (-100) x $\frac{1}{(-10)}$ [∵ division is inverse of multiplication]
= **(-10)**

Question 64:

(-225) ÷ 5 = _____.

Solution:

(-225) ÷ 5 = -225 x $\frac{1}{5}$ [∵ division is inverse of multiplication]
= **-45**

Question 65:

_____ ÷ (-1) = (- 83)

Solution:

83 ÷ (-1) = – 83 $\left[\because \frac{-83}{-1} = 83\right]$

Question 66:

____ ÷ (-1) = 75

Solution:

– **75** ÷(-1) = 75 $\left[\because \frac{75}{-1} = (-75)\right]$

Question 67:

51 ÷ ____ =(-51)

Solution:

51 ÷ (-1) = (-51) $\left[\because \frac{51}{-51} = (-1)\right]$

Question 68:

113 ÷ ____ = (- 1)

Solution:

113 ÷ (**-113**) = (-1) $\left[\because \frac{113}{-1} = (-113)\right]$

Question 69:

-95 ÷ (-1) = 95

Solution:

-95 ÷ (-1) =95 $\left[\because \frac{-95}{95} = (-1)\right]$

Question 70:

(-69) ÷ 69 =_____.

Solution:

(-69) ÷ 69 = (- 1)

Question 71:

(-28) ÷ (-28) =

Solution:

(-28) ÷ (-28) = **1**

True/False

In questions 72 to 108, state whether the statements are True or False.

Question 72:

5 – (-8) is same as 5 + 8.

Solution:

True
5 – (-8) = 5 + 8

Question 73:

(-9) + (-11) is greater than (-9) – (- 11).

Solution:

False
(-9)+ (-11) = – 9- 11 = -20
and (-9)-(-11) =-9+11 = 2
So, (-9) – (-11) is greater than (-9) + (-11).

Question 74:

Sum of two negative integers always gives a number smaller than both the integers.

Solution:

True
e.g. Taking two negative integers, i.e. (-5) and (-3).
(-5) + (-3)=-5-3=-8
= – 8 < – 5 and – 8 < – 3

Question 75:

Difference of two negative integers cannot be a positive integer.

Solution:

False
e.g. Taking two negative integers, i.e. -4 and -5.
=> – 4 – (-5) = – 4+5=1 [positive integer]

Question 76:

We can write a pair of integers, whose sum is not an integer.

Solution:

False
Because, sum of two integers, is always be an integer.

Question 77:

Integers are closed under subtraction.

Solution:

True
Because, if we subtract two integers we get another integer.

Question 78:

(- 23) + 47 is same as 47 + (- 23).

Solution:

True
Because, addition is commutative, i.e. a + b = b + a
=> (-23) + 47 = 47 + (-23)

Question 79:

When we change the order of integers their sum remains the same.

Solution:

True
Because, sum of two integers is commutative, i.e. a + b = b + a for two integers a and b.

Question 80:

When we change the order of integers, their difference remains the same.

Solution:

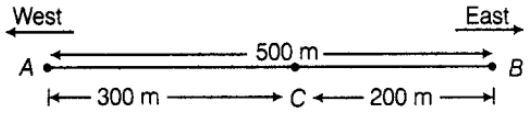
False
Subtraction of two integers is not commutative, i.e. a – b ≠b – a for two integers a and b.

Question 81:

Going 500 m towards East first and then 200 m back, is same as going 200 m towards West first and then going 500 m back.

Solution:

True
Case I Going 500 m towards East first, i.e. point A to B and then 200 m back, i.e. B to C.



As per the above figure shown, final position is C, i.e. 300 m in East.

As per the above figure shown, final position is C, i.e. 300 m in East.

Question 82:

(-5) x (33) = 5 x (- 33)

Solution:

True
∴ LHS = (-5) x 33 = (-165)
and RHS = 5 x (-33) = (-165)
Hence, LHS = RHS

Question 83:

(-19) x (-11) = 19 x 11

Solution:

True
Product of two negative integers is a positive integer, i.e. (-a) x (-b) = a x b where, a and b are positive integers.
=> LHS = (-19) x (-11) = 209
RHS = 19×11 = 209 Hence,
LHS = RHS

Question 84:

(-20) x (5 – 3) = (-20) x (-2)

Solution:

False
∵ LHS = (-20) x (5 – 3) = (-20) x 2 = (-40)
RHS = (-20) x (-2) = 40
Hence, LHS = RHS

Question 85:

4 x (-5) = (-10) x (-2)

Solution:

False
∵ LHS = 4 x (-5) = – 20
RHS = (-10) x (-2) = 20 Hence,

LHS = RHS

Question 86:

(-1) x (-2) x (-3) = 1 x 2x 3

Solution:

False

∵ LHS = (-1) x (-2) x (-3) = (-6)
RHS = 1 x 2 x 3 = 6
Hence, LHS = RHS

Question 87:

(-3) x 3 = (-12) – (-3)

Solution:

True

∵ LHS = (-3) x 3 = (- 9)
RHS = (-12) – (-3) = (-12) + 3 = (-9)
Hence, LHS = RHS

Question 88:

Product of two negative integers is a negative integer.

Solution:

False
Product of two negative integers is a positive integer, i.e. (-a) x (-b) = ab where, a and b are two positive integers.

Question 89:

Product of three negative integers is a negative integer.

Solution:

True
Product of three negative integers is a negative integer, i.e.
(-a) x (-0) x (-c) = (- abc)
where, a,b and c are three positive integers.

Question 90:

90 Product of a negative integer and a positive integer is a positive integer.

Solution:

False
Product of a negative integer and a positive integer is a negative integer, i.e. a x (-b) = -ab where, a and b are two positive integers.

Question 91:

When we multiply two integers their product is always greater than both the integers.

Solution:

False
e.g. Let two integers are (-5) and 2.
So, (-5) x2 = -10
=> (— 10) < (- 5) and (-10) <2.

Question 92:

Integers under multiplication.

Solution:

True
If we multiply two integers, we get an integer.

Question 93:

(-237) x 0 is same as 0 x (-39).

Solution:

True
When we multiply a number with 0, we always get 0.
=> (-237) x 0 = 0

Question 94:

Multiplication is not commutative for integers.

Solution:

False
Multiplication is commutative for integers, i.e. axb=bxa for any two integers a and b.

Question 95:

(-1) is not a multiplicative identity of integers.

Solution:

True
1 is multiplicative identity for integers, i.e, a x 1 = 1 x a = a for any integer a.

Question 96:

99 x 101 can be written as (100 – 1) x (100 + 1).

Solution:

True

∵ 99 x 101 = 9999
and (100 -1) x (100 + 1) = 100 x (100 + 1) -1 x (100 + 1)
= 100 x 100+1 x 100-1 x 100 -1 x 1 [using distributive property]
= 10000 + 100 – 100 – 1 = 9999

Question 97:

If **a, b** and **c** are integers and **b** $\neq$ 0, then **ax(b-c) = a x b – a x c**

Solution:

True
Multiplication can be distributive over subtraction,
i.e. a x (b-c) = a x b-a x c

Question 98:

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

Solution:

False
Integers show distributive property of multiplication over addition, i.e. ax(b + c) = a x b + a x c, where a, b and c are integers.

Question 99:

a x b = b x a

Solution:

True
Multiplication is commutative for integers, i.e. a x b = b x a where, a and b are integers.

Question 100:

a ÷ b = b ÷ a

Solution:

False
Division is not commutative for integers, i.e. a÷b ≠ b÷a where, a and b are integers.

Question 101:

a-b = b-a

Solution:

False
Subtraction is not commutative for integers, i.e. a – b ≠ b – a where, a and b are integers.

Question 102:

a + (**- b)** = – **(a** + **b)**

Solution:

True
Division of a negative integer and a positive integer is always a negative integer
i.e $\frac{a}{-b} = \frac{-b}{a} = -\left(\frac{a}{b}\right)$ where, a and b are integers.

Question 103:

a ÷ (-l) = – a

Solution:

True

a + (-1) = $\frac{a}{(-1)}$ = – a [as division of a negative and positive integer is always negative]

Question 104:

Multiplication fact (-8) x (-10) = 80 is same as division fact 80 ÷ (-8) = (-10).

Solution:

True

Multiplication fact	**Division fact**
$(-8)\times(-10)=80$	$80\div(-8)=(-10)$
$\text{LHS}=(-1)\times 8\times(-1)\times 10$	$\text{LHS}=80\div(-8)=\frac{80}{-8}$
$=(-1)(-1)\times 8\times 10$	
$=1\times 80=80=\text{RHS}$	$=(-10)=\text{RHS}$

Question 105:

Integers are closed under division.

Solution:

False
Because, when we divide two integers, we may or may not get an integer.
e.g. $^{2}/_{1}$ = 2 (integer) and $^{2}/_{3}$ (not an integer).

Question 106:

[(-32) ÷ 8] ÷ 2 = – 32 ÷ [8 ÷ 2]

Solution:

False

$$\because \quad \text{LHS}=[(-32)\div 8]\div 2=\left[\frac{-32}{8}\right]\div 2=-4+2=-2$$

$$\text{and RHS}=(-32)\div[8\div 2]=(-32)\div\left[\frac{8}{2}\right]=(-32)\div 4=\frac{(-32)}{4}=-8$$

Hence, LHS ≠ RHS

Question 107:

The sum of an integer and its additive inverse is zero (0).

Solution:

True
Additive inverse is the number, that when added to a given number yields zero.

Question 108:

The successor of 0 x (-25) is 1 x (-25).

Solution:

False
We know that, successor means adding 1 to the given number.
Here, given number is 0 x (-25) = 0 [on multiplying by 0 to any number the result is zero]
Hence, the successor of 0 = 0 + 1 = 1 but 1 ≠ 1 x (-25).

Question 109:

Observe the following patterns and fill in the blanks to make the statements true:

(a) $-5 \times 4 = -20$
$-5 \times 3 = -15 = -20 - (-5)$
$-5 \times 2 =$ ____ $= -15 - (-5)$
$-5 \times 1 =$ ____ = ___
$-5 \times 0 = 0 =$ ____
$-5 \times (-1) = 5 =$ ___
$-5 \times (-2) =$ ____ = ____

(b) $7 \times 4 = 28$
$7 \times 3 =$ ____ $= 28 - 7$
$7 \times 2 =$ ____ = ____ -7
$7 \times 1 = 7 =$ ____ $- 7$
$7 \times 0 =$ ____ = _____ $-$ ____
$7 \times (-1) = -7 =$ ___ $-$ ____
$7 \times (-2) =$ ____ = ____ $-$ ____
$7 \times (-3)$ _____ = ____ $-$ ____

Solution:

(a) By observing the pattern, we find that Ist column is constant, i.e. –5, IInd column is decreasing by 1, IIIrd column is increasing by 5, IVth column is also increasing by 5 and Vth column is constant, i.e. –5. So, accordingly,

I II III IV V

$-5 \times 4 = -20$

$-5 \times 3 = -15 = (-20) - (-5)$

$-5 \times 2 = -10 = (-15) - (-5)$

$-5 \times 1 = -5 = (-10) - (-5)$

$-5 \times 0 = 0 = (-5) - (-5)$

$-5 \times (-1) = 5 = 0 - (-5)$

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

(b) By observing the pattern, we find that Ist column is constant, i.e. 7, IInd column is decreasing by 1, IIIrd column is decreasing by 7, IVth column is also decreasing by 7 and Vth column is constant, i.e. +7. So, accordingly,

I II III IV V

$7 \times 4 = 28$

$7 \times 3 = 21 = 28 - 7$

$7 \times 2 = 14 = 21 - 7$

$7 \times 1 = 7 = 14 - 7$

$7 \times 0 = 0 = 7 - 7$

$7 \times (-1) = (-7) = 0 - 7$

$7 \times (-2) = (-14) = (-7) - 7$

$7 \times (-3) = (-21) = (-14) - 7$

Question 110:

Science Application An atom consists of charged particles called electrons and protons. Each proton has a charge of +1 and each electron has a charge of -1. Remember number of electrons is equal to number of protons, while answering these questions:
(a) What is the charge on an atom?
(b) What will be the charge on an atom, if it loses an electron?
(c) hat will be the charge on an atom, if it gains an electron?

Solution:

(a) Let a be the number of electrons in an atom.
Number of protons in the atom, will also be equal to a. Since, an atom has equal number of protons and electrons.

∴Charge on one electron = (-1)
∴Total charge in a electrons = a x (-1) = – a
∴Charge on one proton = (+1)
∴Total charge in a protons = a x (+1) = + a
Hence, total charge on the atom = Charge of electrons + Charge of protons
= – a + a = 0

(b) If an atom loses an electron, it will have (a -1) electrons and a protons.
∴Charge in one electron = (-1)
∵ Charge in (a-1) electrons = (a -1) x (-1) = – (a -1) = (1 – a)
∴Charge in one proton = (+1)
∵ Charge in a protons = (+1) x a = (+a)
Hence, total charge on the atom = Charge of electrons + Charge of protons

= 1 – a + a= + 1
(c) If an atom gains an electron, it will have (a + 1) electrons and a protons
∴ Charge in one electron = -1
Charge in (a +1) electrons = -1 x (a + 1) = – (a + 1)
∴Charge in one proton = (+1)
Charge in a protons = (+1) x a = (+ a)
Hence, total charge on the atom = Charge of electrons + Charge of protons
= a – (a + 1) = (-1)

Question 111:

An atom changes to a charged particle called ion, if it loses or gains electrons. The charge on an ion is the charge on electrons plus charge on protons. Now, write the missing information in the table given below:

Name of ion	Proton charge	Electron charge	Ion charge
(a) Hydroxide ion	+9	—	– 1
(b) Sodium ion	+11	—	+ 1
(c) Aluminium ion	+13	– 10	—
(d) Oxide ion	+8	–10	—

Solution:

(a) For Hydroxide ion,
Proton charge + Electron charge = Ion charge
Electron charge = Ion charge – Proton charge
Electron charge = -1 – 9 = -10
Hence, the electron charge in a Hydroxide ion is -10.

(b) For Sodium ion,
Electron charge = Ion charge – Proton charge = + 1 -11 = -10
Hence, the electron charge in a Sodium ion is -10.

(c) For Aluminium ion,
Ion charge = Proton charge + Electron charge
Ion charge = 13-10 = 3
Hence, the ion charge in an Aluminium ion is 3,

(d) For Oxide ion,
Ion charge = Proton charge + Electron charge
Ion charge = 8 -10 = – 2
Hence, the ion charge in an Oxide ion is -2.

Question 112:

Social Studies Application remembering that 1AD came immediately after 1 BC, while solving following problems take 1BC as -1 and 1AD as + 1.
(a) The Greeco-Roman era, when Greece and Rome ruled Egypt, started in the year 330 BC and ended in the year 395 AD. How long did this era last?
(b) haskaracharya was born in the year 1114 AD and died in the year 1185 AD. What was his age

when he died?
(c) Turks ruled Egypt in the year 1517 AD and Queen Nefertis ruled . Egypt about 2900 years, before the Turks ruled. In what year did she rule?
(d) Greek Mathematician Archimedes lived between 287 BC and 212 BC and Aristotle lived between 380 BC and 322 BC. Who lived during an earlier period?

Solution:

(a) Total duration of the era = End year – Start year
= (395 AD) – (330 BC)
= + 395 – (– 330)
= 395 + 330 = 725 yr
Hence, total duration of this era was 725 yr.

(b) Age, when Bhaskaracharya died = Year in which he died – Year in which he born
= (1185 AD) – (1114 AD)
= (+1185) – (+1114)
= 1185 – 1114 = 71 yr
Hence, Bhaskaracharya was died in the age of 71 yr.

(c) Year in which Queen Nefertis ruled = Year in which Turks ruled – 2900 yr
= (1517 AD) – 2900
= (+ 1517) – 2900
= – 1383 = 1383 BC
Hence, Queen Nefertis ruled in the year 1383 BC.

(d) Aristotle lived in an earlier period, as 380 BC and 322 BC is earlier than 287 BC and 212 BC.

Question 113:

The table shows the lowest recorded temperatures for each continent. Write the continents in order from the lowest recorded temperature to the highest recorded temperature.

The Lowest Recorded Temperatures

Continent	**Temperature** (in Fahrenheit)
Africa	–11°
Antarctica	–129°
Asia	–90°
Australia	–9°
Europe	–67°
North America	–81°
South America	–27°

Solution:

Lowest to heights (ascending order) in a negative number, the number that has greater value of actually smaller and vice-versa.
So, accordingly, we arrange them in ascending order

Antarctica (–129°) < Asia (–90°) < North America (–81°) < Europe (–67°) < South America (–27°) < Africa (–11°) < Australia (–9°)

Question 114:

Write a pair of integers whose product is -12 and there lies seven integers between them (excluding the given integers).

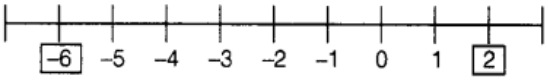
Solution:

For a pair of integers, whose product is -12 and there lies seven integers between them, Two solutions are possible, i.e. (-6and 2) and (-2 and 6).

$\Rightarrow -6 \times 2 = -12, \ -2 \times 6 = -12$

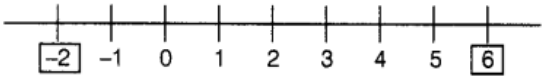
Ist Pair Let first integer = – 6 and second integer = 2

$\Rightarrow (-6) \times 2 = (-12)$ and 7 integers are lying between them.



IInd Pair Let first integer = – 2 and second integer = 6

$\Rightarrow (-2) \times 6 = -12$ and 7 integers are lying between them.



Question 115:

From given integers in Column I, match an integer of Column II, so that their product lies between -19 and -6.

Column I	Column II
–5	1
6	–1
–7	3
8	–2

Solution:

-5 x 3= (-15) which lies between -19 and -6.
6 x (-2)= (-12) which lies between -19 and -6.
– 7 x 1 = (- 7) which lies between -19 and -6.
8 x (-1)= (- 8) which lies between -19and -6.

Question 116:

Write a pair of integers, whose product is -36 and whose difference is 15.

Solution:

For a pair of integers, whose product is -36 and difference is 15, one possible solution is (-3,12).
So, first integer = – 3 and second integer =12

Their product = (-3) x 12 = – (3 x 12) = – 36
and the difference between these two integers is 12 – (- 3) = 15.

Question 117:

Match the following:

	Column I		Column II
(a)	$a \times 1$	(i)	Additive inverse of a
(b)	1	(ii)	Additive identity
(c)	$(-a) + (-b)$	(iii)	Multiplicative identity
(d)	$a \times (-1)$	(iv)	$a \div (-b)$
(e)	$a \times 0$	(v)	$a + b$
(f)	$(-a) \div b$	(vi)	a
(g)	0	(vii)	$-a$
(h)	$a + (-a)$	(viii)	0
(i)	$-a$	(ix)	-1

Solution:

(a) → (vi)
$a \times 1 = a$

(b) → (iii)
1 is multiplicative identity.

(c) → (v)
$-a \div (-b) = a \div b$ [both signs are cancelled with each other]

(d) → (vii)
$a \times (-1) = -a$

(e) → (viii)
$a \times 0 = 0$ [any value, when multiplies with 0 becomes zero]

(f) → (iv)
$(-a) \div b = a \div (-b)$

(g) → (ii)
0 is an additive identity.

(h) → (ix)
$a \div (-a) = \frac{a}{-a} = -1$

(i) → (i)
$-a$ is additive inverse of a.

Question 118:

You have Rs. 500 in your saving account at the beginning of the month.
The record below, shows all of your transactions during the month. How much money is in your account after these transactions?

Cheque no.	Date	Transaction description	Payment	Deposit
384102	4/9	Jal Board	? 120	? 200
275146	12/9	Deposit		
384103	22/9	LIC India	? 240	? 150
801351	29/9	Deposit		

How much money is in your account after these transactions?

Solution:

According to the question,
Already available amount = Rs. 500
On 4/9 with cheque number 384102 withdraw Rs. 120.
Also, with cheque number 275146 on 12/9 deposited amount was Rs. 200.
In the same way, on 22/9 with cheque number 384103, Rs. 240 paid to LIC of India, also.
On 29/9 with cheque number 801351, deposited amount was Rs. 150.
Thus, net amount available in bank account will be
= Already saved amount + Deposited amount – Debited amount (paid amount)
= 500 + 200+ 150-120-240
= 850 + (- 360) = Rs. 490

Question 119:

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

Solution:

A number of solutions can be possible.
e.g. Let first integer = 4and second integer = (-6)
Sum = 4 + (- 6) = – 2 [negative integer]

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

Solution:

A number of solutions can be possible.
e.g. Let first integer =8and second integer = – 2
Sum = 8 + (- 2) = 6 [positive integer]

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

Solution:

A number of solutions can be possible.
e.g. Let first integer = (- 7) and second integer = 2
Difference = (- 7 – 2) = (- 9) [negative integer]

(d) Write a positive integer and a negative integer whose difference is a positive integer.

Solution:

A number of solutions can be possible.
e.g. Let first integer = 4 and
second integer = (- 3) [positive integer]

(e) Write two integers, which are smaller than -5 but their difference is -5.

Solution:

For two integers, which are smaller than -5 but their difference is -5.
Let first integer = -11 and second integer = (- 6) [∵ -11 < (-5) and -6 < (-5)]
Difference = -11 – (- 6) = -11 + 6 = (- 5)

(f) Write two integers which are greater than -10 but their sum is smaller than -10.

Solution:

For two integers which are greater than -10 but their sum is smaller than -10.
Let first integer = – 4 and second integer = – 7 [∵ – 4 > (-10) and -7 > -10]
Sum = – 4 + (-7)= -11 < -10

(g) Write two integers which are greater than – 4 but their difference is smaller than -4.

Solution:

For two integers which are greater than -4 but their difference is smaller than -4.
Let first integer = (-1) and second integer = 4 [∵ -1 > – 4 and 4 > – 4]
Difference = -1-4 = -5<(-4)

(h) Write two integers which are smaller than – 6 but their difference is greater than -6.

Solution:

For two integers which are smaller than -6 but their difference is greater than -6.
e.g. Let first integer = (- 8) and second integer = (- 9) [∵ — 8 < — 6 and – 9 < – 6]
Difference = – 8 – (- 9) = -8 + 9 = 1 > (- 6)

(i) Write two negative integers whose difference is 7.

Solution:

A number of solutions can be possible.
e.g. Let first integer = (- 3) and second integer = (-10)
Difference = – 3 – (-10) = 7

(j) Write two integers, such that one is smaller than – 11 and other is greater than -11 but their difference is -11.

Solution:

For two integers, such that one is smaller than – 11 and other is greater than -11.
Let first integer = – 20and second integer = – 9 [∵-20< -11 and —9> — 11]
Difference = – 20 – (- 9) = (-11)

(k) Write two integers whose product is smaller than both the integers.

Solution:

A number of solutions can be possible.
e.g. Let first integer = – 3 and second integer = 5
Product = -3×5 = -15 [∵—15 < – 3 and — 15 < 5]

(l) Write two integers, whose product is greater than both the integers.

Solution:

A number of solutions can be possible.
e.g. Let first integer = 4 and second integer = 6
Product = 6 x 4 = 24 [∵-24 > 6 and 24 > 4]

Question 120:

What's the error? Ramu evaluated the expression – 7 – (-3) and came up with the answer – 10 . What did Ramu do wrong?

Solution:

Ramu went wrong in solving – (- 3) and took it as – 3 only.
Correct answer = – 7 – (– 3)= – 7 + 3= – 4

Question 121:

What's the error? Reeta evaluated -4 + d for d = — 6 and gave an answer of 2. What might Reeta have done wrong?

Solution:

Reeta went wrong in solving + (- 6) and took it as + 6.
Correct answer = -4 + d= -4+(-6) = -4-6 = -10

Question 122:

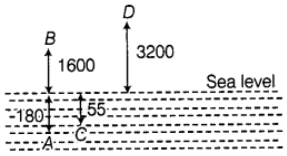
The table given below, shows the elevations relative to sea level of four locations. Taking sea level as zero (0), answer the following questions.

Location	Elevation (in m)
A	−180
B	1600
C	−55
D	3200

(a) Which location is closest to sea level?
(b) Which location is farthest from sea level?
(c) Arrange the locations from the least to the greatest elevation.

Solution:

(a) From the adjacent figure, we can clearly see that C is closest to sea level.
(b) D is farthest from sea level.
(c) Locations from the least to the greatest elevation will be in the order A,Sand D.



Question 123:

You are at an elevation 380 m above sea level as you start a motor ride. During the ride, your elevation changes by the following metres 540 m, -268 m, 116 m, -152 m, 490 m, -844 m, 94 m. What is your elevation relative to the sea level at the end of the ride?

Solution:

As per the given information, initial position of motor was 380 m.
During the ride, change in elevation was 540 m, -268 m, 116 m, -152 m, 490 m, -844 m and 94 m.
Net change in position = 540 + (- 268) + (116) + (-152) + (490) + (- 844) + 94 = – 24 m Initial position was 380 m. So, at the end of the ride the position would be = 380+ (-24) = 356 m

Question 124:

Evaluate the following, using distributive property.
(i) -39 x 99 (ii) (-85) x 43 +43 x (-15)
(iii) 53 x (-9) – (-109) x 53 (iv) 68 x (-17) + (-68) x 3

Solution:

(i) $-39 \times 99 = (-40 + 1) \times (100 - 1)$

$= -40 \times (100 - 1) + 1 \times (100 - 1)$

Now, using distributive property,

$= (-40 \times 100) + (-1 \times -40) + (1 \times 100) + (1 \times -1)$ $[\because a \times (b + c) = a \times b + a \times c]$

$= -4000 + 40 + 100 - 1 = -3861$

(ii) $(-85) \times 43 + 43 \times (-15)$

Taking 43 as common

$= 43 \times (-85 - 15)$ $[\because a \times b + a \times c = a \times (b + c)]$

$= 43 \times (-100) = -4300$

(iii) $53 \times (-9) - (-109) \times 53$

Taking 53 as common,

$= 53 \times [-9 - (-109)]$

$= 53 \times (-9 + 109) = 53 \times 100 = 5300$ $[\because a \times b + a \times c = a \times (b + c)]$

(iv) $68 \times (-17) + (-68) \times 3$

$= 68 \times (-17) - 68 \times 3$

Taking 68 as common,

$= 68 \times (-17 - 3)$ $[\because a \times b + a \times c = a \times (b + c)$ i.e. using distributive property$]$

$= 68 \times (-20)$

$= -1360$

Question 125:

If '*' is an operation have, such that for integers a and b. We have a*b=a x b+(a x a+b x b), then find
(i) (-3)*(-5) (ii) (-6)*2

Solution:

(i) We have, a* b = a x b +(a x a+b x b)
Now, put a = (-3) and b = (-5)
(-3)* (-5) = (- 3)x(- 5)+ [(- 3)x(- 3)+ (- 5)x(- 5)]
= 15+(9+25)= 15+34= 49

(ii) Now, put a = – 6 and b = 2
(-6)*2 = (-6×2)+{(-6)x(-6)+2×2}
= -6×2 + (36+4)= -12 + 40= 28

Question 126:

If Δ is an operation, such that for integers a and b. We have $a \Delta b = a \times b - 2 \times a \times b + b \times b(-a) \times b + b \times b$, then find

(i) $4 \Delta (-3)$ (ii) $(-7) \Delta (-1)$

Also, show that $4 \Delta (-3) \neq (-3) \Delta 4$ and $(-7) \Delta (-1) \neq (-1) \Delta (-7)$

Solution:

(i) We have, $a \Delta b = a \times b - 2 \times a \times b + b \times (b)\,(-a) \times b + b \times b$

Now, put $a = 4$ and $b = (-3)$

$4\Delta(-3) = 4\times(-3)-2\times4(-3)+(-3)\times(-3)\times(-4)\times(-3) + (-3)\times(-3)$

$= -12-2\times(-12)+(9)(12)+9 = -12+24+108+9$

$= 129$

Now, put $a = -3$ and $b = 4$

$\Rightarrow \quad (-3)\Delta4 = (-3)\times4-2\times(-3)\times(4)+4\times4\{-(-3)\}\times4+4\times4$

$= (-12)+24+16(3)\times4+16$

$= (-12)+24+192+16$

$= 220$

Clearly, $4\Delta(-3)\neq(-3)\Delta4$

(ii) Now, put $a = (-7)$ and $b = (-1)$

$\Rightarrow (-7)\Delta(-1) = (-7)\times(-1)-2\times(-7)\times(-1)+(-1)\times(-1)\{-(-7)\}\times(-1) + (-1)\times(-1)$

$= 7-14+1\times7\times(-1)+1$

$= 7-14-7+1 \Rightarrow -13$

Now, put $a = (-1)$ and $b = (-7)$

$\Rightarrow (-1)\Delta(-7) = (-1)\times(-7)-2\times(-1)\times(-7)+(-7)\times(-7)\{-(-1)\}\times(-7) + (-7)\times(-7)$

$= 7-14+49(1)\times(-7)+49$

$= 7-14-343+49$

$= -301$

Clearly, $(-7)\Delta(-1)\neq(-1)\Delta(-7)$

Question 127:

Below u, v, w and x represent different integers, where u = (-4) and $x \neq 1$. By using following equations, find each of the values

u x v=u, x x w =w and u+x = w

(a) v (b) w (c) x

Explain your reason, using the properties of integers

Solution:

We have, three equations

$u \times v = u$ ...(i)

$x \times w = w$ ...(ii)

$u + x = w$ ...(iii)

and $u = -4$

(a) By putting the value of u in Eq. (i), we get

$(-4)\times v = (-4)$

$\Rightarrow \quad v = \frac{(-4)}{(-4)} \Rightarrow v = 1$

(b) From Eq. (ii),

$x \times w = w \Rightarrow x = \frac{w}{w} \Rightarrow x = 1$

But, $x \neq 1$

Hence, $x \times w = w$, (ii) is possible, when $w = 0\,(x \neq 1)$.

(c) From Eq. (iii), $u + x = w$

Put $u = -4$ and $w = 0$, we get

$\Rightarrow \quad -4 + x = 0 \Rightarrow x = 4$

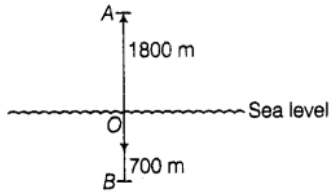
$\therefore \quad v = 1, x = 4$ and $w = 0$

Question 128:

Height of a place A is 1800 m above sea level. Another place B is 700 m below sea level. What is the difference between the levels of these two places?

Solution:

As per the given information, we can draw the diagram,



Let O be the point of level of sea.
Difference between these two points, A and B
= Height between sea level and point A+Height between point B and sea level =AO + OB=1800+ 700
= 2500 m

Question 129:

Gas	Freezing point at sea level (°F)	Freezing point at sea level (°C)
Hydrogen	−435	
Krypton	−251	
Oxygen	−369	
Helium	−458	
Argon	−309	

Solution:

We have, $C = \frac{5}{9}(F - 32)$

For Hydrogen, put $F = (-435)$

$\Rightarrow \quad C = \frac{5}{9}(-435 - 32) = \frac{5}{9} \times (-467) = -259.44$

$\Rightarrow \quad C = -259.44$

For Krypton, put $F = (-251)$

$\Rightarrow \quad C = \frac{5}{9}(-251 - 32) = \frac{5}{9} \times (-283) = -157.22$

$\Rightarrow \quad C = -157.22$

For Oxygen, put $F = (-369)$

$C = \frac{5}{9}(-369 - 32) = \frac{5}{9} \times (-401)$

$\Rightarrow \quad C = -222.7$

$\Rightarrow \quad C = -223$

For Helium, put $F = (-458)$

$C = \frac{5}{9}(-458 - 32) = \frac{5}{9} \times (-490) = -272.22$

$C = -272.22$

For Argon, put $F = (-309)$

$C = \frac{5}{9}(-309 - 32) = \frac{5}{9}(-341) = -189.44$

$\Rightarrow \quad C = -189.44$

Question 130:

Sana and Fatima participated in an apple race. The race was conducted in 6 parts. In the first part, Sana won by 10 seconds. In the second part, she lost by 1 min, then won by 20 seconds in the third part and lost by 25 seconds in the fourth part, she lost by 37 seconds in the fifth part and won by 12 seconds in the last part. Who won the race finally?

Solution:

Let difference in time denoted by positive, when Sana wins the race and negative, when Sana loses the race.
Total difference in time taken by Sana in all the six parts
=10-60+20-25-37+12 =-80s [∵ 1 min=60s]
Hence, Fatima won the race by 80 s.

Question 131:

131 A green grocer had a profit of Rs. 47 on Monday, a loss of Rs. 12 on Tuesday and loss of Rs. 8 on Wednesday. Find his net profit or loss in 3 days.

Solution:

As per the given information,
Profit on Monday = Rs. 47 and loss on Tuesday = Rs. 12
and loss on Wednesday =Rs. 8
∴ Net profit = Total profit – Total loss
Now,total profit = Rs. 47 and total loss =12 + 8 = t 20
∴ Net profit =47-20 = Rs. 27

Question 132:

In a test, +3 marks are given for every correct answer and -1 mark are given for every incorrect answer. Sona attempted all the questions and scored +20 marks, though she got 10 correct answers.
(i) How many incorrect answers has she attempted?
(ii) How many questions were given in the test?

Solution:

Let x be the correct answers and y be the incorrect answers, given by Sona.
It is given that, if she gives 10 correct answers and her score is 20. Since, for every correct answer, +3 is given and for every incorrect answer, -1 is given.
Hence,

(i) $3 \times$ (Correct answer) + $(-1) \times$ (Incorrect answer) = Total score

$\Rightarrow \quad 3 \times 10 + (-1) \times y = 20$

$\Rightarrow \quad 30 - y = 20$

$\Rightarrow \quad 30 - 20 = y$

$\Rightarrow \quad y = 10$

(ii) Total number of questions = Correct answer + Incorrect answer

$= x + y = 10 + 10 = 20$

Question 133:

In a true-false test containing 50 questions, a student is to be awarded 2 marks for every correct answer and -2 for every incorrect answer and 0 for not supplying any answer. If Yash scored 94 marks in a test, what are the possibilities of his marking correct or wrong answer?

Solution:

Since, Yash scored 94 marks.

$$\text{So, minimum correct answer} = \frac{\text{Total marks}}{\text{Marks for 1 correct answer}} = \frac{94}{2} = 47$$

Hence, there are two possibilities:
(i) 47 correct answers and 3 unattempted.
(ii) 48 correct answers, 1 unattempted and 1 wrong answer.

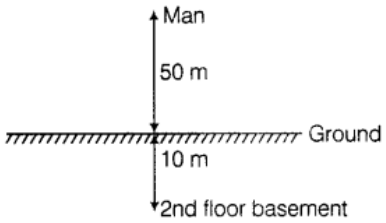
Question 134:

A multistory building has 25 floors above the ground level each of height 5 m. It also has 3 floors in the basement each of height 5m. A lift in building moves at a rate of lm/s. If a man starts from 50m above the ground, how long will it take him to reach at 2nd floor of basement?

Solution:

Man covers the distance above the ground = 50 m
and man covers the distance below the ground = 2 x 5 = 10 m
[∵ distance between two floors = 5 m]

Thus, total distance = 50 m + 10 m = 60 m



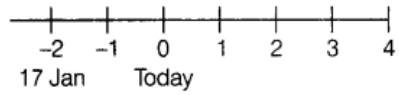
∵ Speed of the lift = 1 m/s [given]

Hence, time taken to reach second floor of basement $= \frac{\text{Distance}}{\text{Speed}} = \frac{60\text{ m}}{1\text{ m/s}} = 60\text{ s or }1\text{min}$

Question 135:

Taking today as zero on the number line, if the day before yesterday is 17 January, what is the date 3 days after tomorrow?

Solution:



If we take today as zero, then two days before today is 17 January. Hence, 3 days after tomorrow will be at 4th place from zero on the number line.

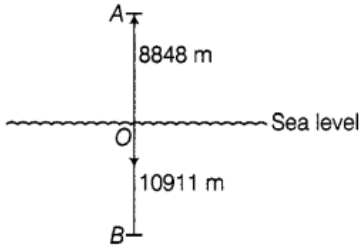
So, required date will be (17+6) January =23 January

Question 136:

The highest point measured above sea level is the summit of Mt. Everest, which is 8848 m above sea level and the lowest point is challenger deep at the bottom of Mariana Trench which is 10911 m below sea level. What is the vertical distance between these two points?

Solution:

As per the given information, we can draw the diagram,



Let A be the point above the sea level and B be the point below the sea level.
∴Vertical distance between points A and B = Distance between point A and sea level + Distance between point B and sea level
= AO+OB = 8848+10911 = 19759 m

Solution of Previous Years' Question Papers
2019

1st term

1) Find the value of a + b + (- 10) when a = 5 , b = - 4
   = 5 - 4 - 10 = - 9
2) Simplify: 27 ÷ (- 9) + 3 x (- 2)
   $27 \times \frac{1}{-9} - 6 = -3 - 6 = -9$

1) Find the product of (-5) X (- 4) X (- 3) X (-2) X (-1)
   = − 120
2) Soham has ₹ 60 in his wallet. Each day he takes out ₹ 5. What integer represents the change in the number of rupees in his wallet over 6 days?
   Total money = ₹ 60
   After 6 days , required money = ₹ (60 − 6 x 5) = ₹ (60 − 30) = ₹ 30
   ∴ It is represented by the integer as (30)

3rd Term

ii) Which of the following is odd one out?
c) (-5)x(-1)

iv) $-37-(-15)-2=-54$.(False)

ii) What is the value of $6-6\div 6\times 6$? Ans-0

2018

1st Term

i) Which of the following is the odd one out?

c) (-5) x (-1)

iii) (-8) x (-3) x (-5)= -120

(i) Find the value of the expression (-8) – a – b when a=5 and b= - 4.
(ii) The average temperature in winter in Manali is about -8^0 C, while in Leh it is about -42^0 C. How many degrees colder is the winter temperature of Leh?

(i) (- 8) – a – b
= (- 8) – 5 – (- 4) [Since a = 5 & b = - 4]
= - 8 – 5 + 4
= - 13 + 4
= - 9.
(ii) Required difference = -42^0 C – (-8^0 C) = -42^0 C + 8^0 C = -34^0 C.

2nd Term

(i) The value of $6\div(-1)$ does not lie between
(a) 0 and –10; (b) -3 and -12; (c) -4 and 10; (d) -7 and 7.

(i) (c) – 4 and 10.

(i) The product of integers is commutative. (i) True

(i) – 15 ÷ 5 × (-7)
= (- 3) × (- 7)
= 21

Exercise Problems

Question 1
What is the value of $(-22)-[(-23)-(-17)-(-61)](-22)-[(-23)-(-17)-(-61)]$

Question 2
What should be subtracted from -9876 to obtain -9512?

Question 3
The temperature of a city is 4^0C. Next day the temperature falls by 5^0C. What is the temperature of the city next day?

Question 4
Fill in the blanks

i. Sum of integer and its additive inverse is _____
ii. Sum of -22 and -44 is _____
iii. -36 ÷ (_____)=-9
iv. _____ is absolute value of -998

Question 5
Mark the correct option

i. Sum of two negative numbers is always
   a. Positive
   b. Negative
   c. 0
   d. 1
ii. Which property is reflected in this equation 7×5=5×7
   a. Closure
   b. Commutative
   c. Associative
   d. Distributive

Question 6
A divers descends 20 feet in the water from the boat at the surface of a lake. He then rose 12 feet and descends another 18 feet. At this point what is his depth in water?

Question 7
Verify a-(-b) =a + b for the following values of 'a' and 'b'

a. a=34 b=73
b. a=45 b=30

Question 8
Write down the pair of integers whose

a. Sum is -4
b. Sum is 0
c. Difference is 2
d. Difference is -6

Question 9
Verify the following

a. $(-22) \times [(-4) + (-5)] = [(-22) \times (-4)] + [(-22) \times (-5)]$
b. $(-12) \times [(3) + (-9)] = [(-12) \times (4)] + [(-12) \times (-9)]$

Question 10
Evaluate

a. $(-100) \div 5$
b. $(-36) \div (-4)$
c. $(0) \div (-12)$
d. $[(-30) \div 5] \div 2$
e. $(-40) \div 40$

Question 11
The price of the stock decreases Rs. 45 per day for four consecutive days. What was the total change in value of the stock over 4 day period?

Question 12
A group of hikers is descending the mountain at a rate of 600 feet per hour. What is the change in elevation of hiker after 6 hours?

Question 13
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.

Question 14
In a test (+5) marks are given for every correct answer and (-2) marks are given for every incorrect answer.

i. Radhika answered all the questions and scored 30 marks and get 10 correct answers
ii. Jay also answered all the questions and scored (-12) marks though he got 4 correct answers

How many incorrect answers had they attempted?

Question 15 In a test (+5) marks are given for every correct answer and (-2) marks are given for every incorrect answer and 0 for answer not attempted. Ram gets 3 correct and 4 incorrect out of 7 questions he attempted. What is his score?