Chapter - 1
Integers

Exercise

In the Questions 1 to 25, there are four options, out of which only one is correct. Write the correct one.

1. When the integers 10, 0, 5, – 5, – 7 are arranged in descending or ascending order, them 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) 0

When the given integers are arranged in descending order: 10, 5, 0, -5, -7.

When the given integers are arranged in ascending order: -7, -5, 0, 5, 10.

We see that in both the orders 0 always remains in the middle of the arrangement.

2. By observing the number line (Fig. 1.2), 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) B is smaller than 0

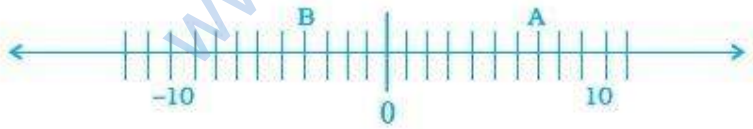


Fig. 1.2

Solution:

(c) B is greater than A.

As, B lies to the left of zero and A lies to the right of zero on the number line clearly, A has to be greater than B.

3. By observing the above number line (Fig. 1.2), state which of the following statements is true.
(a) B is 2 (b) A is – 4 (c) B is –13 (d) B is – 4

Solution:

(d) B is -4

Each division on the number line 1 unit apart.
So,
B is 4 units from the left of zero.

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) -1, -4, -7

In the given sequence of numbers, each number differs by 3 by the previous number.

5. The next number in the pattern – 62, – 37, – 12 _____ is
(a) 25 (b) 13 (c) 0 (d) –13

Solution:

(a) 13

It's found that the pattern is,
-62 + 25 = -37,
-37 + 25 = -12
Similarly,
-12 + 25 = 13

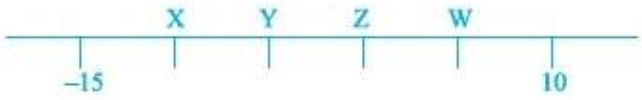
6. Which of the following statements is not true?
(a) When two positive integers are added, we always get a positive integer.
(b) When two negative integers are added we always get a negative integer.
(c) When a positive integer and a negative integer is added we always get a negative integer.
(d) Additive inverse of an integer 2 is (– 2) and additive inverse of (– 2) is 2.

Solution:

(c) When a positive integer and a negative integer is added we always get a negative integer.

The statement is false as when a positive and a negative integer is added we may get a positive number or even zero.

7. On the following number line value 'Zero' is shown by the point



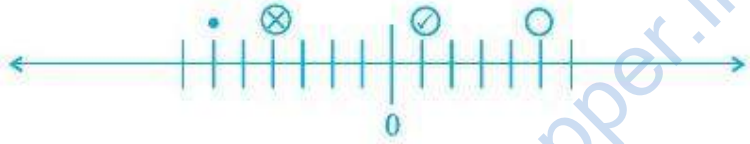
(a) X (b) Y (c) Z (d) W

Solution:

(C) Z

It's observed that each division on the number line is 5 units.
So, from 10 taking two division to its right we get zero.

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



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

Solution:

(c) Descending order of given numbers is ○, ⊘, ⊗, •

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

Solution:

(a) -10

We have,
(-3) x 3 = -9
So,
-9 lies to the right to -10.

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) 0 and 10

The value of 5 ÷ (–1) = -5

As it's as negative number it doesn't lie between 0 and 10.

11. Water level in a well was 20m below ground level. During rainy season, rain water 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 1m 20 cm high and a pulley is fixed 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

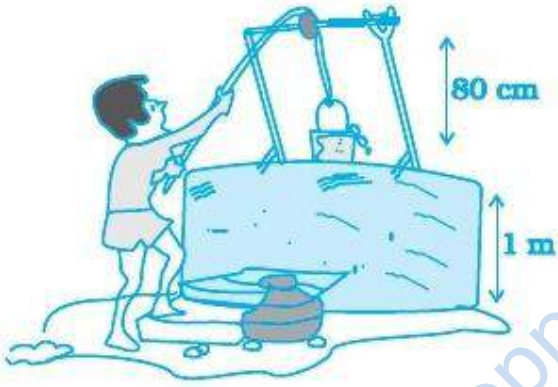


Fig. 1.3

Solution:

(a) 17 m
Height of the wall of the well = 1m 20 cm
= 1.2 m

Height of the fixed pulley = 80 cm
= 0.8 m
Initially water was available at a depth of 20 m below ground level.

Later, due to rain the water level was raised by 5 m.
Hence, the new depth at which water is available = 20 – 5
= 15 m
So,
The minimum length of the rope required to draw water from the well will be
(1.2 + 0.8 + 15) m = 17 m

12. (– 11) × 7 is not equal to
(a) 11 × (– 7) (b) – (11 × 7) (c) (– 11) × (– 7) (d) 7 × (– 11)

Solution:

(c) (– 11) × (– 7)

According to question,

11 x (-7) = -77
– (11 x 7) = -77 and
7 x (-11) = -77

But,
(-11) x (-7) = 77

13. (– 10) × (– 5) + (– 7) is equal to
(a) – 57 (b) 57 (c) – 43 (d) 43

Solution:

(d) 43

Using BODMAS rule,

(-10) x (-5) + (-7) = 50 – 7
= 43

14. Which of the following is not the additive inverse of a ?
(a) – (– a) (b) a × (– 1) (c) – a (d) a ÷ (–1)

Solution:

(a) - (-a)

The additive inverse of a is – a
But,
-(-a) = a

15. Which of the following is the multiplicative identity for an integer a ?
(a) a (b) 1 (c) 0 (d) – 1

Solution:

(b) 1

The multiplicative identity of an integer a is 1. (As a x 1 = a)

16. [(– 8) × (– 3)] × (– 4) is not equal to
(a) (– 8) × [(– 3) × (– 4)]
(b) [(– 8) × (– 4)] × (– 3)
(c) [(– 3) × (– 8)] × (– 4)
(d) (– 8) × (– 3) – (– 8) × (– 4)

Solution:

(d) $(-8) \times (-3) - (-8) \times (-4)$

$[(-8) \times (-3)] \times (-4) = (-8) \times [(-3) \times (-4)]$
$= [(-8) \times (-4)] \times (-3)$
$= [(-3) \times (-8)] \times (-4$
But,
$[(-8) \times (-3)] \times (-4) \neq [(-8) \times (-3)] \times (-4)$

17. $(-25) \times [6 + 4]$ is not same as
(a) $(-25) \times 10$ (b) $(-25) \times 6 + (-25) \times 4$ (c) $(-25) \times 6 \times 4$ (d) -250

Solution:

(c) $(-25) \times 6 \times 4$

$(-25) \times [6 + 4] = (-25) \times 10$
$= (-25) \times 6 + (-25) \times 4$
$= -250$
But,
$(-25) \times [6 + 4] \neq (-25) \times 6 \times 4$

18. -35×107 is not same as
(a) $-35 \times (100 + 7)$
(b) $(-35) \times 7 + (-35) \times 100$
(c) $-35 \times 7 + 100$
(d) $(-30 - 5) \times 107$

Solution:

(c) $-35 \times 7 + 100$

$-35 \times 107 = (-30 - 5) \times 107$
$= -35 \times (100 + 7)$
$= (-35) \times 7 + (-35) \times 100$

But, $-35 \times 107 \neq -35 \times 7 + 100$

19. $(-43) \times (-99) + 43$ is equal to
(a) 4300 (b) – 4300 (c) 4257 (d) – 4214

Solution:

(a) 4300

Using BODMAS rule,

$(-43) \times (-99) + 43 = [(-43) \times (-99)] + 43$
$= 4257 + 43$
$= 4300$

20. (– 16) ÷ 4 is not same as
(a) (– 4) ÷ 16 (b) – (16 ÷ 4) (c) 16 ÷ (– 4) (d) – 4

Solution:

(a) (– 4) ÷ 16

(– 16) ÷ 4 = -4
But,
$(-4) \div 16 = -\frac{1}{4}$

21. Which of the following does not represent an integer?
(a) 0 ÷ (– 7) (b) 20 ÷ (– 4) (c) (– 9) ÷ 3 (d) (– 12) ÷ 5

Solution:

(d) (– 12) ÷ 5

0 ÷ (– 7) = 0, an integer
20 ÷ (– 4) = -5, an integer
(– 9) ÷ 3 = -3, an integer
But,
(– 12) ÷ 5 = -2.4, which is a decimal and not an integer

22. Which of the following is different from the others?
(a) 20 + (–25) (b) (– 37) – (– 32) (c) (– 5) × (–1) (d) (45) ÷ (– 9)

Solution:

(c) (– 5) × (–1)

As all the remaining options give a value of -5
20 + (–25) = (– 37) – (– 32)
= (45) ÷ (– 9)
= -5
But,
(– 5) × (–1) = 5

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) – 10° to + 1°

The difference in the temperature = 1° – (10°)
= 11° (maximum)

Also,
23° to 32° = 32° – 23°
= 9°
– 18° to – 11° = -11° – (-18) °
= 7°
– 5° to 5° = 5° – (-5) °
= 10°

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 × b (d) a ÷ b

Solution:

(d) a ÷ b
If a and b are two integers,
Then,
a + b will always be an integer
a – b will always be an integer
a × b will always be an integer

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) a ÷ 0

a ÷ 0 = $\frac{a}{0}$ is not defined

Encircle the odd one of the following (Questions 26 to 30).

26. (a) (–3, 3) (b) (–5, 5) (c) (–6, 1) (d) (–8, 8)

Solution:

(c) (–6, 1)

–3 + 3 = 0
–5 + 5 = 0
–8 + 8 = 0
–6 + 1 = -5

So, (–6, 1) is the odd one.

27. (a) (–1, –2) (b) (–5, +2) (c) (–4, +1) (d) (–9, +7)

Solution:

(d) (–9, +7)

As,
–1 + (–2) = -3
–5 + 2 = -3
–4 + 1 = -3
–9 + 7 = -2

Hence, (–9, +7) is the odd one.

28. (a) (–9) × 5 × 6 × (–3)
(b) 9 × (–5) × 6 × (–3)
(c) (–9) × (–5) × (–6) × 3
(d) 9 × (–5) × (–6) × 3

Solution:

(c) (–9) × (–5) × (–6) × 3

As,
(–9) × 5 × 6 × (–3) = 810
9 × (–5) × 6 × (–3) = 810
(–9) × (–5) × (–6) × 3 = -810
9 × (–5) × (–6) × 3 = 810

29. (a) (–100) ÷ 5 (b) (–81) ÷ 9 (c) (–75) ÷ 5 (d) (–32) ÷ 9

Solution:

(d) (–32) ÷ 9

As, only (–32) ÷ 9 doesn't give an integer ,
So,

$\frac{-32}{9}$ = -3.5555555556

30. (a) (–1) × (–1)
(b) (–1) × (–1) × (–1)
(c) (–1) × (–1) × (–1) × (–1)
(d) (–1) × (–1) × (–1) × (–1) × (–1) × (–1)

Solution:

(b) (–1) × (–1) × (–1)

As,

(–1) × (–1) = 1
(–1) × (–1) × (–1) × (–1) = 1
(–1) × (–1) × (–1) × (–1) × (–1) × (–1) = 1
But,
(–1) × (–1) × (–1) = -1

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

31. (–a) + b = b + Additive inverse of _____.

Solution:

(–a) + b = b + (-a)
(–a) + b = b + Additive inverse of (a)

32. _____ ÷ (–10) = 0

Solution:

$0 \div (-10) = \frac{0}{-10}$
$= 0$

33. (–157) × (–19) + 157 = _____

Solution:
3140

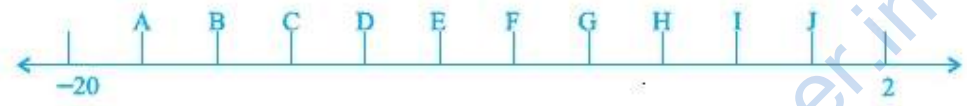
(–157) × (–19) + 157 = (2983) + 157
= 3140

34. [(–8) + _____] + _____ = _____ + [(–3) + _____] = –3

Solution:
-3, 8, -8, 8

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

35. On the following number line, (–4) × 3 is represented by the point _____.



Solution:
D

(-4) x 3 = -12
Each division on the number line is 2 units. So, D represent -12

36. If x, y and z are integers then (x+___) + z = _____ + (y + _____)

Solution:
y, x, z

By associative property of integers, we have
(x + y) + z = x + (y + z)

37. (– 43) + _____ = – 43

Solution:

(– 43) + **0** = – 43

38. (– 8) + (– 8) + (– 8) = _____ × (– 8)

Solution:

(– 8) + (– 8) + (– 8) = -24
= **3** × (– 8)

39. 11 × (– 5) = – (_____ × _____) = _____

Solution:
11, 5, -55

11 × (– 5) = – (11 × 5)
= -55

40. (– 9) × 20 = _____

Solution:
-180

(– 9) × 20 = -180

41. (– 23) × (42) = (– 42) × _____

Solution:
23

(– 23) × (42) = (– 42) × 23
= 966

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

Solution:
Whole, negative

43. If we multiply _____ number of negative integers, then the resulting integer is positive.

Solution:
Even

44. If we multiply six negative integers and six positive integers, then the resulting integer is _____.

Solution:

Positive integer

When even number of negative integers are multiplied the resulting integer is positive and when six positive integers are multiplied the resulting integer is also a positive.

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

Solution:
Negative

When odd number of negative integers are multiplied the resulting integer is negative. Also, when a negative and positive integer are multiplied the resulting integer is negative.

46. _____ is the multiplicative identity for integers.

Solution:
1

1 is the multiplicative identity for integers.
1 x a = a

47. We get additive inverse of an integer a when we multiply it by _____.

Solution:
-1

a x (-1) = -a
= additive inverse of (a)

48. (– 25) × (– 2) = _____.

Solution:
50

(– 25) × (– 2) = 25 x 2
= 50

49. (– 5) × (– 6) × (– 7) = _____.

Solution:
-210

(– 5) × (– 6) × (– 7) = – (5 × 6 × 7)
= -210

50. 3 × (– 1) × (– 15) = _____

Solution:

45

3 × (– 1) × (– 15) = (-3) x (-15)
= 45

51. [12 × (– 7)] × 5 = _____ × [(– 7) × _____]

Solution:

12, 5

[12 × (– 7)] × 5 = 12 × [(– 7) × 5] (Associative property of integers)

52. 23 × (– 99) = _____ × (– 100 + _____) = 23 × _____ + 23 × _____

Solution:

23, 1, -100, 1

23 × (– 99) = 23 × (– 100 + 1)
= 23 × (-100) + 23 × 1 (Distributive property of integers)

53. _____ × (– 1) = – 35

Solution:

35

35 × (– 1) = – 35

54. _____ × (– 1) = 47

Solution:
-47

-47 × (– 1) = 47 (product of even number of negative integers is a positive integer)

55. 88 × = – 88

Solution:

-1

88 × -1 = – 88

56. × (–93) = 93

Solution:

-1

-1 × (–93) = 93

57. (– 40) × = 80

Solution:

-2

(– 40) × (-2) = 80

58. × (–23) = – 920

Solution:

40

40 × (–23) = – 920

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

Solution:

Negative

60. When –16 is divided by _____ the quotient is 4.

Solution:
-4

Let -16 be divided by x and the quotient is 4

So,

$\frac{-16}{x} = 4$

x = -4

61. Division is the inverse operation of _____

Solution:

Multiplication

62. 65 ÷ (– 13) =

Solution:
-5

65 ÷ (– 13) = 65/ (-13) = -5

63. (– 100) ÷ (– 10) =

Solution:
10

(– 100) ÷ (– 10) = (– 100)/ (– 10) = 10

64. (– 225) ÷ 5 =

Solution:
-45

(– 225) ÷ 5 = -45

65. _____÷ (– 1) = – 83

Solution:
83

83 ÷ (– 1) = – 83

66. _____ ÷ (– 1) = 75

Solution:
-75

(-75) ÷ (– 1) = 75

67. 51 ÷ _____ = – 51

Solution:
-1

51 ÷ (-1) = – 51

68. 113 ÷ _____ = – 1

Solution:
-113

113 ÷ (-113) = – 1

69. (– 95) ÷ _____ = 95

Solution:
-1

(– 95) ÷ (-1) = 95

70. (– 69) ÷ (69) = _____

Solution:
-1

(– 69) ÷ (69) = (-69)/ 69
= -1

71. (– 28) ÷ (– 28) = _____

Solution:
1

(– 28) ÷ (– 28) = (-28)/ (-28)
= 1

In Questions 72 to 108, state whether the statements are true or false.

72. 5 – (– 8) is same as 5 + 8.

Solution:

True
5 – (-8) = 5 + 8

73. (– 9) + (– 11) is greater than (– 9) – (– 11).

Solution:

False
(-9) + (-11) = – 9 – 11
= -20
and
(-9) – (-11) = -9 + 11
= 2
Since,
-20 < 2
So,
-9 + (-11) < (-9) – (-11)

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

Solution:

True

75. Difference of two negative integers cannot be a positive integer.

Solution:

False
As,
-3 – (-5) = -3 + 5
= 2

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

Solution:

False
Since, sum of two integers is always an integer.

77. Integers are closed under subtraction.

Solution:

True
As subtraction of any two integers is always an integer.
Integers are closed under subtraction.

78. (– 23) + 47 is same as 47 + (– 23).

Solution:

True
(-23) + 47 = 24
and
47 + (-23) = 47 – 23
= 24

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

Solution:

True

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

Solution:

False
Since,
2 – 3 – 5 = 2 – 8
= -6
but
3 – 2 – 5 = 3 – 7
= -4

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

In first case, he is at a distance of (500 – 200) m = 300 m towards east.
In second case, he is at a distance of (200 – 500) m = -300 m towards west, 300 m towards east.

82. (– 5) × (33) = 5 × (– 33)

Solution:

True
(-5) × (33) = – 165
= 5 × (-33)

83. (– 19) × (– 11) = 19 × 11

Solution:

True
(-19) × (-11) = 19 × 11
= 209

84. (– 20) × (5 – 3) = (– 20) × (– 2)

Solution:

False

(-20) × (5 – 3) = (-20) × 2
= (-40)
but
(-20) × (-2) = 20 × 2
= 40

85. 4 × (– 5) = (– 10) × (– 2)

Solution:

False
4 × (-5) = – 20
but
(-10) × (-2) = 10 × 2
= 20

86. (– 1) × (– 2) × (– 3) = 1 × 2 × 3

Solution:

False

(-1) × (-2) × (-3) = 1 × 2 × (-3)
= 2 × (-3)
= (-6)
But,
1 × 2 × 3 = 6

87. – 3 × 3 = – 12 – (– 3)

Solution:

True

As,
$(-3) \times 3 = (-9)$
and
$(-12) - (-3) = (-12) + 3$
$= (-9)$

88. Product of two negative integers is a negative integer.

Solution:

False
As product of two negative integers is always a positive integer.

89. Product of three negative integers is a negative integer.

Solution:

True
Since, product of odd number of negative integers is always a negative integer.

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

Solution:

False
As product of a negative integer and a positive integer is a negative integer.

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

Solution:

False
When we multiply two integers then their product may or may not be greater than both the integers.

92. Integers are closed under multiplication.

Solution:

True
Since, multiplication of two integers is always an integer.
Integers are closed under multiplication.

93. (–237) × 0 is same as 0 × (–39)

Solution:

True

(-237) × 0 = 0
and
0 × (-39) = 0

94. Multiplication is not commutative for integers.

Solution:

False
As Multiplication is commutative for integers.

95. (–1) is not a multiplicative identity of integers.

Solution:

True
As 1 is multiplicative identity for integers.

96. 99 × 101 can be written as (100 – 1) × (100 + 1)

Solution:

True
99 = 100 – 1 and
101 = 100 + 1
So,
99 × 101 = (100 – 1) × (100 + 1)

97. If a, b, c are integers and b ≠ 0 then, a × (b – c) = a × b – a × c

Solution:

True
a × (b – c) = (a × b) – (a × c)
(Distributive property of multiplication in subtraction)

98. (a + b) × c = a × c + a × b

Solution:

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

99. $a \times b = b \times a$

Solution:

True

100. $a \div b = b \div a$

Solution:

False
As division is not commutative for integers,
So,
$a \div b \neq b \div a$

101. $a - b = b - a$
Solution:

False
As, subtraction is not commutative for integers.
$a - b \neq b - a$

102. $a \div (-b) = -(a \div b)$

Solution:

True

103. $a \div (-1) = -a$

Solution:

True

104. Multiplication fact $(-8) \times (-10) = 80$ is same as division fact $80 \div (-8) = (-10)$

Solution:

True

(-8) × (-10) = 8 × 10 = 80
And,

$$80 \div (-8) = \frac{80}{-8}$$
$$= -10$$

105. Integers are closed under division.

Solution:

False
As integers are not closed under division.

106. [(–32) ÷ 8] ÷ 2 = –32 ÷ [8 ÷ 2]

Solution:

False.

As,
LHS $\neq$ RHS

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

Solution:

True
Let any integer be a.
Its additive inverse is -a.
a + (-a) = a – a
= 0

108. The successor of 0 × (–25) is 1 × (–25)

Solution:

False
0 × (-25) = 0
and
1 × (-25) = -25
But successor of 0 is 1.

109. Observe the following patterns and fill in the blanks to make the statements true:
(a) – 5 × 4 = – 20

– 5 × 3 = – 15 = –20 – (– 5)
– 5 × 2 = _____ = – 15 – (–5)
– 5 × 1 = _____ = _____
– 5 × 0 = 0 = _____
– 5 × – 1 = 5 = _____
– 5 × – 2 = _____ = _____

(b) 7 × 4 = 28
7 × 3 = _____ = 28 – 7
7 × 2 = __ __ = _____– 7
7 × 1 = 7 = _____ – 7
7 × 0 = _____ = _____ –_____
7 × – 1 = –7 = _____ – _____
7 × – 2 = _____ = _____ – _____
7 × – 3 _____ = _____ – _____

Solution:

(a) -10, -5, 10, -10 – (-5), -5 – (-5), 0 – (-5), 10, 5 – (-5):

-5 × 2 = -15 – (-5)
-5 × 1 = -5 = – 10 – (-5)
-5 × 0 = 0 =-5 – (-5)
-5 × -1 = 5 = 0 – (-5)
– 5 × – 2 =10 = 5 – (-5)

(b) 21, 14, 21, 14, 0, 7, 7, 0, 7, -14, -7, 7, -21, -14, 7:

7 × 3 = 28 – 7
7 × 2 = 14 = 21 – 7
7 × 1 = 7 = 14 – 7
7 × 0 = 0 = 7 – 7
7 × (-1) = -7 = 0 – 7
7 × (- 2) = – 14 = -7 – 7
7 × (- 3) = -21 = – 14 – 7

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) What will be the charge on an atom if it gains an electron?

Solution:

(a) Total charge = +1-1
= 0

(b) If an atom loses an electron, then the charge on the atom is +1.

(c) The charge on an atom if it gains an electron is -1.

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
Hydroxide ion	**+9**	**__**	**-1**
Sodium ion	**+11**	**__**	**+1**
Aluminium ion	**+13**	**-10**	**__**
Oxide ion	**+8**	**-10**	**__**

Solution:

Hydroxide ion charge = Proton charge + Electron charge
-1 = +9 + Electron charge
Electron charge = -1 – 9
= – 10

Sodium ion charge = Proton charge + Electron charge
+1 = +11 + Electron charge
Electron charge = +1 – 11 = -10

Aluminium ion charge = Proton charge + Electron charge
= +13 + (-10)
= +13 – 10 = +3

Oxide ion charge = Proton charge + Electron charge
= +8 + (-10)
= +8 – 10 = -2

112. Social Studies Application: Remembering that 1AD came immediately after 1BC, while solving these 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) Bhaskaracharya 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:

Taking 1 BC as -1 and 1 AD as +1

(a) Starting year = 330 BC
= (-330) AD
Ending year = 395 AD
The era lasted for = 395 – (-330)
= 395 + 330
= 725 years

(b) Born year = 1114 AD
Death year = 1185 AD
Total age = 1185 – 1114
= 71 years

(c) Turks ruled Egypt in 1517 AD.
Queen Nefertis ruled Egypt in (1517-2900) AD = -1383 AD or 1383 BC.

(d) Archimedes lived between 287 BC and 212 BC.
Aristotle lived between 380 BC and 322 BC.
Therefore,
Aristotle lived during an earlier period.

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:

As,
$-129° < -90° < -81° < -67° < -27° < -11° < -9°$

Therefore, order of the continents from the lowest to the highest recorded temperature is Antarctica, Asia, North America, Europe, South America, Africa, Australia.

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

Solution:

Let the integers be -2 and 6
So,
$(-2) \times 6 = -12$

A pair of integers is (-2, 6).
And there are seven integers = -1, 0, 1, 2, 3, 4, 5
which lie between -2 and 6.

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 $\rightarrow$ 3;
6 $\rightarrow$ -2;
-7 $\rightarrow$ 1;
8 $\rightarrow$ -1.

Now,
$-5 \times 3 = -15$ and
$-19 < -15 < -6$

$6 \times (-2) = -12$ and
$-19 < -12 < -6$

$-7 \times 1 = -7$ and
$-19 < -7 < -6$

$8 \times (-1) = -8$ and
$-19 < -8 < -6$

116.Write a pair of integers whose product is – 36 and whose difference is 15.

Solution:

Let the integers be 12 and -3,
So,
$12 \times (-3) = -36$
and their difference $= 12 - (-3)$
$= 12 + 3$
$= 15$
A pair of integers is (-3,12).

117. Match the following:

Column I	**Column II**
(a) a x 1	**(i) Additive inverse of a**
(b) 1	**(ii) Additive identity**
(c) (-a) ÷ (-b)	**(iii) Multiplicative identity**
(d) a x (-1)	**(iv) a ÷ (-b)**
(e) a x 0	**(v) a ÷ b**
(f) (-a) ÷ b	**(vi) a**
(g) 0	**(vii) –a**
(h) a ÷ (-a)	**(viii) 0**
(i) –a	**(ix) -1**

Solution:

(a) a x 1 – (vi) a

(b)1 – (iii) Multiplicative identity

(c) (-a) ÷ (-b) – (v) a ÷ b

(d) a x (-1) – (vii) –a

(e) a x 0 – (viii) 0

(f) (-a) ÷ b – (iv) a ÷ (-b)

(g) 0 – (ii) Additive identity

(h) a ÷ (-a) – (ix) -1

(i) -a – (i) Additive inverse of a

118.You have rupees 500 in your savings 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 275146	4/9 12/9	Jal Board Deposit	Rupees 120	Rupees 200
384103 801351	22/9 29/9	LIC India Deposit	Rupees 240	Rupees 150

Solution:

Money left in the account after given transactions;
= ₹ (500 + 200 + 150 – 120 – 240)
= ₹ (850 – 360)
= ₹ 490

119.(a) Write a positive integer and a negative integer whose sum is a negative integer.
(b) Write a positive integer and a negative integer whose sum is a positive integer.
(c) Write a positive integer and a negative integer whose difference is a negative integer.
(d) Write a positive integer and a negative integer whose difference is a positive integer.
(e) Write two integers which are smaller than – 5 but their difference is – 5.
(f) Write two integers which are greater than – 10 but their sum is smaller than – 10.

(g) Write two integers which are greater than – 4 but their difference is smaller than – 4.
(h) Write two integers which are smaller than – 6 but their difference is greater than – 6.
(i) Write two negative integers whose difference is 7.
(j) Write two integers such that one is smaller than –11, and other is greater than –11 but their difference is –11.
(k) Write two integers whose product is smaller than both the integers.
(l) Write two integers whose product is greater than both the integers.

Solution:

(a) 2 + (-3) = -l

(b) 3 + (-2) = 1

(c) -1 – (4) = -5

(d) 4 – (-1) = 5

(e) -7 < -5, -12 < -5 and
-12 – (-7) = -5

(f) -5 > -10, -6 >-10 and
-5 +(-6) = -11 <-10

(g) 2 > -4, -3 > -4 and
-3 – 2 = -5 < -4

(h) -7< -6, -8 <-6 and
-7-(-8) = -7 + 8
= 1 > -6

(i) -2-(-9) = -2 + 9
= 7

(j) -18 < -11;
-7 >-11 and
-18 – (-7) = -18 + 7
= -11

(k) (-1) × (2) = -2.
Also, -2 < -1 and
-2 < 2

(l) 2 × 3 = 6 .

Also, 2 < 6 and 3 < 6

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

Solution:

7 – (-3) = -7 + 3
= -4
But,
-7 – 3 = -10.

So, Ramu have done addition in place of subtraction.

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 evaluated = -4 + d
d = -6
So,
-4 + (-6) = -10
But,
-4 – (-6) = -4 + 6
= 2
Hence, Reeta have done subtraction in place of addition.

122.The table given below shows the elevations relative to sea level of four locations.
Taking sea level as zero, 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) C is closest to sea level.
(b) D is farthest from sea level.

(c) Since, -180 < -55 < 1600 < 3200.

So,The locations from the least to the greatest elevation is A < C < B < D.

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:

Elevation relative to the sea level at the end of the ride;
= [380 + 540 – 268 + 116 -152 + 490 – 844 + 94]
= [380 + 540 + 116 + 490 + 94 – 268 – 152 – 844]
= [1620 – 1264]
= 356 m

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

Solution:

(i) -39 × 99 = -39 × [100 -1]
= -39 × 100 + (-39) × (-1)
= -3900 + 39
= -3861

(ii) (-85) × 43 + 43 × (-15) = 43 × (-85) + 43 × (-15)
= 43 × [-85 – 15]
= 43 × [-100]
= -4300

(iii) 53 × (-9) – (-109) × 53 = 53 × (-9) – 53 × (-109)
= 53 × [(-9) – (-109)]
= 53 × [-9 + 109]
= 53 × 100
= 5300

(iv) 68 × (-17) + (-68) × 3 = 68 × (-17) + 68 × (-3)
= 68 × [(-17) + (-3)]
= 68 × (-20)
= -1360

125.If * is an operation such that for integers a and b we have
$a * b = a \times b + (a \times a + b \times b)$
then find (i) $(-3) * (-5)$
(ii) $(-6) * 2$

Solution:

(i) We know that,
$a * b = a \times b + (a \times a + b \times b)$
Now,
$a = (-3)$ and
$b = (-5)$
$(-3) * (-5) = (-3) \times (-5) + [(-3) \times (-3) + (-5) \times (-5)]$
$= 15 + (9 + 25)$
$= 15 + 34$
$= 49$

(ii) Now, $a = -6$ and
$b = 2$
$(-6) * 2 = (-6) \times 2 + [(-6) \times (-6) + 2 \times 2$
$= -6 \times 2 + (36 + 4)$
$= -12 + 40$
$= 28$

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:

We have,

$a \Delta b = a \times b - 2 \times a \times b + b \times b (-a) \times b + b \times b$

(i) $4 \Delta (-3) = 4 \times (-3) - 2 \times 4 \times (-3) + (-3) \times (-3)(-4) \times (-3) + (-3) \times (-3)$
$= -12 + 24 + 108 + 9$
$= -12 + 141$
$= 129$

(ii) $(-7) \Delta (-1) = (-7) \times (-1) - 2 \times (-7) \times (-1) + (-1) \times (-1) (7) \times (-1) + (-1) \times (-1)$
$= 7-14- 7 + 1$
$= 8-21$

= -13

Now,

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

$= -12 + 24 + 192 + 16$

$= -12 + 232$

$= 220$

But,

$4 \Delta (-3) = 129$

So,

$4 \Delta (-3) \neq (-3) \Delta 4$

And,

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

$= 7 - 14 - 343 + 49$

$= 56 - 357$

$= -301$

But,

$(-7) \Delta (-1) = -13$

So,

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

127. Below u, v, w and x represent different integers, where u = –4 and x ≠ 1. By using following equations, find each of the values:

u × v = u

x × w = w

u + x = w

(a) v

(b) w

(c) x

Explain your reasoning using the properties of integers.

Solution:

(a) $u \times v = u$ and

$u = -4$

So,

$-4 \times v = -4$

$v = 1$ (Multiplicative identity)

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

Given,

$x \neq 1$

So,

$x \times w = w$ is possible only when $w = 0$

(c) As $u + x = w$,

Put $u = -4$ and $w = 0$

So,
-4 + x = 0
x = 4

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:

Difference between the levels of places A and B = [1800 – (-700)] m
= [1800 + 700] m
= 2500 m

129. The given table shows the freezing points in 0F of different gases at sea level. Convert each of these into 0C to the nearest integral value using the relation and complete the table,

C = 5/9(F - 32)

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,

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

Now, **For Hydrogen**,

$F = -435$,

So,

$C = \frac{5}{9}(-435 - 32)$

$C = -259.44$

For krypton,

$F = -251$,

So,

$$C = \frac{5}{9}(-251 - 32)$$

$$C = -157.22$$

For Oxygen,

$F = -369$,

So,

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

$$C = -223$$

For Helium,

$F = -458$,

So,

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

$$C = -272.22$$

For Argon,

$F = -309$,

So,

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

$$C = -189.44$$

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 minute, 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:

Taking winning by time be a positive integer and losing by time be a negative integer.

Sana's total time (winning/losing) = (10 – 60 + 20 – 25 – 37 + 12) seconds
= (42 – 122) seconds

= -80 seconds

Hence,
Sana lost the race by 80 seconds or 1 min. 20 seconds.
Therefore,
Fatima won the race finally.

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

Solution:

Taking profit as a positive integer and loss as negative integer,
According to question,
Grocer's net profit or loss in 3 days = ₹(47-12-8)
= ₹27
So, the grocer has a profit of ₹ 27.

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:

(i)
Total marks scored by Sona = 20
Total correct answers = 10
So,
Marks for correct answers = 10 × 3
= 30
but she secured 20 marks.
So,
Marks for incorrect answers = 20 – 30
= – 10
-1 mark is given for every incorrect answer.
Total incorrect answers = $\frac{-10}{-1}$
=10

(ii)
Total correct answers = 10
Total incorrect answers = 10 (From (i))
So,
Total questions given in the test = 10 + 10

= 20

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 secured 94 marks in a test, what are the possibilities of his marking correct or wrong answer?

Solution:

Yash secured = 94 marks
So,
Minimum correct answers = 94 ÷ 2
= 47
Now, two possibilities are there,

(1) He attempted 47 correct answers and 3 un-attempted.
(2) He attempted 48 correct and 1 un-attempted and 1 wrong answer.

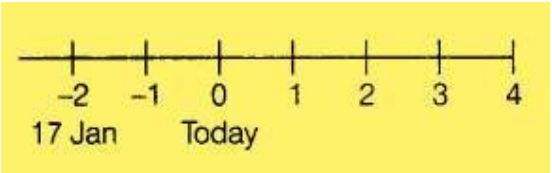
134. A multistorey building has 25 floors above the ground level each of height 5m. It also has 3 floors in the basement each of height 5m. A lift in building moves at a rate of 1m/s. If a man starts from 50m above the ground, how long will it take him to reach at 2nd floor of basement?

Solution:

Height of each floor = 5 m
So,
Height below the basement to be covered = 2 × 5m
= 10m
If a man starts from 50 m above ground level and reach at 2nd floor of basement.
His total distance to be covered = (50 + 10) m
= 60 m
Rate of moving of a lift = 1 m/s
A man reach at 2nd floor of basement in 1 × 60 = 60 seconds
= 1 minute.

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:



A day before yesterday is 17 January.
Therefore,
Today is 19 January.
The date 3 days after tomorrow = 20 January + 3 days
= 23 January

136. The highest point measured above sea level is the summit of Mt. Everest which is 8,848m above sea level and the lowest point is challenger Deep at the bottom of Mariana Trench which is 10911m below sea level. What is the vertical distance between these two points?

Solution:

The highest point (above sea level) = 8,848 m
The lowest point (below sea level) = 10,911 m
So,
Total vertical distance between two points,
= [8,848 – (-10,911)] m
= [8,848 + 10,911] m
= 19,759 m