CHAPTER 1

VII-MATHEMATICS-NCERT

1. INTEGERS (NOTES)

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1. **Natural numbers**: The numbers which are used for counting are called Natural numbers and represented with letter N

   N={1,2,3,4,5,.....}

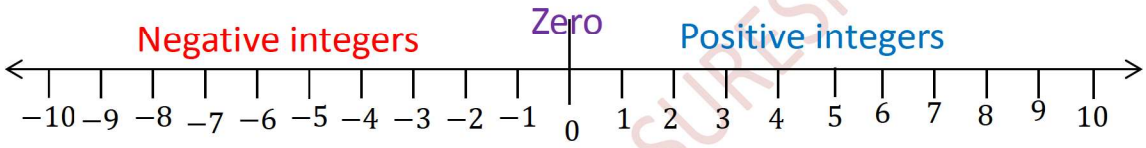
2. **Whole numbers**: If '0' is added to Natural numbers then they are called Whole numbers. And is denoted by 'W'

   W={0,1,2,3,4,5,.....}

3. **Integers**: Combination of positive and negative numbers Including 0 are called Integers and represented by 'Z' or 'I'.

   Z={... ... − 4, −3, −2, −1,0,1,2,3,4, ... }

4. Integers number line



5. **Addition of integers**:

(i) When two positive integers are added, we get a positive integer.

e.g. (+5) + (+6) = +11

(ii) When two negative integers are added, we get a negative integer.

e.g. (−5) + (−6) = −11

(iii) When one positive and one negative integer are added we subtract them as whole numbers by considering the numbers without their sign and then put the sign of the bigger number with the subtraction obtained.

e.g. (+8) + (−5) = 3 , (−8) + (+5) = −3 , −7 + 5 = −2, 10 − 7 = 3,

−(+) = −
−(−) = +
+(−) = −

6. **Multiplication of integers**:

(i) If the signs of two integers are same then the product is positive integer.

e.g. (+3) × (+5) = 15, (−4) × (−3) = 12

(ii) If the signs of two integers are different then the product is negative integer.

e.g. (+3) × (−5) = −15, (−3) × (+5) = −15, (−4) × (+3) = −12, (+4) × (−3) = −12

7. **Division of integers**:

(i) If the signs are same then the quotient is positive.

e. g. 12 ÷ 3 = 4, (−12) ÷ (−3) = 4

(ii) If the signs are different then the quotient is negative.

e. g. (−12) ÷ 3 = −4, 12 ÷ (−3) = −4

8. Division by zero is not defined

$\frac{1}{0}, \frac{3}{0}, \frac{-51}{0}, \frac{-8}{0},$ are not defined

9. $0 \in W$ (0 belongs to whole numbers)

10. $0 \notin N$ (0 does not belong to natural numbers)

11. $-3 \in Z$ (-3 belongs to integers)

PROPERTIES OF ADDITION AND SUBTRACTION OF INTEGERS

1. Closure under Addition:

$(i)\ 17 + 23 = 40$

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

$(iii)(-75) + 18 = -57$

$(iv)\ 19 + (-25) = -6$

$(v)\ 27 + (-27) = 0$

$(vi)(-20) + 0 = -20$

$(vii)(-35) + (-10) = -45$

The sum of two integers always an integer. So, integers are closed under addition

For any two integers a and b, $(a + b)$ is an integer

2. Closure under Subtraction:

$(i)\ \ 7 - 9 = -2$

$(ii)\ \ 17 - (-21) = 17 + 21 = 39$

$(iii)\ (-8) - (-14) = -8 + 14 = 6$

$(iv)\ (-21) - (-10) = -21 + 10 = -11$

$(v)\ \ 32 - (-17) = 32 + 17 = 49$

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

$(vii)\ (-29) - 0 = -29$

The subtraction of two integers always an integer. So, integers are closed under Subtraction.

If a and b are two integers then $(a - b)$ is also an integer.

3. Commutative Property:

$(i)\ 5 + (-6) = -1$ and $(-6) + 5 = -1$

(ii) $(-8) + (-9) = -17$ and $(-9) + (-8) = -17$

(iii) $(-23) + 32 = -11$ and $32 + (-23) = -11$

(iv) $-45) + 0 = -45$ and $0 + (-45) = -45$

The sum of two integers is not changed when the order is changed.

Addition is commutative for integers.

For any two integers a and b, we can say $\boldsymbol{a + b = b + a}$

$(i)\ 5 - (-3) = 5 + 3 = 8$ *and* $(-3) - 5 = -3 - 5 = -8$

$(ii)\ 10 - 5 = 5$ *and* $5 - 10 = -5$

The subtraction of two integers is changed when the order is changed.

Subtraction is not commutative for integers.

4. Associative Property:

$(i)(-5) + [(-3) + (-2)] = (-5) + (-5) = -10$ and $[(-5) + (-3)] + (-2) = (-8) + (-2) = -10.$

$(ii)(-3) + [1 + (-7)] = (-3) + (-6) = -9$ and $[(-3) + 1] + (-7) = -2 + (-7) = -9$

Addition is associative for integers.

For any integers a, b and c, we can say $\boldsymbol{a + (b + c) = (a + b) + c}$

5. **Additive Identity:** **Zero** is an additive identity for integers.

(i) $(-8) + 0 = -8$ | (iii) $(-23) + 0 = -23$

(ii) $0 + (-8) = -8$ | (iv) $0 + (-37) = -37$

For any integer a, $\boldsymbol{a + 0 = a = 0 + a}$

TRY THESE

1. **Write a pair of integers whose sum gives**

(a) a negative integer

Sol: $10, -15$ *and* $-12, 8$

$10 + (-15) = -5$; $-12 + 8 = -4$

(b) Zero

Sol: $-6, 6$ *and* $17, -17$

$(-6) + 6 = 0$ *and* $17 + (-17) = 0$

(c) An integer smaller than both the integers

Sol: $-5, -3$ *and* $-8, -10$

$(-5) + (-3) = -8$ *and* $(-8) + (-10) = -18$

(d) An integer smaller than only one of the integers.

Sol: $-6, 12$ *and* $15, -9$

$(-6) + 12 = 6$ *and* $17 + (-9) = 8$

(e) an integer greater than both the integers.

Sol: $5, 12$ *and* $15, 24$

$5 + 12 = 17$ *and* $15 + 24 = 39$

2. **Write a pair of integers whose difference gives**

(a) a negative integer

Sol: $5, 12$ *and* $-8, 4$

$5 - 12 = -7$ *and* $(-8) - 4 = -12$

(b) zero.

Sol: $14, 14$ *and* $-25, -25$

$14 - 14 = 0$ *and* $(-25) - (-25) = -25 + 25 = 0$

(c) an integer smaller than both the integers

Sol: $-4, 10$ *and* $8, 15$

$(-4) - 10 = -14$ *and* $8 - 15 = -7$

(d) an integer greater than only one of the integers.

Sol: $22, 10$ *and* $-11, -3$

$22 - 10 = 12$ *and* $(-11) - (-3) = -11 + 3 = -8$

(e) an integer greater than both the integers

Sol: $-5, -12$ *and* $6, -15$

$(-5) - (-12) = -5 + 12 = 7$ *and* $6 - (-15) = 6 + 15 = 21$

EXAMPLE 1: Write down a pair of integers whose

(a) sum is –3

Sol: (-1)+(-2)=-3 or (-8)+5=-3 or 10+(-7)=3

(b) difference is –5

Sol: (–9) – (– 4) = –5 or (–2) – 3 = –5 or 10-15=-5

(c) difference is 2

Sol: (–7) – (–9) = 2 or 1 – (–1) = 2 or 0-(-2)=2 or 10-8=2

(d) sum is 0

Sol: $(-10) + 10 = 0$ or $5 + (-5) = 0$

EXERCISE-1.1

1. Write down a pair of integers whose:

(a) sum is –7

Sol: $(-5) + (-2) = -7$ *or* $(-10) + 3 = -7$ *or* $15 + (-22) = -7$

(b) difference is –10

Sol: $(-5) - (5) = -10$ *or* $20 - 10 = 10$ *or* $-30 - (-20) = -10$

(c) sum is 0

Sol: $5 + (-5) = 0$ *or* $(-9) + 9 = 0$ *or* $15 + (-15) = 0$

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

Sol: $(-5) - (-13) = -5 + 13 = 8$ *or* $(-10) - (-18) = -10 + 18 = 8$

(b) Write a negative integer and a positive integer whose sum is –5.

Sol: $-10 + 5 = -5$ *or* $-12 + 7 = -5$ *or* $-20 + 15 = -5$

(c) Write a negative integer and a positive integer whose difference is –3.

Sol: $(-1) - 2 = -1 - 2 = -3$ *or* $(-2) - 1 = -2 - 1 = -3$

3. In a quiz, team A scored – 40, 10, 0 and team B scored 10, 0, – 40 in three successive rounds. Which team scored more? Can we say that we can add integers in any order.

Sol: Total score of team A= $-40 + 10 + 0 = -30$

Total score of team B= $10 + 0 + (-40) = 10 - 40 = -30$

Scores of both the teams are same

Yes, we can add integers in any order.

4. Fill in the blanks to make the following statements true:

$(i)\quad (-5) + (-8) = (-8) + (-5)$

$(ii)\quad -53 + 0 = -53$

$(iii)\quad 17 + (-17) = 0$

$(iv)\quad [13 + (-12)] + (-7) = 13 + [(-12) + (-7)]$

$(v)\quad (-4) + [15 + (-3)] = [-4 + 15] + (-3)$

MULTIPLICATION OF INTEGERS

1. Multiplication of a Positive and a Negative Integer:

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

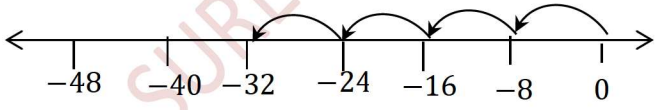
$5 \times (-4) = (-4) + (-4) + (-4) + (-4) + (-4) = -20$

(positive integer) × (negative integer)= (negative integer) × (positive integer)= negative integer

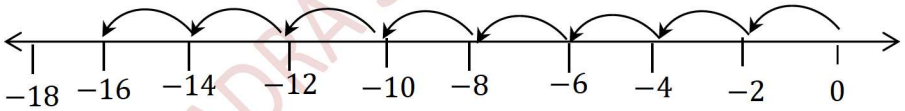
TRY THESE

Find using number line

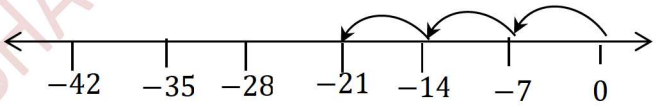
$(i)\ 4 \times (-8) = -32$



$(ii)\ 8 \times (-2) = -16$



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



$(i)\ 6 \times (-19) = -114$ $(ii)\ 12 \times (-32) = -384$ $(iii)\ 7 \times (-22) = -154$

For any two positive integers a and b we can say $\boldsymbol{a \times (-b) = (-a) \times b = -(a \times b)}$

TRY THESE

1. Find

$(a)\ 15 \times (-16) = -240$ $(b)\ 21 \times (-32) = -672$

$(c)\ (-42) \times 12 = -504$ $(d)\ -55 \times 15 = -825$

2. Check if (a) 25 × (–21) = (–25) × 21

Sol: $\text{LHS} = 25 \times (-21) = -(25 \times 21) = -525$;

$\text{RHS} = (-25) \times 21 = -(25 \times 21) = -525$

LHS=RHS; Hence verified

(b) (–23) × 20 = 23 × (–20)

Sol: LHS $= (-23) \times 20 = -(23 \times 20) = -460$

RHS $= 23 \times (-20) = -(23 \times 20) = -460$

LHS=RHS ; Hence verified

Examples: $(i)\ 26 \times (-35) = (-26) \times 35$ $(ii)\ (-12) \times 28 = 12 \times (-28)$

Multiplication of two Negative Integers:

TRY THESE

(i) Starting from (–5) × 4, find (–5) × (– 6)

Sol: $(-5) \times 4 = -20$	$(-5) \times 0 = 0$	$(-5) \times (-4) = 20$
$(-5) \times 3 = -15$	$(-5) \times (-1) = 5$	$(-5) \times (-5) = 25$
$(-5) \times 2 = -10$	$(-5) \times (-2) = 10$	$(-5) \times (-6) = 30$
$(-5) \times 1 = -5$	$(-5) \times (-3) = 15$	$\therefore (-5) \times (-6) = 30$

(ii) Starting from (– 6) × 3, find (– 6) × (–7)

Sol: $(-6) \times 3 = -18$	$(-6) \times (-1) = 6$	$(-6) \times (-5) = 30$
$(-6) \times 2 = -12$	$(-6) \times (-2) = 12$	$(-6) \times (-6) = 36$
$(-6) \times 1 = -6$	$(-6) \times (-3) = 18$	$(-6) \times (-7) = 42$
$(-6) \times 0 = 0$	$(-6) \times (-4) = 24$	$\therefore (-6) \times (-7) = 42$

The product of two negative integers is a positive integer.

We multiply the two negative integers as whole numbers and put the positive sign before the product

For any two positive integers a and b, $(-\boldsymbol{a}) \times (-\boldsymbol{b}) = \boldsymbol{a} \times \boldsymbol{b}$

TRY THESE

Find: $(i)(-31) \times (-100) = 3100$,

$(ii)\ (-25) \times (-72) = 1800$, $(iii)\ (-83) \times (-28) = 2384$

PROPERTIES OF MULTIPLICATION OF INTEGERS

1. **Closure under Multiplication:**

$(-20) \times (-5) = 100$	$(-30) \times 12 = -360$	$(-14) \times (-13) = 182$
$(-15) \times 17 = -255$	$(-15) \times (-23) = 345$	$12 \times (-30) = -360$

The product of two integers is again an integer. So we can say that integers are closed under multiplication.

For all integers a and b, a × b is an integer,

2. **Commutativity of Multiplication**

Statement 1	Statement 2	Inference
$3 \times (-4) = -12$	$(-4) \times 3 = -12$	$3 \times (-4) = (-4) \times 3$
$(-30) \times 12 = -360$	$12(-30) = -360$	$(-30) \times 12 = 12(-30)$
$(-15) \times (-10) = 150$	$(-10) \times (-15) = 150$	$(-15) \times (-10) = (-10) \times (-15)$
$(-35) \times (-12) = 420$	$(-12) \times (-35) = 420$	$(-35) \times (-12) = (-12) \times (-35)$
$(-17) \times 0 = 0$	$0 \times (-17) = 0$	$(-17) \times 0 = 0 \times (-17)$
$(-15) \times (-1) = 15$	$(-1) \times (-15) = 15$	$(-15) \times (-1) = (-1) \times (-15)$

Multiplication is commutative for integers.

For any two integers *a and b* : $\boldsymbol{a \times b = b \times a}$

3. Multiplication by Zero

For any integer *a* we have $\boldsymbol{a \times 0 = 0 \times a = 0}$

4. Multiplicative Identity :1 is the multiplicative identity for integers

$(-3) \times 1 = -3$	$1 \times 8 = 8$	$1 \times (-6) = -6$
$1 \times 5 = 5$	$1 \times (-5) = -5$	$7 \times 1 = 7$
$(-4) \times 1 = -4$	$3 \times 1 = 3$	

For any integer a we have, $\boldsymbol{a \times 1 = 1 \times a = a}$

Additive inverse:

We get additive inverse of an integer a when we multiply (–1) to a, i.e. $a \times (-1) = (-1) \times a = -a$

5. Associativity for Multiplication:

$[(7) \times (-6)] \times 4 = (-42) \times 4 = -168$ *and* $7 \times [(-6) \times 4] = 7 \times (-24) = -168$

$[(7) \times (-6)] \times 4 = 7 \times [(-6) \times 4]$

For any three integers *a, b and c we have* $\boldsymbol{(a \times b) \times c = a \times (b \times c)}$

6. Distributive Property:

For any integers *a, b and c*,

$\boldsymbol{(i) a \times (b + c) = a \times b + a \times c}$ is called distributivity of multiplication over addition

$\boldsymbol{(ii) a \times (b - c) = a \times b - a \times c}$ is called distributivity of multiplication over subtraction.

TRY THESE

(*i*) Is $10 \times [(6 + (-2)] = 10 \times 6 + 10 \times (-2)$?

Sol: LHS $= 10 \times [(6 + (-2)] = 10 \times 4 = 40$

RHS $= 10 \times 6 + 10 \times (-2) = 60 - 20 = 40$

LHS=RHS, So, given statement is true.

(ii) Is $(-15) \times [(-7) + (-1)] = (-15) \times (-7) + (-15) \times (-1)$?

Sol: LHS$= (-15) \times [(-7) + (-1)] = (-15) \times (-8) = 120$

RHS$= (-15) \times (-7) + (-15) \times (-1) = 105 + 15 = 120$

LHS=RHS . So, given statement is true.

Try These

(i) Is $10 \times (6 - (-2)] = 10 \times 6 - 10 \times (-2)$?

Sol: LHS $= 10 \times (6 - (-2)] = 10 \times (6 + 2) = 10 \times 8 = 80$

RHS $= 10 \times 6 - 10 \times (-2) = 60 + 20 = 80$

LHS=RHS . So, given statement is true

(ii) Is $(-15) \times [(-7) - (-1)] = (-15) \times (-7) - (-15) \times (-1)$?

Sol: LHS $= (-15) \times [(-7) - (-1)] = (-15) \times (-7 + 1) = (-15) \times (-6) = 90$

RHS $= (-15) \times (-7) - (-15) \times (-1) = 105 - 15 = 90$

LHS=RHS . So, given statement is true.

EXERCISE 1.2

1. Find each of the following products:

(a) $3 \times (-1) = -3$
(b) $(-1) \times 225 = -225$
(c) $(-21) \times (-30) = 630$
(d) $(-316) \times (-1) = 316$
(e) $(-15) \times 0 \times (-18) = 0$
(f) $(-12) \times (-11) \times (10) = 1320$
(g) $9 \times (-3) \times (-6) = 162$
(h) $(-18) \times (-5) \times (-4) = -360$
(i) $(-1) \times (-2) \times (-3) \times 4 = -24$
(j) $(-3) \times (-6) \times (-2) \times (-1) = 36$

2. Verify the following:

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

Sol: LHS$= 18 \times [7 + (-3)] = 18 \times 4 = 72$

RHS$= [18 \times 7] + [18 \times (-3)] = 126 + (-54) = 72$

LHS=RHS. So, given statement is true

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

Sol: LHS $= (-21) \times [(-4) + (-6)] = (-21) \times (-10) = 210$

RHS $= [(-21) \times (-4)] + [(-21) \times (-6)] = 84 + 126 = 210$

LHS=RHS. So, given statement is true

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

Sol: For any integer a, $(-1) \times a = -a$

(ii) Determine the integer whose product with (–1) is

(a) –22 (b) 37 (c) 0

Sol: $(a)\ (-1)\times(-22)=22\quad (b)\ (-1)\times 37=-37\quad (c)\ (-1)\times 0=0$

4. Starting from (–1) × 5, write various products showing some pattern to show (–1) × (–1) = 1

Sol:

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

$(-1)\times 4=-4$

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

$(-1)\times 2=-2$

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

$(-1)\times 0=0$

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

DIVISION OF INTEGERS

Multiplication Statement	Corresponding Division Statements	
$2\times(-6)=(-12)$	$(-12)\div(-6)=2$	$(-12)\div 2=(-6)$
$(-4)\times 5=(-20)$	$(-20)\div 5=-4$	$(-20)\div(-4)=5$
$(-8)\times(-9)=72$	$72\div(-9)=(-8)$	$72\div(-8)=(-9)$
$(-3)\times(-7)=21$	$21\div(-7)=(-3)$	$21\div(-3)=(-7)$
$(-8)\times 4=(-32)$	$(-32)\div 4=-8$	$(-32)\div(-8)=4$
$5\times(-9)=(-45)$	$(-45)\div(-9)=5$	$(-45)\div 5=(-9)$
$(-10)\times(-5)=50$	$50\div(-5)=(-10)$	$50\div(-10)=(-5)$

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

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

For any two positive integers a and b $a\div(-b)=(-a)\div b=-(a\div b)$ where $b\neq 0$

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

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

For any two positive integers a and b $(-a)\div(-b)=a\div b$ where $b\neq 0$

TRY THESE

Find: $(a)\ 125\div(-25)=-5\quad (b)\ 80\div(-5)=-16\quad (c)\ 64\div(-16)=-4$

Find: (a) (–36) ÷ (– 4) =9 **(b) (–201) ÷ (–3)**=67 **(c) (–325) ÷ (–13)**=25

PROPERTIES OF DIVISION OF INTEGERS

1. Integers are not closed under division.

$(-8)\div(-4)=2$ is an integer and $(-4)\div(-8)=\frac{-4}{-8}=\frac{1}{2}$ is not an integer

For any two integers a and b ; ***a ÷ b* need not be an integer.**

2. Division is not commutative for integers.

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

For any two different integers a and b ; $a\div b\neq b\div a$

3. Divided by zero : For any integer a, $a\div 0$ is not defined.

$\frac{1}{0},\frac{-5}{0},\frac{3}{0},\ldots$ *are not defined.*

4. **Divided by '1'**:

$(-8) \div 1 = (-8)$ | $(-13) \div 1 = -13$ | $(-37) \div 1 = -37$

$(-11) \div 1 = -11$ | $(-25) \div 1 = -25$ | $(-48) \div 1 = -48$

Any integer divided by 1 gives the same integer.**For any integer a, $a \div 1 = a$**

5. If any integer is divided by (−1) it does not give the same integer.
6. Division is not associative for integers.

$(-16) \div [4 \div (-2)] = (-16) \div 2 = -8$ and $[(-16) \div 4] \div (-2) = (-4) \div (-2) = 2$

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

Exp 2 :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 though she got 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?

Sol: (i) Marks for one correct answer=5

Marks for 10 correct answers=10×5=50

Radhika's score = 30

Marks obtained for incorrect answers = 30 – 50 = – 20

Marks for one incorrect answer = (–2)

Therefore, number of incorrect answers = (–20) ÷ (–2) = 10

(ii) Marks given for 4 correct answers = 5 × 4 = 20

Jay's score = –12

Marks obtained for incorrect answers = –12 – 20 = – 32

Marks given for one incorrect answer = (–2)

Therefore number of incorrect answers = (–32) ÷ (–2) = 16

EXAMPLE 3 :A shopkeeper earns a profit of ₹ 1 by selling one pen and incurs a loss of 40 paise per pencil while selling pencils of her old stock. (i) In a particular month she incurs a loss of ₹ 5. In this period, she sold 45 pens. How many pencils did she sell in this period? (ii) In the next month she earns neither profit nor loss. If she sold 70 pens, how many pencils did she sell?

Sol: Profit earned by selling one pen = ₹ 1

Profit earned by selling 45 pens = ₹ 45, which we denote by + ₹ 45

Total loss given = ₹ 5, which we denote by – ₹ 5

Profit earned + Loss incurred = Total loss

Therefore, Loss incurred = Total Loss – Profit earned = ₹ (– 5 – 45) = ₹ (–50) = –5000 paise

Loss incurred by selling one pencil = 40 paise which we write as – 40 paise So, number of pencils sold = (–5000) ÷ (– 40) = 125.

(ii) In the next month there is neither profit nor loss.

So, Profit earned + Loss incurred = 0 i.e., Profit earned = – Loss incurred

Now, profit earned by selling 70 pens = ₹ 70 Hence, loss incurred by selling pencils = ₹ 70 which we indicate by – ₹ 70 or – 7,000 paise. Total number of pencils sold = (–7000) ÷ (– 40) = 175 pencils.

EXERCISE-1.3

1. Evaluate each of the following:

(a) $(-30) \div 10 = -3$

(b) $50 \div (-5) = -10$

(c) $(-36) \div (-9) = 4$

(d) $(-49) \div (49) = -1$

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

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

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

(h) $[(-36) \div 12] \div 3$
$= (-3) \div 3 = -1$

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

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

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

Sol: $a \div (b + c) = 12 \div (-4 + 2) = 12 \div (-2) = 6$

$(a \div b) + (a \div c) = (12 \div -4) + (12 \div 2) = 3 + 6 = 9$

$a \div (b + c) \neq (a \div b) + (a \div c)$

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

Sol: $a \div (b + c) = (-10) \div (1 + 1) = (-10) \div (2) = -5$

$(a \div b) + (a \div c) = (-10 \div -1) + (-10 \div 1) = (-10) + (-10) = -20$

$a \div (b + c) \neq (a \div b) + (a \div c)$

3. Fill in the blanks.

(a) $\mathbf{369 \div 1} = 369$

(b) $\mathbf{(-75) \div 75} = -1$

(c) $\mathbf{(-206) \div (-206)} = 1$

(d) $\mathbf{(-87) \div (-1)} = 87$

(e) $\mathbf{(-87) \div 1} = -87$

(f) $\mathbf{(-48) \div 48} = -1$

(g) $\mathbf{20 \div (-10)} = -2$

(h) $\mathbf{(-12) \div (4)} = -3$

4. Write five pairs of integers (a, b) such that a ÷ b = –3. One such pair is (6, –2) because 6 ÷ (–2) = (–3).

Sol:

(i) $(9, -3)$ because $9 \div (-3) = -3$

(ii) $(-12,4)$ because $(-12) \div 4 = -3$

(iii) $(-15,5)$ because $(-15) \div 5 = -3$

(vi) $(30, -10)$ because $30 \div (-10) = -3$ | (v) $(45, -15)$ because $45 \div (-15) = -3$

5. The temperature at 12 noon was 10°C above zero. If it decreases at the rate of 2°C per hour until midnight, at what time would the temperature be 8°C below zero? What would be the temperature at mid-night?

Sol: The temperature at 12 noon = 10°C above zero=+10°C

Decrease rate per 1 hour is 2°C=-2°C

Time taken for 8°C below zero= Time taken to decrease $\frac{10°C-(-8°C)}{2°C} = \frac{18°C}{2°C} = 9\ hours$

The temperature be 8°C below zero at 9PM.

(ii) The temperature at mid-night= 10°C+ Temperature decreased in 12 hours

$= 10°C + (-2°C \times 12) = 10°C + (-24°C) = -14°C$

The temperature at mid-night will be 14°C below zero

6. In a class test (+ 3) marks are given for every correct answer and (–2) marks are given for every incorrect answer and no marks for not attempting any question. (i) Radhika scored 20 marks. If she has got 12 correct answers, how many questions has she attempted incorrectly? (ii) Mohini scores –5 marks in this test, though she has got 7 correct answers. How many questions has she attempted incorrectly?

Sol: Marks for 1 correct answer $= +3$, Marks for 1 incorrect answer $= -2$

Marks for not attempting=0

(i) Marks for 12 correct answers=12×3=36

Radhika scored 20 marks

Marks for incorrect answers $= 20 - 36 = -16$

Number of incorrect answers $= (-16) \div (-2) = 8$

(ii) Marks for 7 correct answers=7×3=21

Mohini scores $= -5$

Marks for incorrect answers $= -5 - 21 = -26$

Number of incorrect answers $= (-26) \div (-2) = 13$

Mohini attempted 13 questions incorrectly.

7. An elevator descends into a mine shaft at the rate of 6 m/min. If the descent starts from 10 m above the ground level, how long will it take to reach – 350 m.

Sol: Time taken to elevator descends of 6 m= 1 min

Total distance covered by elevator $= 10 - (-350) = 10 + 350 = 360$ m

Time taken to elevator descends $360\text{m} = 360 \div 6 = 60 \text{ min} = 1 \text{ hour}$