

Exercise 5.4

Q.1 Subtract the first integer from the second in each of the following:

$$(i) 12, -5 \quad (ii) -12, 8 \quad (iii) -225, -135$$

$$(iv) 1001, 101 \quad (v) -812, 3126 \quad (vi) 7560, -8$$

$$(vii) -3978, -4109 \quad (viii) 0, -1005$$

Solution (i) $-5 - 12 = -17$

$$(ii) 8 - (-12) = 8 + 12 = 20$$

$$(iii) -135 - (-225) = -135 + 225$$

It means, $225 - 135 = 90$

$$(iv) 101 - 1001 = -(1001 - 101) \\ = -900$$

$$(v) 3126 - (-812) = 3126 + 812 = 3938$$

$$(vi) -8 - 7560 = -7568$$

$$(vii) -4109 - (-3978) = -4109 + 3978 \\ = -131$$

$$(viii) -1005 - 0 = -1005$$

Q.2 Find the value of:

$$(i) -27 - (-23) \quad (ii) -17 - 18 - (-35)$$

$$(iii) -12 - (-5) - (-125) + 270$$

$$(iv) 373 + (-245) + (-373) + 145 + 3000$$

$$(v) \quad 1 + (-475) + (-475) + (-475) + (-475) + 1900$$

$$(vi) \quad (-1) + (-304) + 304 + 304 + (-304) + 1$$

Solution (i) $-27 - (-23)$

$$= -27 + 23$$

This can be written as

$$= -(27 - 23)$$

$$= -4$$

$$(ii) \quad -17 - 18 - (-35)$$

$$= -17 - 18 + 35$$

Separating positive and negative terms.

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

$$= 0$$

$$(iii) \quad (-12) - (-5) - (-125) + 270$$

$$= -12 + 5 + 125 + 270$$

Separating positive and negative terms

$$= (-12) + (5 + 125 + 270)$$

$$= -12 + 400 = 388$$

$$(iv) \quad 373 + (-245) + (-373) + 145 + 3000$$

$$= 373 - 245 - 373 + 145 + 3000$$

Collecting all negative and positive terms

$$= (373 + 145 + 3000) + (-245 - 373)$$

$$= 3518 + (-618) = 3518 - 618$$

$$= 2900$$

$$(v) \quad 1 + (-475) + (-475) + (-475) + (-475) + 1900$$

$$= 1 - 475 - 475 - 475 - 475 + 1900$$

separating positive and negative terms.

$$= (1900 + 1) + (-475 - 475 - 475 - 475)$$

$$= 1901 + (-1900)$$

$$= 1901 - 1900 = 1$$

$$(vi) \quad (-1) + (-304) + 304 + 304 + (-304) + 1$$

$$= -1 - 304 + 304 + 304 - 304 + 1$$

Separating positive and negative terms.

$$= (304 + 304 + 1) + (-1 - 304 - 304)$$

$$= 609 + (-609)$$

$$= 609 - 609$$

$$= 0$$

Q.3 Subtract the sum of -5020 and 2320 from -709 .

Solution! Sum of -5020 and 2320 is

$$-5020 + 2320 = -2700$$

Subtracting -2700 from -709 , we get

$$-709 - (-2700)$$

$$= -709 + 2700 = 1991$$

Q.4 Subtract the sum of -1250 and 1138 from the sum of 1136 and -1272 .

Sol! Sum of -1250 and $1138 = -1250 + 1138$
 $= -112$

Sum of 1136 and $-1272 = 1136 + (-1272)$
 $= 1136 - 1272$
 $= -136$

Now subtracting -112 from -136 , we get

$$\begin{aligned} & -136 - (-112) \\ &= -136 + 112 \\ &= -24 \end{aligned}$$

Q.5 From the sum of 233 and -147 , Subtract -284

Solution! Sum of 233 and $-147 = 233 + (-147)$
 $= 233 - 147 = 86$

Now $86 - (-284)$
 $= 86 + 284$
 $= 370$

Q.6 The sum of two integers is 238 . If one of the integers is -122 , determine the other.

Solution! Sum of two integers $= 238$
 one integer $= -122$

$\therefore$ other integer $= 238 - (-122) = 238 + 122$
 $= 360$

Q7 The sum of two integers is -223 . If one of the integers is 172 , find the other.

Solution: Sum of two integers $= -223$
one integer $= 172$

$$\therefore \text{other integer} = -223 - 172 \\ = -395$$

Q.8 Evaluate the following:

(i) $-8 - 24 + 31 - 26 - 28 + 7 + 19 - 18 - 8 + 33$

separating positive and negative terms, we get

$$= (-8 - 24 - 26 - 28 - 18 - 8) + (31 + 7 + 19 + 33)$$

$$= (-112) + (90) = -112 + 90 \\ = -22$$

(ii) $-26 - 20 + 33 - (-33) + 21 + 24 - (-25) - 26 - 14 - 34$

$$= -26 - 20 + 33 + 33 + 21 + 24 + 25 - 26 - 14 - 34$$

separating positive and negative terms, we get

$$= (-26 - 20 - 26 - 14 - 34) + (33 + 33 + 21 + 24 + 25)$$

$$= (-120) + (136)$$

$$= -120 + 136 = 16$$

Q.9 Calculate

$$1 - 2 + 3 - 4 + 5 - 6 + \dots + 15 - 16$$

Sol: Separating positive and negative terms, we get

$$= (1 + 3 + 5 + 7 + 9 + 11 + 13 + 15) + (-2 - 4 - 6 - 8 - 10 - 12 - 14 - 16)$$

$$= (64) + (-72) = 64 - 72 = -8$$

Q.10 Calculate the sum: $5 + (-5) + 5 + (-5) + \dots$

(i) If the number of terms is 10

(ii) If the number of terms is 11

Solution: If number of terms is 10

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

$$= \{5 + (-5)\} + \{5 + (-5)\} + \{5 + (-5)\} + \{5 + (-5)\} + \{5 + (-5)\}$$

$$= 0 + 0 + 0 + 0 + 0$$

$$= 0$$

(ii) If number of terms is 11, then

$$5 + (-5) + 5 + (-5) + 5 + (-5) + 5 + (-5) + 5 + (-5) + 5$$

$$\text{Now } \{5 + (-5)\} + \{5 + (-5)\} + \{5 + (-5)\} + \{5 + (-5)\} + \{5 + (-5)\} + 5$$

$$= 0 + 0 + 0 + 0 + 0 + 5 = 5$$

Q.11 Replace * by '<' or '>' in each of the following to make the statement true:

$$(i) (-6) + (-9) * (-6) - (-9)$$

$$(ii) (-12) - (-12) * (-12) + (-12)$$

$$(iii) (-20) - (-20) * 20 - (65)$$

$$(iv) 28 - (-10) * (-16) - (-76)$$

Solution (i) $(-6) + (-9) * (-6) - (-9)$

here, LHS: $(-6) + (-9) = -6 - 9 = -15$

also RHS: $(-6) - (-9) = -6 + 9 = 3$

$$\therefore (-6) + (-9) < (-6) - (-9)$$

$$(ii) (-12) - (-12) * (-12) + (-12)$$

here, LHS = $(-12) - (-12) = -12 + 12 = 0$

$$RHS = (-12) + (-12) = -12 - 12 = -24$$

$$\therefore 0 > -24$$

$$\therefore (-12) - (-12) > (-12) + (-12)$$

$$(iii) (-20) - (-20) * 20 - (65)$$

here LHS = $(-20) - (-20) = -20 + 20 = 0$

$$RHS = 20 - 65 = -45$$

$$\therefore 0 > -45$$

$$\therefore (-20) - (-20) > 20 - (65)$$

$$(iv) \quad 28 - (-10) * (-16) - (-76)$$

$$\underline{\text{LHS}} \quad 28 - (-10) = 28 + 10 = 38$$

$$\text{RHS} \quad -16 - (-76) = -16 + 76 = 60$$

$$\therefore 60 > 38$$

$$\therefore 28 - (-10) < (-16) - (-76)$$

Q.12 If Δ is an operation on integers such that $a \Delta b = -a + b - (-2)$ for all integers a and b . Find the value of

$$(i) \quad 4 \Delta 3$$

$$(ii) \quad (-2) \Delta (-3)$$

$$(iii) \quad 6 \Delta (-5)$$

$$(iv) \quad (-5) \Delta 6$$

Solution! (i) $\therefore a \Delta b = -a + b - (-2)$

$$\therefore 4 \Delta 3 = -4 + 3 - (-2) \\ = -4 + (3 + 2) = -4 + 5 = 1$$

$$(ii) \quad (-2) \Delta (-3) = -(-2) + (-3) - (-2) \\ = 2 - 3 + 2 = (2 + 2) - 3 \\ = 4 - 3 = 1$$

$$(iii) \quad 6 \Delta (-5) = -6 + (-5) - (-2) \\ = (-6 - 5) + 2 = -11 + 2 = -9$$

$$(iv) \quad (-5) \Delta 6 = -(-5) + (6) - (-2) \\ = (5 + 6) + 2 = 11 + 2 = 13$$

Q.13 If a and b are two integers such that a is the predecessor of b . Find the value of $a-b$.

Sol: If a is predecessor of b , then

$$a = b - 1$$

$$\begin{aligned}\text{Now } a - b &= (b - 1) - b \quad (\text{Replacing } a = b - 1) \\ &= b - 1 - b \\ &= (b - b) - 1 = 0 - 1 = -1\end{aligned}$$

Q.14 If a and b are two integers such that a is the successor of b . Find the value of $a-b$.

Solution: If a is the successor of b , then

$$a = b + 1$$

$$\begin{aligned}\text{Now } a - b &= (b + 1) - b \\ &= (b - b) + 1 = 0 + 1 = 1\end{aligned}$$

$$\therefore a - b = 1$$

Q.15 Which of the following statements are true:

- (i) $-13 > -8 - (-2)$ (ii) $-4 + (-2) < 2$
 (ii) The negative of negative integer is positive
 (iii) If a and b are two integers such that $a > b$, then $a - b$ is always a positive integer.
 (iv) The difference of two integers is an integer.
 (v) Additive inverse of negative integer is negative.

(vii) Additive inverse of a positive integer is negative

(viii) Additive inverse of a negative integer is positive.

Solution: (i) $-13 > -8 - (-2)$

$-13 > -8 + 2$ i.e. $-13 > -6$, It is False.

(ii) $-4 + (-2) < 2$

$-6 < 2$, It is a true.

(iii) True (iv) True (v) True (vi) false

(vii) True (viii) True

Q.16 Fill in the blanks:

(i) $-7 + \dots = 0$

(ii) $29 + \dots = 0$

(iii) $132 + (-132) = \dots$

(iv) $-14 + \dots = 22$

(v) $-1256 + \dots = -742$

(vi) $\dots - 1234 = -4539$

Solution (i) $-7 + \underline{7} = 0$

(ii) $29 + \underline{(-29)} = 0$

(iii) $132 + (-132) = \underline{0}$

(iv) $-14 + \dots = 22$

$\therefore \dots = 22 + 14 = 36$

(v) $-1256 + \dots = -742 \Rightarrow \dots = -742 + 1256$
 $= 514$

(vi) $\dots - 1234 = -4539$

$\Rightarrow \dots = -4539 + 1234 = -3305$