

EXERCISE 5(A)

PAGE NO: 31

1. Fill in the blanks :

- (i) Smallest natural number is
- (ii) Smallest whole number is
- (iii) Largest natural number is
- (iv) Largest whole number is
- (v) All natural numbers are

Solution:

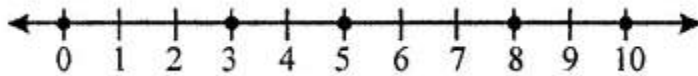
- (i) Smallest natural number is 1
- (ii) Smallest whole number is 0
- (iii) Largest natural number is not possible
- (iv) Largest whole number is not possible
- (v) All natural numbers are whole numbers

2. Represent the following whole numbers on a number line:

0, 3, 5, 8, 10

Solution:

Number line used to represent whole numbers 0, 3, 5, 8, 10 is shown below



3. State, true or false :

- (i) Whole number are closed for addition.
- (ii) If a and b are any two whole numbers, then $a + b$ is not a whole number.
- (iii) If a and b are any two whole numbers, then $a + b = b + a$
- (iv) $0 + 18 = 18 + 0$
- (v) Addition of whole numbers is associative.

Solution:

- (i) True
- (ii) False
- (iii) True
- (iv) True
- (v) True

4. Fill in the blanks :

- (i) $54 + 234 = 234 + \dots\dots\dots$
- (ii) $332 + 497 = \dots\dots\dots + 332$
- (iii) $286 + 0 = \dots\dots\dots$

(iv) $286 \times 1 = \dots\dots\dots$

(v) $a + (b + c) = (a + \dots\dots\dots) + c$

Solution:

(i) $54 + 234 = 234 + 54$

(ii) $332 + 497 = 497 + 332$

(iii) $286 + 0 = 286$

(iv) $286 \times 1 = 286$

(v) $a + (b + c) = (a + b) + c$

5. By re-arranging the given numbers, evaluate:

(i) $237 + 308 + 163$

(ii) $162 + 253 + 338 + 47$

(iii) $21 + 22 + 23 + 24 + 25 + 75 + 76 + 77 + 78 + 79$

(iv) $1 + 2 + 3 + 4 + 596 + 597 + 598 + 599$

Solution:

(i) $237 + 308 + 163$

$= (237 + 163) + 308$ (by associative law)

$= 400 + 308$

$= 708$

(ii) $162 + 253 + 338 + 47$

$= (162 + 338) + (253 + 47)$ (by associative law)

$= 500 + 300$

$= 800$

(iii) $21 + 22 + 23 + 24 + 25 + 75 + 76 + 77 + 78 + 79$

$= (21 + 79) + (22 + 78) + (23 + 77) + (24 + 76) + (25 + 75)$ (by associative law)

$= 100 + 100 + 100 + 100 + 100$

$= 500$

(iv) $1 + 2 + 3 + 4 + 596 + 597 + 598 + 599$

$= (1 + 599) + (2 + 598) + (3 + 597) + (4 + 596)$ (by associative law)

$= 600 + 600 + 600 + 600$

$= 2400$

6. Is $a + b + c = a + (b + c) = (b + a) + c$?

Solution:

Yes, for any set of three whole numbers if the sum of any two whole numbers is added to the third whole number, then whatever be the order, the sum will remain the same.

7. Which property of addition is satisfied by:

(i) $8 + 7 = 15$

(ii) $3 + (5 + 4) = (3 + 5) + 4$

(iii) $8 \times (8 + 0) = 8 \times 8 + 8 \times 0$

(iv) $(7 + 6) \times 10 = 7 \times 10 + 6 \times 10$

(v) $(15 - 12) \times 18 = 15 \times 18 - 12 \times 18$

Solution:

(i) $8 + 7 = 15$

The property used as closure property satisfied by 15

(ii) $3 + (5 + 4) = (3 + 5) + 4$

$3 + (5 + 4) = 3 + 9 = 12$ and

$(3 + 5) + 4 = 8 + 4 = 12$

The property used as Associative law of addition satisfied by 12

(iii) $8 \times (8 + 0) = 8 \times 8 + 8 \times 0$

$8 \times (8 + 0) = 8 \times 8$

$= 64$ and

$8 \times 8 + 8 \times 0 = 64 + 0$

$= 64$

The property used as Distributivity of multiplication over addition satisfied by 64

(iv) $(7 + 6) \times 10 = 7 \times 10 + 6 \times 10$

$(7 + 6) \times 10 = 13 \times 10$

$= 130$ and

$7 \times 10 + 6 \times 10 = 70 + 60$

$= 130$

The property used as Distributive property over addition satisfied by 130

(v) $(15 - 12) \times 18 = 15 \times 18 - 12 \times 18$

$(15 - 12) \times 18 = 3 \times 18$

$= 54$ and

$15 \times 18 - 12 \times 18 = 270 - 216$

$= 54$

The property used as Distributive over subtraction satisfied by 54

8. State, True or False :

(i) The sum of two odd numbers is an odd number.

(ii) The sum of two odd numbers is an even number.

(iii) The sum of two even numbers is an even number.

(iv) The sum of two even numbers is an odd number.

(v) The sum of an even number and an odd number is odd number.

(vi) Every whole number is a natural number.

(vii) Every natural number is a whole number.

(viii) Every whole number $+ 0 =$ The whole number itself.

(ix) Every whole number $\times 1 =$ The whole number itself.

(x) Commutativity and associativity are properties of natural numbers and whole numbers both.

(xi) Commutativity and associativity are properties of addition for natural and whole numbers both.

(xii) If x is a whole number then $-x$ is also a whole number.

Solution:

(i) False

The sum of two odd numbers is an even number

(ii) True

(iii) True

(iv) False

The sum of two even numbers is an even number

(v) True

(vi) False

Every natural number is a whole number

(vii) True

(viii) True

(ix) True

(x) True

(xi) True

(xii) True

EXERCISE 5(B)

PAGE NO: 34

1. Consider two whole numbers a and b such that a is greater than b .

(i) Is $a - b$ a whole number? Is this result always true?

(ii) $b - a$ a whole number? Is this result always true?

Solution:

Let us take $a = 2$ and $b = 1$

(i) $a - b = 2 - 1$

$= 1$

Yes, $a - b$ is a whole number and the result will always remain true

(ii) $b - a = 1 - 2$

$= -1$

No, $(b - a)$ cannot be a whole number and this result will always remain true.

2. Fill in the blanks :

(i) $8 - 0 = \dots\dots\dots$ and $0 - 8 = \dots\dots\dots$

$8 - 0 \neq 0 - 8$, this shows subtraction of whole numbers is not $\dots\dots\dots$

(ii) $5 - 10 = \dots\dots\dots$, which is not a $\dots\dots\dots$

\Rightarrow Subtraction of $\dots\dots\dots$ is not closed.

(iii) $7 - 18 = \dots\dots\dots$ and $(7 - 18) - 5 = \dots\dots\dots$

$18 - 5 = \dots\dots\dots$ and $(7 - 18) - 5 = \dots\dots\dots$

Is $(7 - 18) - 5 = 7 - (18 - 5)$?

\Rightarrow Subtraction of whose numbers is not $\dots\dots\dots$

Solution:

(i) $8 - 0 = 8$ and $0 - 8 = -8$

$8 - 0 \neq 0 - 8$, this shows subtraction of whole numbers is not **commutative**

(ii) $5 - 10 = -5$, which is not a **whole number**

\Rightarrow Subtraction of **whole numbers** is not closed.

(iii) $7 - 18 = -11$ and $(7 - 18) - 5 = -16$

$18 - 5 = 13$ and $(7 - 18) - 5 = -6$

Is $(7 - 18) - 5 = 7 - (18 - 5)$?

No $(7 - 18) - 5 \neq 7 - (18 - 5)$

\Rightarrow Subtraction of whole numbers is not **associative**

3. Write the identity number, if possible for subtraction.

Solution:

It is not possible because for subtraction no identity number exists.

4. Write the inverse, if possible for subtraction of whole numbers?

Solution:

Since subtraction for every non-zero whole number does not have identity number, its inverse does not exist.

5. $12 \times (9 - 6) = \dots\dots\dots = \dots\dots\dots$

$12 \times 9 - 12 \times 6 = \dots\dots\dots = \dots\dots\dots$

Is $12 \times (9 - 6) = 12 \times 9 - 12 \times 6$? $\dots\dots\dots$

Is this type of result always true? $\dots\dots\dots$

Name the property used here $\dots\dots\dots$

Solution:

$12 \times (9 - 6) = 12 \times 3 = 36$

$12 \times 9 - 12 \times 6 = 108 - 72 = 36$

Is $12 \times (9 - 6) = 12 \times 9 - 12 \times 6$? **Yes**

Is this type of result always true? **Yes**

Name the property used here **Distributive property**

6. $(16 - 8) \times 24 = \dots\dots\dots = \dots\dots\dots$

$16 \times 24 - 8 \times 24 = \dots\dots\dots - \dots\dots\dots = \dots\dots\dots$

Is $(16 - 8) \times 24 = 16 \times 24 - 8 \times 24$? $\dots\dots\dots$

Is the type of result always true? $\dots\dots\dots$

Name the property used here $\dots\dots\dots$

Solution:

$(16 - 8) \times 24 = 8 \times 24 = 192$

$16 \times 24 - 8 \times 24 = 384 - 192 = 192$

Is $(16 - 8) \times 24 = 16 \times 24 - 8 \times 24$? **Yes**

Is the type of result always true? **Yes**

Name the property used here **Distributivity.**

EXERCISE 5(C)**PAGE NO: 39****1. Fill in the blanks :**

(i) $42 \times 0 = \dots\dots\dots$

(ii) $592 \times 1 = \dots\dots\dots$

(iii) $328 \times 573 = \dots\dots\dots \times 328$

(iv) $229 \times \dots\dots\dots = 578 \times 229$

(v) $32 \times 15 = 32 \times 6 + 32 \times 7 + 32 \times \dots\dots\dots$

(vi) $23 \times 56 = 20 \times 56 + \dots\dots\dots \times 56$

(vii) $83 \times 54 + 83 \times 16 = 83 \times (\dots\dots\dots) = 83 \times \dots\dots\dots = \dots\dots\dots$

(viii) $98 \times 273 - 75 \times 273 = (\dots\dots\dots) \times 273 = \dots\dots\dots \times 273$

Solution:

(i) $42 \times 0 = 0$

(By closure property 0)

(ii) $592 \times 1 = 592$

(By closure property 1)

(iii) $328 \times 573 = 573 \times 328$

(By commutative law of multiplication)

(iv) $229 \times 578 = 578 \times 229$

(By commutative law of multiplication)

(v) $32 \times 15 = 32 \times 6 + 32 \times 7 + 32 \times 2$

(By commutative law of multiplication)

(vi) $23 \times 56 = 20 \times 56 + 3 \times 56$

(By distributive law of multiplication)

(vii) $83 \times 54 + 83 \times 16 = 83 \times (54 + 16) = 83 \times 70 = 5810$

(viii) $98 \times 273 - 75 \times 273 = (98 - 75) \times 273 = 23 \times 273$

2. By re-arranging the given numbers, evaluate :

(i) $2 \times 487 \times 50$

(ii) $25 \times 444 \times 4$

(iii) $225 \times 20 \times 50 \times 4$

Solution:

(i) $2 \times 487 \times 50$

$2 \times 50 = 100$

$2 \times 487 \times 50 = (2 \times 50) \times 487$

$= 100 \times 487$

$= 48700$

(ii) $25 \times 444 \times 4$

$25 \times 4 = 100$

$25 \times 444 \times 4 = (25 \times 4) \times 444$

$= 100 \times 444$

$= 44400$

(iii) $225 \times 20 \times 50 \times 4$

$(225 \times 4) \times (20 \times 50) = 900 \times 1000$

$= 900000$

3. Use distributive law to evaluate:

(i) 984×102

(ii) 385×1004

(iii) 446×10002

Solution:

$$\begin{aligned} \text{(i)} \quad & 984 \times 102 \\ & = 984 \times (100 + 2) \\ & = 984 \times 100 + 984 \times 2 \\ & = 98400 + 1968 \\ & = 100,368 \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 385 \times 1004 \\ & = 385 \times (1000 + 4) \\ & = 385 \times 1000 + 385 \times 4 \\ & = 385000 + 1540 \\ & = 386540 \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad & 446 \times 10002 \\ & = 446 \times (10000 + 2) \\ & = 446 \times 10000 + 446 \times 2 \\ & = 4460000 + 892 \\ & = 4460892 \end{aligned}$$

4. Evaluate using properties:

(i) 548×98

(ii) 924×988

(iii) 3023×723

Solution:

$$\begin{aligned} \text{(i)} \quad & 548 \times 98 \\ & = (500 + 40 + 8) \times 98 \\ & = 500 \times 98 + 40 \times 98 + 8 \times 98 \\ & = 49000 + 3920 + 784 \\ & = 53704 \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 924 \times 988 \\ & = (900 + 20 + 4) \times 988 \\ & = 900 \times 988 + 20 \times 988 + 4 \times 988 \\ & = 889200 + 19760 + 3952 \\ & = 912912 \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad & 3023 \times 723 \\ & = (3000 + 20 + 3) \times 723 \\ & = 3000 \times 723 + 20 \times 723 + 3 \times 723 \\ & = 2169000 + 14460 + 2169 \end{aligned}$$

$$= 2185629$$

5. Evaluate using properties :

(i) $679 \times 8 + 679 \times 2$

(ii) $284 \times 12 - 284 \times 2$

(iii) $55873 \times 94 + 55873 \times 6$

(iv) $7984 \times 15 - 7984 \times 5$

(v) $8324 \times 1945 - 8324 \times 945$

(vi) $3333 \times 987 + 13 \times 3333$

Solution:

(i) $679 \times 8 + 679 \times 2$

$$= 679 \times (8 + 2) \quad \text{(using distributivity)}$$

$$= 679 \times 10$$

$$= 6790$$

(ii) $284 \times 12 - 284 \times 2$

$$= 284 \times (12 - 2) \quad \text{(using distributivity)}$$

$$= 284 \times 10$$

$$= 2840$$

(iii) $55873 \times 94 + 55873 \times 6$

$$= 55873 \times (94 + 6) \quad \text{(using distributivity)}$$

$$= 55873 \times 100$$

$$= 5587300$$

(iv) $7984 \times 15 - 7984 \times 5$

$$= 7984 \times (15 - 5) \quad \text{(using distributivity)}$$

$$= 7984 \times 10$$

$$= 79840$$

(v) $8324 \times 1945 - 8324 \times 945$

$$= 8324 \times (1945 - 945) \quad \text{(using distributivity)}$$

$$= 8324 \times 1000$$

$$= 8324000$$

(vi) $3333 \times 987 + 13 \times 3333$

$$= 3333 \times (987 + 13) \quad \text{(using distributivity)}$$

$$= 3333 \times 1000$$

$$= 3333000$$

6. Find the product of the :**(i) greatest number of three digits and smallest number of five digits.****(ii) greatest number of four digits and the greatest number of three digits.****Solution:**

(i) Greatest number of three digits = 999

Smallest number of five digits = 10000

$$\begin{aligned}\text{Required product} &= 999 \times 10000 \\ &= 9990000\end{aligned}$$

(ii) Greatest number of four digits = 9999

Greatest number of three digits = 999

$$\begin{aligned}\text{Required product} &= 9999 \times 999 \\ &= 9999 \times (1000 - 1) \\ &= 9999 \times 1000 - 9999 \times 1 && \text{(using distributivity)} \\ &= (10000 - 1) \times 1000 - (10000 - 1) \times 1 \\ &= 10000000 - 1000 - 10000 + 1 \\ &= 10000001 - 11000 \\ &= 9989001\end{aligned}$$

7. Fill in the blanks:

(i) $(437 + 3) \times (400 - 3) = 397 \times \dots\dots\dots$

(ii) $66 + 44 + 22 = 11 \times (\dots\dots\dots) = 11 \times \dots\dots\dots$

Solution:

(i) $(437 + 3) \times (400 - 3) = 397 \times 440$

(ii) $66 + 44 + 22 = 11 \times (6 + 4 + 2) = 11 \times 12 = 132$

8. Evaluate:

(i) 355×18

(ii) 6214×12

(iii) 15×49372

(iv) 9999×8

Solution:

(i) 355×18

This can be written as

$$\begin{aligned}&= (300 + 50 + 5) \times 18 \\ &= (300 \times 18) + (50 \times 18) + (5 \times 18) \\ &= 5400 + 900 + 90 \\ &= 6390\end{aligned}$$

(ii) 6214×12

This can be written as

$$\begin{aligned}&= (6000 + 200 + 10 + 4) \times 12 \\ &= (6000 \times 12) + (200 \times 12) + (10 \times 12) + (4 \times 12) \\ &= 72000 + 2400 + 120 + 48 \\ &= 74568\end{aligned}$$

(iii) 15×49372

This can be written as

$$\begin{aligned} &= 15 \times (40000 + 9000 + 300 + 70 + 2) \\ &= (15 \times 40000) + (15 \times 9000) + (15 \times 300) + (15 \times 70) + (15 \times 2) \\ &= 600000 + 135000 + 4500 + 1050 + 30 \\ &= 740580 \end{aligned}$$

(iv) 9999×8

This can be written as

$$\begin{aligned} &= (9000 + 900 + 90 + 9) \times 8 \\ &= (9000 \times 8) + (900 \times 8) + (90 \times 8) + (9 \times 8) \\ &= 72000 + 7200 + 720 + 72 \\ &= 79992 \end{aligned}$$



EXERCISE 5(D)

PAGE NO: 40

1. Show that:

- (i) division of whole numbers is not closed.
- (ii) any whole number divided by 1, always gives the number itself.
- (iii) every non-zero whole number divided by itself gives 1 (one).
- (iv) zero divided by any non-zero number is zero only.
- (v) a whole number divided by 0 is not defined.

For each part, given above, give two suitable examples.

Solution:

(i) Example:

5 and 8 are whole numbers, but $5 \div 8$ is not a whole number
Therefore, closure property does not exist for division of whole numbers

(ii) Example:

$$2 \div 1 = 2, 18 \div 1 = 18, 129 \div 1 = 129$$

Hence, the given statement, any whole number divided by 1, always gives the number itself is true.

(iii) Example:

$$2 \div 2 = 1, 128 \div 128 = 1, 256 \div 256 = 1$$

Therefore, the given statement, every non-zero whole number divided by itself gives one is true

(iv) Example:

$$0 \div 138 = 0, 0 \div 2028 = 0, 0 \div 15140 = 0$$

Therefore, the given statement, zero divided by any non-zero number is zero only, is true

(v) Example:

$7 \div 0$ is not defined

$16 \div 0$ is not defined

Hence, the given statement, a whole number divided by zero is not defined

2. If x is a whole number such that $x \div x = x$, state the value of x.

Solution:

We know that, any number divided by 1, always gives the number itself
The value of x can be any number 1, 2, 3, 4, 5, 6,and so on.

3. Fill in the blanks:

(i) $987 \div 1 = \dots\dots\dots$

(ii) $0 \div 987 = \dots\dots\dots$

(iii) $336 - (888 \div 888) = \dots\dots\dots$

(iv) $(23 \div 23) - (437 \div 437) = \dots\dots\dots$

Solution:

- (i) $987 \div 1 = 987$
(ii) $0 \div 987 = 0$
(iii) $336 - (888 \div 888) = 335$
(iv) $(23 \div 23) - (437 \div 437) = 0$

4. Which of the following statements are true?

- (i) $12 \div (6 \times 2) = (12 \div 6) \times (12 \div 2)$
(ii) $a \div (b - c) = a / b - a / c$
(iii) $(a - b) \div c = a / c - b / c$
(iv) $(15 - 13) \div 8 = (15 \div 8) - (13 \div 8)$
(v) $8 \div (15 - 13) = 8 / 15 - 8 / 13$

Solution:

(i) $12 \div (6 \times 2) = (12 \div 6) \times (12 \div 2)$

$12 \div 12 = 2 \times 6$

$1 \neq 12$

Hence, the statement is false

(ii) $a \div (b - c) = a / b - a / c$

$a / (b - c) \neq (ac - ab) / bc$

Hence, the statement is false

(iii) $(a - b) \div c = a / c - b / c$

$(a - b) / c = (a - b) / c$

Hence, the statement is true

(iv) $(15 - 13) \div 8 = (15 \div 8) - (13 \div 8)$

$15 - 13 / 8 = 15 - 13 / 8$

$2 / 8 = 2 / 8$

Hence, the statement is true.

(v) $8 \div (15 - 13) = 8 / 15 - 8 / 13$

$8 / 2 = 104 - 120 / 15 (13)$

$4 \neq (-16) / 15 (13)$

Hence, the statement is false

(iii) and (iv) statements are true

EXERCISE 5(E)

PAGE NO: 42

1. Find the difference between the largest number of four digits and the smallest number of six digits.

Solution:

Largest number of 4 digits = 9999

Smallest number of 6 digits = 100000

Their difference = $100000 - 9999$

= 90001

Therefore, the difference between the largest number of four digits and the smallest number of six digits = 90001

2. Find the difference between the smallest number of eight digits and the largest number of five digits.

Solution:

Smallest number of eight digits = 10000000

Largest number of five digits = 99999

Their difference = $10000000 - 99999$

= 9900001

Hence, the difference between the smallest number of eight digits and the largest number of five digits is 9900001

3. The product of two numbers is 528. If the product of their unit's digits is 8 and the product of their ten's digits is 4; find the numbers.

Solution:

Given the product of unit's digits = 8 i.e., 2×4

Hence, unit's digits are 2 and 4

So, the numbers are either 24 or 22

$24 \times 22 = 528$

The required numbers are 24 and 22

4. Does there exist a number a such that $a \div a = a$?

Solution:

Yes and the number a is 1

$a \div a = a$

$1 \div 1 = 1$

5. Divide 5936 by 43 to find the quotient and remainder. Also, check your division by using the formula, $\text{dividend} = \text{divisor} \times \text{quotient} + \text{remainder}$

Solution:

On dividing 5936 by divisor 43, we get the quotient 138 and the remainder 2

$$\begin{array}{r|l|l} 43 & 5936 & 138 \\ - & 43 & \\ \hline & 163 & \\ - & 129 & \\ \hline & 346 & \\ - & 344 & \\ \hline & 2 & \end{array}$$

Verification:

Dividend = divisor \times quotient + remainder

$$5936 = 43 \times 138 + 2$$

$$5936 = 43 \times (100 + 38) + 2$$

$$= 4300 + 1634 + 2$$

$$= 5936$$

Therefore, verified.

EXERCISE 5(F)

PAGE NO: 46

1. For each pattern, given below, write the next three steps:

- (i) $1 \times 9 + 1 = 10$
 $12 \times 9 + 2 = 110$
 $123 \times 9 + 3 = 1110$
- (ii) $9 \times 9 + 7 = 88$
 $98 \times 9 + 6 = 888$
 $987 \times 9 + 5 = 8888$
- (iii) $1 \times 8 + 1 = 9$
 $12 \times 8 + 2 = 98$
 $123 \times 8 + 3 = 987$
- (iv) $111 \div 3 = 37$
 $222 \div 6 = 37$
 $333 \div 9 = 37$

Solution:

- (i) $1 \times 9 + 1 = 10$
 $12 \times 9 + 2 = 110$
 $123 \times 9 + 3 = 1110$
 $1234 \times 9 + 4 = 11110$
 $12345 \times 9 + 5 = 111110$
 $123456 \times 9 + 6 = 1111110$
- (ii) $9 \times 9 + 7 = 88$
 $987 \times 9 + 6 = 888$
 $9876 \times 9 + 5 = 8888$
 $9876 \times 9 + 4 = 88888$
 $98765 \times 9 + 3 = 888888$
 $987654 \times 9 + 2 = 8888888$
- (iii) $1 \times 8 + 1 = 9$
 $12 \times 8 + 2 = 98$
 $123 \times 8 + 3 = 987$
 $1234 \times 8 + 4 = 9876$
 $12345 \times 8 + 5 = 98765$
 $123456 \times 8 + 6 = 987654$
- (iv) $111 \div 3 = 37$
 $222 \div 6 = 37$
 $333 \div 9 = 37$
 $444 \div 12 = 37$
 $555 \div 15 = 37$
 $666 \div 18 = 37$

2. Complete each of the following magic squares:

(i)

6	7	.....
.....	5	9
8	.....	4

(ii)

4	.....	8
.....	7	.....
.....	.....	10

(iii)

16	2	.....
.....	10	.....
.....	.....	4

Solution:

(i) Sum for row-wise is as follows

$$6 + 7 + 2 = 15$$

$$1 + 5 + 9 = 15$$

$$8 + 3 + 4 = 15$$

Sum for column wise is as follows

$$6 + 1 + 8 = 15$$

$$7 + 5 + 3 = 15$$

$$2 + 9 + 4 = 15$$

Sum for diagonal wise is as follows

$$6 + 5 + 4 = 15$$

$$2 + 5 + 8 = 15$$

Hence, the magic square is

6	7	2
1	5	9
8	3	4

(ii) Row wise sum is as follows:

$$4 + 9 + 8 = 21$$

$$11 + 7 + 3 = 21$$

$$6 + 5 + 10 = 21$$

Column wise sum is as follows

$$4 + 11 + 6 = 21$$

$$9 + 7 + 5 = 21$$

$$8 + 3 + 10 = 21$$

Diagonal wise sum is as follows

$$4 + 7 + 10 = 21$$

$$8 + 7 + 6 = 21$$

Hence, the magic square is

4	9	8
11	7	3
6	5	10

(iii) Row wise sum is as follows

$$16 + 2 + 12 = 30$$

$$6 + 10 + 14 = 30$$

$$8 + 18 + 4 = 30$$

Column wise sum is as follows

$$16 + 6 + 8 = 30$$

$$2 + 10 + 18 = 30$$

$$12 + 14 + 4 = 30$$

Diagonal wise sum is as follows

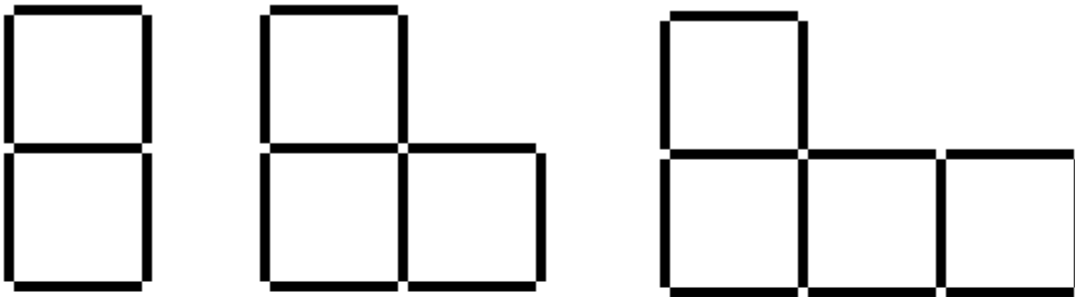
$$16 + 10 + 4 = 30$$

$$12 + 10 + 8 = 30$$

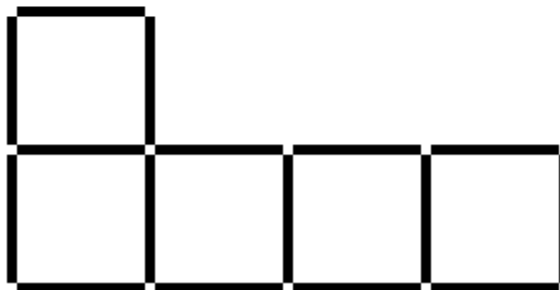
Hence, the magic square is

16	2	12
6	10	14
8	18	4

3. See the following pattern carefully:



and



(i) If n denotes the number of figures and S denotes the number of matchsticks; find S in terms of n .

(ii) Find how many matches are required to make the:

(1) 15th figure

(2) 40th figure

(iii) Write a description of the pattern in words,

Solution:

The table is

n	1	2	3	4
S	7	10	13	16

$$S = 3n + 4$$

(ii) (1) 15th figure has $= 3 \times 15 + 4$
 $= 49$ matches

(2) 40th figure has = $3 \times 40 + 4$
= 124 matches

(iii) It is clear that each time the figure (n) is increased by 4, the number of matches (S) are increased by 3.

4. (i) In the following pattern, draw the next two figures.



(ii) Construct a table to describe the figures in the above pattern.

(iii) If n denotes the number of figures and L denotes the number of matchsticks, find L in terms of n.

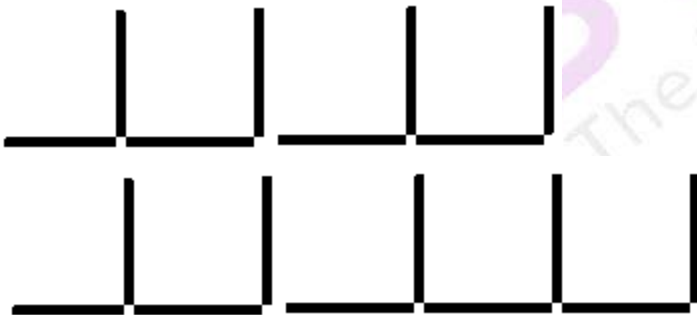
(iv) Find how many matchsticks are required to make the:

(1) 12th figure

(2) 20th figure

Solution:

(i)



(ii) The table is

n	1	2	3	4	5
L	2	4	6	8	10

(iii) Hence, the value of L is

$$L = 2n$$

(iii) (1) Number of matchsticks in 12th figure = 2×12

$$= 24$$

(2) Number of matchsticks in 20th figure = 2×20

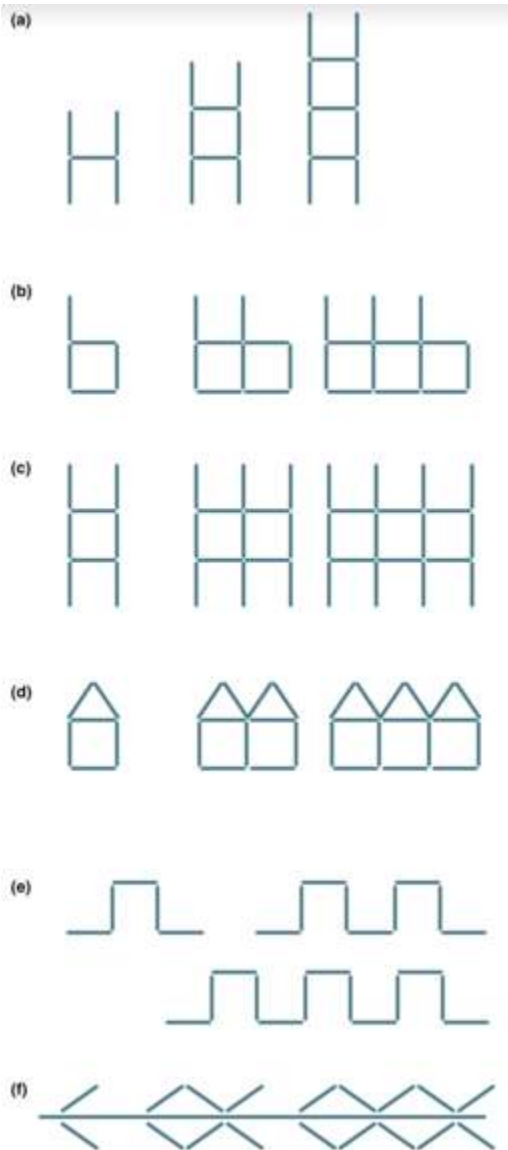
$$= 40$$

5. In each of the following patterns, construct next figure.

(i) In each case, if n denotes the number of figures and F denotes the number of

matchsticks used, find F in terms of n.

(ii) Also find, in each case, how many matchsticks are required to make the:
16th figure and 30th figure.



Solution:

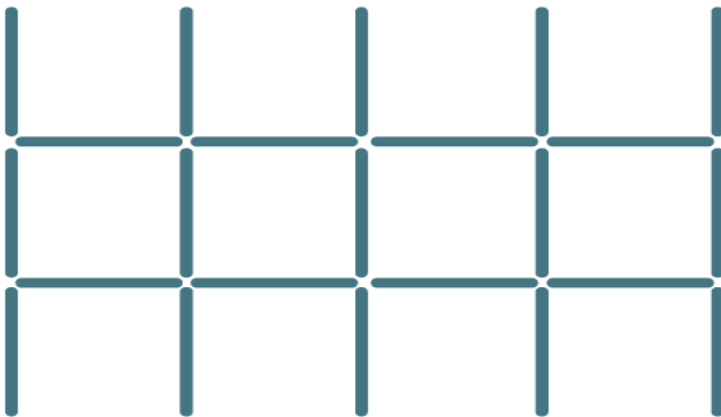
(a)



(b)



(c)



(d)



(e)



(f)



(i) (a) $F = 3n + 2$

(b) $F = 4n + 1$

(c) $F = 5n + 3$

(d) $F = 5n + 1$

(e) $F = 4n + 1$

(f) $F = 4n - 2$

16th figure

(a) $3 \times 16 + 2$

$= 48 + 2$

$= 50$

(b) $F = 4 \times 16 + 1$

$= 64 + 1$

$= 65$

(c) $F = 5 \times 16 + 3$

$= 80 + 3$

$= 83$

(d) $F = 5 \times 16 + 1$

$= 80 + 1$

$= 81$

$$\begin{aligned} \text{(e) } F &= 4 \times 16 + 1 \\ &= 64 + 1 \\ &= 65 \end{aligned}$$

$$\begin{aligned} \text{(f) } F &= 4 \times 16 - 2 \\ &= 64 - 2 \\ &= 62 \end{aligned}$$

30th figure

$$\begin{aligned} \text{(a) } F &= 3 \times 30 + 2 \\ &= 90 + 2 \\ &= 92 \end{aligned}$$

$$\begin{aligned} \text{(b) } F &= 4 \times 30 + 1 \\ &= 120 + 1 \\ &= 121 \end{aligned}$$

$$\begin{aligned} \text{(c) } F &= 5 \times 30 + 3 \\ &= 150 + 3 \\ &= 153 \end{aligned}$$

$$\begin{aligned} \text{(d) } F &= 5 \times 30 + 1 \\ &= 150 + 1 \\ &= 151 \end{aligned}$$

$$\begin{aligned} \text{(e) } F &= 4 \times 30 + 1 \\ &= 120 + 1 \\ &= 121 \end{aligned}$$

$$\begin{aligned} \text{(f) } F &= 4 \times 30 - 2 \\ &= 120 - 2 \\ &= 118 \end{aligned}$$