Knowing Our Numbers

Exercise 1.1

Question: 1

Write each of the following in numeral form :

i) Eight thousand twelve

ii) Seventy thousand fifty-three

iii) Five lakh seven thousand four hundred six

iv) Six lakh tow thousand nine

v) Thirty lakh eleven thousand one

vi) Eight crore four lakh twenty-five.

vii) Three crore three thousand three hundred three

viii) Seventeen crores sixty lakh thirty thousand fifty-seven.

Solution:

i) 8,012

ii) 70,053

iii) 5,07,406

iv) 6,02,009

v) 30,11,001

vi) 8,04,00,025

vii) 3,03,03,303

viii) 17,60,30,057

Question: 2

Write the following numbers in words in the Indian system of numeration.

i) 42,007

ii) 4,05,045

iii) 35,42,012

iv) 7,06,04,014

v) 25,05,05,500

vi) 5,50,50,050

vii) 5,03,04,012

Solution:

i) Forty two thousand seven.

ii) Four lakh five thousand forty five.

iii) Thirty five lakh forty two thousand twelve.

iv) Seven crore six lakh four thousand fourteen.

v) Twenty five crore five lakh five thousand five hundred.

vi) Five crore fifty lakh fifty thousand fifty.

vii) Five crore three lakh four thousand twelve.

Question: 3

Insert commas in the correct positions to separate periods and write the following numbers in words:

i) 4375

ii) 24798

iii) 857367

iv) 9050784

v) 10105607

vi) 10000007

vii) 910107104

Solution:

i) 4,357

ii) 24,798

iii) 8,57,367

iv) 90,50,784

v) 1,01,05,607

vi) 1,00,00,007

vii) 91,01,07,104

Question: 4

Write each of the following in expanded form:

i) 3057

ii) 12345

iii) 10205

iv) 235060

Solution:

i) 3000 + 50 + 7

ii) 10000 + 2000 + 300 + 40 + 5

iii) 10000 + 200 + 5

iv) 200000 + 30000 + 5000 + 60

Question: 5

Write the corresponding numeral for each of the following :

i) 7 x 10000 + 2 x 1000 + 5 x 100 + 9 x 10 + 6 x 1

ii) 4 x 100000 + 5 x 1000 + 1 x 100 + 7 x 1

iii) 8 x 1000000 + 3 x 1000 + 6 x 1

iv) 5 x 10000000 + 7 x 1000000 + 8 x 1000 + 9 x 10 + 4

Solution:

i) 70000 + 2000 + 500 + 90 + 6 = 72,596

ii) 400000 + 5000 + 100 + 7 = 4,05,107

iii) 8000000 + 3000 + 6 = 80,03,006

iv) 50000000 + 7000000 + 8000 + 90 + 4 = 5,70,08,094

Question: 6

Find the place value of the digit 4 in each of the following:

i) 74983160

ii) 8745836

Solution:

i) Place value of 4 = 4 × 10,00,00 = 40,00,00

ii) Place value of 4 = 4 × 10,000 = 40,000

Question: 7

Determine the product of the place values of two fives in 450758.

Solution:

Place value of first 5 = 5 × 10 = 50

Place value of second 5 = 5 × 10,000 = 50,000

Required product = 50 × 50,000 = 25, 00,000

Question: 8

Determine the difference of the place values of 7's in 257839705.

Solution:

Place value of first 7 = 7 × 10 = 700

Place value of second 7 = 7 × 10,000 = 70, 00,000

Required difference = 70, 00,000 – 700 = 69, 99,300

Question: 9

Determine the difference between the place value and the face value of 5 in 78654321.

Solution:

The number = 7, 86, 54, 321

The place value of 5 = 5 ten thousands = 50,000

The face value of 5 = 5

Therefore, the difference = 50,000 – 5 = 49,995

Question: 10

Which digits have the same face value and place value in 92078634?

Solution:

The place value of a digit depends on the place where it occurs, while the face value is the value of the digit itself.

In a number, the digits that have same face value and place value are the ones digit and all the zeroes of the number.

Therefore, in 9, 20, 78,634, 4 (the ones digit) and 0 (the lakhs digit) have the same face value and place value

Question: 11

How many different 3- digit numbers can be formed by using the digits 0, 2, 5 without repeating any digit in the number?

Solution:

The three-digit numbers formed using the digits 0, 2 and 5 (without repeating any digit in the number) are 250 , 205 , 502 and 520.

Therefore, four such numbers can be formed.

Question: 12

Write all possible 3- digit numbers using 6, 0, 4 when

i) Repetition of digits is not allowed

ii) Repetition of digits is allowed

Solution:

i) 604, 640, 460, 406

ii) 666, 664, 646, 660, 606, 600, 644, 640, 604, 444, 466, 440, 446,464, 400, 404, 406, 460

Question: 13

Fill in the blanks:

i)1 lakh = —— ten thousand

ii) 1 lakh = —— thousand

iii) 1 lakh = ——- hundred

iv) 1 lakh = ——- ten

v) 1 crore = —– ten lakh

vi) 1 crore = —– lakh

vii)1 crore = —— ten thousand

viii) 1 crore = ——- thousand

ix) 1 crore = ——- hundred

x) 1 crore = —— ten

Solution:

i) 1 lakh = 10 ten thousand

ii) 1 lakh = 100 thousand

iii) 1 lakh = 1000 hundred

iv) 1 lakh = 10000 ten

v) 1 crore = 10 ten lakh

vi) 1 crore = 100 lakh

vii) 1 crore = 1000 ten thousand

viii) 1 crore = 10000 thousand

ix) 1 crore = 100000 hundred

x) 1 crore = 1000000 ten

Exercise 1.2

Question: 1

Write each of the following numbers in digits by using international place value chart. Also, write them in expanded form.

i) Seven million three hundred three thousand two hundred six

ii) Fifty five million twenty nine thousand seven

iii) Six billion one hundred ten million three thousand seven

Solution:

i) 7,303,206

Expanded form = $7 \times 1000000 + 3 \times 100000 + 0 \times 10000 + 3 \times 1000 + 2 \times 100 + 0 \times 10 + 6 \times 1$

ii) 55,029,007

Expanded form = $5 \times 10000000 + 5 \times 1000000 + 0 \times 100000 + 2 \times 10000 + 9 \times 1000 + 0 \times 100 + 0 \times 10 + 7 \times 1$

iii) 6,110,003,007

Expanded form = $6 \times 1000000000 + 1 \times 100000000 + 1 \times 10000000 + 0 \times 1000000 + 0 \times 100000 + 0 \times 10000 + 3 \times 1000 + 0 \times 100 + 0 \times 10 + 7 \times 1$

Question: 2

Rewrite each of the following numerals with proper commas in the international system of numeration

i) 513625

ii) 4035672

iii) 65954923

iv) 70902005

Solution:

i) 513,625 or Five hundred thirteen thousand six hundred twenty five.

ii) 4,035,672 or Four million thirty five thousand six hundred seventy two.

iii) 65,954,923 or Sixty five million nine hundred fifty four thousand nine hundred twenty three

(iv) 70,902,005 or Seventy million nine hundred two thousand five

Question: 3

Write each of the following numbers in the international system of numeration :

i) Forty three lakh four thousand eighty four.

ii) Six crore thirty four lakh four thousand forty four.

iii) Seven lakh thirty five thousand eight hundred ninety nine only.

Solution:

i) 4,304,084 or Four million three hundred four thousand eighty four.

ii) 63,404,044 or Sixty three million four hundred four thousand forty four.

iii) 735,899 or Seven hundred thirty five thousand eight hundred ninety nine.

Question: 4

Write the following numbers in the Indian system of numeration :

i)Six million five hundred forty three thousand two hundred ten.

ii)Seventy six million eighty five thousand nine hundred eighty seven

iii) Three hundred twenty five million four hundred seventy nine thousand eight hundred thirty eight.

Solution:

i) 65, 43,210 or Sixty five lakh forty three thousand two hundred ten.

ii) 7, 60,85,987 or Seven crore sixty lakh eighty five thousand nine hundred eighty seven.

iii) 32, 54,79,838 or Thirty two crore fifty four lakh seventy nine thousand eight hundred thirty eight.

Question: 5

A certain nine digit number has only ones in ones period, only twos in the thousands period and only threes in millions period. Write this number in words in the Indian system.

Solution:

The number is 333,222,111

In Indian system , the number is written as 33,32,22,111 thirty – three crore thirty – two lakh twenty thousand one hundred and eleven.

Question: 6

How many thousands make a million?

Solution:

1,000 thousands makes a million

Question: 7

How many millions make a billion?

Solution:

1,000 millions make a billion

Question: 8

i) How many lakhs make a million?

ii) How many lakhs make billion?

Solution:

i) Ten lakhs make a million

ii) Ten thousand lakhs make a billion

Question: 9

Write each of the following in numerical form:

i) Nighty-Eight million seven hundred eight thousand four.

ii) Six hundred seven million twelve thousand eighty four.

iii) Four billion twenty five million forty five thousand.

Solution:

i) 98,708,004

ii) 607,012,084

iii) 4,025,045,000

Question: 10

Write the number names of each of the following in international system of numeration :

i) 435,002

ii) 1,047,509

iii) 59,064,523

iv) 25,201,905

Solution:

i) Four hundred thirty-five thousand and two

ii) One million, forty-seven thousand, five hundred and nine

iii) Fifty-nine million, sixty-four thousand, five hundred and twenty-three

iv) Twenty-five million, two hundred one thousand, nine hundred and five

Exercise 1.3

Question: 1

How many four – digit numbers are there in all?

Solution:

There are 10 digits i.e., 0, 1, 2, 3, 4, 5, 6 ,7, 8, 9.

We cannot use '0' at thousand's place.

So, we can use only 9 digits at thousand's place.

Also, we can use 10 digits at hundred's, 10 digits at ten's and 10 digits at unit's place.

So, total numbers of four-digit numbers = $9 \times 10 \times 10 \times 10 = 9000$

Question: 2

Write the smallest and the largest six digit numbers. How many numbers are between these two.

Solution:

The smallest digit is 0. But we cannot use 0 at the place having the highest place value in six digit numbers. So, we will use the second smallest digit i.e., 1. All other places are filled by 9.

Hence, the required number = 100000

Smallest six digit number will be 100000.

The largest digit is 9.

We can use 9 at any place. In fact , we can use 9 in all places in six digit numbers.

Hence, the required number = 999999

Largest six digit number will be 999999

Required difference = 999999 – 100000 = 899999

So, the total numbers between 999999 and 100000 will be 899998.

Question: 3

How many 8 – digit numbers are there in all ?

Solution:

There are 10 digits i.e., 0, 1, 2, 3, 4, 5, 6 ,7, 8, 9.

We cannot use '0' at the place having the highest place value in 8 digit numbers.

So, we can use only 9 digits at the place having the highest place value in 8 digit numbers.

Also, we can use 10 digits at the remaining places in 8 digit numbers So, total numbers of 8-digit numbers = 9 × 10 × 10 × 10 × 10 × 10 × 10 × 10 = 90000000

Question: 4

Write 10075302 in words and rearrange the digits to get the smallest and the largest numbers.

Solution:

One crore seventy-five thousand three hundred two.

In order to write the smallest 8-digit number using digits 0, 1, 2, 3, 5 and 7, we put the smallest digit 1 (Except 0) at the place having the highest place value. The largest digit 7 is put at the rightmost place i.e. at unit's place, the digit 5 is put at the ten's place, the digit 3 is put at the hundred's place and the digit 2 is put at the thousand's place. All other places are filled by 0. Hence, the required largest number is 10002357.

In order to write the largest 8-digit number using digits 0, 1, 2, 3, 5 and 7, we put the largest digit 7 at the place having the highest place value. The smallest digit 5 is put at the place after the highest place value. We put the next smallest digit (i.e., 3) after the previous one. After it we place the next smallest digit (i.e., 2) and after that we put the digit 1. All other places are filled by 0. Hence, the required largest number is 75321000.

Question: 5

What is smallest 3-digit number with unique digits?

Solution:

The smallest three-digit number with unique digits is 102.

Question: 6

What is the largest 5- digits number with unique digits?

Solution:

The largest five – digit number with unique digits 98,765.

Question: 7

Write is smallest 3-digit number which does not change if the digits are written in reverse order.

Solution:

The smallest three – digit number that does not change if the digits are written in reverse order is 101.

Question: 8

Find the difference between the number 279 and that obtained on reversing its digits.

Solution:

The number obtained on reversing 279 = 972

Difference = 972 – 279 = 693

Thus, the difference between 279 and that obtained on reversing its digits is 693.

Question: 9

Form the largest and smallest 4- digit numbers using each of digits 7,1,0,5 only once.

Solution:

The largest and smallest four- digit numbers formed using 7,1,0 and and 5are 7,510 and 1,057.

Exercise 1.4

Question: 1

Put the appropriate symbol (< >) in each of the following boxes :

i) 102394 ___ 99887

ii) 2507324 ___ 2517324

iii) 3572014 ____ 10253104

iv) 47983505 ____ 47894012

Solution:

i) 102394 > 99887

ii) 2507324 < 2517324

iii) 3572014 < 10253104

iv) 47983505 > 47894012

Question: 2

Arrange the following numbers in ascending order :

i) 6,35,47,201, 10,23,45,694 , 65,39,542 , 83,54,208 , 1,23,45,678

ii) 18,08,088, 1,81,888, 1,90,909, 18,08,090, 1,60,60,666

Solution:

i) 65,39,542, 83,54,208, 1,23,45,678, 6,35,47,201, 10,23,45,694

ii) 1,81,888, 1,90,909, 18,08,088, 18,08,090, 1,60,60,666

Question: 3

Arrange the following numbers in descending order :

i) 05,69,44,000, 5,69,43,201 , , 56,95,440, 5,69,43,300, 56,94,437

ii) 10,20,216, 10,20,308 , 10,21,430, 8,93,425, 8,93,245

Solution:

i) 5,69,44,000, 5,69,43,300, 5,69,43,201, 56,95,440, 56,94,437

ii) 10,21,430, 10,20,308, 10,20,216, 8,93,425, 8,93,245

Exercise 1.5

Question: 1

How many milligrams make one kilogram?

Solution:

Ten lakh or one million (10, 00, 000) milligrams make one kilogram.

Question: 2

A box of medicine tablets contains 2, 00,000 tablets each weighing 20mg. what is the total weight of all the tablets in the box in grams? in kilograms ?

Solution:

Given data: Each tablet weighs = 20 mg

Therefore, The weight of 2, 00,000 tablets = 2, 00,000 × 20 = 40, 00,000 mg

Therefore, The total weight of all the tablets in the box = 40, 00,000 mg

We know 1 g = 1,000 mg

Weight of the box having all tablets = 40,00,000 ÷ 1,000=4000g

And, as 1 kg = 1,000 g

Therefore, Weight of the box having all tablets = 4,000 ÷ 1,000 = 4000g = 4 kg

Question: 3

Population of sundarnagar was 2, 35,471 in the year 1991. In the year 2001 it was found to have increased by 72,958. What was the population of the city in 2001?

Solution:

The population of Sundar Nagar in 2001 = Sum of the population of city in 1991 + Increase in population over the given time period

As given in the question, The population of Sundar Nagar in 1991 = 2, 35,471

As given in the question,

Increase in population over the given time period = 72.958

Therefore, The population of Sundar Nagar in 2001

= 2, 35,471 + 72,958 = 3, 08,429

Question: 4

A book exhibition was held for four days in a school. The number of tickets sold at the counter on the first, second, third and final days were respectively 1094, 1812, 2050 and 2751. Find the total number of tickets sold on all the four days.

Solution:

Total number of tickets sold on all four days is the sum of the tickets sold on the first, second, third and final days.

Therefore, total number of tickets sold on all four days is given by:

= 1094 + 1812 + 2050 + 2751 = 7707

Question: 5

The town newspaper is published every day. One copy has 12 pages. Everyday 11,980 copies are printed. How many pages are in all printed every day? Every month?

Solution:

As given in the question,

Number of pages in 1 copy of newspaper = 12

Therefore, Number of pages in 11,980 copies of newspaper

= 11,980 × 12 = 1, 43,760

Thus, 1, 43,760 pages are printed every day.

Now, number of pages printed every day = 1, 43,760

Therefore, Number of pages printed in a month = 1, 43,760 × 30 = 43, 12,800

Thus, 43, 12,800 pages are printed in a month.

Question: 6

A machine, on an average, manufactures 2825 screws a day. How many screws did it produce in the month of January 2006?

Solution:

As given in the question,

Number of screws produced by a machine in a day = 2,825

Therefore, Number of screws produced by the same machine in the month of January 2006 = 2, 825 × 31 = 87,575

Thus, machine-produced 87,575 screws in the month of January 2006.

Question: 7

A famous cricket player has so far scored 6978 runs in test matches. He wishes to complete 10,000 runs. How many more runs does he need?

Solution:

Runs scored by cricket player in test matches = 6,978

Therefore, Remaining runs required to complete 10,000 runs

= 10,000 – 6,978 = 3,022

Thus, the player needs to score 3,022 more runs to complete 10,000 runs.

Question: 8

Ravish has Rs. 78,592 with him. He placed an order for purchasing 39 radio sets at Rs. 1234 each. How much money will remain with him after the purchase?

Solution:

Ravish's initial money = Rs.78, 592

He purchased 39 radio sets at Rs.1, 234 each.

Therefore, Money spent by him on purchasing 39 radio sets

= 1,234 × 39 = Rs. 48,126

Therefore, Remaining money with Ravish after the purchase = Initial money – Money spent on purchasing 39 radio sets = Rs. 78,592 – Rs. 48,126 = Rs. 30,466

Thus, 230,466 are left with him after the purchase.

Question: 9

In an election, the successful candidate registered 5, 77,570 votes and his nearest rival secured 3, 48,685 votes. By what margin did the successful candidate win the election?

Solution:

Margin of victory in the election for the successful candidate = Number of votes registered by the winner – Number of votes secured by nearest rival candidate

Votes registered by the winner = 5, 77,570

Votes secured by the rival = 3, 48,685

Therefore, Margin of victory for the successful candidate

= 5, 77, 570 – 3, 48, 685 = 2, 28, 885

Question: 10

To stitch a shirt 2m 15 cm cloth is needed. Out of 40 m cloth, how many shirts can be stitched and how much cloth will remain?

Solution:

As given in the question, Total length of available cloth = 40 m = 4,000 cm (1 m = 100 cm)

As given in the question, Length of cloth required to stitch a shirt

= 215 cm = 200 + 15 = 215 cm

Therefore, The number of shirts that can be stitched from the 40-metre cloth

= 4,000 / 215 = 18.60

As the number of shirts has to be a whole number, we consider the whole part only. That is, 18 such shirts can be stitched.

Therefore, Cloth required for stitching 18 shirts = 215 x 18 = 3870 cm. Therefore, Remaining cloth = 4,000 — 3870 = 130 cm = 1.3 m

Question: 11

A vessel has 4 litre and 650 ml of curd. In how many glasses, each of 25 ml capacity, can it be distributed?

Solution:

The number of glasses in which curd can be distributed = Total amount of curd/Capacity of each glass.

Total amount of curd in the vessel = 4,650 ml = 4,000 + 650 = 4,650 ml

(1 L = 1,000 ml)

Capacity of each glass = 25 ml

Therefore, Number of glasses in which curd can be distributed = 4,650/25 = 186

Question: 12

Medicine in packed in boxes, each such boxes weighing 4kg 500g. How many such boxes can be loaded in a van which cannot carry beyond 800 Kg?

Solution:

Sol :

As given in the question,

Total capacity of a van carrying boxes of medicines = 800 kg = 8, 00,000 g (1 kg = 1,000 g)

As given in the question, Weight of each packed box

= 4,500 g = 4,000 + 500 = 4,500 g

Therefore, Total number of boxes that can be loaded in the van

= 8, 00,000 / 4,500 = 177.77

The obtained number of boxes is not a whole number.

Therefore, Weight of 177 boxes = 177 × 4,500 = 7, 96,500 g (under permissible limit)

Therefore, Weight of 178 boxes = 178 × 4,500 = 8, 01,000 g (beyond permissible limit)

Therefore, we can’t load 178 boxes; hence, we can say that 177 boxes can be loaded in the van.

Question: 13

The Distance between the school and the house of a student is 1 Km 875 m. Every day she walks both ways between her school and home. Find the total distance covered by her in a week?

Solution:

Therefore, Distance between the school and the house of a student

= 1,875 m = 1,000 + 875 = 1,875 m (1 km = 1,000 m)

As given in the question, Distance covered by a student in a day

= 2 × 1,875 = 3,750 m

Total distance covered by her in a week = 7 × 3,750 = 26,250 m = 26.25 km

Exercise 1.6

Question: 1

Round off each of the following numbers to nearest tens :

i) 84

ii) 98

iii) 984

iv) 808

v) 998

vi) 12,096

vii) 10,908

viii) 28,925

Solution:

i) 80

ii) 100

iii) 980

iv) 810

v) 1,000

vi) 12,100

vii) 10,910

viii) 28,930

Question: 2

Round off each of the following numbers to nearest hundreds :

i) 3,985

ii) 7289

iii) 8074

iv) 14,627

v) 28,826

vi) 4,20,387

vii) 43,68,973

viii) 7,42,898

Solution:

i) 4,000

ii) 7,300

iii) 8,100

iv) 14,600

v) 28,800

vi) 4,20,400

vii) 43,69,000

viii) 7,42,900

Question: 3

Round off each of the numbers to nearest thousands :

i) 2401

ii) 9600

iii) 4278

iv) 7832

v) 9567

vi) 26,019

vii) 20,963

viii) 4,36,952

Solution:

i) 2000

ii) 10000

iii) 4000

iv) 8000

v) 10000

vi) 26000

vii) 21000

viii) 4,37,000

Question: 4

Round off each of the following numbers to nearest tens, hundreds and thousands.

i) 964

ii) 1049

iii) 45,634

iv) 79,085

Solution:

Tens :

i) 970

ii) 1050

iii) 45,630

iv) 79,090

Hundreds :

i)1000

ii) 1000

iii) 45,600

iv) 79,100

Thousands :

i) 1000

ii) 1000

iii) 46000

iv) 79000

Question: 5

Round off the following measures to the nearest hundreds :

i) Rs 666

ii) Rs 850

iii) Rs 3,428

iv) Rs 9,080

v) 1265 km

vi) 417 m

vii) 550 cm

viii) 2486 m

ix) 360 gm

x) 940 kg

xi) 273 l

xii) 820 mg

Solution:

i) Rs. 700

ii) Rs. 900

iii) Rs. 3,500

iv) Rs.9100

v) 1300 km

vi) 400 m

vii) 600 cm

viii) 2500 m

ix) 400 gm

x) 900 kg

xi) 300 l

xii) 800 mg

Question: 6

List all numbers which are rounded off to the nearest ten as 370.

Solution:

365 , 366 , 367 , 368 , 369 , 370 , 371 , 372 , 373 , 374

Question: 7

Find the smallest and the greatest numbers which are rounded off to the nearest hundreds as 900.

Solution:

Smallest number: 850

Greatest number: 949

Question: 8

Find the smallest and the greatest numbers which are rounded off to the nearest thousands as 9000.

Solution:

Smallest number: 8,500

Greatest number: 9,499

Exercise 1.7

Question: 1

Estimate the following by rounding off each factor to nearest hundreds:

i) 730 + 998

ii) 796 – 314

iii) 875 – 384

Solution:

i) 700 + 1000 = 1700

ii) 800 – 300 = 500

iii) 900 – 400 = 500

Question: 2

Estimate the following by rounding off each factor to nearest thousands:

i) 12904 + 2888

ii) 28292 – 21496

Solution:

i) 13000 + 3000 = 16000

ii) 28000 – 21000 = 7000

Question: 3

Estimate the following by rounding off each number to its greatest place:

i) 439 + 334 + 4317

ii) 8325 – 491

iii) 108734 – 47599

iv) 898 × 785

v) 9 × 795

vi) 87 × 317

Solution:

i) 400 + 300 + 4000 = 4700

ii)8000 – 500 = 7500

iii)100000 -500000 = 50000

iv) 900 × 800 = 720000

v) 10 × 800 = 8000

vi) 90 x 300 = 27000

Question: 4

Find the estimated quotient for each of the following by rounding off each number to its greatest place :

i) 878 ÷ 28

ii) 745 ÷ 24

iii) 4489 ÷ 394

Solution:

i) 900 ÷ 30 = 30

ii) 700 ÷ 20 = 35

iii) 4000 ÷ 400 = 10

Question: 5

Write the expression for each of the following statements using brackets:

i) Four multiplied by the sum of 13 and 7

ii) Eight multiplied by the difference of four from nine.

iii) Divide the difference of twenty eight and seven by 3.

The sum of 3 and 7 in multiplied by the difference of twelve and eight.

Solution:

i) 4 × (13 + 7)

ii) 8 × (9 – 4)

iii) 28 – 73

iv) (3 + 7) x (12 – 8)

Question: 6

Simplify each of the following:

i) 124 – (12 – 2) × 9

ii) (13 + 7) × (9 – 4) – 18

iii) 210 – (14 – 4) x (18 + 2) – 10

Solution:

i) 34

ii) 82

iii) 0

Question: 7

Simplify each of the following:

i) 7×109

ii) 6×112

iii) 9×105

iv) 17×109

v) 16×108

vi) 12×105

vii) 102×103

viii) 101×105

ix) 109×107

Solution:

i) 763

ii) 672

iii) 945

iv) 1853

v) 1728

vi) 1260

vii) 10506

viii)10605

ix)11663

Question: 8

Write the roman – numerals for each of the following:

i) 33

ii) 48

iii) 76

iv) 95

Solution:

i) XXXIII

ii) XLVIII

iii) LXXVI

iv) XCV

Question: 9

Write the following in roman numerals:

i) 154

ii) 173

iii) 248

iv) 319

Solution:

i) CLIV

ii) CLXXIII

iii) CCXLVIII

iv) CCCXIX

Question: 10

Write the following in roman numerals:

i) 1008

ii) 2718

iii) 3906

iv) 3794

Solution:

i) KVIII

ii) KKDCCXVIII

iii) KKKCKVI

iv) KKKDCCXCIV

Question: 11

Write the following in roman numerals:

i) 4201

ii) 10009

iii) 44000

iv) 25819

Solution:

i) $I\overline{V}CCI$

ii) $\overline{X}IX$

iii) $XL\overline{I}V$

iv) $X\overline{X}VDCCCXIX$

Question: 12

Write the following in Hindu – Arabic numerical:

i) XXVI

ii) XXIX

iii) LXXII

iv) XCI

Solution:

i) 26

ii) 29

iii) 72

iv) 91

Question: 13

Write the corresponding Hindu – Arabic numerical for each of the following:

i) CIX

ii) CLXXII

iii) CCLIV

iv) CCCXXIX

Solution:

i) 109

ii) 172

iii) 254

iv) 329

Question: 14

Write the corresponding Hindu – Arabic numerical for each of the following:

i) KXIX

ii) KDLXV

iii) KKCXXIII

iv) KKKDCXL

Solution:

i) 1019

ii) 1565

iii) 2123

iv) 3640

Question: 15

Write the following in Hindu – Arabic numerical:

i) I$\overline{\text{V}}$CDXLIV

ii) $\overline{\text{VI}}$CKXLIX

iii) I$\overline{\text{X}}$CCCXCI

iv) L$\overline{\text{X}}$XIX

Solution:

i) 4444

ii) 6949

iii) 9391

iv) 70009

Question: 16

Which of the following is meaningless?

i) I$\overline{\text{I}}$ICC $<$

ii) KKKCCXI

iii) XD

iv) VC

Solution:

(i) and (iii) are meaningless.

Playing With Numbers

Exercise 2.1

Question: 1

Define:

Solution:

(i) Factor: A factor of a number is an e×act divisor of that number. For e×ample, 4 e×actly divide 32. Therefore, 4 is a factor of 32.

Examples of factors are:

2 and 3 are factors of 6 because 2 × 3= 6

2 and 4 are factors of 8 because 2 × 4= 8

3 and 4 are factors of 12 because 3 × 4 = 12

3 and 5 are factors of 15 because 3 × 5 = 15

(ii) Multiple: When a number 'a' is multiplied by another number 'b', the product is the multiple of both the numbers 'a' and 'b'.

Examples of multiples:

6 is a multiple of 2 because 2 × 3= 6

8 is a multiple of 4 because 4 × 2 = 8

12 is a multiple of 6 because 6 × 2 = 12

21 is a multiple of 7 because 7 × 3 = 21

Question: 2

Write all factors of each of the following numbers:

Solution:

(i) 60

60= 1 × 60

60= 2 × 30

60 = 3 × 20

60 = 4 × 15

60 = 5 × 12

60 = 6 × 10

The factors of 60 are 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 and 60.

(ii) 76

76 = 1 × 76

76 = 2 × 38

76 = 4 × 19

Therefore, The factors of 76 are 1, 2, 4, 19, 38 and 76.

(iii) 125

125 = 1 × 125

125 = 5 × 25

Therefore, the factors of 125 are 1, 5, 25 and 125.

(iv) 729

729 = 1 × 729

729 = 3 × 243

729 = 9 × 81

729 = 27 × 27

Therefore, the factors of 729 are 1, 3, 9, 27, 81, 243 and 729.

Question: 3

Write first five multiples of each of the following numbers:

Solution:

(i) 25

The first five multiples of 25 are as follows:

25 × 1 = 25

25 × 2 = 50

25 × 3 = 75

25 × 4 = 100

25 × 5 = 125

(ii) 35

The first five multiples of 35 are as follows:

35 × 1 = 35

35 × 2 = 70

35 × 3 = 105

35 × 4 = 140

35 × 5 = 175

(iii) 45

The first five multiples of 45 are as follows:

45 × 1 = 45

45 × 2 = 90

45 × 3 = 135

45 × 4 = 180

45 × 5 = 225

(iv) 40

The first five multiples of 40 are as follows:

40 × 1 = 40

40 × 2 = 80

40 × 3 = 120

40 × 4 = 160

40 × 5 = 200

Question: 4

Which of the following number have 15 as their factor?

Solution:

(i) 15625

15 is not a factor of 15,625 because it is not a divisor of 15,625.

(ii) 123015

15 is a factor of 1,23,015 because it is a divisor of 1,23,015. i.e., 8,201 × 15 = 1, 23,015

Question: 5

Which of the following number are divisible by 21?

Solution:

We know that a given number is divisible by 21 if it is divisible by each of its factors. The factors of 21 are 1, 3, 7 and 21.

(i) 21063

Sum of the digits of the given number = 2 + 1 + 0 + 6 + 3 = 12 which is divisible by 3.

Hence, 21,063 is divisible by 3.

Again, a number is divisible by 7 if the difference between twice the one's digit and the number formed by the other digits is either 0 or a multiple of 7. 2,106 – (2 × 3) = 2,100 which is a multiple of 7. Thus, 21,063 is divisible by 21.

(ii) 20163

Sum of the digits of the given number = 2 + 0 + 1 + 6 + 3 = 12 which is divisible by 3. Hence, 20,163 is divisible by 3.

Again, a number is divisible by 7 if the difference between twice the one's digit and the number formed by the other digits is either 0 or multiple of 7. 2016 – (2 × 3) = 2010 which is not a multiple of 7. Thus, 20,163 is not divisible by 21.

Question: 6

Without actual division show that 11 is a factor of each of the following numbers:

Solution:

(i) 1,111

The sum of the digits at the odd places = 1 + 1 = 2

The sum of the digits at the even places = 1 + 1 = 2

The difference of the two sums = 2 – 2 = 0

Therefore, 1,111 is divisible by 11 because the difference of the sums is zero.

(ii) 11,011

The sum of the digits at the odd places = 1 + 0 + 1 = 2

The sum of the digits at the even places = 1 + 1 = 2

The difference of the two sums = 2 – 2 = 0

Therefore, 11,011 is divisible by 11 because the difference of the sums is zero.

(iii) 1, 10,011

The sum of the digits at the odd places = 1 + 0 + 1 = 2

The sum of the digits at the even places = 1 + 0 + 1 = 2

The difference of the two sums = 2 – 2 = 0

Therefore, 1, 10,011 is divisible by 11 because the difference of the sums is zero.

(iv) 11, 00,011

the sum of the digits at the odd places = 1 + 0 + 0 + 1 = 2

The sum of the digits at the even places = 1 + 0 + 1 = 2

The difference of the two sums = 2 – 2 = 0

Therefore, 11, 00,011 is divisible by 11 because the difference of the sums is zero.

Question: 7

Without actual division show that each of the following numbers is divisible by 5:

Solution:

A number will be divisible by 5 if the unit’s digit of that number is either 0 or 5.

(i) 5

In 55, the unit's digit is 5. Hence, it is divisible by 5.

(ii) 555

In 555, the unit's digit is 5. Hence, it is divisible by 5.

(iii) 5555

In 5,555, the unit's digit is 5. Hence, it is divisible by 5.

(iv) 50,005

In 50,005, the unit's digit is 5. Hence, it is divisible by 5.

Question: 8

Is there any natural number having no factor at all?

Solution:

No, because each natural number is a factor of itself

Question: 9

Find numbers between 1 and 100 having exactly three factors

Solution:

The numbers between 1 and 100 having exactly three factors are 4, 9, 25, and 49.

The factors of 4 are 1, 2 and 4.

The factors of 9 are 1, 3 and 9.

The factors of 25 are 1, 5 and 25.

The factors of 49 are 1, 7 and 49.

Question: 10

Sort out even and odd numbers:

Solution:

A number which is exactly divisible by 2 is called an even number. Therefore, 42 and 144 are even numbers.

A number which is not exactly divisible by 2 is called an odd number. Therefore, 89 and 321 are odd numbers.

Exercise 2.2

Question: 1

Find the common factors of:

Solution:

(i) 15 and 25

15 = 1 × 15

15 = 3 × 5

i.e., the factors of 15 are 1, 3, 5 and 15.

Again, 25 = 1 × 25

25 = 5 × 5 i.e., the factors of 25 are 1, 5 and 25.

Therefore, the common factors of the two numbers are 1 and 5.

(ii) 35 and 50

35 = 1 × 35

35 =5 × 7 i.e., the factors of 35 are 1, 5, 7 and 35.

Again, 50 = 1 × 50

50 = 2 × 25

50 = 5 × 10

i.e., the factors of 50 are 1, 2, 5, 10, 25 and 50.

Therefore, the common factors of the two numbers are 1 and 5.

(iii) 20 and 28

20 = 1 × 20

20 = 2 × 10

20 =4 × 5

i.e., the factors of 20 are 1, 2 , 4, 5, 10 and 20.

Again, 28 = 1 × 28

28 = 2 × 14

28 =7 × 4

i.e., the factors of 28 are 1, 2, 4, 7, 14 and 28.

Therefore, the common factors of the two numbers are 1, 2 and 4.

Question: 2

Find the common factors of:

Solution:

(i) 5, 15 and 25

Factors of 5 are 1 and 5

Factors of 15 are 1, 3, 5 and 15

Factors of 25 are 1, 5 and 25

Therefore, the common factors of 5, 15, and 25 are 1 and 5.

(ii) 2, 6 and 8

Factors of 2 are 1 and 2

Factors of 6 are 1, 2, 3 and 6

Factors of 8 are 1, 2, 4 and 8

Therefore, the common factors of 2, 6 and 8 are 1 and 2.

Question: 3

Find first three common multiples of 6 and 8

Solution:

Multiples of 6: 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84…

Multiples of 8: 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96…

Therefore, the first three common multiples of 6 and 8 are 24, 48 and 72.

Question: 4

Find first two common multiples of 12 and 18.

Solution:

Multiples of 12: 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 132…

Multiples of 18: 18, 36, 54, 72, 90, 108, 126, 144, 162, 180, 198…

Therefore, the first two common multiples of 12 and 18 are 36 and 72.

Question: 5

A number is divisible by both 7 and 16. By which other number will that number be always divisible?

Solution:

Since the number is divisible by 7 and 16, they are the factors of that number.

So, the number will be divisible by the common factor of 7 and 16.

The factors of 7 are 1 and 7.

The factors of 16 are 1, 2, 4, 8, and 16.

Therefore, the common factor of 7 and 16 is 1 and the number is divisible by 1.

Question: 6

A number is divisible by 24. By what other numbers will that number be divisible?

Solution:

Since the number is divisible by 24, it will be divisible by all the factors of 24.

The factors of 24 are 1, 2, 3, 4, 6, 8, 12 and 24.

Hence, the number is also divisible by 1, 2, 3, 4, 6, 8 and 12.

Exercise 2.3

Question: 1

What are prime numbers? List all the prime numbers between 1 and 30.

Solution:

Those numbers with only two factors, i.e., 1 and the number itself, are known as prime numbers.

Examples: 2, 3, 5, 7. 11 and 13

The prime numbers between 1 and 30 are 2, 3, 5, 7, 11, 13, 17, 19, 23 and 29.

Question: 2

Write all the prime numbers between:

Solution:

(i) 10 and 50

The prime numbers between 10 and 50 are 11, 13, 17, 19, 23, 29, 31, 37, 41, 43 and 47.

(ii) 70 and 90

The prime numbers between 70 and 90 are 71, 73, 79, 83 and 89.

(iii) 40 and 85

The prime numbers between 40 and 85 are 41, 43, 47, 53, 59, 61, 67, 71, 73, 79 and 83.

(iv) 60 and 100

The prime numbers between 60 and 100 are 61, 67, 71, 73, 79, 83, 89 and 97.

Question: 3

What is the smallest prime number? Is it an even number?

Solution:

The number 2 is the smallest prime number.

It is an even prime number. Except 2, all other even numbers are composite numbers.

Question: 4

What is the smallest odd prime? Is every odd number a prime number? If not, give an example of an odd number which is not prime.

If yes, write the smallest odd composite number.

Solution:

The smallest odd prime number is 3.

No, every odd number is not a prime number. For example, 9 is an odd number but it is not a prime number because its three factors are 1, 3 and 9.

Question: 5

What are composite numbers? Can a composite number be odd?

Solution:

A number which has more than two factors is called a composite number.

For example, the numbers 4, 6, 8, 9 10 and 15 are composite numbers.

Yes, a composite number can be an odd number. The smallest odd number is 9.

Question: 6

What are twin-primes? Write all pairs of twin-primes between 50 and 100.

Solution:

Twin primes: Two prime numbers are said to be twin primes if there is only one composite number between them.

For example, (3, 5) and (5, 7) are twin primes.

Twin primes between 50 and 100 are (59, 61) and (71, 73).

Question: 7

What are co-primes? Give examples of five pairs of co-primes. Are co-primes always prime?

Solution:

Two numbers are said to be co-primes if they do not have any common factors other than 1.

For example, (2, 3), (3, 4), (4, 5), (5, 7) and (13, 17) are co-primes.

Two co-primes numbers need not be both prime numbers.

e.g., (3, 4), (6, 7) and (4, 13).

Question: 8

Which of the following pairs are always co-primes?

Solution:

(i) Two prime numbers

Two prime numbers are always co-primes to each other.

Example: 7 and 11 are co-primes to each other.

(ii) One prime and one composite number

One prime and one composite number are not always co-prime

Example: 3 and 21 are not co-primes to each other.

(iii) Two composite numbers

Two composite numbers are not always co-primes to each other.

Example: 4 and 6 are not co-primes to each other.

Question: 9

Express each of the following numbers as a sum of two or more primes:

Solution:

We can write the given numbers as the sums of the two or more primes as follows:

(i) 13 = 11 + 2

(ii) 130= 59 + 71

(iii) 180 = 139 + 17 + 11 + 13 or 79 + 101

Question: 10

Express each of the following numbers as the sum of two odd primes:

Solution:

We can express the given numbers as the sums of two odd primes as follows:

(i) 36 = 7 + 29 or 17 + 19

(ii) 42 = 5 + 37 or 13 + 29

(iii) 84 = 17 + 67 or 23 + 61

Question: 11

Express each of the following numbers as the sum of three odd prime numbers:

Solution:

We can express the given numbers as the sums of three odd prime numbers as follows:

(i) 31 = 5 + 7+ 9 + 13 or 31 = 11 + 13 + 7

(ii) 35 = 5 + 7 + 23 or 35 = 17 +13 + 5

(iii) 49 = 3 + 5 + 41 or 49 = 7 +11 +31

Question: 12

Express each of the following numbers as the sum of twin primes:

Solution:

We can express the given numbers as the sums of twin primes which are as follows:

(i) 36= 17 +19

(ii) 84 = 41 + 41

(iii) 120 = 59 + 61

Question: 13

Find the possible missing twins for the following numbers so that they become twin primes:

Solution:

(i) The possible missing twins for 29 are 27 and 31. Since 31 is a prime and 37 is not, 31 is the missing twin.

(ii) The possible missing twins for 89 are 87 and 91. Since 87 and 91 are not primes, 89 has no twin.

(iii) The possible twins for 101 are 99 and 103. Since 103 is a prime and 99 is not , 103 is the missing twin.

Question: 14.

A list consists of the following pairs of numbers:

Solution:

(i) Co-primes: Two natural numbers are said to be co-primes numbers if they have 1 as their only common factor.

Hence, all the given pairs of numbers are co-primes.

(ii) Primes: Natural numbers which have exactly two distinct factors, i.e., 1 and the number itself are called prime numbers.

Hence, (59, 61) and (71, 73) are pairs of prime numbers.

(iii) Composite numbers: Natural numbers which have more than two factors are called composite numbers.

Hence, (55, 57) and (63, 65) are pairs of composite numbers.

Question: 15.

For a number, greater than 10, o be prime what may be the possible digit in the unit's place?

Solution:

For a number (greater than 10) to be a prime number, the possible digit in the unit's place may be 1, 3, 7 or 9.

Example: 11, 13, 17 and 19 are prime numbers greater than 10.

Question: 16.

Write seven consecutive composite numbers less than 100 so that there is no prime number between them.

Solution:

The required seven consecutive composite numbers are 90, 91, 92, 93, 94, 95 and 96.

Question: 17.

State true (T) and false (F):

(i) The sum of primes cannot be a prime.

(ii) The product of primes cannot be a prime.

(iii) An even number is composite

(iv) Two consecutive numbers cannot be a prime.

(v) Odd numbers cannot be composite.

(vi) Odd numbers cannot be written as sum of primes.

(vii) A number and its successor are always co-primes.

Solution:

(i) False.

2 + 3 = 5 which is a prime number.

(ii) True.

The product of prime number is always a composite number.

(iii) False

The even number 2 is not a composite number.

(iv) False

2 and 3 are consecutive and are also prime numbers.

(v) False.

9 is an odd number but it is composite numbers as its factor are 1, 3 and 9.

(vi) False

9 is an odd number: 9 = 7 +2 where 7 and 2 are prime numbers.

(vii) True

A number and its successor have only one common factor (i.e., 1).

Question: 18.

Fill in the Blank:

Solution:

(i) A number having only two factors is called a prime number.

(ii) A number having more than two factors is called a composite number.

(iii) 1 is neither composite nor prime.

(iv) The smallest prime number is 2.

(v) The smallest composite number is 4.

Exercise 2.4

Question: 1

In which of the following expressions, prime factorization has been done?

Solution:

(i) 24 = 2 x 3 x 4 is not a prime factorization as 4 is not a prime number.

(ii) 56 = 1 x 7 x 2 x2 x 2 is not a prime factorization as 1 is not a prime number.

(iii) 70 = 2 x 5 x 7 is a prime factorization as 2, 5, and 7 are prime numbers.

(iv) 54 = 2 x 3 x 9 is not a prime factorization as 9 is not a prime number.

Question: 2

Determine prime factorization of each of the following numbers:

Solution:

(i) 216

We have:

2	216
2	108
2	54
3	27
3	9
3	3
	1

Therefore, Prime factorization of 216 = 2 x 2 x 2 x 3 x 3

(ii) 420

We have:

2	420
2	210

3	105
5	35
7	7
	1

Therefore, Prime factorization of 420 = 2 x 2 x 3 x 5 x 7

(iii) 468

We have:

2	468
2	234
3	117
3	39
13	13
	1

Therefore, Prime factorization of 468 = 2 x 2 x 3 x 3 x 13

(iv) 945

We have:

3	945
3	315
3	105
5	35
7	7
	1

Therefore, Prime factorization of 945 = 3 x 3 x 3 x 5 x 7

(v) 7325

We have:

5	7325
5	1465

293	293
	1

Therefore, Prime factorization of 732 5= 5 x 5 x 293

(vi) 13915

We have:

5	13915
11	2783
11	253
23	23
	1

Therefore, Prime factorization of 13915 = 5 x 11 x 11 x 23

Question: 3

Write the smallest 4-digit number and express it as a product of primes.

Solution:

The smallest 4-digit number is 1000.

1000 = 2 x 500

= 2 × 2 × 250

= 2 × 2 × 2 × 125

= 2 × 2 × 2 × 5 × 25

= 2 × 2 × 2 × 5 × 5 × 5

Therefore, 1000 = 2 × 2 × 2 × 5 × 5 × 5

Question: 4

Write the largest 4-digit number and express it as product of primes.

Solution:

The largest 4-digit number is 9999.

We have:

3	9999

3	3333
11	1111
101	101
	1

Hence, the largest 4-digit number 9999 can be expressed in the form of its prime factors as 3 x 3 x 11 x 101.

Question: 5

Find the prime factors of 1729. Arrange the factors in ascending order, and find the relation between two consecutive prime factors.

Solution:

The given number is 1729.

We have:

7	1729
13	247
19	19

Thus, the number 1729 can be expressed in the form of its prime factors ass 7 x 13 x19.

Relation between its two consecutive prime factors:

The consecutive prime factors of the given number are 7, 13 and 19.

Clearly, 13 – 7 = 6 and 19 – 13 =6

Here, in two consecutive prime factors, the latter is 6 more than the previous one.

Question: 6

Which factors are not included in the prime factorization of a composite number?

Solution:

1 and the number itself are not included in the prime factorization of a composite number.

Example: 4 is a composite number.

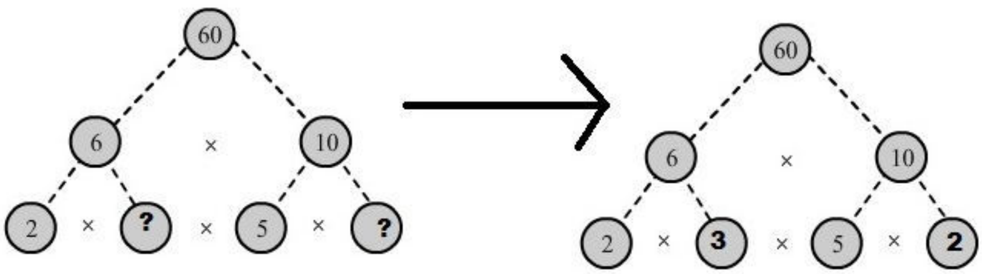
Prime factorization of 4 = 2 x 2.

Question: 7

Here are two different factor trees for 60. Write the missing numbers:

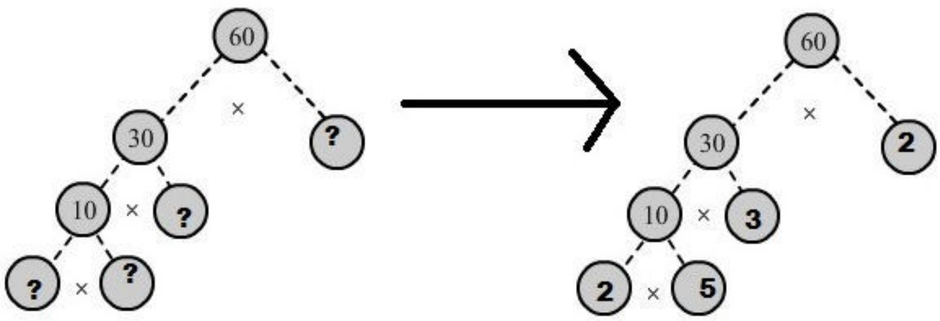
Solution:

(i) Since 6 = 2 x 3 and 10= 5 x 2. We have:



(ii) Since 60 = 30 x 2.

30= 10 x 3 and 10 = 5 x 2 we have:



Exercise 2.5

Question: 1

Test the divisibility of the following numbers by 2:

Solution:

Rule: A natural number is divisible by 2 if its unit digit is 0, 2, 4, 6 or 8.

(i) 6250

Here, the unit's digit = 0

Thus, the given number is divisible by 2.

(ii) 984325

Here, the unit's digit = 5

Thus, the given number is not divisible by 2.

(iii) 367314

Here, the unit's digit = 4

Thus, the given number is divisible by 2.

Question: 2

Test the divisibility of the following numbers by 3:

Solution:

Rule: A number is divisible by 3 if the sum of its digits is divisible by 3.

(i) 70335

Here, the sum of the digits in the given number = 7 + 0 + 3 + 3 + 5 = 18 which is divisible by 3.

Thus, 70,335 is divisible by 3.

(ii) 607439

Here, the sum of the digits in the given number = 6 + 0 + 7 + 4 + 3 + 9 = 29 which is not divisible by 3.

Thus, 6, 07,439 is not divisible by 3.

(iii) 9082746

Here, the sum of the digits in the given number = 9 + 0 + 8 + 2 + 7 + 4 + 6 = 36 which is divisible by 3.

Thus, 90, 82,746 is divisible by 3.

Question: 3

Test the divisibility of the following numbers by 6:

Solution:

Rule: A number is divisible by 6 if it is divisible by 2 as well as 3.

(i) 7020

Here, the units digit = 0

Thus, the given number is divisible by 2.

Also, the sum of the digits = 7 + 0 + 2 + 0 = 9 which is divisible by 3. So, the given number is divisible by 3. Hence, 7,020 is divisible by 6.

(ii) 56423

Here, the units digit = 3 Thus, the given number is not divisible by 2.

Also, the sum of the digits = 5 + 6 + 4 + 2 + 3 = 20 which is not divisible by 3.

So, the given number is not divisible by 3. Since 3,56,423 is neither divisible by 2 nor by 3, it is not divisible by 6.

(iii) 732510

Here, the units digit = 0

Thus, the given number is divisible by 2.

Also, the sum of the digits = 7 + 3 + 2 + 5 + 1 + 0 = 18 which is divisible by 3. So, the given number is divisible by 3.

Hence, 7,32,510 is divisible by 6.

Question: 4

Test the divisibility of the following numbers by 4:

Solution:

Rule: A natural number is divisible by 4 if the number formed by its last two digits is divisible by 4.

(i) 786532

Here, the number formed by the last two digits is 32 which is divisible by 4. Thus, 7,86,532 is divisible by 4.

(ii) 1020531

Here, the number formed by the last two digits is 31 which is not divisible by 4. Thus, 10,20,531 is not divisible by 4.

(iii) 9801523

Here, the number formed by the last two digits is 23 which is not divisible by 4. Thus, 98,01,523 is not divisible by 4.

Question: 5

Test the divisibility of the following numbers by 8:

Solution:

Rule: A number is divisible by 8 if the number formed by its last three digits is divisible by 8.

(i) The given number = 8364

The number formed by its last three digits is 364 which is not divisible by 8. Therefore, 8,364 is not divisible by 8.

(ii) The given number = 7314

The number formed by its last three digits is 314 which is not divisible by 8. Therefore, 7,314 is not divisible by 8.

(iii) The given number = 36712

Since the number formed by its last three digit = 712 which is divisible by 8. Therefore, 36,712 is divisible by 8.

Question: 6

Test the divisibility of the following numbers by 9:

Solution:

Rule: A number is divisible by 9 if the sum of its digits is divisible by 9.

(i) The given number = 187245

The sum of the digits in the given number = 1 + 8 + 7 + 2 + 4 + 5 = 27 which is divisible by 9. Therefore, 1,87,245 is divisible by 9.

(ii) The given number = 3478

The sum of the digits in the given number = 3 + 4 + 7 + 8 = 22 which is not divisible by 9. Therefore, 3,478 is not divisible by 9.

(iii) The given number = 547218

The sum of the digits in the given number = 5 + 4 + 7 + 2 + 1 + 8 = 27 which is divisible by 9. Therefore, 5,47,218 is divisible by 9.

Question: 7

Test the divisibility of the following numbers by 11:

Solution:

(i) The given number is 5,335.

The sum of the digit at the odd places = 5 + 3 = 8

The sum of the digits at the even places = 3 + 5 = 8

Their difference = 8 – 8 = 0

Therefore, 5,335 is divisible by 11.

(ii) The given number is 7,01,69,803.

The sum of the digit at the odd places = 7 + 1 + 9 + 0 = 17

The sum of the digits at the even places = 0 + 6 + 8 + 3 = 17

Their difference = 17 – 17 = 0

Therefore, 7,01,69,803 is divisible by 11.

(iii) The given number is 1,00,00,001.

The sum of the digit at the odd places = 1 + 0 + 0 + 0 = 1

The sum of the digits at the even places = 0 + 0 + 0 + 1 = 1

Their difference = 1 – 1 = 0

Therefore, 1,00,00,001 is divisible by 11.

Question: 8

In each of the following numbers, replace * by the smallest number to make it divisible by 3:

Solution:

We can replace the * by the smallest number to make the given numbers divisible by 3 as follows:

(i) 75*5

75*5 = 7515

As 7 + 5 + 1 + 5 = 18, it is divisible by 3.

(ii) 35*64

35*64 = 35064

As 3 + 5 +6 + 4 = 18, it is divisible by 3.

(iii) 18 * 71

18 * 71= 18171

As 1 + 8 + 1 + 7 + 1 = 18, it is divisible by 3.

Question: 9

In each of the following numbers, replace * by the smallest number to make it divisible by 9:

Solution:

(i) 67 *19

Sum of the given digits = 6 + 7 + 1 + 9 = 23

The multiple of 9 which is greater than 23 is 27.

Therefore, the smallest required number = 27 – 23 = 4

(ii) 66784 *

Sum of the given digits = 6 + 6 + 7 + 8 + 4 = 31

The multiple of 9 which is greater than 31 is 36.

Therefore, the smallest required number = 36 – 31 = 5

(iii) 538 * 8

Sum of the given digits = 5 + 3 + 8 + 8 = 24

The multiple of 9 which is greater than 24 is 27.

Therefore, the smallest required number = 27 – 24 = 3

Question: 10

In each of the following numbers, replace * by the smallest number to make it divisible by 11:

Solution:

Rule: A number is divisible by 11 if the difference of the sums of the alternate digits is either 0 or a multiple of 11.

(i) 86 x 72

Sum of the digits at the odd places = 8 + missing number + 2 = missing number + 10

Sum of the digits at the even places = 6 + 7 = 13

Difference = [missing number + 10] – 13 = Missing number – 3

According to the rule, missing number – 3 = 0 [Because the missing number is a single digit]

Thus, missing number = 3

Hence, the smallest required number is 3.

(ii) 467 x 91

Sum of the digits at the odd places = 4 + 7 + 9 = 20

Sum of the digits at the even places = 6 + missing number + 1 = missing number + 7 Difference = 20 – [missing number + 7] = 13 – missing number

According to rule, 13 – missing number = 11 [Because the missing number is a single digit]

Thus, missing number = 2

Hence, the smallest required number is 2.

(iii) 9 x 8071

Sum of the digits at the odd places = 9 + 8 + 7 = 24

Sum of the digits at the even places = missing number + 0 + 1 = missing number + 1

Difference = 24 – [missing number + 1] = 23 – missing number

According to rule, 23 – missing number = 22 [Because 22 is a multiple of 11 and the missing number is a single digit]

Thus, missing number = 1

Hence, the smallest required number is 1.

Question: 11

Given an example of a number which is divisible by

Solution:

(i) A number which is divisible by 2 but not by 4 is 6.

(ii) A number which is divisible by 3 but not by 6 is 9.

(iii) A number which is divisible by 4 but not by 8 is 28.

(iv) A number which is divisible by 4 and 8 but not by 32 is 48.

Question: 12

Which of the following statement are true?

Solution:

(i) If a number is divisible by 3, it must be divisible by 9.

False. 12 is divisible by 3 but not by 9.

(ii) If a number is divisible by 9, it must be divisible by 3.

True.

(iii) If a number is divisible by 4, it must be divisible by 8.

False. 20 is divisible by 4 but not by 8.

(iv) If a number is divisible by 8, it must be divisible by 4.

True.

(v) A number is divisible by 18, it is divisible by both 3and 6.

False. 12 is divisible by both 3 and 6 but it is not divisible by 18.

(vi) If a number is divisible by both 9 and 10, it must be divisible by 90

True.

(vii) If a number exactly divides three numbers the sum of two numbers, it must exactly divide the numbers separately.

False. 10 divides the sum of 18 and 2 (i.e., 20) but 10 divides neither 18 nor 2.

(viii) If a number divides three numbers exactly, it must divide their sums exactly.

True.

(ix) If two numbers are co-prime, at least one of them must be a co-prime number.

False. 4 and 9 are co-primes and both are composite numbers.

(x) The sum of two consecutive odd numbers is always divisible by 4

True.

Exercise 2.6

Question: 1

Find the H.C. F of the following numbers using prime factors using prime factorization method:

Solution:

(i) 144 and 198

Prime factorization of 144 = 2 × 2 × 2 × 3 × 3

Prime factorization of 198 = 2 × 3 × 3 ×11

Therefore, HCF = 2 × 2 × 3 = 18

(ii) 81 and 117

Prime factorization of 81 = 3 × 3 × 3 × 3

Prime factorization of 117 = 3 × 3 ×13

Therefore, HCF = 3 × 3 = 9

(iii) 84 and 98

Prime factorization of 84 = 2 × 2 × 3 × 7

Prime factorization of 98 = 2 × 7 × 7

Therefore, HCF = 2 × 7 = 14

(iv) 225 and 450

Prime factorization of 225 = 3 × 3 × 5 × 5

Prime factorization of 198 = 2 × 3 × 3 × 5 × 5

Therefore, HCF = 3 × 3 × 5 × 5 = 225

(v) 170 and 238

Prime factorization of 170 = 2 × 5 × 17

Prime factorization of 238 = 2 × 7 × 17

Therefore, HCF = 2 × 17 = 34

(vi) 504 and 980

Prime factorization of 504 = 2 × 2 × 2 × 3 × 3 × 7

Prime factorization of 980 = 2 × 2 × 5 × 7 × 7

Therefore, HCF = 2 × 2 × 7 = 28

(vii) 150, 140 and 210

Prime factorization of 150 = 2 × 3 × 5 × 5

Prime factorization of 140 = 2 × 2 × 5 × 7

Prime factorization of 210 = 2 × 3 × 5 × 7

Therefore, HCF = 2 × 5 = 10

(viii) 84, 120 and 138

Prime factorization of 84 = 2 × 2 × 3 × 7

Prime factorization of 120 = 2 × 2 × 2 × 3 × 5

Prime factorization of 138 = 2 × 3 × 23

Therefore, HCF = 2 × 3 = 6

(i×) 106, 159 and 265

Prime factorization of 106 = 2 × 53

Prime factorization of 159 = 2 × 53

Prime factorization of 265 = 5 × 53

Therefore, HCF = 53

Question: 2

What is the H.C.F of two consecutive?

Solution:

(i) The common factor of two consecutive numbers is always 1.

Therefore, HCF of two consecutive numbers = 1

(ii) The common factors of two consecutive even numbers are 1 and 2.

Therefore, HCF of two consecutive even numbers = 2

(iii) The common factor of two consecutive odd numbers is 1.

Therefore, HCF of two consecutive odd numbers = 1

Question: 3

H.C.F of co-primes numbers 4 and 15 was found as follows:

$4 = 2 \times 2$ and $15 = 3 \times 5$

Since there is no common prime factor. So, H.C.F of 4 and 15 is 0. Is the answer correct? If not what is the correct H.C.F?

Solution:

No, it is not correct.

We know that HCF of two co-prime number is 1.

4 and 15 are co-prime numbers because the only factor common to them is 1.

Thus, HCF of 4 and 15 is 1.

Exercise 2.7

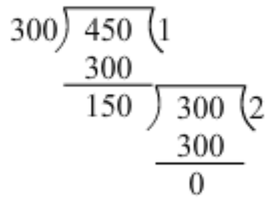
Question: 1

Determine the H.C.F of the following numbers by using Euclid’s algorithm (I – x):

Solution:

(i) 300 and 450

Dividend = 450 and divisor = 300

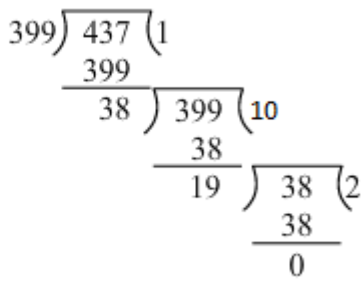


Clearly, the last divisor is 150.

Hence, HCF of the given number is 150.

(ii) 399 and 437

We have dividend = 399 and divisor= 437

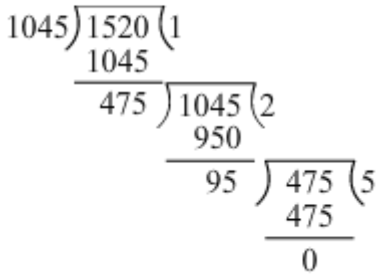


Clearly, the last divisor is 19.

Hence, HCF of the given number is 19

(iii) 1045 and 1520

We have dividend = 1045 and divisor = 1520



Clearly, the last divisor is 95.

Hence, HCF of given numbers is 95.

Question: 2

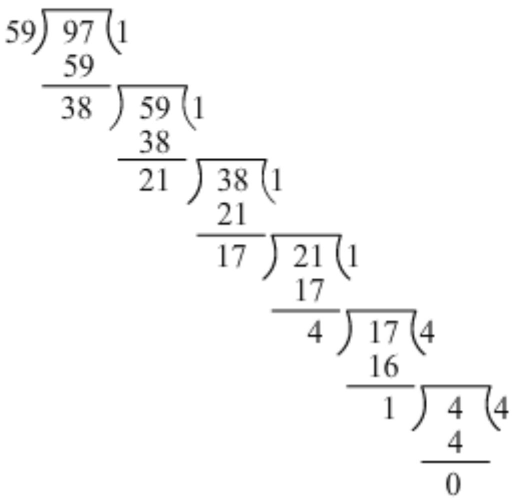
Show that the following pairs are co-prime:

Solution:

We know that two numbers are co-primes if their HCF is 1.

(i) 59 and 97

Here, dividend = 97 and divisor = 59

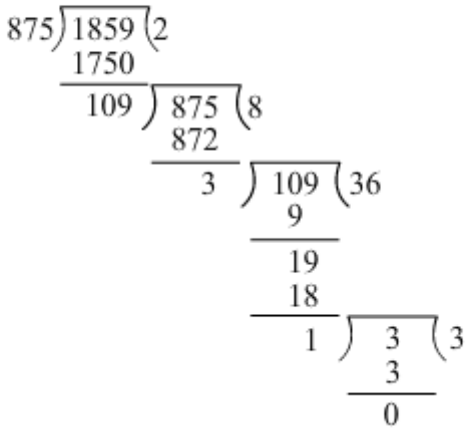


Clearly, the last divisor is 1.

Hence, the given numbers are co-primes.

(ii) 875 and 1859

Here, dividend = 1859 and divisor = 875

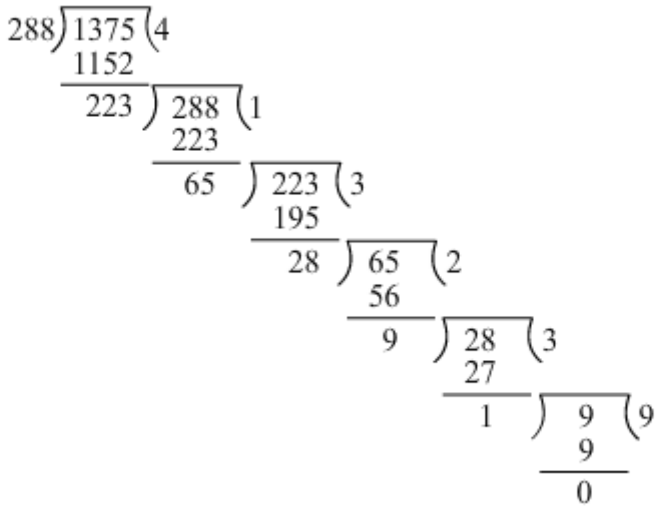


Clearly, the last divisor is 1.

Hence, the given numbers are co-prime.

(iii) 288 and 1375

Here, dividend = 288 and divisor = 1375



Clearly, the last divisor is 1.

Hence, the given numbers are co-prime.

Question: 3

What is the H.C.F of two consecutive numbers?

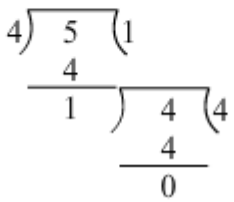
Solution:

The HCF of two consecutive numbers is 1.

Example:

D = 4 and d= 5 are two consecutive numbers.

Here, we have dividend = 5 and divisor = 4



Clearly, the last divisor is 1.

Hence, HCF of 4 and 5 is 1.

Question: 4

Write true (T) or false (F) for each of the following statements:

Solution:

(i) The H.CF of two distinct prime numbers is 1

True.

(ii) The H.CF of two co-prime number is 1.

True.

(iii) The H.CF of an even and an odd number is 1.

False. HCF of 6 and 9 is 3 not 1.

(iv) The H.C.F of two consecutive even numbers is 2.

True.

(v) The H.C.F of two consecutive odd numbers is 2.

False.

HCF of two consecutive odd numbers is 1.

Example: HCF of 25 and 27 is 1.

Exercise 2.8

Question: 1

Find the largest number which divides 615 and 963 leaving remainder 6 in each case.

Solution:

We have to find the largest number which divides (615 – 6) and (963 – 6) exactly.

Therefore, the required number = HCF of 609 and 957

Resolving 609 and 957 into prime factors, we have:

$609 = 3 \times 7 \times 29$

$957 = 3 \times 11 \times 29$

Therefore, HCF of 609 and 957 = $29 \times 3 = 87$

Hence, the required largest number is 87.

Question: 2

Find the largest number that divides 285 and 1249 leaving remainders 9 and 7 respectively.

Solution:

We have to find the greatest number which divides (285 – 9) and (1,249 – 7) exactly.

The required number will be given by the HCF of 276 and 1242.

Resolving 276 and 1242 into prime factors, we have:

$276 = 2 \times 2 \times 3 \times 23$

$1242 = 2 \times 3 \times 3 \times 3 \times 23$

HCF of 276 and 1242 is $2 \times 3 \times 23 = 138$.

Question: 3

What is the largest number that divides 626, 3127 and 15628 leaving remainders 1, 2 and 3 respectively.

Solution:

We have to find the largest number which divides (626 – 1), (3,127 – 2), and (15,628 – 3) exactly.

The required number will be given by the HCF of 625, 3,125 and 15,625.

Resolving 625, 3125, and 15625 into prime factors, we have:

625 = 5 × 5 × 5 × 5 3,

125 = 5 × 5 × 5 × 5 × 5 15,

625 = 5 × 5 × 5 × 5 × 5 × 5

Therefore, HCF of 625, 3125 and 15625 = 5 × 5 × 5 × 5 = 625 Hence, the required largest number is 625.

Question: 4

The length, breadth and height of the room are 8cm 25cm, 6m 75 cm and 4m 50 cm, respectively. Determine the longest rod which can measure the three dimensions of the room exactly.

Solution:

Given:

Length of the room = 8 m 25 cm = 825 cm

Breadth of the room = 6 m 75 cm = 675 cm

Height of the room = 4 m 50 cm = 450 cm

The longest rod will be given by the HCF of 825, 675 and 450.

Prime factorization of 825 = 3 × 5 × 5 × 11

Prime factorization of 675 = 3 × 3 × 3 × 5 × 5

Prime factorization of 450 = 2 × 3 × 3 × 5 × 5 Therefore, HCF of 825, 675 and 450 = 3 × 5 × 5 = 75

Thus, the required length of the longest rod is 75 cm.

Question: 5

A rectangular courtyard is 20 m 16 cm long and 15m 60 cm broad. It is to be paved with square roots of the same size. Find the least possible number of such stones.

Solution:

Length of the rectangular courtyard = 20 m 16 cm = 2,016 cm

Breadth of the rectangular courtyard = 15 m 60 cm = 1,560 cm

Least possible side of the square stones used to pave the rectangular courtyard = HCF of (2,016 and 1,560)

Prime factorization of 2,016 = 2 × 2 × 2 × 2 × 2 × 3 × 3 × 7

Prime factorization of 1,560 = 2 × 2 × 2 × 3 × 5 × 13 HCF of (2,016, 1,560) = 2 × 2 × 2 × 3 = 24

Least possible side of square stones used to pave the rectangular courtyard is 24 cm. Number of square stones used to pave the rectangular courtyard

= Area of rectangular courtyard Area of square stone = 2016 cm × 1560 cm (24 cm) 2 = 5460 Thus, the least number of square stones used to pave the rectangular courtyard is 5,460.

Question: 6

Determine the longest tape which can be used to measure exactly the lengths 7m, 3m 85 cm and 12 m 95 cm?

Solution:

Given: Length of the first tape = 7 m = 700 cm

Length of the second tape = 3 m 85 cm = 385 cm

Length of the third tape = 12 m 95 cm = 1,295 cm

The length of the longest tape will be the HCF of 700, 385, and 1,295.

Prime factorization of 700 = 2 × 2 × 5 × 5 × 7

Prime factorization of 385 = 5 × 7 × 11

Prime factorization of 1,295 = 5 × 7 × 37 I-ICF of 700, 385, and 1,295 = 5 × 7 = 35

Required length of the longest tape = 35 cm

Question: 7

105 goats, 140 donkeys and 175 cows have to b taken across a river .Three is only one boat which will have to make many trips in order to do so .The lazy boatman has his own conditions for transporting them. He insists that he will take the same number of animals in every trip and they have to be of the same kind .He will naturally like to take the largest possible number each time. Can you tell how many animals went in each trip?

Solution:

We have to find the largest possible number of animals. Thus, we will have to find the HCF of 105, 140, and 175.

Prime factorization of 105 = 3 × 5 × 7

Prime factorization of 140 = 2 × 2 × 5 × 7

Prime factorization of 175 = 5 × 5 × 7

Required HCF = 5 × 7 = 35 Hence, 35 animals went in each trip.

Question: 8

Two brands of chocolates are available in packs of 24 and 15 respectively. If in need to but an equal number of chocolates of both kinds, what is the least number of boxes of each kind I would need to buy?

Solution:

Let the brand ‘A’ contain 24 chocolates in one packet and brand ‘B’ contain 14 chocolates in one packet.

Equal number of chocolates of each kind can be found out by taking LCM of the number of chocolates in each packet.

Therefore, LCM of 15 and 24 is:

2	15,24
2	15,12
2	15,6
3	15,3
5	5,1
	1,1

Required LCM = 2 × 2 × 2 × 3 × 5 = 120

Therefore, minimum 12o chocolates of each kind should be purchased.

Number of boxes of brand ‘A’ which needs to be purchased = 120 ÷ 24 = 5

Number of boxes of brand ‘B’ which needs to be purchased = 120 ÷ 15 = 8

Question: 9

During a sale, colour pencils were being sold in packs of 24 each and crayons in packs of 32 each. If you want full packs of both and the same number of pencils and crayons, how many of each would need to buy?

Solution:

To find the required number of pencils and crayons, we need to find the LCM of 24 and 32.

Prime factorization of 24 = 2 × 2 × 2 × 3

Prime factorization of 32 = 2 × 2 × 2 × 2 × 2

Required LCM of 24 and 32 = 2 × 2 × 2 × 2 × 2 × 3 = 96

Thus, number of pencils and crayons needed to be bought is 96 each, i.e. 96•24 = 4 packs of color

pencils and 96 ÷ 32 = 3 packs of crayons.

Question: 10

Reduce each of the following fractions to the lowest terms:

Solution:

(i) 161/207

For reducing the given fraction to the lowest terms, we have to divide its numerator and denominator by their HCF.

Now, we have to find the HCF of 161 and 207.

Prime factorization of 161 = 7 × 23

Prime factorization of 207 = 3 × 3 × 23

Therefore, HCF of 161 and 207 = 23

Now, 161+23207+ 23 = 79

Hence, 79 is the required fraction.

(ii) 296/491<

For reducing the given fraction to the lowest terms, we have to divide its numerator and denominator by their HCF.

Now, we have to find the HCF of 296 and 481.

Prime factorization of 296 = 2 × 2 × 2 × 37

Prime factorization of 481 = 13 × 37

Therefore, HCF of 296 and 481 = 37

Now, 296 + 37481 + 37 = 813

Hence, 813 is the required fraction.

Question: 11

A merchant has 120 liters of oil of one kind, 180 liters of another kind and 340 liters of third kind. He wants to sell the oil by filling the three kinds of oil in tins of equal capacity. What should be the greatest capacity of such a tin?

Solution:

The maximum capacity of the required tin is the HCF of the three quantities of oil.

Prime factorization of 120 = 2 × 2 × 2 × 3 × 5

Prime factorization of 180 = 2 × 2 × 3 × 3 × 5

Prime factorization of 240 =2 × 2 × 2 × 2 × 3 × 5

Therefore, HCF of 120, 180, and 240 = 2 × 2 × 3 × 5 = 60

Hence, the required greatest capacity of the tin must be 60 liters.

Exercise 2.9

Question: 1

Determine the L.C.M of the numbers given below:

Solution:

(i) 48, 60

Prime factorization of 48 = 2 × 2 × 2 × 2 × 3

Prime factorization of 60 = 2 × 2 × 3 × 5

Therefore, Required LCM = 2 × 2 × 2 × 2 × 3 × 5 = 240

(ii) 42, 63

Prime factorization of 42 = 2 × 3 × 7

Prime factorization of 63 = 3 × 3 × 7

Therefore, Required LCM = 2 × 3 × 3 × 7 = 126

(iii) 18, 17

Prime factorization of 18 = 2 × 3 × 3

Prime factorization of 17 = 17

Therefore, Required LCM = 2 × 3 × 3 × 17 = 306

(iv) 15, 30, 90

Prime factorization of 15 = 3 × 5

Prime factorization of 30 = 2 × 3 × 5

Prime factorization of 90 = 2 × 3 × 3 × 5

Therefore, Required LCM = 2 × 3 × 3 × 5 = 90

(v) 56, 65, 85

Prime factorization of 56 = 2 × 2 × 2 × 7

Prime factorization of 65 = 5 × 13

Prime factorization of 85 = 5 × 17

Therefore, Required LCM = 2 × 2 × 2 × 5 × 7 × 13 × 17 = 61,880

(vi) 180, 384, 144

Prime factorization of 180 = 2 × 2 × 3 × 3 × 5

Prime factorization of 384 = 2 × 2 × 2 × 2 × 2 × 2 × 2 × 3

Prime factorization of 144 = 2 × 2 × 2 × 2 × 3 × 3

Therefore,

Therefore, Required LCM = 2 × 2 × 2 × 2 × 2 × 2 × 2 × 3 × 3 × 5 = 5,760

(vii) 108, 135, 162

Prime factorization of 108 = 2 × 2 × 3 × 3 × 3

Prime factorization of 135 = 3 × 3 × 3 × 5

Prime factorization of 162 = 2 × 3 × 3 × 3 × 3

Therefore, Required LCM = 2 × 2 × 3 × 3 × 3 × 3 × 5 = 1,620

(viii) 28, 36, 45, 60

Prime factorization of 28 = 2 × 2 × 7

Prime factorization of 36 = 2 × 2 × 3 × 3

Prime factorization of 45 = 3 × 3 × 5

Prime factorization of 60 = 2 × 2 × 3 × 5

Therefore, Required LCM =2 × 2 × 3 × 3 × 5 × 7= 1,260

Exercise 2.10

Question: 1

What is the smallest number which when divided by 24, 36 and 54 gives a remainder of 5 each time?

Solution:

We have to find prime factorization of 24, 36, and 54.

Prime factorization of 24 = 2 × 2 × 2 × 3

Prime factorization of 36 = 2 × 2 × 3 × 3

Prime factorization of 54 = 2 × 3 × 3 × 3

Therefore, Required LCM = 2 × 2 × 2 × 3 × 3 × 3 = 216

Thus, 216 is the smallest number exactly divisible by 24, 36, and 54.

To get the remainder as 5:

Smallest number = 216 + 5 = 221

Thus, the required number is 221.

Question: 2

What is the smallest number that both 33 and 39divide leaving remainders of 5?

Solution:

We have to find prime factorization of 33 and 39.

Prime factorization of 33 = 3 × 11

Prime factorization of 39 = 3 × 13

Therefore, Required LCM = 3 × 11 × 13 = 429

Thus, 429 is the smallest number exactly divisible by 33 and 39.

To get the remainder as 5: Smallest number = 429 + 5 = 434

Thus, the required number is 434.

Question: 3

Find the least number that is divisible ny all the numbers between 1 and 10 (both inclusive)

Solution:

To find the required least number, we have to find the LCM of the numbers from 1 to 10. We know that 2, 3, 5, and 7 are prime number.

Prime factorization of 4 = 2 × 2

Prime factorization of 6 = 2 × 3

Prime factorization of 8 = 2 × 2 × 2

Prime factorization of 9 = 3 × 3

Prime factorization of 10 = 2 × 5

Therefore, Required least number = 2 × 2 × 2 × 3 × 3 × 5 × 7 = 2,520

Question: 4

What is the smallest number that, when divided by 35, 56 and 91 leaves remainder of 7 in each case?

Solution:

We have to find the prime factorization of 35, 56, and 91.

Prime factorization of 35 = 5 × 7

Prime factorization of 56 = 2 × 2 × 2 × 7

Prime factorization of 91 = 7 × 13

Therefore, Required LCM = 2 × 2 × 2 × 5 × 7 × 13 = 3,640

Thus, 3,640 is the smallest number exactly divisible by 35, 56, and 91.

To get the remainder as 7:

Smallest number = 3,640 + 7 = 3,647

Thus, the required number is 3,647.

Question: 5

In school there are two sections- section A and section B of class VI. There are 32 students in section- A and 36 in section B. determine the minimum number of books required for their class library so that they can be distributed equally among students of section A and section B

Solution:

We have to find the LCM of 32 and 36.

Prime factorization of 32 = 2 × 2 × 2 × 2 × 2

Prime factorization of 36 = 2 × 2 × 3 × 3

Required LCM = 2 × 2 × 2 × 2 × 2 × 3 × 3 =288

Therefore, Minimum number of books required = LCM of 32 and 36 = 288 books

Question: 6

In a morning walk three persons step off together. Their steps measure 80 cm. 85 cm and 90 cm respectively. What is the minimum distance each should walk so that he can cover the distance in complete steps?

Solution:

We have to find the LCM of 80 cm, 85 cm, and 90 cm.

Prime factorization of 80 = 2 × 2 × 2 × 2 × 5

Prime factorization of 85 = 5 × 17

Prime factorization of 90 = 2 × 3 × 3 × 5

Therefore, Required LCM=2 × 2 × 2 × 2 × 3 × 3 × 5 × 17 = 12,240

Therefore, Required minimum distance = LCM of 80 cm, 85 cm, and 90 cm

= 12,240 cm

= 122 m 40 cm (since 1 m =100 cm)

Question: 7

Determine the number nearest to 10000 but greater than 10000 which is exactly divisible by each of 8, 15 and 21.

Solution:

First, we have to find the L.C.M of 8, 15 and 21.

Prime factorization of 8 = 2 × 2 × 2

Prime factorization of 15 = 3 × 5

Prime factorization of 21 = 3 × 7

Therefore, required LCM= 2 × 2 × 2 × 3 × 5 × 7 = 840

The number nearest to 1, 00,000 and exactly divisible by each 8, 15 and 21 should also be divisible by their LCM (i.e. 840)

We have to divide 1, 00,000 by 840.

$$
\begin{array}{r|l}
840 & 100000 \ (119 \\
 & \underline{840} \\
 & 1600 \\
 & \underline{840} \\
 & 7600 \\
 & \underline{7560} \\
 & 40
\end{array}
$$

Remainder = 40

Therefore, Number greater than 1,00,000 and exactly divisible by 840 = 1,00,000 + (840 – 40) = 1,00,000 + 800 = 1,00,800

Therefore, Required number = 1, 00, 800.

Question: 8

A school bus picking up children in a colony of flats stops at every sixth block of flats. Another school bus starting from the same place stops at every eight blocks of flats. Which is the first bus stop at which both of them will stop?

Solution:

First bus stop at which both the buses will stop together = LCM of 6th block and 8th block

Prime factorization of 6 = 2 × 3

Prime factorization of 8 = 2 × 2 × 2

Therefore, Required LCM = 2 × 2 × 2 × 3 = 24

Hence, the first bus stop at which both the buses will stop together will be at the 24th block.

Question: 9

Telegraph pole occur at equal distances of 220 m along a road and heaps of stones are put at equal distances of 300 m along the same road. The first heap is at the foot of the first pole. How far from it along the road is the next heap which lies at the foot of a pole?

Solution:

We have to find the LCM of 220 m and 300 m.

Prime factorization of 220 = 2 × 2 × 5 × 11

Prime factorization of 300 = 2 × 2 × 3 × 5 × 5

Therefore, Required LCM = 2 × 2 × 3 × 5 × 5 × 11 = 3,300

Hence, 3,300 m far is the next heap that lies at the foot of a pole.

Question: 10

Find the smallest number which leaves remainders 8 and 12 when divided by 28 and 32 respectively.

Solution:

First, we have to find the LCM of 28 and 32.

Prime factorization of 28 = $2 \times 2 \times 7$

Prime factorization of 32 = $2 \times 2 \times 2 \times 2 \times 2$

Therefore, Required LCM = $2 \times 2 \times 2 \times 2 \times 2 \times 7 = 224$

It is given that when we divide the number by 28, the remainder is 8 and when we divide the number by 32, the remainder is 12.

We observe:

$28 - 8 = 20$

$32 - 12 = 20$

Therefore, Required number = $224 - 20 = 204$

Exercise 2.11

Question: 1

For each of the following pairs of numbers, verify the property:

Product of the number = Product of their H.C.F and L.C.M

Solution:

(i) Given numbers are 25 and 65

Prime factorization of 25 = 5 × 5

Prime factorization of 65 = 5 × 13

HCF of 25 and 65 = 5

LCM of 25 and 65 = 5 × 5 × 13 = 325

Product of the given numbers = 25 × 65 = 1, 625

Product of their HCF and LCM = 5 × 325 = 1, 625

Therefore, Product of the number = Product of their HCF and LCM (Verified)

(ii) Given numbers are 117 and 221.

Prime factorization of 117 = 3 × 3 × 13

Prime factorization of 221 = 13 × 17

HCF of 117 and 221 = 13

LCM of 117 and 221 = 3 × 3 × 13 × 17 = 1, 989

Product of the given number = 117 × 221 = 12, 857

Product of their HCF and LCM = 13 × 1, 989 = 12,857

Therefore, Product of the number = Product of their HCF and LCM (verified)

(iii) Given numbers are 35 and 40.

Prime factorization of 35 = 5 × 7

Prime factorization of 40 = 2 × 2 × 2 × 5

HCF of 35 and 40 = 5

LCM of 35 and 40 = 2 × 2 × 2 × 5 × 7 = 280

Product of the given number = 35 × 40 = 1400

Product of their HCF and LCM = 5 × 280 = 1400

Therefore, Product of the number = Product of their HCF and LCM (Verified)

(iv) Given numbers are 87 and 145.

Prime factorization of 87= 3 × 29

Prime factorization of 145= 5 × 29

HCF of 87 and 145 = 29

LCM of 87 and 145 = 3 × 5 × 29 = 435

Product of the given number = 87 × 145 = 12615

Product of their HCF and LCM = 29 × 435 = 12615

Therefore, Product of the number = Product of their HCF and LCM (Verified)

(v) Given numbers are 490 and 1155.

Prime factorization of 490= 2 × 5 × 7 × 7

Prime factorization of 1155= 3 × 5 × 7 × 11

HCF of 490 and 1155 = 35

LCM of 490 and 1155 = 2 × 3 × 3 × 5 × 7 × 7 × 11 = 16710

Product of the given number = 490 × 1155 = 5, 65,950

Product of their HCF and LCM = 35 × 16, 170 = 5, 65,950

Therefore, Product of the number = Product of their HCF and LCM (Verified)

Question: 2

Find the H.C. F and L.C.M of the following pairs and numbers:

Solution:

(i) 1174 and 221

Prime factorization of 117 = 3 × 3 × 13

Prime factorization of 221 = 13 × 17

Therefore, Required HCF of 117 and 221 = 13

Therefore, Required LCM of 117 and 221 = 3 × 3 × 13 × 17 = 1989

(ii) 234 and 572.

Prime factorization of 234 = 2 × 3 × 3 × 13

Prime factorization of 572 = 2 × 2 × 11 × 13

Therefore, Required HCF of 234 and 572 = 226

Therefore, Required LCM of 117 and 221 = 2 × 2 × 3 × 3 × 11 × 13 = 5148

(iii) 145 and 232

Prime factorization of 145 = 5 × 29

Prime factorization of 232 = 2 × 2 × 2 × 29

Therefore, Required HCF of 145 and 232 = 289

Therefore, Required LCM of 145 and 232 = 2 × 2 × 2 × 5 × 29 = 1160

(v) 861 and 1353

Prime factorization of 861 = 3 × 7 × 41

Prime factorization of 1353 = 3 × 11 × 41

Therefore, Required HCF of 861 and 1353 = 123

Therefore, Required LCM of 861 and 1353 = 3 × 7 × 11 × 41 = 9471

Question: 3

The L.C.M and H.C.F of two numbers are 180 and 6 respectively. If one of the number is 30, find the other number.

Solution:

Given: HCF of two numbers = 6

LCM of two numbers = 180

One of the given number = 30

Product of the two numbers = Product of their HCF and LCM

Therefore, 30 × other number = 6 × 180

Other number = 6 × 18030 = 36

Thus, the required number is 36.

Question: 4

The H.C.F of two numbers is 16, and their product is 3072. Find their L.C.M

Solution:

Given: HCF of two numbers = 16

Product of these two numbers = 3,072

Product of the two numbers = Product of their HCF and LCM

Therefore, 3,072 = 16 × LCM

LCM = 307216 = 192

Thus, the required LCM is 192.

Question: 5

The H.C.F of two numbers is 145, their L.C.M is 2175. If one number is 725, find the other.

Solution:

HCF of two numbers = 145

LCM of two numbers = 2,175

One of the given numbers = 725

Product of the given two numbers = Product of their LCM and HCF

Therefore, 725 × other number = 145 × 2,175

Other number = 145 × 2175725 = 435

Thus, the required number is 435.

Question: 6

Can two numbers have 16 as their HCF and 380 as their L.C.M? Give reasons.

Solution:

No. We know that HCF of the given two numbers must exactly divide their LCM.

But 16 does not divide 380 exactly.

Hence, there can be no two numbers with 16 as their HCF and 380 as their LCM.

Whole Numbers

PAGE NO 3.4:

Question 1:

Write down the smallest natural number.

ANSWER:

The smallest natural number is 1.

PAGE NO 3.4:

Question 2:

Write down the smallest whole number.

ANSWER:

The smallest whole number is 0 (zero).

PAGE NO 3.4:

Question 3:

Write down, if possible, the largest natural number.

ANSWER:

We know that every natural number has a successor. Thus, there is no largest natural number.

PAGE NO 3.4:

Question 4:

Write down, if possible, the largest whole number.

ANSWER:

We know that every whole number has a successor. Thus, there is no largest whole number.

PAGE NO 3.4:

Question 5:

Are all natural numbers also whole numbers?

ANSWER:

Yes, all natural numbers are whole numbers.

PAGE NO 3.4:

Question 6:

Are all whole numbers also natural numbers?

ANSWER:

No, all whole numbers are not natural numbers because 0 is a whole number but not a natural number.

PAGE NO 3.4:

Question 7:

Give successor of each of the whole numbers?

(i) 1000909
(ii) 2340900
(iii) 7039999

ANSWER:

	Given Number	**Successor**
(i)	1,000,909	1,000,909 + 1 = 1,000,910
(ii)	2,340,900	2,340,900 + 1 = 2,340,901
(iii)	7,039,999	7,039,999 + 1 = 7,040,000

PAGE NO 3.4:

Question 8:

Write down the predecessor of each of the following whole numbers:

(i) 10000
(ii) 807000
(iii) 7005000

ANSWER:

	Given Number	Predecessor
(i)	10,000	10,000 - 1 = 9,999
(ii)	807,000	807,000 - 1 = 806,999
(iii)	7,005,000	7,005,000 - 1 = 7,004,999

PAGE NO 3.4:

Question 9:

Represent the following numbers on the number line:

2,0,3,5,7,11,15

ANSWER:

PAGE NO 3.4:

Question 10:

How many whole numbers are there between 21 and 61?

ANSWER:

The whole numbers between 21 and 61 are 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59 and 60.

Thus, there are 39 whole numbers between 21 and 61.

PAGE NO 3.4:

Question 11:

Fill in the blanks with the appropriate symbol < or >:

(i) 25...205
(ii) 170...107
(iii) 415...514
(iv) 10001...100001
(v) 2300014...2300041

ANSWER:

We have:

(i) 25 **<** 205

(ii) 170 **>** 107

(iii) 415 **<** 514

(iv) 10001 **<** 100001

(v) 2300014 < 2300041

PAGE NO 3.5:

Question 12:

Arrange the following numbers is descending order:

925, 786, 1100, 141, 325, 886, 0, 270

ANSWER:

Numbers in descending order:

1100, 925, 886, 786, 325, 270, 141, 0

PAGE NO 3.5:

Question 13:

Write the largest number of 6 digits and the smallest number of 7 digits. Which one of these two is larger and by how much?

ANSWER:

Largest six-digit number = 999,999
Smallest seven-digit number = 1,000,000
Thus, the smallest seven-digit number is larger than the largest six-digit number.

Again,
Difference between these two numbers = 1,000,000 - 999,999 = 1
Hence, the smallest seven-digit number is larger than the largest six-digit number by 1.

PAGE NO 3.5:

Question 14:

Write down three consecutive whole numbers just preceding 8510001.

ANSWER:

We have:
First number = 8,510,001 - 1 = 8,510,000
Second number = 8,510,000 - 1 = 8,509,999
Third number = 8,509,999 - 1 = 8,509,998

Hence, the three consecutive whole numbers just preceding 8,510,001 are 8,510,000, 8,509,999 and 85,09,998.

PAGE NO 3.5:

Question 15:

Write down the next three consecutive whole numbers starting from 4009998.

ANSWER:

We have:
First number = 4,009,998 + 1 = 4,009,999
Second number = 4,009,999 + 1 = 4,010,000
Third number = 4,010,000 + 1 = 4,010,001

Hence, the next three consecutive whole numbers starting from 4,009,998 will be 4,009,999, 4,010,000 and 4,010,001.

PAGE NO 3.5:

Question 16:

Give arguments in support of the statement that there does not exist the largest natural number.

ANSWER:

We know that every natural number has a successor. Therefore, the largest natural number does not exist.

PAGE NO 3.5:

Question 17:

Which of the following statements are true and which are false?

(i) Every whole number has its successor.
(ii) Every whole number has its predecessor.
(iii) 0 is the smallest natural number.
(iv) 1 is the smallest whole number.
(v) 0 is less than every natural number.
(vi) Between any two whole numbers there is a whole number.
(vii) Between any two non-consecutive whole numbers there is a whole number.
(viii) The smallest 5-digit number is the successor of the largest 4 digit number
(ix) Of the given two natural numbers, the one having more digits is greater.
(x) The predecessor of a two digit number cannot be a single digit number.
(xi) If a and b are natural numbers and $a < b$, than there is a natural number c such that $a<b<c$.
(xii) If a and b are whole numbers and $a<b$, then $a+1< b+1$.
(xiii) The whole number 1 has 0 as predecessor.
(xiv) The natural number 1 has no predecessor.

ANSWER:

(i) True
The successor of every whole number can be found by adding 1.
(ii) False
Zero (0) is a whole number whose predecessor (-1) is not a whole number.
(iii) False
1 is the smallest natural number.
(iv) False
Zero (0) is the smallest whole number.
(v) True
The smallest natural number is 1, so zero (0) is less than every natural number.
(vi) False
There is no whole number between two consecutive whole numbers.
(vii) True
(viii) True
The smallest five-digit number = 10,000
The largest four-digit number = 9,999
Difference = 10,000 - 9,999 = 1
Because the difference is 1, 10,000 is the successor of 9,999.
(ix) True
(x) False
10 is a two-digit number whose predecessor is 9, which is a one-digit number.
(xi) False
If a and b are consecutive natural numbers, then there cannot be any natural number c in between a and b.
(xii) True
(xiii) True

(xiv) True
The predecessor of natural number 1 is 0, which is not a natural number.

PAGE NO 3.5:

Question 1:

The smallest natural number is

(a) 0
(b) 1
(c) -1
(d) None of these

ANSWER:

(b) 1

PAGE NO 3.5:

Question 2:

The smallest whole number is

(a) 1
(b) 0
(c) -1
(d) None of these

ANSWER:

(b) 0

PAGE NO 3.5:

Question 3:

The predecessor of 1 in natural numbers is

(a) 0
(b) 2
(c) -1
(d) None of these

ANSWER:

(d) None of these

We know that the smallest natural number is 1. Hence, its predecessor does not exist.

PAGE NO 3.5:

Question 4:

The predecessor of 1 in whole numbers is

(a) 0
(b) -1
(c) 2
(d) None of these

ANSWER:

(a) 0

Predecessor of 1 = 1 - 1 = 0

PAGE NO 3.6:

Question 5:

The predecessor of 1 million is

(a) 9999
(b) 99999
(c) 999999
(d) 1000001

ANSWER:

(c) 9,99,999

We have:
1 million = 10,00,000
Predecessor of 1 million = 10,00,000 - 1
= 9,99,999

PAGE NO 3.6:

Question 6:

The successor of 1 million is

(a) 10001
(b) 100001
(c) 1000001
(d) 10000001

ANSWER:

(c) 10,00,001

We have:
1 million = 10,00,000
Successor of 1 million = 10,00,000 + 1
= 10,00,001

PAGE NO 3.6:

Question 7:

The product of the successor and predecessor of 99 is

(a) 9800
(b) 9900
(c) 1099
(d) 9700

ANSWER:

(a) 9800

We have:
Successor of 99 = 99 + 1 = 100
Predecessor of 99 = 99 − 1 = 98
Their product = 100 × 98 = 9800

PAGE NO 3.6:

Question 8:

The product of a whole number (other than zero) and its successor is

(a) an even number
(b) an odd number
(c) divisible by 4
(d) divisible by 3

ANSWER:

(a) an even number

Example:
Whole number = 1
Successor of 1 = 1 + 1 = 2
Their product = 1 × 2 = 2
Thus, 2 is an even number.

PAGE NO 3.6:

Question 9:

The product of the predecessor and successor of an odd natural number is always divisible by

(a) 2
(b) 4
(c) 6
(d) 8

ANSWER:

(d) 8

The predecessor of an odd number is an even number.
The successor of an odd number is also an even number.
These two even numbers are two consecutive even numbers, and the product of two consecutive even numbers is always divisible by 8.

PAGE NO 3.6:

Question 10:

The product of the predecessor and successor of an even natural number is

(a) divisible by 2
(b) divisible by 3
(c) divisible by 4
(d) an odd number

ANSWER:

(d) an odd number

Example:

Even natural number = 2
Predecessor of 2 = 2 − 1 = 1
Successor of 2 = 2 + 1 = 3
Their product = 1 × 3 = 3
Thus, the product is an odd number.

PAGE NO 3.6:

Question 11:

The successor of the smallest prime number is
(a) 1
(b) 2
(c) 3
(d) 4

ANSWER:

The smallest prime number is 2
So, Successor of 2 = 2 + 1 = 3
Hence, the correct answer is option (c).

PAGE NO 3.6:

Question 12:

If x and y are co-primes, then their LCM is

(a) 1
(b) x/y
(c) xy
(d) None of these

ANSWER:

A set of numbers which do not have any other common factor other than 1 are called co-prime.
The LCM of two co-prime numbers is equal to their product.
Hence, the correct answer is option (c).

PAGE NO 3.6:

Question 13:

The HCF of two co-primes is
(a) the smaller number
(b) the larger number

(c) product of the numbers
(d) 1

ANSWER:

A set of numbers which do not have any other common factor other than 1 are called co-prime.
The HCF of two co-prime numbers is 1.
Hence, the correct answer is option (d).

PAGE NO 3.6:

Question 14:

The smallest number which is neither prime nor composite is
(a) 0
(b) 1
(c) 2
(d) 3

ANSWER:

The smallest number which is neither prime nor composite is 1
Hence, the correct answer is option (b).

PAGE NO 3.6:

Question 15:

The product of any natural number and the smallest prime is
(a) an even number
(b) an odd number
(c) a prime number
(d) None of these

ANSWER:

The smallest prime number is 2.
Thus, when we multiply any natural number we will always get an even number.
Hence, the correct answer is option (a).

PAGE NO 3.6:

Question 16:

Every counting number has an infinite number of
(a) factors

(b) multiples
(c) prime factors
(d) None of these

ANSWER:

Multiples are what we get after multiplying the number by any number.
Thus, every counting number has an infinite number of multiples
Hence, the correct answer is option (b).

PAGE NO 3.6:

Question 17:

The product of two numbers is 1530 and their HCF is 15. The LCM of these numbers is
(a) 102
(b) 120
(c) 84
(d) 112

ANSWER:

Product of two numbers = HCF of two numbers × LCM of two numbers
$\Rightarrow 1530 = 15 \times \text{LCM of two numbers}$
$\Rightarrow \text{LCM of two numbers} = 1530/15 = 102$
Hence, the correct answer is option (a).

PAGE NO 3.6:

Question 18:

The least number divisible by each of the numbers 15, 20, 24 and 32 is
(a) 960
(b) 480
(c) 360
(d) 640

ANSWER:

LCM of 15, 20, 24 and 32 is given by
$15 = 3 \times 5 = 3^1 \times 5^1$
$20 = 2 \times 2 \times 5 = 2^2 \times 5^1$
$24 = 2 \times 2 \times 2 \times 3 = 2^3 \times 3^1$
$32 = 2 \times 2 \times 2 \times 2 \times 2 = 2^5$

LCM = $2^5 \times 3^1 \times 5^1 = 480$
Hence, the correct answer is option (b).

PAGE NO 3.6:

Question 19:

The greatest number which divides 134 and 167 leaving 2 as remainder in each case is
(a) 14
(b) 19
(c) 33
(d) 17

ANSWER:

First we subtract the required remainder from 134 and 167.
Thus, we will get 132 and 165.
$132 = 2 \times 2 \times 3 \times 11 = 2^2 \times 3 \times 11$
$165 = 3 \times 5 \times 11 = 3^1 \times 5 \times 11$
HCF = $3 \times 11 = 33$
Thus, the greatest number which divides 134 and 167 leaving 2 as remainder in each case is 33
Hence, the correct answer is option (c).

PAGE NO 3.6:

Question 20:

Which of the following numbers is a prime number?
(a) 91
(b) 81
(c) 87
(d) 97

ANSWER:

Since, factors of
$91 = 1 \times 7 \times 13$
$81 = 1 \times 3 \times 3 \times 3 \times 3$
$87 = 1 \times 3 \times 29$
$97 = 1 \times 97$
Thus, 81, 87 and 91 all are not prime numbers.
Hence, the correct answer is option (d).

PAGE NO 3.6:

Question 21:

If two numbers are equal, then
(a) their LCM is equal to their HCF
(b) their LCM is less than their HCF
(c) their LCM is equal to two times their HCF
(d) None of these

ANSWER:

If two numbers are equal, then their LCM is equal to their HCF
Hence, the correct answer is option (a).

PAGE NO 3.6:

Question 22:

a and *b* are two co-primes. Which of the following is/are true?
(a) LCM $(a, b) = a \times b$
(b) HCF $(a, b) = 1$
(c) Both (a) and (b)
(d) Neither (a) nor (b)

ANSWER:

A set of numbers which do not have any other common factor other than 1 are called co-prime.
The LCM of two co-prime numbers is equal to their product.
The HCF of two co-prime numbers is 1.
Hence, the correct answer is option (c).

Operations on Whole Numbers

Exercise 4.1

Question: 1

Fill in the blanks to make each of the following a true statement:

Solution:

(i) 359 + 476 = 476 + 359 (Commutativity)
(ii) 2008 + 1952 = 1952 + 2008 (Commutativity)
(iii) 90758 + 0 = 90758 (Additive identity)
(iv) 54321 + (489 + 699) = 489 + (54321 + 699) (Associativity)

Question: 2

Add each of the following and check by reversing the order of addends:

Solution:

(i) 5628 + 39784 = 45412

And,

39784 + 5628 = 45412

(ii) 923584 + 178 = 923762

And,

178 + 923584 = 923762

(iii) 15409 + 112 = 15521

And,

112 + 15409 = 15521

(iv) 2359 + 641 = 3000

And,

641 + 2359 = 3000

Question: 3

Determine the sum by suitable rearrangements:

Solution:

(i) 953 + 407 + 647

Therefore, 53 + 47 = 100

Therefore, (953 + 647) + 407 = 1600 + 407 = 2007

(ii) 15409 + 178 + 591 + 322

409 + 91 = 500

And,

78 + 22 = 100

Therefore, (15409 + 591) + (178 + 322) = (16000) + (500)

= 16500

(iii) 2359 + 10001 + 2641 + 9999

Therefore, 59 + 41 = 100

And, 99 + 01 = 100

Therefore, (2359 + 2641) + (10001 + 9999)

= (5000) + (20000)

= 25000

(iv) 1 + 2 + 3 + 4 + 1996 + 1997 + 1998 + 1999

Therefore, 99 + 1 = 100

98 + 2 = 100

97 + 3 = 100

And

96 + 4 = 100

Therefore, (1 + 1999) + (2 + 1998) + (3 + 1997) + (4 + 1996)

= 2000 + 2000 + 2000 + 2000

= 8000

(v) 10 + 11 + 12 + 13 + 14 + 15 + 16 + 17 + 18 + 19 + 20

10 + 20 = 30

1 + 9 = 10

2 + 8 = 10

3 + 7 = 10

And,

4 + 6 = 10

Therefore, (10 + 20) + (11 + 19) + (12 + 18) + (13 + 17) + (14 + 16)

= 30 + 30 + 30 + 30 + 30 + 15

= 150 + 15

= 165

Question: 4

Which of the following statements are true and which are 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 an odd number.

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

(vii) Every whole number is a natural number.

(viii) Every natural number is a whole number.

(ix) There is a whole number which when added to a whole number, gives that number

(x) There is a natural number which when added to a natural number, gives that number.

(xi) Commmutativity and associativity are properties of whole numbers.

(xii) Commmutativity and associativity are properties of addition of whole number.

Solution:

(i) FALSE (3 + 5 = 8; 8 is an even number)

(ii) TRUE (3 + 5 = 8; 8 is an even number)

(iii) TRUE (2 + 4 = 6; 6 is an even number)

(iv) FALSE (2 + 4 = 6; 6 is an even number)

(v) TRUE (2 + 3 = 5; 5 is an odd number)

(vi) FALSE (3 + 2 = 5; 5 is not an even number)

(vii) FALSE [The whole number set is {0, 1, 2, 3, 4 …), whereas the natural number set is {1, 2, 3, 4 …)]

(viii) TRUE [The whole number set is {0, 1, 2, 3, 4 …), whereas the natural number set is {1, 2, 3, 4 …)]

(ix) TRUE [That number is zero.]

(x) FALSE

(xi) FALSE

(xii) TRUE

Exercise 4.2

Question: 1

A magic square is an array of numbers having the same number of rows and columns and the sum of numbers in each row, column or diagonal being the same. Fill in the blank cells of the following magic squares:

(i)

	8	13
	12	
11		

(ii)

22		6	13	20
	10	12	19	
9	11	18	25	
15	17	24	26	
16			7	14

Solution:

(i) It can be seen that diagonally, 13 + 12 + 11 = 36.

Thus,

Number in the first cell of the first row = 36 – (8 + 13) = 15

Number in the first cell of the second row = 36 – (15 + 11) = 10

Number in the third cell of the second row = 36 – (10 + 12) = 14

Number in the second cell of the third row = 36 – (8 + 12) = 16

Number in the third cell of the third row = 36 – (11 + 16) = 9

15	8	13
10	12	141
11	16	9

(ii) It can be seen that diagonally, 20 + 19 + 18 + 17 + 16 = 90.

Thus,

Number in the second cell of the first row = 90 – (22 + 6 + 13 + 20) = 29

Number in the first cell of the second row = 90 – (22 + 9 + 15 + 16) = 28

Number in the fifth cell of the second row = 90 – (28 + 10 + 12 + 19) = 21

Number in the fifth cell of the third row = 90 – (9 + 11 + 18 + 25) = 27

Number in the fifth cell of the fourth row = 90 – (15 + 17 + 24 + 26) = 8

Number in the second cell of the fifth row = 90 – (29 + 10 + 11 + 17) = 23

Number in the third cell of the fifth row = 90 – (6 + 12 + 18 + 24) = 30

22	29	6	13	20
28	10	12	19	21
9	11	18	25	27
15	17	24	26	8
16	23	30	7	14

Question: 2

Perform the following subtractions and check your results by performing corresponding additions:

Solution:

(i) 57839 – 2983 = 54856

Verification: 54856 + 2983 = 57839

(ii) 92507 – 10879 = 81628

Verification: 81628 + 10879 = 92507

(iii) 400000 – 98798 = 301202

Verification: 301202 + 98798 = 400000

(iv) 5050501 – 969696 = 4080805

Verification: 4080805 + 969696 = 5050501

(v) 200000 – 97531 = 102469

Verification: 102469 + 97531 = 200000

(vi) 3030301 – 868686 = 2161615

Verification: 2161615 + 868686 = 3030301

Question: 3

Replace each * by the correct digit in each of the following:

Solution:

$$\begin{array}{r} 6\ 16 \\ 8\,\cancel{7}\,\cancel{6} \\ -\ *\,3\,* \\ \hline 6\,*\,7 \\ \hline \end{array}$$

Here, we can we see that in the units digit, 6 – * = 7, which means that the value of * is 9, as 1 gets carried from 7 at tens place to 6 at unit place and 6 at unit digit becomes 16 then 16 – 9 = 7.

Now, when 7 gives 1 to 6, it becomes 6, so 6 – 3 = 3.

Also, it can be easily deduced that in (8 – * = 6), the value of * is 2.

$$\begin{array}{r} 8\,7\,6 \\ -\ 2\,3\,9 \\ \hline 6\,3\,7 \\ \hline \end{array}$$

(ii) Here, it is clear that in the units place, 9 – 4 = 5;

And in the tens place,

8 – 3 = 5.

We can now easily find out the other missing blanks by subtracting 3455 from 8989. Addend (difference) = 3455

Thus, the correct answer is:

$$\begin{array}{r} 8\,9\,8\,9 \\ -\ 5\,5\,3\,4 \\ \hline 3\,4\,5\,5 \\ \hline \end{array}$$

(iii)

$$\begin{array}{rrrrrrrr} & 5 & 9 & 9 & 9 & 10 & 9 & 17 \\ & \cancel{6} & \cancel{0} & \cancel{0} & \cancel{0} & \cancel{1} & \cancel{0} & \cancel{7} \\ - & 0 & * & * & 8 & 9 & 7 & 8 \\ \hline & 5 & 0 & 6 & * & * & * & * \\ \hline \end{array}$$

Here, in the units digit, 17 – 8 = 9; in the tens digit, 9 – 7 = 2;

in the hundreds place, 10 – 9 = 1;

and in the thousands place, 9 – 8 = 1.

Addend difference = 5061129.

So, in order to get the addend, we will subtract 5061129 from 6000107.

$$\begin{array}{r} 6\,0\,0\,0\,1\,0\,7 \\ -\ \underline{5\,0\,6\,1\,1\,2\,9} \\ \underline{0\,9\,3\,8\,9\,7\,8} \end{array}$$

Thus, the correct answer is:

$$\begin{array}{r} 6\,0\,0\,0\,1\,0\,7 \\ -\ \underline{0\,9\,3\,8\,9\,7\,8} \\ \underline{5\,0\,6\,1\,1\,2\,9} \end{array}$$

(iv)

$$\begin{array}{r} 9\ \ 9\ 9\ \ 9\ 9\ 9\ \ 10 \\ \cancel{1}\,\cancel{0}\,\cancel{0}\,\cancel{0}\,\cancel{0}\,\cancel{0}\,\cancel{0} \\ -\ \underline{*\,*\,*\,*\,1} \\ \underline{*\,7\,0\,4\,2\,*} \end{array}$$

In the units place, 10 -1 = 9;

Also, in the lakhs place, 9 -0 = 9;

Addend difference = 970429.

So, in order to get the addend, we will subtract 970429 from 1000000.

$$\begin{array}{r} 1\,0\,0\,0\,0\,0\,0 \\ -\ \underline{0\,9\,7\,0\,4\,2\,9} \\ \underline{0\,0\,2\,9\,5\,7\,1} \end{array}$$

Thus, the correct answer is:

$$\begin{array}{r} 1\,0\,0\,0\,0\,0\,0 \\ -\ \underline{0\,0\,2\,9\,5\,7\,1} \\ \underline{0\,9\,7\,0\,4\,2\,9} \end{array}$$

(v)

$$
\begin{array}{cccccccc}
 & 4 & 9 & 9 & 10 & 9 & 9 & 13 \\
 & \cancel{5} & \cancel{0} & \cancel{0} & \cancel{1} & \cancel{0} & \cancel{0} & \cancel{3} \\
- & 0 & * & * & 6 & 9 & 8 & 7 \\
\hline
 & 4 & 8 & 4 & * & * & * & * \\
\hline
\end{array}
$$

Here, in the units digit, 13 – 7 = 6;

in the tens digit, 9 – 8 = 1;

in the hundreds place, 9 – 9 = 0;

and in the thousands place, 10 – 6 = 4.

Addend difference = 4844016.

So, in order to get the addend, we will subtract 4844016 from 5001003.

$$
\begin{array}{cccccccc}
 & 5 & 0 & 0 & 1 & 0 & 0 & 3 \\
- & 4 & 8 & 4 & 4 & 0 & 1 & 6 \\
\hline
 & 0 & 1 & 5 & 6 & 9 & 8 & 7 \\
\hline
\end{array}
$$

(vi)

$$
\begin{array}{ccccccc}
 & 0 & 10 & 10 & 10 & 10 & 11 \\
 & \cancel{1} & \cancel{1} & \cancel{1} & \cancel{1} & \cancel{1} & \cancel{1} \\
- & & * & 6 & 7 & 8 & 9 \\
\hline
 & & 5 & 4 & 3 & 2 & * \\
\hline
\end{array}
$$

It is clear from the units place that 11 – 9 = 2.

Addend difference = 54322.

To get the other addend, we will subtract 54322 from 111111.

$$
\begin{array}{ccccccc}
 & 1 & 1 & 1 & 1 & 1 & 1 \\
- & & 5 & 4 & 3 & 2 & 2 \\
\hline
 & & 5 & 6 & 7 & 8 & 9 \\
\hline
\end{array}
$$

Thus, the other addend is 56789.

The correct answer is:

$$
\begin{array}{ccccccc}
 & 1 & 1 & 1 & 1 & 1 & 1 \\
- & & 5 & 6 & 7 & 8 & 9 \\
\hline
 & & 5 & 4 & 3 & 2 & 2 \\
\hline
\end{array}
$$

Question: 4

What is the difference between the largest number of five digits and smallest number of six digits?

Solution:

The largest five – digit number is 99999.

The smallest six – digit number is 100000.

Therefore, difference between them = 100000 – 99999 = 1

Question: 5

Find the difference between the largest number of 4 digits and the smallest number of 6 digits.

Solution:

The largest four – digit number is 9999.

The smallest seven – digit number is 1000000.

Therefore, difference between them = 1000000 – 9999 = 990001

Question: 6

Rohit deposited Rs 125000 in his savings bank account. Later he withdrew Rs 35425 from it. How much money was left in his account?

Solution:

Money deposited by Rohit = Rs 125000

Money withdrawn by Rohit = Rs 35425

Therefore, money left in the account = Rs (125000 – 35425) = Rs 89575

Question: 7

The population of a town is 96209. If the number of men is 29642 and that of women is 29167, determine the number of children.

Solution:

Total population of the town = 96209

Number of men = 29642

Number of women = 29167

Sum of men and women = (29642 + 29167) = 58809

Therefore, Number of children in the town = (Total population) – (Sum of men and women)

= 96209 – 58809 = 37400

Question: 8

The digits of 6 and 9 of the number 36490 are interchanged. Find the difference between the original number and the new number.

Solution:

Original number = 39460

New number = – 36490

Difference = 39460 – 36490 = 2970

Question: 9

The population of a town was 59000. In one year it was increased by 4563 due to new births. However, 9218 persons died or left the town during the year. What was the population at the end of the year?

Solution:

Population of the town = 59000

Increase in the population = 4536

Decrease in the population = 9218

New population = 59000 + 4536 – 9218 = 54318

Exercise 4.3

Question: 1

Fill in the blanks to make each of the following a true statement:

Solution:

(i) $785 \times 0 = 0$

(ii) $4567 \times 1 = 4567$ (Multiplicative identity)

(iii) $475 \times 129 = 129 \times 475$ (Commutativity)

(iv) $1243 \times 8975 = 8975 \times 1243$ (Commutativity)

(v) $10 \times 100 \times 10 = 10000$

(vi) $27 \times 18 = 27 \times 9 + 27 \times 4 + 27 \times 5$

(vii) $12 \times 45 = 12 \times 50 - 12 \times 5$

(viii) $78 \times 89 = 78 \times 100 - 78 \times 16 + 78 \times 5$

(ix) $66 \times 85 = 66 \times 90 - 66 \times 4 - 66$

(x) $49 \times 66 + 49 \times 34 = 49 \times (66 + 34)$

Question: 2

Determine each of the following products by suitable rearrangements:

Solution:

(i) $2 \times 1497 \times 50$

$= (2 \times 50) \times 1497 = 100 \times 1497 = 149700$

(ii) $4 \times 358 \times 25$

$= (4 \times 25) \times 358 = 100 \times 358 = 35800$

(iii) $495 \times 625 \times 16$

$= (625 \times 16) \times 495 = 10000 \times 495 = 4950000$

(iv) $625 \times 20 \times 8 \times 50$

$= (625 \times 8) \times (20 \times 50) = 5000 \times 1000 = 5000000$

Question: 3

Using distributivity of multiplication over addition of whole numbers, find each of the following products:

Solution:

(i) $736 \times 103 = 736 \times (100 + 3)$

{Using distributivity of multiplication over addition of whole numbers}

$= (736 \times 100) + (736 \times 3)$

$= 73600 + 2208 = 75808$

(ii) $258 \times 1008 = 258 \times (1000 + 8)$

{Using distributivity of multiplication over addition of whole numbers}

$= (258 \times 1000) + (258 \times 8)$

$= 258000 + 2064 = 260064$

(iii) $258 \times 1008 = 258 \times (1000 + 8)$

{Using distributivity of multiplication over addition of whole numbers}

$= (258 \times 1000) + (258 \times 8)$

$= 258000 + 2064 = 260064$

Question: 4

Find each of the following products:

Solution:

(i) 736×93

Since, $93 = (100 - 7)$

Therefore, $736 \times (100 - 7)$

$= (736 \times 100) - (736 \times 7)$

(Using distributivity of multiplication over subtraction of whole numbers)

$= 73600 - 5152 = 68448$

(ii) 816×745

Since, $745 = (750 - 5)$

Therefore, $816 \times (750 - 5)$

$= (816 \times 750) - (816 \times 5)$

(Using distributivity of multiplication over subtraction of whole numbers)

= 612000 – 4080 = 607920

(iii) 2032 × 613

Since, 613 = (600 +13)

Therefore, 2032 × (600 + 13)

= (2032 × 600) + (2032 × 13)

= 1219200 + 26416 = 1245616

Question: 5

Find the values of each of the following using properties:

Solution:

(i) 493 × 8 + 493 × 2

= 493 × (8 + 2)

(Using distributivity of multiplication over addition of whole numbers)

= 493 × 10 = 4930

(ii) 24579 × 93 + 7 × 24579

= 24579 × (93 + 7)

(Using distributivity of multiplication over addition of whole numbers)

= 24579 × 100 = 2457900

(iii) 1568 × 184 – 1568 × 84

= 1568 × (184 – 84)

(Using distributivity of multiplication over subtraction of whole numbers)

= 1568 × 100 = 156800

(iv) 15625 × 15625 – 15625 × 5625

= 15625 × (15625 – 5625)

(Using distributivity of multiplication over subtraction of whole numbers)

= 15625 × 10000 = 156250000

Question: 6

Determine the product of:

(i) the greatest number of four digits and the smallest number of three digits.

(ii) the greatest number of five digits and the greatest number of three digits.

Solution:

(i) The largest four-digit number = 9999

The smallest three – digit number = 100

Therefore, Product of the smallest three-digit number and the largest four-digit number = 9999 × 100 = 999900

(ii) The largest five – digit number = 9999

The largest number of three digits = 999

Therefore, Product of the largest three-digit number and the largest five-digit number

= 9999 × 999

= 9999 × (1000 — 1)

= (9999 × 1000) — (9999 × 1)

= 9999000 – 9999

= 9989001

Question: 7

In each of the following, fill in the blanks, so that the statement is true:

Solution:

(i) (500 + 7) (300 – 1)

= 507 × 299

= 299 × 507 (Commutativity)

(ii) 888 + 777 + 555

= 111 (8 + 7 + 5)

= 111 × 20 (Distributivity)

(iii) 75 × 425

= (70 + 5) × 425

= (70 + 5) (340 + 85)

(iv) 89 × (100 – 2)

= 89 × 98

= 98 × 89

= 98 × (100 – 11) (Commutativity)

(v) (15 + 5) (15 – 5)

= 20 × 10

= 200

= 225 – 25

(vi) 9 × (10000 + 974)

= 98766

Question: 8

A dealer purchased 125 color television sets. If the cost of each set is Rs 19820, determine the cost of all sets together.

Solution:

Cost of 1 color television set = Rs 19820

Therefore, Cost of 125 color television sets = Rs (19820 × 125)

= Rs 19820 × (100 + 25)

= Rs (19820 × 100) + (19820 × 25)

= Rs 1982000 + 495500

= Rs 2477500

Question: 9

The annual fee charged from a student of class 6^{th} in a school is Rs 8880. If there are, in all, 235 students in class 6^{th}, find the total collection.

Solution:

Fees charged from 1 student = Rs 8880

Therefore, Fees charged from 235 students = Rs 8880 × 235

= 2086800

Thus, the total collection from class VI students is Rs 2086800.

Question: 10

A group housing society constructed 350 flats. If the cost of construction for each flat is Rs 993570, what is the total cost of construction of all the flats.

Solution:

Cost of construction of 1 flat = Rs 993,570

Total number of flats constructed = 350

Total cost of construction of 350 flats = Rs (993,570 × 350)

= Rs 347,749,500

Question: 11

The product of two whole numbers is zero. What do you conclude?

Solution:

If the product of two whole numbers is zero, then it means that either one of them is zero or both of them are zero.

Question: 12

What are the whole numbers which when multiplied with itself gives the same number?

Solution:

There are two numbers which when multiplied with themselves give the same numbers.

(i) $0 \times 0 = 0$

(ii) $1 \times 1 = 1$

Question: 13

In a large housing complex, there are 15 small buildings and 22 large building. Each of the large buildings has 10 floors with 2 apartments on each floor. Each of the small buildings has 12 floors with 3 apartments on each floor. How many apartments are there in all.

Solution:

Number of large buildings = 22

Number of small buildings = 15

Number of floors in 1 large building = 10

Number of apartments on 1 floor = 2

Therefore, Total apartments in 1 large building = 10 × 2 = 20

Similarly,

Total apartments in 1 small building = 12 × 3 = 36

Therefore, Total apartments in the entire housing complex = (22 × 20) + (15 × 36)

= 440 + 540

= 980

Exercise 4.4

Question: 1

Does there exists a whole number ‘a’ such that a/a = a?

Solution:

Yes, there exists a whole number ‘a’ such that a/a = a.

The whole number is 1 such that,

1/1 = 1

Question: 2

Find the value of:

Solution:

(i) 23457 / 1 = 23457

(ii) 0 / 97 = 0

(iii) 476 + (840 / 84) = 476 + 10 = 486

(iv) 964 – (425 / 425) = 964 – 1 = 963

(v) (2758 / 2758) – (2758 + 2758) = 1 – 1 = 0

(vi) 72450 / (583 – 58) = 72450 + 525 = 138

Question: 3

Which of the following statements are true:

Solution:

(i) False

LHS: 10 / (5 × 2)

= 10 / 10

=1

RHS: (10 / 5) × (10 / 2)

= 2 × 5 = 10

(ii) True

LHS: (35 – 14) / 7

= 21 / 7

=3

RHS: 35 / 7 – 14 / 7

= 5 – 2 = 3

(iii) False

LHS: 35 – 14 / 7

= 35 – 2 = 33

RHS: 35 / 7 – 14 / 7

= 5 – 2

= 3

(iv) False

LHS: (20 – 5) / 5

= 15 / 5

= 3

RHS: 20 / 5 – 5

= 4 – 5 = -1

(v) False

LHS: 12 × (14 / 7)

= 12 × 2

= 24

RHS: (12 × 14) / (12 × 7)

= 168 / 84

=2

(vi) True

LHS: (20 / 5) / 2

= 4 / 2

=2

RHS : (20 / 2) / 5

= 10 / 5

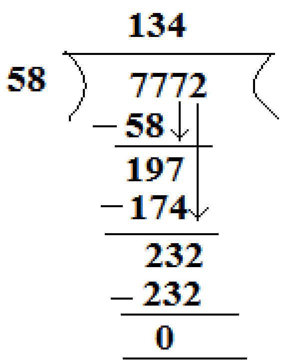
= 2

Question: 4

Divide and check the quotient and remainder:

Solution:

(i) 7777 / 58 = 134



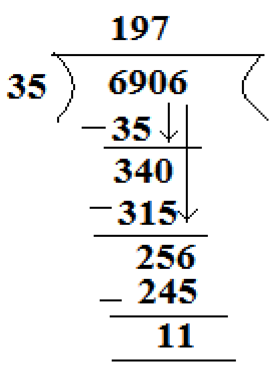
Verification: [Dividend = Divisor × Quotient + Remainder]

7772 = 58 × 134 + 0

7772 = 7772

LHS = RHS

(ii) 6906/35 gives quotient = 197 and remainder = 11



Verification: [Dividend = Divisor × Quotient + Remainder]

6906 = 35 × 197 + 11

6906 = 6895 + 11

6906 = 6906

LHS = RHS

(iii) 16135 / 875 gives quotient = 18 and remainder = 385.

$$\begin{array}{r|r} & 18 \\ \hline 875 & 16135 \\ & -\ 875 \\ \hline & 7385 \\ & -\ 7000 \\ \hline & 385 \\ \hline \end{array}$$

Verification: [Dividend = Divisor × Quotient + Remainder]

16135 = 875 × 18 + 385

16135 = 15750 + 385

16135 = 16135

LHS = RHS

(iv) 16025/1000 gives quotient and remainder = 25

$$\begin{array}{r|r} & 16 \\ \hline 1000 & 16025 \\ & -\ 1000 \\ \hline & 6025 \\ & -\ 6000 \\ \hline & 25 \\ \hline \end{array}$$

Verification: [Dividend = Divisor × Quotient + Remainder]

16025 = 1000 × 16 + 25

16025 = 16000 + 25

16025 = 16025

LHS = RHS

Question: 5

Find a number which when divided by 35 gives the quotient 20 and remainder 18.

Solution:

Dividend = Divisor × Quotient + Remainder

Dividend = 35 × 20 + 18

= 700 + 18

= 718

Question: 6

Find the number which when divided by 58 gives a quotient 40 and remainder 31.

Solution:

Dividend = Divisor × Quotient + Remainder

Dividend = 58 × 40 + 31

= 2320 + 31

= 2351

Question: 7

The product of two numbers is 504347. If one of the numbers is 1591, find the other.

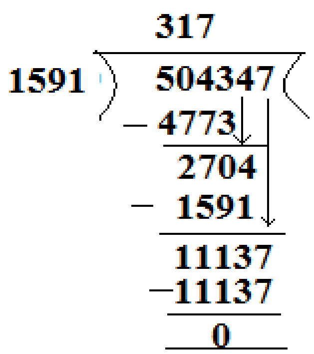
Solution:

Product of two numbers = 504347

One of the two numbers = 1591

Let the number be A.

Therefore, A × 1591 = 504347



A = 5043471591 = 317

Question: 8

On dividing 59761 by a certain number, the quotient is 189 and the remainder is 37. Find the divisor.

Solution:

Dividend = 59761

Quotient = 189

Remainder = 37

Divisor = A

Now, Dividend = Divisor × Quotient + Remainder

59761 =A × 189 + 37

59761 – 37 = A × 189

59724 = A × 18

Therefore, A = 59724189

= 316

Question: 9

On dividing 55390 by 299, the remainder is 75. Find the quotient.

Solution:

Dividend = 55390

Divisor = 299

Remainder = 75

Quotient = A

Dividend = Divisor × Quotient + Remainder

55390 = 299 × A + 75

55390 – 75 = A × 299

55315 = A × 299

Therefore, A = 55315299 = 185

Exercise 4.5

Question: 1

Without drawing a diagram, find:

Solution:

(i) 10th square number:

A square number can easily be remembered by the following rule

N^{th} square number = n × n

10th square number = 10 × 10 = 100

(ii) 6th triangular number:

A triangular number can easily be remembered by the following rule

N^{th} triangular number = n × (n + 1)2

Therefore, 6^{th} triangular number = 6 × (6 + 1)2 = 21

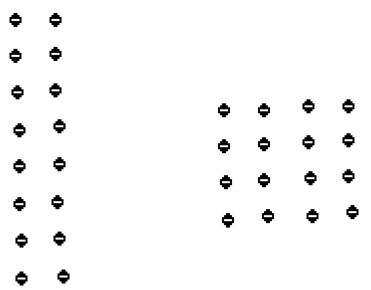
Question: 2

(i) Can a rectangle number also be a square number?

(ii) Can a triangular number also be a square number?

Solution:

(i) Yes, a rectangular number can also be a square number; for example, 16 is a square number also a rectangular number.



(ii) Yes, there e×ists only one triangular number that is both a triangular number and a square number, and that number is 1.

Question: 3

Write the first four products of two numbers with difference 4 starting from in the following order:

1 , 2 , 3 , 4 , 5 , 6 , ……….

Identify the pattern in the products and write the next three products.

Solution:

$1 \times 5 = 5$ $(5 - 1 = 4)$

$2 \times 6 = 12$ $(6 - 2 = 4)$

$3 \times 7 = 21$ $(7 - 3 = 4)$

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

Question: 4

Observe the pattern in the following and fill in the blanks:

Solution:

$9 \times 9 + 7 = 88$

$98 \times 9 + 6 = 888$

$987 \times 9 + 5 = 8888$

$9876 \times 9 + 4 = 88888$

$98765 \times 9 + 3 = 888888$

$987654 \times 9 + 2 = 8888888$

$9876543 \times 9 + 1 = 88888888$

Question: 5

Observe the following pattern and extend it to three more steps:

Solution:

$6 \times 2 - 5 = 7$

$7 \times 3 - 12 = 9$

$8 \times 4 - 21 = 11$

$9 \times 5 - 32 = 13$

$10 \times 6 - 45 = 15$

$11 \times 7 - 60 = 17$

$12 \times 8 - 77 = 19$

Question: 6

Study the following pattern:

$1 + 3 = 2 \times 2$

$1 + 3 + 5 = 3 \times 3$

$1 + 3 + 5 + 7 = 4 \times 4$

$1 + 3 + 5 + 7 + 9 = 5 \times 5$

By observing the above pattern, find:

Solution:

(i) $1 + 3 + 5 + 7 + 9 + 11$

$= 6 \times 6$

$= 36$

(ii) $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15$

$= 8 \times 8$

$= 64$

(iii) $21 + 23 + 25 + \ldots + 51$

$= (21 + 23 + 25 + \ldots + 51)$ can also be written as

$(1 + 3 + 5 + 7 + \ldots + 49 + 51) - (1 + 3 + 5 + \ldots + 17 + 19)$

$(1 + 3 + 5 + 7 + \ldots + 49 + 51) = 26 \times 26 = 676$

and, $(1 + 3 + 5 + \ldots + 17 + 19) = 10 \times 10 = 100$

Now,

$(21 + 23 + 25 + \ldots + 51) = 676 - 100 = 576$

Question: 7

Study the following pattern:

$$1 \times 1 + 2 \times 2 = \frac{2 \times 3 \times 5}{6}$$

$$1 \times 1 + 2 \times 2 + 3 \times 3 = \frac{3 \times 4 \times 7}{6}$$

$$1 \times 1 + 2 \times 2 + 3 \times 3 + 4 \times 4 = \frac{4 \times 5 \times 9}{6}$$

By observing the above pattern, write next two steps.

Solution:

The next two steps are as follows:

1 × 1 + 2 × 2 + 3 × 3 + 4 × 4 + 5 × 5

= 5 × 6 × 116

= 55

1 × 1+ 2 × 2 + 3 × 3 + 4 × 4 + 5 × 5 + 6 × 6

= 6 × 7 × 136

= 91

Question: 8

Study the following pattern:

$$1 = \frac{1 \times 2}{2}$$

$$1 + 2 = \frac{2 \times 3}{2}$$

$$1 + 2 + 3 = \frac{3 \times 4}{2}$$

$$1 + 2 + 3 + 4 = \frac{4 \times 5}{2} <$$

By observing the above pattern, find:

Solution:

(i) 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10

= 10 × 112

= 55

(ii) 50 + 51 + 52 + …+ 100

This can also be written as

(1 + 2 + 3 + …+ 99 + 100) − (1 + 2 + 3 + 4 + …+ 47 + 49)

Now,

(1 + 2 + 3 + …+ 99 + 100) = 100 × 1012

and, (1 + 2 + 3 + 4 +…+ 47 + 49) = 49 × 502

So, (50 + 51 + 52 + …+ 100) = 100 × 1012 − 49 × 502

= 5050 − 1225

= 3825

(iii) 2 + 4 + 6 + 8 + 10 +…+ 100

This can also be written as 2 × (1 + 2 + 3 + 4 + …+ 49 + 50)

Now,

(1 + 2 + 3 + 4 + …+ 49 + 50) = 50 × 512

= 1275

Therefore, (2 + 4 + 6 + 8 + 10 + …+ 100) = 2 × 1275 = 2550

Exercise 4.6

Question: 1

Which one of the following is the smallest whole number?

(a) 1 (b) 2   (c) 0 (d) None of these

Solution:

The set of whole numbers is {0 , 1, 2, 3, 4, …}.

So, the smallest whole number is 0.

Hence, the correct option is (c).

Question: 2

Which one of the following is the smallest even whole number?

(a) 0 (b) 1 (c) 2 (d) None of these

Solution:

The natural numbers along with 0 form the collection of whole numbers.

So, the numbers 0, 1, 2, 3, 4, … form the collection of whole numbers.

The number which is divisible by 2 is an even number.

So, in the collection “0, 1, 2, 3, 4, …”, 2 is the smallest even number.

Hence, the correct option is (c).

Question: 3

Which one of the following is the smallest odd whole number?

(a) 0 (b) 1 (c) 3 (d) 5

Solution:

The natural numbers along with 0 form the collection of whole numbers.

So, the numbers 0, 1, 2, 3, 4, … form the collection of whole numbers.

A natural number which is not divisible by 2 is called an odd whole number.

So, in the collection “0, 1, 2, 3, 4, …”, 1 is the smallest odd whole number.

Hence, the correct option is (b).

Question: 4

How many whole numbers are between 437 and 487?

(a) 50 (b) 49 (c) 51 (d) None of these

Solution:

The whole numbers between 437 and 487 are 438, 439, 440, 441, … , 484, 485 and 486. To find the required number of whole numbers,

We need to subtract 437 from 487 and then subtract again 1 from the result.

Thus, there are (487 – 437) – 1 whole numbers between 437 and 487.

Now, (487 – 437) – 1 = 50 – 1 = 49

Hence, the correct option is (b).

Question: 5

The product of the successor 999 and predecessor of 1001 is:

(a) one lakh (b) one billion (c) one million (d) one crore

Solution:

Successor of 999 = 999 + 1 = 1000

Predecessor of 1001 = 1001 – 1 = 1000

Now,

Product = (Successor of 999) × (Predecessor of 1001)

= 1000 × 1000

= 1000000

= one million

Hence, the correct option is (c).

Question: 6

Which one of the following whole numbers does not have a predecessor?

(a) 1 (b) 0 (c) 2 (d) None of these

Solution:

The numbers 0, 1, 2, 3, 4, …. form the collection of whole numbers.

The smallest whole number is 0.

So, 0 does not have a predecessor.

Hence, the correct option is (b).

Question: 7

The number of whole numbers between the smallest whole number and the greatest 2 digit number is:

(a) 101 (b) 100 (c) 99 (d) 98

Solution:

Smallest whole number = 0

Greatest 2-digit whole number = 99

The whole numbers between 0 and 99 are 1, 2, 3, 4 …… 97, 98.

To find the number of whole numbers between 0 and 99,

Subtract 1 from the difference of 0 and 99.

Therefore, Number of whole numbers between 0 and 99 = (99 – 0) – 1

= 99 – 1

= 98

Hence, the correct option is (d).

Question: 8

If n is a whole number such that n + n = n, then n =?

(a) 1 (b) 2 (c) 3 (d) None of these

Solution:

Here, 0 + 0 = 0, 1 + 1 = 2 , 2 + 2 = 4 …..

So, the statement n + n = n is true only when n = 0.

Hence, the correct option is (d).

Question: 9

The predecessor of the smallest 3 digit number is:

(a) 999 (b) 99 (c) 100 (d) 101

Solution:

Smallest 3-digit number = 100

Predecessor of 3-digit number = 100 — 1 = 99

Hence, the correct option is (b).

Question: 10

The least number of 4 digits which is exactly divisible by 9 is:

(a)1008 (b)1009 (c)1026 (d)1018

Solution:

Least 4-digit number = 1000

The least 4-digit number exactly divisible by 9 is 1000 + (9 – 1) = 1008.

Hence, the correct option is (a).

Question: 11

The number which when divided by 53 gives 8 as quotient and 5 as remainder is:

(a) 424 (b) 419 (c) 429 (d) None of these

Solution:

Here, Divisor = 53, Quotient = 8 and Remainder = 5.

Now, using the relation Dividend = Divisor x Quotient + Remainder

We get

Dividend = 53 x 8 + 5

= 424 + 5

= 429

Thus, the required number is 429.

Hence, the correct option is (c).

Question: 12

The whole number n satisfying n + 35 = 101 is:

(a) 65 (b) 67 (c) 64 (d) 66

Solution:

Here, n+ 35 = 101.

Adding – 35 on both sides, we get

n + 35 + (- 35) = 101 + (- 35)

n + 0 = 66

n = 66

Hence, the correct option is (d).

Question: 13

The value of 4 x 378 x 25 is:

(a) 37800 (b) 3780 (c) 9450 (d) 30078

Solution:

By regrouping, we get

4 × 378 × 25 = 4 × 25 × 378

= 100 × 378

= 37800

Hence, the correct option is (a).

Question: 14

The value of 1735 x 1232 – 1735 x 232 is:

(a) 17350 (b) 173500 (c) 1735000 (d) 173505

Solution:

Using distributive law of multiplication over subtraction, we get

1735 × 1232 – 1735 × 232 = 1735 (1232 – 232)

= 1735 × 1000

= 1735000

Hence, the correct option is (c).

Question: 15

The value of 47×99 is:

(a) 4635 (b) 4653 (c) 4563 (d) 6453

Solution:

Since, $99 = 100 - 1$

Therefore, $47 \times 99 = 47 \times (100 - 1)$

$= 47 \times 100 - 47$

$= 4700 - 47$

$= 4653$

Thus, the value of 47×99 is 4653.

Hence, the correct option is (b).

Negative Numbers and Integers

Exercise 5.1

Q.1

Ans.

(i) Decrease of population.

(ii) with drawing money from a bank

(iii) Spending money.

(iv) Going South

(v) Loosing a weight of 4 kg.

(vi) A gain of Rs 1000.

(vii) – 25.

(viii) 15.

Q.2

Ans.

(i) 25° above zero is → + 25°.

(ii) 5° below zero → – 5°.

(iii) A profit of 800 → + 800.

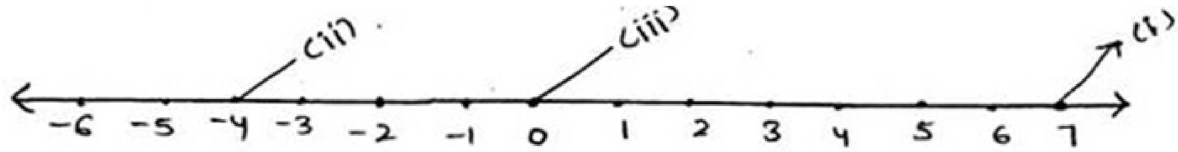
(iv) A deposit of 2500 → + 2500.

(v) 3 km above sea level → + 3.

(vi) 2 km below sea level → – 2.

Q.3

Ans.



Integers are as shown in the number line.

Q.4

Ans.

(i) since 'o' is greater than all negative integers.

Therefore - 4 < 0.

- 4 is smaller.

(ii) we know that > 3 on the number line -3 is to left of 12 · 50 - < 12.

- 3 is smaller.

(iii) 8, 13.

WKT on the number line 8 is to left of 13. so 8 < 13.

(iv) – 15, – 27.

W.K.T on the number line -27 is to left of -27

So -27 < -15.

Q.5

Ans.

(i) 3, -4.

Sr. WKT on the number line 3 is to right of – 4.

So 3 > – 4.

3 is larger.

(ii) -12, – 8.

WKT on the number line -12 is to left of – 8

so -12 < – 8

- 8 is larger

(iii) 0,7.

Since '0' is less than all positive integers.

Therefore 7 > 0

7 is Larger

(iv) 12, –18.

WKT on the number line -18 is to left of 12.

So 12 > – 18

12 is Larger.

Q.6

Ans.

(i) integers between -7 and 3 are -6, 5, -4, -3, -2, -1, 0, 1, 2.

(ii) integers between -2 and 2 are. -1, 0, 1

(iii) integers between -4 and 0 are. -3, -2, -1.

(iv) integers between 0 and 3 are 1, 2.

Q.7

Ans.

(i) integers between -4 and 3 are -3, -2, -1, 0, 1, 2.

∴ No of integers between -4 and 3 are 6.

(ii) integers between 5 and 12 are 6, 7, 8, 9, 10, 11.

∴ No of integers between 5 and 12 are 6.

(iii) integers between -9 and -2 are -8, -7, -6, -5, -4, -3.

∴ No of integers between -9 and -2 are 6.

(iv) Integers between 0 and 5 are 1, 2, 3, 4.

∴ No of integers between 0 and 5.

Q.8

Ans.

(i) 2 < 5

(ii) 0 < 3

(iii) 0 > -7

(iv) -18 < 15

(v) – 235 > – 532

(vi) – 20 < 20

Q.9

Ans.

(i) – 12, – 9 , – 8, 0, 1, 5, 15.

(ii) – 320, – 106, – 7, 107, 186.

Q.10

Ans.

(i) 8, 7, 6, 0, 2, – 5, – 9, – 15.

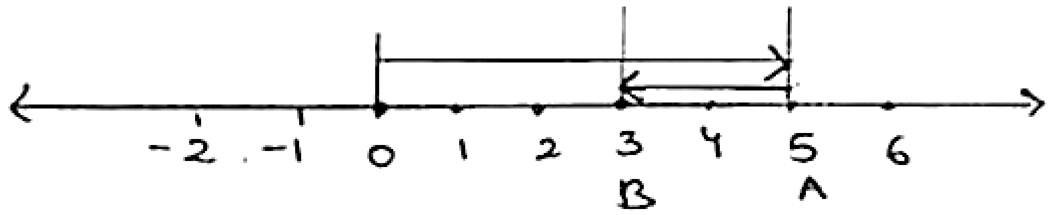
(ii) 124, – 74, – 89, – 154, – 205.

Exercise 5.2

Q.1

Ans.

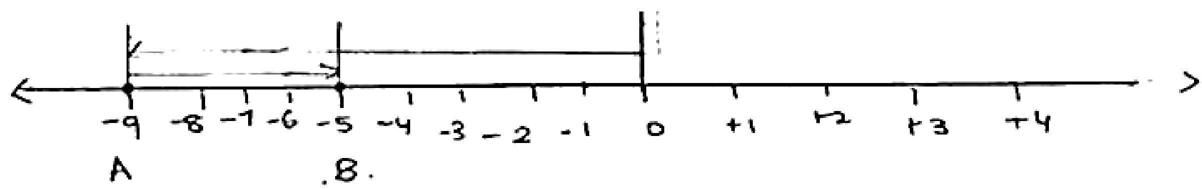
(i) 5 + (-2)



We begin at 0 and first more five units to the right of zero to reach ar a which represents +5. The second number 2 is negative. So, we move 2 units to the left of A to reach at B which represents 3.

Thus, we have = 5 + (-2) = 3.

(ii) (-9) + 4.

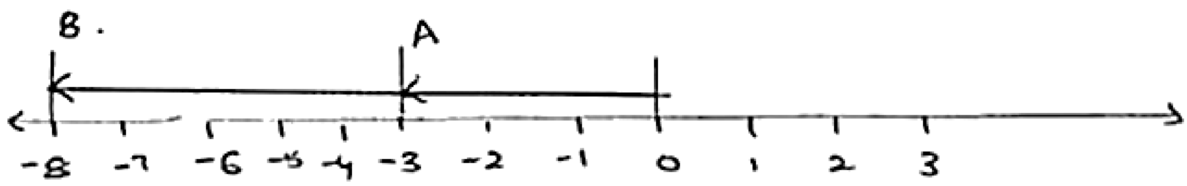


We begin at 0 and first move nine units to the left of zero to reach at A. Which represents – 9. The second number 4 is positive. So we over 4 units to the right of A to reach at B. Which represents -5.

Thus, we have.

-9 + 4 = -5.

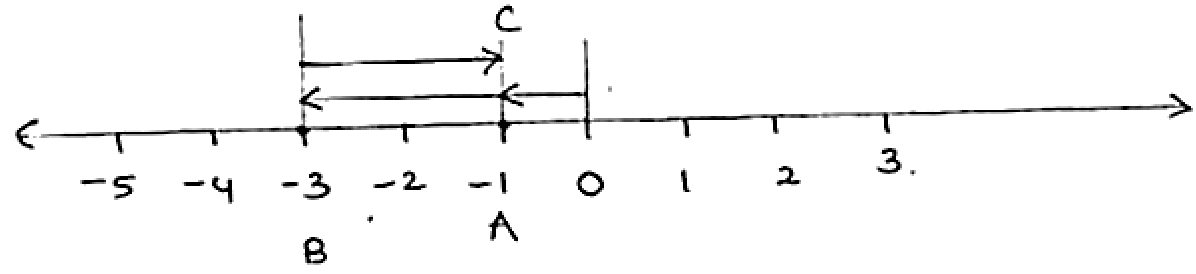
(iii) (-3) + (-5).



We begin at 0 and first move three units to the left of zero to reach at A which represents -3. The second number +5 is negative. So we move 5 units to the left of A to reach at b which represents -8.

Thus we have = (-3) + (-5) = -3 -5 = -8.

(iv) (-1) + (-2) + 2.

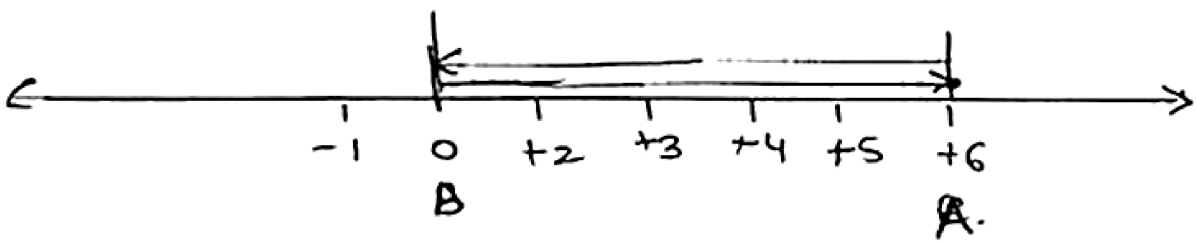


We begin at zero and first move one unit to the left of zero to reach at point A which represents -1. The second number 2 is negative.

So we move 2 units to the left of A to reach at B which represents -3. The Third number is 2 positive. So we move 2 units to the right of B. which is -1.

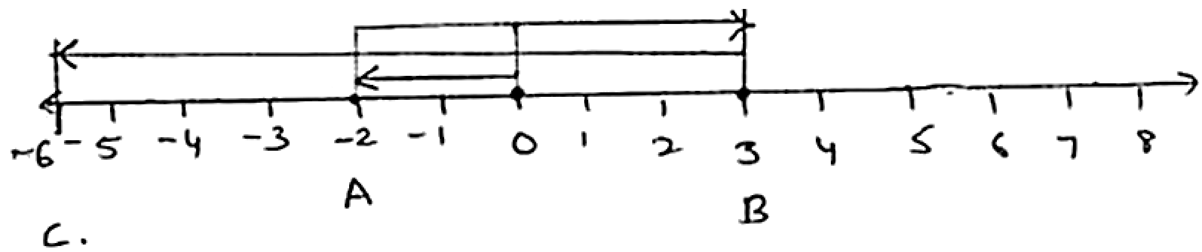
(-1) + (-2) + 2 = (-1) + 2 -2 = -1.

(v) 6 + (-6)



Thus we have 6 + (-6) = 0

(vi) (-2) + 5 + (-a).



Thus we have = -2 + 5 + (-9)

= 5 - 2 + (-9)

= 3 - 9

= -6.

Q.2

Ans.

(i) – 557 and 488

The integers are to be added are of the unlike signs.Therefore to add them we find the difference of their absolute values and assign the sign of the addend having greater absolute value

(- 557) and 488 = |- 557| - |488|

= 557 - 488

= - 69.

(ii) - 522 + (-160) = - 522 - 160

= - 682

(iii) 2567 and -325

2567 + (-325) = (2567) - (-325)

= 2567 and -325

2567 + (-325) = (2567) - (-325)

= 2567 - 325

= 2242

(iv) – 10025 and 139

-10025 + 139 = [-10025] + [139]

= -10025 + 139

= -9886.

(v) 2567+ (-2578) = 2547 - 2548

= -1.

(vi) 2884 + (-2884) = 2884 - 2884 = 0.

Exercise 5.3

Q.1

Ans.

(i) Additive inverse of 52 is -52.

(ii) 176

(iii) 0

(iv) -1

Q.2

Ans.

(i) Success - or – 42 is = – 42 + (-1)

= 1- 42

= – 41

(ii) -1 + 1 = 0

(iii) 0 + 1 =1

(iv) – 200 + 1 = –199

(v) – 99 + 1 = –98.

Q.3

Ans.

(i) predecessor of 0 is $\Longrightarrow$ 0 -1 = -1

(ii) 1 - 1 = 0

(iii) -1 -1 = -2

(iv) -125 -1 = -126

(v) 1000 -1 = 999

Q.4

Ans.

(i) True

(ii) False

(iii) False

(iv) False

(v) False

Q.5

Ans.

Integers whose absolute values less than 5 are

− 4, − 3, − 2, − 1, 0, 1, 2, 3, 4.

Q.6

Ans.

(i) True

(ii) False

(iii) True

(iv) True

Q.7

Ans.

+	- 6	- 4	- 2	0	2	4	6
6	0	2	4	6	8	10	12
4	- 2	0	2	4	6	8	10
2	- 4	- 2	0	2	4	6	8
0	- 6	-4	- 2	4	2	4	6
- 2	- 8	-6	- 4	- 2	0	2	4

- 4	- 10	-8	- 6	- 4	- 2	0	2
- 6	- 12	-10	- 8	- 6	- 4	- 2	0

(i) (+6, -6), (4, -4), (3, -3), (2, -2), (1, -1), (0, 0)

(ii) yes by commutativity of Addition

(-4) + (-2) = (-2) + (-4)

(iii) By existence of additive identity

0 + (-6) = -6 [∵ 0 + a = a]

Q.8

Ans.

(i) x +1 = 0

⟹ x + 1 - 1 = 0 - 1 [subtract ∵ on both sides]

⟹ x = -1

(ii) x + 5 = 0

x + 5 - 5 = 0 - 5

x + 0 = -5

⟹ x = -5

(iii) -3 + x = 0

3 - 3 + x = 0 + 3

x = 3

(iv) x + (-8) = 0

x - 8 = 0

x - 8 + 8 = 0 + 8

x = 8

(v) 7 + x = 0

⟹ 7 + x - 7 = 0 - 7

⟹ x = - 7

(vi) x + 0 = 0

x = 0.

Exercise 5.4

Q.1

Ans.

(i) Using the rule for sub traction, we have – 5 –12 = – 17.

(ii) In order to subtract -12 from 8, 8 – (–12) = 8 + 12 = 20.

(iii) -135 – (– 225) = 225 –135 = 90

(iv) 101 – 1001 = – 900

(v) 3126 – (– 812)6 = 3126 + 812 = 3938.

(vi) – 8-7560 = – 7568

(vii) – 4109 – (– 3978) = – 4109 + 3978 = – 131

(viii) –1005 – 0 = –1005

Q.2

Ans.

(i) – 27 – (– 23) = – 27 + 12

= 23 – 27

= – 4

(ii) – 17 –18 – (– 35) = – 35 + 35

= 0

(iii) –12 – (– 5) – (– 125) + 270 = – 12 + 5 + 125 + 270

= 400 – 12

= 388.

(iv) 373 + (– 245) + (– 373) + 145 + 3000 = 373 - 245 - 373 + 3145

= 3145 + 373 - 373 - 245

= 3145 - 245

= 2900.

(v) 1 - 475 - 475 - 475 + 1900 = 1 - 950 - 950 + 1900

= 1900 + 1 - 1900 = 1.

(vi) (-1) + (– 304) + 304 + 304 + (– 304) + 1 = -1 + 1 - 304 + 304 - 304 + 304 = 0

Q.3

Ans.

The sum of 5020 and 2320 is – 5020 + 2320

= 2320 – 5020

= – 2700.

⟹ – (– 2700) + (– 709) = – 709 – (– 2700)

= – 709 + 2700

= 1991

Q.4

Ans.

sum of -1250 and 1138 = - 1250 + 1138

= 1138 - 1250

= -112

Sum of 1136 and -1272 = 1136 - 1272

= – 136

⟹ – 136 - (-112) = -136 + 112

= – 24

Q.5

Ans.

Sum of 233 and -147 = 233 -147

= 86.

⟹ 86 – (– 284) = 86 + 284

= 370.

Q.6

Ans.

Given that,

Sum of two integer's = 238.

one of the integer = -122

Required integer = -(-122) + 238

= 238 + 122

360.

Q.7

Ans.

Required integer = -223 - 172

= - 395.

Q.8

Ans.

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

= – 8 -24 - 26 - 28 - 18-8 + 31+ 7 + 19 + 33

= – 32 - 26 - 28 - 26 + 38 + 19 + 33

= 38 - 32 - 26 - 28 + 33 - 26 + 19.

= 6 - 26 - 28 + 7 + 19

= 6 - 28 - 26 + 26

= 6 - 28

= -22.

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

= - 46 + 33 + 33 + 21 + 24 + 25 - 26 - 14 - 34

= - 46 + 66 + 21 + 24 + 25+ -74

= − 46 + 66 + 70 - 74

= − 46 - 4 + 66

= − 50 + 66

= 66 - 50

= 16.

Q.9

Ans.

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

= − 8

Q.10

Ans.

(i) If the number of term is 10

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

= 5 - 5 + 5 - 5 + 5 - 5 + 5 -5

= 0

(ii) If the number of terms is 11.

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

= 5 - 5 + 5 - 5 + 5 - 5 + 5 -5 + 5 - 5 + 5

= 5.

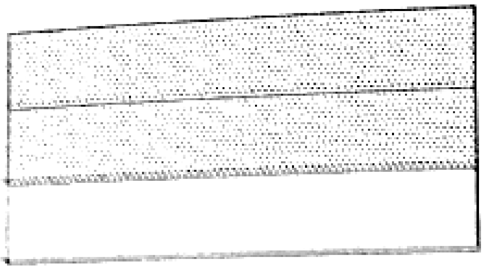
Fractions

Exercise 6.1

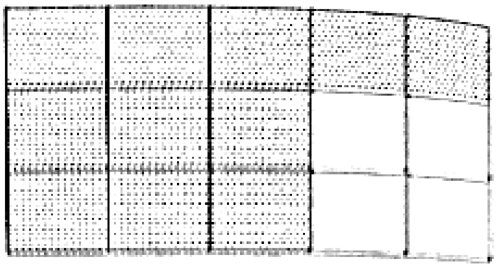
Question: 1

Write the fraction representing the shaded portion:

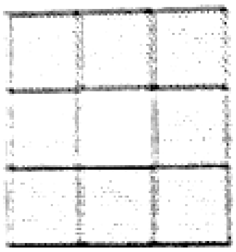
(i)



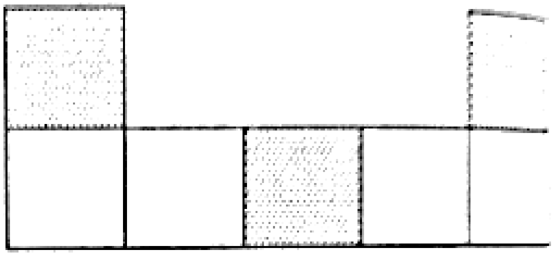
(ii)



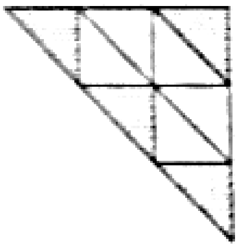
(iii)



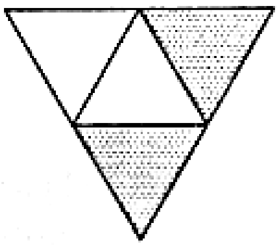
(iv)



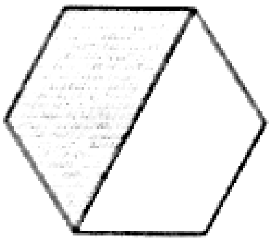
(v)



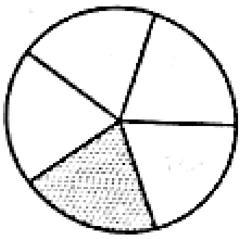
(vi)



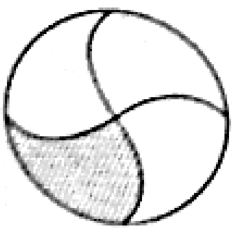
(vii)



(viii)



(ix)



Solution:

Fraction of the shaded portion = Number of shaded parts/Total number of parts

(i) Total number of parts = 3

Number of shaded parts = 2

Fraction of the shaded portion = 2/3

(ii) Total number of parts = 15

Number of shaded parts = 11

Fraction of the shaded portion = 11/15

(iii) Total number of parts = 9

Number of shaded parts = 8

Fraction of the shaded portion = 8/9

(iv) Total number of parts = 7

Number of shaded parts = 3

Fraction of the shaded portion = 3/7

(v) Total number of parts = 9

Number of shaded parts = 4

Fraction of the shaded portion = 4/9

(vi) Total number of parts = 4

Number of shaded parts = 2

Fraction of the shaded portion = 2/4 = 1/2

(vii) Total number of parts = 2

Number of shaded parts = 1

Fraction of the shaded portion = 1/2

(viii) Total number of parts = 5

Number of shaded parts = 1

Fraction of the shaded = 1/5

(ix) Total number of parts = 4

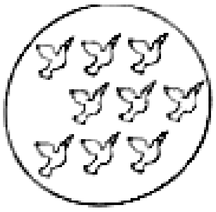
Number of shaded parts = 1

Fraction of the shaded portion = ¼

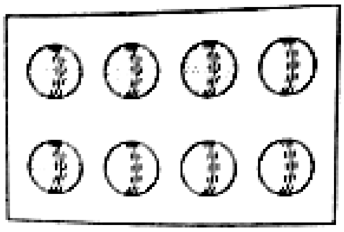
Question: 2

Write the fraction representing the shaded parts:

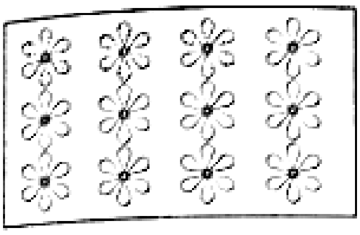
(i)



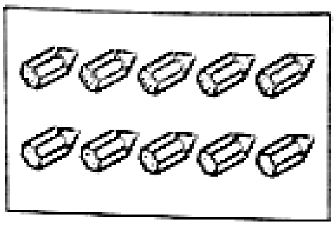
(ii)



(iii)



(iv)



Solution:

Fraction of the shaded portion = Number of shaded parts = Total number of parts

(i) Total number of parts = 9

Number of shaded parts = 3

Fraction of the shaded portion = 3/9 = 1/3

(ii) Total number of parts = 8

Number of shaded parts = 5

Fraction of the shaded portion = 4/8 = 1/2

(iii) Total number of parts = 12

Number of shaded parts = 3

Fraction of the shaded portion = 3/12 = 1/4

(iv) Total number of parts = 10

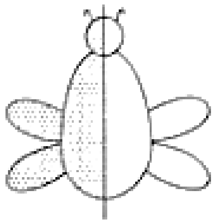
Number of shaded parts = 5

Fraction of the shaded portion = 5/10 = ½

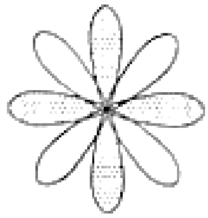
Question: 3

Write the fraction representing the shaded portion:

(i)



(ii)



Solution:

a) Total number of parts = 2

Number of shaded parts = 1

Fraction of the shaded portion = Number of shaded parts

Total number of parts = 1/2

b) Total number of parts = 8

Number of shaded parts = 4

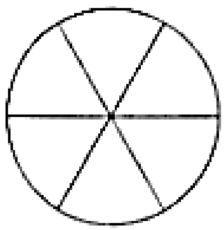
Fraction of the shaded portion = Number of shaded parts

Total number of parts = 4/8

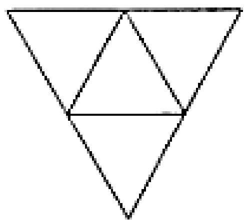
Question: 4

Colour the part according to the fraction given:

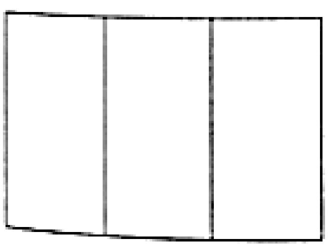
(i) $\frac{1}{6}$



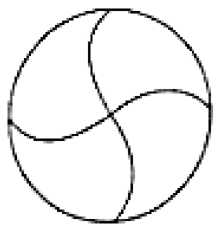
(ii) $\frac{2}{4}$



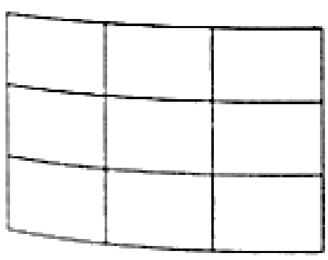
iii) $\frac{1}{3}$



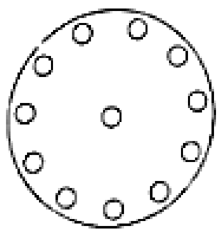
(iv) $\frac{3}{4}$



(v) $\frac{4}{9}$

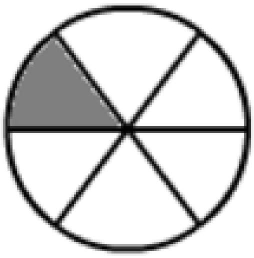


(vi) $\frac{1}{4}$

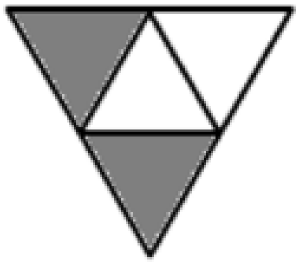


Solution:

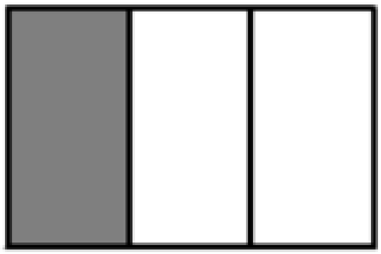
(i) $\frac{1}{6}$



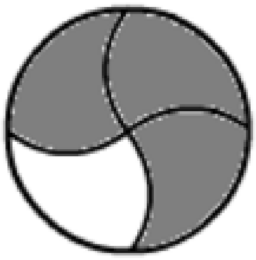
(ii) $\frac{2}{4}$



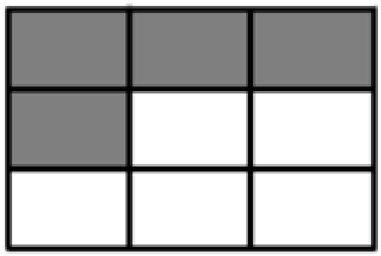
(iii) $\frac{1}{3}$



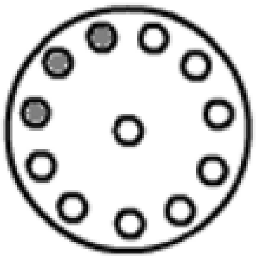
(iv) $\frac{3}{4}$



(v) $\frac{4}{9}$



(vi) $\frac{1}{4}$



Question: 5

What fraction of an hour is 20 minutes?

Solution:

Minutes in an hour = 60

20 minutes of an hour = 2060 = 13

Question: 6

Write the natural numbers from 2 to 12. What fraction of them are prime numbers?

Solution:

Natural numbers from 2 to 12 are 2, 3, 4 , 5 , 6 , 7 , 8 , 9 , 10 , 11 and 12.

Prime numbers from 2 to 12 are 2, 3 , 5 , 7 and 11

Out of 11 numbers, 5 are prime.

Fraction of the prime numbers = 511

Question: 7

Write the natural numbers from 102 to 113. What fraction of them are prime numbers.

Solution:

Natural numbers from 102 to 113 are 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112 and 113.

Prime numbers from 102 to 113 are 103, 107, 109 and 113.

Out of 12 natural numbers, 4 are prime.

Fraction of the prime numbers = 4/12 = 1/3

Question: 8

Mukesh has a box of 24 pencils. He gives half of them to sunita. How many does sunita get? How many does mukesh still have?

Solution:

Given data: Mukesh has 24 pencils

Sunita gets half of mukesh's pencils

Sunita gets 242 pencils, that is, 12 pencils.

Number of pencils mukesh still has = 24 – 12 = 12

Question: 9

Kavita has 44 cassettes. She gives 3/4 *of them to Sonia. How many does Sonia get? How many does kavita keep?*

Solution:

Kavita has 44 cassettes.

She gives 34 of the cassettes to Sonia.

For this, Kavita divides 44 cassettes in 4 equal parts and takes 3 parts.

Therefore, 44/4 = 11

It means that Kavita gives 33 cassettes to Sonia.

Number of cassettes Kavita has = 44 – 33 = 11

Question: 10

Shikas has three frocks that she wears when playing. The material is good, but the colours are faded. Her mother buys some blue dye and uses it on two of the frocks. What fraction of all of the shikas play frocks did her mother dye?

Solution:

Total frocks shikha has = 3

Number of frocks dyed by shikha's mother = 2

Fraction of the dyed frocks = 23

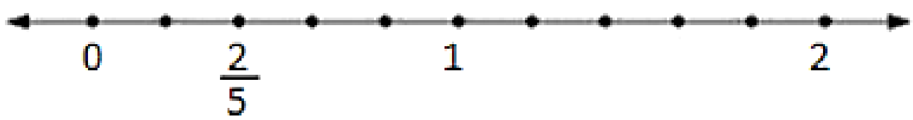
Therefore, shikha's mother dyed 23 of shikha's frocks.

Exercise 6.2

Question: 1

Represent 2/5 *on a number line.*

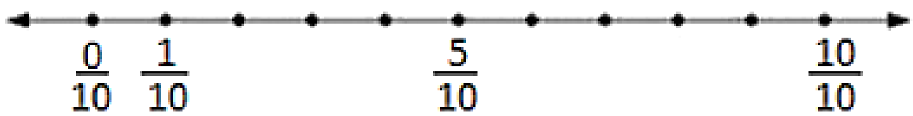
Solution:



Question: 2

Represent 0/10, 1/10, 5/10 *and* 10/10 *on a number line.*

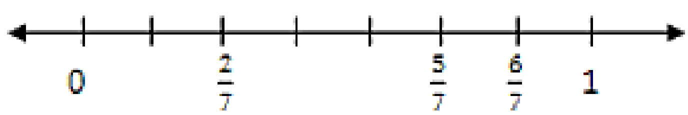
Solution:



Question: 3

Represent 2/7, 5/7 *and* 6/7 *on a number line.*

Solution:



Question: 4

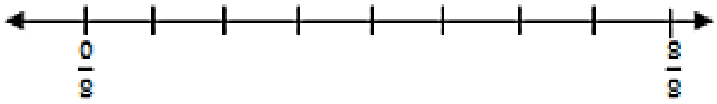
How many fractions lie between 0 and 1?

Infinite. We can check this by taking numerator less than denominator in a fraction.

Question: 5

Represent 0/8 *and* 8/8 *on a number line.*

Solution:



Exercise 6.3

Question: 1

Write each of the following divisions as fraction :

1. 6 ÷ 3

2. 25 ÷ 5

3.125 ÷ 50

4. 55 ÷ 11

Solution:

1. 6/3

2. 25/5

3. 125/50

4. 55/11

Question: 2

Write each of the following fractions as divisions:

1. 9/7

2. 3/11

3. 90/63

4. 1/5

Solution:

1. 9 ÷ 7

2. 3 ÷ 11

3. 90 ÷ 63

4. 1 ÷ 5 <

Exercise 6.4

Question: 1

Convert each of the following into a mixed fraction:

i) 28/9

ii) 226/15

iii) 145/9

iv) 128/5

Solution:

i) $3\frac{1}{9}$

ii) $15\frac{1}{15}$

iii) $16\frac{1}{9}$

iv) $25\frac{3}{5}$

Question: 2

Convert each of the following into an improper fraction:

i) $7\frac{1}{4}$

ii) $8\frac{5}{7}$

iii) $5\frac{3}{10}$

iv) $12\frac{7}{15}$

Solution:

i) 29/9

ii) 61/7

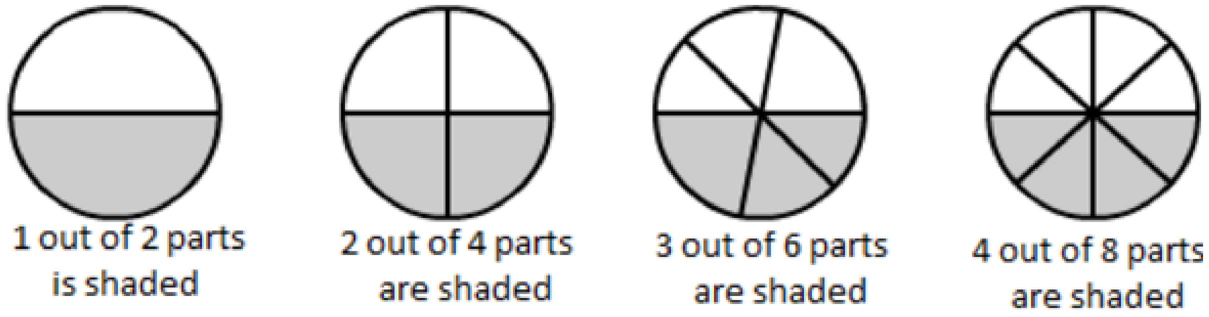
iii) 53/10

iv) 187/15

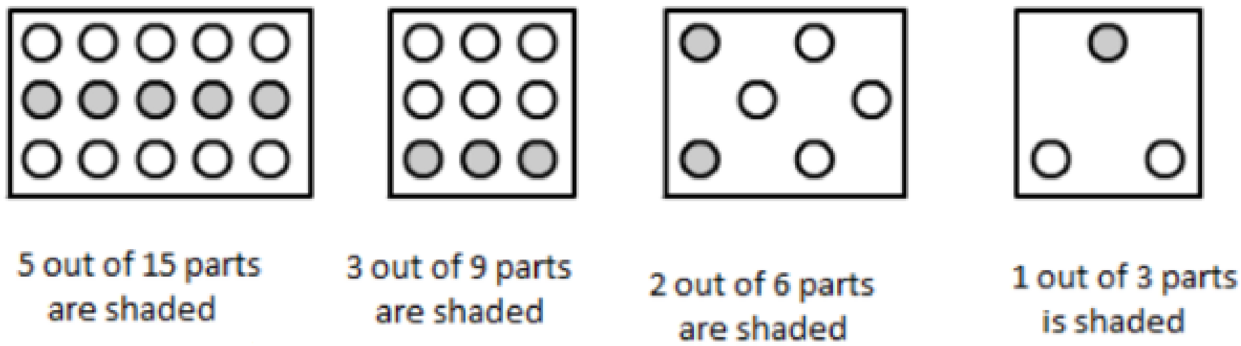
Exercise 6.5

Question: 1

(i)



(ii)



Solution:

(i)

Fraction = 1/2

Fraction = 2/4 = 1/2

Fraction = 3/6 = 1/2

Fraction = 4/8 = 1/2

Yes, they are equivalent

(ii)

Fraction = 5/15 = 1/3

Fraction = 3/9 = 1/3

Fraction = 2/6 = 1/3

Fraction = 1/3

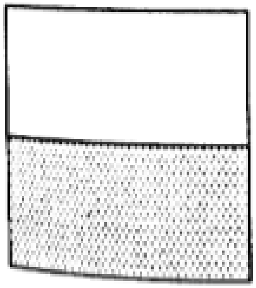
Yes, they are equivalent

Question: 2

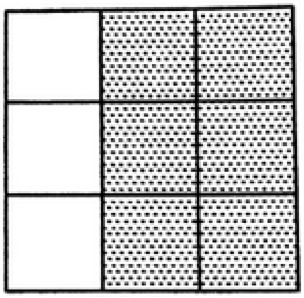
Write the fractions and match fractions in column I with the equivalent fractions in column II.

Column I

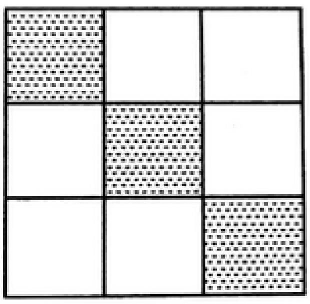
(i)



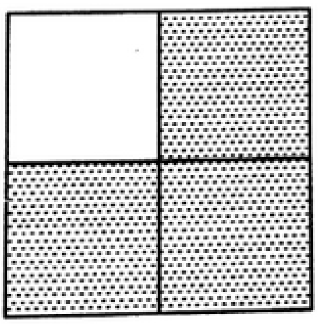
(ii)



(iii)

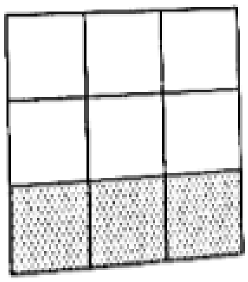


(iv)

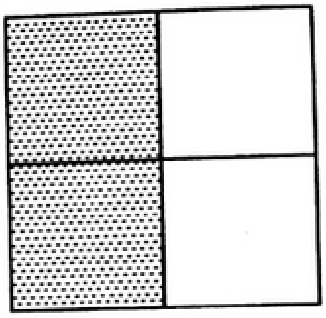


Column II

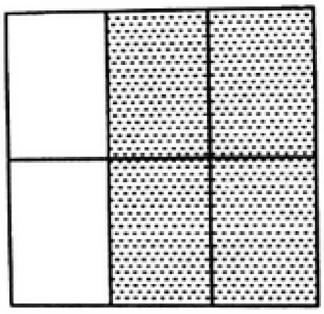
(a)



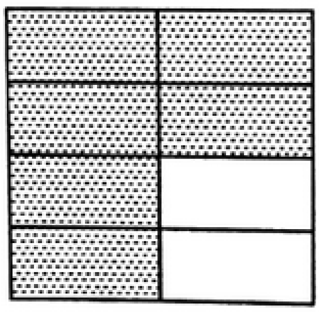
(b)



(c)



(d)



Solution:

(i) (b)

(ii) (c)

(iii) (a)

(iv) (d)

Question: 3

Replace * in each of the following by the correct number:

(i) 2/7 = 6/*

(ii) 5/8 = 10/*

(iii) 4/5 = */20

(iv) 45/60 = 15/*

(v) 18/24 = */4

Solution:

(i) 2/7 = 6/21

(ii) 5/8 = 10/16

(iii) 4/5 = 16/20

(iv) 45/60 = 15/20

(v) 18/24 = 3/8

Question: 4

Find the equivalent fraction of 35, having:

(i) Numerator 9

(ii) Denominator 30

(iii) Denominator 21

(iv) Numerator 40

Solution:

(i) 3/5 = 9

Consider the numerator = 9

As 3 × 3 = 9, we will multiply both the numerator and denominator by 3, we have

3/5 × 3/3 = 9/15

(ii) 3/5 = 30

Consider the denominator = 30

As 5 × 6 = 30, we multiply both the numerator and denominator by 6, we have

3/5 × 6/6 = 18/30 = 3/5

(iii) 3/5 = 21

Consider the denominator = 21

As 3 × 7 = 21, we multiply both the numerator and denominator by 7, we have

3/5 × 7/7 = 21/35

(iv) 3/5 = 40

Consider the numerator = 40

As 5 × 8 = 40, we multiply both the numerator and denominator by 8, we have

3/5 × 8/8 = 24/40

Question: 5

Find the fraction equivalent to 45/60, having:

(i) Numerator 15

(ii) Denominator 4

(iii) Denominator 240

(iv) Numerator 135

Solution:

(i) 45/60 = 15

Consider the numerator = 15

As 45 ÷ 3 = 15, we will divide both the numerator and denominator by 3, we have,

45/60 ÷ 3/3 = 15/20

(ii) 45/60 = 4

Consider the denominator = 4

As 60 ÷ 15 = 4, We divide both the numerator and denominator by 15,

we have ,

45/60 ÷ 15/15 = 3/4

(iii) 45/60 = 240

Consider the denominator = 240

As 60 × 4 = 240, we multiply both the numerator and denominator by 4, we have

45/60 × 4/4 = 180/240

(iv) 45/60 = 135

Consider the numerator = 135

As 45 x 3 = 135, we multiply both the numerator and denominator by 3, we have

45/60 × 3/3 = 135/180

Question: 6

Find the fraction equivalent to 35/42, having:

(i) Numerator 15

(ii) Denominator 18

(iii) Denominator 30

(iv) Numerator 30

Solution:

Firstly, we will reduce 35/42 into the lowest term. Now, we will divide both the numerator and denominator by the HCFs of 35 and 42, i.e 7, we have

35/42 ÷ 7/7 = 5/6

(i) 5/6 = 15

Consider the numerator = 15

As 5 × 3 = 15, we will multiply both the numerator and denominator by 3, we have

5/6 × 3/3 = 15/18

(ii) 5/6 = 18

Consider the denominator = 18

As 6 × 3 = 18, we multiply both the numerator and denominator by 3, we have

5/6 × 3/3 = 15/18

(iii) 5/6 = 30

Consider the denominator = 30

As 6 × 5 = 30, we multiply both the numerator and denominator by 5, we have

5/6 × 5/5 = 25/30

(iv) 5/6 = 30

Consider the numerator = 30

As 5 × 6 = 30, we multiply both the numerator and denominator by 6, we have

5/6 × 6/6 = 30/36

Question: 7

Check whether the given fractions are equivalent:

(i) 5/9, 30/54

(ii) 2/7, 16/42

(iii) 7/13, 5/11

(iv) 4/11, 32/88

(v) 3/10, 12/50

(vi) 9/27, 25/75

Solution:

(i) 5/9 × 6/6 = 30/54

Hence, the given fractions are equivalent

(ii) 2/7 × 8/8 = 16/42

27 is not equivalent to 16/42

(iii) 7/13 × 5/5 = 35/65

5/11 × 7/7 = 35/77

7/13 is not equivalent to 5/11

(iv) 4/11 × 8/8 = 32/88

4/11 is equivalent to 32/88

(v) 3/10 × 4/4 = 12/50

3/10 is not equivalent 12/50

(vi) 9/27 × 13/13 = 25/75

9/27 is equivalent 25/75

Question: 8

Match the equivalent fractions and write another 2 for each:

(i) 250/400	(a) 2/3
(ii) 180/200	(b) 2/5
(iii) 660/990	(c) 1/2
(iv) 180/360	(d) 5/8
(v) 220/550	(e) 9/10

Solution:

The correct matches for the above question are given below:

(i) (d), 250/400, 5/8

(ii) (e), 180/200, 9/10

(iii) (a), 660/990, 2/3

(iv) (c), 180/360, 1/2

(v) (b), 220/550, 2/5

Question: 9

Write some equivalent fractions which contain all digits from 1 to 9 once only.

Solution:

2/6 = 3/9 = 58/174, 2/4 = 3/6 = 79/158

Question: 10

Ravish had 20 pencils , sikha had 50 pencils and priya had 80 pencils. After 4 months, Ravish used up 10 pencils, sikha used up 25 pencils and priya used 40 pencils. What fraction did each use up? Check if each has used up an equal fraction of their pencils?

Solution:

Total pencils Ravish had = 20

Pencils used by Ravish = 10

Fraction of pencils used by ravish = 10 ÷ 10/20 ÷ 10 = 12 (Dividing both the numerator &

denominator by the HCFs of 10 & 20) Total pencils Shikha had = 50 Pencils used by

Shikha = 25 Fraction of pencils used by Shikha = 25 ÷ 25/50 ÷ 25 = 12 (Dividing both the numerator & denominator by the HCFs of 25 & 50)

Total pencils Priya had = 80

Pencils used by Priya = 40

Fraction of pencils used by Priya = 40 ÷ 40/80 ÷ 40 = 12 (Dividing both the numerator

& denominator by the HCFs of 40 & 80)

Yes, each of them has utilized an equal fraction of pencils.

Exercise 6.6

Question: 1

Reduce each of the following fractions to its lowest term (simplest form):

i) 40/75

ii) 42/28

iii) 12/52

iv) 40/72

v) 80/24

vi) 84/56

Solution:

i) 40/75

Factors of 40 are 1, 2, 4, 5, 8, 10, 20 and 40.

Factors of 75 are 1, 3, 5, 15 and 75.

Common factors of 40 and 75 are 1 and 5.

HCF = 5

Divide both the numerator & denominator by 5.

$$40 \div 575 \div 5 = \frac{8}{15}$$

Therefore, the simplest form obtained is 8/15

ii) 42/28

Factors of 42 are 1, 2, 3, 6, 7, 14, 21, 42

Factors of 28 are 1, 2, 4, 7, 14, 28

Common factors of 42 & 28 are 1, 2 and 4.

HCF = 4

Divide both the numerator & denominator by

$$\frac{14}{42} \div \left(\frac{14}{28}\right) \div 14 = 32$$

Therefore, the simplest form obtained is 32

iii) 12/52

Factors of 12 are 1, 2, 3, 4, 6 and 12.

Factors of 52 are 1, 2, 4, 13, 26 and 52.

Common factors of 12 and 52 are 1, 2 and 4

HCF = 4

Divide both the numerator & denominator by 4.

On solving the above we have,

3/13

Therefore, the simplest form obtained is 3/13

iv) 40/72

Factors of 40 are 1, 2, 4, 5, 8, 10, 20, 40

Factors of 72 are 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72

Common factors of 40 and 72 are 1, 2, 4 and 8.

HCF = 8

Divide both the numerator & denominator by 8.

On solving the above equation, we have:

5/9

Therefore, the simplest form obtained is 5/9

v) 80/24

Factors of 80 are 1, 2, 4, 5, 8, 10, 16, 20, 40 and 80.

Factors of 24 are 1, 2, 3, 4, 6, 8, 12 and 24.

Common factors of 80 and 24 are 1, 2 , 4 , 8

HCF = 8

Divide both the numerator & denominator by 4.

On solving the above equation, we have:

10/3

Therefore, the simplest form obtained is 10/3

vi) 84/56

Factors of 84 are 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42 and 84.

Factors of 56 are 1, 2, 4, 7, 8, 14, 28 and Common factors of 84 & 56 are 1, 2, 4, 7, 14 and 28.

HCF = 28

Divide both the numerator & denominator by 28

On solving the above equation, we have:

3/2

Therefore, the simplest form obtained is 3/2

Question: 2

Simplify each of the following to its lowest form:

i) 75/80

ii) 52/76

iii) 84/98

iv) 68/17

v) 150/50

vi) 162/108

Solution:

i) 75/80

Factors of 75 are 1, 3, 5, 15, 25 and 75.

Factors of 80 are 1, 2, 4, 5, 8, 10, 12, 16, 20, 40 and 80.

Common factors of 75 and 80 are 1 and 5.

HCF of 75 and 80 is 5.

Dividing both the numerator and denominator by 5, we get:

$$\frac{75}{80} \div \frac{5}{5} = \frac{15}{16}$$

Therefore, the simplest form obtained is

$$\frac{75}{80} = \frac{15}{16}$$

ii) 52/76

Factors of 52 are 1, 2, 4, 13, 26 and 52.

Factors of 76 are 1, 2, 4, 19, 38 and 76.

Common factors of 52 and 76 are 1, 2 and 4.

HCF of 52 and 76 is 4.

Dividing both the numerator and denominator by 5, we get:

$$\frac{52}{72} \div \frac{4}{4} = \frac{13}{19}$$

Therefore, the simplest form obtained is

$$\frac{52}{72} = \frac{13}{19}$$

iii) 84/98

Factors of 84 are 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42 and 84.

Factors of 98 are 1, 2, 7, 14, 49 and 98.

Common factors of 84 and 98 are 1, 2, 7 and 14.

HCF of 84 and 98 is 14

Dividing both the numerator and denominator by 5, we get:

$$\frac{84}{98} \div \frac{14}{14} = \frac{6}{7}$$

Therefore, the simplest form obtained is

84/98 = 6/7

iv) 68/17

Factors of 68 are 1, 2, 4, 17, 34 and 68.

Factors of 17 are 1 and 17.

Common factor of 68 and 17 is 17

HCF of 68 and 17 is 17

Dividing both the numerator and denominator by 5, we get:

$$\frac{68}{17} \div \frac{17}{17} = \frac{4}{1}$$

Therefore, the simplest form obtained is

68/17 = 4/1

v) 150/50

Factors of 150 are 1, 2, 3, 5, 6, 10, 15, 25, 50 and 150.

Factors of 50 are 1, 2, 5, 10, 25 and 50.

Common factor of 150 and 50 is 50

HCF of 150 and 50 is 50

Dividing both the numerator and denominator by 50, we get:

$$\frac{150}{50} \div \frac{50}{50} = 31$$

Therefore, the simplest form obtained is

150/50 = 3/1

vi) 162/108

Factors of 162 are 1, 2, 3, 6, 9, 18, 27, 54, 81 and 162.

Factors of 108 are 108, 1, 2, 3, 4, 6, 9, 12, 18, 27 and 54.

Common factor of 162 and 108 are 1, 2, 3, 6, 9, 18, 27, 54

HCF of 162 and 108 is 54

Dividing both the numerator and denominator by 54, we get:

$$\frac{162}{108} \div \frac{54}{54} = \frac{3}{2}$$

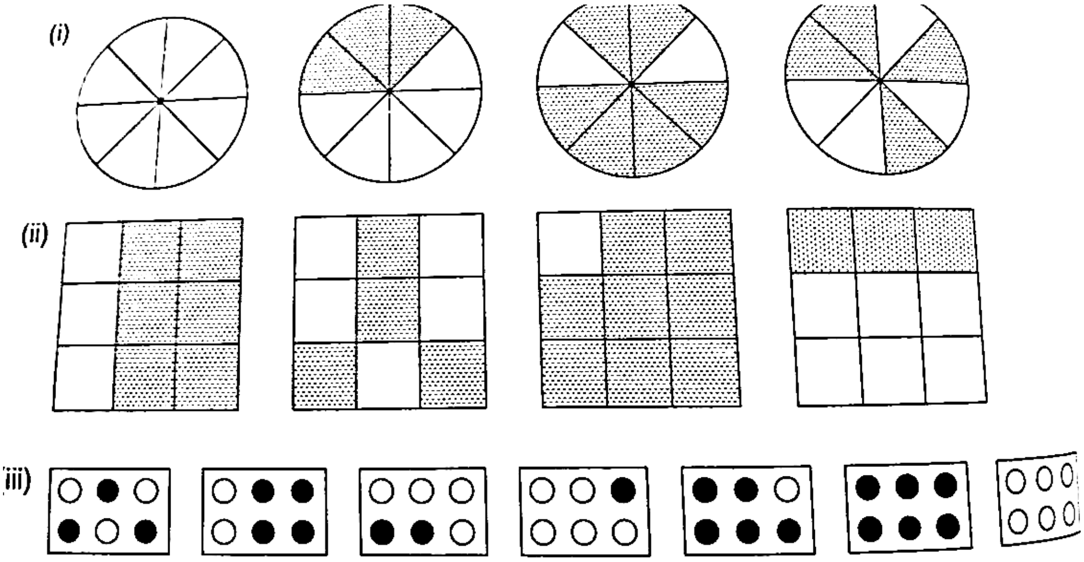
Therefore, the simplest form obtained is

162/108 = 3/2

Exercise 6.7

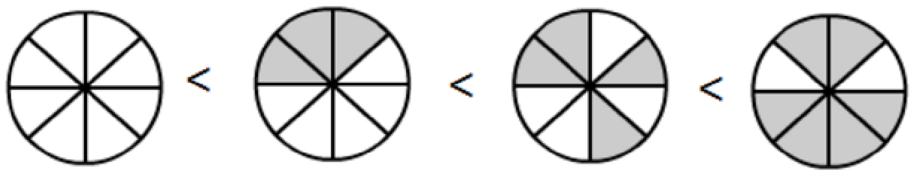
Question: 1

Write each fraction. Arrange them in ascending and descending order using correct sign ‵ < ‵ , ‵ = ‵ > ‵ between the fractions:



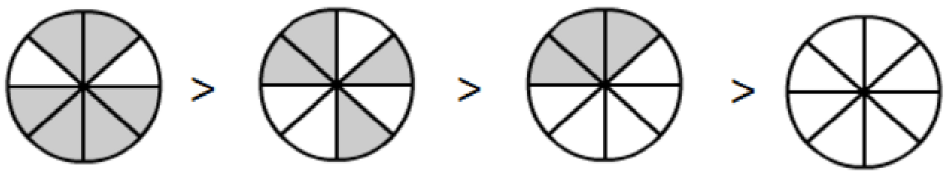
Solution:

(i) Ascending order



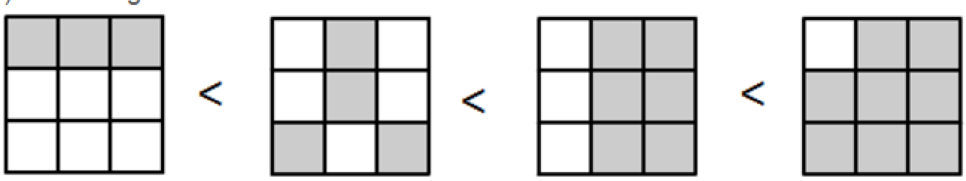
Fraction= $\frac{0}{8}$ Fraction= $\frac{3}{8}$ Fraction= $\frac{4}{8}$ Fraction= $\frac{6}{8}$

Descending order



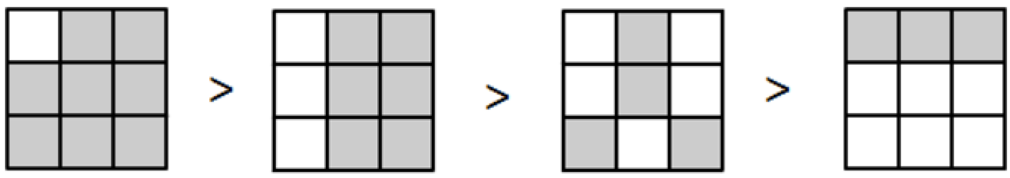
Fraction= $\frac{6}{8}$ Fraction= $\frac{4}{8}$ Fraction= $\frac{3}{8}$ Fraction= $\frac{0}{8}$

(ii) Ascending order



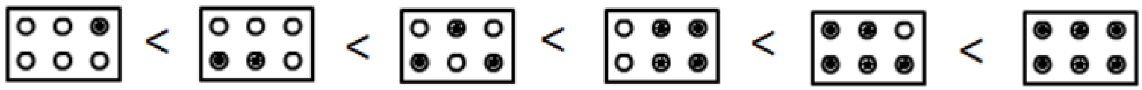
Fraction= $\frac{3}{9}$ Fraction= $\frac{4}{9}$ Fraction= $\frac{6}{9}$ Fraction= $\frac{8}{9}$

Descending order



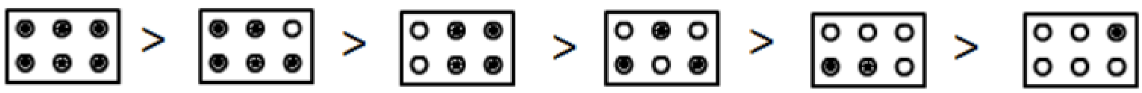
Fraction= $\frac{8}{9}$ Fraction= $\frac{6}{9}$ Fraction= $\frac{4}{9}$ Fraction= $\frac{3}{9}$

(iii) Ascending order



Fraction= $\frac{1}{6}$ Fraction= $\frac{2}{6}$ Fraction= $\frac{3}{6}$ Fraction= $\frac{4}{6}$ Fraction= $\frac{5}{6}$ Fraction= $\frac{6}{6}$

Descending order



Fraction= $\frac{6}{6}$ Fraction= $\frac{5}{6}$ Fraction= $\frac{4}{6}$ Fraction= $\frac{3}{6}$ Fraction= $\frac{2}{6}$ Fraction= $\frac{1}{6}$

Question: 2

Mark 2/6,4/6, 8/6, 6/6 on the number line and put appropriate signs between fractions given below:

i) $\frac{5}{6}$ — — — — $\frac{2}{6}$

ii) $\frac{3}{6}$ — — — — $\frac{0}{6}$

iii) $\frac{1}{6}$ — — — — $\frac{6}{6}$

iv) $\frac{8}{6}$ — — — — $\frac{5}{6}$

Solution:

i) 56 > 26 because 5 > 2 and the denominator is the same.

ii) 36 > 06 because 3 > 0 and the denominator is the same.

iii) 16 < 66 because 6 > 1 and the denominator is the same.

iv) 86 > 56 because 8 > 5 and the denominator is the same.

Question: 3

Compare the following fractions and put an appropriate:

i) $\frac{3}{6}$ ———— $\frac{5}{6}$

ii) $\frac{4}{5}$ ———— $\frac{0}{5}$

iii) $\frac{3}{20}$ ———— $\frac{4}{20}$

iv) $\frac{1}{7}$ ———— $\frac{1}{4}$

Solution:

i) 36 < 56 because 3 < 5 and the denominator is the same.

ii) 45 > 05 because 4 > 0 and the denominator is the same.

iii) 320 < 420 because 3 < 4 and the denominator is the same.

iv) 17 < 14 because 7 > 4; if the numerator is the same, then the fraction that has smaller denominator is greater.

Question: 4

Compare the following fractions using the symbol > or <:

i) 6/7 and 6/11

ii) 3/7 and 5/7

iii) 2/3 and 8/12

iv) 1/5 and 4/15

v) 8/3 and 8/13

vi) 4/9 and 15/8

Solution:

i) 6/7 > 6/11 because if the numerator is the same, then the fraction with smaller denominator is greater.

ii) 3/7 < 5/7 because 3 < 5 and the denominator is the same.

$$\text{iii) } \frac{8}{12} = \frac{2\times 2\times 2}{2\times 2\times 3} = \frac{2}{3} \text{ therefore, } \frac{2}{3} = \frac{8}{12}$$

$$\text{iv) } \frac{1}{5} = \frac{1}{5}\times\frac{3}{3} = \frac{3}{15}, \text{therefore } \frac{3}{15} < \frac{4}{15}$$

(Because 3 < 4 and the denominator is the same. Therefore, 1/15 < 4/15)

v) 8/3 < 8/13 Because if the numerator is the same, then the fraction with smaller denominator is greater.

$$\text{vi) } \frac{4}{9} = \frac{4}{9}\times\frac{8}{8} = \frac{32}{72}$$

$$\frac{15}{8} = \frac{15}{8}\times\frac{9}{9} = \frac{135}{72} \frac{32}{72} < \frac{135}{72}$$

(Because 135 > 32 and the denominator is the same)

Therefore, 4/9 < 15/8

Question: 5

The following fractions represent just three different numbers. Separate them in to three groups of equal fractions by changing each one to its simplest form:

i) 2/12

ii) 3/15

iii) 8/50

iv) 16/100

v) 10/60

vi) 15/75

vii) 12/60

viii) 16/96

ix) 12/75

x) 12/72

xi) 3/18

xii) 4/25

Solution:

i) 2/12

HCF of 2 & 12 is 2.

Divide both the numerator & denominator by the HCF of 2 &12

$$2 \div \frac{2}{12} \div 2 = \frac{1}{6}$$

ii) 3/15

HCF of 3 & 15 is 3.

Divide both the numerator & denominator by the HCF of 3 &15.

$$3 \div \frac{3}{15} \div 3 = \frac{1}{5}$$

iii) 8/50

HCF of 8 & 50 is 2.

Divide both the numerator & denominator by the HCF of 8 & 50.

$$8 \div \frac{2}{50} \div 2 = \frac{4}{25}$$

iv) 16/100

HCF of 16 & 100 is 4.

Divide both the numerator & denominator by the HCF of 16 & 100.

$$16 \div \frac{4}{100} \div 4 = \frac{4}{25}$$

v) 10/60

HCF of 10 & 60 is 10.

Divide both the numerator & denominator by the HCF of 10 & 60.

$$10 \div \frac{10}{60} \div 10 = \frac{1}{6}$$

vi) 15/75

HCF of 15 & 75 is 15.

Divide both the numerator & denominator by the HCF of 15 & 75.

$$15 \div \frac{15}{75} \div 15 = \frac{1}{5}$$

vii) 12/60

HCF of 12 & 60 is 12.

Divide both the numerator & denominator by the HCF of 12 & 60.

$$12 \div \frac{12}{60} \div 12 = \frac{1}{5}$$

viii) 16/96

HCF of 16 & 96 is 16.

Divide both the numerator & denominator by the HCF of 16 & 96

$$16 \div \frac{16}{96} \div 16 = \frac{1}{6}$$

ix) 12/75

HCF of 12 & 75 is 3.

Divide both the numerator & denominator by the HCF of 12 & 75.

$$12 \div \frac{3}{75} \div 3 = \frac{4}{25}$$

x) 12/72

HCF of 12 & 72 is 12.

Divide both the numerator & denominator by the HCF of 12 & 72

$$12 \div \frac{12}{72} \div 12 = \frac{1}{6}$$

xi) 3/18

HCF of 3 & 18 is 3.

Divide both the numerator & denominator by the HCF of 3 & 18.

$$3 \div \frac{3}{18} \div 3 = \frac{1}{6}$$

xii) 4/25

HCF of 4 & 25 is 1.

Divide both the numerator & denominator by the HCF of 4 & 25

$$4 \div \frac{1}{25} \div 1 = \frac{4}{25}$$

Three groups of equal fractions:

$$\frac{2}{12}, \frac{10}{60}, \frac{16}{96}, \frac{12}{72}, \frac{3}{18}; \frac{3}{15}, \frac{8}{50}, \frac{16}{100}, \frac{15}{75}, \frac{12}{60}, \frac{12}{75}, \frac{4}{25}$$

Question: 6

Isha read 25 pages of a book containing 100 pages. Nagma read 1/2 of the same book. Who read less?

Solution:

Total pages in the book = 100

$$\text{Fraction of the book read by Isha} = 25 \div \frac{25}{100} \div 25 = \frac{1}{4}$$

(Dividing numerator & denominator by the HCF of 25 & 100)

Fraction of the book read by Nagma = 12

Now, compare 14 & 12.

LCM of 4 & 2 is 4.

Convert each fraction into equivalent fraction with 4 as its denominator.

$$1 \times \frac{1}{4} \times 1 \text{ and } 1 \times \frac{2}{2} \times \frac{2}{14} \text{ and } \frac{1}{4} = \frac{2}{4}$$

Therefore, Isha read less.

Question: 7

Arrange the following fractions in the ascending order:

i) $\frac{2}{9}, \frac{7}{9}, \frac{3}{9}, \frac{4}{9}, \frac{1}{9}, \frac{6}{9}, \frac{5}{9}$

ii) $\frac{7}{8}, \frac{7}{25}, \frac{7}{11}, \frac{7}{18}, \frac{7}{10}$

iii) $\frac{37}{47}, \frac{37}{50}, \frac{37}{100}, \frac{37}{100}, \frac{37}{85}, \frac{37}{41}$

iv) $\frac{3}{5}, \frac{1}{5}, \frac{4}{5}, \frac{2}{5}$

v) $\frac{2}{5}, \frac{3}{4}, \frac{1}{2}, \frac{3}{5}$

vi) $\frac{3}{8}, \frac{3}{12}, \frac{3}{6}, \frac{3}{4}$

vii) $\frac{4}{6}, \frac{3}{8}, \frac{6}{12}, \frac{5}{16}$

Solution:

i) 2/9, 7/9, 3/9, 4/9, 1/9, 6/9, 5/9, when the denominators are the same and numerators are different, then the fraction with greater numerator has a larger value.

ii) 7/8, 7/25, 7/11, 7/18, 7/10, when numerator are the same and denominators are different, the fraction with greater denominator has a smaller value.

iii) 37/47, 37/50, 37/100, 37/100, 37/85, 37/41

When numerators are the same and denominator has a smaller value.

iv) 3/5, 1/5, 4/5, 2/5

When denominators are the same and numerators are different, then the fraction with greater numerator has a larger value.

v) LCM of 2, 4 and 5 is 20

$$\frac{2}{5} = \frac{2}{5} \times \frac{4}{4} = \frac{8}{20}$$

$$\frac{3}{4} = \frac{3}{4} \times \frac{5}{5} = \frac{15}{20}$$

$$\frac{2}{5} = \frac{2}{5} \times \frac{4}{4} = \frac{8}{20}$$

vi) 3/12, 3/8, 3/6, 3/4.

vii) 5/16, 3/8, 6/12, 4/6

Question: 8

Arrange in descending order in each of the following using symbols >:

i) 8/17, 8/9, 8/5, 8/13

ii) 5/9, 3/12, 1/3, 4/15

Solution:

i) 8/5 > 8/9 > 8/13 > 8/17

ii) 5/9 > 1/3 > 3/12 > 4/15

Question: 9

Find answers to the following. Write and indicate how you solved them.

i) Is 5/9 equal to 4/5?

ii) Is 9/16 equal to 5/9?

iii) Is 4/5 equal to 16/20?

iv) Is 1/15 equal to 4/30?

Solution:

i) No. $5 \times 5 \neq 9 \times 4$

ii) No. $9 \times 9 \neq 16 \times 5$

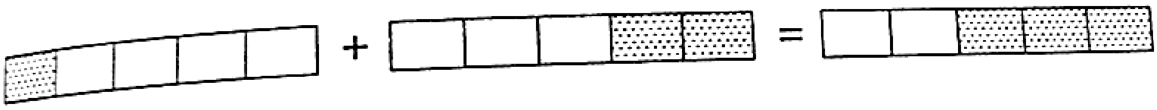
iii) yes. $4 \times 20 = 16 \times 5$

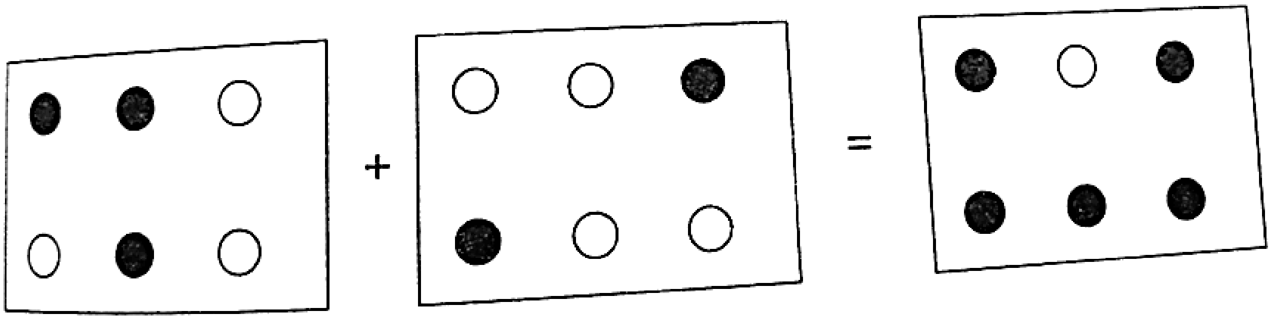
iv) No. $1 \times 30 = 15 \times 4$

Exercise 6.8

Question: 1

Write these fractions appropriately as additions or subtraction:





Solution:

(i) $\frac{1}{5}+\frac{2}{5}=\frac{3}{5}$ $\left[\because \frac{1+2}{5}=\frac{3}{5}\right]$

(ii) $\frac{3}{6}+\frac{2}{6}=\frac{5}{6}$

Question: 2

Solve:

i) $\frac{5}{12}+\frac{1}{12}$

ii) $\frac{3}{15}+\frac{7}{15}$

iii) $\frac{3}{22}+\frac{7}{22}$

iv) $\frac{1}{4}+\frac{0}{4}$

v) $\frac{4}{13}+\frac{2}{13}+\frac{1}{13}$

vi) $\frac{0}{15}+\frac{2}{15}+\frac{1}{15}$

vii) $\frac{7}{31}-\frac{4}{31}+\frac{9}{31}$

viii) $3\frac{2}{7}+\frac{1}{7}-2\frac{3}{7}$

ix) $2\frac{1}{3}-1\frac{2}{3}-4\frac{1}{3}$

x) $\frac{1}{1}-\frac{2}{3}+\frac{7}{3}$

xi) $\frac{16}{7}-\frac{5}{7}+\frac{9}{7}$

Solution:

i) The given fractions are:

$$\frac{5}{12}+\frac{1}{12}=\frac{1+2}{5}=\frac{3}{5}$$

Hence the answer is 3/5

ii) The given fractions are:

$$\frac{3}{6}+\frac{2}{6}=\frac{3+2}{6}=\frac{8}{6}=\frac{4}{3}$$

Hence the answer is 4/3

iii) the given fractions are:

$$\frac{3}{22}+\frac{7}{22}=\frac{3+7}{22}=\frac{10}{22}=\frac{5}{11}$$

Hence the answer is 5/11

iv) the given fractions are:

$$\frac{1}{4}+\frac{0}{4}$$

$$=\frac{1+0}{4}=\frac{1}{4}$$

Hence the answer is 1/4

v) The given fractions are:

$$\frac{4}{13}+\frac{2}{13}+\frac{1}{13}$$

$$=\frac{4+2+1}{13}=\frac{7}{13}$$

Hence the answer is 7/13

vi) the given fractions are:

$$\frac{0}{15}+\frac{2}{15}+\frac{1}{15}$$

$$=\frac{0+2+1}{15}=\frac{3}{15}=\frac{1}{5}$$

Hence the answer is 1/5

vii) the given fractions are:

$$\frac{7}{31}-\frac{4}{31}+\frac{9}{31}$$

$$=\frac{7-4+9}{31}=\frac{12}{31}$$

Hence the answer is 12/31

viii) the given fractions are:

$$3\frac{2}{7}+\frac{1}{7}-2\frac{3}{7}$$

$$=\frac{23+1-17}{7}=\frac{7}{7}=\frac{1}{1}=1$$

Hence the answer is 1/1 = 1

ix) the given fractions are:

$$3\frac{2}{7}+\frac{1}{7}-2\frac{3}{7}$$

$$=\frac{23+1-17}{7}=\frac{35}{7}=\frac{5}{1}=5$$

Hence the answer is 5/1 = 5

x) the given fractions are:

$$\frac{1}{1}-\frac{2}{3}+\frac{7}{3}$$

$$=\frac{3-2+7}{3}=\frac{8}{3}$$

Hence the answer is 8/3

xi) the given fractions are:

$$\frac{16}{7}-\frac{5}{7}+\frac{9}{7}$$

$$=\frac{16-5+9}{7}=\frac{20}{7}$$

Hence the answer is 20/7

Question: 3

Shikha painted 1/5 of the wall space in her room. Her brother ravish helped and painted 3/5 of the wall space. How much did they paint together? How much the room is left unpainted?

Solution:

Shikha painted 1/5 of the wall space in her room

Ravish painted 3/5 of the wall space

Wall space painted by both of them together $= \frac{1}{5} + \frac{3}{5} = \frac{1+3}{5} = \frac{4}{5}$

Unpainted part of the room $= \frac{1-4}{5} = \frac{5-4}{5} = \frac{1}{5}$

Question: 4

Ramesh bought $2\frac{1}{2}$ kg sugar whereas rohit bought $3\frac{1}{2}$ kg of sugar. Find the total amount of sugar bought by both of them.

Solution:

Quantity of sugar bought by ramesh = $2\frac{1}{2}$ kg

$= \frac{(2 \text{ x } 2) + 1}{2} = \frac{5}{2}$ kg

Quantity of sugar bought by rohit = $3\frac{1}{2}$ kg

$= \frac{(2 \text{ x } 3) + 1}{2} = \frac{7}{2}$ kg

Total amount of sugar bought by them:

Quantity of sugar bought by rohit + Quantity of sugar bought by ramesh

$= \frac{5}{2}$ kg $+ \frac{7}{2}$ kg

= 6 kg (Dividing numerator and denominator by their HCF (6))

Question: 5

The teacher taught 3/5 **of the book, Vivek revised** 1/5 **more on his own. How much does he still have to revise?**

Solution:

Fraction of the book taught by the teacher = 3/5

Fraction of the book revised by vivek = 1/5

Fraction of the book still left for revision by vivek:

$$\frac{3}{5}-\frac{1}{5}=\frac{3-1}{5}=\frac{2}{5}$$

Therefore, Fraction of the book still left for revision by vivek is 2/5

Question: 6

Amit was given 5/7 **of a bucket of oranges. What fraction of oranges was left in the basket?**

Solution:

Fraction of oranges given to amit = 5/7

Fraction of oranges left in the basket:

$$1-\frac{5}{7}=\frac{7-5}{7}=\frac{2}{7}$$

Therefore, Fraction of oranges left in the basket is 2/7

Question: 7

i) $\frac{7}{10}-\frac{*}{*}=\frac{3}{10}$

ii) $\frac{*}{*}-\frac{3}{21}=\frac{5}{21}$

iii) $\frac{*}{*}-\frac{3}{6}=\frac{3}{6}$

iv) $\frac{*}{*}-\frac{5}{27}=\frac{12}{27}$

Solution:

i) Given:

$$\frac{7}{10} - \frac{*}{*} = \frac{3}{10}$$

$$\frac{7}{10} - \frac{3}{10} = \frac{*}{*}$$

$$\frac{7-3}{10} = \frac{2}{5}$$

Therefore,

$$\frac{*}{*} = \frac{2}{5}$$

ii) Given:

$$\frac{*}{*} - \frac{3}{21} = \frac{5}{21}$$

$$\frac{*}{*} = -\frac{3}{21} + \frac{5}{21}$$

$$\frac{5-3}{21} = \frac{2}{21}$$

Therefore,

$$\frac{*}{*} = \frac{2}{21}$$

iii) Given:

$$\frac{*}{*} - \frac{3}{6} = \frac{3}{6}$$

$$\frac{*}{*} = \frac{3}{6} + \frac{3}{6}$$

$$\frac{3+3}{6} = \frac{6}{6}$$

Therefore,

$$\frac{*}{*} = \frac{6}{6} = \frac{1}{1} = 1$$

iv) Given:

$$\frac{*}{*} - \frac{5}{27} = \frac{12}{27}$$

$$\frac{*}{*} = \frac{5}{27} + \frac{12}{27}$$

$$\frac{5+12}{27} = \frac{17}{27}$$

Therefore,

$$\frac{*}{*} = \frac{17}{27}$$

Exercise 6.9

Question: 1

Add:

i) 3/4 and 5/6

ii) 7/10 and 2/15

iii) 8/13 and 2/3

iv) 4/5 and 7/15

Solution:

i) Given: 3/4 and 5/6

$$\frac{3}{4}+\frac{5}{6}$$

LCM of 4 and 6 is 12, so we will convert each fraction into an equivalent fraction with denominator 12.

$$=\frac{3 \text{ x } 3}{4 \text{ x } 3}+\frac{5 \text{ x } 2}{6 \text{ x } 2}$$

$$=\frac{9}{12}+\frac{10}{12}$$

$$=\frac{9+10}{12}=\frac{19}{12}$$

ii) Given: 7/10 and 2/15

$$\frac{7}{10}+\frac{2}{15}$$

LCM of 10 and 15 is 30, so we will convert each fraction into an equivalent fraction with denominator 30.

$$= \frac{7 \times 3}{10 \times 3} + \frac{2 \times 2}{15 \times 2}$$

$$= \frac{21}{30} + \frac{4}{30}$$

$$= \frac{21 + 4}{30} = \frac{25}{30}$$

iii) Given: 8/13 and 2/3

$$\frac{8}{13} + \frac{2}{3}$$

LCM of 13 and 3 is 39, so we will convert each fraction into an equivalent fraction with denominator 39.

$$= \frac{8 \times 3}{13 \times 3} + \frac{2 \times 13}{3 \times 13}$$

$$= \frac{24}{39} + \frac{26}{39}$$

$$= \frac{24 + 26}{39} = \frac{50}{39}$$

iv) Given: 4/5 and 7/15

$$\frac{4}{5} + \frac{7}{15}$$

LCM of 5 and 15 is 1, so we will convert each fraction into an equivalent fraction with denominator 15.

$$= \frac{4 \times 3}{5 \times 3} + \frac{7 \times 1}{15 \times 1}$$

$$= \frac{12}{15} + \frac{7}{15}$$

$$= \frac{12 + 7}{15} = \frac{19}{15}$$

Question: 2

Subtract:

i) $\frac{2}{7}$ from $\frac{19}{21}$

ii) $\frac{21}{25}$ from $\frac{18}{20}$

iii) $\frac{7}{16}$ from $\frac{2}{1}$

iv) $\frac{4}{15}$ from $2\frac{1}{5}$

Solution:

i) Given: 2/7 and 19/21

$$\frac{2}{7}+\frac{19}{21}$$

LCM of 21 and 7 is 21, so we will convert each fraction into an equivalent fraction with denominator 21.

$$=\frac{19 \times 1}{21 \times 1}-\frac{2 \times 3}{7 \times 3}$$

$$=\frac{19}{21}-\frac{6}{21}$$

$$=\frac{19-6}{21}=\frac{13}{21}$$

ii) Given: 21/25 and 18/20

$$\frac{18}{20}-\frac{21}{25}$$

LCM of 20 and 25 is 100, so we will convert each fraction into an equivalent fraction with denominator 100.

$= \frac{18 \times 5}{20 \times 5} - \frac{21 \times 4}{25 \times 4}$

$= \frac{90}{100} - \frac{84}{100}$

$= \frac{90 - 84}{100} = \frac{6}{100}$

iii) Given: 2/1 and 7/16

$\frac{2}{1} - \frac{7}{16}$

LCM of 1 and 16 is 16, so we will convert each fraction into an equivalent fraction with denominator 16.

$= \frac{16 \times 2}{16 \times 1} - \frac{7 \times 1}{16 \times 1}$

$= \frac{32}{16} - \frac{7}{16}$

$= \frac{32 - 7}{16} = \frac{25}{16}$

iv) Given: $2\frac{1}{5}$ and $4\frac{1}{5}$

$\frac{(2 \times 5) + 1}{5} - \frac{4}{15}$

LCM of 5 and 15 is 15, so we will convert each fraction into an equivalent fraction with denominator 15.

$= \frac{11 \times 3}{5 \times 3} - \frac{4 \times 1}{15 \times 1}$

$= \frac{33}{15} - \frac{4}{15}$

$= \frac{33 - 4}{15} = \frac{29}{15}$

Question: 3

Find the difference of:

i) 13/24 and 7/16

i) 5/18 and 4/15

i) 1/12 and 3/4

i) 2/3 and 6/7

Solution:

i) Given: 13/24 and 7/16

$$\frac{13}{24} - \frac{7}{16}$$

$$= \frac{13 \text{ x } 2}{24 \text{ x } 2} - \frac{7 \text{ x } 3}{16 \text{ x } 3}$$

$$= \frac{26}{48} - \frac{21}{48} \text{ (because LCM of 24 and 16 is 48)}$$

$$= \frac{26 - 21}{48} = \frac{5}{48}$$

ii) Given: 5/18 and 4/15

$$\frac{5}{18} - \frac{4}{15}$$

$$= \frac{5 \text{ x } 5}{18 \text{ x } 5} - \frac{4 \text{ x } 6}{15 \text{ x } 6}$$

$$= \frac{25}{90} - \frac{24}{90} \text{ (because LCM of 18 and 15 is 90)}$$

$$= \frac{25 - 24}{90} = \frac{1}{90}$$

iii) Given: 3/4 and 1/12

$$\frac{3}{4} - \frac{1}{12}$$

$$= \frac{3 \ x\ 3}{4\ x\ 3} - \frac{1\ x\ 1}{12\ x 1}$$

$$= \frac{9}{12} - \frac{1}{12} \text{ (because LCM of 4 and 12 is 12)}$$

$$= \frac{9-1}{12} = \frac{8}{12}$$

iv) Given: 6/7 and 2/3

$$\frac{6}{7} - \frac{2}{3}$$

$$= \frac{6\ x\ 3}{7\ x\ 3} - \frac{2\ x\ 7}{3\ x\ 7}$$

$$= \frac{18}{21} - \frac{14}{21} \text{ (because LCM of 7 and 3 is 21)}$$

$$= \frac{18-14}{21} = \frac{4}{21}$$

Question: 4

Subtract as indicated:

i) $\frac{8}{3} - \frac{5}{9}$

ii) $4\frac{2}{5} - 2\frac{1}{5}$

iii) $5\frac{6}{7} - 2\frac{2}{3}$

iv) $4\frac{3}{4} - 2\frac{1}{6}$

Solution:

i) Given: 8/3 and 5/9

$\frac{8}{3} - \frac{5}{9}$

$= \frac{8 \, x \, 3}{3 \, x \, 3} - \frac{5 \, x \, 1}{9 \, x \, 1}$

$= \frac{24}{9} - \frac{5}{9}$ (because LCM of 3 and 9 is 9)

$= \frac{24-5}{9} = \frac{19}{9}$

ii) Given : $4\frac{2}{5}$ and $2\frac{1}{5}$

$4\frac{2}{5} - 2\frac{1}{5}$

$\frac{(5 \, x \, 4) + 2}{5} - \frac{(5 \, x \, 2) + 1}{5}$

$= \frac{22}{5} - \frac{11}{5}$

$= \frac{22-11}{5} = \frac{11}{5}$

iii) Given : $5\frac{6}{7}$ and $2\frac{2}{3}$

$5\frac{6}{7} - 2\frac{2}{3}$

$= \frac{(5 \, x \, 7) + 6}{7} - \frac{(3 \, x \, 2) + 2}{3}$

$= \frac{41}{7} - \frac{8}{3}$

$= \frac{(41 \, x \, 3)}{7 \, x \, 3} - \frac{(8 \, x \, 7)}{3 \, x \, 7}$

(because LCM of 7 and 3 is 21)

$= \frac{123}{21} - \frac{56}{21}$

$= \frac{123-56}{21} = \frac{67}{21}$

iv) Given: $4\frac{3}{4}$ and $2\frac{1}{6}$

$4\frac{3}{4} - 2\frac{1}{6}$

$= \frac{(4 \, x \, 4) + 3}{4} - \frac{(6 \, x \, 2) + 1}{6}$

$= \frac{19}{4} - \frac{13}{6}$

$= \frac{19 \, x \, 3}{4 \, x \, 3} - \frac{(13 \, x \, 2)}{6 \, x \, 2}$

(because LCM of 4 and 6 is 12)

$= \frac{57}{21} - \frac{26}{21}$

$= \frac{57-26}{21} = \frac{31}{12}$

Question: 5

Simplify:

i) $\frac{2}{3} + \frac{3}{4} + \frac{1}{2}$

ii) $\frac{5}{8} + \frac{2}{5} + \frac{3}{4}$

iii) $\frac{3}{10} + \frac{7}{15} + \frac{3}{5}$

iv) $\frac{3}{4} + \frac{7}{16} + \frac{5}{8}$

v) $4\frac{2}{3} + 3\frac{1}{4} + 7\frac{1}{2}$

vi) $\frac{7}{13} + 3\frac{2}{3} + 5\frac{1}{6}$

vii) $\frac{7}{1} + \frac{7}{4} + 5\frac{1}{6}$

viii) $\frac{5}{6} + \frac{3}{1} + \frac{3}{4}$

ix) $\frac{7}{18} + \frac{5}{6} + 1\frac{1}{12}$

Solution:

i) given: $\frac{2}{3}+\frac{3}{4}+\frac{1}{2}$

$= \frac{2 \text{ x } 4}{3 \text{ x } 4}+\frac{3 \text{ x } 3}{4 \text{ x } 3}+\frac{1 \text{ x } 6}{2 \text{ x } 6}$ (because LCM of 3, 4 and 2 is 12)

$= \frac{8}{12}+\frac{9}{12}+\frac{6}{12}$

$= \frac{8+9+6}{12} = \frac{23}{12}$

ii) given: $\frac{5}{8}+\frac{2}{5}+\frac{3}{4}$

$= \frac{5 \, x \, 5}{8 \, x \, 5}+\frac{2 \, x \, 8}{5 \, x \, 8}+\frac{3 \, x \, 10}{4 \, x \, 10}$ (because LCM of 8, 5 and 4 is 40)

$= \frac{25}{40}+\frac{16}{40}+\frac{30}{40}$

$= \frac{25+16+30}{40} = \frac{71}{40}$

iii) given: $\frac{3}{10}+\frac{2}{5}+\frac{3}{4}$

$= \frac{5 \text{ x } 5}{8 \text{ x } 5}+\frac{2 \text{ x } 8}{5 \text{ x } 8}+\frac{3 \text{ x } 10}{4 \text{ x } 10}$ (because LCM of 8, 5 and 4 is 40)

$= \frac{25}{40}+\frac{16}{40}+\frac{30}{40}$

$= \frac{25+16+30}{40} = \frac{71}{40}$

iv) given: $\frac{3}{4}+\frac{7}{16}+\frac{5}{8}$

$= \frac{3 \text{ x } 4}{4 \text{ x } 4}+\frac{7 \text{ x } 1}{16 \text{ x } 1}+\frac{5 \text{ x } 2}{8 \text{ x } 2}$ (because LCM of 4, 16 and 8 is 16)

$= \frac{12}{16}+\frac{7}{16}+\frac{10}{16}$

$= \frac{12+7+10}{16} = \frac{29}{16}$

v) given: $4\frac{2}{3} + 3\frac{1}{4} + 7\frac{1}{2}$

$= \frac{(4 \text{ x } 3) + 2}{3} + \frac{(3 \text{ x } 4) + 1}{4} + \frac{(7 \text{ x } 2) + 1}{2}$

$= \frac{14}{3} + \frac{13}{4} + \frac{15}{2}$

$= \frac{14 \text{ x } 4}{3 \text{ x } 4} + \frac{13 \text{ x } 3}{4 \text{ x } 3} + \frac{15 \text{ x } 6}{2 \text{ x } 6}$ (because LCM of 3, 4 and 2 is 12)

$= \frac{56}{12} + \frac{39}{12} + \frac{90}{12}$

$= \frac{56 + 39 + 90}{12} = \frac{185}{12}$

vi) given: $7\frac{1}{3} + 3\frac{2}{4} + 5\frac{1}{6}$

$= \frac{(7\text{x } 3) + 1}{3} + \frac{(3 \text{ x } 4) + 2}{4} + \frac{(5 \text{ x } 6) + 1}{6}$

$= \frac{22}{3} + \frac{14}{4} + \frac{31}{6}$

$= \frac{22 \text{ x } 4}{3 \text{ x } 4} + \frac{14 \text{ x } 3}{4 \text{ x } 3} + \frac{31 \text{ x } 2}{6 \text{ x } 2}$ (because LCM of 3, 4 and 6 is 12)

$= \frac{88}{12} + \frac{42}{12} + \frac{62}{12}$

$= \frac{88 + 42 + 62}{12} = \frac{16}{1}$

(HCF of numerator and denominator is 12)

vii) given : $\frac{7}{1}+\frac{7}{4}+5\frac{1}{6}$

$=\frac{7 \text{ x } 12}{1 \text{ x } 12}+\frac{7 \text{ x } 3}{4 \text{ x } 3}+\frac{31 \text{ x } 2}{6 \text{ x } 2}$ (because LCM of 1, 4 and 6 is 12)

$=\frac{84}{12}+\frac{21}{12}+\frac{62}{12}$

$=\frac{84+21+62}{12}=\frac{167}{12}$

viii) given : $\frac{5}{6}+\frac{3}{1}+\frac{3}{4}$

$=\frac{5 \text{ x } 2}{6 \text{ x } 2}+\frac{3 \text{ x } 12}{1 \text{ x } 12}+\frac{3 \text{ x } 3}{4 \text{ x } 3}$ (because LCM of 6, 1 and 4 is 12)

$=\frac{10}{12}+\frac{36}{12}+\frac{9}{12}$

$=\frac{10+36+9}{12}=\frac{55}{12}$

ix) given : $\frac{7}{18}+\frac{5}{6}+1\frac{1}{12}$

$=\frac{7}{18}+\frac{5}{6}+\frac{13}{12}$

$=\frac{7 \text{ x } 2}{18 \text{ x } 2}+\frac{5 \text{ x } 6}{6 \text{ x } 6}+\frac{13 \text{ x } 3}{12 \text{ x } 3}$

$=\frac{14}{36}+\frac{30}{36}+\frac{39}{36}$

$=\frac{14+30+39}{36}=\frac{83}{36}$

Question: 6

Replace * with a correct number:

i) $* - \frac{5}{8} = \frac{1}{4}$

ii) $* - \frac{1}{5} = \frac{1}{2}$

iii) $\frac{1}{2} - * = \frac{1}{6}$

Solution:

i) $* - \frac{5}{8} = \frac{1}{4}$

$* = \frac{5}{8} + \frac{1}{4}$

$* = \frac{1 \text{ x } 2}{4 \text{ x } 2} + \frac{5 \text{ x } 1}{8 \text{ x } 1}$

$* = \frac{2}{8} + \frac{5}{8} = \frac{2+5}{8} = \frac{7}{8}$

Therefore, 7/8

ii) $* - \frac{1}{5} = \frac{1}{2}$

$* = \frac{1}{2} + \frac{1}{5}$

$* = \frac{1 \text{ x } 5}{5 \text{ x } 2} + \frac{1 \text{ x } 2}{2 \text{ x } 5}$

$= \frac{5}{10} + \frac{2}{10}$

$= \frac{5+2}{10} = \frac{7}{10}$

iii) $\frac{1}{2} - * = \frac{1}{6}$

$* = \frac{1}{2} - \frac{1}{6}$

$* = \frac{1 \text{ x } 3}{2 \text{ x } 3} - \frac{1 \text{ x } 1}{6 \text{ x } 1}$ (because LCM of 2 and 6 is 6)

$= \frac{3}{6} - \frac{1}{6}$

$= \frac{1}{3}$

Question: 7

Savita bought 2/5 m of ribbon and kavita 3/4 m of ribbon. What was the total length of the ribbon they bought?

Solution:

Length of the ribbon bought by savita = 2/5 metres

Length of the ribbon bought by kavita = 3/4 metres

Total length of the ribbon bought by them:

$$\frac{2}{5}\text{ metres} + \frac{3}{4}\text{ metres}$$

$$= \frac{2 \times 4}{5 \times 4}\text{ metres} + \frac{3 \times 5}{4 \times 5}\text{ metres}$$

(because LCM of 5 and 4 is 20)

$$= \frac{8}{20}\text{ metres} + \frac{15}{20}\text{ metres} = \frac{8 + 15}{20}\text{ metres}$$

$$= \frac{23}{20}\text{ metres}$$

Question: 8

Ravish takes $2\frac{1}{5}$ minutes to walk across the school ground. Rahul takes 7/4 minutes to do the same. Who takes less time and by what fraction?

Solution:

$$\text{Time taken by ravish} = 2\frac{1}{5} = \frac{(5 \times 2) + 1}{5} = \frac{11}{5}\text{ minutes}$$

$$\text{Time taken by rahul} = \frac{7}{4}\text{ minutes}$$

Comparing $\frac{11}{5}$ minutes and $\frac{7}{4}$ minutes, we get:

$$\frac{11 \times 4}{5 \times 4}\text{ minutes}, \frac{7 \times 5}{4 \times 5}\text{ minutes}$$

(LCM of 4 and 5 is 20, so will we convert each fraction into an equivalent fraction with denominator 20)

$$\frac{44}{20} > \frac{35}{20}$$

Rahul takes less time,

$$\text{i. e, } \frac{44}{20} - \frac{35}{20} = \frac{44 - 35}{20} = \frac{9}{20}\text{ minutes.}$$

Question: 9

A piece of a wire 7/8 metres long broke into two pieces. One piece was 1/4 meter long. How long is the other piece?

Solution:

Length of the wire = 7/8 metres

Length of one piece of wire = 1/4 metres

Let the length of the second piece of wire be x m.

Therefore, Length of the wire = length of one piece + length of the second piece

$$\frac{7}{8} \text{ metres} = \frac{1}{4} \text{ metres} + x$$

$$X = \frac{7}{8} \text{ metres} - \frac{1}{4} \text{ metres}$$

$$X = \frac{7 \times 1}{8 \times 1} \text{ metres} - \frac{1 \times 2}{4 \times 2} \text{ metres}$$

$$= \frac{7}{8} \text{ metres} - \frac{2}{8} \text{ metres}$$

$$= \frac{7-2}{8} \text{ metres}$$

$$X = \frac{5}{8} \text{ metres}$$

Therefore, the length of the second piece is 5/8 metres

Question: 10

Shikha and priya have bookshelves of the same size shikha's shelf is 5/6 full of book and priya's shelf is 2/5 full. Whose bookshelf is more full? By what fraction?

Solution:

Fraction of shikha's filled bookshelf = 5/6

Fraction of Priya's filled bookshelf = 2/5

Comparing 5/6 and 2/5, we get :

LCM of 5 and 6 is 30, so will convert each fraction into an equivalent fraction with denominator 30.

$$= \frac{5 \text{ x } 5}{6 \text{ x } 5} \text{ metres}, \frac{2 \text{ x } 6}{5 \text{ x } 6} \text{ metres}$$

$$\frac{25}{30} > \frac{12}{30}$$

Shikha's shelf is more full.

Therefore,

$$\frac{25}{30} - \frac{12}{30} = \frac{25-12}{30} = \frac{13}{30}$$

Question: 11

Ravish's house is 9/10 Km from his school. He walked some distance and then took a bus for 1/2 Km. How far did he walk?

Solution:

Total distance between the house and the school = 9/10 Km

Distance covered in the bus = 1/2 Km

Distance covered by walking + distance covered in the bus = total distance between

the house and the school

Distance covered by walking = total distance between the house and the school – Distance

covered in the bus

Distance covered by walking:

9/10 Km – 1/2 Km

LCM of 10 and 2 is 10, so we convert each fraction into an equivalent fraction with denominator 10

$$= \frac{9 \text{ x } 1}{10 \text{ x } 1} - \frac{1 \text{ x } 5}{2 \text{ x } 5} = \frac{9}{10} - \frac{5}{10}$$

$$= \frac{9 - 5}{10} = \frac{4}{10} \text{ km} = \frac{2}{5} \text{ km}$$

(HCF of numerator and denominator is 2)

Decimals

Exercise 7.1

Question: 1

Write the following decimals in the place value table:

	Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousand
(i)			5	2	5		
(ii)			1	2	5	7	
(iii)			1	5	0	5	
(iv)			7	4	0	5	9
(v)					5	0	3

The given decimals can be written as above in the place-value table

Solution:

	Decimals	Tens	Ones	Tenths	Hundredths	Thousand
(i)	52.5	5	2	5		
(ii)	12.5	1	2	5	7	
(iii)	15.05	2	5	0	5	
(iv)	74.059	7	2	0	5	9
(v)	0.503		0	5	0	3

Question: 2

The decimals shown in the above place value table can be written as follows:

(i) 307.12

(ii) 9543.025

(iii) 12.503

Solution:

	Thousands	Hundrends	Tens	Ones	Tenths	Hundredths	Thusandths
(i)		3	0	7	1	2	
(ii)	9	5	4	3	0	2	5
(iii)			1	2	5	0	3

Question: 3

Write each of the following as decimals:

i) One hundred seventy five and four hundredths.

ii) Zero and twenty one hundredths

iii) Nine and four thousandths

iv) Zero and four hundred fifty nine thousandths

Solution:

i) 175.04

ii) 0.21

iii) 0.459

Question: 4

i) $65 + \frac{2}{10} + \frac{7}{100}$

ii) $45 + \frac{9}{100}$

iii) $88 + \frac{5}{10} + \frac{2}{1000}$

iv) $\frac{3}{10} + \frac{7}{1000}$

Solution:

i) We have 6 tens, 5 ones and 7 hundredths. Therefore, the decimal number is 65.27

ii) We have 4 tens, 5 ones and 9 hundredths. Therefore, the decimal number is 45.09

iii) We have 8 tens, 8 ones, 5 tenths and 2 thousandths. Therefore, the decimal number is 88.502

iv) We have 3 tenths, 5 ones and 7 hundredths. Therefore, the decimal number is 0.307

Question: 5

Write each of the following as decimals

i) Five and four tenths

ii) Twelve four hundredths

iii) Nine and seven hundred five thousandths

iv) Zero point five two six

v) Forty seven and six thousandths

vi) Eight thousandths

vii) Nineteen and nineteen hundredths

Solution:

i) 5 + 410 = 5.4

ii) 12 + 4100 = 12.4

iii) 9 + 7051000 = 9.705

iv) 0.526

v) 47 + 61000 = 47.006

vi) 81000 = 0.008

vii) 19+13100 = 19.19

Exercise 7.2

Question: 1

i) Three tenths
ii) Two ones and five tenths
iii) Thirty and one tenths
iv) Twenty two and six tenths
v) One hundred, two ones and three tenths

Solution:

i) 3/10 = 0.3
ii) 2+ 5/10 = 2.5
iii) 30 +1/10 = 30.1
iv) 22+ 6/10 = 22.6
v) 100 + 2 + 3/10 = 102.3

Question: 2

i) $30 + 6 + \frac{2}{10}$

ii) $700 + 5 + \frac{7}{10}$

iii) $100 + 60 + 5 + \frac{1}{10}$

iv) $200 + 70 + 9 + \frac{5}{10}$

Solution:

i) We have 3 tens, 6 ones and 2 tenths. Therefore, the decimal is 36.2
ii) We have 7 hundreds, 5 ones and 7 tenths. Therefore the decimal is 705.7
iii) We have 2 hundreds, 6 tens, 5 ones and 1 tenths. Therefore the decimal is 265.1
iv) We have 2 hundreds, 7 tens, 9 ones and 5 tenths. Therefore, the decimal is 279.5

Question: 3

i) 22/10
ii) 3/2
iii) 2/5

Solution:

i) Since the denominator is ten, the decimal is 2.2
ii) Making the denominator 10, we have 3/2

3(52)(5) = 1510 = 1.5
iii) Making the denominator 10, we have 2/5

2(25)(2) = 410 = 0.4

Question: 4

i) $\frac{4}{0}25$

ii) $\frac{3}{9}210$

iii) $\frac{4}{3}5$

iv) $\frac{2}{5}12$

Solution:

i) To write in decimal, we need to make the denominator 10 by multiplying it by a number. But, to maintain the value of the fraction, we should also multiply the numerator by the same number. Thus, we get

= 40 + 2(25)(2) = 40 + 410 = 40.4

ii) 39210 = 39 +210

Here, the denominator is 10 .

Therefore, the decimal is 39.2

iii) 435 = 4 + 35

To write in decimal, we need the denominator by 10 by multiplying it by a number. but, to maintain the value of the fraction, we should also multiply the numerator by the same number. Thus we get,

= 4 + 3(3)(25)(2)

= 4 + 610 = 4.6

iv) 2512 = 25 +12

To write in decimal, we need to make the denominator 10 by multiplying it by a number. But, to maintain the value of the fraction, we should also multiply the numerator by the same number. Thus, we get

= 25 + 1(52)(5)

= 25 + 510 = 25.5

Question: 5

i) 3.8

ii) 21.2

iii) 6.4

iv) 1

Solution:

i) 3.8

= 3 + 8 tenths

= 3 + 810

= 3(1010) + 810 = 3010 + 810 = 3810 = 195

ii) 21.2

=21+2 tenths

= 21+210= 21(1010) + 210 = 21010 + 210 = 21210 = 1065

iii) 6.4

= 6 + 4 tenths

= 6 + 410

= 6(1010) +410 = 6010 + 410 = 325

iv) 1

Since the only number after the decimal is 0, the fraction is 1

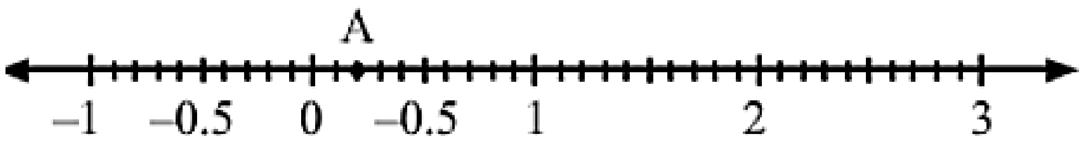
Question: 6

Represent the following number on the number line.

i) 0.2
ii) 1.9
iii) 1.1
iv) 2.5

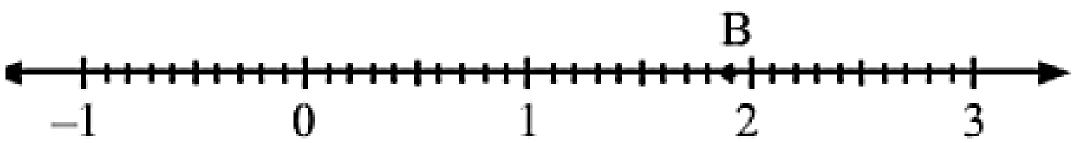
Solution:

i)



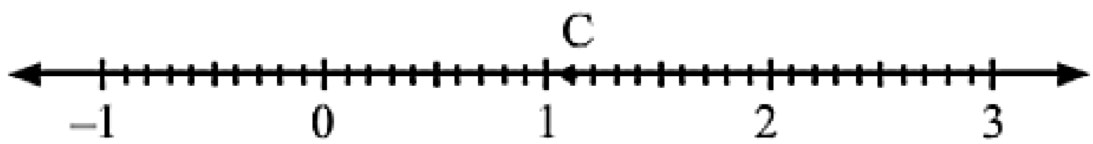
A = 0.2

ii)



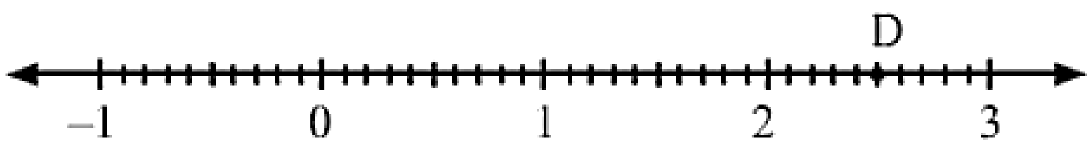
B = 1.9

iii)



C = 1.1

iv)



Question: 7

i) 0.8 is between the two whole numbers 0 and 1

ii) 5.1 is between the two whole number 5 and 6.

iii) 2.6 is between 2 and 3

iv) 6.4 is between 6 and 7

Solution:

i) As 0.8 is 8 units from 0 and 2 units from 1, it is nearer to 1
ii) As 5.1 is 1 unit from 5 and 9 units from 6, it is nearer to 5
iii) As 2.6 is 6 units from 2 and 4 units from 3, it is nearer to 3
iv) As 6.4 is 4 units from 6 and 6 units from 7, it is nearer to 6

9.0 is itself a whole number, that is 9

4.9 is between 4 and 5

As 4.9 is 9 units from 4 and 1 unit from 5, it is nearer to 5

Question: 8

Write the decimal number represented by the points on the given number line A, B, C, D

Solution:

A) 0.8, since A is at the eighth place between 0 and 1

B) 1.3, since B is at the third place between 1 and 2

C) 1.9, since C is at the ninth place between 1 and 2

D) 2.6, since D is at the sixth place between 2 and 3

Disclaimer: the image given in the book is not consistent; as the number of periods between 0 and 1 is ten but the number of periods between 1 and 2 are seven. So, ignoring the position of the given numbers 1, 2 and 3. it has been assumed that there are ten periods between every two consecutive numbers starting from the first point taken as zero.

Exercise 7.3

Question: 1

i) Five hundred twenty five and forty hundredths

ii) Twelve and thirty five thousandths

iii) Fifteen and seventeen thousandths

iv) Eighty eight and forty eight hundredths

Solution:

i) 525 + 40100 = 525.40
ii) 12 + 351000 = 12.035
iii) 15 + 171000 = 15.017
iv) 88 + 48100 = 88.48

Question: 2

i) $137 + \frac{5}{100}$

ii) $\frac{20 + 9 + 4}{100}$

Solution:

i) We have 1 hundred, 3 tens, 7 ones and 5 hundredths. Therefore, the decimal is 137.05
ii) We have 2 tens, 9 ones and 4 hundredths. Therefore, the decimal is 29.04

Question: 3

i) 8/100

ii) 300/1000

iii) 18/1000

iv) 208/100

Solution:

i) We have 8 hundredths. Therefore, the decimal is 0.08
ii) In its lowest form, the fraction is 310. We have 3 tenths. Therefore, the

decimal is 0.3
iii) We have eighteen thousandths. Therefore the decimal is 0.018
iv) 208100 = 200100 + 8100 = 2 + 8100

We have 2 and 8 hundredths. Therefore, the decimal is 2.08

888/1000

8881000 = 8001000 + 801000 + 81000 = 810 + 8100 + 81000

We have 8 tenths, 8 hundredths and 8 thousandths.Therefore, the decimal is 0.888

Question: 4

i) $12\frac{1}{4}$

ii) 718 = 7 + 18

iii) 5120 = 5 + 120

Solution:

i) 1214 = 12 + 14

= 12 + 254(25) = 12 + 25100 = 12.25

ii) 7 + 1(1258)(125) = 7 + 1251000 = 7.125

iii) 5 + 1(520)(5) = 5 + 510 = 5.05

Question: 5

i) 0.04

ii) $7\frac{1}{8}$

iii) $5\frac{1}{20}$

iv) 1.20

v) 17.38

Solution:

i)

= 0 + 0.04

= 0 + 4 hundredths

= 0 + 4100

= 125

ii)

2.34

= 2 + 0.34

= 2 + 34 hundredths

= 2 + 34100

= 2(100100) + 34100

= 200100 + 34100

= 234100

= 11750

iii)

0.342

= 0 + 342 thousandths

= 3421000

= 171500

iv)

= 1 + 0.20

= 1 + 20 hundredths

= 1 + 20100

= 100100 + 20100

= 120100

= 65

v)

= 17 + 0.38

= 17 + 38 hundredths

= 17 + 38100

= 17(100100) + 38100

= 1700100 + 38100

= 1738100

= 86950

Question: 6

i) 2 tens, 9 ones, 4 tenths and 1 hundredths.

ii) 3 tens, we have3 tens, 4 tenths, 8 hundredths and 3 thousandths.

iii) 1 hundred, 3 tens, 7 ones and 5 hundredths.

iv) 7 tenths, 6 hundredths and 4 thousandths.

v) 2 tens, 3 ones, 2 tenths and 6 thousandths.

vi) 7 hundreds, 2 tens, 5 ones and 9 hundredths.

Solution:

i) Here, we have 2 tens, 9 ones, 4 tenths and 1 hundredths. Therefore, the decimal is 29.41

ii) Here, we have 3 tens, we have3 tens, 4 tenths, 8 hundredths and 3 thousandths. Therefore, the decimal is 30.483

iii) Here, we have 1 hundred, 3 tens, 7 ones and 5 hundredths. Therefore, the decimal is 137.05

iv) Here, we have 7 tenths, 6 hundredths and 4 thousandths . Therefore, the decimal is 0.764

v) Here, we have 2 tens, 3 ones, 2 tenths and 6 thousandths. Therefore, the decimal is 23.206

vi) Here, we have 7 hundreds, 2 tens, 5 ones and 9 hundredths. Therefore, the decimal is 725.09

Exercise 7.4

Question: 1

Express the following fractions as decimals:

i) $\frac{23}{10}$

ii) $\frac{139}{100}$

iii) $\frac{4375}{1000}$

iv) $12\frac{1}{2}$

v) $75\frac{1}{4}$

vi) $25\frac{1}{8}$

vii) $18\frac{3}{24}$

viii) $\frac{3}{9}735$

ix) $\frac{1}{5}125$

x) $\frac{111}{250}$

Solution:

i) 2310 = 20 + 310 = 2010 + 310 = 2 + 310 = 2.3
ii) 139100 = 10 + 30 + 9100 = 100100 + 30100 + 9100 = 1 + 310 + 9100 = 1.39
iii) 43751000 = 4000 + 300 + 70 + 51000 = 40001000 + 3001000 + 701000 + 51000 = 4 + 310 + 7100 + 51000 = 4.375
iv) 1212 = 12 + 12 = 12 + 1(52)(5) = 12 + 510 = 12.5
v) 7514 = 75 + 14 = 75 + 1(254)(25) = 75 + 25100 = 75.25
vi) 2518 = 25+1(1258)(125) = 25 + 1251000 = 25.125
vii) 18324 = 18+324 = 18 + 18 =18 + 125(1125)(8) = 18 +1251000 = 18.125

viii) 39735 = 39 +735 = 39 +15 = 39 + 1(25) (2) = 39 + 210 = 39.2
ix) 15125 =15 + 125 = 15 + 1(1)(425)(4) = 15 + 4100 = 15.04
x)111250 = 111(4250)(4) = 4441000 = 0.444

Question: 2

Express the following decimals as fractions in the lowest form:

i) 0.5
ii) 2.5
iii) 0.60
iv) 0.18
v) 5.25
vi) 7.125
vii) 15.004
viii) 20.375
ix) 600.75

Solution:

i) 0.5 $= \frac{5}{10} = \frac{1}{2}$

ii) 2.5 $= \frac{25}{10} = \frac{5}{2}$

iii) 0.60 $= \frac{60}{100} = \frac{3}{5}$

iv) 0.18 $= \frac{18}{100} = \frac{9}{50}$

v) 5.25 $= \frac{525}{100} = \frac{21}{4}$

vi) 7.125 $= \frac{7125}{1000} = \frac{201}{8}$

vii) 15.004 $= \frac{15004}{1000} = \frac{3751}{250}$

viii) 20.375 $= \frac{20375}{1000} = \frac{163}{8}$

ix) 600.75 $= \frac{60075}{100} = \frac{2403}{14}$

Exercise 7.5

Question: 1

Fill in the blanks by using > or < to complete the following.

i) 25.35 > 8.47

ii) 20.695 < 20.93

iii) 0.39 < 0.72

iv) 0.109 < 0.83

v) 0.236 > 0.201

vi) 0.93 < 0.99

Solution:

i) Here, the whole part 23 > 8
ii) Here the whole parts are equal. Hence, we should check the tenth parts. Now 9 is greater than 6.

$$\text{Therefore, } 20+\frac{6}{10}+\frac{9}{100}+\frac{5}{1000}<20+\frac{9}{10}+\frac{3}{100}$$

iii) Here both the whole parts are 0. Hence, we should check the tenth part, now, 3 < 7
iv) Here both the whole parts are 0. Hence, we should check the digit in the tenth parts 1< 8
v) Here both the whole parts are 0. Hence, we should check the tenth parts in the two numbers, which are again equal. So we should check the hundredth digit 3 > 0
vi) Here both whole parts are 0. Hence, we should check the digits in the tenth place which is again equal. So, digit in the hundredth place 3 < 9

Question: 2

Which is greater? Give reason for your answer?

i) 1.008 < 1.800

ii) 3.3 = 3.300

iii) 5.64 > 5.603

iv) 1.431 < 1.439

v) 0.5 > 0.05

Solution:

i) The whole parts are equal, and comparing the tenth parts, we have 0 < 8
ii) The whole parts and the tenth parts are both equal.
iii) The whole parts and the digit in the tenth place are equal. But, comparing the digits in the hundredth's place we get 4 > 0

1.5 = 1.50

The whole parts and the digits in the tenth's place are equal.

iv) The whole parts, the digit in the tenth's and hundredth's place are equal. But comparing the digits in the thousandth's place 1 < 9
v) Here the whole parts are both 0. Comparing the tenth's place, we have 5 > 0

Exercise 7.6

Question: 1

Express as rupees (Rs) using decimals

i) 15 paisa

ii) 5 paisa

iii) 350 paisa

iv) 2 rupees 60 paisa

Solution:

i) We know that 100 paisa = Rs. 1

Therefore, 1 paisa = Rs. 1/100

15 paisa = 15/100

= Rs 0.15

ii) We know that 100 paisa = Rs. 1

Therefore, 1 paisa = Rs. 1/100

5 paisa = 5/100

= Rs 0.05

iii) We know that 100 paisa = Rs. 1

Therefore, 1 paisa = Rs. 1/100

35 paisa = 350/100

= Rs 3.50

iv) We know that 100 paisa = Rs. 1

Therefore, 1 paisa = Rs. 1/100

2 rupees 60 paisa = 2 + 60100

= Rs 2.60

Question: 2

Express as metres (m) using decimals

i) 15 cm

ii) 8 cm

iii) 135 cm

iv) 3 m 65 cm

Solution:

i) We know that 100 cm = 1m

Therefore 1 cm = 1/100 m

$$15\text{cm} = 15\left(\frac{1}{100}\text{m}\right) = \frac{15}{100}\text{m}$$

0.15 m

ii) We know that 100 cm = 1m

Therefore 1 cm = 1/100 m

$$8\text{ cm} = 8\left(\frac{1}{100}\text{m}\right) = \frac{8}{100}\text{m}$$

= 0.08 m

iii) We know that 100 cm = 1m

Therefore 1 cm = 1/100 m

$$135\text{ cm} = 135\left(\frac{1}{100}\text{m}\right) = \frac{135}{100}\text{m}$$

= 1.35 m

iv) We know that 100 cm = 1m

Therefore 1 cm = 1/100 m

$$3\text{ m }65\text{cm} = 3 + \frac{65}{100}\text{ m}$$

= 3.65 m

Question: 3

Express as centimetre (cm) using decimals

i) 5 mm

ii) 60 mm

iii) 175 mm

iv) 4 cm 5 mm

Solution:

i) We know that 10 mm = 1cm

Therefore 1 mm = 1/10 cm

5 mm = 5/10 cm

= 0.5 cm

ii) We know that 10 mm = 1cm

Therefore 1 mm = 1/10 cm

60 mm = 60/10 cm

= 6 cm

iii) We know that 10 mm = 1cm

Therefore 1 mm = 1/10 cm

175 mm = 175/10 cm

= 17.5 cm

iv) We know that 10 mm = 1cm

Therefore 1 mm = 1/10 cm

4 cm 5 mm = 4 + 5/10

= 4.5 cm

Question: 4

Express as kilogram (km) using decimals

i) 5 m

ii) 55 m

iii) 555 m

iv) 5555 m

v) 15 km 35 m

Solution:

i) We know that 1000 m = 1 km

Therefore 1m = 1/1000 km

5 m = 5/1000 km

= 0.005 km

ii) We know that 1000 m = 1 km

Therefore 1m = 1/1000 km

55 m = 55/1000 km

= 0.055 km

iii) We know that 1000 m = 1 km

Therefore 1m = 1/1000 km

555 m = 555/1000 km

= 0.555 km

iv) We know that 1000 m = 1 km

Therefore 1m = 1/1000 km

5m = 5/1000 km

= 5.555 km

v) We know that 1000 m = 1 km

Therefore 1m = 1/1000 km

15 km 35 m = 15 + 351000

= 15.035 km

Question: 5

Express each of the following without using decimals

i) 8g

ii) 150 g

iii) 2750 g

iv) 5 kg 750 g

v) 36 kg 50 g

Solution:

i) We know that 1000g = 1kg

Therefore 1 g = 1/1000 kg = 0.001 kg

8g = 8/1000 kg

= 0.008 kg

ii) We know that 1000 g = 1kg

Therefore 1g = 1/1000 kg = 0.001 kg

150 g = 150/1000 kg

= 0.150 kg

iii) We know that 1000 g = 1kg

Therefore 1 g = 1/1000 kg = 0.001 kg

2750g = 2750/1000 kg

= 2.750 kg

iv) We know that 1000 g = 1kg

Therefore 1 g = 1/1000 kg = 0.001 kg

5 kg 750 g = 5 + 7501000

= 5.750 kg

v)We know that 1000 g = 1kg

Therefore 1g =1/1000 kg = 0.001 kg

36 kg 50 g = 36 + 501000

= 36.050 kg

Question: 6

Express each of the following without using decimals

i) Rs.5.25

ii) 8.354 kg

iii) 3.05 km

iv) 7.54 m

v) 15.005 kg

vi) 12.05 m

Solution:

i) We know 100 paisa = 1 rupee

So, 1 paisa = 1/100 rupee

Therefore, Rs 5.25 = 5 + 0.25

= 5 + 25100 = Rs 5 and 25 paisa

ii) We know that 100g = 1kg

So 1 g = 1/1000 kg

Therefore, 8.354 = 8 + 0.354 = 8 + 3541000 = 8 kg 354 g

1. 3.5 cm

We know that 10 mm = 1cm

So, 1 mm = 1/10 cm

Therefore 3.5 = 3 + 0.5

= 3 + 510 = 3 cm 5 mm

iii) We know that 1000 m = 1 km

Therefore 3.05 = 3 + 0.05

$$= 3 + \frac{5}{100}$$

$$= 3 + \frac{50}{1000}\,\text{km}$$

= 3 km 50 m

iv) We know that 100 cm = 1m

Therefore 7.54 = 7 + 0.54

$$= 7 + \frac{54}{100}$$

= 7m 54 cm

v) We know that 1 kg = 1000 g

Therefore, 15.005 = 15 + 0.005

$$= 15 + \frac{5}{1000}$$

= 15 kg 5 g

vi) We know that 1m = 100 cm

Therefore 12.05 = 12 + 0.05

$$= 12 + \frac{5}{100}$$

= 12 m 5 cm

Exercise 7.7

Question: 1

Choose the decimal(s) from the brackets which are not equivalent to the given decimals:

i) 0.8 (0.80, 0.85, 0.800, 0.08)

ii) 25.1 (25.01, 25.10, 25.100, 25.001)

iii) 45.05(45.050, 15.005, 45.500, 45.0500)

Solution:

i) 0.85 and 0.08 are not equivalent to the given decimal .

In 0.85, we have 5 in the hundredth place, where as in 0.8 we have nothing in the hundredth place.

In 0.08, 0 is in the tenth place, whereas in 0.8, 8 is in the tenth place.

ii) 25.01 and 25.001 are not equivalent to the given decimal.

In 25.01, 0 is in the tenth place, whereas in 25.1, 1 is in the tenth place.

iii) In 45.005 and 45.500 are not equivalent to the given decimal.

In 45.005, 0 is in the hundredth place, whereas in 45.05, 5 is in the hundredth place.

In 45.500, 5 is in the tenth place, whereas in 45.05 is in the tenth place

Question: 2

Which of the following are like decimals?

Solution:

i) 0.34, 0.07, 5.35, 24.70

Like decimals, since these have the same number of digits after the decimal point

ii) 45.05, 4.505, 20.55, 20.5

Unlike decimals, since these have different number of digits after the decimal point

iii) 8.80, 17.08, 8.94, 0.27

Like decimals, since these have the same number of digits after the decimal point.

iv) 4.50, 16.80, 0.700, 7.08

Unlike decimals, since these have different number of digits after the decimal point.

Question: 3

Which of the following statements are correct?

Solution:

i) Correct since these two decimals have the same number of digits after the decimal point, only by 2

ii) Correct, since these three decimals have different numbers of digits after the decimal point.

iii) Incorrect, since these two decimals have different numbers of digits after the decimal point.

iv) Incorrect , since these three decimals have different numbers of digits after the decimal point.

v) Correct, since these three decimals have the same number of digits after the decimal point.

Question: 4

Convert each of the following sets of unlike decimals to like decimal:

Solution:

i) Of the two given decimals, 7.85 has more decimal points, i.e two, so we change 7.8 so that it has two decimal places.

Therefore, the like decimals are 7.80 and 7.85

ii) Of the two given decimals, 2.02 has more decimals places, i.e two, so we change 3.2 so that it has two decimal places.

Therefore, the like decimals are 2.02 and 3.20

iii) Of the three given decimals , 12.765 has the highest number of decimal places, i.e three, so we change the other two decimals so that they also have three decimal places.

Therefore, like decimals are 0.600, 5.800 and 12.765

iv) Of the three given decimals, 5.296 has the highest number of decimal places, i.e three so we change the other two decimals so that they also have three decimal places.

Therefore, the like decimals are 5.296, 5.200 and 5.290

v) Among the three given decimals, 4.3294 has the highest number of decimal places, i.e four so we change all the decimals so that they also have four decimal places.

Therefore, the like decimals are 4.3294, 13.2900 and 132.9400

Exercise 7.8

Question: 1

Find the sum of the each of the following:

Solution:

i) 102.360 + 7.054+ 0.800

= 110.214

ii) 0.060 + 4.108 + 91.500

= 95.668

iii) 312.800 + 290.020 + 128.457

= 731.277

iv) 113.285 + 6.700 + 9.340 + 30.080

= 370.421

v) 18.0030 + 41.7000 + 10.9500 + 5.0570

= 75.7100

Question: 2

Add the following:

Solution:

i) 41.80 + 39.24 + 5.01 + 62.60

= 148.65

ii) 4.702 + 4.200 + 6.020 + 1.270

= 16.192

iii) 18.030 + 146.300 + 0.829 + 5.324

= 170.483

Question: 3

Find the sum of each of the following:

Solution:

i) 0.007 + 8.500 + 30.080

= 38.587

ii) 280.69 + 25.20 + 38.00

= 343.89

iii) 25.650 + 9.005 + 3.700 + 38.355

= 38.355

iv) 27.076 + 0.550 + 0.004

= 27.630

Question: 4

Radhika's mother gave her Rs.10.50and her father gave her Rs.15.80. Find the total amount given to by her parents?

Solution:

Radhika's mother gave her Rs 10.50

Radhika's father gave her Rs 15.80

Total amount given to Radhika = (10.50 + 15.80)

= Rs 26.30

Question: 5

Rahul bought 4 kg 60 g of grapes and 5 kg 300 g of mangoes. Find the weight of the fruits he bought in all?

Solution:

Weight of the apples = 4 kg 90 g = 4.090 kg

Weight grapes = 2 kg 60 g = 2.060 kg

Weight of mangoes = 5 kg 300 g = 5.300 kg

Therefore, the total weight of fruits bought by rahul = (4.090 + 2.060 + 5.300) kg

= 11.450 kg

The total weight of the fruits is 11.450 kg

Question: 6

Nasreen bought 3m 20 cm cloth for her shirt and 2 m 5 cm cloth for her skirt .Find the total cloth bought by her?

Solution:

Cloth for shirt = 3 m 20 cm = 3.20 m

Cloth for skirt = 2 m 50 m = 2.05 m

Total cloth bought by nasreen = (3.20 + 2.05) m

= 5.25 m

Total cloth bought by nasreen is 5.25 m

Question: 7

Sunita travels 15 km 268 m by bus, 7 km 7 m by car and 500 m by foot in order to reach her school. How far is her school from her residence?

Solution:

Distance travelled by bus = 15 km 268 m = 15.268 km

Distance travelled by car = 7 km 7m = 7.007 km

Travel on foot = 500m = 0.500 km

Total distance travelled by sunita = (15.268 +7.07 + 0.500) km

= 22.775 km

Therefore, the total distance covered by sunita is 22.775 km

Exercise 7.9

Question: 1

Subtract:

Solution:

1. 46.23 – 37.5

= 8.73

1. 128.40 - 53.05

= 75.35

1. 45.03 - 27.80

= 17.23

1. 23.930 - 5.946

17.984

Question: 2

Subtract:

Solution:

1. 9.756 – 6.280

= 3.476

1. 21.05 – 15.27

= 5.78

1. 18.50 – 6.79

= 11.71

1. 48.10 – 0.37

= 47.73

1. 108.032 – 86.800

= 21.232

1. 91.001 – 72.900

= 18.101

1. 100.0 – 26.32

= 73.68

Question: 3

The sum of two numbers is 100. If one of them is 78.01. Find the other one?

Solution:

One number is 78.01

Suppose the other number is x

The sum of these numbers is 100

Therefore, 78.01 + x = 100

= x = 100 -78.01

= x = 21.99

The other number is 21.99

Question: 4

Waheeda's school is at a distance 5 km 350 m from her house. She travels 1 km 70 m on foot and the rest she travels by bus. How much distance does she travel by bus?

Solution:

Distance travelled on foot = 1 km 70 m

Suppose the distance travelled by bus = x km

Total distance of school from residence = 5km 350 m = 5.350 km

So, 1.070 +x = 5.350

= x= 5.350 – 1.070

= x = 4.280 km

Therefore, distance travelled by bus is 4.280 km

Question: 5

Raju bought a book of Rs.35.65. he gave Rs.50.35 to the shopkeeper. How much money did he pay back to the shopkeeper?

Solution:

Price of the book = Rs. 365

Amount given to the shopkeeper = Rs50

Therefore, balance returned by the shopkeeper = Rs. (50 - 35.65)

= Rs. 14.35

Question: 6

Raju bought a water melon weighing 5 kg 200g. Out of this she gave 2 kg 750 g to her neighbor. What is the weight of the watermelon left with ruby?

Solution:

Weight of the watermelon when bought = 5 kg 200g = 5.200 kg

Weight of the watermelon given to the neighbor = 2 kg 750 g = 2.750 kg

Therefore, weight of the watermelon left with ruby = weight of the watermelon when bought – weight of the watermelon when given to the neighbor

= (5.200 - 2.750) kg

= 2.450 kg

So, the weight of the water melon left with ruby = 2.450 kg

Question: 7

Victor drove 89.05 km on Saturday and 73.9 km on Sunday. How many kilometers did he drove more on Saturday?

Solution:

Distance travelled on Saturday = 89.050 km

Distance travelled on Sunday = 73.9 km

Subtracting the distance travelled on Sunday from the distance travelled on Saturday = 89.050 – 73.9 km

= 15.15 km

Therefore, victor drove 15.15km more on Saturday.

Question: 8

Raju bought a book of Rs.35.65. he gave Rs.50.35 to the shopkeeper. How much money did he pay back to the shopkeeper?

Solution:

Price of the book = Rs. 365

Amount given to the shopkeeper = Rs50

Therefore, balance returned by the shopkeeper = Rs. (50 - 35.65)

= Rs.14.35

Question: 9

Gopal travelled 125.5 km by bus, 14.25 km by pony and the rest of the distance to kedarnath on foot. If he covered a total distance of 150 km, how much did he travel on foot?

Solution:

Distance travelled by bus = 125.5 km

Distance travelled by pony = 14.25 km

Suppose the distance travelled on foot = x

Total distance = 150 km = distance travelled by bus + distance travelled on pony + distance travelled travelled on foot

= 150 = 125.5 + 14.25 + x

= 150 = 139.75 + x

= x = 10.25 km

Therefore, distance travelled on foot= 10.25 km

Question: 10

Tina had 20 m 5 cm long cloth. She cuts 4 m 50 cm length of cloth from this for making a curtain. How much cloth is left with her?

Solution:

Length of cloth originally = 20 m 5 cm = 2.05 m

Length of cloth cut for curtain = 4m 50 cm = 4.50 m

Therefore, length of cloth left with tina = length of cloth originally – length of cloth cut for curtain

= 20.05 – 4.50 m

= 15.55 m

Length of the cloth left with tina = 15.55 m

Question: 11

Vineeta bought a book of Rs. 18.9, a pen of Rs. 8.50 and some papers for Rs. 5.05. She gave fifty rupee to the shopkeeper. How much balance did she get back?

Solution:

Price of the book = Rs. 18.90

Price of the pen = Rs 8.50

Price of the paper = Rs. 5.05

Total price of three items = Rs(18.90 + 8.50 + 5.05)

= Rs 32.45

Total amount given to the shopkeeper = Rs 50

Balance received = Rs (50 - 32.45)

= Rs. 17.55

Question: 12

Tanuj walked 8.62 km on Monday, 7.05 km on Tuesday, and some distance on Wednesday. If he walked 21.01 km in three days, how much distance did he walk on Wednesday?

Solution:

Distance travelled on Monday = 8.62 km

Distance travelled on Tuesday = 7.05 km

Suppose the distance travelled on Wednesday = x km

Total distance covered =

$21.01 = 8.62 + 7.05 + x$

$= x = 21.01 - 15.67$

$= x = 5.34$

Therefore, Tanuj walked 5.34 km on Wednesday.

Exercise 7.10

Question: 1

Find the value.

Solution:

1**.** 3/10 is equals to

c) 0.3

2.7/100 is equals to

d) 0.07

3.4/1000 is equals to

0.004

4. The value of 37/10000 is:

0.0037

5.The place value of 5 in 0.04532 is

5/1000

6.The value of 231/1000

0.231

7. The value of 3/5 100

3.005

8.The value of 3/25

9. The value of $2\frac{1}{25}$

2.04

10. $\frac{4}{7}8$ is equals to

c) 4.875

11. $2+\frac{3}{10}+\frac{5}{100}$ is equals to

is equals to

c) 2.35

12. $\frac{3}{100}+\frac{5}{1000}$ is equals to

c) 0.0305

13. 1 cm is equals to

0.01 m

14. 1 m is equals to

c) 0.001 km

15.2 kg 5 gm is equal to

2.005 kg

16. 15 litres and 15 ml is equals to

d) 15.015 litres

17. Which of the following are like decimals

c) 5.5, 6.6, 7.7, 8.8

18. The value of the 0.5 + 0.005 + 5.05 is

b) 5.555

19.0.35 - 0.035 is equal to

c) 0.0315

20. 2.5 + 3.05 - 4.005 is equals to

1.545

21. Which is greater among 2.3, 2.03, 2.33, 2.05?

c) 2.33

Introduction to Algebra

Exercise 8.1

Question: 1

Write the following using numbers, literals and signs of basic operations. State what each letter represents:

(i) The diameter of a circle is twice its radius.

(ii) The area of a rectangle is the product of its length and breadth.

(iii) The selling price equals the sum of the cost price and profit.

(iv) The total amount equals the sum of the principal and the interest.

(v) The perimeter of a rectangle is two times the sum of its length and breadth.

(vi) The perimeter of a square is four times its side.

Solution:

(i) Let r and d be the radius and diameter of the circle, respectively.

Therefore, $d = 2r$

(ii) Let l and b be the length and breadth of the rectangle, respectively.

Therefore, area of rectangle = lb

(iii) Let s, c and p be the selling price, cost price and profit, respectively.

Therefore, $s = c + p$

(iv) Let T, p and i be the total amount, principal and interest, respectively.

Therefore, $T = p + i$

(v) Let land b be the length and breadth of the rectangle, respectively.

Therefore, perimeter of rectangle = $2(l + b)$

(vi) Let a be the side of the square.

Therefore, perimeter of the square = $4a$

Question: 2

Write the following using numbers, literals and signs of basic operations:

(i) The sum of 6 and x.

(ii) 3 more than a number y.

(iii) One- third of a number x.

(iv) One- half of the sum of number x and y.

(v) Number y less than a number 7.

(vi) 7 taken away from x.

(vii) 2 less than the quotient of x by y

(viii) 4 times x taken away from one-thirs of y.

(ix) Quotient of x by 3 is multiplies by y.

Solution:

(i) The sum of 6 and x is $6 + x$.

(ii) 3 more than a number y means $y + 3$.

(iii) One-third of a number x is $x/3$.

(iv) One-half of the sum of numbers x and y is $(x + y)/2$.

(v) Number y less than a number 7 means $7 – y$.

(vi) 7 taken away from x means $x – 7$.

(vii) 2 less than the quotient of x by y is $x/y – 2$.

(viii) 4 times x taken away from one-third of y is $y/3 – 4x$.

(ix) Quotient of x by 3 is multiplied by y means: $xy/3$

Question: 3

Think of a number. Multiply it by 5. Add 5 to the result. Subtract y from this result. What is the result?

Solution:

Let the number be x.

On multiplying the number by 5. We get: 5x

Further, adding 6 to 5x. We get: 5x + 6

Finally, on subtracting y from 5x + 6,

We get: 5x + 6 – y

Question: 4

The number of rooms on the ground floor of a building is 12 less than the twice of the numbers of rooms on the first floor. If the first floor has x rooms, how many rooms does the ground floor has?

Solution:

Let the number of rooms on the ground floor be y.

It is given that the number of rooms on the first floor is x; therefore, we have:

$y = 2 \times x - 12$

$= 2x - 12$

Thus, the number of rooms on the ground floor is 2x – 12.

Question: 5

Binny spends Rs. A daily and saves Rs. B per week. What is her income for 2 weeks?

Solution:

It is given that Binny spends Rs. a in one day.

Money spent by him in one week = $7 \times a = 7a$

It is further given that he saves Rs. b in one week; therefore we have:

Total income in one week = Total expenditure in one week + Total saving in one week

$= 7a + b$

Therefore, Binny's total income in 2 weeks = 2 X (7a + b)

= Rs. (14a + 2b)

Question: 6

Rahul score 80 marks in English and x marks in Hindi. What is his total scores in the two subjects?

Solution:

Marks obtained in English = 80

Marks obtained in Hindi = x

Total marks obtained = 80 + x

Question: 7

Rohit covers x centimeters in one step. How much distance does he covers in y steps?

Solution:

It is given that Rohit covers x cm in one step.

Therefore, distance covered by him in y steps = $x \times y$ = x y cm

Question: 8

One apple weighs 75 grams and one orange weighs 40 grams. Determine the weight of x apples an y oranges.

Solution:

Weight of an apple = 75 grams

Wright of an orange = 40 grams

Weight of x apples = 75 X x = 75x grams

Weight of y oranges = 40 X y = 40y grams

Total weight of x apples and y oranges = (75x + 40y) grams

Question: 9

One pencil costs Rs. 2 and one fountain pen costs Rs. 15. What is the cost of x pencils and y fountain pens?

Solution:

Cost of one pencil = Rs. 2

Cost of x pencils = Rs. 2x

Cost of one fountain pen = Rs. 15

Cost of y fountain pens = Rs. 15y

Total cost of x pencils and y fountain pens = Rs. (2x + 15y)

Exercise 8.2

Question: 1

Write each of the following products into exponential form:

(i) $a \times a \times a \times a \times ...$ 15 times

(ii) $8 \times b \times b \times b \times a \times a \times a \times a$

(iii) $5 \times a \times a \times a \times b \times b \times c \times c \times c$

(iv) $7 \times a \times a \times a...$ 8 times $\times b \times b \times b \times..$. 5 times

(v) $4 \times a \times a \times a \times....$ 5 times $\times b \times b \times ...$ 12 times $\times c \times c \times c ...$ 15 times

Solution:

(i) a^{15}

(ii) $8a^4b^3$

(iii) $5a^3b^2c^3$

(iv) $7a^8b^5$

(v) $4a^5b^{12}c^{15}$

Question: 2

Write each of the following in the product form:

(i) a^2b^5

(ii) $8x^3$

(iii) $7a^3b^4$

(iv) $15a^9b^8c^6$

(v) $30x^4y^4z^5$

(vi) $43p^{10}q^5r^{15}$

(vii) $17p^{12}q^{20}$

Solution:

(i) $a \times a \times b \times b \times b \times b \times b$

(ii) $8 \times x \times x \times x$

(iii) $7 \times a \times a \times a \times b \times b \times b \times b$

(iv) $15 \times a \times a \times a \times. . .$ 9 times $\times b \times b \times b \times . . .$ 8 times

(v) $30 \times x \times x \times x \times x\, y \times y \times y \times y \times z \times z \ldots$ 5 times

(vi) $43 \times p \times p \ldots..$ 10 times $\times q \times q \ldots$ 5 times $\times r \times r \ldots..$ 15 times

(vii) $17 \times p \times p \ldots$ 12 times $\times q \times q \ldots$ 20 times

Question: 3

Write down each of the following in the exponential form:

(i) $4a^3 \times 6ab^2 \times c^2$

(ii) $5xy \times 3x^2y \times 7y^2$

(iii) $a^3 \times 3ab^2 \times 2a^2b^2$

Solution:

(i) $24a^4b^2c^2$

(ii) $105x^3y^4$

(iii) $6a^6b^4$

Question: 4

The number of bacteria in a culture is x now. It becomes square of itself after one week. What will be its number after two weeks?

Solution:

Present number of bacteria in a culture = x

Number of bacteria in the culture after one week = x^2

Number of bacteria in the culture after two weeks = $(x^2)^2 = x^4$

Question: 5

The area of a rectangle is given by the product of its length and breadth. The length of a rectangle is two-thirs of its breadth. Find its area if its breadth is x cm.

Solution:

Breadth of the given rectangle = x cm

Length of the rectangle = 23 x cm

Area of the rectangle = 23x × x = 23 cm^2

Question: 6

If there are x rows of chairs and each row contains x^2 chairs. Determine the total numbers of chairs.

Solution:

Total number of chairs = Number of rows × Number of chairs in each row

= $x \times x^2 = x^3$

Exercise 8.3

Question: 1

5 more than twice a number x is written as:

(a) 5 + x + 2

(b) 2x + 5

(c) 2x – 5

(d) 5x + 2

Solution:

(b) 2x + 5

Question: 2

The quotient of x by 2 is written as:

(a) $\frac{x}{2} + 5$

(b) $\frac{2}{x} + 5$

(c) $\frac{x + 2}{5}$

(d) $\frac{x}{2 + 5}$

Solution:

(a) $\frac{x}{2} + 5$

Question: 3

The quotient of x by 3 is multiplied by y is written as:

(a) x/3y

(b) 3x/y

(c) 3y/x

(d) xy/3

Solution:

(d) xy/3

Question: 4

9 taken away from the sum of x and y is

(a) x + y – 9

(b) 9 – (x + y)

(c) $\frac{x+y}{9}$

(d) $\frac{9}{x+y}$

Solution:

(a) x + y – 9

Question: 5

The quotient of x by y added to the product of x and y is written as:

(a) $\frac{x}{y}+xy$

(b) $\frac{y}{x}+xy$

(c) $\frac{xy+x}{y}$

(d) $\frac{xy+y}{x}$

Solution:

(a) $\frac{x}{y}+xy$

Question: 6

$a^2b^3 \times 2ab^2$ is equal to

(a) $2a^3b^4$

(b) $2a^3b^5$

(c) $2ab$

(d) a^3b^5

Solution:

(b) $2a^3b^5$

Question: 7

$4a^2b^3 \times 3ab^2 \times 5a^3b$ is equal to

(a) $60a^3b^5$

(b) $60a^6b^5$

(c) $60a^6b^6$

(d) a^6b^6

Solution:

(c) $60a^6b^6$

Question: 8

If $2x^2y$ and $3xy^2$ denote the length and breadth of a rectangle, then its area is

(a) $6xy$

(b) $6x^2y^2$

(c) $6x^3y^3$

(d) x^3y^3

Solution:

(c) $6x^3y^3$

Question: 9

In a room there are x^2 rows of chairs and each rows contains $2x^2$ chairs. The total number of chairs in the room is

(a) $2x^2$

(b) $2x^4$

(c) x^4

(d) $\frac{x^4}{4}$

Solution:

(b) $2x^4$

Question: 10

$a^3 \times 2a^2b \times 3ab^5$ is equal to

(a) a^6b^6

(b) $23a^6b^6$

(c) $6a^6b^6$

(d) None of these

Solution:

(b) $2x^4$

Ratio, Proportion and Unitary Method

Exercise 9.1

Q.1

(i) Ratio of number of girls of girls to that of boys in the merit list is 2 : 1.

(ii) Ratio of number of students passing a mathematics test to that of total students appearins in test is 2 : 3.

Q.2

(i) The number of bad pencils produced in a factory is 1/9 of the number of good pencils produced in the factory.

(ii) The number of villages is 2000 times that of cities in India.

Q.3

(i) 60 : 72.

To express this ratio in the simplest form, we will have to find the H.C.F of 60 and 72.

It is 12 dividing each term of the ration by the H.C.F of its terms i.e. 12 we get

$$\frac{60}{12} = \frac{60 \div 12}{72 \div 12} = \frac{5}{6} \text{ or } 5 : 6.$$

Hence, the simplest form of the ratio 60: 72 is 5 : 6.

(ii) 324: 144

To express this ratio in the simplest form, we will have to find the H.C.F of 324/144, It is 36.Dividing each term of the ration by the H.C.F of its terms i.e. 36, we get

$$\frac{324}{144} = \frac{324 \div 36}{144 \div 36} = \frac{9}{4}.$$

Hence, the simplest form of the ratio 324: 144 is 9:4.

(iii) 85 : 391.

To express this ratio in the simplest form we will have to find the H.C.F of 85 and 391, It is 17.

Dividing each term of the ratio by the H.C.F of its terms i.e. 17, we get

$$\frac{85}{391} = \frac{85 \div 17}{391 \div 17} = \frac{85/17}{391/17} = \frac{5}{23}$$

Hence, the simplest form of the ratio 85:391 is 5:23

(iv) 186 : 403.

The given ratio is 186 : 403 = 186/403

To express this ratio in the simplest form, we will have to find the H.C.F of 186 and 403, It is 31.

Dividing each term of the ratio by the H.C.F of its terms i.e. 31, we get 186: 403 is 6:23.

Q.4

(i) 75 paise to Rs 3 = 75 paise : Rs 3

= 75 paise : 300 paise

= 1 : 4.

[∵ IRS = 100 paise]

[Dividing the first and second term by their H.C.R = 75]

(ii) 35 minutes to 45 minutes

= 35 min : 45 min

= 7 : 9 [diving the first-and second term by their H.C.F = 5]

(iii) 8kg to 400 gm. = 8 kg : 400 gm

= 8000 gm : 400 gm

= 20 : 1.

[dividing the first and second terms by their H.C.F = 400]

(iv) 48 minutes to 1 hour = 48 min: 1 hour

= 48 min: 60 min

[∵ 1 hour = 60 min] = 4: 5.

[Dividing the first and second term by their H.C.F = 12]

(v) 2 meters to 35 cm = 2 met: 35 cm

= 200 cm : 35 cm

[1m = 100 cm]

= 40 : 7

[∵ dividing the first and second term by their H.C.F = 5].

[∵ dividng the first and second term by their H.C.F = 5]

(vi) 35 minutes to 45 seconds = 35 min : 45 sec

= 2100 sec: 45 sec

= 140:3 [H.C.F = 15]

(vii) 2 dozen to 3 scores = 2 dozen : 3 scores

= 24: 60

[∵ 1 dozen = 12 score = 20] = 2:5.

[Dividing the first and second term by their H.C.F = 12].

(viii) 3 weeks to 3 days = 3 weeks : 3 days

= 21 day: 3days

[1 week = 7 days]

= 3 × 7 = 3

= 7:1.

(ix) 48 min to 2 hours 40 min = 48 min : 160 min

[∵ 1 hour = 60 min]

= 3: 10

[∵ dividing the first and second term by their H.C.F = 3:10]

(x) 3m 5cm to 35 cm = 3m 5 cm : 35 cm

= 305 cm : 35 cm

[dividing the first and second terms by their H.C.F = 5] = 61 : 7

Exercise 9.2

Q.1

(i) 3 : 4 (or) 9 : 16

Writing the given ratios as fractions, we have

$$3 : 4 = \frac{3}{4} \text{ and } 9 : 16 = \frac{9}{16}$$

Now L.C.M of 4 and is is 16

Making the denominaator of each fraction

equal to 16, we have

$$\frac{3}{4} = \frac{3 \times 4}{4 \times 4} = \frac{12}{16} \text{ and } \frac{9}{16} = \frac{9}{16}.$$

Clearly 12 >9

$$\therefore \frac{12}{16} > \frac{9}{16} \Rightarrow \frac{3}{4} > \frac{9}{16}$$

(ii) 15 : 16 or 24 : 24

Writing the given ratio as fractions, we have

$$15 : 16 = \frac{15}{16} \text{ and } 24 : 25 = \frac{24}{25}.$$

L.C.M of 25 & 16 is = 400

Making the denominator of each fraction equal to 400, we have

$$\frac{15}{16} = \frac{15 \times 25}{16 \times 25} = \frac{375}{400} \text{ and } \frac{24}{25} = \frac{24 \times 16}{25 \times 16} = \frac{384}{400}$$

clearly 384 > 375

$$\therefore \frac{384}{400} > \frac{375}{400} \Rightarrow \frac{24}{25} > \frac{15}{16}.$$

(iii) 4 :7 or 5 : 8

$$4 : 7 = \frac{4}{7} \text{ and } 5 : 8 = \frac{5}{8}$$

Now, LCM of 7 and 8 is 56.

$$\frac{4}{7} = \frac{4 \times 8}{7 \times 8} = \frac{32}{56} \text{and } 5 : 8 = \frac{5 \times 7}{8 \times 7} = \frac{35}{56}$$

Clearly 35 > 32

$$\therefore \frac{35}{56} > \frac{32}{56} \Longrightarrow \frac{5}{8} > \frac{4}{7}.$$

(iv) 9 : 20 or 8 : 13.

$$9 : 20 = \frac{9}{20} \text{and } 8 : 13 = \frac{8}{13}.$$

Now, LCM of 20 and 13 is 260

$$\frac{9}{20} = \frac{9 \times 13}{20 \times 13} = \frac{117}{260} \text{ and} \frac{8}{13} = \frac{8 \times 20}{20 \times 13} = \frac{160}{260}$$

Clearly 160 > 117

$$\therefore \frac{160}{260} > \frac{117}{260} \Longrightarrow \frac{8}{13} > \frac{9}{20}.$$

(v) 1 : 2 or 13 : 27

$$1 : 2 = \frac{1}{2} \text{ and } 13 : 27 = \frac{13}{27}$$

Now, LCM of 2 and 27 is 54

$$\frac{27}{54} (\text{or}) \frac{26}{54}$$

$$\therefore \frac{1}{2} > \frac{13}{27}$$

Q.2

i.e. have.

$$\frac{6}{8} = \frac{6 \div 2}{8 \div 2} = \frac{3}{4}$$

∴ 3 : 4 is an equivalent ratio of 6 : 15

$$\text{Also,} \quad \frac{6}{8} = \frac{6 \times 2}{8 \times 2} = \frac{12}{16}$$

So, 12 : 16 is an equivalent ratios of 6:8. Hence, 3 : 4 and 12 : 16 are equivalent ratios of 6 : 8.

Q.3

$$\frac{12}{20} = \frac{\boxed{}}{5} = \frac{9}{\boxed{}}$$

In order to find the first missing number, we consider the denominator 20 and 35

LCM of 20 and 5 is 20.

We have 20 ÷ 4 = 4.

So, we divide the Nr or of 12/20 by 4 to get

$$\frac{12}{20} = \frac{12 \div 4}{20 \div 4} = \frac{3}{5}$$

Hence, first missing number is 3, consequently the second ratio is 3/5

To find the second missing number, we consider

$$\frac{2}{3} + \frac{3}{5} = \frac{9}{\boxed{}}$$

We have 9 ÷ 3 = 3, so we multiply the nr Δ or of 3/5 by 3 to get

$$\frac{3}{5} = \frac{3 \times 3}{5 \times 3} = \frac{9}{15}$$

Hence, the second missing number is 15.

Exercise 9.3

Q.1

(i) 16 : 24 = 20 : 30

$$\Rightarrow \frac{16}{24} = \frac{20}{30}$$

$$\Rightarrow \frac{\frac{16}{24}}{\frac{4}{4}} = \frac{\frac{20}{30}}{\frac{5}{5}}$$

$$\Rightarrow \frac{4}{6} = \frac{4}{6}$$

$$\Rightarrow \frac{2}{3} = \frac{2}{3}$$

True

(ii)

21 : 6 = 35 : 10

$$\frac{\frac{21}{6}}{\frac{3}{3}} = \frac{\frac{35}{10}}{\frac{5}{5}}$$

$$\Rightarrow \frac{7}{2} = \frac{7}{2}$$

True

(iii)

$$\frac{12}{18} = \frac{28}{12}$$

$$\frac{6}{9} \neq \frac{14}{6}$$

False.

(iv) 51 : 58 = 85 : 102.

$$\frac{51}{58} \neq \frac{5}{6}$$

False

(v)

$$\frac{40 \text{ men}}{200 \text{ men}} = \frac{1}{5} \text{ (or) } \frac{40 \text{ men} \div 40}{200 \text{ men} \div 40} = \frac{\text{Rs } 5 \div 5}{\text{Rs } 25 \div 5}$$

$$\frac{1}{5} = \frac{1}{5}$$

True

(vi)

$$\frac{99 \text{ kg}}{45 \text{ kg}} = \frac{\text{Rs } 44}{\text{Rs } 20}$$

$$\Rightarrow \frac{99}{45} = \frac{44}{20}$$

$$\Rightarrow \frac{99 \div 9}{45 \div 9} = \frac{44 \div 9}{20 \div 9}$$

$$\Rightarrow \frac{11}{5} = \frac{11}{5}$$

True.

Q.2

(i) 8, 16, 6, 12.

We have,

$$8 : 16 = \frac{8}{16} = \frac{1}{2}$$

$$\text{and } \frac{6}{12} = \frac{1}{2}$$

$$\therefore \frac{8}{16} = \frac{6}{12}$$

Hence 8, 16, 6, 12 are in proportion.

(ii) 6, 2, 4, 3

We have

$\frac{6}{2} = \frac{3}{1}$

and $\frac{4}{3} = \frac{4}{3}$

$\therefore \frac{3}{1} \neq \frac{4}{3}$

Hence, 6, 2, 4, 3 are not in proportion

(iii) 150, 250, 200, 300.

We have

$\frac{150}{250} = \frac{3}{5}$ and $\frac{200}{300} = \frac{4}{6} = \frac{2}{3}$

∴ Hence 150, 250 200, 300 are not in proportion.

Exercise 9.4

Q.1

The price of 3 meters of cloth = Rs 79.50

Let the price of 15m cloth be x

Then,

$$\frac{3}{15} = \frac{79.50}{x}$$

By cross multiplication, we get

$$\Longrightarrow 3x = 15 \times 79.50$$

$$\Longrightarrow x = \frac{15 \times 79.50}{3}$$

$\Longrightarrow$ x = 5 × 79.50

$\Longrightarrow$ x = Rs 397.50

Q.2

Cost of 17 chairs = Rs 9605

$$\text{Cost of one chair } = \frac{\text{Rs } 9605}{17} = 565$$

Number of chairs purchased

$$\text{by Rs } 56500 = \frac{56500}{\text{cost of one chair}}$$

$$= \frac{56500}{565}$$

= 100 chairs.

Q.3

Three ferry loads carry = 150 people

one ferry load carry = 150/3 people

= 50 people

Number of peoples can be carried by 4 ferryloads = 50 × 4

= 200 people.

Q.4

9 kg rice cost 120.60

50 kg cost = ?

1 kg rice cost = 120.60/9

= 13.4

50 kg rice cost = 13.4 × 50

= 670

∴ 50 kg rice cost = Rs. 670

Q.5

Train runs 200 km in 5 hours.

Train runs in one hour = 200/5 km

= 40 km

∴ No of Kms does it run in 7 hrs = 7 × 40 km

= 280 km

Q.6

10 boys can dig a pitch in 12 hours.

8 boys can dig pitch in x hrs

one boy can dig pitch in = 12 × 10 = 120 hrs

8 boys can dig pitch in = 120/8

= 15 hrs.

Q.7

Daily 8 hours → work finishes in 72 days.

6 hrs daily → ?

Daily one hour = 12 × 8 = 96 days

No of day will take 6 hrs daily works = 96/6 = 16 days.

Basic Geometrical Concepts

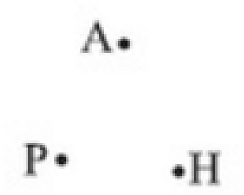
Exercise 10.1

Question: 1

Make three points in your notebook and name them.

Solution:

Three points, namely A, P and H can be marked as follows:



Question: 2

Draw a line in your notebook and name it using a small letter of the alphabet

Solution:

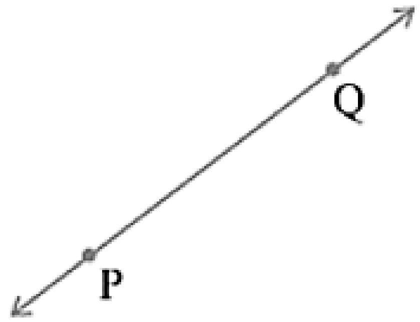
Let us draw a line and name it l

Question: 3

Draw a line in your notebook and name it by using two points on it

Solution:

Let us first draw a line. Two points on it are P and Q. now, the line can be written as line PQ



Question: 4

Give three examples from your environment of:

i) Points

ii) Portion of a line

iii) Plane of a surface

iv) Portion of a plane

v) Curved surface

Solution:

i) Points –

The period at the end of the sentence, a pinhole on the map and the point at which two walls and the floor meet at the corner of the room.

ii) Portion of a line –

Tightly stretched power cables, laser beams, and thin curtain rods

iii) Plane of a surface –

The surface of a smooth wall, the surface of the top of a table and the surface of a smooth white board

iv) Portion of a plane –

The surface of the sheet of the paper, the surface of calm water in a swimming pool and the surface of a mirror

v) Curved surface –

The surface of a gas cylinder, the surface of a tea pot and the surface of an ink pot.

Question: 5

There are a number of ways by which we can visualize a portion of a line. State whether the following represent a portion of line or not:

i) A piece of elastic stretched to the breaking point

ii) Wire between two electric poles

iii) The line thread by which a spider lowers itself

Solution:

i) Yes

ii) No

iii) Yes

Question: 6

Can you draw a line on the surface of a sphere which lies wholly on it?

Solution:

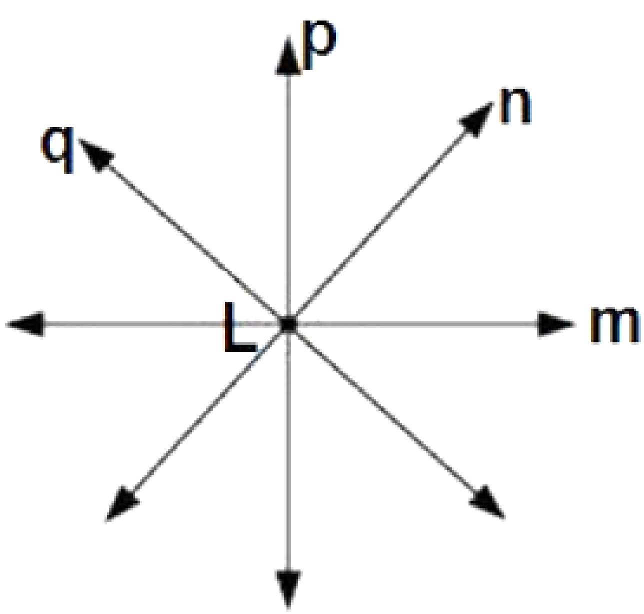
No, we cannot draw a line on the surface of the sphere, which lies wholly on it.

Question: 7

Make appoint on the sheet of a paper and draw a line passing through it. How many lines can you draw through this point?

Solution:

Unlimited number of lines can be drawn passing through a point L



Question: 8

Mark any two points P and Q in your notebook and draw a line passing through the points.

How many lines can you draw passing through this both points?

Solution:

We have two points P and Q and we draw a line passing through these two points.

Only one line can be drawn passing through these two points.

Question: 9

Give an example of the horizontal plane and a vertical plane from your environment.

Solution:

Ceiling of a room is an example of a horizontal plane in our environment.

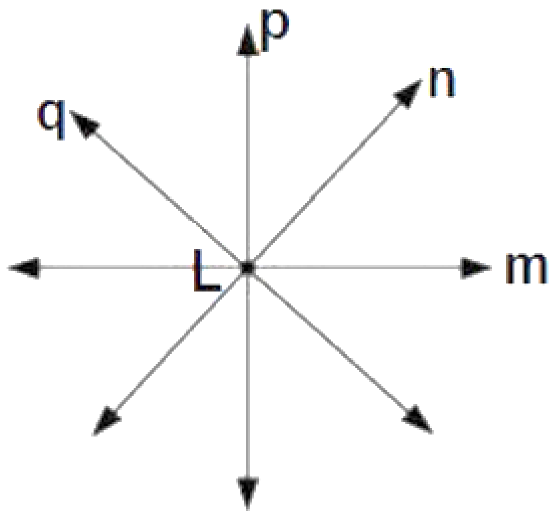
Wall of a room is an example of a vertical plane in our environment.

Question: 10

How many lines may pass through one given point, two given point, any three collinear points?

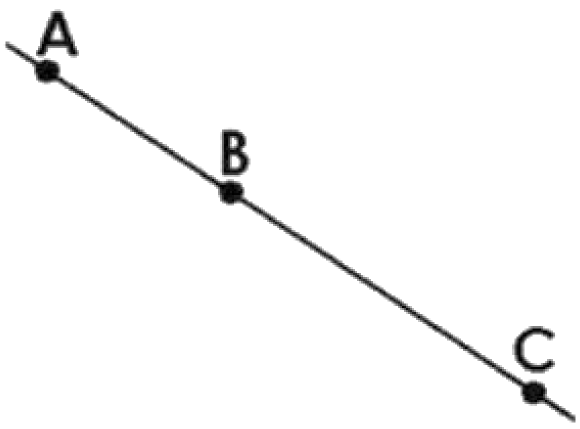
Solution:

Lines passing through one point – unlimited



Lines passing through two points – one

Lines passing through any three collinear points – one

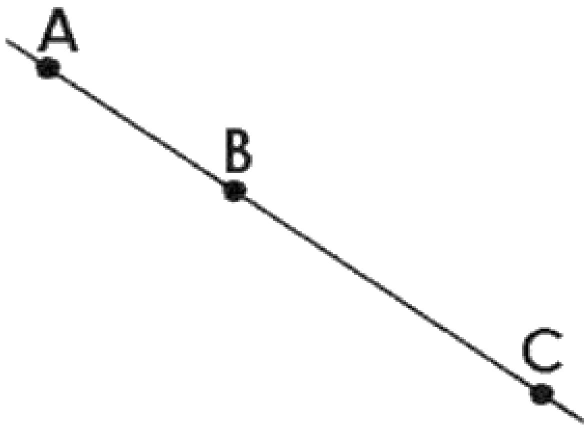


Question: 11

Is it ever possible for exactly one line to pass through three points?

Solution:

Yes, it is possible if three points lie on a straight line



Question: 12

Explain why is not possible for a line to have a mid point?

Solution:

The length of the line is infinite. Thus, it is not possible to find its midpoint. On the other hand, we can find, we can find the midpoint of a line segment

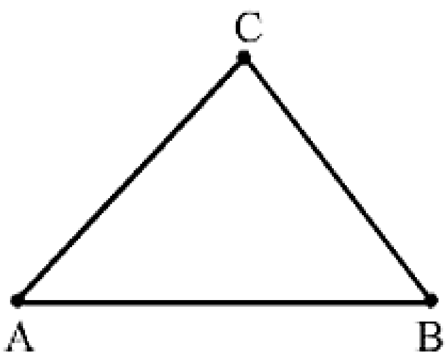
Question: 13

Mark three non – collinear points points A, B, C in your notebook. Draw the lines through the points taking two at a time. Name these lines. How many such different lines can be drawn?

Solution:

These are three non – collinear points A, B, C

Three lines can be drawn through these points. These three lines are AB, BC and AC



Question: 14

Coplanar points are the points that are in the same plane. Thus,

i) Can 150 points be coplanar?

ii) Can 3 points be non – co planar?

Solution:

i) Yes,

A group of points that lie in the same plane are called co planar points.

Thus, it is possible that 150 points can be co-planar.

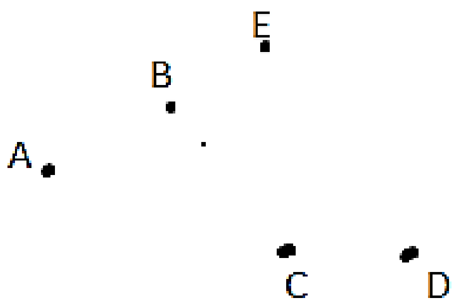
ii) No

Three points will be coplanar because we can have a plane that can contain 3 points on it.

Thus, it is not possible that 3 points will be non – coplanar.

Question: 15

Using a ruler, check whether the following points given in the figure are collinear or not?



Solution:

i) D, A and C are collinear points

ii) A, B and C are non – collinear points

iii) A, B and E are collinear points

iv) B, C and E are non – collinear points

Question: 16

Lines p, q is coplanar. So are the lines p, r. Can we conclude that the lines p, q, r are coplanar?

Solution:

No, p, q and r are not necessarily coplanar.

Example – If we take p as intersecting line of two consecutive walls of a room, q as a line on the first wall and r on the second wall whose (both walls) intersection is line p

Thus we can see that p, q and r are not coplanar.

Question: 17

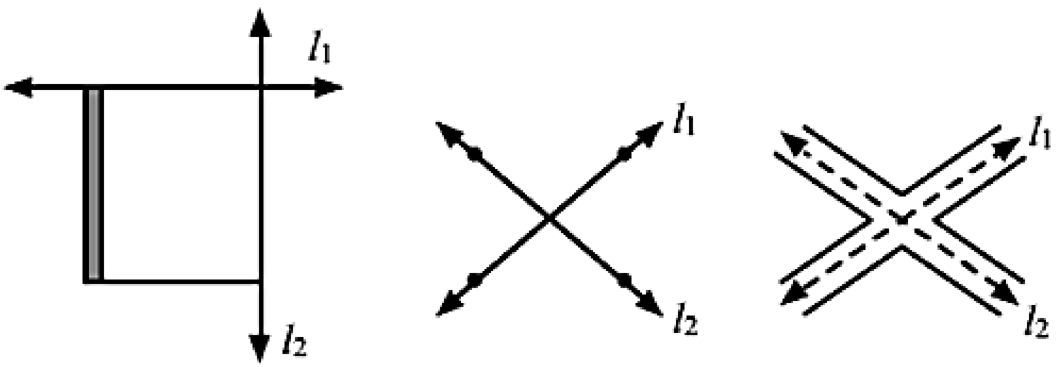
Give three examples of each:

i) Intersecting lines:

ii) Parallel lines from your environment:

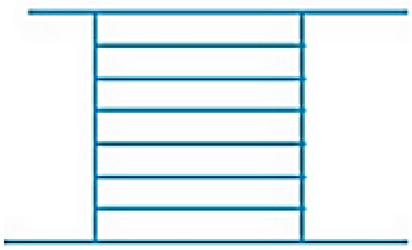
Solution:

i) Intersecting lines:

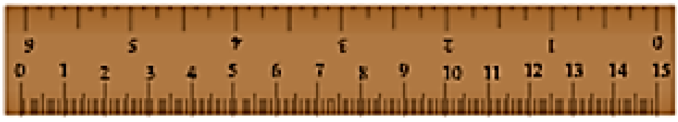


Two adjacement edges of your notbook | The letter X of the english alphabet | Crossing-roads

ii) Parallel lines from your environment:



The cross-bars of this window

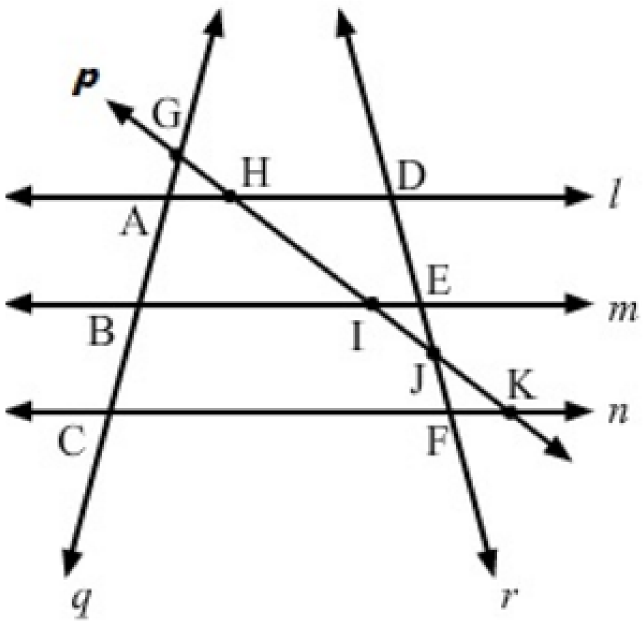


The opposite edges of ruler (scale)

Rail lines

Question: 18

From the figure write:



Solution:

i) All pairs of intersecting lines – (l, m), (m, n) and (l, n)

ii) All pairs of intersecting lines: (l, p), (m, p), (n, p), (l, r), (m, r), (n, r), (I, q), (m, q),(n, q), (q, p), (q, r)

iii) Lines whose point of intersection is I: (m, p)

iv) Lines whose point of intersection is D: (l, r)

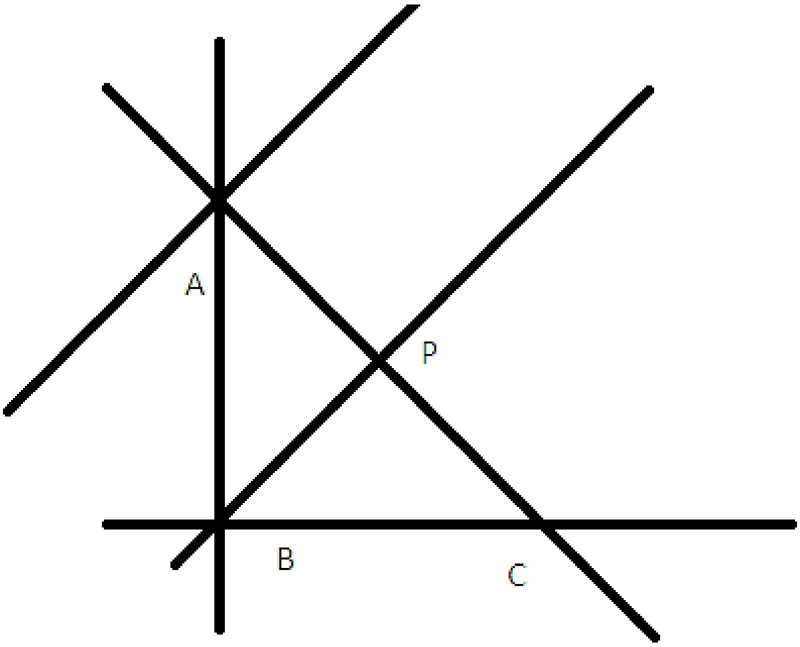
v) Lines whose point of intersection E: (m, r)

vi) Lines whose point of intersection is A: (l, q)

vii) Collinear points: (G, A, B and C) ,(D, E, J and F), (G, H, I and J, K), (A, H and D), (B, I and E) and (C, F and K)

Question: 19

Write concurrent lines and their and their point of concurrence:



Solution:

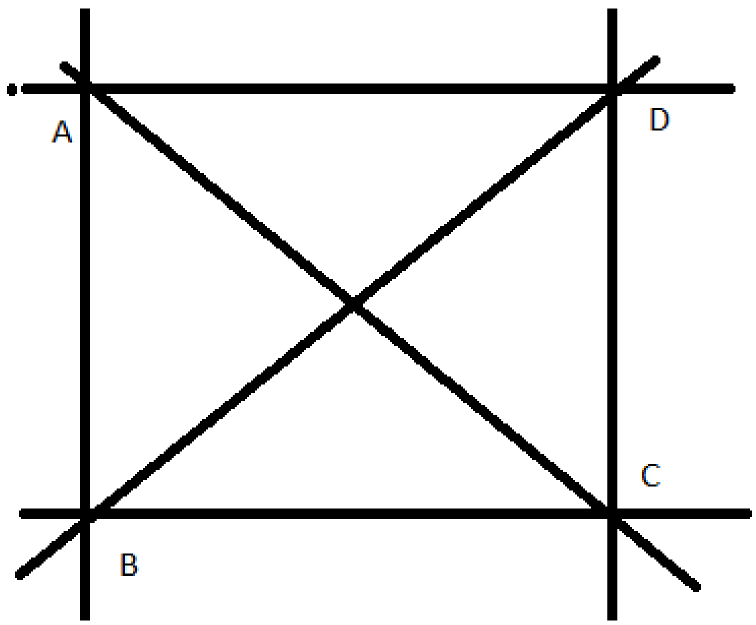
From the given figure, we have:

Concurrent lines can be defined as three or more lines which share the same meeting point. Clearly lines, n, q, and l are concurrent with A as the point of concurrence.

Lines, m, q and p are concurrent with B as the point of concurrence.

Question: 20

Mark four points A, B, C, D in your notebook such that no three of them are collinear. Draw all the lines which join them in pairs as shown



Solution:

i) How many such lines can be drawn

Six lines can be drawn through these four points as given in the figure.

ii) Write the names of these lines

These lines are AB, BC, CD, BD and AD

iii) Name the lines which are concurrent to A

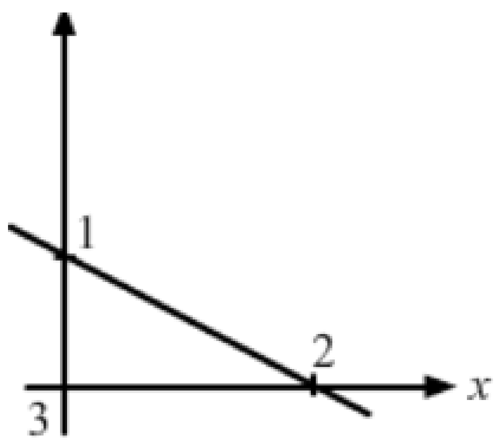
Lines which are concurrent at A are AC, AB and AD

Question: 21

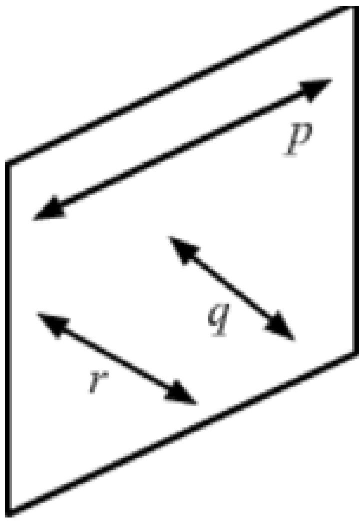
What is the maximum number of points of intersection of three lines in a plane? What is the minimum number?

Solution:

Maximum number of points of intersection of three lines in a plane will be three



Minimum number of points of intersection of three lines in a plane will be zero

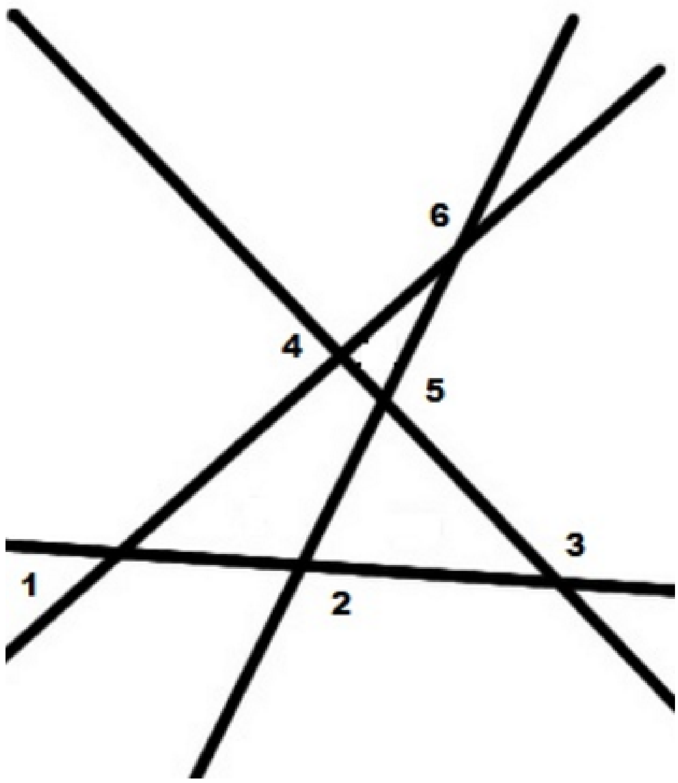


Question: 22

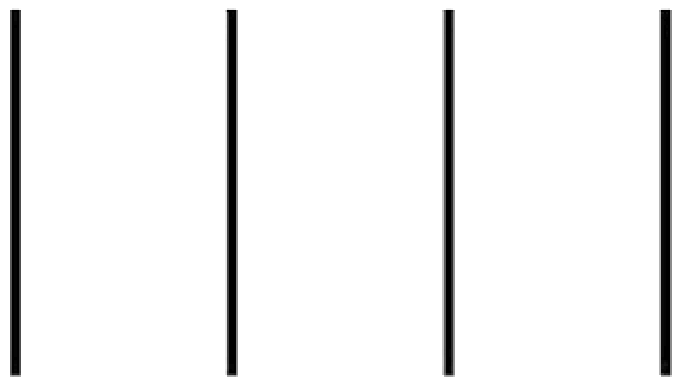
With the help of a figure, find the maximum and minimum number of points of intersection of four lines in a plane.

Solution:

Maximum number of points of intersection of four lines in a plane will be six



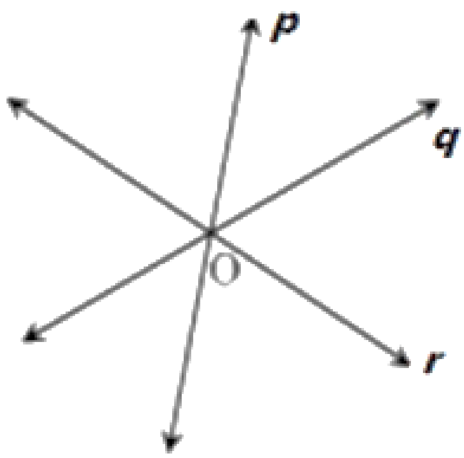
Minimum number of points of intersection of four lines in a plane will be zero.



Question: 23

Lines p, q and r are concurrent. Also, the lines p, r and s are concurrent. Draw a figure and state whether lines p, q, r and s are concurrent or not?

Solution:



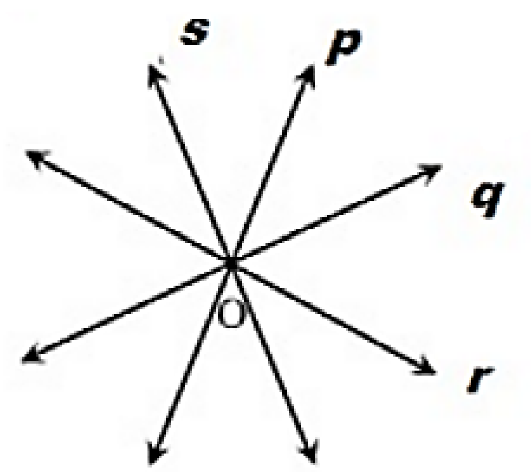
Thus, lines p, q and r intersect at a common point O

Also, lines p, r and s are concurrent

Therefore, lines p, r, and s intersect at a common point. But q and r intersect each other at O.

So, p, q and r intersect at O

Hence, p, q, r and s are concurrent. Lines p, q, r and s intersect at O.

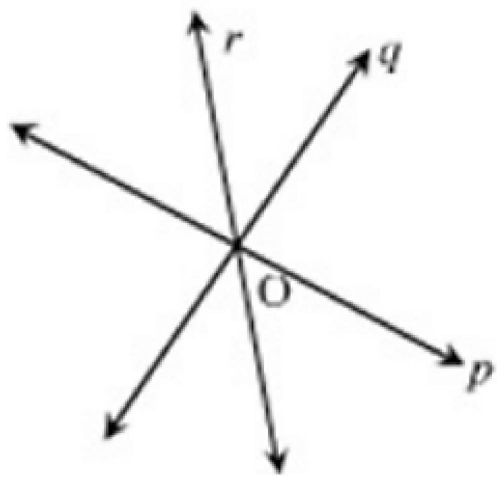


Question: 24

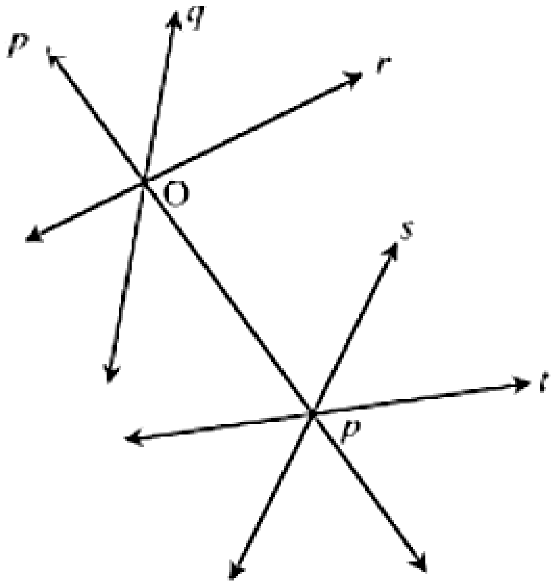
Lines p, q, and r are concurrent. Also lines p, s and t are concurrent. Is it always true that the lines q, r and s will be concurrent? Is it always true for lines q, r, and t?

Solution:

Lines p, q, and r are concurrent. So, lines p, q and r intersect at a common point O.



Given lines p, s, and t are concurrent. So, lines p, s and t also intersect at a common point. However, it is not always true that q, r and s or q, r and t are concurrent.



Question: 25

Fill in the blanks in the following statements using suitable words:

i) A page of a book is a physical example of a ______.

ii) An inkpot has both ________surfaces.

iii) Two lines in a plane are either _______ or are _________.

Solution:

i) A page of a book is a physical example of a **plane**

ii) An inkpot has both **curved and plane** surfaces

iii) Two lines in a plane are either **parallel** or are **intersecting**

Question: 26

State which of the following statements are true and which are false:

i) Point has a size because we can see it as a thick dot on paper

ii) By lines in geometry, we mean only straight lines

iii) Two lines in a plane always intersect at a point

iv) Any plane through a vertical line is vertical

v) Any plane through a horizontal line is horizontal

vi) There cannot be a horizontal line in a vertical plane

vii) All lines in a horizontal plane are horizontal

viii) Two lines in a plane always intersect at a plane

ix) If two lines intersect at a point P, then P is called the point of concurrence of the two lines

x) If two lines intersect at a point P, then P is called the point of intersection of the two lines

xi) If A, B, C and D are collinear points D, P and Q are collinear, then points A, B, C, D, P and Q are always collinear

xii) Two different lines can be drawn passing through two given points

xiii) Through a given point only one line can be drawn

xiv) Four points are collinear if any three of them lie on them lie on the same line

xv) The maximum number of points of intersection of three lines is three

xvi) The minimum number of points of intersection of three lines is one

Solution:

i) False

ii) True

iii) False

iv) True

v) False

vi) False

vii) True

viii) False

ix) False

x) True

xi) False

xii) False

xiii) False

xiv) False

xv) True

xvi) False

Question: 27

Give the correct matching of the statements of column A and column B

Column A	Column B	Column B	
i	Points are collinear	a.	May be parallel or intersecting
ii	Line is completely known	b.	Undefined terms in geometry
iii	Two lines in a plane	c.	If they lie on the same line
iv	Relations between points and lines	d.	Can pass through a point
v	Three non-collinear points	e.	Determine a plane
vi	A plane extends	f.	Are called incidence properties
vii	Indefinite number of lines	g.	If two points are given
viii	Point, line and plane are	h	Indefinitely in all directions

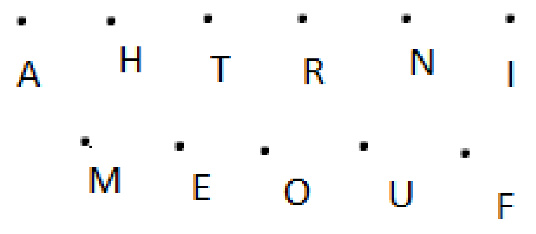
Solution:

Column A	Column B	Column B	
i	Points are collinear	c.	If they lie on the same line
ii	Line is completely known	g.	If two points are given
iii	Two lines in a plane	a.	May be parallel or intersecting
iv	Relations between points and lines	f.	Are called incidence properties
v	Three non-collinear points	e.	Determine a plane
vi	A plane extends	h.	Indefinitely in all directions
vii	Indefinite number of lines	d.	Can pass through a point
viii	Point, line and plane are	b.	Undefined terms in geometry

Exercise 10.2

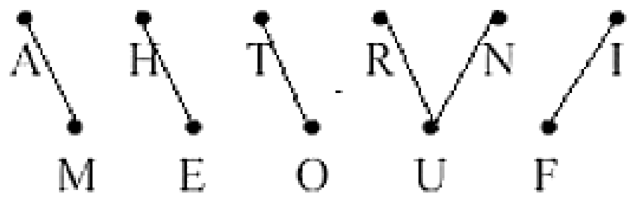
Question: 1

In the figure, points are given in two rows. Join the points AM, HE, TO, RUN, IF. How many line segments are formed?



Solution:

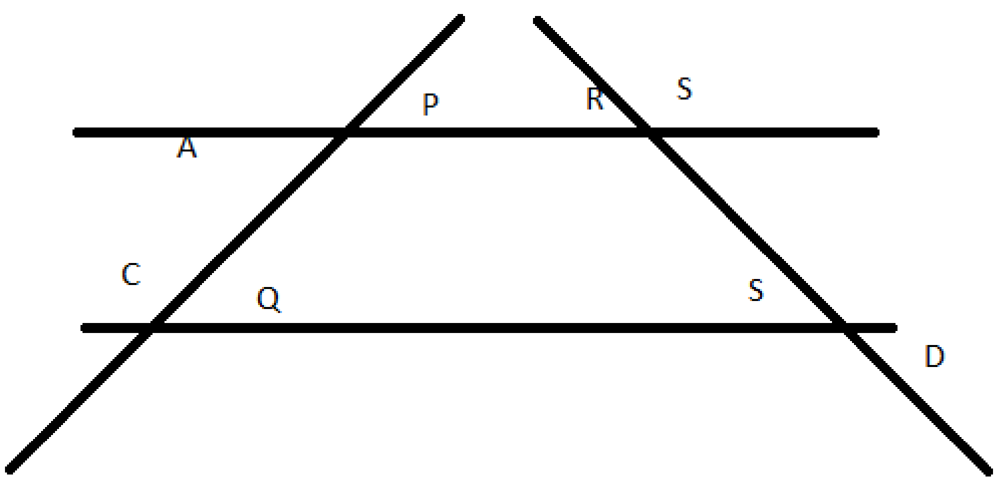
If we join the points AM, HE, RUN, IF, 6 line segments can be formed



These six line segments are AM, HE, RU, IF, UN

Question: 2

In the figure name:



i) Five line segments

ii) Five rays

iii) non intersecting line segments

Solution:

i) Five line segments – PQ, RS, PR, QS, AP

ii) Five rays – QC->SD->PA->RB-> AND RA

iii) non intersecting line segments – PR , QS

Question: 3

In each of the following cases, state whether you can draw line segments on the given surfaces:

i) The face of the cuboids

ii) The surface of an egg or apple

iii) The curved surface area of the cylinder. Four points such that there no three of them belong to the same line

iv) The curved surface of the cone

v) The base of the cone

Solution:

i) Yes, we can draw line segments on the face of the cuboids.

ii) No, we cannot draw a line segment on the surface of an egg or apple

iii) Yes, we can draw line segments on the curved surface of a cylinder. Every line segment parallel to the axis of a cylinder on the curved surface will be a line segment.

iv) Yes we can draw line segments on the curved surface of the cone. Every line segment joining the vertex of a cone and any point on the circumference of the cone will be a line segment.

v) Yes , we can draw line segments on the base of the cone. Yes, , we can draw line segments on the curved surface area of the cone. Every line segment joining the vertex of a cone and any point on the circumference of the cone will form a line segment.

Question: 4

Mark the following points on the sheet of the paper. Tell how many line segments can be obtained in the each case:

Solution:

If there are n points in a plane and no three of them are collinear, the number of line segments obtained by joining these points is equal to n(n-1)2

On applying the above formula, we get,

i) Two points A, B – number of line segments = 2(2-1) 2 = 1

ii) Three non – collinear points A, B, C

The number of line segments = 3(3-1) 2 = 3(22) = 3

iii) For four points such that no three of them belong to the same line

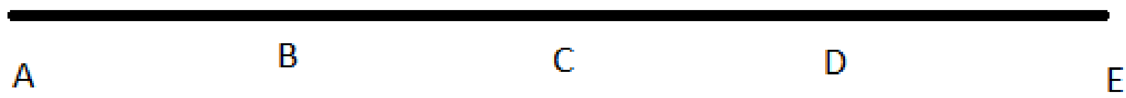
Number of line segments = 4(4-1)2 = 4(32) = 6

iv) Any five points so that no three of them are collinear

Number of line segments = 5(5-1) 2 = 5(42) = 10

Question: 5

Count the number of line segments in figure

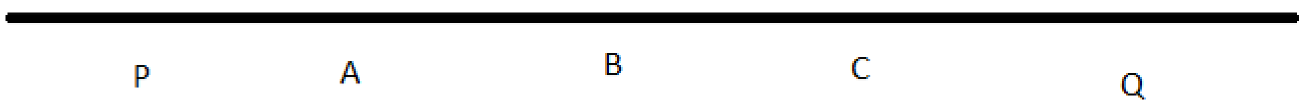


Solution:

Line segments in the given figure are AB, AC, AD, AE, BC, BD, BE, CD, CE and DE. Thus, there are 10 line segments

Question: 6

In the figure name all the rays with initial points as A, B, C respectively.



Solution:

Name of all the rays with initial point A:

AP, AB, AC, AQ

Name of all the rays with initial point B:

BP, BA, BC, BQ

Name of all the rays with initial point C:

CP, CA, CB, CQ

i) Is ray AB different from AC?

No, because the origin point of both the rays. AB, AC

ii) Is ray BA different from CA?

Yes, because the original point of both the rays. BA and CA are different

iii) Is ray CP different from ray CQ?

Yes, because both the rays. CP and CQ are different.

Question: 7

Give three examples of line segments from the environment

Solution:

Examples of line segments in our home are:

i) Grout lines in the tile floors

ii) Groves where wooden flooring connects

iii) Metal outline of a sliding glass door.

Exercise 10.3

Question: 1

Draw rough diagrams to illustrate the following:

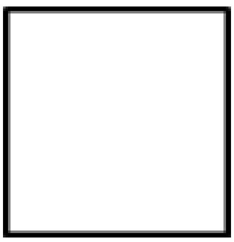
i) Open curve

ii) Closed curve

Solution:

i) Open curve:

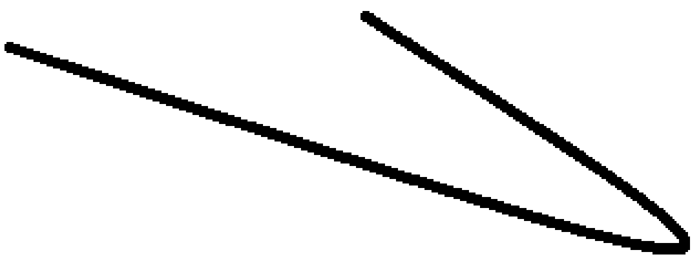
ii) Closed curve:



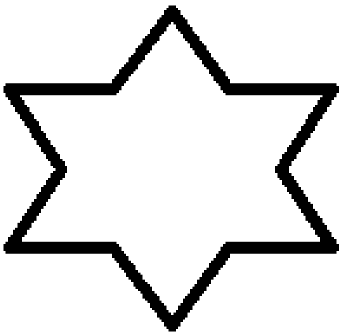
Question: 2

Classify the following curves as open or closed?

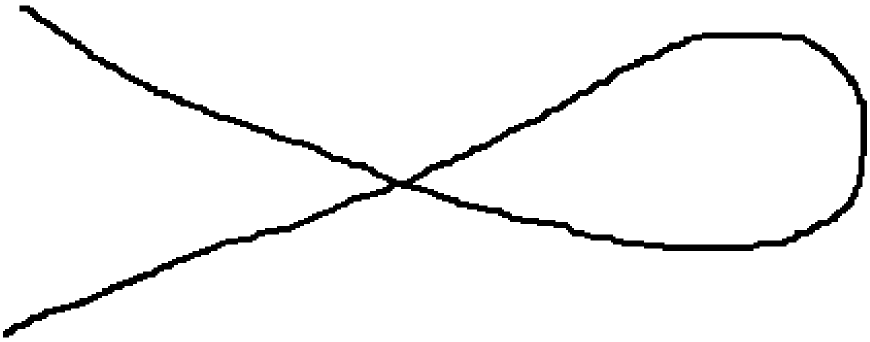
i)



ii)

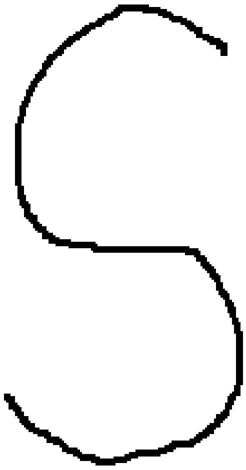


iii)

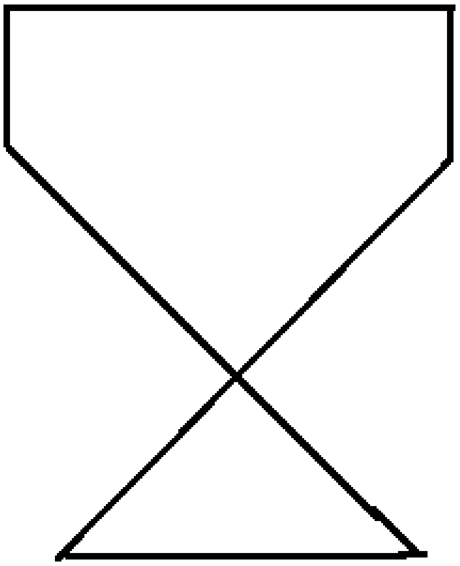


iv)

v)



vi)



Solution:

i) Open

ii) Closed

iii) Closed

iv) Open

v) Open

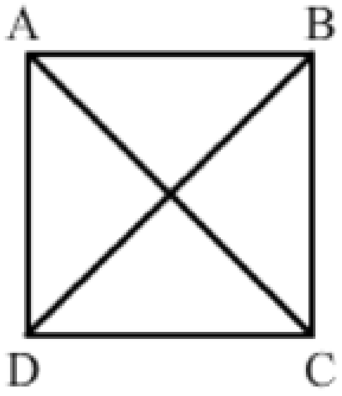
vi) Closed

Question: 3

Draw a polygon and shade its interior. Also draw its diagonals, if any

Solution:

ABCD is a polygon and AC and BD are its two diagonals.



Question: 4

Illustrate, if possible, each one of the following with a rough diagram:

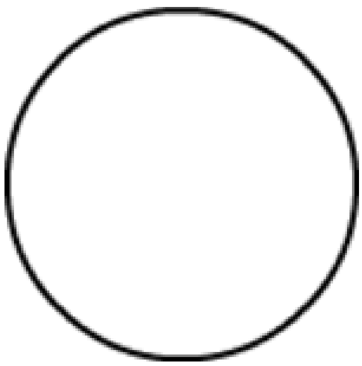
i) A closed curve that is not a polygon

ii) An open curve made up entirely of line segments

iii) A polygon with two sides

Solution:

i) A circle is a simple closed curve but not a polygon. A polygon has line segments, but a circle has only curve



ii) Rough diagram of an open curve made up entirely of line segments

iii) A polygon with two sides is not possible.

Angles

Exercise 11.1

Question: 1

Give three examples of angles from your environment.

Solution:

Three examples of angles from our environment are:

(i) Angle formed by the minute and hour hands of an analog clock.

(ii) Angle formed by the two adjacent walls of a room

(iii) Angle formed by the two adjacent fingers of our hand.

Question: 2

Write the arms and the vertex of ∠LMP **given in the figure.**

Solution:

Arms of ∠LMP are MP and ML. Further, vertex is M.

Question: 3

How many angles are formed in the figures given? Name them. (fig. from book)

Solution:

(i) Three angles are formed, namely ∠ABC, ∠BAC, and ∠ACB.

(ii) Four angles are formed, namely ∠ABC, ∠ADC, ∠BCD, and ∠BAD.

(iii) Eight angles are formed
namely ∠ADC, ∠ACD, ∠DAC, ∠ACB, ∠ABC, ∠BAC¸ ∠BCD, and ∠BAD.

Question: 4

From figure, list the points which are: (fig. from book)

(i) in the interior of ∠P

(ii) in the exterior of ∠P

(iii) lie on ∠P

Solution:

(i) Points J and C lie in the interior of ∠P.

(ii) Points D and B lie in the exterior of ∠P.

(iii) Points A, P and M lie on ∠P.

Question: 5

In the figure, write another name for: (fig. from book)

(i) ∠1.

(ii) ∠2.

(iii) ∠3.

(iv) ∠4.

Solution:

(i) Another name for ∠1 is ∠BOD.

(ii) Another name for ∠2 is ∠BOC.

(iii) Another name for ∠3 is ∠AOC.

(iv) Another name for ∠4 is ∠AOD.

Question: 6

In the figure, write another name for: (fig. from book)

(i) ∠1.

(ii) ∠2.

(iii) ∠3.

Solution:

(i) ∠BPE

(ii) ∠PQC

(iii) ∠DQF

Question: 7

In the given fig., which of the following statements are true: (fig. from book)

(i) Point B in the interior of ∠AOB

(ii) Point B in the interior of ∠AOC

(iii) Point A in the interior of ∠AOD

(iv) Point C in the exterior of ∠AOB

(v) Point D in the exterior of ∠AOC

Solution:

(ii), (iv) and (v) are true statements.

(i), and (iii) are incorrect statements as B lies on ∠AOB and A lies on ∠AOD.

Question: 8

Which of the following statements are true:

(i) The vertex of an angle lies in its interior.

(ii) The vertex of an angle lies in its exterior.

(iii) The vertex of an angle lies on it.

Solution:

(iii) The vertex of an angle lies on it.

This is the only correct statement.

Question: 9

By simply looking at the pair of angles given in figure, state which of the angles in each of the pairs is greater. (fig. from book)

Solution:

(i) ∠AOB is greater than ∠DEF.

(ii) ∠PQR is greater than ∠LMN.

(iii) ∠UVW is greater than ∠XYZ.

Question: 10

By using tracing paper compare the angles in each of the pairs given in figure, (fig. from book)

Solution:

Using tracing paper, we get that:

(i) ∠PQR is greater than ∠AOB.

(ii) ∠UVW is greater than ∠LMN.

(iii) ∠RST is greater than ∠XYZ.

(iv) ∠PQR is greater than ∠EFG.

Exercise 11.2

Question: 1

Give two examples each of right, acute and obtuse angles from your environment.

Solution:

Two examples of right angle in our environment are:

(i) The angle formed by the two adjacent walls of a room is a right angle.

(ii) The angle formed by the two adjacent edges of a book is a right angle.

Two examples of acute angle in our environment are:

(i) The angle formed between the two adjacent fingers of our hand.

(ii) The angle between the two adjacent sides of the letter Z of English alphabet.

Two examples of obtuse angle in our environment are:

(i) The smaller angle formed by the two adjacent blades of a fan.

(ii) The smaller angle formed by the two sloping sides of a roof of a but is an obtuse angle.

Question: 2

An angle is formed by two adjacent fingers. What kind of angle will it appear?

Solution:

Angle formed by two adjacent fingers will appear as an acute angle.

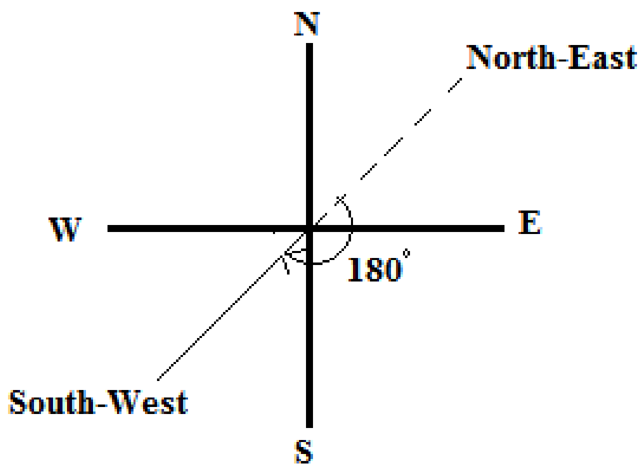
Question: 3

Shikha is rowing a boat due northeast. In which direction will she be rowing if she turns it through:

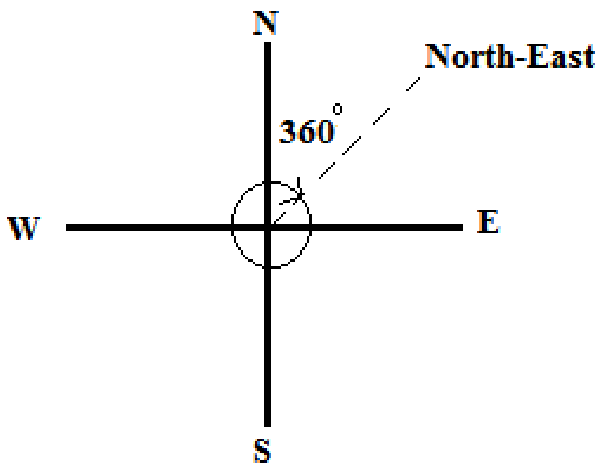
(i) a straight angle. (ii) a complete angle.

Solution:

(i) If Shikha turns through a straight angle or 180 degrees, she will be rowing along the south – west direction.



(ii) If Shikha turns through a complete angle or 360 degrees, she will be rowing along her original direction, i.e., north – east direction.

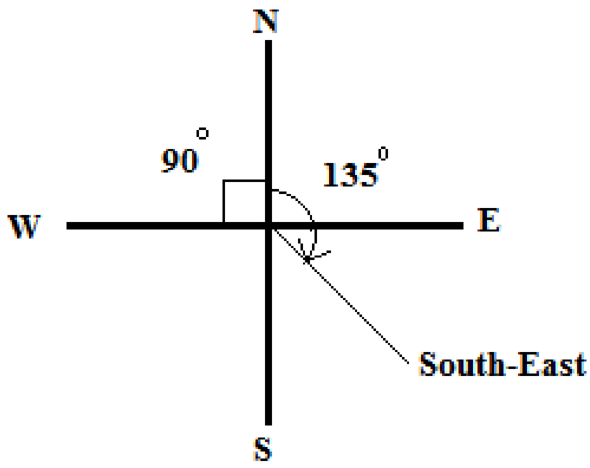


Question: 4

What is the measure of the angle in degrees between:

(i) North and West?

(ii) North and South?
(iii) North and South – East?



Solution:

The measure of the angle between:

(i) North and West is 90 degrees.

(ii) North and South is 180 degrees.

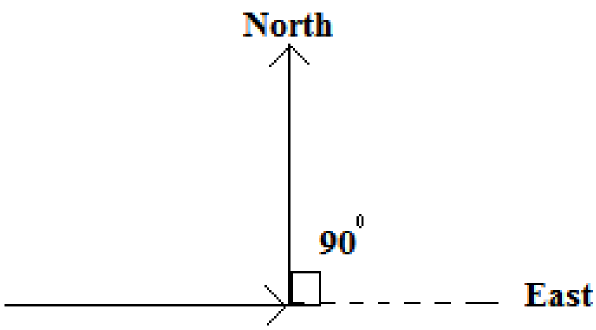
(iii) North and South – East is 135 degrees.

Question: 5

A ship sailing in river Jhelam moves towards east. If it changes to north, through what angle does it turn?

Solution:

If the ship is sailing in east direction and turns to north direction, it turns through an angle of 90 degrees.



Question: 6

You are standing in a class room facing north. In what direction are you facing after making a quarter turn?

Solution:

After making a quarter turn or a turn of 90 degrees, i will be facing east if i turn to my right hand. Similarly, if i turn to my left hand, i will be facing west.

Question: 7

A bicycle wheel makes four and a half turns. Find the number of right angles through which it turns.

Solution:

In one turn, the wheel of a bicycle covers 360°.

If we express 360° in right angles, we get:

360°/90° = 4 right angles.

Thus, in four and a half turns, the wheel will turn by (4 × 4.5) = 18 right angles.

Question: 8

Look at your watch face. Through how many right angles does the minute hand moves between 8 O' clock and 10:30 O' clock?

Solution:

The time interval between 8: 00 O'clock and 10 : 30 O'clock is 2.5 hours, i.e., two and a half hours.

In 1 hour, the minute hand turns by a complete angle, i.e., 360° or 360°/90° = 4 right angles.

Thus, in 2.5 hours, the minute hand will turn by 2.5 × 4 = 10 right angles.

Question: 9

If a bicycle wheel has 48 spokes, then find the angle between a pair of adjacent spokes.

Solution:

In a bicycle, the central angle measures 360° and it consists of 48 spokes.

Therefore, angle between any two adjacent spokes = 360/48 = 7.5°.

Question: 10

Classify the following angles as acute, obtuse, straight, right, zero and complete angle:

(i) 118°

(ii) 29°

(iii) 145°

(iv) 165°

(v) $0^{\uparrow 8}$

(vi) 75°

(vii) 180°

(viii) 89.5°

(ix) 30°

(x) 90°

(xi) 179°

(xii) 360°

(xiii) 90.5°

Solution:

An acute angle measures between 0° and 90°; an obtuse angle measures between 90° and 180°; a straight angle measures 180°; a right angle measures 90°; a zero angle measures 0° and a complete angle measures 360°.

(i) 118° is an obtuse angle.

(ii) 29° is an acute angle.

(iii) 145° is an obtuse angle.

(iv) 165° is an obtuse angle.

(v) 0° is a zero angle.

(vi) 75° is an acute angle.

(vii) 180° is a straight angle.

(viii) 89.5° is an acute angle.

(ix) 30° is an acute angle.

(x) 90° is a right angle.

(xi) 179° is an obtuse angle.

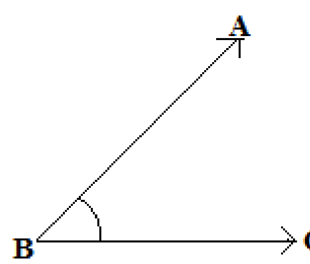
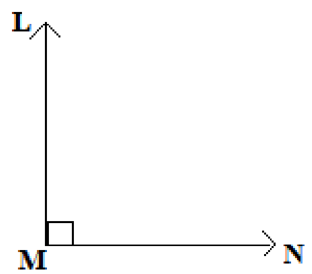
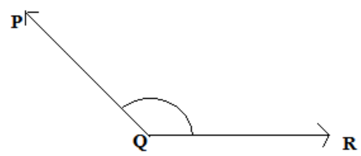
(xii) 360° is a complete angle.

(xiii) 90.5° is an obtuse angle.

Question: 11

Using only a ruler, draw an acute angle, a right angle and an obtuse angle in your notebook and name them.

Solution:

		
Acute angle ∠ABC	Right angle ∠LMN	Obtuse angle ∠PQR

Question: 12

State the kind of angle, in each case, formed between the following directions:

(i) East and West

(ii) East and North

(iii) North and North – East

(iv) North and South – East

Solution:

(i) East and west directions form an angle of 180°, which is a straight angle.

(ii) East and north directions form an angle of 90°, which is a right angle.

(iii) North and north-east directions form an angle of 45°, which is an acute angle.

(iv) North and south-east directions form an angle of 135°, which is an obtuse angle.

Question: 13

State the kind of each of the following angles:

Solution:

(i) Acute angle, as it measures between 0° and 90°.

(ii) Obtuse angle, as it measures between 90° and 180°.

(iii) Straight angle, as it is equal to 180°.

(iv) Right angle, as it is equal to 90°.

(v) Complete angle, as it is equal to 360°.

Objective Type Questions

Mark the correct alternative in each of the following:

Question: 1

The vertex of an angle lies

(a) in its interior (b) in its exterior (c) on the angle (d) inside the angle

Solution:

(c) on the angle.

The vertex of an angle lies on the angle.

Question: 2

The figure formed by two rays with the same initial point is known as

(a) a ray (b) a line (c) an angle (d) a line segment

Solution:

(c) an angle.

An angle is a figure by two rays with the same initial point.

Question: 3

An angle of measure 0° is called

(a) a complete angle (b) a right angle (c) a straight angle (d) none of these

Solution:

(d) none of these.

An angle of measure 0° is called a zero angle.

Question: 4

An angle of measure 90° is called

(a) a complete angle (b) a right angle (c) a straight angle (d) a reflex angle

Solution:

(b) a right angle.

An angle of measure 90° is called a right angle.

Question: 5

An angle of measure 180° is called

(a) a zero angle (b) a right angle (c) a straight angle (d) a reflex angle

Solution:

(c) a straight angle.

An angle of measure 180° is a straight angle.

Question: 6

An angle of measure 360° is called

(a) a zero angle (b) an straight angle (c) a reflex angle (d) a complete angle

Solution:

(d) a complete angle.

An angle of measure 360° is called a complete angle.

Question: 7

An angle of measure $240^\circ$is

(a) an acute angle (b) an obtuse angle (c) a straight angle (d) a complete angle

Solution:

None of the given options are correct.

An angle of measure $240^\circ$is called a reflex angle.

Question: 8

A reflex angle measures

(a) more than 90° but less than 180° (b) more than 180° but less than 270° (c) more than 180° but less than 360° (d) none of these.

Solution:

(c) more than 180° but less than 360°

A reflex angle is defined as an angle that measures more than 180° but less than 360°.

Question: 9

The number of degrees in 2 right angles is

(a) 90° (b) 180° (c) 270° (d) 360°

Solution:

(b) 180°

Since, 1 right angle = 90°

Therefore, 2 right angles = 90° x 2 = 180°

Question: 10

The number of degrees in 3/2 right angles is

(a) 180° (b) 360° (c) 270° (d) 90°

Solution:

None of the options are correct.

The correct answer is 135°

Since, 1 right angle = 90°

Therefore, 3/2 right angles = 3/2 x 90°= 135°

Question: 11

If bicycle wheel has 36 spokes, then the angle between a pair of adjacent spokes is

(a) 10° (b) 15° (c) 20° (d) 12°

Solution:

(a) 10°

The complete angle of bicycle wheel measures is 360°.

Therefore, the angle between two adjacent spokes of the containing 36 spokes = 360/36 = 10°.

Triangles

Exercise 12.1

Question: 1

Take three non- collinear points A, B and C on a page of your notebook. Join AB, BC and CA. what figure do you get? Name the triangle. Also, name

(i) the side opposite to ∠B (ii) the angle opposite to side AB

(iii) the vertex opposite to site BC (iv) the side opposite to vertex B

Solution:

Let us consider three non- collinear points A, B and C join them.

After joining these points, we get a 'Triangle', as it consists of three sides. The name of the triangle we get is ΔABC

(i) The side opposite ∠B is AC

(ii) The angle opposite side AB is ∠C

(iii) The vertex opposite side BC is A

(iv) The side opposite vertex B is AC

Question: 2

Take three collinear points A, B and C on a page of your note book. Join AB, BC and CA. Is the figure a triangle? If not why

Solution:

Let us consider three collinear points A, B and C and join AB, BC and CA

The figure we get is not a triangle because it is a straight line consisting of only one side. It is also not a closed figure, where as a triangle is defined as a closed figure consisting of three sides

Question: 3

Distinguish between a triangle and its triangular region.

Solution:

A triangle is defined as a closed polygon consisting of three sides, where as a triangular region is the region that lies inside the triangle. In the adjoining figure, the shaded region shows the triangular region.

Question: 4

In fig 12.11, D is a point on side BC of a ΔABC. AD is joined. Name all the triangles that you can observe in the figure. How many are they?

Solution:

The figure consists of triangles ΔADC, ΔADC and ΔABC. Therefore, three triangles are present in the figure.

Question: 5

In fig 12.12, A, B, C and D are four points, and no three points are collinear. AC and BD interest at O. There are eight triangles that you can observe. Name all the triangles.

Solution:

The following figure consists of triangles, namely ΔODC, ΔODA, ΔOBC, ΔOAB, ΔADB, ΔACB, ΔDAC and ΔDBC. Hence, there are a total of eight triangles.

Question: 6

What is the difference between triangle and a triangular region?

Solution:

A triangle is defined as a closed polygon consisting of three sides, where as a triangular region is the region that lies inside the three sides of triangles.

In the adjoining figure, the shaded region shows the triangular region

Question: 7

Explain the following terms:

(i) Triangle

(ii) Parts or elements of a triangle

(iii) Scalene triangle

(iv) Isosceles triangle

(v) Equilateral triangle

(vi) Acute triangle

(vii) Right triangle

(viii) Obtuse triangle

(ix) interior of a triangle

(x) exterior of a triangle

Solution:

(i) Triangle – A triangle is a closed polygon that consists of three straight lines as its sides.

(ii) Parts or elements of a triangle – A triangle consists of three sides, three angles and three vertices.

(iii) Scalene triangle – A triangle, in which the length of all the sides are different.

(iv) Isosceles triangle – A triangle, in which the length of two sides are equal.

(v) Equilateral triangle – A triangle, in which the length of all the sides are equal.

(vi) Acute triangles – A triangle, in which all the angles measure less than 90°.

(vii) Right triangle – A triangle, which has an angle that measure 90°.

(viii) Obtuse triangle – A triangle, in which one of the angles measure more than 90°.

(ix) Interior of a triangle – The region lying inside the boundaries or side of a triangle.

(x) Exterior of a triangle – The region lying outside the boundaries or sides of a triangle.

Question: 8

In fig 12.13, the length (in cm) of each side has been indicted along the side. State for each triangle whether it is a scalene, isosceles or equilateral:

Solution:

(i)	(ii)	(iii)
(iv)	(v)	(vi)

(i) This is a scalene triangle, as all the sides have different length.

(ii) This is an equilateral triangle, as all the sides are equal in length i.e. 5 cm.

(iii) This is an isosceles triangle, as two sides are equal in length i.e. 5.6 cm.

(iv) This is an isosceles triangle, as two sides are equal in length i.e. 6.2 cm.

(v) This is a scalene triangle, as all the sides have different length.

(vi) This is an acute angle, as all the angles are less than 90°.

Question: 9

In fig 12.14, there are five triangles. The measures of some of their angles have been indicated. State for each triangle whether it is acute, right or obtuse.

Solution:

(i)	(ii)
(iii)	(iv)

(i) This is an obtuse angled triangle, as one of the angle (120°) measures more than 90° and less than 180°.

(ii) This is a right angle triangle, as it contains a 90°.

(iii) This is an acute angle triangle, as all the angles are less than 90°.

(v) This is an obtuse angled triangle, as one of the angle (110°) measures more than 90° and less than 180°.

Question: 10

Fill in the blanks with the correct world/ symbol to make it a true statement:

(i) A triangle has _______.

(ii) A triangle has _________.

(iii) A triangle has _________.

(iv) A triangle has ________.

(Angles and sides are part of a triangle. So, three angles and three sides make six parts.)

(v) A triangle whose no two sides are equal is known as _______.

(A triangle whose lengths of all sides are different is called scalene triangle).

(vi) A triangle whose two sides are equal is known as __________.

(A triangle whose lengths of two sides are equal is called an equilateral triangle).

(vii) A triangle whose one angle is a right angle is known as ________.

(A triangle whose one angle is $90°$ is called a right angle triangle).

(viii) A triangle whose all angles are less than 90° is known as _______.

(A triangle whose all angle are less than 90° is known as Acute triangle).

(x) A triangle whose one side angle is more than 90° is known as _______.

(A triangle whose one angle is more than 90° is called Obtuse triangle).

Solution:

(i) A triangle has **three sides**.

(ii) A triangle has **three vertices**.

(iii) A triangle has **three angles**.

(iv) A triangle has **six parts**.

(Angles and sides are part of a triangle. So, three angles and three sides make six parts.)

(v) A triangle whose no two sides are equal is known as **Scalene triangle**.

(A triangle whose lengths of all sides are different is called scalene triangle).

(vi) A triangle whose two sides are equal is known as **Equilateral triangle**.

(A triangle whose lengths of two sides are equal is called an equilateral triangle).

(vii) A triangle whose one angle is a right angle is known as **Right angled triangle**.

(A triangle whose one angle is 90° is called a right angle triangle).

(viii) A triangle whose all angles are less than 90° is known as **an Acute triangle**.

(A triangle whose all angle are less than 90° is known as Acute triangle).

(x) A triangle whose one side angle is more than 90° is known as an **Obtuse triangle**.

(A triangle whose one angle is more than 90° is called Obtuse triangle).

Question: 11

In each of the following, state if the statement is true or false:

Solution:

(i) True

(ii) False; a triangle consists of three vertices only.

(iii) False; three lines segments joined by three non- collinear points can only from a triangle.

(iv) False; it lies on the triangle.

(v) True

(vi) False; the vertices of a triangle are three non-collinear points.

(vii) True

(ix) False; it can also be an isosceles triangle.

(x) False; it can be an obtuse triangle.

Exercise 12.2

Question: 1

Total number of parts of a triangle is

Solution:

Six: Three sides and three angles

Question: 2

A perpendicular drawn from a vertex to the opposite side of a triangle is known as

Solution:

An Altitude: An Altitude is defined as the perpendicular drawn from a vertex to the opposite side of a triangle.

Question: 3

A triangle

Solution:

has three altitudes

Question: 4

Line segment joining the vertices to the mid – points of the opposite side of a triangle is known as

Solution:

Medians: A median is defined as the line segment joining the vertex to the mid – point of the opposite side of a triangle.

Question: 5

A triangle whose no two sides are equal is called

Solution:

A scalene triangle: A Scalene triangle is defined as the triangle in which no sides are equal.

Question: 6

A triangle whose two sides are equal is known as

Solution:

An isosceles triangle: An isosceles triangle is a triangle that has two equal sides.

Question: 7

A triangle whose two sides are equal is called

Solution:

An equilateral triangle is defined as a triangle whose all sides are equal.

Question: 8

The sum of the lengths of side of a triangle is known as its

Solution:

Perimeter: Perimeter is defined as the sum of the length of all the sides of a triangle

Question: 9

A triangle having all sides of different length is known as its

Solution:

Scalene triangle: A Scalene triangle is defined as a triangle having all sides of different length.

Question: 10

A triangle whose one angle is more than 90° is called

Solution:

An obtuse triangle: An obtuse triangle is a triangle whose one angle is more than 90°

Quadrilaterals

Exercise 13.1

Question: 1

A quadrilateral having one and only pair of parallel side is called

Sol.

A Trapezium

Question: 2

A quadrilateral whose opposite sides are parallel is called

Sol.

None of these

(A quadrilateral whose opposite sides are parallel is called parallelogram)

Question: 3

A quadrilateral having all sides equal is a

Sol.

Rhombus

(A quadrilateral having four equal sides is called a Rhombus, and if each angle is a right angle then it is called a square)

Question: 4

A quadrilateral whose each angle is a right angle is a

Sol.

Rectangle

(Both a square and a rectangle’s angles are right angles, but the other necessary condition for a quadrilateral to be a square is that its sides must be equal.)

Question: 5

A quadrilateral whose each angle is a right angle and whose all sides are equal is a

Sol.

Square

Question: 6

A quadrilateral having two pairs of equal adjacent sides but unequal opposite sides is called a

Sol.

Kite

Question: 7

The diagonals of a quadrilateral bisect each other. This quadrilateral is a

Sol.

Rectangle

(The diagonals of a parallelogram bisect each other and Rectangle is a parallelogram)

Question: 8

If the diagonals of a quadrilateral bisects each other at a right angle, then the quadrilateral is a

Sol.

Rhombus

Question: 9

An isosceles trapezium has

Sol.

Non- parallel sides that are equal

Circle

Exercise 14.1

Question: 1

Explain the following:

(i) Circle

(ii) Radius

(iii) Centre

(iv) Diameter

(v) Chord

(vi) Interior of a circle

Solution:

(i) A circle is a set of all those points in a plane, whose distance from a fixed point remains constant.

(ii) Radius of a circle is a line segment with one end at its centre and the other end on the circle. (It is the constant distance between all the points on the circle and its centre.)

(iii) The centre of a circle is that fixed point from which all points remain at a constant distance.

(iv) Diameter of a circle is a line segment passing through the centre of a circle, and having its end points on the circle.

(v) A chord of a circle is a line segment with its end points lying on the circle.

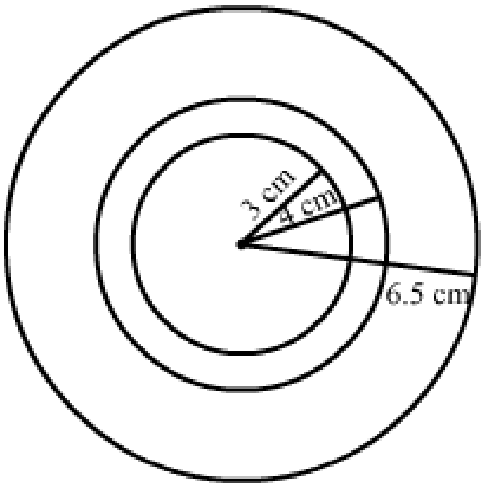
(vi) Interior of a circle is a set of all those points which lie inside the circle.

Question: 2

Take a point on your notebook and draw circle of radii 4 cm, 3 cm and 6.5 cm, each having the same centre 0.

Solution:

The given figure shows circles of radii 4 cm, 3 cm and 6.5 cm, respectively.

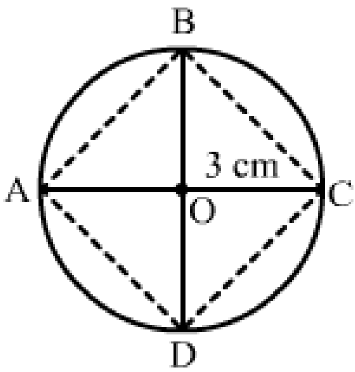


Question: 3

Draw a circle with centre o and any radius. Draw AC and BC two perpendicular diameters of the circle. Join AB, BC, CD and DA.

Solution:

The figure is shown below:



Question: 4

Draw a circle with centre 0 and radius 6 cm. Mark points P, Q, R such that

(i) P lies on the circle,

(ii) Q lies in the interior of the circle, and

(ii) R lies in the exterior of the circle,

Rewrite each of the following statements using the correct symbol (=, < or >):

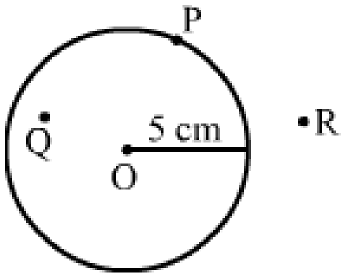
(i) OO....5 cm

(ii) OR...5 cm

(iii) OR ....5 cm

Solution:

The given figure shows the points P, Q and R such that



(i) Plies on the circle.

(ii) Q lies in the interior of the circle.

(iii) R lies on the exterior of the circle.

correct symbol

(i) OQ < 5 cm

(ii) OP = 5 cm

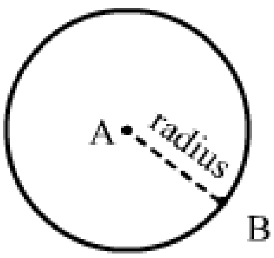
(iii) OR > 5 cm

Question: 5

Take two points A and B on the page of your note book. Draw a circle with centre A which passes through B.

Solution:

The figure is shown below:

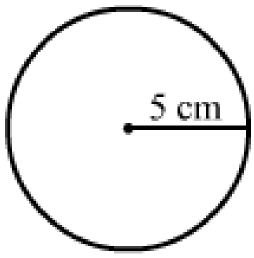


Question: 6

Draw a semi-circle with centre O and radius 5 cm. Is the diameter that determines the semi-circle, a part of the semi-circle?

Solution:

The semi -circle with centre O and radius 5 cm is shown below:



The end point of a diameter of a circle divides it into two equal parts, and each part is called a semi-circle. So, it is not the diameter, but end points of the diameter that determines the semi-circle or a part of the semi-circle.

Question: 7

The diameter of a circle is 14 cm, find its radius.

Solution:

The radius of a circle is half of its diameter. Therefore, the radius = diameter/2

Radius = 14/2 = 7 cm

Question: 8

Given a circle with centre O and radius 2.5 cm, what is the length of the longest chord of the circle.

Solution:

The diameter of a circle is its longest chord. The diameter of a circle is twice of its radius. Length of the longest chord is: 2 x 2.5 = 5 cm

Question: 9

Fill in the blanks:

(i) The diameter of a circle is ….. times its radius.

(ii) The diameter of a circle is the ….. chord of the cirlce.

(iii)The diameter of a circle pass through ……..

(iv) A chord of a circle is a line segment with its end points on the.......

(v) If join any two points on a circle by a line segment, we obtain...... of the circle.

(vi) A radius of a circle is a line segment with one end at ...... and the other end at…..

(vii) All radii of a circle are……

(viii) The diameters of a circle are ……

(ix) The total number of diameters of a circle is …….

(x) Every point on a circle is ……. from its centre.

(xi) A chord of a circle contains exactly ……. points of the circle.

(xii) A diameter is the longest …….

(xiii) Concentric circles are circles having …….

Solution:

(i) two

(ii) longest

(iii) The centre of the circle

(iv) circle

(v) chord

(vi) the centre, on the circle

(vii) equal

(viii) concurrent

(ix) infinite

(x) equidistant

(xi) two

(xii) chord

(xiii) the same centre point

Question: 10

In each of the following, state if the statement is true (T) of false (F);

(i) Every circle has a centre.

(ii) The centre of a circle is a point of the circle.

(iii) Any two radii of a circle make up a diameter.

(iv) Every chord of a circle is parallel to some diameter of the circle.

(v) A circle is symmetric about each of its diameters.

(vi) The diameter is twice the radius.

(vii) A radius is a chord of the circle.

(viii) Concentric circles have the same radii.

(ix) The nearer a chord to the centre of a circle, the longer is its length.

Solution:

(i) T

(ii) F

(iii) F

(iv) F

(v) T

(vi) T

(vii) F

(viii) F

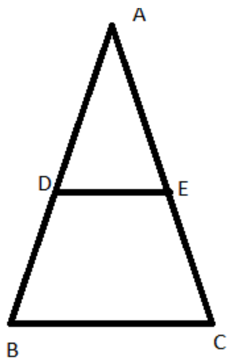
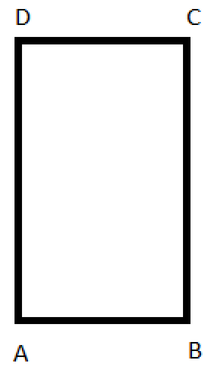
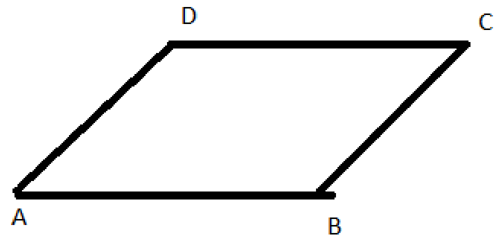
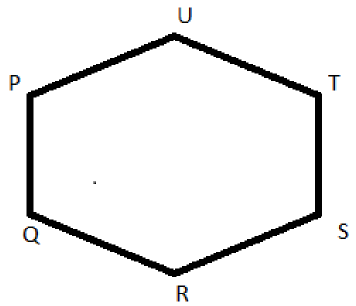
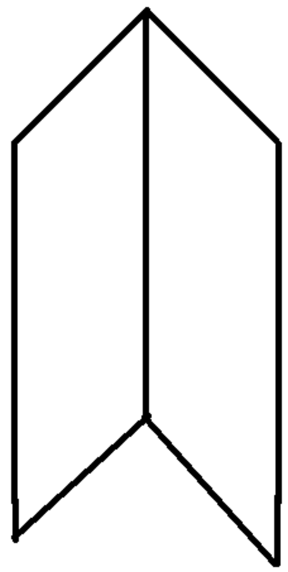
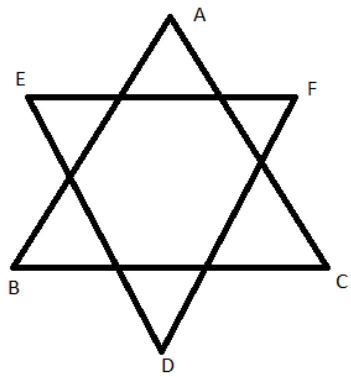
(ix) T

Pair of Lines and Transversal

Exercise 15.1

Question: 1

Identify parallel line segments:

		
(i)	(ii)	(iii)
		
(iv)	(v)	(vi)

Solution:

(i) BC ∥ DE

(ii) AB ∥ DC, AD ∥ BC

(iii) AB ∥ DC, AD ∥ BC

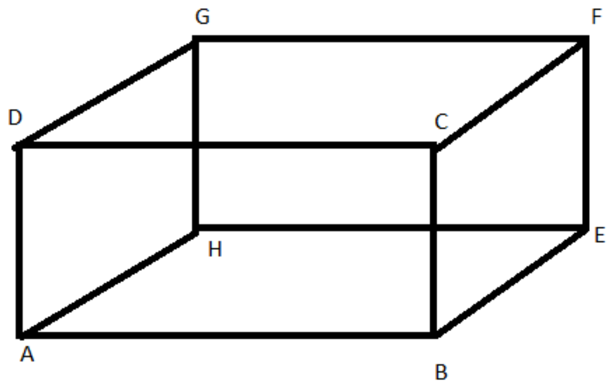
(iv) PQ ∥ TS, UT ∥ QR , UP ∥ SR

(v) AB ∥ DC ∥ EF, AD ∥ BC and DE ∥ CF

(vi) BC ∥ E, AB ∥ DF and AC ∥ DE

Question: 2

Name the pairs of all possible parallel edges of the pencil box whose figure is shown in the figure



Solution:

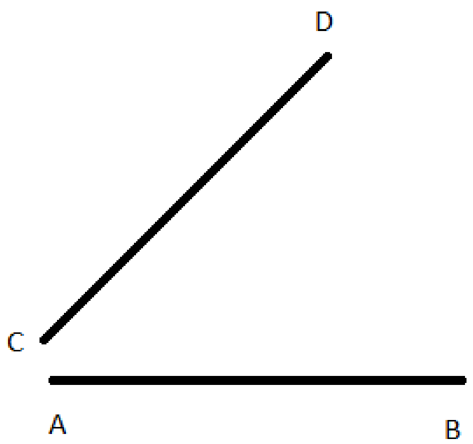
(i) AH ∥ DG ∥ CF ∥ BE

(ii) AB ∥ DC ∥ GF ∥ HE

(iii) AD ∥ HG ∥ EF ∥ BC

Question: 3

In the figure, do the segments AB and CD intersect? Are they parallel? Give reasons.



Solution:

In the given position, segments AB and CD do not intersect, but hey can if extended to a point. No, they are not parallel, as the distance between them is not constant.

Question: 4

State which of the following are true or false:

i) If two lines in the same plane do not intersect, then they must be parallel

ii) Distance between two parallel lines is not same everywhere

iii) If m perpendicular l and n perpendicular l and m ≠ n, then m parallel to n

iv) Two non – intersecting co –planar rays are parallel

iv) If Ray AB parallel to m, then line segment AB parallel to m

v) If Ray AB parallel to m, then line segment AB parallel to m

vi) No two parallel segments intersect each other

vii) Every pair of lines is a pair of co-planar lines

viii) Two lines perpendicular to the same line are parallel

ix) A line perpendicular to one of two parallel lines is perpendicular to each other

Solution:

State which of the following are true or false:

i) True

ii) False

iii) True

iv) False

iv) True

v) True

vi) True

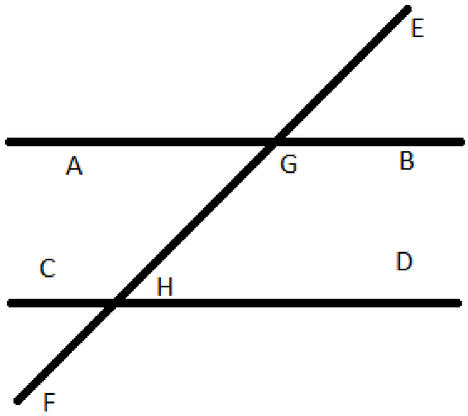
vii) False

viii) True

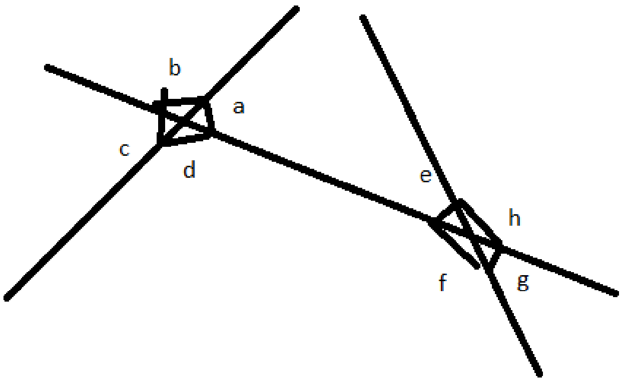
ix) True

Question: 5

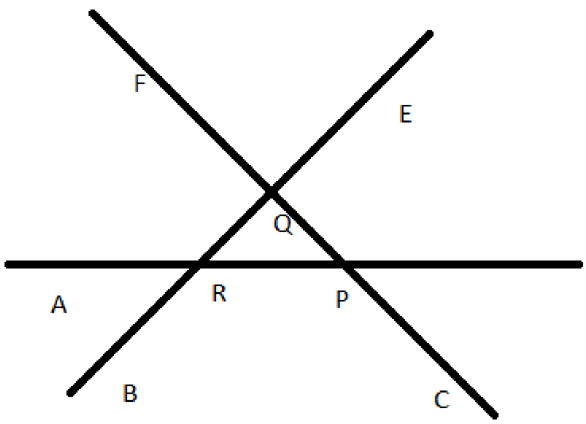
i) Alternate corresponding angles



ii) Angles alternate to ∠d and ∠g and angles corresponding to angles ∠f and ∠h in the figure



iii) Angles alternative to ∠PQR, angle corresponding to ∠RQF and angle alternative to ∠PQE in the figure



Solution:

i)

Alternate interior angles are:

Angle BGH and angle CHG

Angle AGH and angle CHF

Alternate exterior angles:

Angle AGE and angle DHF

Angle EGB and angle CHF

Corresponding angles are:

Angle EGB and angle GHD

Angle EGA and angle GHC

Angle BGH and angle DHF

Angle AGF and angle CHF

ii)

The alternate angle to ∠d is ∠e and alternate angles to ∠g is ∠b

The corresponding angles to ∠f is ∠c and ∠h is ∠a

iii)

In the given figure. 'I' is a transversal to 'm' and 'n'

So, the alternate angle of ∠PQR is ∠QRA

The corresponding angle ∠RQF and ∠BRA

The alternate angle of ∠PQE is ∠BRA

Question: 6

Match column A and column B.

i) Vertically opposite angles → a. ∠PAB and ∠ABS

ii) Alternate angles → b – ∠PAB and ∠RBY

iii) Corresponding angles → c. ∠PAB and ∠XAQ

Solution:

i) Vertically opposite angles → c. ∠PAB and ∠XAQ

ii) Alternate angles → a. ∠PAB and ∠ABS

iii) Corresponding angles → b – ∠PAB and ∠RBY

Understanding Three Dimensional Shapes

Exercise 16.1

Question: 1

Name any four objects from your environment, which have the form of

(i) A cuboid

(ii) A cube

Solution:

(i) A lunch box, a compass box, a book, and a duster.

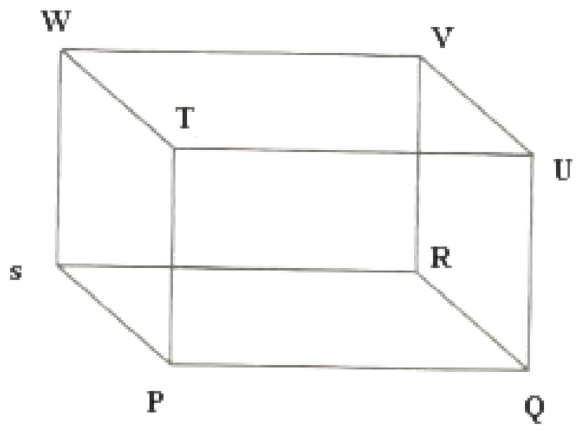
(ii) A disc, a chalk box, a cubical cabin, and a tissue box.

Question: 2

Draw a diagram to represent a cuboid. Label its vertices as P, Q, R, S, T, U, V and W. Now write the names of its faces and edges.

Solution:

The diagram of a cuboid is shown below:



Faces:

PQRS (bottom)

TUVW (top)

TPQU (front)

WSRV (back)

TPSW (left)

UVRQ (right)

Edges:

PQ, QR, RS, SP

TU, UV, VW, WT

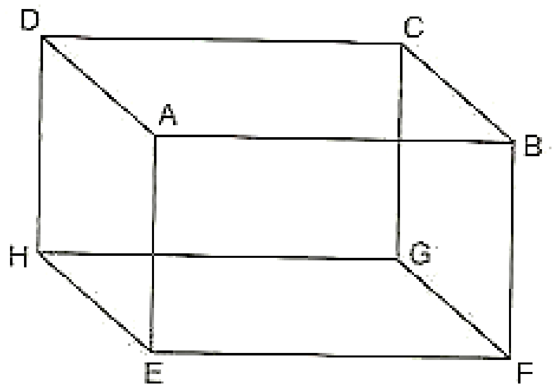
WS, SR, RV, VW

UV, VR, RQ, QU

Question: 3

Draw a diagram to represent a cube. Label its vertices as A, B, C, D, E, F, G and H. Now write the names of its faces and edges.

Solution:



The cube given below:

A cube has 6 faces and 12 edges.

Faces:

ABCD, EFGH, BVGF, ADHE, ABFE and CDHG.

Edges:

AB, BC, CD, DA, EF, FG, GH, HE, BF, CG, AE and HD.

Question: 4

Figure represents a cuboid. The lengths of the edges AE, EF and FG are indicated as l, b and h respectively. Indicated the lengths of all other edges.

Solution:

AE = DH = BF = CG = L

EF = AB = CD = GH = B

FG = EH = AD = BC = H

Question: 5

In figure, if the face EFGH is taken as the base, the name the lateral faces. Also, name the line segment represent the height of the cuboid. (fig. from book)

Solution:

Following are the lateral faces for the base EFGH.

AEHD, AEFB, BFGC, DHGC.

AE or DH or BF or CG are the line segments representing the height of the cuboid.

Question: 6

In fig. name the four diagonals of the cuboid. (fig. from book)

Solution:

The four diagonals of the cuboid CE, BH, AG and DF.

Question: 7

In fig., name the (fig. from book)

(i) face parallel to BFGC

(ii) faces adjacent to BFGC

(iii) three edges which meet in the vertex G.

Solution:

(i) The faces parallel to BFGC is AEHD.

(ii) The faces adjacent to BFGC are BCDA, DCGH, ABFE, and EFGH.

(iii) GF, GH, CG.

Question: 8

Fill in the blanks to make the following statements true :

(i) A cuboid has ……………… vertices.

(ii) A cuboid has .... edges.

(iii) A cuboid has .... faces.

(iv) The number of lateral faces of a cuboid is ....

(v) A cuboid all of whose edges are equal is called a ....

(vi) Two adjacent faces of a cuboid meet in a line segment called its ....

(vii)Each edge of a cuboid can be obtained as a line segment called in which two .... meet.

(viii) .... edges of a cube (or cuboid) meet at each of its vertices.

(ix) A .... is a cuboid in which all the six faces are squares.

(x) The three concurrent edges of a cuboid meet at a point called the .... of the cuboid.

Solution:

(i) eight

(ii) twelve

(iii) six

(iv) four

(v) cube

(vi) edge

(vii) adjacent faces

(viii) three

(ix) cube

(x) vertex or corner.

Question: 9

In each of the following , state if the statement is true (T) or false (f) :

(i) Number of faces in a cuboid and the number of faces in a cube are equal.

(ii) A cube has twelve vertices.

Solution:

(i) True

(ii) False

Question: 10

For the cuboid shown: (fig. from book)

(i) What is the base of this cuboid?

(ii) What are the lateral faces of this cuboid?

(iii) Name one pair of opposite faces. How many pairs of opposite faces are there. Name them.

(iv) Name all the faces of this cuboid which have X as a vertex. Also, name those which have VW as a side.

(v) Name the edges of this cuboid which meet at the vertex P. Also name those faces which meet at this vertex.

Solution:

(i) UVWX is the base of a cuboid.

(ii) The lateral faces for the base UVWX are UXSP, QVWR, PQVU and SXWR.

(iii) Any one pair of opposite faces among the lateral faces of the base are PQVU and SXWR or UXSP and QVWR.

There are two pairs of opposite faces among the lateral faces of the base of the cuboid.

(iv) The faces, which have one of the vertex as X, are UVWX, UXSP and SXWR.

The faces, which have VW as side, are QVWR and UVWX.

(v) Edges which meet at P are UP, SP, and PQ.

Faces which meet at vertex P are PQRS, UPSX, and PQVU.

Question: 11

The dimensions of a cuboid with vertices A, B, C, D, E, F, G and H are as shown

(i) Which edges are of length 4 cm? Which edges are of length 5 cm?

(ii) Which faces have area equal to $20cm^2$?

(iii) Which faces have the largest area? What is this largest area?

(iv) Which faces have a diagonal equal to 5 cm?

(v)What is the area of the base of this cuboid?

(vi) Do all the lateral faces have the same area?

Solution:

(i) The edges of 4 cm length are AD, EH, BC, and FG.

The edges of 5 cm length are AB, EF, CD and GH.

(ii) The faces having dimensions of 5 cm x 4 cm would have an area of 20 cm^2. And such faces are ABCD and EFGH.

(iii) ABCD and EFGH have the largest area of 20 cm^2.

(There are three pairs of opposite faces of equal area. The area of opposite faces are: 3×4 cm^2, 4×5 cm^2, and 3×5 cm^2. And among these, 4×5 cm^2 is the largest.

(iv) The faces having sides of 3 cm and 4 cm respectively would have the diagonal of 5 cm. (As hypotenuse of a right- angles triangle is: $3^2 + 4^2 = 5^2$).

Therefore, the faces ADHE and BCGF have the diagonal of 5 cm.

(v) The base has q dimension of 4 cm × 5 cm, so area of abase is: $4 \times 5 = 20$ cm^2.

(vi) No, all lateral faces do not have the same area. The two lateral faces have an area of $3 \times 5 = 15$ cm^2 and rest of the two lateral faces have an area of $3 \times 4 = 12$ cm^2.

Exercise 16.2

Question: 1

Give two new examples of each of the for three-dimensional shapes:

(i) Cone

(ii) Sphere

(iii) Cylinder

(iv) Cuboid

(v) Pyramid

Solution:

(i) A school bell and a funnel.

(ii) A tennis ball and a model of a globe.

(iii) Drink cans and delivering pipes for a water and gas.

(iv) A match box and brick.

(v) A paper- weight and a tower like the Eiffel tower.

Question: 2

What is the shape of:

(i) instrument box

(ii) a brick

(iii) a match box

(iv) a rod- roller

(v) a sweet laddoo

Solution:

(i) My instrument box is in the shape of a cuboid.

(ii) A brick is in the shape of the cuboid.

(iii) A match – box is in the shape of a cuboid.

(iv) A road – roller is in the shape of a cylinder.

(v) A sweet laddoo is shaped like a sphere.

Objective Type Questions:

Question: 1

Total number of faces of a cuboid is

(a) 4

(b) 6

(c) 8

(d) 12

Solution:

(b) 6

Question: 2

Total number of edges of a cuboid is

(a) 4

(b) 6

(c) 8

(d) 12

Solution:

(d) 6

Question: 3

Number of faces of a cuboid is

(a) 4

(b) 6

(c) 8

(d) 12

Solution:

(c) 8

Question: 4

Which one of them is example of cuboid?

(a) a dice

(b) a football

(c) a gas pipe

(d) an ice- cream cone

Solution:

(a) A dice

Question: 5

A brick is an example of

(a) cube

(b) cuboid

(c) prism

(d) cylinder

Solution:

(b) Cuboid

Question: 6

A gas pipe is an example of

(a) cone

(b) a cylinder

(c) cube

(d) sphere

Solution:

(b) A cylinder

Question: 7

If the base radius and height of a right circular cone are 3 cm and 4 cm in lengths, then the slant height is

(a) 5 cm

(b) 2 cm

(c) 25 cm

(d) 6 cm

Solution:

(a) 5 cm

$$L = \sqrt{r^2 + h^2} = \sqrt{3^2 + 4^2} = \sqrt{25} = 5 \text{ cm.}$$

Question: 8

The number of faces of a triangular pyramid is

(a) 3

(b) 4

(c) 6

(d) 8

Solution:

(b) 4

A pyramid is called a triangular pyramid if its base is a triangle.

Question: 9

The number of edges of a triangular pyramid is

(a) 3

(b) 4

(c) 6

(d) 8

Solution:

(c) 6

Question: 10

A tetrahedron is a pyramid whose base is a

(a) triangle

(b) square

(c) rectangle

(d) quadrilateral

Solution:

(a) Triangle

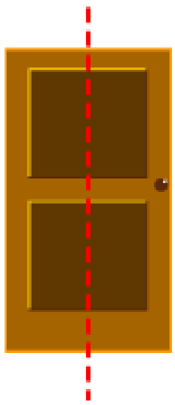
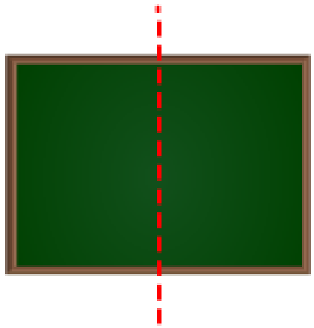
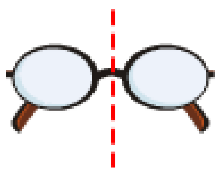
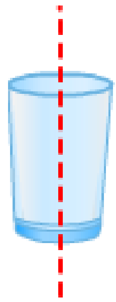
Symmetry

Exercise 17.1

Question: 1

List any four symmetrical objects from your home or school. Also mention the line of symmetry.

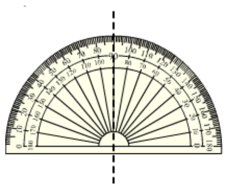
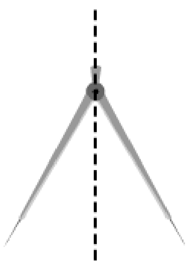
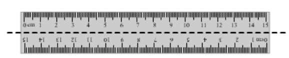
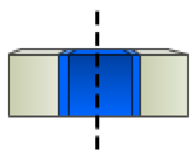
Solution:

			
(i) A gate	(ii) A green board	(iii) A pair of spectacles	(iv) A glass

Question: 2

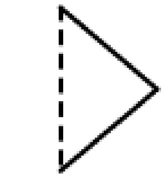
Identify the symmetrical instruments from your mathematical instrument box.

Solution:

				
(i) A protractor	(ii) A divider	(iii) A ruler (scale)	(iv) A glass	(v) A pencil

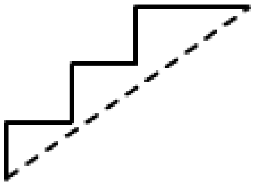
Question: 3

Copy each of the following on a squared paper and compute then in such a way that the dotted line is the line of symmetry.

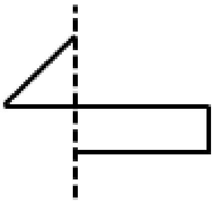


(i)

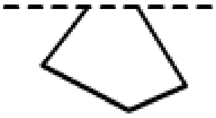
(ii)



(iii)



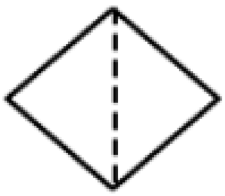
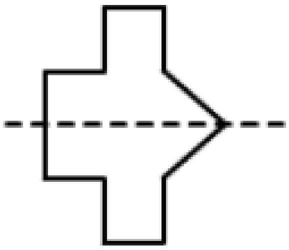
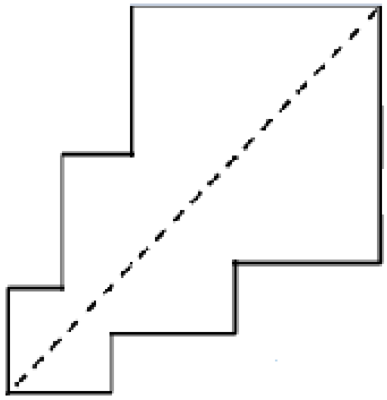
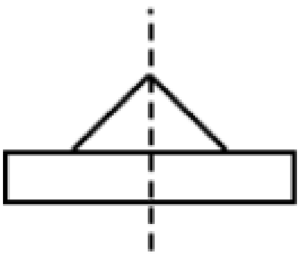
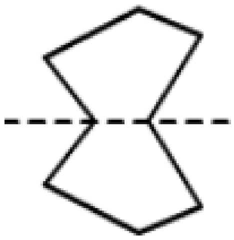
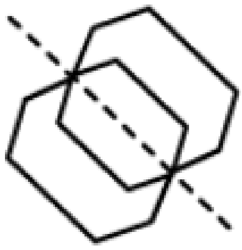
(iv)



(v)

(vi)

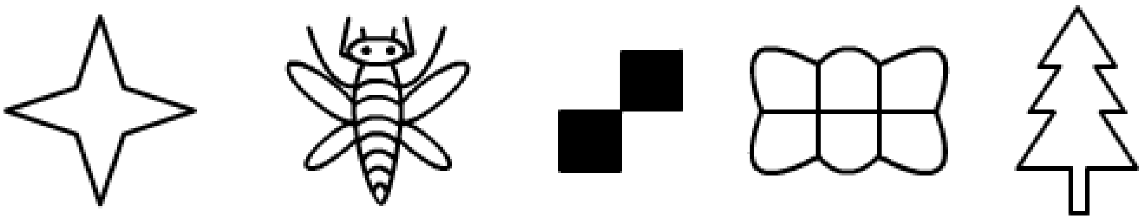
Solution:

		
(i)	(ii)	(iii)
		
(iv)	(v)	(vi)

Exercise 17.2

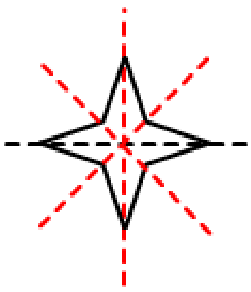
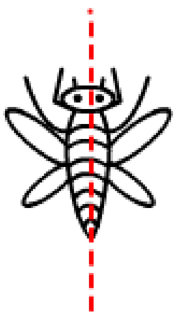
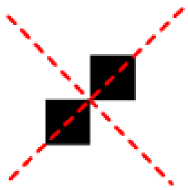
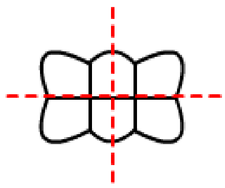
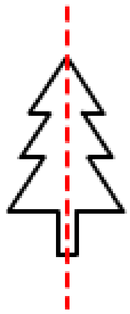
Question: 1

Find the number of line of symmetry in each of the following shapes



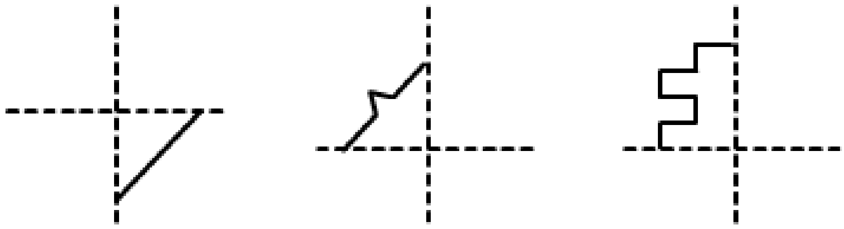
(i) (ii) (iii) (iv) (v)

Solution:

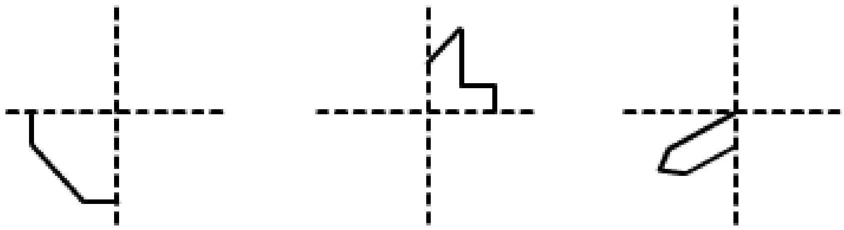
				
(i)	(ii)	(iii)	(iv)	(v)

Question: 2

Copy the following drawings on a paper and compute each one of them in such a way that resulting figure has two dotted lines as two lines of symmetry:

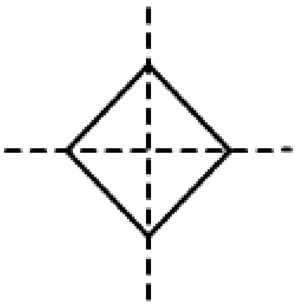
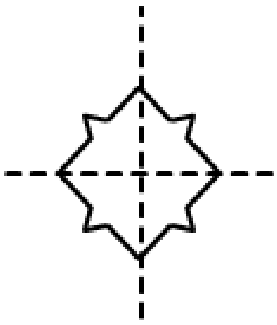
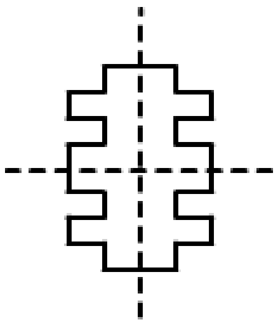
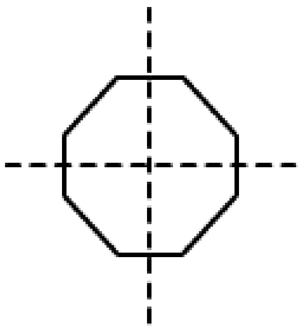
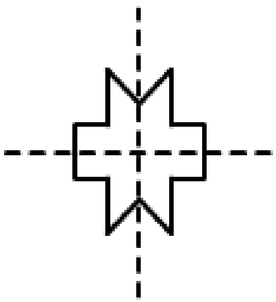
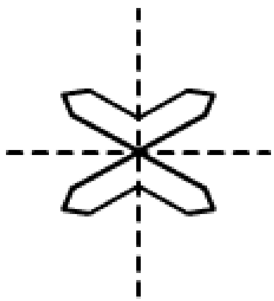


(i) (ii) (iii)



(iv) (v) (vi)

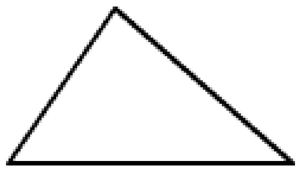
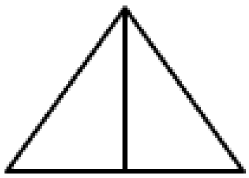
Solution:

		
(i)	(ii)	(iii)
		
(iv)	(v)	(vi)

Exercise 17.3

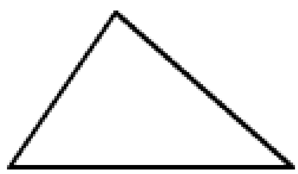
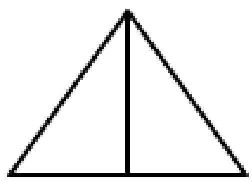
Question: 1

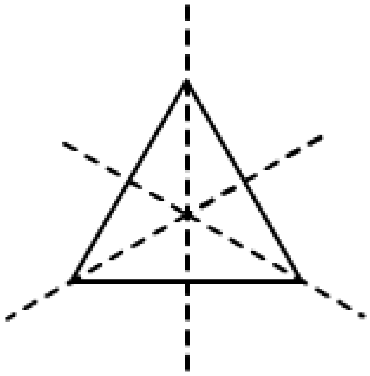
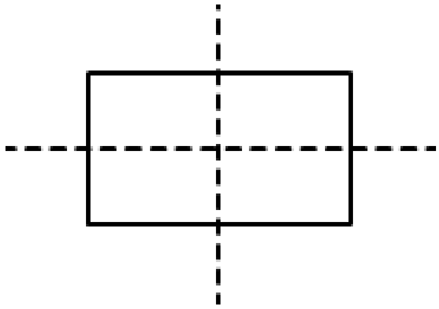
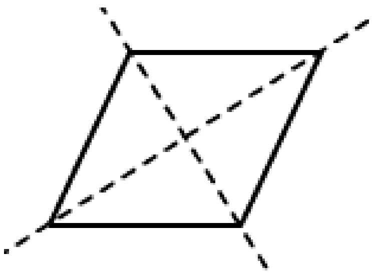
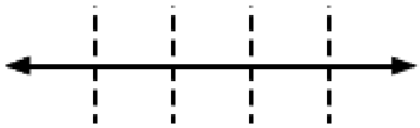
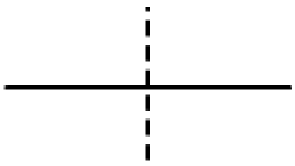
Complete the following table:

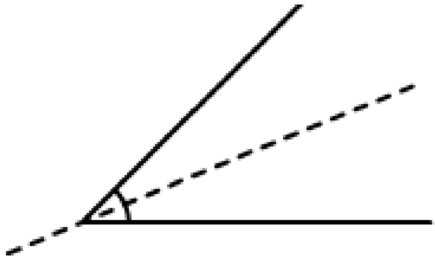
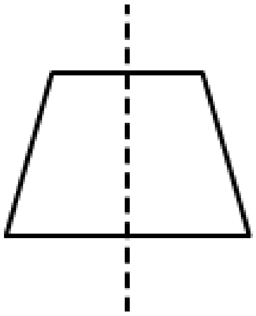
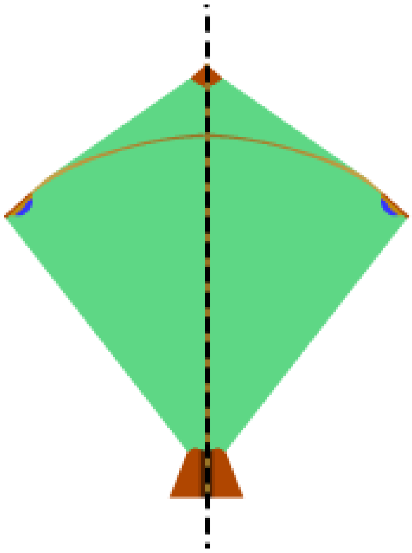
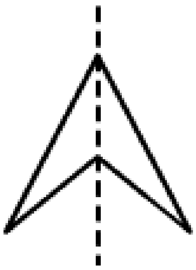
Shapes	Rough figure	Number of lines of symmetry
(i) scalene triangle		0
(ii) Isosceles triangle		1
(iii) equilateral triangle		
(iv) Rectangle		
(v) Parallelogram		
(vii) Rhombus		
(viii) Line		
(ix) Line segment		
(x) Angle		

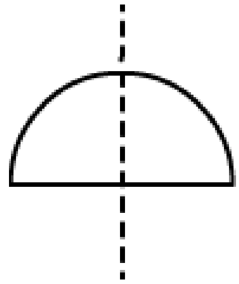
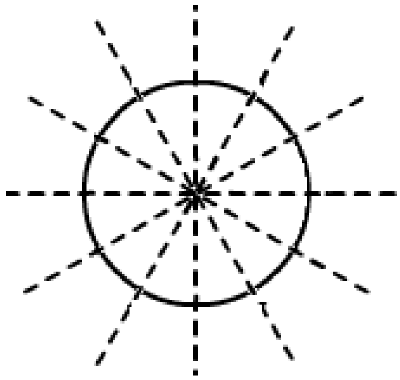
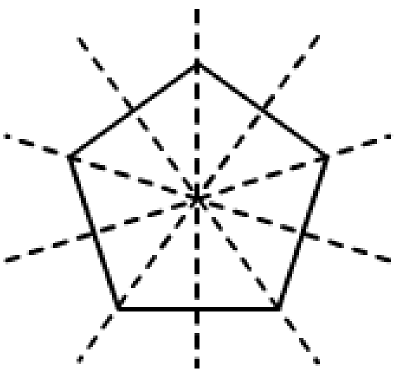
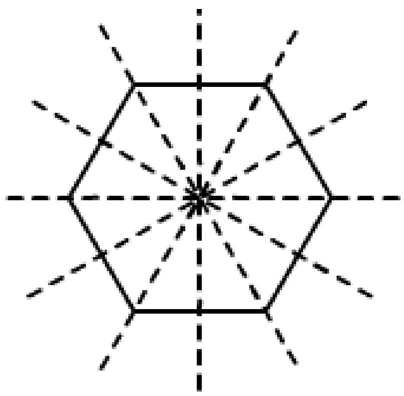
(xi) Isosceles trapezium	
(xii) Kite	
(xiii) Arrow head	
(xiv) Semi – circle	
(xv) Circle	
(xvi) Regular pentagon	
(xvii) Regular hexagon	

Solution:

Shapes	Rough figure	Number of lines of symmetry
(i) scalene triangle		0
(ii) Isosceles triangle		1
(iii) equilateral triangle		3

		
(iv) Rectangle		4
(v) Parallelogram		0
(vii) Rhombus		2
(viii) Line Infinitely		Many
(ix) Line segment		1

(x) Angle		1
(xi) Isosceles trapezium		1
(xii) Kite		1
(xiii) Arrow head		1
(xiv) Semi – circle		1

		
(xv) Circle Infinitely		Many
(xvi) Regular pentagon		5
(xvii) Regular hexagon		6

Question: 2

Consider the English alphabets A to Z. List among them the letters which have

(i)Vertical line of symmetry

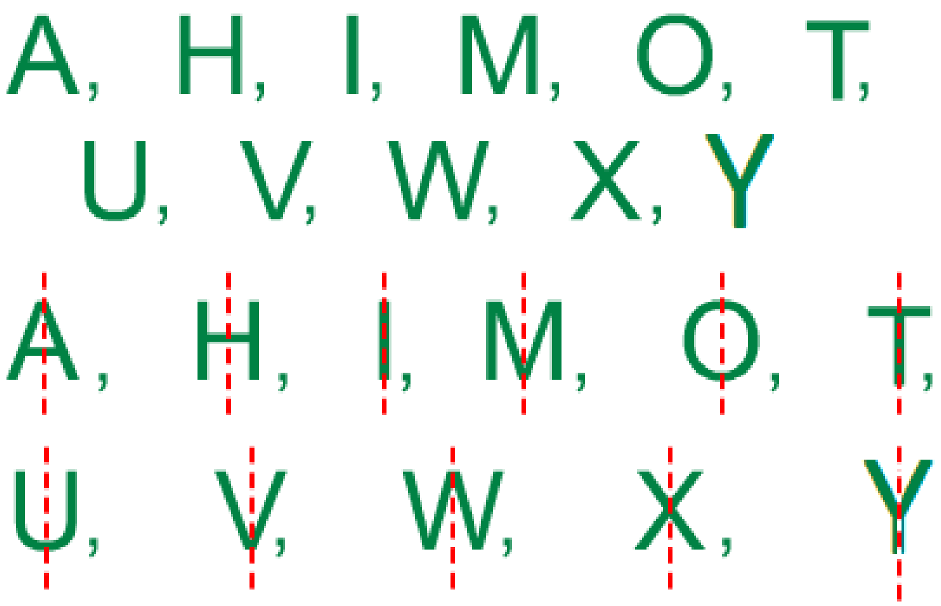
(ii)Horizontal line of symmetry

(iii)Vertical and Horizontal line of symmetry

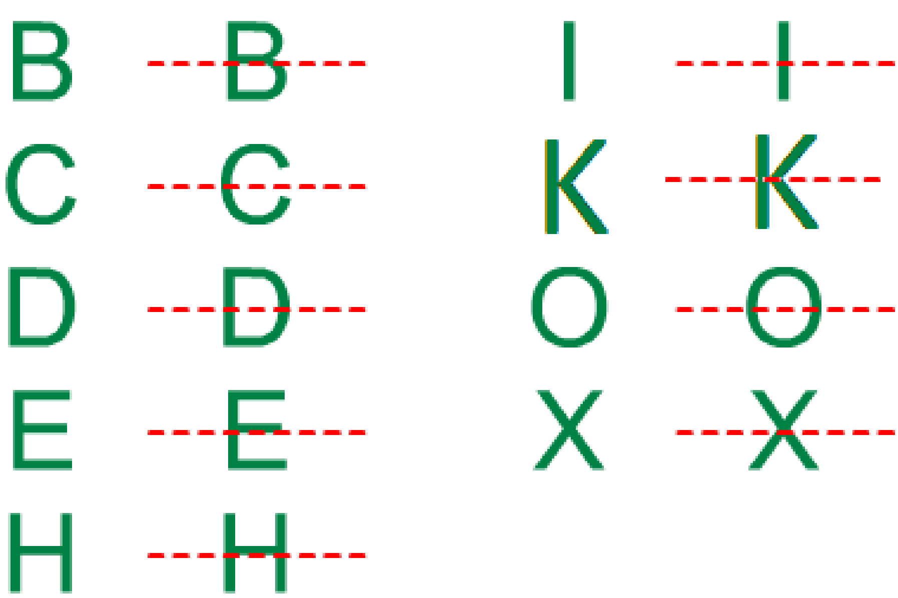
(iv)No line of symmetry

Solution:

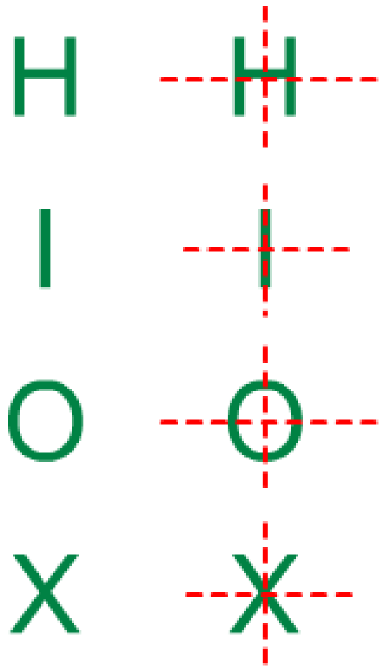
(i) Vertical line of symmetry:



(ii) Horizontal line of symmetry:



(iii) Vertical and Horizontal line of symmetry:



(iv) No line of symmetry:

F, G, J, L, N, P, Q, R, S, Z

Question: 3

No line of symmetry?

(i) Exactly one line of symmetry.

(ii) Exactly two line of symmetry.

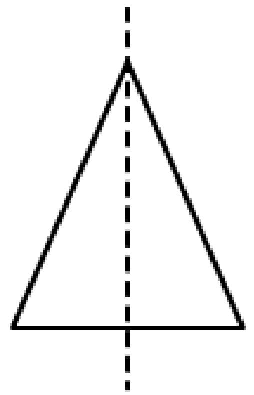
(iii) Three line of symmetry.

(iv) no lines of symmetry

Solution:

(i) Exactly one line of symmetry:

Yes; isosceles triangle

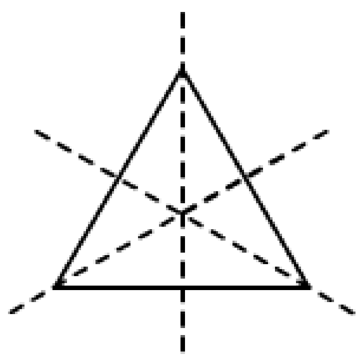


(ii) Exactly two line of symmetry:

No

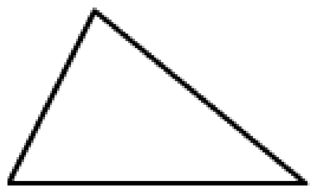
(iii) Three line of symmetry:

Yes; equilateral triangle



(iv) no lines of symmetry

Yes; scalene triangle



Question: 4

On a squared paper, sketch the following:

(i) A triangle with a horizontal with both horizontal and vertical line of symmetry

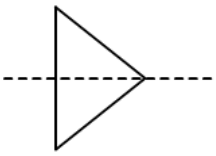
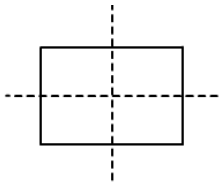
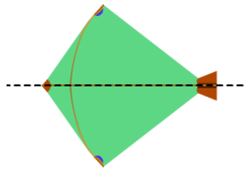
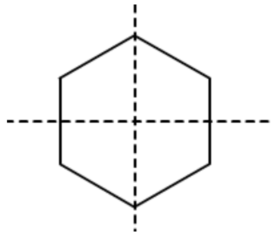
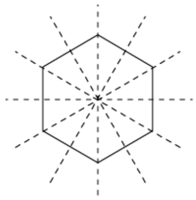
(ii) A quadrilateral with both horizontal and vertical lines of symmetry

(iii) A quadrilateral with horizontal but no vertical lines of symmetry

(iv) A hexagon with exactly two lines of symmetry

(v) A hexagon with exactly six lines of symmetry

Solution:

				
(i)	(ii)	(iii)	(iv)	(v)

Question: 5

Draw neat diagrams showing the line (or lines) of symmetry and give the specific name to the quadrilateral having:

(i) only one line of symmetry. How many such quadrilaterals are there?

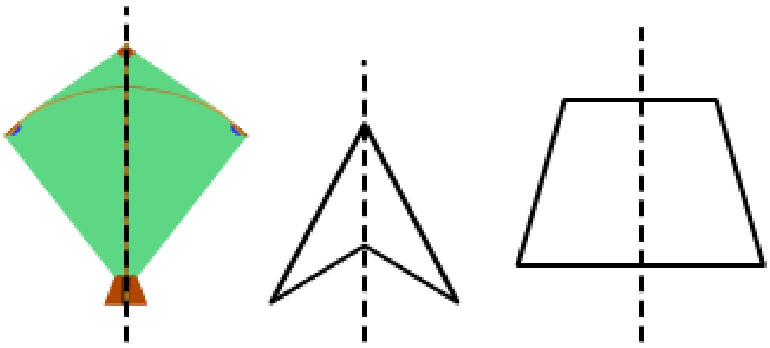
(ii) its diagonals as the only lines of symmetry

(iii) two lines of symmetry other than diagonals

(iv) More than two lines of symmetry

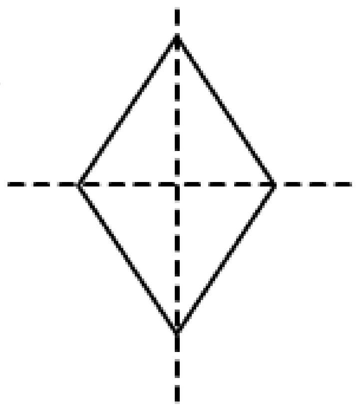
Solution:

(i) only one line of symmetry



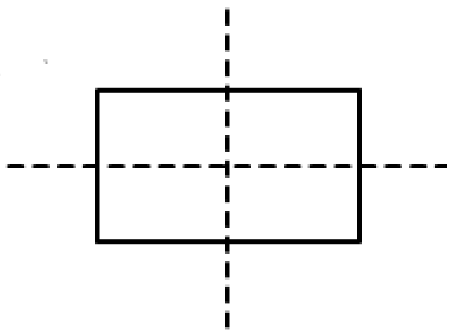
Kite Arrow head Isosceles triangle

(ii) diagonals as the only lines of symmetry



Rhombus

(iii) two lines of symmetry other than diagonals:



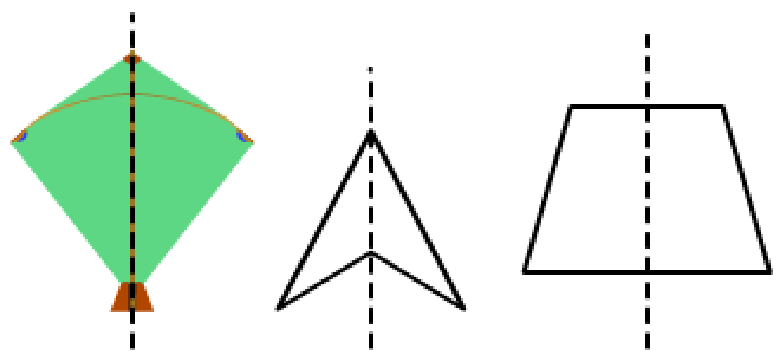
Rectangle

(iv) More than two lines of symmetry:

Question: 6

write the specific names of all the three quadrilaterals which have only one line of symmetry

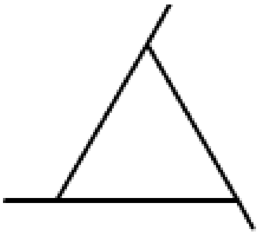
Solution:



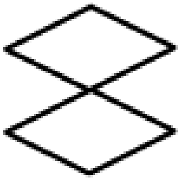
Kite Arrow head Isosceles triangle

Question: 7

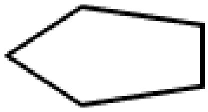
Trace each of the following figures and draw the lines of symmetry. If any



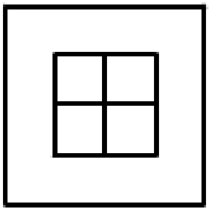
(i)



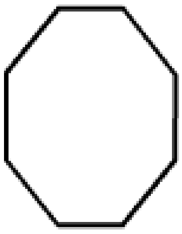
(ii)



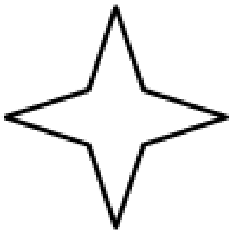
(iii)



(iv)

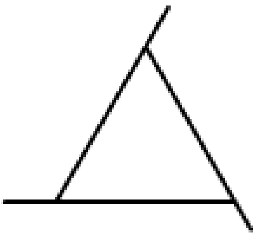


(v)

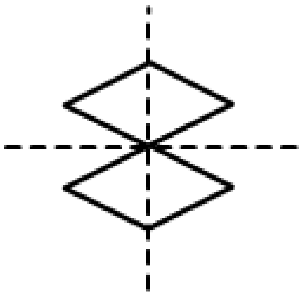


(vi)

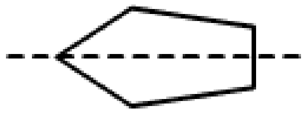
Solution:



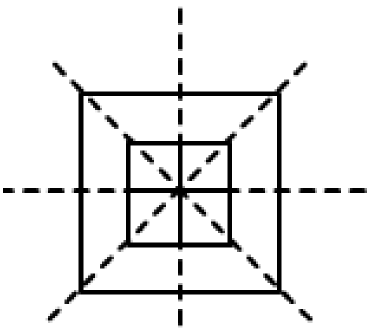
(i)



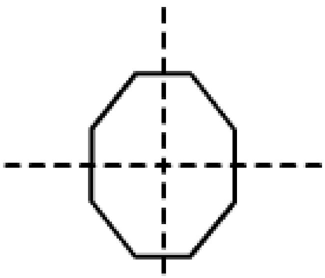
(ii)



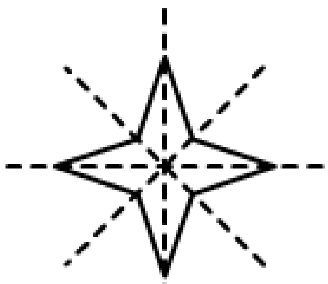
(iii)



(iv)



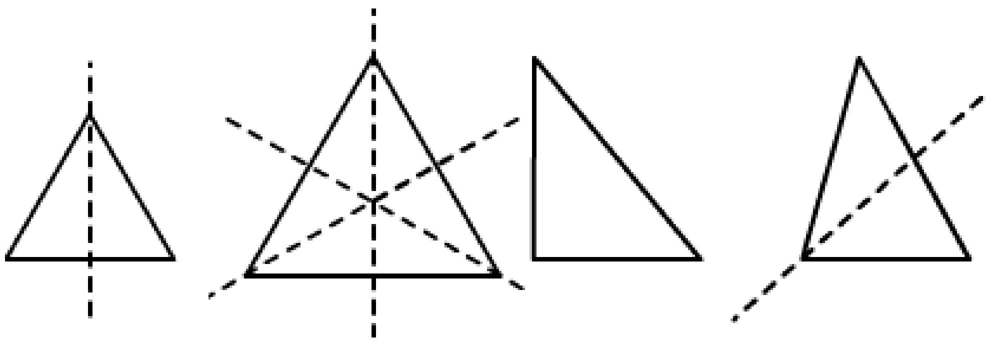
(v)



(vi)

Question: 8

On squared paper copy the triangle in each of the following figures. In each case draw the line(s) of symmetry if any and identify the type of the triangle



(i) (ii) (iii) (iv)

Solution:

(i) This is an isosceles triangle because it has only one line of symmetry.

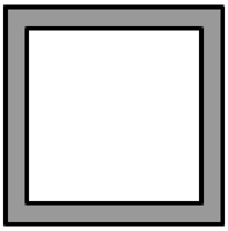
(ii) This is an Equilateral triangle because it has three lines of symmetry.

(iii) This is a right angled triangle because it has no line of symmetry.

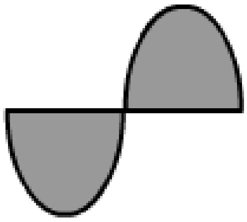
(iv) This is an isosceles triangle it has one line of symmetry.

Question: 9

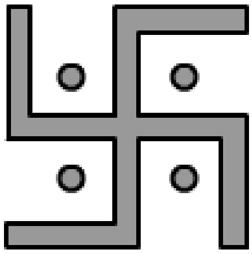
Find the lines of symmetry for each of the following shapes



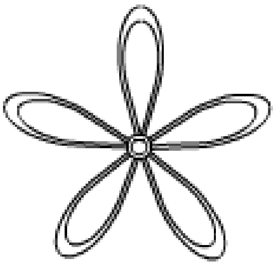
(i)



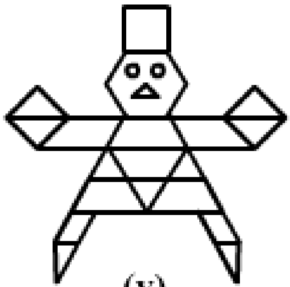
(ii)



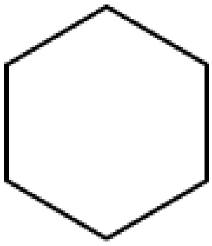
(iii)



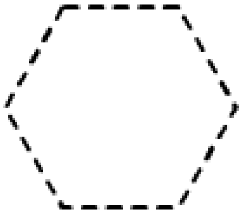
(iv)



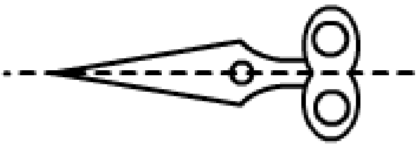
(v)



(vi)

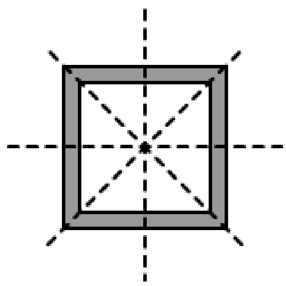
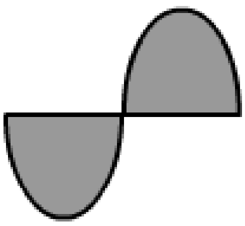
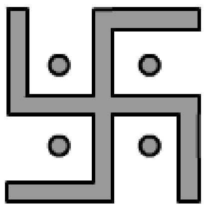
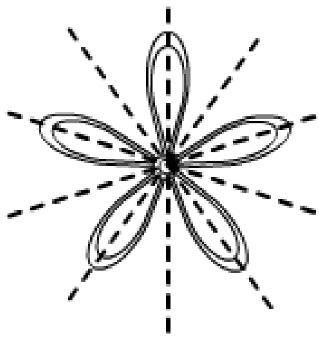
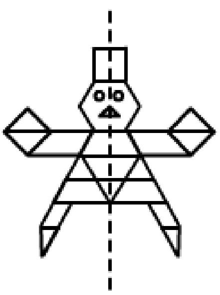
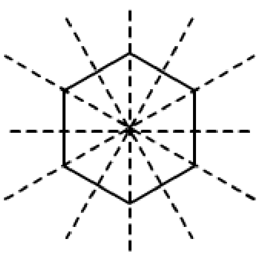
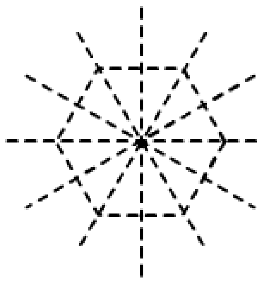
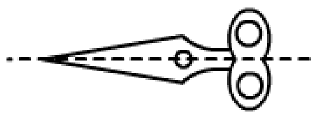


(vii)



(viii)

Solution:

			
(i)	(ii)	(iii)	(iv)
			

(v)	(vi)	(vii)	(viii)

Question: 10

State whether the following statements are true or false:

(i) A right- angled triangle can have at most two lines of symmetry

(ii) An isosceles triangle with more than one line of symmetry must be an equilateral triangle

(iii) A pentagon with one line of symmetry can be drawn.

(iv) A pentagon with more than one line of symmetry must be regular

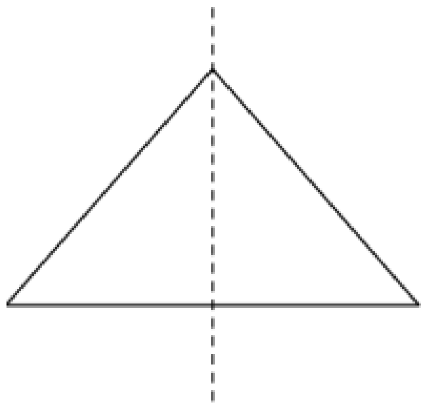
(v) A hexagon with one line of symmetry can be drawn

(vi) A hexagon with more than one line of symmetry must be regular

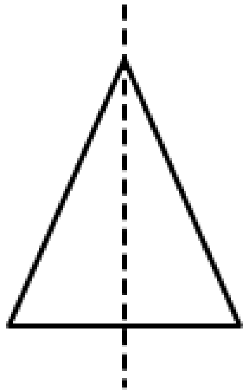
Solution:

(i)True

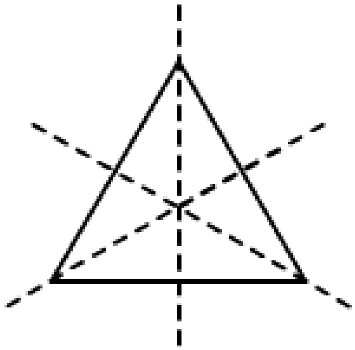
If it is an isosceles right angle triangle, then it can have only one line of symmetry at the most. Otherwise, a right angle triangle has no line of symmetry.



(ii) If an isosceles triangle has no more than one line of symmetry, then it must be an equilateral triangle. This is because an equilateral triangle has three lines of symmetry, and a triangle other than that cannot have two lines of symmetry.

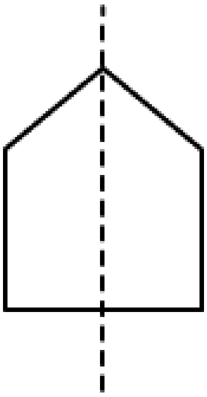


Isosceles triangle

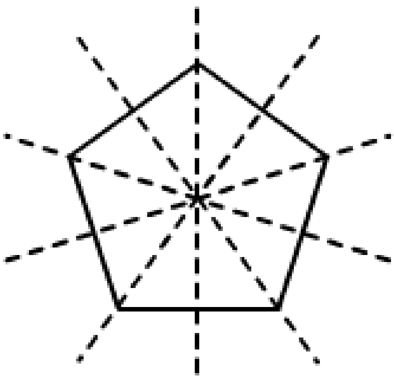


Equilateral triangle

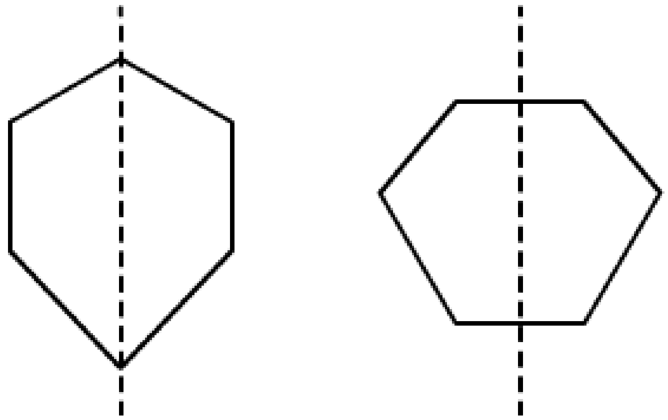
(iii)True



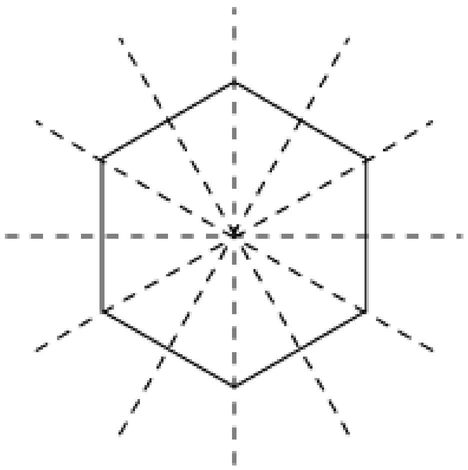
(iv)True



(v)True



(vi)True



Exercise 17.4

Question: 1

The total number of lines of symmetry of a scalene triangle is

(a) 1

(b) 2

(c) 3

(d) none of these

Solution:

(d) none of these

This is because the line of symmetry of a scalene triangle is 0.

Question: 2

The total number of lines of symmetry of an isosceles triangle is

(a) 1

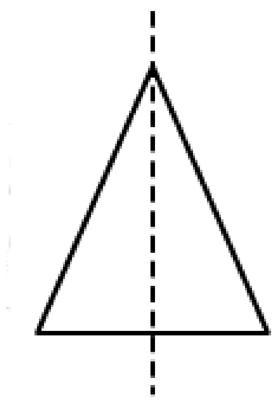
(b) 2

(c) 3

(d) none of these

Solution:

(a) 1



Question: 3

An equilateral triangle is symmetrical about each of its

(a) altitudes

(b) median

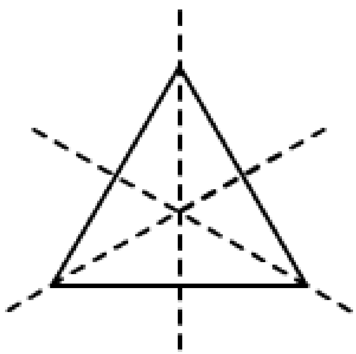
(c) angle of bisectors

(d) all of the above

Solution:

(d) all the above

In equilateral triangle altitudes, angle bisectors and medians are all the same.



Question: 4

The total number of lines of symmetry of a square is

(a) 1

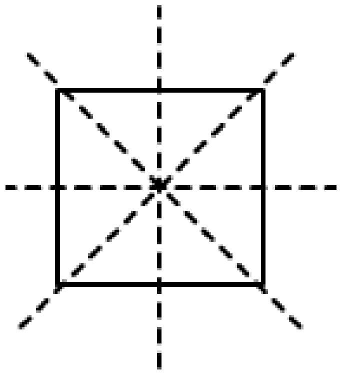
(b) 2

(c) 3

(d) 4

Solution:

(d) 4



Question: 5

A rhombus is symmetrical about

(a) each of its diagonals

(b) the line joining the mid-points of its opposite sides

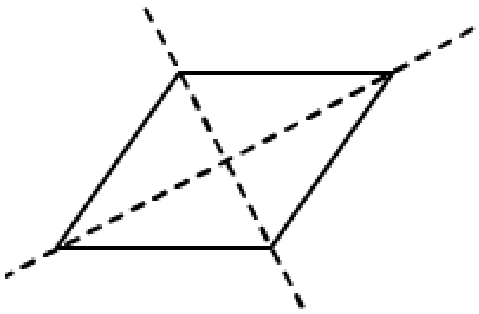
(c) perpendicular bisectors of each of its sides

(d) none of these

Solution:

(a)

Each of its diagonals



Question: 6

The number of lines of symmetry of a rectangle is

(a) 0

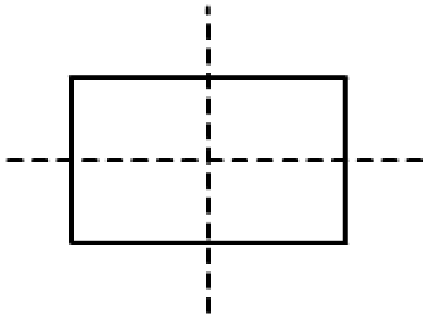
(b) 2

(c) 4

(d) 1

Solution:

(b) 2



Question: 7

The number of lines of symmetry of a kite is

(a) 0

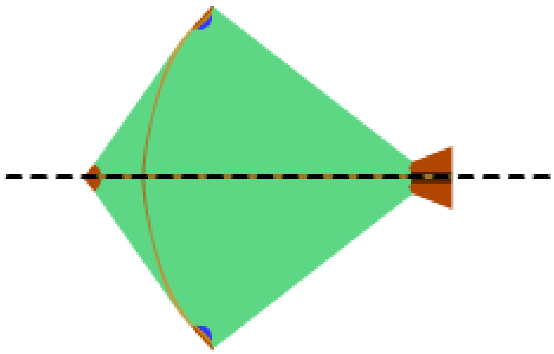
(b) 1

(c) 2

(d) 3

Solution:

(b) 1



Question: 8

The number of lines of symmetry of a circle is

(a) 0

(b) 1

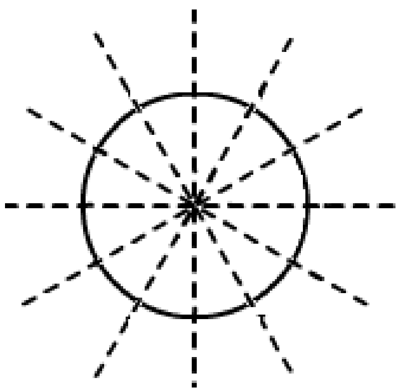
(c) 4

(d) unlimited

Solution:

(d) Unlimited

A circle has an infinite number of symmetry all along the diameters. It has an infinite number of diameters



Question: 9

The number of lines of symmetry of a regular hexagon is

(a) 1

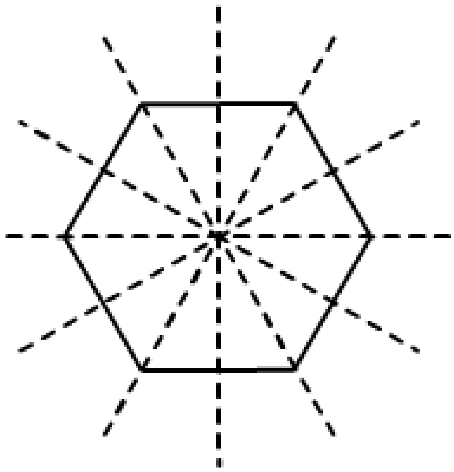
(b) 2

(c) 6

(d) 8

Solution:

(c) 6



Question: 10

The number of lines of symmetry of an n – sided regular polygon is

(a) n

(b) 2n

(c) n/2

(d) none of these

Solution:

(a) n

The number of lines of symmetry of a regular polygon is equal to the sides of the polygon. If it has ‘n’ number of sides, then there are ‘n’ lines of symmetry

Question: 11

The number of lines of symmetry of the letter O of the English alphabet is

(a) 0

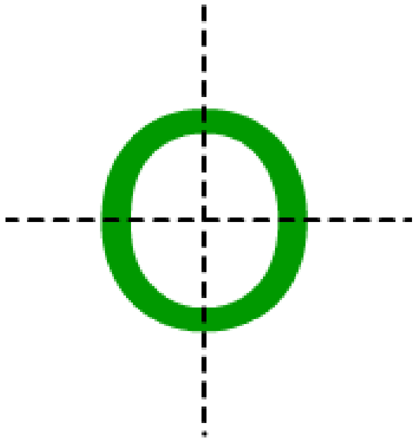
(b) 1

(c) 2

(d) 3

Solution:

(c) 2



Question: 12

The number of lines of symmetry of the letter Z of the English alphabet is

(a) 0

(b) 1

(c) 2

(d) 3

Solution:

(a) 0

Z has no line of symmetry

Basic Geometrical Tools

Exercise 18.1

Question: 1

Construct the following angles using set- squares:

(i) 45°

(ii) 90°

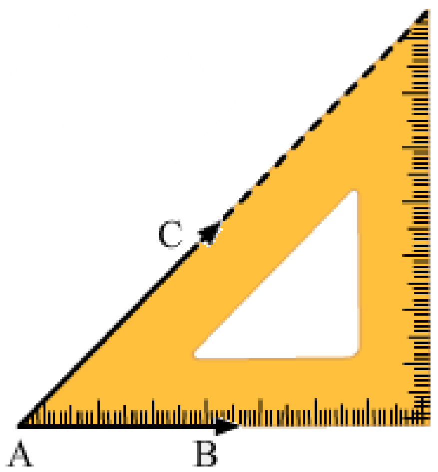
(iii) 60°

(iv) 105°

(v) 75°

(vi) 150°

Solution:



(i) 45°

Place 45° set- square.

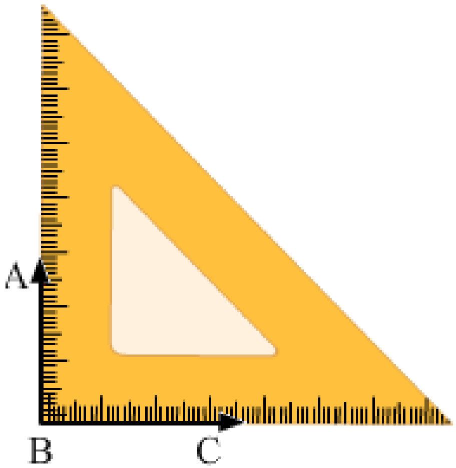
Draw two rays AB and AC along the edges from the vertex from the vertex of 45° angle of the set- square.

The angle so formed is a 45° angle.

$\angle BAC = 45^\circ$

(ii) 90°

Place = 90° set –square as shown in the figure.



Draw two rays BC and BA along the edges from the vertex of 90° angle.

The angle so formed is 90° angle.

∠ABC = 90°

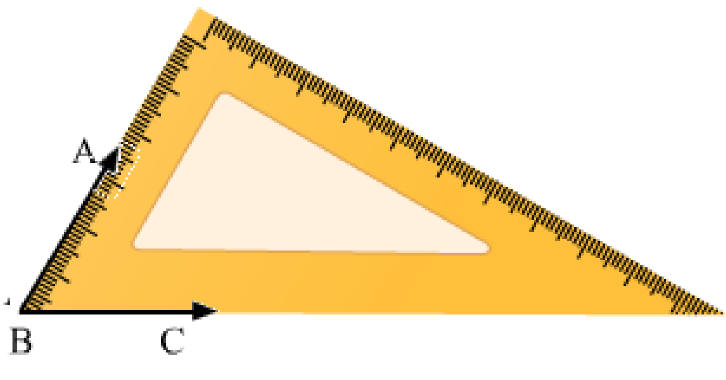
(iii) 60°

Place 30° set –square as shown in the figure.

Draw the rays BA and BC along the edges from the vertex of 60°

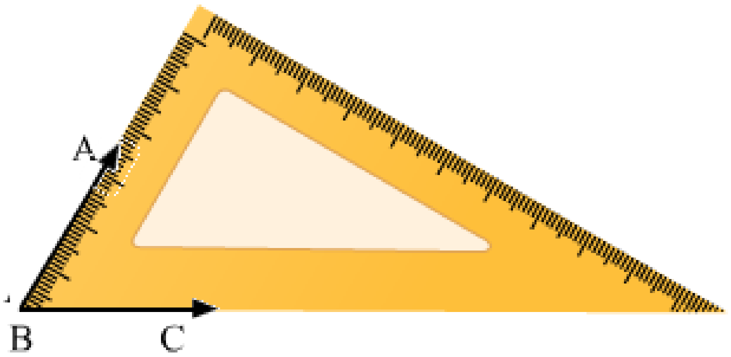
The angle so formed is 60°

∠ABC = 60°



(iv) 105°

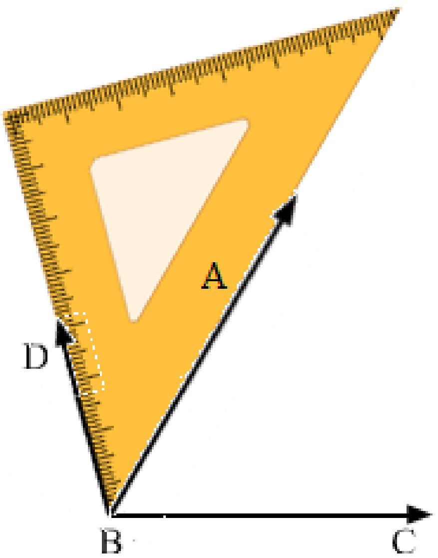
Place 30° set –square and make an angle 60° by drawing the rays BA and BC as shown in figure.



Now place the vertex of 45°of the set –square on the ray BA as shown in figure and draw the ray BD.

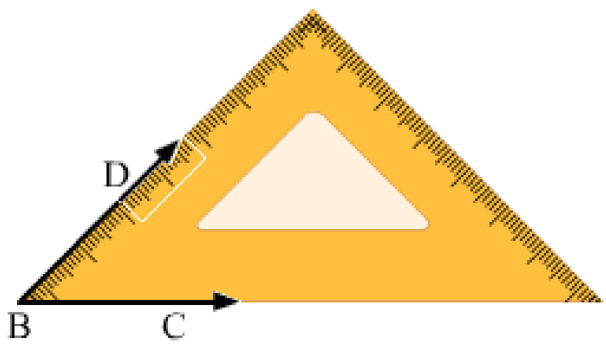
The angle so formed is 105°

Therefore, ∠DBC = 105°



(v) 75°

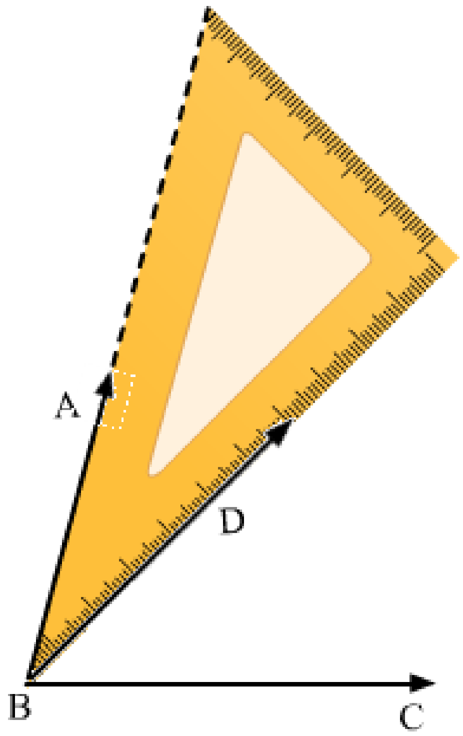
Place 45° set –square and make an angle of 45° by drawing the rays BD and BC as shown in the figure.



Now place the vertex of 30° of the set- square on the ray BD as shown in the figure and draw the ray BA.

The angle so formed is 75°.

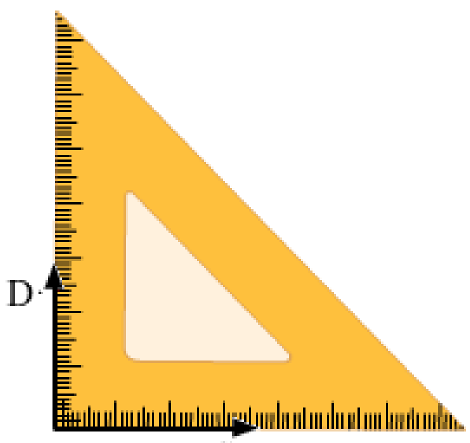
Therefore, ∠ABC = 75°



(Line BD is hidden)

(vi) 150°

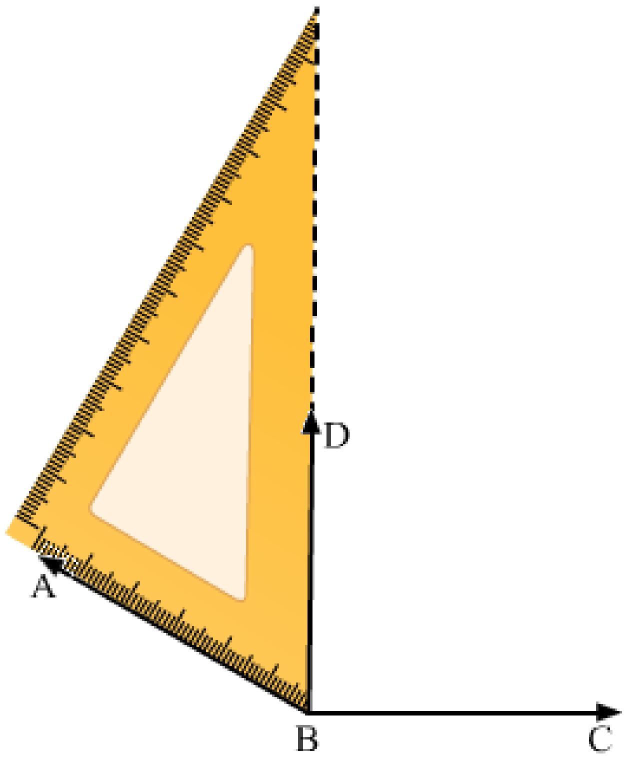
Place the vertex of 45° of the set – square and make angle of 90° by drawing the rays BD and BC as shown in the figure



Now, place the vertex of 30°of the set –square on the ray BS as shown in the figure and draw the ray BA

The angle so formed is 150°.

Therefore, $\angle ABC = 150°$



Question: 2

Given a line BC and a point A on it, construct a ray AD using set – squares so that $\angle DAC$ is

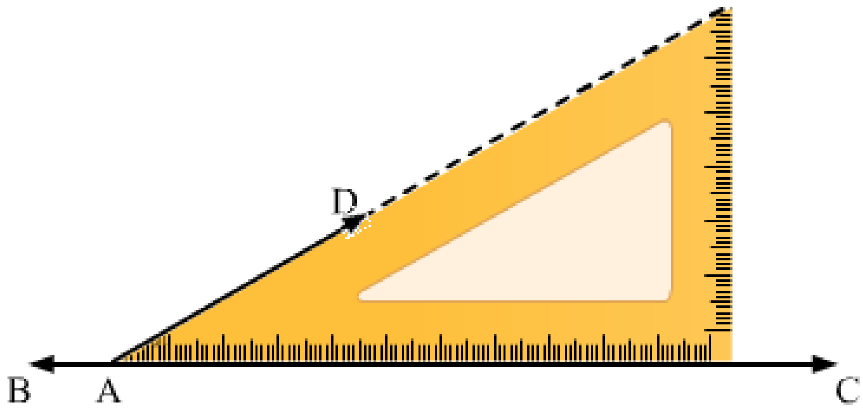
(i) 30°

(ii) 150°

Solution:

(i) Draw a line BC and take a point A on it. Place 30° set –square on the line BC such that its vertex of 30° angle lies on point A and one edge coincides with the ray AB as shown in figure

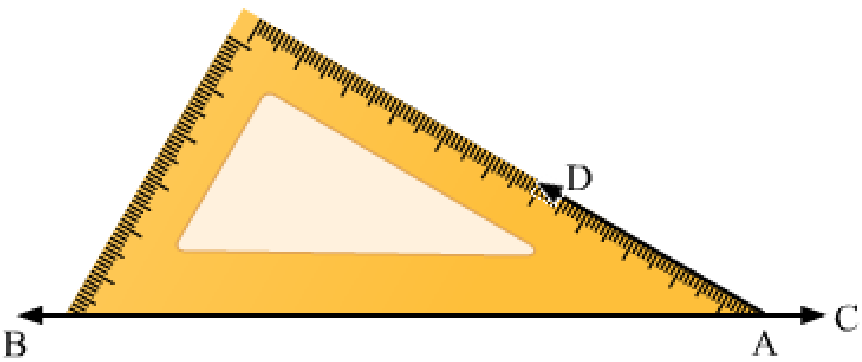
Draw the ray AD.



Thus ∠DAC is the required angle of 30°

(ii) Draw a line BC and take a point A on it. Place 30° set –square on the line BC such that its vertex of 30° angle lies on point A and one edge coincides with the ray AB as shown in the figure.

Draw the ray AD.



Therefore, ∠DAB = 30°

We know that angle on one side of the straight line will always add to 180°

Therefore, ∠DAB + ∠DAC = 180°

Therefore, ∠DAC = 150°

Exercise 18.2

Question: 1

Mark the two points, A and B on a piece of paper and join them. Measure this length. For each of the following draw a line segment CD that is:

(i) Equal to the segment AB

(ii) Twice AB

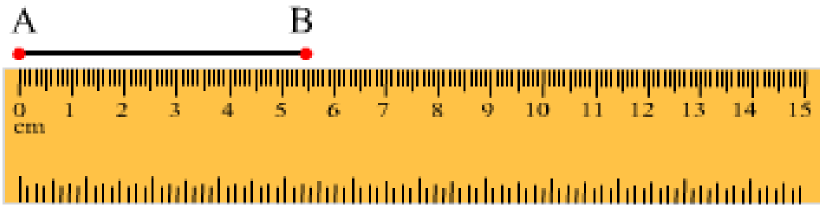
(iii) three times AB

(iv) Half AB

(v) collinear with AB and is equal to it.

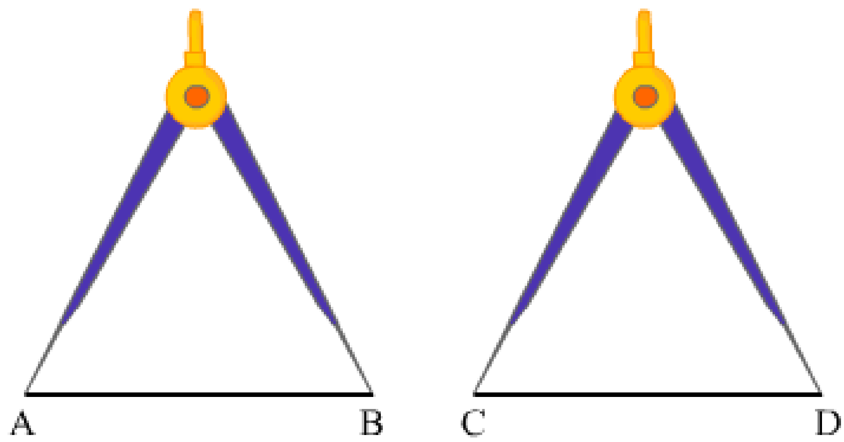
Solution:

Mark two points, A and B on a piece of paper and join them as follows:

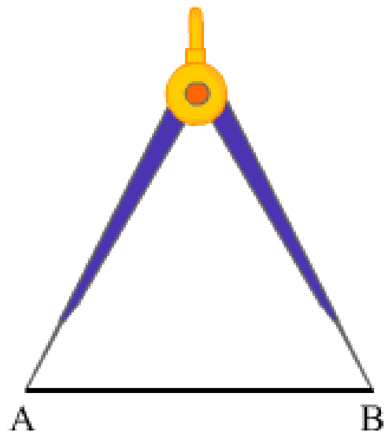


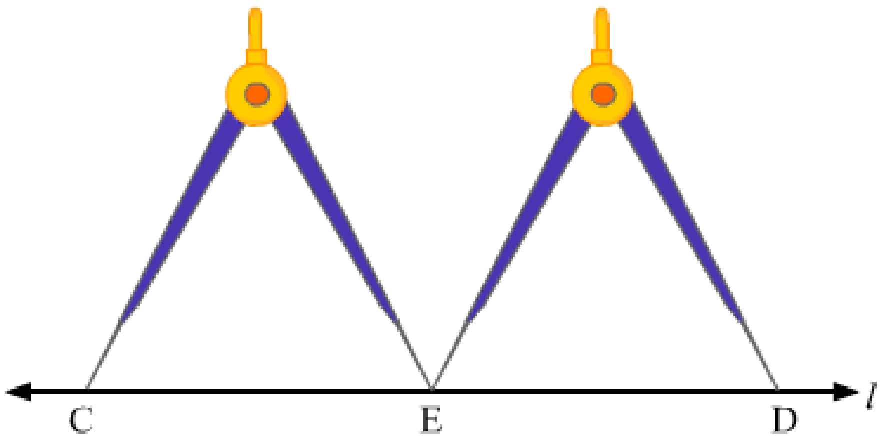
To measure the length of AB, place the ruler with its edge along AB, such that the zero mark of the cm side of the ruler coincides with point A, as shown in the figure. Now, read the mark on the ruler, which corresponds to the point B. The reading on the ruler at point B is the length of the line segment AB. Here, AB = 5.6 cm

(i) To draw the line segment CD equal to AB, take a divider and open it, such that the end-point of one of its arms is at A and the end-point of the second arm is at B, as shown in the figure. Then, lift the divider and without disturbing its opening, place the end-points of both hands on the paper, where we have to draw CD.



(ii) To draw the line segment twice AB, draw a line / and take a point C on it. Now, take a divider and open it such that the end points of both its arms are at A and B. Then, lift the divider and without disturbing its opening, place one end-point at C and the other end-point on the line 1, as shown in the figure. Lift the divider and place one end-point at E and the other end-point on the line 1, opposite C. Name this point D.





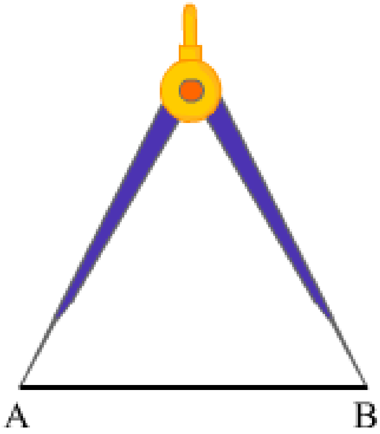
(iii) To draw the line segment three times A, we draw a line / and take a point C on it. Now take a divider and open it, such that the end-points of both its arms are at A and B.

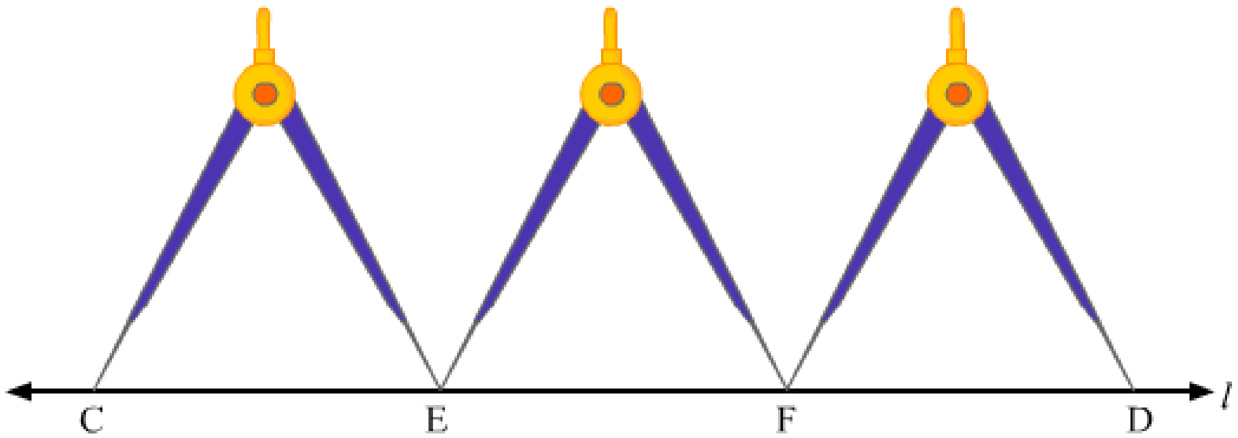
Then, we lift the divider and place one end-point at C and the other end-point on the line 1, as shown in the figure.

Let this point be E.

Again, lift the divider and place one end-pint at E and the other end-point on the line 1, opposite to C. Let this point be F.

Again, lift the divider and place one end-point at F and the other end-point on the line 1, opposite to C. Name this point D.



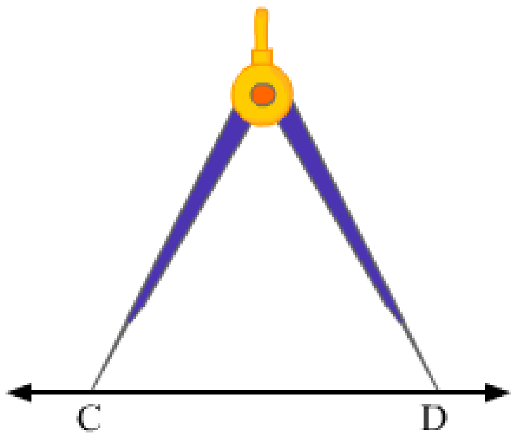


(iv) To draw the line segment that is half AB, we draw a line / and take a point C on it. Now, using a ruler, we measure the line segment AB and here, AB = 5.6 cm

Half of AB = 5.62 = 2.8 cm

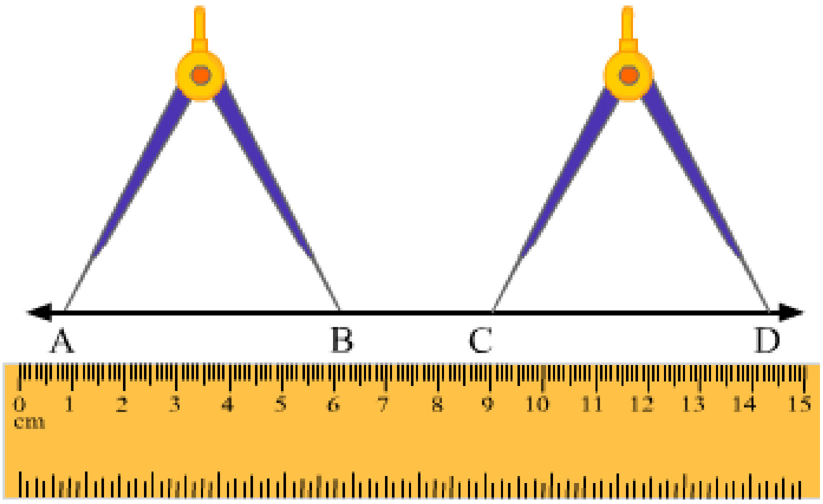
Now, we take a divider and open it so much that its end of one hand is at 0 and end of the another hand is at 2.8 cm

Then, we lift the divider and place one end at C and the other end on the line l at point D.



(v) To draw a line segment CD collinear with AB and equal to AB, we take a ruler along AB and draw the line extended to AB, as shown in the figure. We take a divider and open it such that the end-points of both its arms are at A and B.

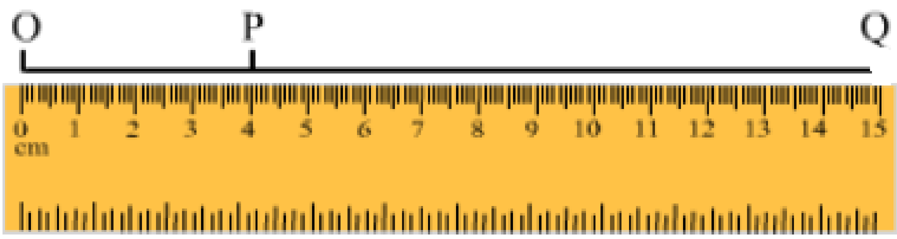
Then, we lift the divider and place the end-points of both its hands on the extended line of AB and mark them as C and D.



Question: 2

The end – point P of a line – segment PQ is against 4 cm mark and the end – point Q is against the mark indicating 14.8 cm on a ruler. What is the length of the segment PQ?

Solution:



Extend the line segment QP towards point zero of the ruler and take a point 0 on the extended line QP corresponding to point zero on the ruler.

From the figure, we can say:

OP = 4 cm and OQ = 14.8 cm

Now, PQ = OQ – OP

= (14.8 – 4) cm

= 10.8 cm

Question: 3

Draw a line segment CD. Produce it to CE such that CE = 3 CD

Solution:

We draw a line l and take two points C and D on it.

Take a divider and open it such that its end of both arms is at C and D.

Then, we lift the divider and place its one end at D and other end on the line l opposite to C as shown in the figure.

Let this point be A.

Lift the divider again and place its one end at A and other end on the line 1 opposite to C.

Name this point as E.

Here CD = DE = AE

Therefore, CE = CD + DE + AE

= CD + CD + CD (As, CD ± DE = AE)

or, CE = 3CD

Question: 4

If AB = 7.5 cm and CD = 2.5 cm, construct a segment whose length is equal to

(i) AB – CD

(ii) 2 AB

(iii) 3 CD

(iv) AB + CD

(v) 2 AB + 3 CD

Solution:

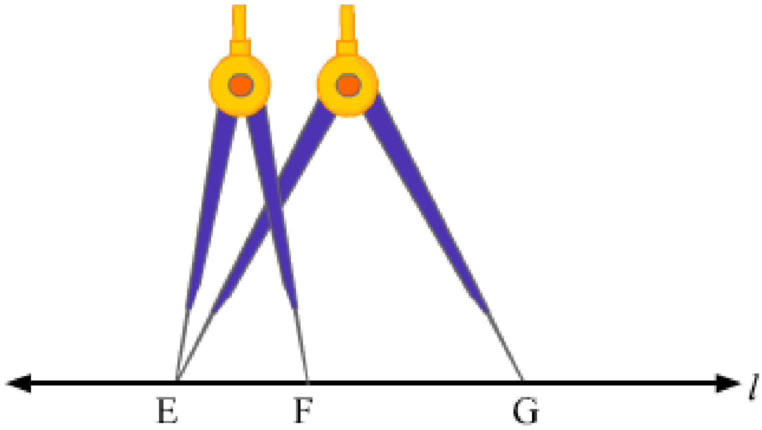
Given:

AB= 7.5 cm and CD = 2.5 cm

Draw AB and CD

(i) Draw a line l and take a point E on it.

Now, take a divider and open it such that ends of both the arms are at A and B. Then, we lift the divider and place its one end at E and other end (F) and on the line l as shown in figure. Now, reset the divider in such a way that the end of its one hand is at C and the end of the other hand is at D. Then, we lift the divider and place its one end at E and other end (G) on the line l as shown in the figure. FG is required line segment, whose length is equal to (AB – CD)



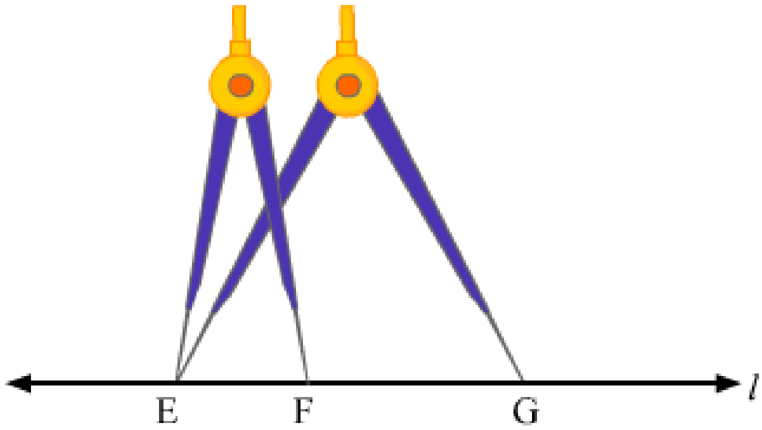
(ii) Draw a line l and take a point E on it. Now a take a divider and open it such that the ends of both its arms are at A and B.

Then, we lift the divider and place its one end at E and other end (say F) on the line l as shown in the figure.

Again, lift the divider and place its one end F and other end on the line l, opposite to E.

Let this point be G.

EG is required line segment, whose length is equal to 2 AB.



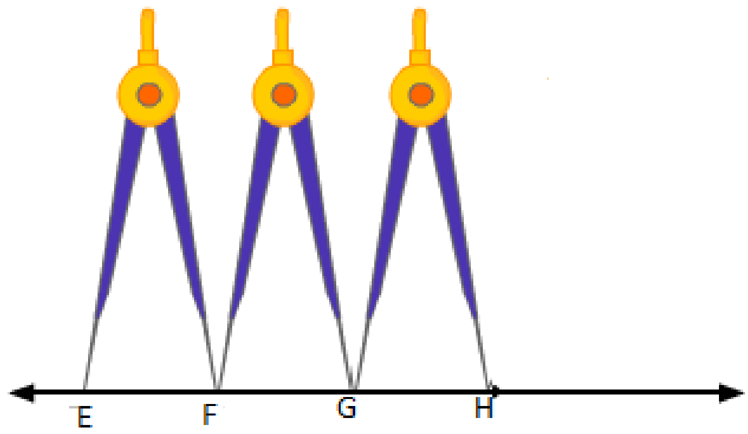
(iii) Draw a line l and take a point E on it. Now take a divider and open it such that the ends of both its arms are at C and D.

Then, we lift the divider and place its end at E on it and other end (F) on the line l, as shown in the figure.

Again, we lift the divider end (G) on the l opposite to C.

Again, lift the divider end (G) on the line l opposite to C.

Again, lift the divider and place its one end at G and another end (H) on the line l, opposite to E. EH is required line segment, whose length is equal to 3 CD.

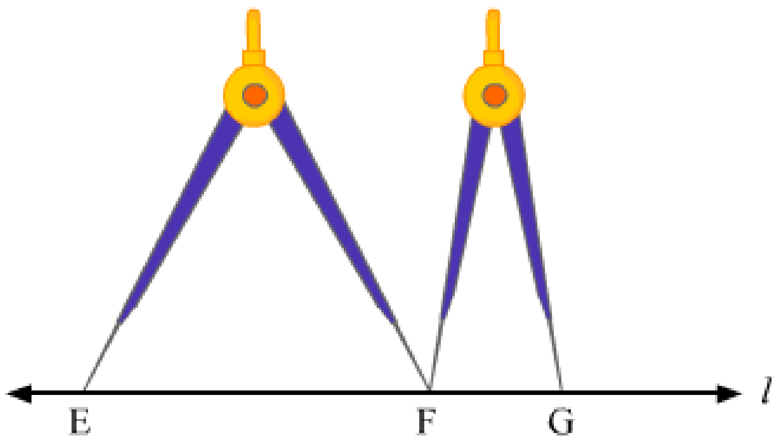


(iv) We draw a line l and take a point E on it. Now, take a divider and open it such that the ends of both its arms are A and B. The, we lift the divider end (F) on the line l, as shown in the figure.

Now, reset the divider in such a way that the end of its one hand is at C and the end of the other hand is at D.

Then, we lift the divider and place its one end at F and another end (G) on the line l opposite to E as shown in the figure.

EG is required line segment, whose length is equal to (AB + CD)



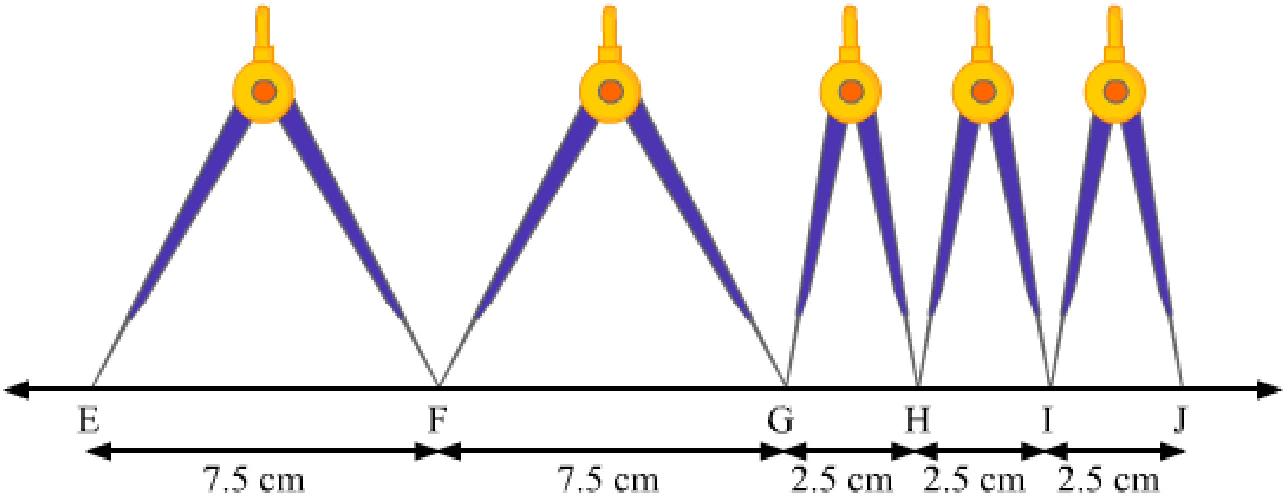
(v) Draw a line / and take point Eon it. Now, take a divider and open it such that the ends of both its arms are at A and B. Then, we lift the divider and place its one end at E and other end (say F) on the line 1, as shown in the figure.

Again, lift the divider and place its one end at F and another end (G) on the line 1, opposite to E. Now, reset the divider in such a way that the ends of its one hand are at C and the end of other hand is at D.

Then, we lift the divider and place its one end at G and another end (say H) on the line 1, opposite to E as shown in the figure.

Again, lift the divider and place its one end at H and other end (say I) on the line 1, opposite to E as shown in the figure. Again, lift the divider and place its one end at I and another end (say J) on the line 1, opposite to E as shown in the figure.

EG is required line segment, whose length is equal to (2AB + 3CD).



Question: 5

Fill in the blanks:

(i) A part of a line with two end – points is called a __________.

(ii) Segment AB is ________ segment BA

(iii) The length of a line segment is the ____________ distance between two segments.

(iv) Two segments are congruent only if they have _________.

(v) Two segments of the same length are said to be ________.

Solution:

(i) A part of a line with two end – points is called a **Line segment**

Explanation: a line segment is a part of a line that is bounded by two distinct end points.

Example: Sides of a triangle or any polygon.

A and B are definite fixed points.

Therefore, AB is a line segment.

(ii) Segment AB is **equal to** segment BA

Explanation: While naming a line segment, the order may not be same but the length will be equal. If AB = 4 cm, then, BA = 4 cm

(iii) The length of a line segment is the **shortest** distance between two segments.

Explanation: We measure the length between two points as the length of the line segment between the two points. The length between two points is the straight line, which is the shortest distance between the two end points.

(iv) Two segments are congruent only if they have **equal length**.

(v) Two segments of the same length are said to be **congruent**.

Explanation: Line segments are congruent if they have the same length. If AB = 4 cm and CD = 4 cm Then, we say segment AB is congruent to segment CD.

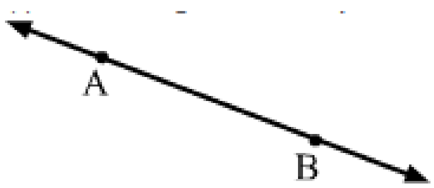
Question: 6

Match the following statements:

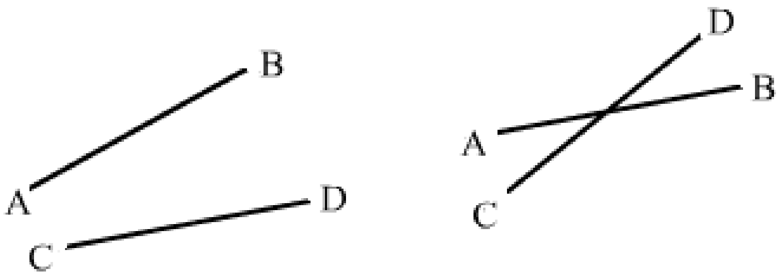
Column A	Column B	Column B	
(i)	Line segment has	C	Two end – point
(ii)	Two segments may intersect	A	At a point
(iii)	Two segments are congruent	B	If they have equal lengths
(iv)	Line segment is	D	Portion of a line.

Solution:

(i) A line segment is a part of a line that is bounded by two distinct end points.

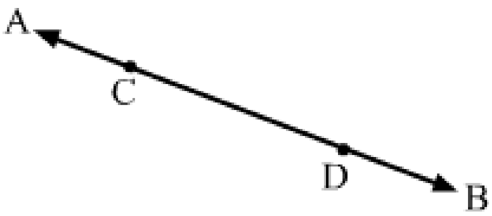


(ii) Two line segments will either not intersect at all or intersect at one point. It can never intersect at more than one point.



(iii) Line segments are congruent if they have the same lengths. If AB = 6 cm and CD = 6 cm Then, AB and CD are congruent.

(iv) A line segment is a part of a line that is bounded by two distinct end points.



Here, AB is a line and CD is a line segment.

So, segment CD is a portion of a line AB.

Question: 7

Tell which of the following statements are true (T) and false (F):

(i) The intersection of two segments may be segment.

(ii) Two segments may intersect at a point which is not any end point of either segments containing it.

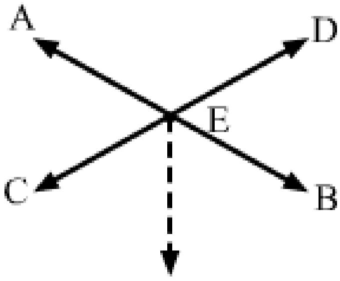
(iii) Every ray is a segment

(iv) Every segment is a ray.

Solution:

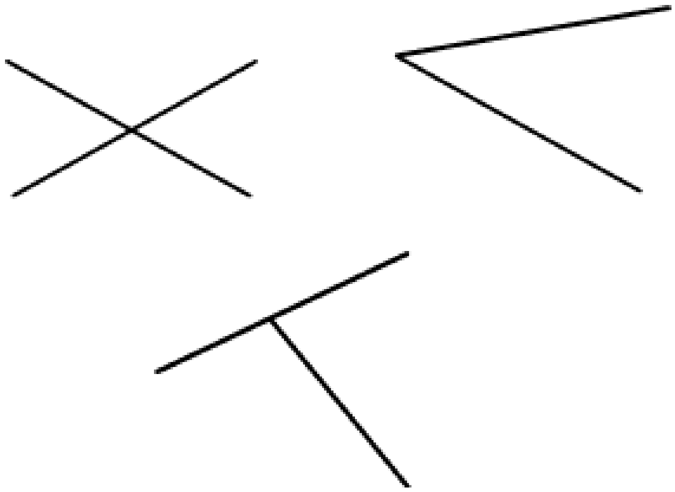
(i) False

Explanation: Two line segments can intersect maximum at one point and one point cannot make a line segment.



(ii) True

Explanation: If two line segment, then point of intersection will not be any of the end points.



(iii) True

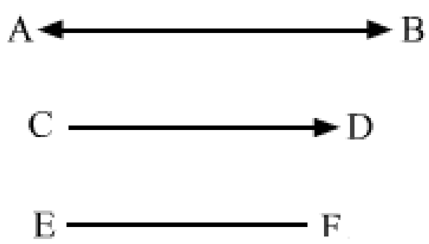
Explanation: A portion of line that starts at point and has no end point is called a ray, whereas align segment.

(iv) Both ends points of a line segment are fixed but ray has only one end fixed. Thus a segment can never be a ray.

Question: 8

What is the difference between a line, a line segment and a ray?:

Solution:

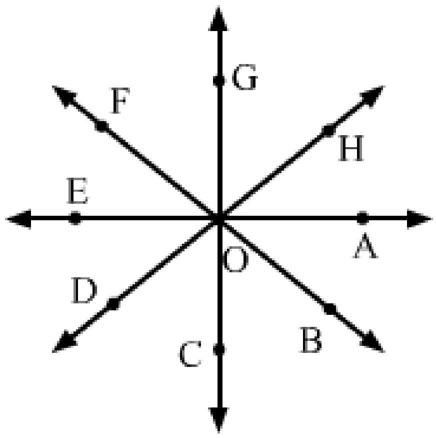


A line can be drawn to infinity in both the directions. AB is a line

A line segment has both ends fixed. EF is a line segment. A ray has one end fixed and another end can be drawn to infinity. CD is a ray.

Question: 9

How many rays are represented in fig 18.8? Name them



Solution:

We know that a ray has fixed starting point and it can be drawn to infinity. If we take 0 as starting point, we will have a ray in every given direction.

So, our rays are, OA → , OB →, OC →, OD →, OE →, OF →, OG, OH→.

Thus, the number of rays in the figure is 8.

Geometrical Constructions

Exercise 19.1

Question: 1

Construct line segments whose lengths are:

(i) 4.8 cm

(ii) 12 cm 5 mm

(ii) 7.6 cm

Solution:

(i) Draw a line L on the paper and mark a point A on it.

Take a compass and place its metal point at zero mark of the ruler.

Adjust the compass such that the pencil point is at 4.8 cm mark on the ruler.

Now, take the compass to L such that its metal point is on point A.

Mark a small mark at B on L corresponding to the pencil point of the compass.

AB is the required line segment of 4.8 cm.

(ii) Draw a line L on the paper and mark a point A on it.

Take a compass and place its metal point at zero mark of the ruler.

Adjust the compass such that the pencil point gets placed at the point which is 5 small points from the mark of 12 cm to 13 cm of the ruler.

Now, take the compass to L such that its metal point is on A.

Mark a small mark at B on L corresponding to the pencil point of the compass.

AB is the required line segment of 12 cm 5 mm.

(iii) Draw a line L on the paper and mark a point A on it.

Take a compass and place its metal point at zero mark of the ruler.

Adjust the compass such that the pencil point gets placed at the point which is 6 small points from the mark of 7 cm to 8 cm of the ruler.

Take the compass to L such that its metal point is on A.

Mark a small mark at B on the line L corresponding to the pencil point of the compass.

AB is the required segment of 7.6 cm.

Question: 2

Construct two segments of lengths 4.3 cm and 3.2 cm.Construct a segment whose length is equal to the sum of the lengths of these segments.

Solution:

Using compass and ruler, we construct two segments AB and CD of lengths 4.3 cm and 3.2 cm, respectively.

Draw a line L and mark a point P on it.

Take a compass and place its metal point at A and adjust it, such that the pencil point reaches point B.

Take the compass to line L, such that its metal point is on P.

Mark a small mark at Q on the line L corresponding to the pencil point of the compass.

Now, reset the compass, such that its metal and pencil points are on C and D, respectively.

Take the compass again to line L, such that its metal point is on Q and the pencil point makes a small mark at point R, which opposite to point P on line L

PR is the required segment, whose length is equal to the sum of the lengths of these segments.

Exercise 19.2

Question: 1

How many lines can be drawn which are perpendicular to a given line and pass through a given point lying

(i) outside it?

(ii) on it?

Solution:

(i) Explanation:

Perpendicular line from a given point to a given line is the shortest distance between them.

Only one shortest distance is possible.

Thus, only one perpendicular line is possible from the given point (outside the line) to a given line.

(ii) Explanation:

At any point on the line, we can draw only one perpendicular line.

Thus, on the given line on a point, we can draw only one perpendicular line.

Question: 2

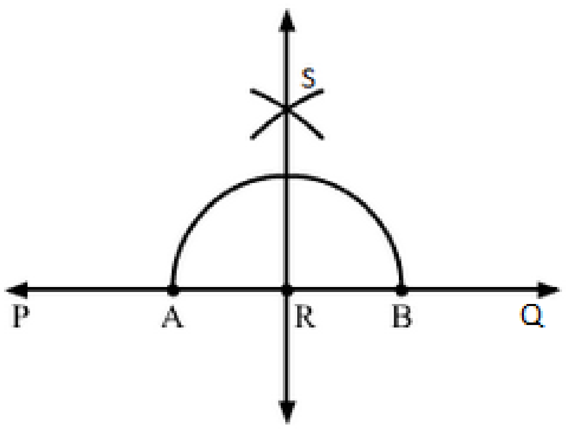
Draw a line PQ. Take a point R on it. Draw a line perpendicular to PQ and passing through R.

(i) Using ruler and set square.

(ii) ruler and compasses.

Solution:

(i) Draw a line PQ and take a point R on it.



Place a set-square, such that its one arm of the right angle is along the line PQ .

Without disturbing the position of the set-square, place a ruler along its edge.

Now, without disturbing the position of the ruler, remove the set-square and draw a line MN through point R.

MN is the required line perpendicular to line PQ passing through R.

(ii) Draw a line PQ and take a point R on it.

With R as centre and taking a convenient radius, construct an arc touching the line PQ at two points A and B.

Now, with A and B as centres and radius greater than AR, construct two arcs cutting each other at S.

Join RS and extend it in both directions. This is the required line, which is perpendicular to PQ and passes through R.

Question: 3

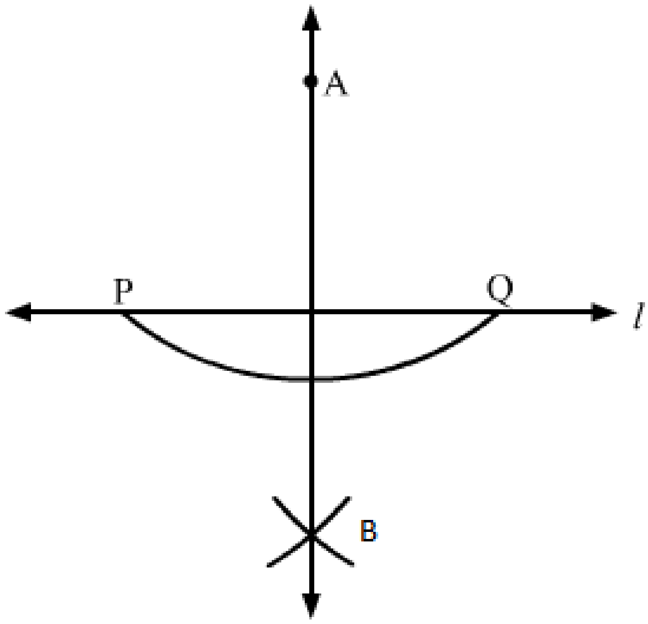
Draw a line l, take a point A not lying on l. Draw a line m such that and passing through A. Using

(i) ruler and set square

(ii) ruler and compass.

Solution:

(i) We draw a line L and take a point A outside it.



Place a set square PQR such that its one arm PQ of the right angle is along the line L.

Without disturbing the position of set-square, place a ruler along its edge PR.

Now, without disturbing the position of the ruler, slide the set-square along the ruler until its arm QR reaches point A.

Without disturbing the position of the set-square, draw a line m.

Line m is the required line perpendicular to line L.

(ii) With A as centre, draw an arc PQ, which intersects line L at points P and Q.

Without disturbing the compass and taking P and Q as centres, we construct two arcs such that they intersect each other.

The point where both arcs intersect is B.

Join points A and B and extend it in both directions. This is the required line.

Question: 4

Draw a line AB and take two points C and E on opposite sides of AB. Through C, draw draw CD⊥AB and through E draw EF⊥AB. Using

(i) ruler and set square

(ii) ruler and compass.

Solution:

(i) Draw a line AB and take two points C and E on the opposite sides of the line AB.

On the side of E, place a set-square PQR, such that its one arm PQ of the right angle is along the line AB. Without disturbing the position of the set-square, place a ruler along its edge PR.

Now, without disturbing the position of the ruler, slide the set square along the ruler until the arm QR reaches point C.

Without disturbing the position of the set-square, draw a line CD, where D is a point on AB.

CD is the required line and CD ⊥ AB.

We repeat the same process starting with taking set-square on the side of E, we draw a line EF ⊥ AB.

(ii) Draw a line AB and take two points C and E on its opposite sides.

With C as centre, draw an arc PQ, which intersects line AB at P and Q.

Taking P and Q as centres, construct two arcs, such that they intersect each other at H.

Join points H and C. HC crosses AB at D.

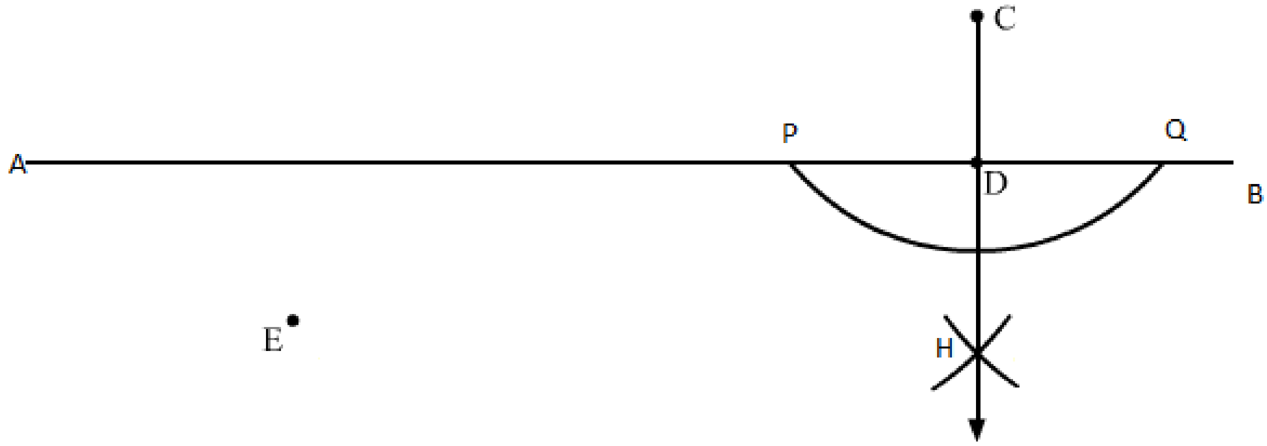
We have CD ⊥ AB.

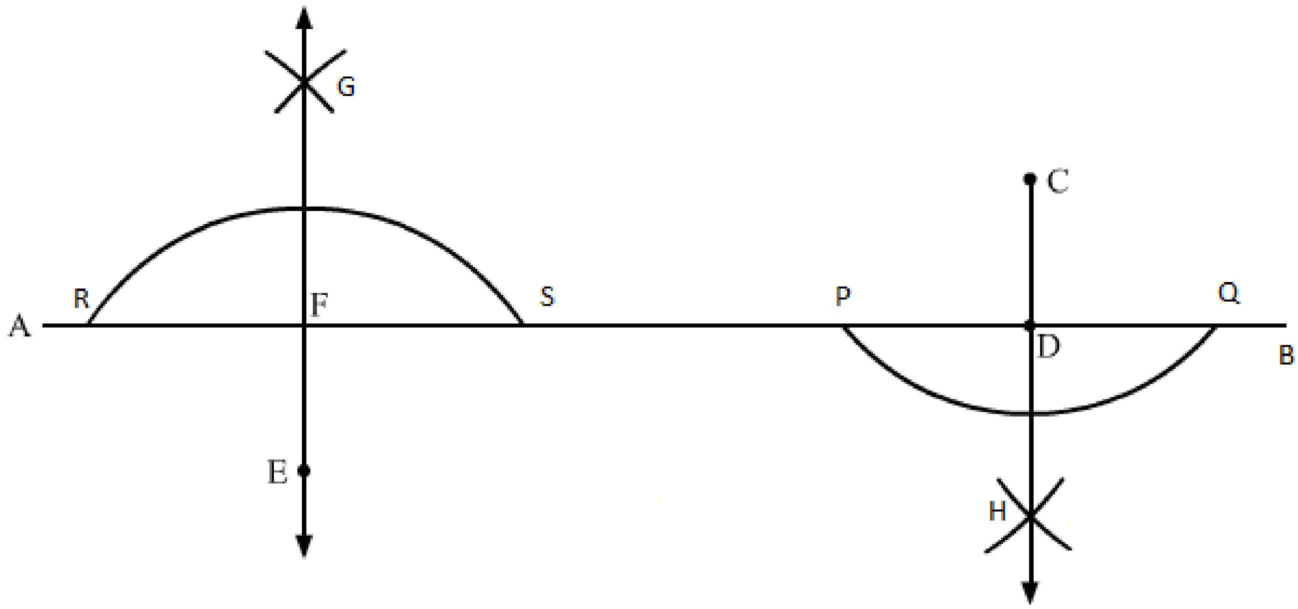
Similarly, take E as centre and draw an arc RS.

Taking R and S as centres, draw two arcs which intersect each other at G.

Join points G and E. GE crosses AB at F.

We have EF ⊥ AB.

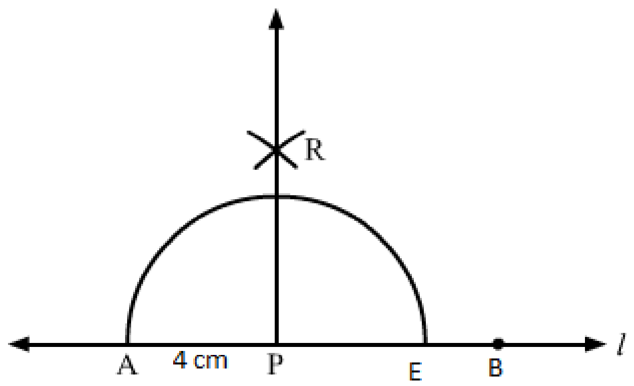




Question: 5

Draw a line segment AB of length 10 cm. Mark a point P on AB such that AP = 4 cm. Mark a point P on AB such that AP = 4 cm. Draw a line through P perpendicular to AB.

Solution:



We draw line L and take a point A on it.

Using a ruler and a compass, we mark a point B, 10 cm from A, on the line L.

AB is the required line segment of 10 cm.

Again, we mark a point P, which is 4 cm from A, in the direction of B.

With P as centre, take a radius of 4 cm and construct an arc intersecting the line L at two points A and E.

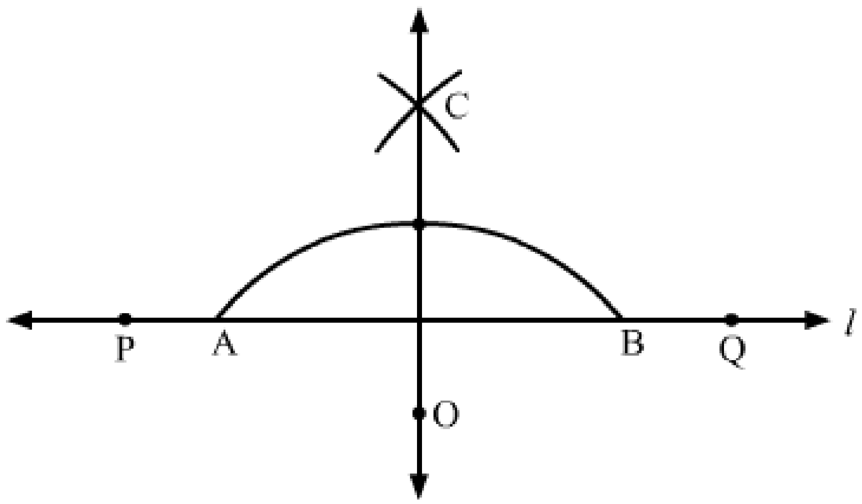
With A and E as centres, take a radius of 6 cm and construct two arcs intersecting each other at R.

We join PR and extend it. PR is the required line, which is perpendicular to AB.

Question: 6

Draw a line segment PQ of length of length 12 cm. Mark a point O outside this segment. Draw a line through O perpendicular to PQ.

Solution:



Draw a line L and take a point P on it.

Using a ruler and a compass, mark a point Q on the line L, where PQ = 12 cm.

Mark a point Q outside PQ.

Now, with O as centre, draw an arc of appropriate radius such that the arc cuts the line at points A and B.

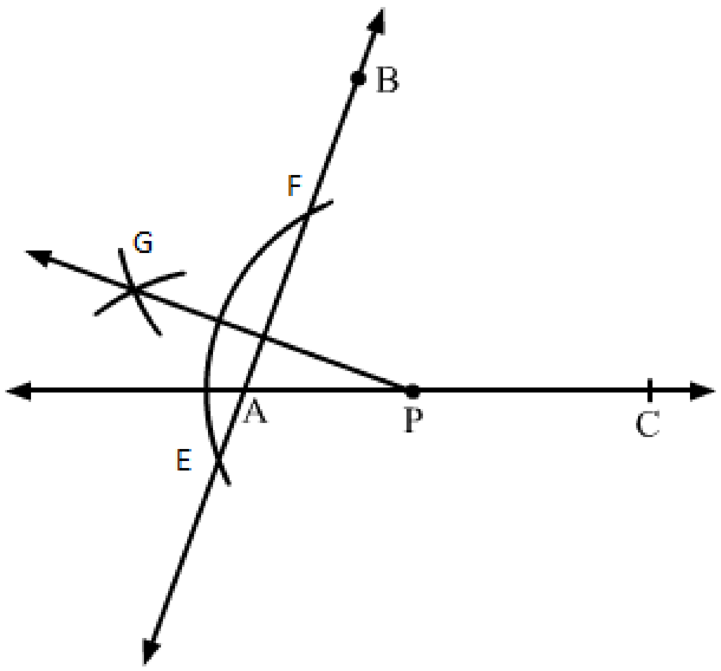
Taking A and B as centres, construct two arcs such that they intersect each other at C.

Join OC. OC is the required line, which is perpendicular to PQ.

Question: 7

Using a protractor, draw ∠BAC of measure 70°. On side AC, take a point P, such that AP = 2cm. From P draw a line perpendicular to AB.

Solution:



Draw a line segment AC on a line L

(i) Take a protractor and place it on the segment AC such that segment AC coincides with the line of diameter of protractor and middle of this line coincides with point A.

(ii) Counting from the right side, mark the point as B at the point of 70° of the protractor and draw AB.

(iii) Now, measuring 2 cm from A on AC, mark a point P.

(iv) With P as centre, draw an arc intersecting line 1 at points E and F.

(v) Using the same radius and E and F as centres, construct two arcs that intersect at point G on the other side.

(vi) Join PG.

Question: 8

Draw a line segment AB of length 8 cm. At each end of this line segment, draw a line perpendicular to AB. Are these two lines parallel?

Solution:

(i) Take a convenient radius with A as centre and draw an arc intersecting the line at points W and X.

(ii) With W and X as centres and radius greater than AW, construct two arcs intersecting each other at M.

(iii) Join AM and extend it in both directions to P and Q.

(iv) Take a convenient radius with B as centre and draw an arc intersecting the line at points Y and Z.

(v) With Y and Z as centres and a radius greater than YB, construct two arcs intersecting each other at N.

(vi) Join BN and extend it in both directions to S and R.

Let the lines perpendicular at A and B be PQ and RS, respectively.

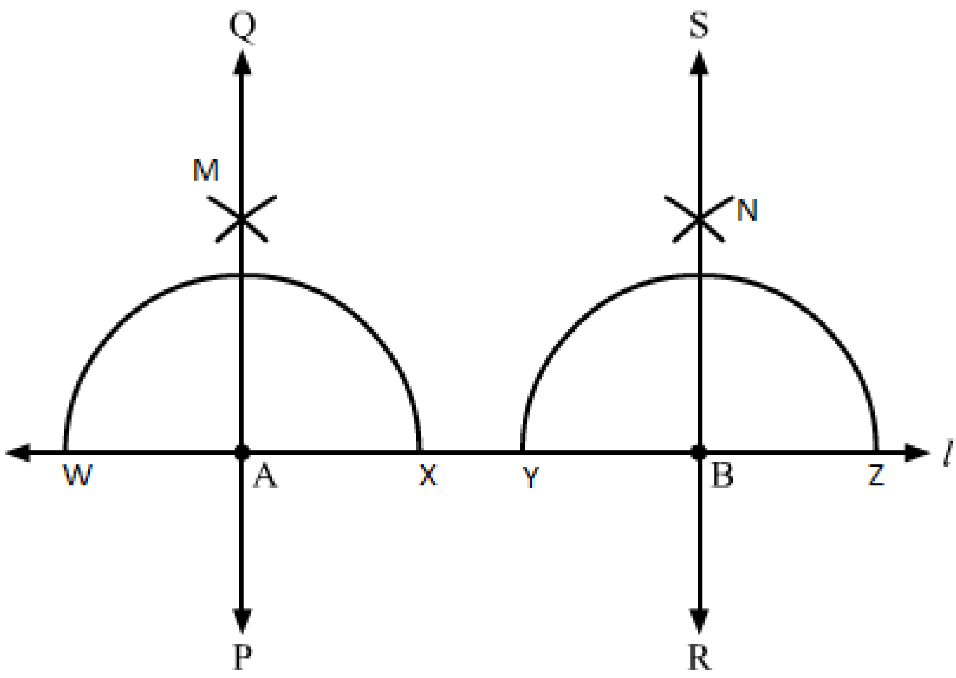
Since, $\angle QAB = 90°$ and $\angle ABR = 90°$

Therefore, $\angle QAB = \angle ABR$.

When two parallel lines are intersected by a third line, the two alternate interior angles are equal.

Since, $\angle QAB = \angle ABR$

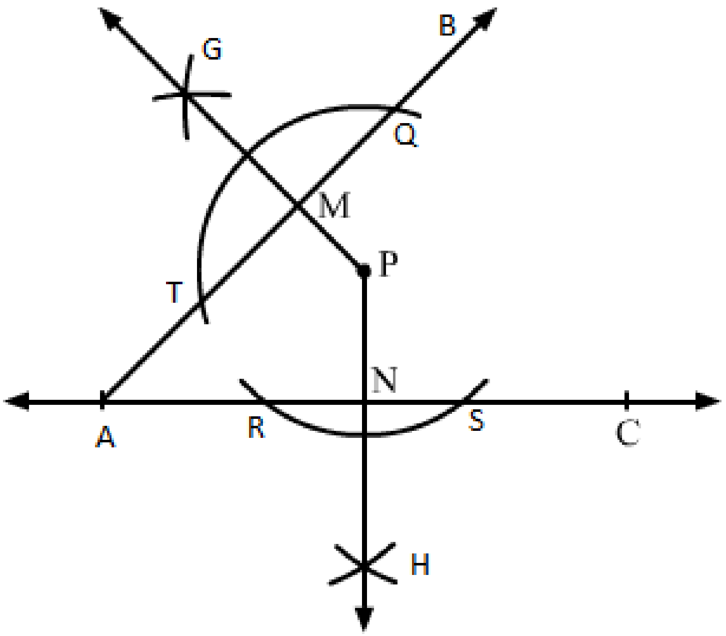
Therefore, PQ and RS are parallel.



Question: 9

Using a protractor, draw ∠BAC of measure 45°. Take a point P in the interior of ∠BAC. From P draw line segments PM and PN such that PM⊥AB and PN⊥AC. Measure ∠MPN.

Solution:



(i) Draw a line segment A on the line L .

(ii) Take a protractor and place it on the segment AC such that AC coincides with the line of the diameter of the protractor and the middle point of the line coincides with point A.

(iii) Counting from the right side, mark a point as B at the point of 45° of protractor and draw a line segment AB.

(iv) Take a convenient radius with P as centre, construct an arc intersecting the line segments AB at T and Q and AC at R and S.

(v) Using the same radius and with T and Q as centres, construct two arcs intersecting at G on the other side.

(vi) Using the same radius and with R and S as centres, construct two arcs intersecting at H on the other side.

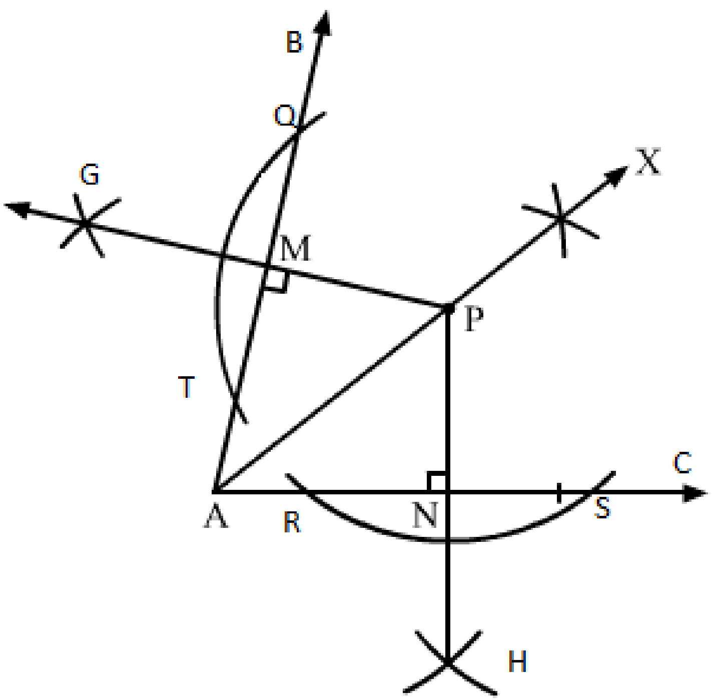
(vii) Join PG and PH which intersects AB and AC at M and N, respectively.

On measuring ∠MPN using a protractor, we get it equal to 135°.

Question: 10

Draw an angle and label it as ∠BAC. Draw a bisector ray AX and take point P on it. From P draw line segments PM and PN, such that PM⊥AB and PN⊥ AC, where M and N are respectively, points on rays AB and AC. Measure PM and PN. Are the two lengths equal?

Solution:



(i) Draw ∠BAC on the line segment AC.

With a convenient radius and A as centre, draw an arc from AB and AC.

(ii) The points where arc cuts AB and AC, take both points as centres and draw two small arcs intersecting at X. Now, draw AX.

(iii) Take a point P on the ray AX.

(iv) Take a convenient radius with P as centre and construct an arc intersecting the line segments AB at T and Q and AC at R and S, respectively.

(v) Using the same radius and with T and Q as centres, construct two arcs intersecting at G on the other side.

(vi) Using the same radius and with R and S as centres, construct two arcs intersecting at H on the other side.

(vii) Join PG and PH, which intersects AB and AC at M and N, respectively.

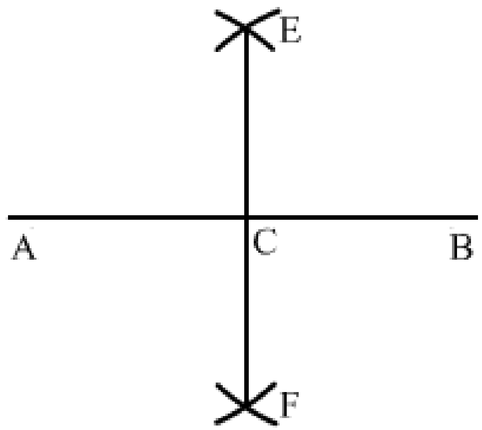
On measuring PM and PN using a ruler, we find that both are equal.

Exercise 19.3

Question: 1

Draw a line segment of length 8.6 cm. Bisect it and measure the length of each part.

Solution:



Draw a line segment AB of length 8.6 cm.

With A as centre and radius more than half of AB, draw arcs on both sides of AB.

With the same radius and B as centre, draw arcs on the both sides of AB, cutting the previous two arcs at E and F.

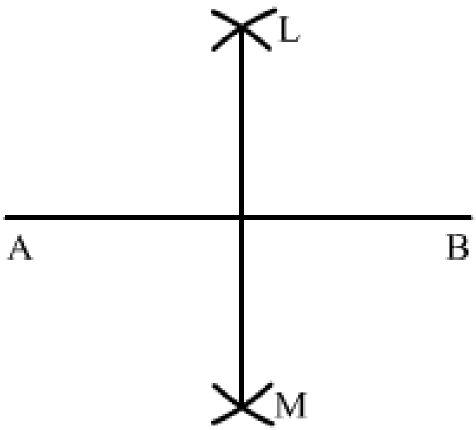
Draw a line segment from E to F intersecting AB at C.

On measuring AC and BC, we get: AC = BC = 4.3 cm.

Question: 2

Draw a line segment AB of length 5.8 cm. Draw the perpendicular bisector of this line segment.

Solution:



Draw a line segment AB of length 5.8 cm using a ruler.

With A as centre and radius more than half of AB, draw arcs on both sides of AB.

With the same radius and B as centre, draw arcs on both sides of AB, intersecting the previous arcs at L and M.

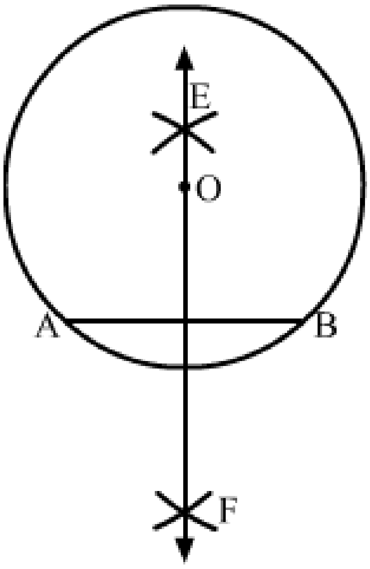
Draw the line segment LM with L and M as end-points.

LM is the required perpendicular bisector of AB.

Question: 3

Draw a circle with centre at point O and radius 5 cm. Draw its chord AB, draw the perpendicular bisector of line segment Ab. Does it pass through the centre of the circle?

Solution:



Draw a point O. With O as centre and radius equal to 5 cm, draw a circle.

Take any two points A and B on the circumference of the circle and draw a line segment with A and B as its end points.

AB is the chord of the circle.

With A as centre and radius more than half of AB, draw arcs on both sides of AB.

With the same radius and B as a centre, draw arcs on both sides of AB, cutting the previous two arcs at E and F.

Draw a line passing through E and F.

Line EF passes through the centre of the circle O.

Question: 4

Draw a circle with centre at point O. Draw its two chords AB and CD such that AB is not parallel to CD. Draw the perpendicular bisector of AB and CD. At what point do they intersect?

Solution:

Draw a circle with centre at O. We draw two chords AB and CD as shown in the figure.

(i) With A as centre and radius more than half of AB, draw arcs on both sides of AB.

(ii) With the same radius and B as centre, draw arcs cutting the arcs of step (i) at P and Q.

(iii) Join P and Q.

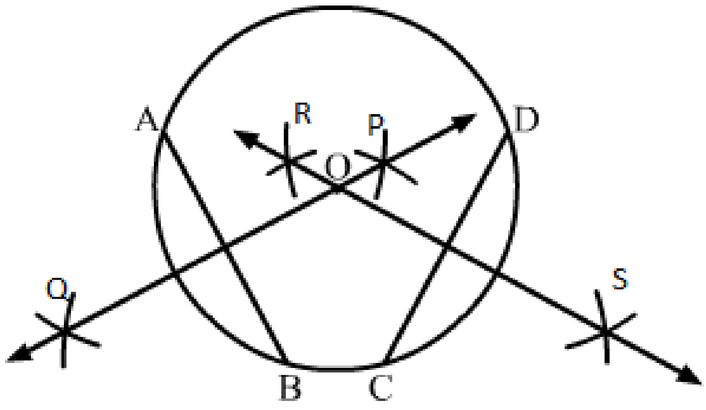
(iv) With C as centre and radius more than half of CD, draw arcs on both sides of CD.

(v) With the same radius and D as centre, draw arcs cutting the arcs of step (iv) at R and S.

(vi) Join R and S.

We draw the line segments of perpendicular bisector of AB and CD.

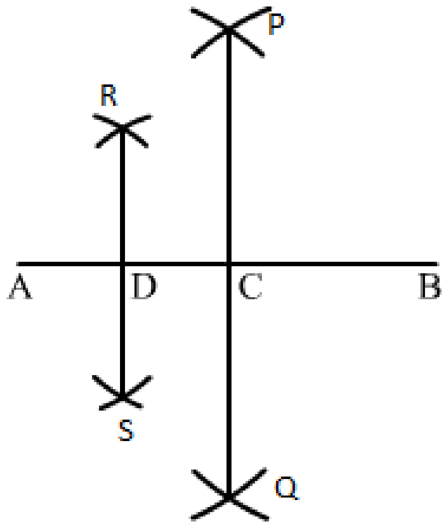
We see that the perpendicular bisector of AB and CD meet at 0, the centre of the circle.



Question: 5

Draw a line segment of length 10 cm and bisect it. Further bisect one of the equal parts and measure its length.

Solution:



Draw a line segment AB of length 10 cm and bisect it.

(i) With A as centre and radius more than half of AB, draw arcs on both sides of AB.

(ii) With the same radius and B as centre, draw arcs cutting the arcs of step (i) at P and Q, respectively.

(iii) Join P and Q. Line PQ intersects line AB at C.

(iv) With A as centre and radius more than half of AC, draw arcs on both sides of AB.

(v) With the same radius and C as centre, draw arcs cutting the arcs of step (iv) at R and S, respectively.

(vi) Join R and S.

Line RS intersects AC at D.

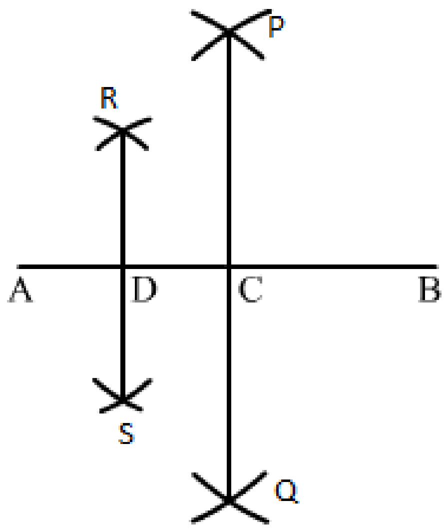
If we measure AD with the ruler, we have AD = 2.5 cm

Question: 6

Draw a line segment AB and bisect it. Bisect one of the equal parts to obtain a line segment of length 1/2(AB).

Solution:

Draw a line segment AB.



(i) With A as centre and radius more than half of AB, draw arcs on both sides of AB.

(ii) With the same radius and B as centre, draw arcs cutting the arcs drawn in step (1) at P and Q.

(iii) Join P and Q. PQ intersects AB at C.

(iv) With A as centre and radius more than half of AC, draw arcs on both sides of AC.

(v) With the same radius and C as centre, draw arcs cutting the arcs drawn in step

(iv) at R and S.

(vi) Join R and S. RS intersects AB at D.

Now, AC and CB are equal.

Both are 1/2(AB). Again, divide AC at D.

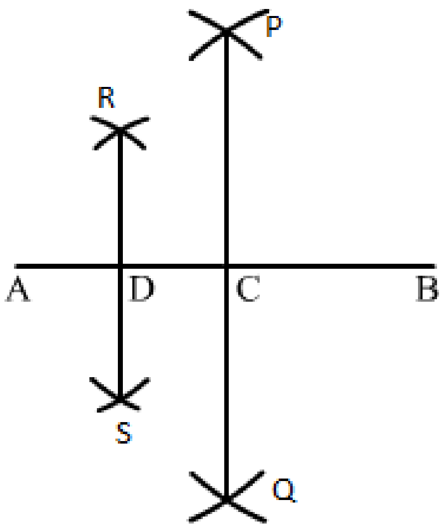
So, AD and AC are of same length, i.e., 1/4(AB).

Question: 7

Draw a line segment AB and by ruler and compasses, obtain a line segment of length 3/4(AB).

Solution:

Draw a line segment AB using the ruler.



(i) With A as centre and radius more than half of AB, draw arcs on both sides of AB.(ii) With the same radius and B as centre, draw arcs cutting the arcs drawn in step (i) at P and Q.

(iii) Join P and Q. PQ intersects AB at C.

(i) With A as centre and radius more than half of AB, draw arcs on both sides of AC.

(ii) With the same radius and C as centre, draw arcs cutting the arcs drawn in step (iv) at R and S.

(iii) Join R and S. RS intersects AB at D.

Bisect AC again and mark the point of bisection as D.

So, we have: AD = 1/4(AB),

DC = 1/4 (AB) and CB = 1/2(AB)

Therefore, DB = 1/4 (AB) + 1/2(AB) = 3/4(AB)

Thus, DB is the required line segment of length 3/4(AB).

Exercise 19.4

Question: 1

Construct the following angles with the help of protractor:

45°, 67°, 38°, 110°, 179°, 98°, 84°.

Solution:

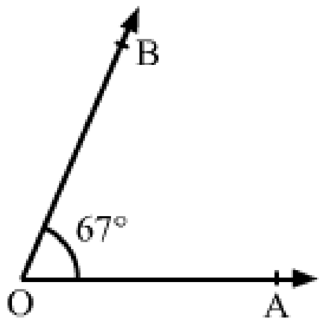
We draw a ray OA.

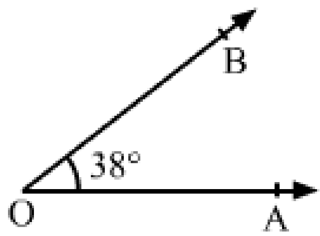
We place the protractor on OA such that its center coincides with the point 0 and the diameter of the protractor coincides with OA.

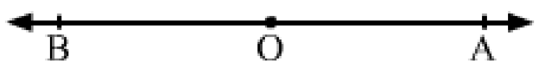
We mark a point B against the mark of 45° on the protractor.

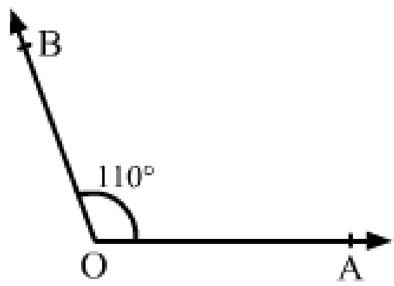
We remove the protractor and draw OB. ∠AOB is the required angle of 45°.

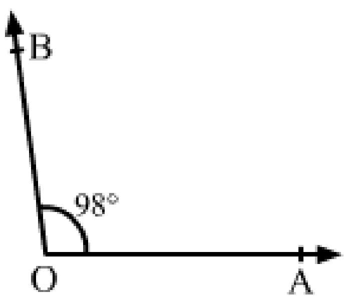
Similarly, we draw the angles 67°, 38°, 110°, 179°, 98° and 84°.

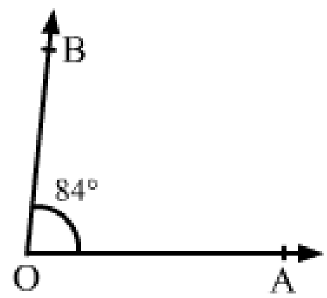












Question: 2

Draw two rays PQ and RS as shown in figure. Using the protractor, construct angles of 15° and 138° with one arm PQ and RS respectively.

Solution:

(i) Draw a ray PQ as given in the question.

Place the protractor on the ray PQ such that its center coincides with the point P and the diameter of the protractor coincides with PQ.

Mark a point B against the mark of 15° on the protractor.

Remove the protractor and draw PB. ∠QPB is the required angle of 15°.

(ii) Draw a ray RS as given in the question.

Place the protractor on ray RS such that its centre coincides with the point R and diameter of the protractor coincides with RS.

Mark a point T against the mark of 138° on the protractor.

Remove the protractor and draw RJ.

∠SRTIIs the required angle of 138°.

Exercise 19.5

Question: 1

Draw an angle and label it as ∠BAC. Construct another angle, equal to ∠BAC

Solution:

Draw an angle ∠BAC also draw a ray OP.

With a suitable radius and A as center, draw an arc intersecting AB and AC at X and Y, respectively.

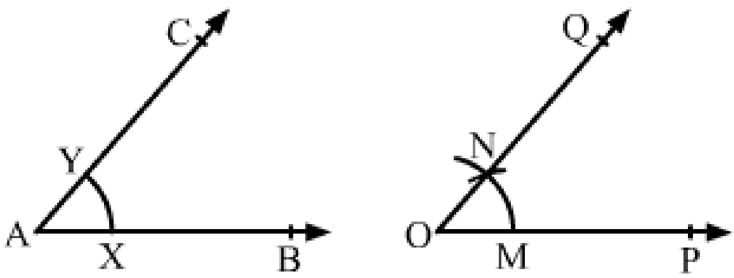
With the same radius and O as center, draw an arc to intersect the arc OP at M.

Measure XY using the compass.

With M as centre and radius equal to XY, draw an arc to intersect the arc drawn from O at N.

Join 0 and N and extend it to Q.

∠POQ is the required angle.

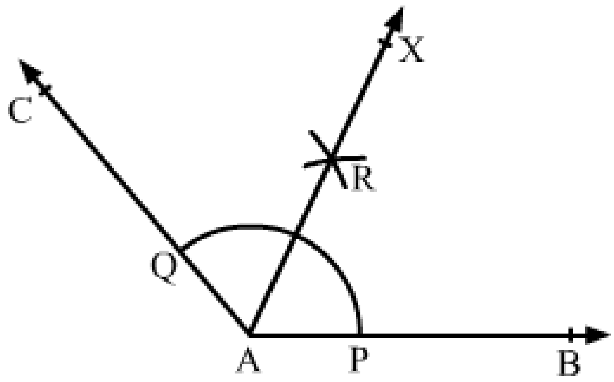


Question: 2

Draw an obtuse angle. Bisect it. Measure each of the angle obtained.

Solution:

Obtuse angles are those angles which are greater than 90° but less than 180°.



Draw an obtuse angle ∠BAC.

With an appropriate radius and centre at A, draw an arc such that it intersects AB and AC at P and Q, respectively.

With centre P and radius more than half of PQ, draw an arc.

With the same radius and centre at Q, draw another arc intersecting the previous arc at R.

Join A and R and extend it to X.

The ray AX is the required bisector of ∠BAC.

If we measure ∠BAR and ∠CAR,

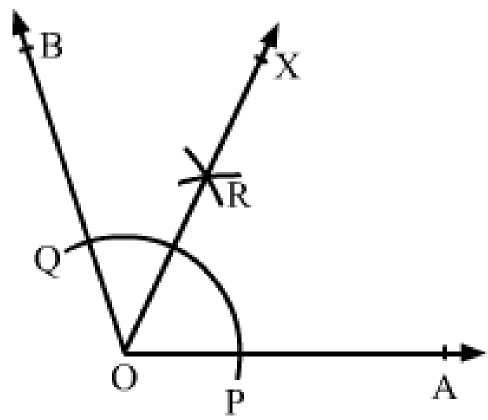
we have ∠BAR = ∠CAR = 65°

Question: 3

Using protractor, draw an angle of measure 108°. With this angle as given, draw an angle of 54°.

Solution:

Draw a ray OA.



With the help of a protractor, construct an angle ∠AOB of 108°.

Since, 108/2 = 54°

Therefore, 54° is half of 108°.

To get the angle of 54°, we need to bisect the angle of 108°.

With centre at O and a convenient radius, draw an arc cutting sides OA and OB at P and Q, respectively.

With centre at P and radius more than half of PQ, draw an arc.

With the same radius and centre at Q, draw another arc intersecting the previous arc at R.

Join O and R and extend it to X.

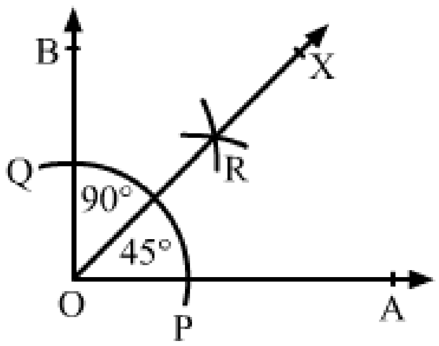
∠AOX is the required angle of 54°.

Question: 4

Using protractor, draw a right angle. Bisect it to get an angle of measure 45°.

Solution:

We know that a right angle is of 90°.



Draw a ray OA.

With the help of a protractor, draw an ∠AOB of 90°.

With centre at O and a convenient radius, draw an arc cutting sides OA and OB at P and Q, respectively.

With centre at P and radius more than half of PQ, draw an arc.

With the same radius and centre at Q, draw another arc intersecting the previous arc at R.

Join O and R and extend it to X.

∠AOX is the required angle of 45°.

∠AOB = 90°

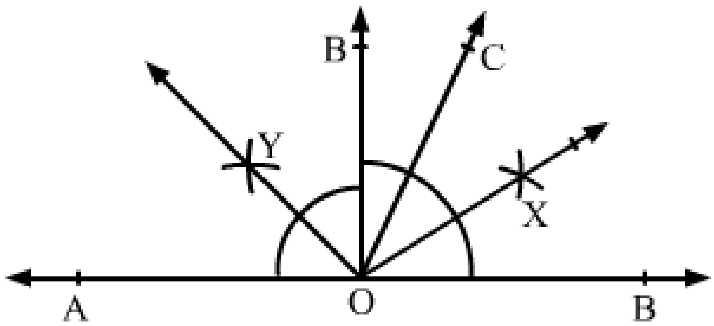
∠AOX = 45°

Question: 5

Draw a linear pair of angles. Bisect each of the two angles. Verify that the two bisecting rays are perpendicular to each other.

Solution:

Two angles, which are adjacent and supplementary, are called linear pair of angles.



Draw a line AB and mark a point O on it.

When we draw any angle ∠AOC, we also get another angle ∠BOC.

Bisect ∠AOC by a compass and a ruler and get the ray OX.

Similarly, bisect ∠BOC and get the ray OY.

Now,

∠XOY = ∠XOC + ∠COY

= 1/2 ∠AOC + 12 ∠BOC

= 1/2(∠AOC + ∠BOC)

= 1/2 x 180° = 90° (As ∠AOC and ∠BOC are supplementary angles)

Question: 6

Draw a pair of vertically opposite angles. Bisect each of the two angles. Verify that the bisecting rays are in the same line.

Solution:

Draw two lines AB and CD intersecting each other at O.

We know that the vertically opposite angles are equal.

Therefore, ∠BOC = ∠AOD and

∠AOC = ∠BOD.

We bisect angle AOC and draw the bisecting ray as OX.

Similarly, we bisect angle BOD and draw the bisecting ray as OY.

Now, ∠XOA + ∠AOD + ∠DOY

= 1/2 ∠AOC + ∠AOD + 1/2 ∠BOD

= 1/2 ∠BOD + ∠AOD + 1/2 ∠BOD

[As, ∠AOC = ∠BOD]

= ∠AOD + ∠BOD

Since, AB is a line.

Therefore, ∠AOD and ∠BOD are supplementary angles and the sum of these two angles will be 180°.

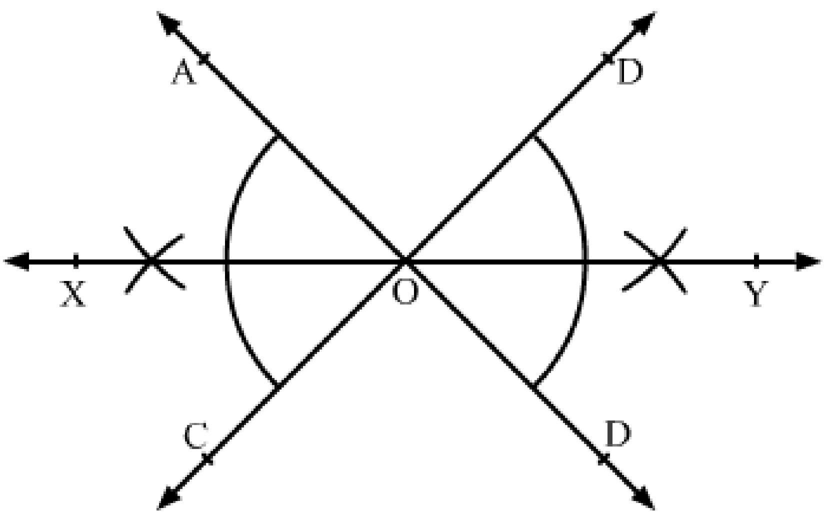
Therefore, ∠XOA + ∠AOD + ∠DOY = 180°

We know that the angles on one side of a straight line will always add to 180°.

Also, the sum of the angles is 180°.

Therefore, XY is a straight line.

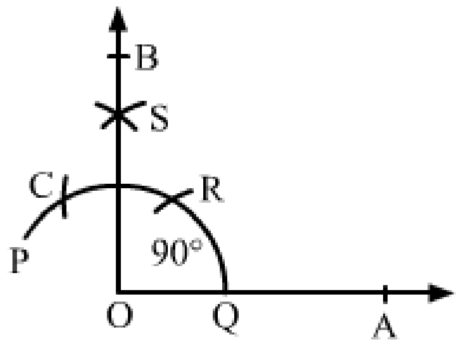
Thus, OX and OY are in the same line.



Question: 7

Using ruler and compass only, draw a right angle.

Solution:



Draw a ray OA.

With a convenient radius and centre at O, draw an arc PQ with the help of a compass intersecting the ray OA at P.

With the same radius and centre at P, draw another arc intersecting the arc PQ at R.

With the same radius and centre at R, draw an arc cutting the arc PQ at C, opposite P.

Taking C and R as the centre, draw two arcs of radius more than half of CR that intersect each other at S.

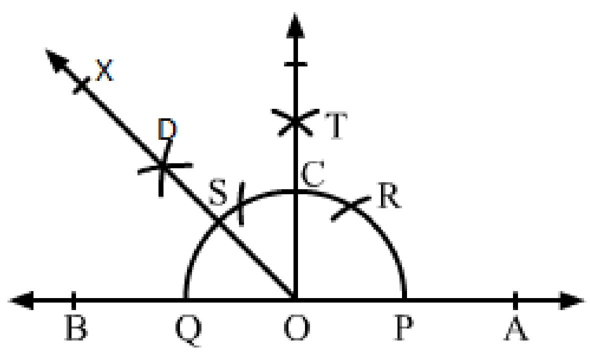
Join O and S and extend the line to B.

$\angle AOB$ is the required angle of 90°.

Question: 8

Using ruler and compass only, draw an angle of measure 135°.

Solution:



We draw a line AB and mark a point O on it.

With a convenient radius and centre at O, draw an arc PQ with the help of a compass intersecting the line AB at P and Q.

With the same radius and centre at P, draw another arc intersecting the arc PQ at R.

With the same radius and centre at Q, draw one more arc intersecting the arc PQ at S, opposite to P.

Taking S and R as centres and radius more than half of SR, draw two arcs intersecting each other at T.

Join O and T intersecting the arc PQ at C.

Taking C and Q as centres and radius more than half of CQ, draw two arcs intersecting each other at D.

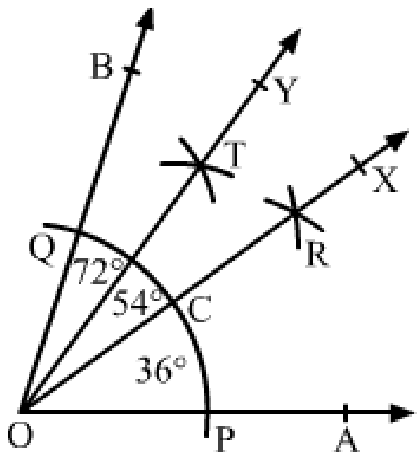
Join O and D and extend it to X to form the ray OX.

∠AOX is the required angle of measure 135°.

Question: 9

Using a protractor, draw an angle of measure 72°. With this angle as given, draw angles of measure 36° and 54°.

Solution:



Draw a ray OA.

With the help of a protractor, draw an angle ∠AOB of 72°.

With a convenient radius and centre at O, draw an arc cutting sides OA and OB at P and Q, respectively.

With P and Q as centres and radius more than half of PQ, draw two arcs cutting each other at R.

Join O and R and extend it to X.

OR intersects arc PQ at C.

With C and Q as centres and radius more than half of CQ, draw two arcs cutting each other at T.

Join O and T and extend it to Y.

Now, OX bisects $\angle AOB$

Therefore, $\angle AOX = \angle BOX = 72/2 = 36°$

Again, OY bisects $\angle BOX$

Therefore, $\angle XOY = \angle BOY = 36/2 = 18°$

Therefore, $\angle AOX$ is the required angle of 36° and $\angle AOY = \angle AOX + \angle XOY = 36° + 18° = 54°$

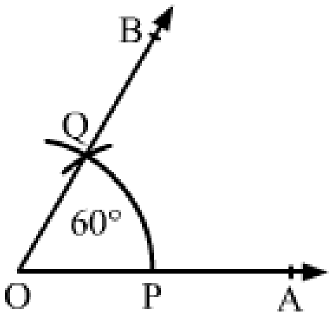
Therefore, $\angle AOY$ is the required angle of 54°.

Exercise 19.6

Question: 1

Construct an angle of 60° with the help of compasses and bisect it by paper folding.

Solution:

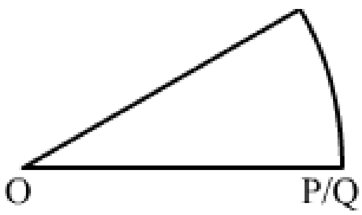


Draw a ray OA.

With convenient radius and centre O, draw an arc cutting the ray OA at P.

With the same radius and centre at P, draw another arc cutting the previous arc at Q.

Draw OQ and extend it to B.



∠AOB is the required angle of 60°.

We cut the part of paper as sector OPQ.

Now, fold the part of paper such that line segments OP and OQ get coincided.

Angle made at point O is the required angle, which is half of angle ∠AOB.

Question: 2

Construct the following angles with the help of ruler and compasses only.

(i) 30°

(ii) 90°

(iii) 45°

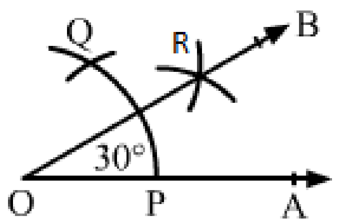
(iv) 135°

(v) 150°

(vi) 105°

Solution:

(i) 30°



Draw a ray OA.

With a convenient radius and centre at O, draw an arc, which cuts OA at P.

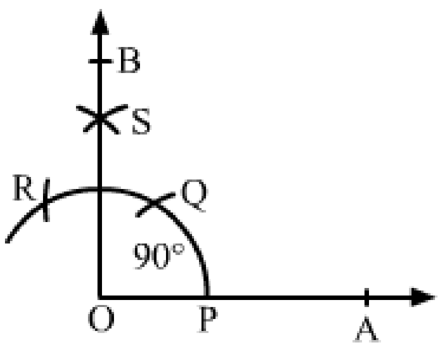
With the same radius and centre at P, draw an arc cutting the previous arc at P.

Taking P and Q as centres and radius more than half of PQ, draw two arcs, which cuts each other at R.

Draw OR and extend it to B.

∠AOB is the required angle of 30°.

(ii) 90°



Draw a ray OA.

With a convenient radius and centre at O, draw an arc cutting the ray OA at P.

With the same radius and centre at P, draw another arc, which cuts the first arc at Q.

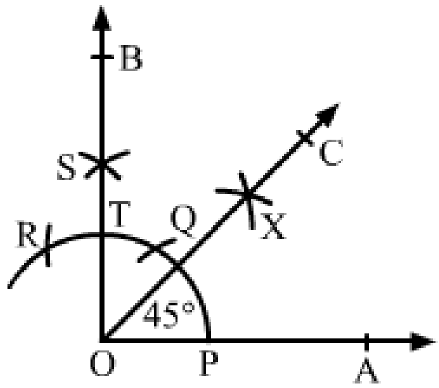
With the same radius and centre at Q, draw another arc, which cuts the first arc at R.

With Q and R as centres and radius more than half of QR, which cuts each other at S.

Draw OS and extend it to B from the ray OB.

∠AOB is required angle of 90°.

(iii) 45°



To construct an angle of 45°, construct an angle of 90^0 and bisect it.

Construct the angle ∠AOB = 90°, where rays OA and OB intersect the arc at points P and T as shown in figure.

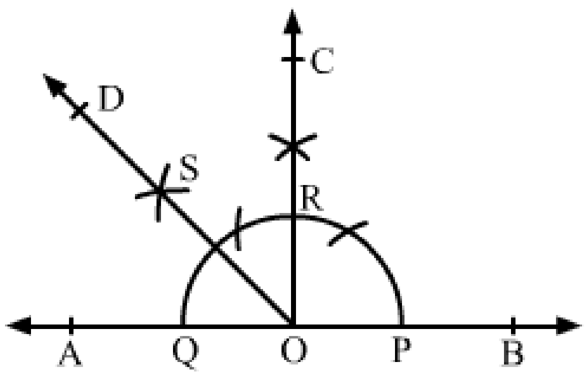
With P and T as centres and radius more than half of PT, draw two arcs, which cut each other at X

Draw OX and extend it to C to form the ray OC.

∠AOC is the required angle of 45°.

(iv) 135°

Draw the line AB and take the point O at the middle of AB.



With a convenient radius and centre at O, draw an arc, which cuts AB at P and Q, respectively.

Draw an angle of 90° on the ray OB as ∠BOC = 90°, where ray OC cuts the arc at R.

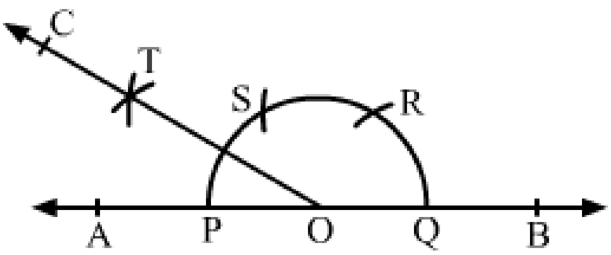
With Q and R as centres and radius more than half of QR, draw two arcs, which cuts each other at S.

Draw OS and extend it to form the ray OD.

∠BOD is required angle of 135°.

(v) 150°

Draw a line AB and take point O at the middle of AB.



With a convenient radius and centre at O, draw an arc, which cuts the line AB at P and Q.

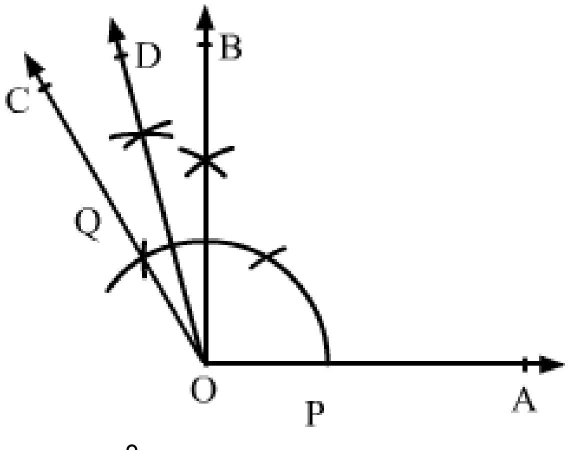
With the same radius and centre at Q, draw an arc, which cuts the first arc at R.

With the same radius and centre at R, draw an arc, which cuts the first arc at S.

With the centres P and S and radius more than half of PS, draw two arcs, which cut each other at T.

Draw OT and extend it to C to form the ray OC.

∠BOC is required angle of 150°.



(vi) 105°

Draw a ray OA and make an angle ∠AOB = 90° and ∠AOC = 120°

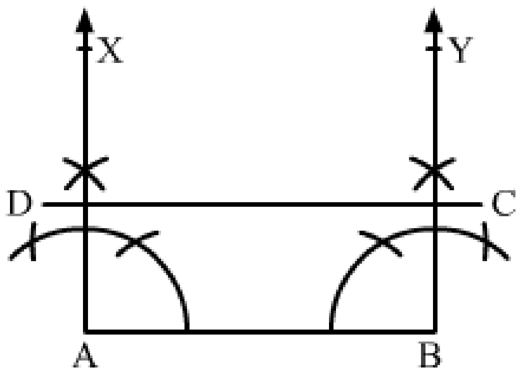
Now bisect ∠BOC and get the ray OD.

∠AOD is the required angle of 105°

Question: 3

Construct a rectangle whose adjacent sides are 8 cm and 3 cm.

Solution:



Draw a line segment AB of length 8 cm.

Construct ∠BAX = 90° at point A and ∠ABY = 90° at point B.

Using a compass and ruler, mark a point D on the ray AX such that AD = 3 cm.

Similarly mark the point C on the ray Y such that BC = 3 cm.

Draw the line segment CD.

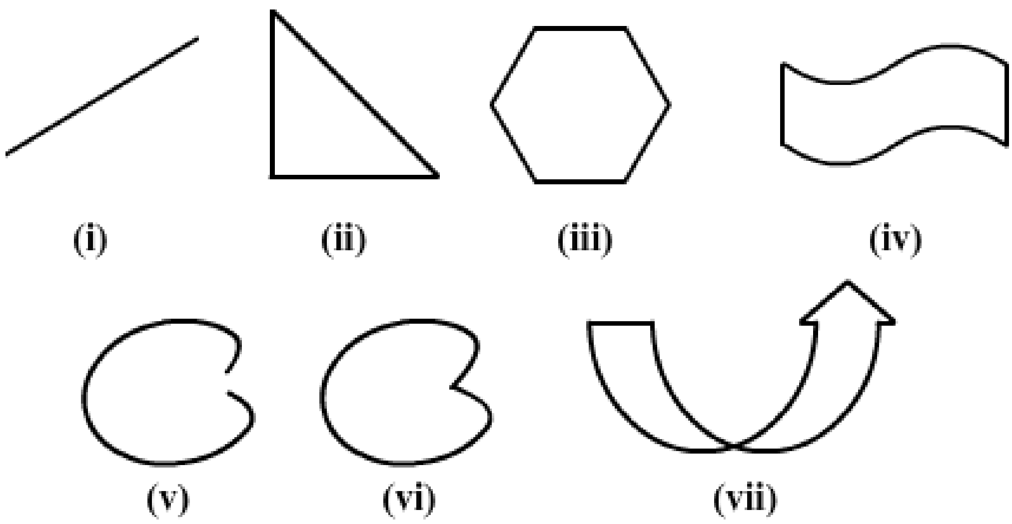
ABCD is the required rectangle.

Mensuration

Exercise 20.1

Question: 1

Which of the following are closed curves? Which of them are simple?



Solution:

Figure (ii), (iii), (iv), (vi), and (vii) are closed curves, whereas Figure (ii), (iii), (iv) and (vi) are simple closed curves.

Question: 2

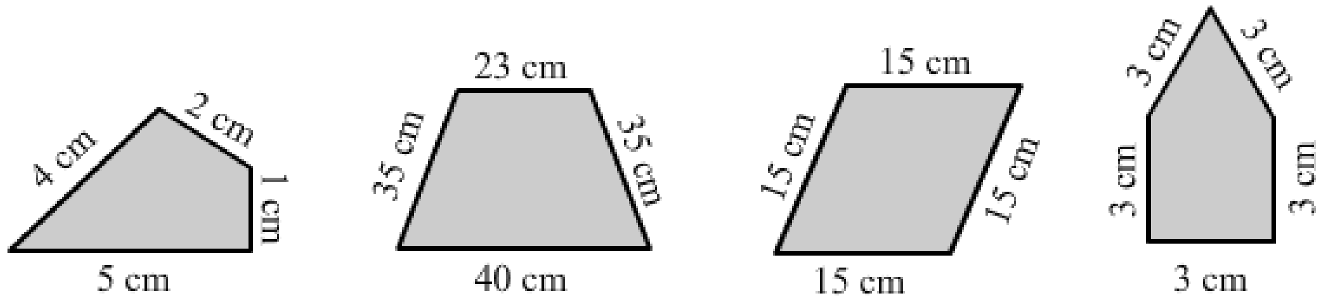
Define perimeter of a closed figure.

Solution:

The length of the boundary of a closed figure is known as its permieter.

Question: 3

Find the perimeter of each of the following shapes:



Solution:

Perimeter = Sum of lengths of all sides os a closed figure

(i) Perimeter = (4 + 2 + 1 + 5) cm = 12 cm

(ii) Perimeter = (23 + 35 + 40 + 35) cm = 133 cm

(iii) Perimeter = (15 + 15 + 15 + 15) cm = 60 cm

(iv) Perimeter = (3 + 3 + 3 + 3 + 3) cm = 15 cm

Exercise 20.2

Question: 1

Find the perimeter of the rectangle whose lengths and breadths are given below:

(i) 7 cm, 5 cm

(ii) 5 cm, 4 cm

(iii) 7.5 cm, 4.5 cm

Solution:

(i) Perimeter of a rectangle = $2 \times$ (Length + Breadth)

Since, Length = 7 cm, Breadth = 5 cm

Therefore, Perimeter = $2 \times (7 + 5) = 2 \times (12) = 24$ cm

(ii) Perimeter of a rectangle = $2 \times$ (Length + Breadth)

Since, Length = 5 cm, Breadth = 4 cm

Therefore, Perimeter = $2 \times (5 + 4) = 2 \times (9) = 18$ cm

(iii) Perimeter of a rectangle = $2 \times$ (Length + Breadth)

Since, Length = 7.5 cm, Breadth = 4.5 cm

Therefore, Perimeter = $2 \times (7.5 + 4.5) = 2 \times (12) = 24$ cm

Question: 2

Find the perimeter of the squares whose sides are given below:

(i) 10 cm

(ii) 5 m

(iii) 115.5 cm

Solution:

Perimeter of a square = $4 \times$ (Length of one side)

(i) Length of one side = 10 cm

Perimeter = $4 \times 10 = 40$ cm

(ii) Length of one side = 5 m

Perimeter = 4 × 5 = 20 m

(iii) Length of one side = 115.5 cm

Perimeter = 4 × 115.5 = 462 cm

Question: 3

Find the side of the square whose perimeter is:

(i) 16 m

(ii) 40 cm

(iii) 22 cm

Solution:

Side of a square = Perimeter 4

(i) Perimeter = 16 m

Side of this square = 16/4 = 4 m

(ii) Perimeter = 40 cm

Side of this square = 40/4 = 10 cm

(iii) Perimeter = 22 cm

Side of this square = 22/4 = 5. 5 cm

Question: 4

Find the breadth of the rectangle whose perimeter is 360 cm and whose length is

(i) 116 cm

(ii) 140 cm

(iii) 102 cm

Solution:

Perimeter of a rectangle = 2 (Length + Breadth)

Therefore, Breadth of the rectangle = Perimeter/2 – Length

(i) Perimeter = 360 cm

Length = 116 cm

Breadth = 360/2 – 116

= 180 – 116 = 64 cm

(ii) Perimeter = 360 cm

Length = 140 cm

Breadth = 360/2 – 140

= 180 -140 = 40 cm

(iii) Perimeter = 360 cm

Length = 10/2 cm

Breadth = 360/2 – 102 = 180 – 102 = 78 cm

Question: 5

A rectangular piece of lawn is 55 m wide and 98 m long. Find the length of the fence around it.

Solution:

Length of the lawn = 98 m

Breadth of the lawn = 55 m

Length of the fence around the lawn = Perimeter of the lawn = 2 × (Length + Breadth)

Perimeter of the lawn = 2 × (98 + 55) m = 2 × (153) = 306 m

Thus, the length of the fence around the lawn = 306 m

Question: 6

The side of a square field is 65m. What is the length of the fence required all around it?

Solution:

Side of the square field = 65 m

Length of the fence around the square field = Perimeter of the square field = 4 × (Side of the square)

Perimeter of the square field = 4 × 65 = 260 m

Thus, the length of the fence around the square filed = 260 m

Question: 7

Two sides of a triangle are 15 cm and 20 cm. The perimeter of the triangles is 50 cm. What is the third side?

Solution:

Given: Perimeter = 50 cm

Length of the first side = 15 cm

Length of the second side = 20 cm

We have to find the length of the third side.

Perimeter of a triangle = Sum of all three sides of the triangle

Length of the third side = (Perimeter of the triangle) – (Sum of the length of the other two sides)

= 50 – (15 + 20)

= 50 – 35 = 15 cm

Question: 8

A wire of length 20 m is to be folded in the form of a rectangle. How many rectangles can be formed by folding the wire if the sides are positive integers in metres?

Solution:

It is given that a wire of length 20 m is to be folded in the form of a rectangle;

Therefore, we have: Perimeter of the rectangle = 20 m

⟹ 2 (Length + Breadth) = 20 m

⟹ (Length + Breadth) = 20/2 = 10 m

Since, length and breadth are positive integers in metres, therefore, the possible dimensions are: (1m, 9m), (2m, 8m), (3m, 7m), (4m, 6m) and (5m, 5m)

Thus, five rectangles can be formed with the given wire.

Question: 9

A square piece of land has each side equal to 100 m. If 3 layers of metal wire have to be used to fence it, what is the length of the wire?

Solution:

Side of the square field = 100 m

Wire required to fence the square field = Perimeter of the square field = 4 × Side of the square field Perimeter = 4 × 100 = 400 m

This perimeter is the length of wire required to fence one layer.

Therefore, the length of wire required to fence three layers = 3 × 400 m = 1200 m

Question: 10

Shikha runs around a square of side 75 m. Priya runs around a rectangle with length 60 m and breadth 45 m. Who covers the smaller distance?

Solution:

Shikha and Priya, while running around the square and rectangular field respectively, actually cover a distance equal to the perimeters of these fields.

Distance covered by Shikha = Perimeter of the square = 4 × 75 m = 300 m

Similarly, distance covered by Priya = Perimeter of the rectangle = 2 × (60 + 45)

= 2 × 105 = 210 m

Thus, it is evident that the distance covered by Priya is less than that covered by Shikha.

Question: 11

The dimensions of a photographs are 30 cm X 20 cm. What length of wooden frame is needed to frame the picture?

Solution:

Dimensions of the photograph = 30 cm x 20 cm

So, the required length of wooden frame = Perimeter of the photograph

= 2 (Length + Breadth)

= 2 × (30 + 20) cm = 2 × 50 cm

= 100 cm

Question: 12

The length of a rectangular field is 100 m. If its perimeter is 300 m, what is its breadth?

Solution:

Length of the rectangular field = 100 m

Perimeter of the rectangular field = 300 m

Perimeter of a rectangle = 2 (Length + Breadth)

Applying the above formula, we get:

Breadth of the rectangular field = Perimeter/2 – Length

= 300/2 – 100

= 150 – 100 = 50 m

Question: 13

To fix fence wires in a garden. 70 m long and 50 m wide, Arvind bought metal pipes for posts. He fixed a post every 5 metres apart; each post was 2 m long. What is total length og the pipers he bought for the posts?

Solution:

Length of the garden = 70 m

Breadth of the garden = 50 m

Perimeter of the garden = 2 × (Length + Breadth)

= 2 × (70 + 50)

= 2 × 120 = 240 m

On the perimeter of the garden, it is given that Arvind fixes a post every 5 metres apart.

So, the number of posts required =240/5 = 48

Since, Length of each post = 2 m

Therefore, Total length of the pipe required = 48 × 2 = 96 m

Question: 14

Find the cost of fencing a rectangular park of length 175 m and breadth 125 m at the rate of Rs 12 per meter.

Solution:

Length of the park = 175 m

Breadth of the park = 125 m

Perimeter of the park = 2 × (Length + Breadth)

= 2 × (175 + 125)

= 2 × 300 = 600 m

Rate of fencing = Rs. 12 per meter

Cost of fencing = Rs. 12 × 600 = Rs. 7,200

Question: 15

The perimeter of a rectangular pentagon is 100 cm. How long is each side?

Solution:

A regular pentagon is a closed polygon having five sides of equal length.

Perimeter of the regular pentagon = 100 cm

Perimeter of the regular pentagon = 5 x Side of the regular pentagon

Therefore, side of the regular pentagon = Perimeter/5

= 100/5 = 20 cm

Question: 16

Find the perimeter of a regular hexagon with each side measuring 8 m.

Solution:

A regular hexagon is a closed polygon having six sides of equal lengths.

Side of the hexagon = 8 m

Perimeter of the hexagon = 6 × Side of the hexagon

= 6 × 8 = 48 m

Question: 17

A rectangular piece of land measure 0.7 km by 0.5 km. Each side is to be fenced with four rows of wires. What length of the wire is needed?

Solution:

Dimensions of the rectangular land = 0.7 km x 0.5 km

Perimeter of the rectangular land = 2 (Length + Breadth)

= 2 (0.7 + 0.5) km

= 2 × 1.2 km = 2.4 km

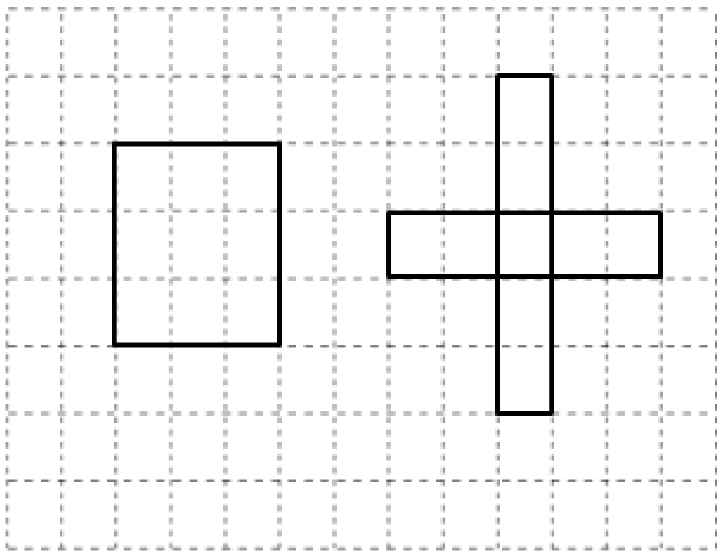
This perimeter is equal to one row of wire required to fence the land.

Therefore, length of wire required to fence the land with four rows of wire = 4 × 2.4 km

= 9.6 km

Question: 18

Avneet buys 9 square paving slabs, each with a side of ½ m. He lays them in the form of a square.



(i) What is the perimeter of his arrangement?

(ii) Shari does not like his arrangement. She gets him to lay them out like a cross. What is the perimeter of her arrangement?

(iii) Avneet wonders, if there is a way of getting an even greater perimeter. Can you find a way of doing this? (The paving slabs must meet along complete edges they cannot be broken)

Solution:

(i) Length of the side of one slab = 1/2 m

In the square arrangement, one side of the square is formed by three slabs.

So, length of the side of the square = 3 × 1/2 = 3/2 m

The perimeter of the square arrangement = 4 × 3/2 = 6 m

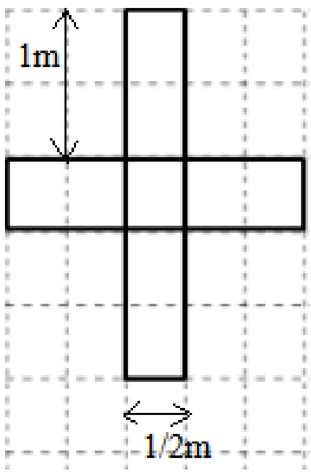
(ii) The cross arrangement consists of 8 sides.

These sides form the periphery of the arrangement and measure 1 m each.

Also, this arrangement consists of other 4 sides that measure 1/2 m each.

So, the perimeter of the cross arrangement = (1 + 1/2 + 1 + 1 + 1/2 + 1 + 1 + 1/2 + 1 + 1 + 1/2 + 1)

= (8 + 2) = 10 m



(iii) Perimeter of the cross arrangement = 10 m

Perimeter of the square arrangement = 6 m

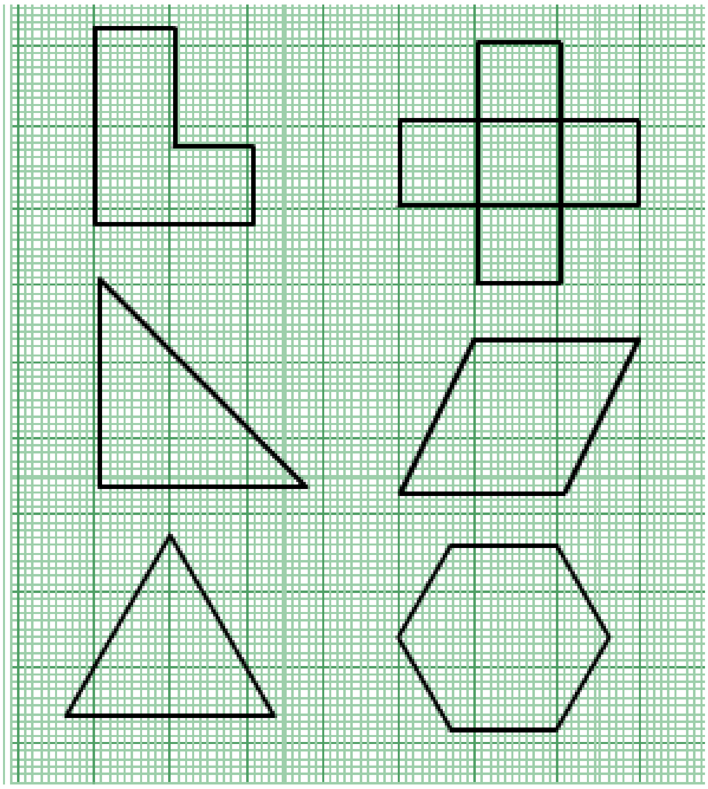
Thus, the perimeter of the cross arrangement is more than that of the square arrangement.

(iv) No, there is no way of arranging these slabs where the perimeter is more than 10 m.

Exercise 20.3

Question: 1

The following figures are drawn on a squared paper. Count the number of squares enclosed by each figure and find its area, taking the area of each square as 1 cm^2.



Solution:

(i) There are 16 complete squares in the given shape.

Since, Area of one square = 1 cm^2

Therefore, Area of this shape = 16 × 1 = 16 cm^2

(ii) There are 36 complete squares in the given shape.

Since, Area of one square = 1 cm^2

Therefore, Area of 36 squares = 36 × 1 = 36 cm^2

(iii) There are 15 complete and 6 half squares in the given shape.

Since, Area of one square = 1 cm^2

Therefore, Area of this shape = (15 + 6 × 12) = 18 cm^2

(iv) There are 20 complete and 8 half squares in the given shape.

Since, Area of one square = 1 cm^2

Therefore, Area of this shape = $(20 + 8 \times 12) = 24\ cm^2$

(v) There are 13 complete squares, 8 more than half squares and 7 less than half squares in the given shape.

Area of one square = 1 cm^2

Area of this shape = $(13 + 8 \times 1) = 21\ cm^2$

(vi) There are 8 complete squares, 6 more than half squares and 4 less than half squares in the given shape.

Area of one square = 1 cm^2

Area of this shape = $(8 + 6 \times 1) = 14\ cm^2$

Question: 2

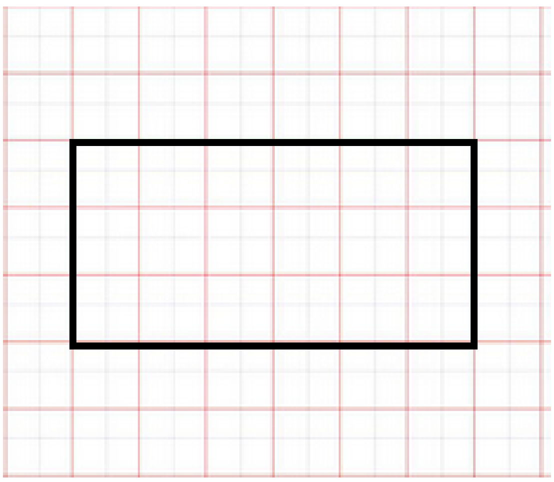
On a squared paper, draw (i) a rectangle, (ii) a triangle, (iii) any irregular closed figure, Find approximate area of each by counting the number of squares complete, more than half and exactly half.

Solution:

(i) A rectangle: This contains 18 complete squares.

If we assume that the area of one complete square is 1 cm^2,

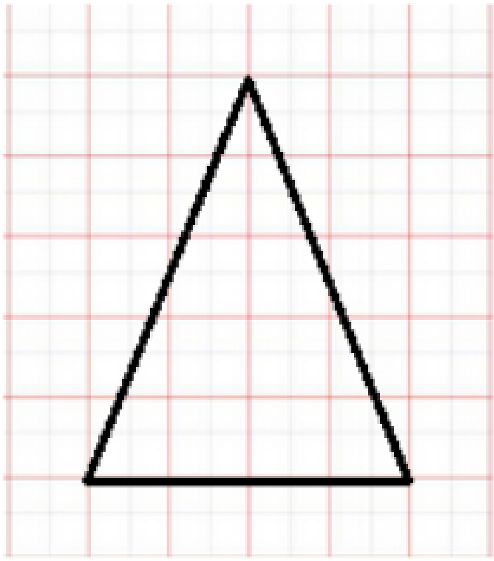
Then the area o this rectangle will be 18 cm^2.



(ii) A triangle: This triangle contains 4 complete squares, 6 more than half squares and 6 less than half squares.

If we assume that the area of one complete square is 1 cm^2,

Then the area of this shape = (4 + 6 x 1) = 10 cm^2



(iii) Any irregular figure: This figure consists of 10 complete squares, 1 exactly half square, 7 more than half squares and 6 less than half squares.

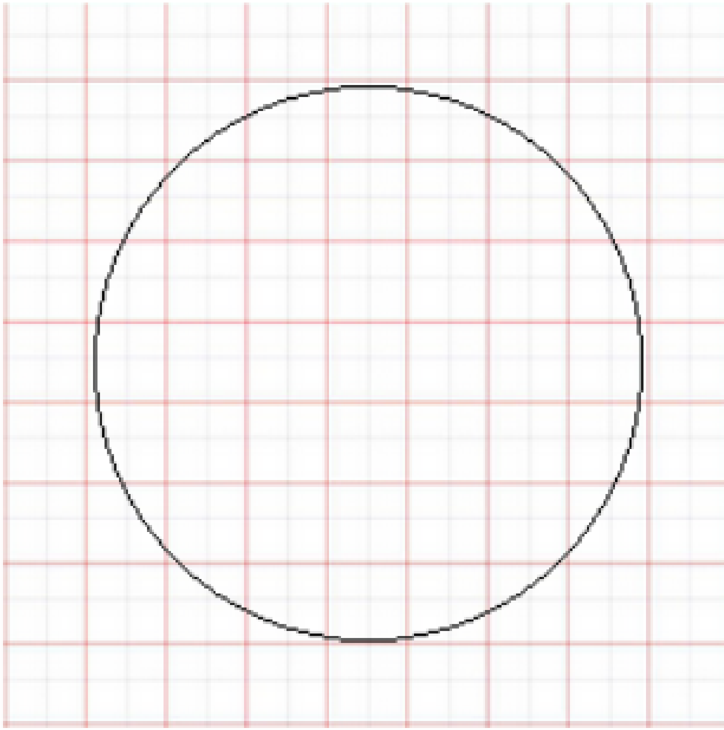
If we assume that the area of one complete square is 1 cm^2,

Then the area of this shape = (10 + 1 x12 + 7 x 1) = 17.5 cm^2

Question: 3

Draw any circle on the graph paper, Count the squares and use them to estimate the area the area of the circular region.

Solution:



This circle on the squared paper consists of 21 complete squares, 15 more than half squares and 8 less than half squares.

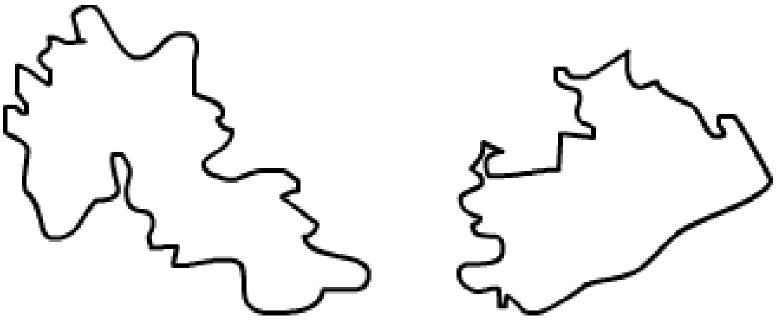
Let us assume that the area of 1 square is 1 cm^2.

If we neglect the less than half squares while approximating more than half square as equal to a complete square, we get:

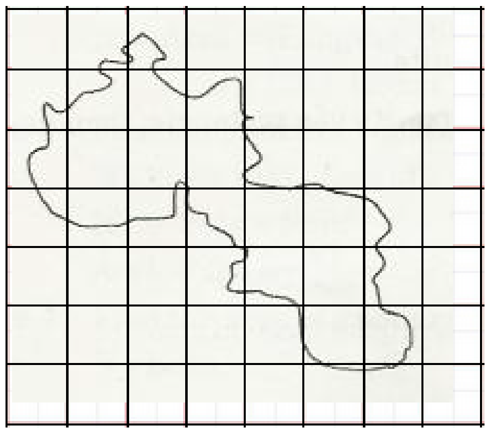
Area of this shape = (21 + 15) = 36 cm^2

Question: 4

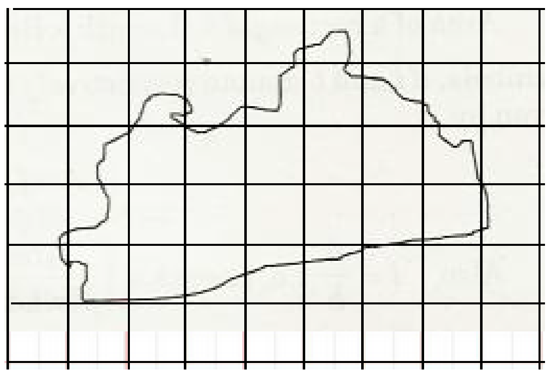
Using tracing paper and centimeter graph paper to compare the areas of the following pairs of figures:



Solution:



(i)



(ii)

Using tracing paper, we traced both the figures on a graph paper.

This figure contains 4 complete squares, 9 more than half squares and 9 less than half squares. Let us assume that the area of one square is 1 cm^2

If we neglect the less than half squares and consider the area of more than half squares as equal to area of complete square, we get:

Area of this shape = (4 + 9) = 13 cm^2

This figure contains 8 complete squares, 11 more than half squares and 10 less than half squares.

Let us assume that the area of one square is 1 cm^2.

If we neglect the less than half squares and consider the area of more than half squares as equal to area of complete square, we get:

Area of this shape = (8 + 11) = 19 cm^2

On comparing the areas of these two shapes, we get that the area of Fig. (ii) is more than that of Fig. (i).

Exercise 20.4

Question: 1

Question 1. Find the area of a rectangle, whose

(i) Length = 6cm, breadth = 3 cm

(ii) Length = 8 cm, breadth = 3 cm

(iii) Length = 4.5 cm, breadth = 2 cm

Solution:

(i) Area of a rectangle = Length × Breadth

Length = 6 cm Breadth = 3 cm

Area of rectangle = 6 × 3 = 18 cm^2

(ii) Area of a rectangle = Length × Breadth

Length = 8 cm Breadth = 3 cm

Area of rectangle = 8 × 3 = 24 cm^2

(iii) Area of a rectangle = Length × Breadth

Length = 4.5 cm

Breadth = 2 cm

Area of rectangle = 4.5 × 2 = 9 cm^2

Question: 2

Find the area of a square whose side is:

(i) 5 cm

(ii) 4.1 cm

(iii) 5.5 cm

(iv) 2.6 cm

Solution:

Area of a square = Side × Side

(i) Side of the square = 5 cm

Area of the square = 5 × 5 = 25 cm^2

(ii) Side of the square = 4.1 cm

Area of the square = 4.1 × 4.1 = 16.81 cm^2

(iii) Side of the square = 5.5 cm

Area of the square = 5.5 × 5.5 = 30.25 cm^2

(iv) Side of the square = 2.6 cm

Area of the square = 2.6 × 2.6 = 6.76 cm^2

Question: 3

The area of a rectangle is 49 cm^2 and its breadth is 2.8 cm. Find the length of the rectangle.

Solution:

Area = 49 cm^2 Breadth = 2.8 cm

Area of the rectangle = Length × Breadth

Therefore, Length = Area/Breadth

= 49/2.8 = 17.5 cm

Question: 4

The side of a square is 70 cm. Find its area and perimeter.

Solution:

Side of the square = 70 cm

Area of the square = Side × Side = 70 × 70 = 4900 cm^2

Perimeter of the square = 4 × Side

= 4 × 70 = 280 cm

Question: 5

The area of a rectangle is 225 cm^2 and its one side is 25 cm, find its other side.

Solution:

Area = 225 cm^2

One of the sides = 25 cm

Area of the rectangle = Product of the lengths of its two side

Other side = Area/Side = 225/25 = 9 cm

Question: 6

What will happen to the area of a rectangle if its

(i) Length and breadth are trebled (ii) Length is doubled and breadth is same

(iii) Length is doubled

Solution:

(i) If the length and breadth of a rectangle are trebled.

Let the initial length and breadth be l and b, respectively.

Original area = l × b = lb

Now,

the length and breadth are trebled which means they become three times of their original value.

Therefore New length = 3l

New breadth = 3b

New area = 3l × 3b = 9lb

Thus, the area of the rectangle will become 9 times that of its original area.

(ii) If the length is doubled and the breadth is same.

Let the initial length and breadth be l and b, respectively.

Original area = l × b = lb

Now, length is doubled and breadth remains same.

Therefore New length = 2l

New breadth = b

New area = 2l × b = 2 lb

Thus, the area of the rectangle will become 2 times that of its original area.

(iii) If the Length is doubled and breadth is halved.

Let the initial length and breadth be land b, respectively.

Original area =l × b = lb

Now, length is doubled and breadth is halved.

Therefore New length = 2l

New breadth = b/2

New area = 2 l × b / 2 = lb

New area is also lb.

This means that the areas remain the same.

Question: 7

What will happen to the area of a square if its side is :

(i) Tripled

(ii) increased by half of it

Solution:

(i) Let the original side of the square be s.

Original area = s x s = s^2

If the side of a square is tripled, new side will be equal to 3s.

New area = 3s × 3s = $9s^2$

This means that the area becomes 9 times that of the original area.

(ii) Let the original side of the square be s.

Original area = s × s = s^2

If the side of a square is increased by half of it, new side $= \left(s + \frac{1}{2}s\right) = \frac{3}{2}s$

$$\text{New area} = \frac{3}{2}s \times \frac{3}{2}s = \frac{9}{4}s$$

This means that the area becomes 9/4 times that of the original area.

Question: 8

Find the perimeter of a rectangle whose area is 500 cm^2 and breadth is 20 cm.

Solution:

Area = 500 cm^2

Breadth = 20 cm

Area of rectangle = Length × Breadth

Therefore Length = Area/Breadth

= 500/20 = 25 cm

Perimeter of a rectangle = 2 (Length + Breadth)

= 2(25 + 20) cm = 2 × 45 cm = 90 cm

Question: 9

A rectangle has the area equal to that of a square of side 80 cm. If the breadth of the rectangle is 20 cm, Find its length.

Solution:

Side of the square = 80 cm

Area of square = Side × Side = 80 × 80 = 6400 cm^2

Given that:

Area of the rectangle = Area of the square = 6400 cm^2

Breadth of the rectangle = 20 cm

Applying the formula:

Length of the rectangle = Area/Breadth

We get:

Length of the rectangle = 6400/20 = 320 cm

Question: 10

Area of a rectangle of breadth 17 cm is 340 cm^2. Find the perimeter of the rectangle.

Solution:

Area of the rectangle = 340 cm^2

Breadth of the rectangle = 17 cm

Applying the formula:

Length of a rectangle = Area / Breadth

We get:

Length of the rectangle = 340/17 = 20 cm

Perimeter of rectangle = 2 (Length + Breadth)

= 2 (20 + 17)

= 2 × 37

= 74 cm

Question: 11

A marble tile measures 15 cm × 20cm. How many tiles will be required to cover a wall of size 4m × 6m?

Solution:

Dimensions of the tile = 15 cm × 20 cm

Dimensions of the wall = 4 m × 6 m = 400 cm × 600 cm (Since, 1 m = 100 cm)

Area of the tile = 15 cm × 20 cm = 300 cm^2

Area of the wall = 400 cm × 600 cm = 2, 40, 000 cm^2

$$\text{Number of tiles required to cover the wall} = \frac{\text{Area of wall}}{\text{Area of onetile}}$$

$$= \frac{240000}{300} = 800 \text{ tiles}$$

Question: 12

A marble tile measures 10 cm × 12 cm. How many tiles will be required to cover a wall of size 3m × 4m? Also, find the total cost of the tiles at the rate of Rs 2 *per tile.*

Solution:

Dimension of the tile = 10 cm × 12 cm

Dimension of the wall =3 m × 4 m = 300 cm × 400 cm (Since, 1 m = 100 cm)

Area of the tile = 10 cm × 12 cm = 120 cm^2

Area of the wall = 300 cm × 400 cm = 1, 20, 000 cm^2

Number of tiles required to cover the wall = Area of wall / Area of one tile

= 120000/120 = 1,000 tiles

Cost of tiles at the rate of Rs. 2 per tile = 2 × 1,000 = Rs. 2,000

Question: 13

One tile of a square plot is 250 m, find the cost of leveling it at the rate of Rs 2 per square meter.

Solution:

Side of the square plot = 250 m

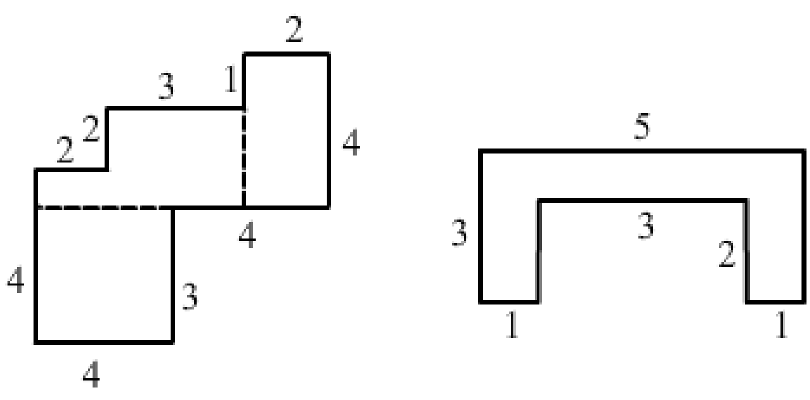
Area of the square plot = Side × Side = 250 × 250 = 62,500 m^2

Rate of leveling the plot = Rs. 2 per m^2

Cost of leveling the square plot = Rs. 62,500 × 2 = Rs. 1, 25, 000

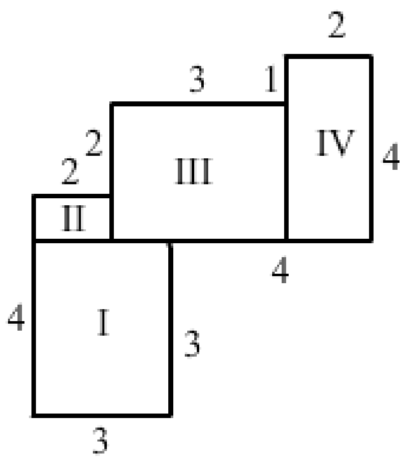
Question: 14

The following figures have been split into rectangles. Find the areas. (The measures are given in centimeters)



(i) (ii)

Solution:



(i) This figure consists of two rectangles II and IV and two squares I and III.

Area of square I = Side × Side = 3 × 3 = 9 cm=2

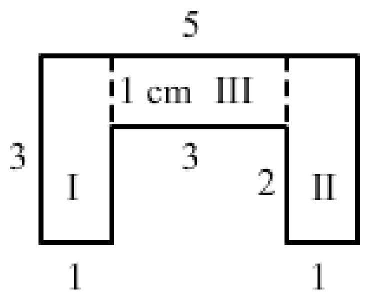
Similarity, area of rectangle II = (2 × 1) = 2 cm^2

Area of square III = (3 × 3) = 9 cm^2

Area of rectangle IV = (2 × 4) = 8 cm^2

Thus, the total area of this figure = (Area of square I + Area of rectangle II + Area of square III + Area of rectangle IV) = 9 + 2 + 9 + 8 = 28 cm^2

(ii) This figure consists of three rectangles I, II and Ill.



Area of rectangle I = Length × Breadth = 3 × 1 = 3 cm^2

Similarly, area of rectangle II = (3 × 1) = 3 cm^2

Area of rectangle III = (3 × 1) = 3 cm^2

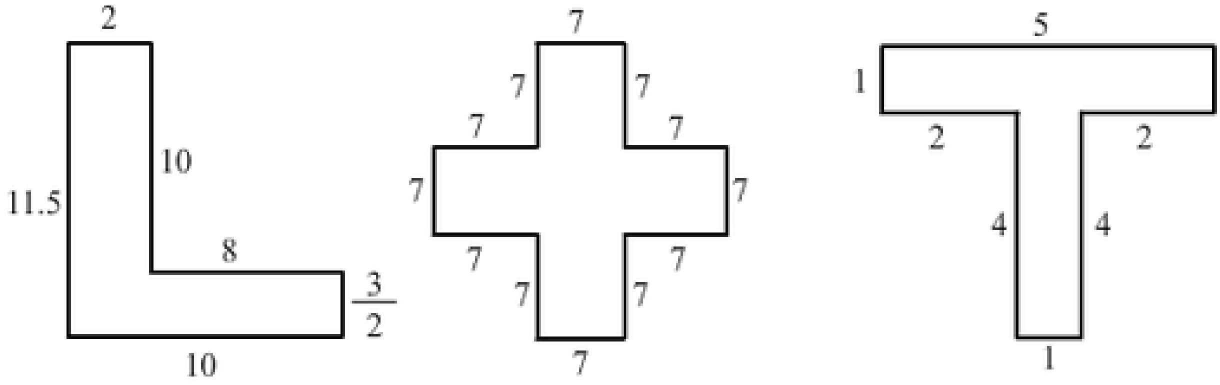
Thus,

the total area of this figure = (Area of rectangle I + area of rectangle II + area of rectangle III)

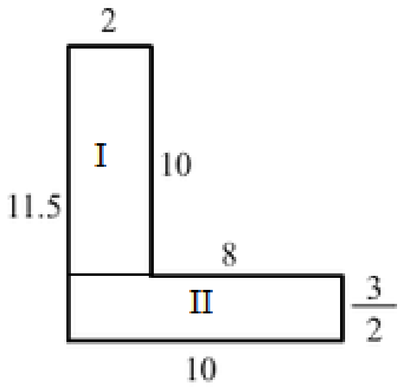
= 3 + 3 + 3 = 9 cm^2

Question: 15

Split the following shapes into rectangles and find the area of each. (The measures are given in centimeters)



(i) (ii) (iii)



(i)

Solution:

(i) This figure consists of two rectangles I and II.

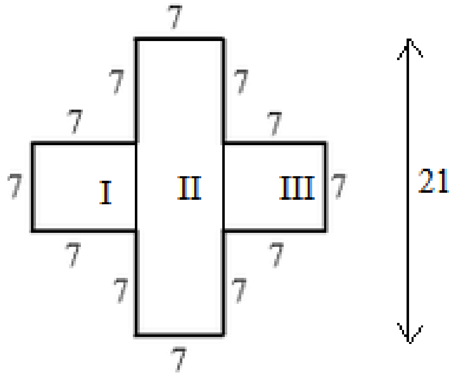
The area of rectangle I = Length × Breadth = 10 × 2 = 20 cm^2

Similarly, area of rectangle II = 10 × 32 = 15 cm^2

Thus, total area of this figure = (Area of rectangle I + Area of rectangle II) = 20 + 15 = 35 cm^2

(ii) This figure consists of two squares I and III and one rectangle II.

Area of square I = Area of square III = Side × Side = 7 × 7 = 49 cm^2



(ii)

Similarly, area of rectangle II = $(21 \times 7) = 147$ cm^2

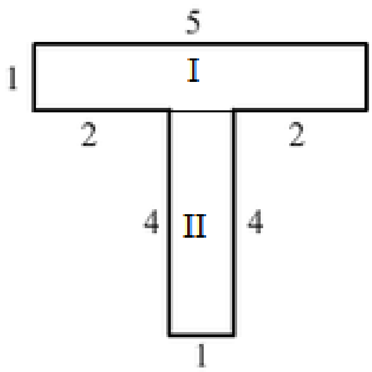
Thus, total area of this figure = (Area of square I + Area of rectangle II + Area of square III)

= 49 + 49 + 147 = 245 cm^2

(iii) This figure consists of two rectangles I and II.

Area of rectangle I = Length × Breadth = $5 \times 1 = 5$ cm^2

Similarly, area of rectangle II = $4 \times 1 = 4$ cm^2



(iii)

Thus, total area of this figure = (Area of rectangle I + Area of rectangle II) = 5 + 4 = 9 cm^2

Question: 16

How many tiles with dimension 5 cm and 12 cm will be needed to fit a region whose length and breadth are respectively?

(i) 100 cm and 144 cm

(ii) 70 cm and 36 cm

Solution:

(i) Dimension of the tile = 5 cm × 12 cm

Dimension of the region = 100 cm × 144 cm

Area of the tile = 5 cm × 12 cm = 60 cm^2

Area of the region = 100 cm × 144 cm = 14,400 cm^2

Number of tiles required to cover the region = Area of the region / Area of one tile

= 14400/60 = 240 tiles

(ii) Dimension of the tile = 5 cm × 12 cm

Dimension of the region = 70 cm × 36 cm

Area of the tile = 5 cm × 12 cm = 60 cm^2

Area of the region = 70 cm × 36 cm = 2,520 cm^2

Number of tiles required to cover the region = Area of the region / Area of one tile

= 2520/42 = 42 tiles

Exercise 20.5

Question: 1

The sides of a rectangle are in the ratio 5 : 4. If its perimeter is 72 cm, then its length is

(a) 40 cm

(b) 20 cm

(c) 30 cm

(d) 60 cm

Solution:

(b) 20 cm

Explanation:

Let the sides of the rectangle be 5x and 4x. (Since, they are in the ratio 5 : 4)

Now, perimeter of rectangle = 2 (Length + Breadth)

$72 = 2(5x + 4x)$

$72 = 2 \times 9x$

$72 = 18x$

$x = 4$

Thus, the length of the rectangle = $5x = 5 \times 4 = 20$ cm

Question: 2

The cost of fencing a rectangular field 34 m long and 18 m wide at As 2.25 per metre is

(a) Rs 243

(b) Rs 234

(c) Rs 240

(d) Rs 334

Solution:

(b) Rs. 234

Explanation:

For fencing the rectangular field, we need to find the perimeter of the rectangle.

Length of the rectangle = 34 m

Breadth of the rectangle = 18 m

Perimeter of the rectangle = 2 (Length + Breadth) = 2 (34 + 18) m = 2 × 52 m = 104 m

Cost of fencing the field at the rate of Rs. 2.25 per meter = Rs. 104 × 2.25 = Rs. 234

Question: 3

If the cost of fencing a rectangular field at Rs. 7.50 per metre is Rs. 600, and the length of the field is 24 m, then the breadth of the field is

(a) 8 m

(b) 18 m

(c) 24 m

(d) 16 m

Solution:

(d) 16 m

Explanation:

Cost of fencing the rectangular field = Rs. 600

Rate of fencing the field = Rs. 7.50 per m

Therefore, perimeter of the field = Cost of fencing / Rate of fencing = 600 / 7.50 = 80 m

Now, length of the field = 24 m

Therefore, breadth of the field = Perimeter/2 – Length = 80/2- 24 = 16 m

Question: 4

The cost of putting a fence around a square field at As 2.50 per metre is As 200. The length of each side of the field is

(a) 80 m

(b) 40 m

(c) 20 m

(d) None of these

Solution:

(c) 20 m

Explanation:

Cost of fencing the square field = Rs. 200

Rate of fencing the field = Rs. 2.50

Now, perimeter of the square field = Cost of fencing / Rate of fencing = 200/2.50 = 80 m

Perimeter of square = 4 × Side of the square

Therefore, side of the square = Perimeter/4 = 80/4 = 20 m

Question: 5

The length of a rectangle is three times of its width. If the length of the diagonal is $8\sqrt{10}$ m, then the perimeter of the rectangle is

(a) $15\sqrt{10}$ m

(b) $16\sqrt{10}$ m

(c) $24\sqrt{10}$ m

(d) 64 m

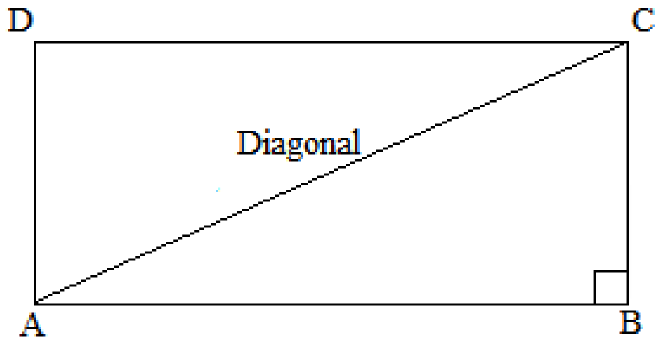
Solution:

(d) 64 m

Explanation:

Let us consider a rectangle ABCD.

Also, let us assume that the width of the rectangle, i.e., BC be x m.



It is given that the length is three times width of the rectangle.

Therefore, length of the rectangle, i.e., AB = 3x m

Now, AC is the diagonal of rectangle.

In right angled triangle ABC.

$AC^2 = AB^2 + BC^2$

$$\left(8\sqrt{10}\right)^2 = (3x)^2 + x^2$$

$640 = 9x^2 + x^2$

$640 = 10x^2$

$x^2 = 640/10 = 64$

x = 64 = 8 m

Thus, breadth of the rectangle = x = 8 m

Similarly, length of the rectangle = 3x = 3 × 8 = 24 m

Perimeter of the rectangle = 2 (Length + Breadth)

= 2 (24 + 8)

= 2 × 32 = 64 m

Question: 6

If a diagonal of a rectangle is thrice its smaller side, then its length and breadth are in the ratio

(a) 3:1

(b) √3:1

(c) √2:1

(d) 2√2:1

Solution:

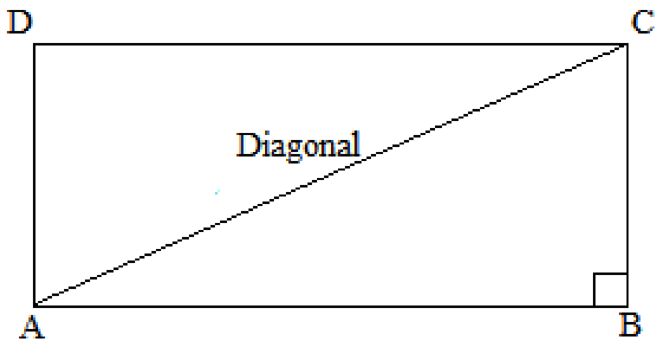
(d) 22 : 1

Explanation:

Let us assume that the length of the smaller side of the rectangle, i.e., BC be x and length of the larger side , i.e., AB be y.

It is given that the length of the diagonal is three times that of the smaller side.

Therefore, diagonal = 3x = AC



Now, applying Pythagoras theorem, we get:

$(\text{Diagonal})^2 = (\text{Smaller side})^2 + (\text{Larger side})^2$

$(AC)^2 = (AB)^2 + (BC)^2$

$(3x)^2 = (x)^2 + (y)^2$

$9x^2 = x^2 + y^2$

$8x^2 = y^2$

Now, taking square roots of both sides, we get:

22 x = y

or, y / x = 22 / 1

Thus, the ratio of the larger side to the smaller side = 22 : 1

Question: 7

The ratio of the areas of two squares, one having its diagonal double than the other, is

(a) 1 : 2

(b) 2:3

(c) 3 : 1

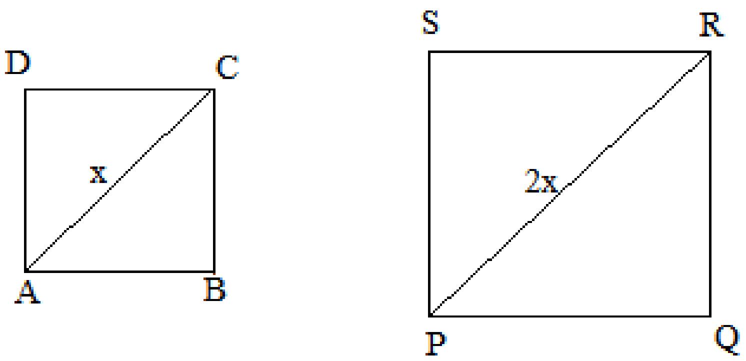
(d) 4 : 1

Solution:

(d) 4 : 1

Explanation:

Let the two squares be ABCD and PQRS. Further, the diagonal of square PQRS is twice the diagonal of square ABCD



PR = 2 AC

Now, area of the square = $(\text{diagonal})^2/2$

Area of PQRS = $(PR)^2)/2$

Similarly, area of ABCD = $(AC)^2/2$

According to the question:

If AC = x units, then, PR = 2x units

Therefore, $\frac{\text{Area of PQRS}}{\text{Area of ABCD}} = \frac{(PR)^2 \times 2}{2 \times (AC)^2} = \frac{(PR)^2}{(AC)^2} = \frac{(2x)^2}{(1x)^2} = \frac{4}{1} = 4 : 1$

Thus, the ratio of the areas of squares PQRS and ABCD = 4:1

Question: 8

If the ratio of areas of two squares is 225:256, then the ratio of their perimeters is

(a) 225 : 256

(b) 256 : 225

(c) 15:16

(d) 16 : 15

Solution:

(c) 15 : 16

Explanation:

Let the two squares be ABCD and PQRS.

Further, let the lengths of each side of ABCD and PQRS be x and y, respectively.

Therefore Area of sq. ABCD / Area of sq. PQRS = x^2 / y^2

$\Rightarrow x^2/y^2 = 225 / 256$

Taking square roots on both sides, we get:

x/y = 15/16

Now, the ratio of their perimeters:

Perimeter of sq. ABCD / Perimeter of sq. PQRS

= 4 × side of sq. ABCD / 4 × Side of sq. PQRS = 4x / 4y

Perimeter of sq. ABCD / Perimeter of sq. PQRS = x y

Perimeter of sq. ABCD / Perimeter of sq. PQRS = 15 / 16

Thus, the ratio of their perimeters = 15:16

Question: 9

If the sides of a square are halved, then its area

(a) remains same

(b) becomes half

(c) becomes one fourth

(d) becomes double

Solution:

(c) becomes one fourth

Explanation:

Let the side of the square be x.

Then, area = (Side × Side) = (x × x) = x^2

If the sides are halved, new side = x/2

Now, new area = $(x/2)^2$

= $(x^2)/4$

It is clearly visible that the area has become one-fourth of its previous value.

Question: 10

A rectangular carpet has area 120 m^2 and perimeter 46 metres. The length of its diagonal is

(a) 15 m

(b) 16 m

(c) 17 m

(d) 20 m

Solution:

(c) 17 m

Explanation:

Area of the rectangle = 120 m^2

Perimeter = 46 m

Let the sides of the rectangle be l and b.

Therefore

Area = lb = 120 m^2 ...(1)

Perimeter = 2 (l + b) = 46

Or, (l + b) = 46 / 2 =23 m ...(2)

Now, length of the diagonal of the rectangle = $l^2 + b^2$

So, we first find the value of $(l^2 + b^2)$

Using identity:

$(l^2 + b^2) = (l + b)^2 - 2\,(lb)$ [From (1) and (2)]

Therefore

$(l^2 + b^2) = (23)^2 - 2\,(120)$

$= 529 - 240 = 289$

Thus, length of the diagonal of the rectangle $= l^2 + b^2 = 289 = 17$ m

Question: 11

If the ratio between the length and the perimeter of a rectangular plot is 1: 3, then the ratio between the length and breadth of the plot is

(a) 1 : 2

(b) 2 : 1

(c) 3 : 2

(d) 2 : 3

Solution:

(b) 2 : 1

Explanation:

It is given that Length of rectangle / Perimeter of rectangle = 1 / 3

$\Rightarrow l/(2l + 2b) = 1 / 3$

After cross multiplying, we get:

$3l = 2l + 2b$

$\Rightarrow l = 2b$

$\Rightarrow l / b = 2 / 1$

Thus, the ratio of the length and the breadth is 2: 1.

Question: 12

If the length of the diagonal of a square is 20 cm, then its perimeter is

(a) $10\sqrt{2}$ cm

(b) 40 cm

(c) 40√2 cm

(d) 200 cm

Solution:

(c) 40√2 cm

Explanation:

Length of diagonal = 20 cm

$\text{Length of diagonal} = 20 \text{ cm}$

$$\text{Length of side of a square} = \frac{\text{Length of diagonal}}{\sqrt{2}}$$

$$= \frac{20}{\sqrt{2}}$$

$$= \frac{10}{\sqrt{2}}$$

$\text{Therefore, perimeter of the square is } 4 \times \text{side} = 4 \times 10\sqrt{2} \text{ cm}$

$= 40\sqrt{2} \text{ cm}$

Data Handling I (Presentation of Data)

Question: 1

Define the following terms:

(i) Observation

(ii) data

(iii) Frequency of an observation

(iv) Frequency distribution

Solution:

(i) Observation is the active acquisition of information from a primary source.

(ii) A collection of facts such as values measurements are called data.

(iii) Number of times an observation has occurred in a given data.

(iv) A frequency distribution is an arrangement of instances in which a variable takes each of its possible values. A frequency distribution depicts a summarized grouping of data divided into mutually exclusive classes and the number of occurrences in those classes.

Question: 2

The final marks in mathematics of 30 students are as follows:

53, 61, 48, 60, 78, 68, 55, 100, 67, 95

75, 88, 77, 37, 84, 58, 60, 48, 62, 56

44, 58, 52, 64, 98, 59, 70, 39, 50, 60

(i) Arrange these marks in the ascending order. 30 to 39 one group, 40 to 49 second group, etc

(ii) What is the highest score?

(iii) What is the lowest score?

(iv) What is the range?

(v) If 40 is the pass mark how many have failed?

(vi) How many have scored 75 or more?

(vii) Which observations between 50 and 60 have not actually appeared?

(viii) How many have scored less than 50?

Solution:

(i) Frequency distribution of the given marks in mathematics of 30 students

30 – 39	37, 39
40 – 49	44, 48, 48
50 – 59	50, 52, 53, 55, 56, 58, 58, 59
60 – 69	60, 60, 60, 61, 62, 64, 67, 68
70 – 79	70, 75, 77, 78
80 – 89	84, 88
90 – 99	90, 98
100 – 109	100

(ii) From the given data we can see that the highest score is 100.

(iii) The above data shows 37 as the lowest score.

(iv) Range = highest score – lowest score = 100 – 37 = 63

(v) If 40 is the pass marks, students who have scored led the 40 have failed. So, the students who have scored 37 and 39 have failed.

Therefore number of students that have failed in the exam = 2

(vi) Students who have scored 75, 77, 78, 84, 88, 90, 98 and 100 are the ones to score more than 75

Therefore number of students who scored 75 or more = 8

(vii) The observation 51, 54 and 57 have not appeared in the data range of 50 – 60.

(viii) Students who have scored 37, 39, 44, 48 and 48 are the ones to score less than 50

Therefore number of students who got less than 50 = 5

Question: 3

The weights of new born babies (in kg) in a hospital on a particular day are as follows:

2.3, 2.2, 2.1, 2.7, 2.6, 3.0, 2.5, 2.9, 2.8, 3.1, 2.5, 2.8, 2.7, 2.9, 2.4

(i) Rearrange the weights in descending order.

(Ii) Determine the highest weight.

(iii) Determine the lowest weight.

(iv) Determine the range.

(v) How many babies were born on that day?

(vi) How many babies weigh below 2.5 kg?

(vii) How many babies weigh more than 2.8 kg?

(viii) How many babies weigh 2.8 kg?

Solution:

(i) Arranging the weights of the newborn babies in the descending order, we get 3.1, 3.0, 2.9, 2.9, 2.8, 2.8, 2.7, 2.6, 2.5, 2.5, 2.4, 2.3, 2.2, 2.1,

(ii) In a descending order, the first number is always the highest.

Therefore, highest weight = 3.1 kg.

(iii) In an descending order, the last number is always the lowest

Therefore, lowest weight = 2.1 kg

(iv) Range = Highest weight – lowest weight

= 3.1 kg – 2.1 kg = 1.0 kg

(v) We can count the number of babies born on that particular day by counting the number of observations.

Therefore, number of babies born on that day = 15.

(vi) Babies which weigh 2.1, 2.2, 2.3 and 2.4 kg are the ones to weigh less than 2.5 kg.

(vii) Babies which weigh 2.9, 2.9, 3.0 and 3.1 kg are the ones to weigh more than 2.8 kg.

(viii) Number of babies weighing 2.8 kg = 2

Question: 4

Following data gives the number of children in 40 families:

1, 2, 6, 5, 1, 5, 1, 3, 2, 6, 2, 3, 4, 2, 0, 0, 4, 4, 3, 2

2, 0, 0, 1, 2, 2, 4, 3, 2, 1, 0, 5, 1, 2, 4, 3, 4, 1, 6, 2

Represent it in the form of a frequency distribution.

Solution:

Frequency distribution of the given data:

Number of children	Tally marks	Frequency
0	~~IIII~~	5
1	~~IIII~~ II	7
2	~~IIII~~ ~~IIII~~ I	11
3	~~IIII~~	5
4	~~IIII~~ I	6
5	III	3
6	III	3

Question: 5

Prepare a frequency table of the following scores obtained by 50 students in a test

42 51 21 42 37 37 42 49 38 52

7 33 17 44 39 7 14 27 39 42

42 62 37 39 67 51 53 53 59 41

29 38 27 31 54 19 53 51 22 61

42 39 59 47 33 34 16 37 57 43

Solution:

Frequency distribution table of the given scores:

Marks	Tally marks	Frequency
7	II	2

14	I	1
16	I	1
17	I	1
19	I	1
21	I	1
22	I	1
27	II	2
29	I	1
31	I	1
33	II	2
34	I	1
37	IIII	4
38	II	2
39	IIII	4
41	I	1
42	~~IIII~~ I	6
43	I	1
44	I	1
47	I	1
49	I	1
51	III	3
52	I	1
53	III	3
54	I	1
57	I	1
59	II	2
61	I	1
62	I	1
67	I	1

Question: 6

A die was thrown 25 times and following scores were obtained

1 5 2 4 3

6 1 4 2 5

1 6 2 6 3

5 4 1 3 2

3 6 1 5 2

Solution:

Frequency distribution table of the given data:

Scores	Tally marks	Number of times
1	~~IIII~~	5
2	~~IIII~~	5
3	IIII	4
4	III	3
5	IIII	4
6	IIII	4

Question: 7

In a study of number of accidents per day, the observations for 30 days were obtained as follows:

6 3 5 6 4 3 2 5 4 2

4 2 1 2 2 0 5 4 6 1

6 0 5 3 6 1 5 5 2 6

Prepare a frequency distribution table

Solution:

Frequency distribution table of the given number of accidents per day is given below:

Number of accidents	Tally marks	Number of days
0	II	2
1	III	3
2	~~IIII~~ I	6
3	III	3
4	IIII	4
5	~~IIII~~ I	6
6	~~IIII~~ I	6

Question: 8

Prepare a frequency table of the following ages (in years) of 30 students of class VIII in your school:

13, 14, 13, 12, 14, 13, 14, 15, 13, 14, 13, 14, 16, 12, 14

13, 14, 15, 16, 13, 14, 13, 12, 17, 13, 12, 13, 13, 13, 14

Solution:

Frequency distribution table of the given ages (in years) of 30 students:

Ages (in years)	Tally marks	Number of students
12	IIII	4
13	~~IIII~~ ~~IIII~~ II	12
14	~~IIII~~ IIII	9
15	II	2
16	II	2
17	I	1

Question: 9

Following figures relate the weekly wages (in Rs) of 15 workers in a factory:

300, 250, 200, 250, 200, 150, 350, 200, 250, 200, 150, 300, 150, 200, 250

Prepare a frequency table

(i) What is the range in wages (in Rs)?

(ii) How many Workers are getting RS 350?

(iii) How many of workers are getting the minimum wages?

Solution:

Frequency distribution of the given weekly wages of 15 workers:

Weekly wages (in Rs)	Tally marks	Number of workers
150	III	3
200	~~IIII~~	5
250	IIII	4
300	II	2
350	I	1

(i) Minimum wages = Rs. 150

Maximum wage = Rs. 350

Therefore, Range = Maximum wage – Minimum wage

= Rs. 350 – Rs. 150

= Rs. 200

(ii) Number of workers getting Rs. 350 = 1 worker

(iii) Here, Minimum wages Rs. 150

Number of workers getting Rs. 150 = 3 workers

Therefore, number of workers getting minimum wages = 3 workers.

Question: 10

Construct a frequency distribution table for the following marks obtained by 25 students in a history test in class VI of a school:

9, 17, 12, 20, 9, 18, 25, 17, 19, 9, 12, 9, 18, 17, 19, 20, 25, 9, 12, 17, 19, 19, 20, 9

(i) What is the range of marks?

(ii) What is the highest mark?

(iii) Which mark is occurring more frequently?

Solution:

Frequency distribution of the given marks in mathematics:

Marks obtained in mathematics	Tally marks	Number of students (frequency)
1	II	2
2	III	3
3	III	3
4	~~IIII~~ II	7
5	~~IIII~~ I	6
6	~~IIII~~ II	7
7	~~IIII~~	5
8	IIII	4
9	III	3

(i) Number of students who have obtained marks equal to or more than 7

= Frequency of 7 + frequency of 8 + frequency of 9

= 5 + 4 + 3 = 12

(ii) Numbers of students who have scored below 4

= Frequency of 1 + frequency of 2 + frequency of 3

= 2 + 3 + 3 = 8

Question: 11

Following is the choice of sweets of 30 students of class VI: Ladoo, Barfi, Ladoo, Jalebi, Ladoo, Rasgulla, Jalebi, Ladoo, Barfi, Rasgulla, Ladoo, Jalebi, Jalebi, Rasgulla, Ladoo, Rasgulla, Jalebi, Ladoo, Rasgulla, Ladoo, Rasgulla, Jalebi, Ladoo, Rasgulla, Ladoo, Ladoo, Barfi, Rasgulla, Rasgulla, Ladoo.

(i) Arrange the names of sweets in a table using tally marks

(ii) Which sweet is preferred by most of the students.

Solution:

(i) Frequency distribution of the given sweets:

Sweet	Tally marks	Frequency
Ladoo	~~IIII~~ ~~IIII~~ II	12
Barfi	III	3
Jelebi	~~IIII~~ I	6
Rasgulla	~~IIII~~ IIII	9

(ii) The frequency of Ladoo is 12 i.e. maximum

Therefore, Ladoo is the sweet that is preferred by most of the students.

Data Handling II (Pictographs)

Exercise 22.1

Question: 1

The sale of electric bulbs on different days of a week is shown below:

Observe the pictograph and answer the following questions:

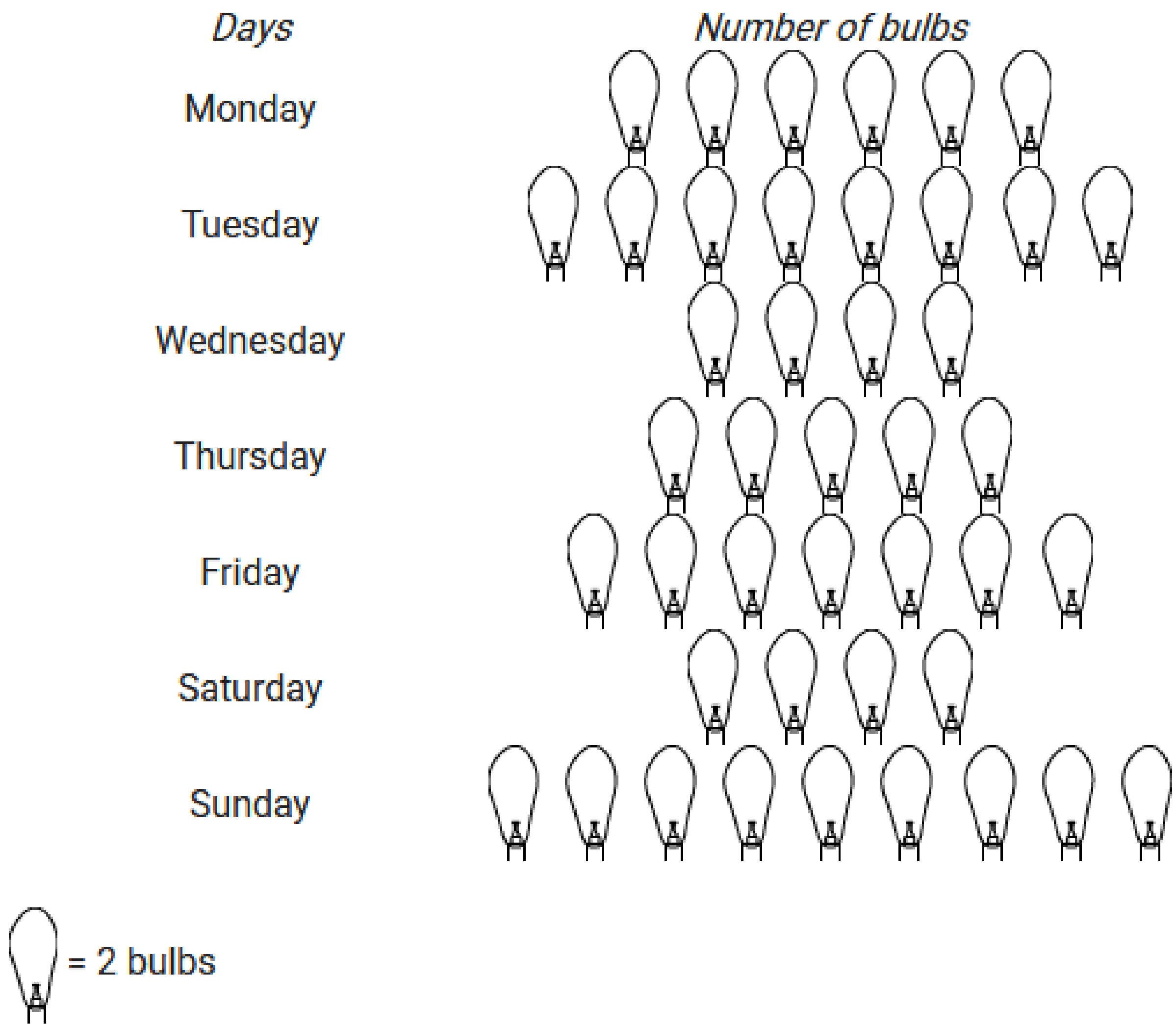
(i) How many bulbs were sold Friday?

(ii) On which day maximum numbers of bulbs were sold?

(iii) If one bulb were sold at the rate of Rs 10, what was the total earning on Sunday?

(iv) Can you find out the total earning of the week?

(v) If one big carton can hold 9 bulbs. How many cartons were needed in the given week, more than 7, more than 8 or more than 9?



Solution:

(i) Number of figures of bulbs shown against Friday = 7

Given: 1 figure = 2 bulbs

Therefore, Total number of bulbs sold on Friday = 2 x 7 = 14

(ii) Sunday shows the maximum number of figure of bulbs, i.e. 9

Therefore, On Sunday, maximum bulbs were sold.

(iii) Number of figures of bulbs shown against Sunday = 9

Therefore, Total number of bulbs sold on Sunday = 2 x 9 = 18

Given, the cost of each bulb = Rs 10

Therefore, Total earning on Sunday = Rs 10 x 18 = Rs 180

(iv) Total number of figures of bulbs shown throughout the week

= 6 + 8 + 4 + 5 + 7 + 4 + 9 = 43

Therefore, Total number of bulbs = 43 x 2 = 86

Therefore, Total earning of the week = Rs 10 x 86 = Rs 860.

(v) Total number of bulbs = 86

Given that one big carton can hold 9 bulbs.

Therefore, for holding 86 bulbs, we need

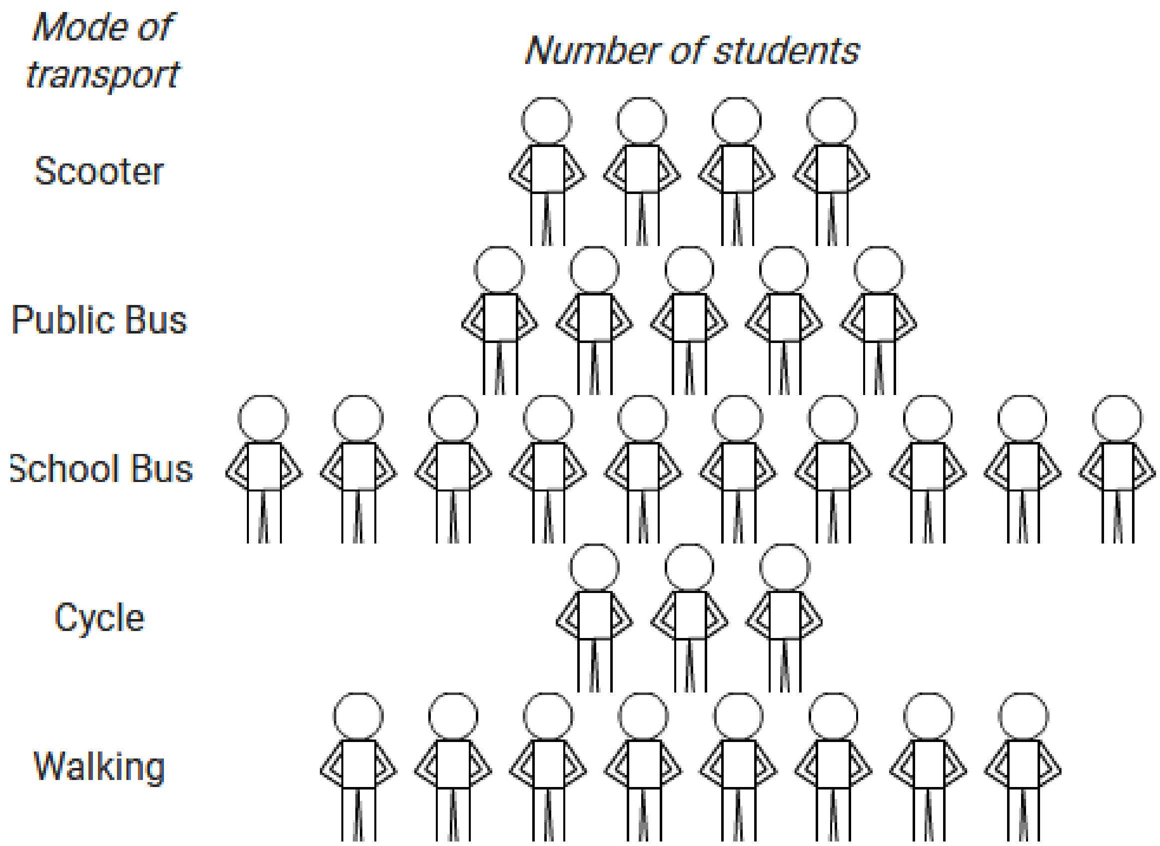
869 = 959 cartons

So, more than 9 cartons are needed.

Question: 2

A survey was carried out in a certain school to find about different modes of transport used by students to travel to school each day. 30 students of class VI were interviewed and the data obtained was displayed in the form of pictographs given below:

Mode of transport Number of students



Look at the above pictograph and answer the following questions:

(i) Look at the above pictograph and answer the following questions

(ii) How many students are using cycle or walking as a mode of travel?

(iii) Which is the most popular mode of travel?

Solution:

(i) Number of students shown traveling to school using cycle = 3

Number of students shown walking to school = 8

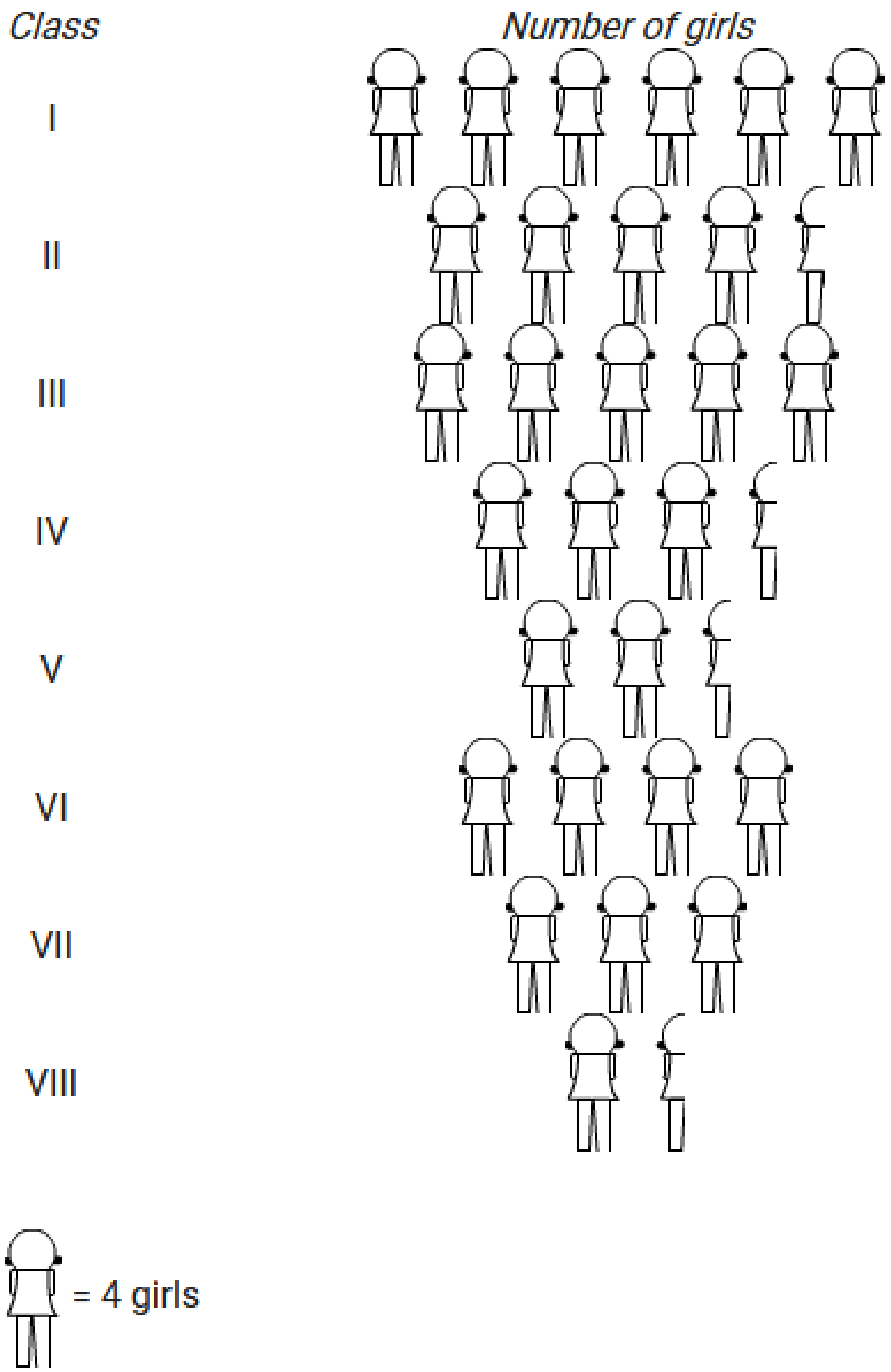
Therefore, Number of students using cycle or walking as a mode of travelling to school = 3 + 8 =11

(ii) The pictograph shows that the maximum number of students, i.e. 10 are using the school bus as a mode of traveling to school.

Therefore, the most popular mode of travel to school is the school bus.

Question: 3

The number of girl students in each class of co-ed. Middle school is depicted by the following pictograph:



Observe the above pictograph and answer the following questions:

(i) Which class has the maximum number of girl students?

(ii) is the number of girls in class VI is less than the number of girls in class V?

(iii) How many girls are there in VII class?

Solution:

Based on the above pictograph, we can prepare the following chart to determine the number of girl students in each class.

Given, 1 figure = 4 girls

Class	Numbers of girls
I	6 x 4 = 24
II	4.5 x 4 = 18
III	5 x 4 = 20
IV	3.5 x 4 = 14
V	2.5 x 4 = 10
VI	4 x 4 = 16
VII	3 x 4 = 12
VIII	1.5 x 4 = 6

(i) From the chart we can easily say that the maximum number of girls i.e 24 are present in Class I

Therefore, Class I has the maximum number of girls.

(ii) Number of girls in class VI = 16

Number of girls in class V = 10

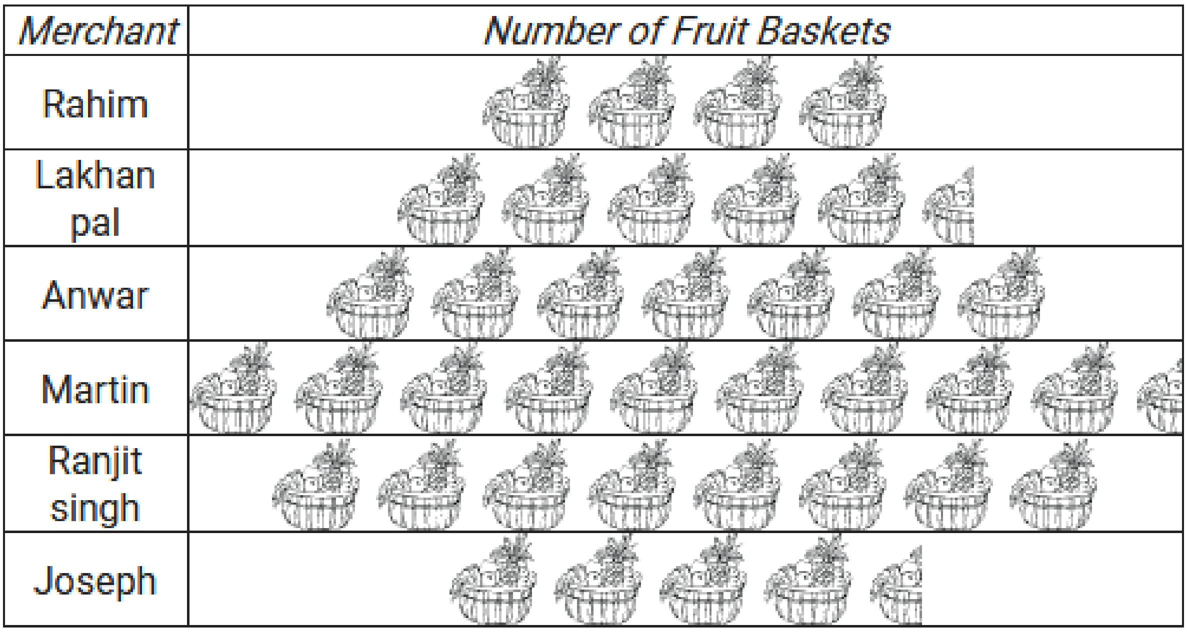
Therefore, number of girls in class VI is not less than the number of girls in class V

Ans: No

(iii) From the chart, we can say that these are 12 girls in class VII

Question: 4

In a village six fruit merchants sold the following number of fruit baskets in particular season:



 = 100 fruit baskets

Observe the above pictograph and answer the following questions.

(i) Which merchant sold the maximum number of baskets?

(ii) How many fruit baskets were sold by Anwar?

(iii) The merchants who have sold 600 or more number of baskets are planning to buy a godown for the next season. Can you name them?

Solution:

Given, one figure = 100 fruit baskets

Based on the above pictographs and hints, we can prepare the following charts to ascertain the maximum number of fruit baskets sold by each merchant:

Merchant	Numbers of fruit baskets
Rahim	4 x 100 = 400
Lakhan pal	5.5 x 100 = 550
Anwar	7 x 100 = 700
Martin	9.5 x 100 = 950
Ranjit singh	8 x 100 = 800
Joseph	4.5 x 100 = 450

(i) On the above chart we can see that martin sold the maximum number of baskets i.e. 950 fruits baskets.

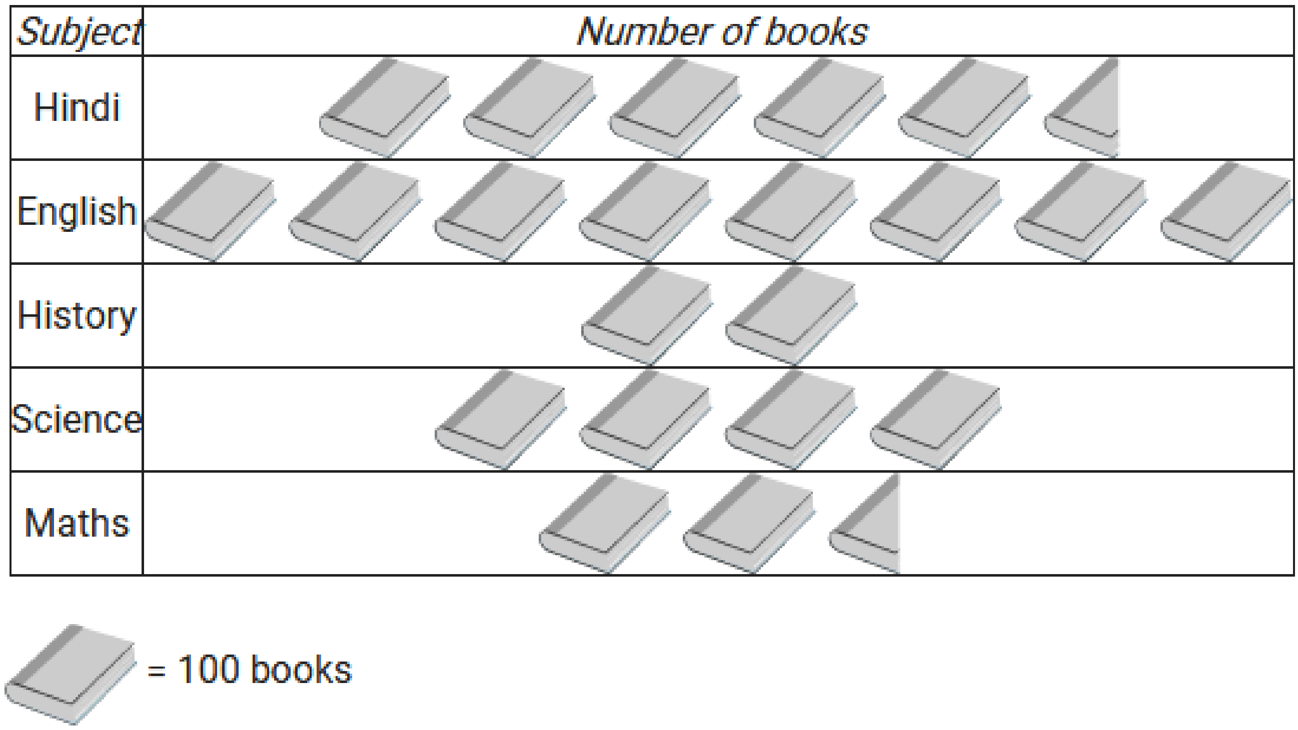
Ans: Martin

(ii) Anwar sold 700 fruit baskets

(iii) On the above chart we can see that Anwar sold 700 fruit baskets, Martin sold 950 fruit baskets and Ranjit Singh sold 800 fruit baskets. Therefore, Anwar, Martin and Ranjit Singh are the merchants who are planning to buy a godown for the next season.

Question: 5

The pictograph shows different subject books which are kept in a library.



(i) How many English books are there in the library?

(ii) How many maths books are there?

(iii) Which books are maximum in number?

(iv) Which books are minimum in number?

Given, 1 figure = 100 books

Solution:

Based on the above pictograph and the given data, we can prepare the following chart to ascertain the number of books present in the library for each subject:

Subjects	Numbers of books
Hindi	$5.5 \times 100 = 550$
English	$8 \times 100 = 800$
History	$2 \times 100 = 200$
Science	$4 \times 100 = 400$
Math	$2.5 \times 100 = 250$

(i) From the above charts, we can say that there are 800 English books in the library.

(ii) The calculation on the above chart shows that there are 250 Math books in the library.

(iii) From the above charts, we can say that the English books are maximum in number, as there are 800 books on that subject.

Therefore, English

(iv) From the above chart, we can see that the History books are minimum in number, as there are only 200 books of that subjects

Therefore, History

Exercise 22.2

Question: 1

The following are the details or the number of students in a class of 30 students presents a week.

Day	Number of students present
Monday	24
Tuesday	20
Wednesday	28
Thursday	30
Friday	26
Saturday	22

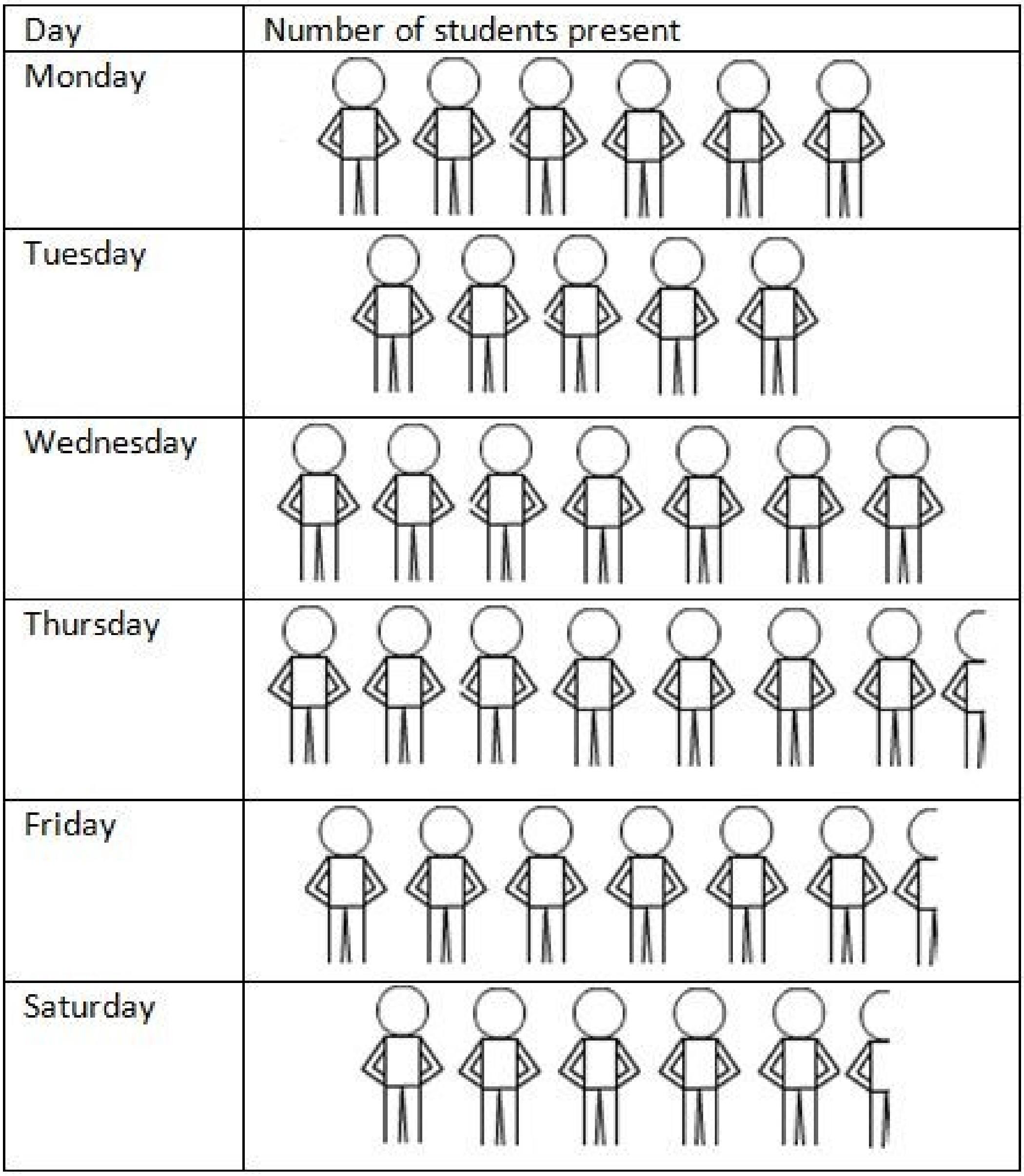
Represent the above data by a pictograph.

Solution:

Let an icon of a student represent 4 students. Then, the number of icons for each day is as follows:

Day	Number of students present
Monday	24 / 4 = 6
Tuesday	20 / 4 = 5
Wednesday	28 / 4 = 7
Thursday	30 / 4 = 7.5
Friday	26 / 4 = 6.5
Saturday	22 / 4 = 5.5

The pictograph representing the above data is as follows:



Question: 2

Total number of students of a school in different years is shown in the following table:

Year	Number of students
1996	400
1998	550
2000	450
2002	600
2006	650

Represent the above data by a pictograph.

(a) Prepare a pictograph of students using one symbol an icon of a student to represent students and answer the following questions:

(i) How many symbols represent total number of students in the year 2002?

(ii) How many symbols represent total number of students for the year 1998?

(b) Prepare another pictograph of students using any other symbol each represents students. Which pictograph do you find more informative?

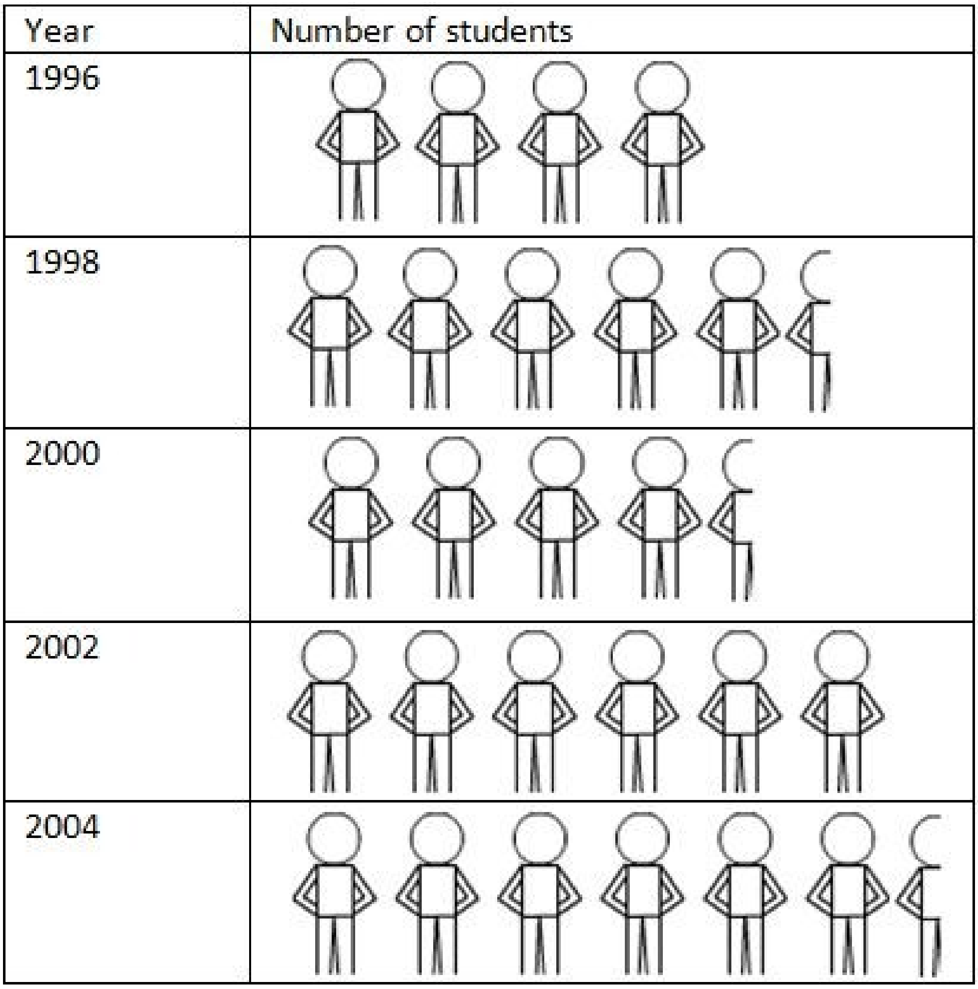
Solution:

(a) Let one icon represent 100 students.

Then, the numbers of icons for different years are as follows:

Year	Number of students
1996	400 / 100 = 4
1998	550 / 100 = 5.5
2000	450 / 100 = 4.5
2002	600 / 100 = 6
2006	650 / 100 = 6.5

The pictograph representing the above data is as follows:



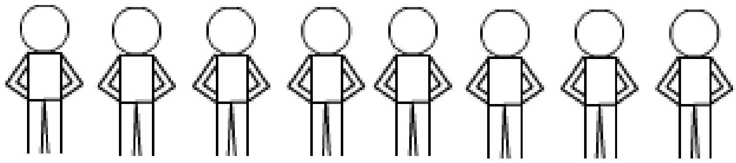
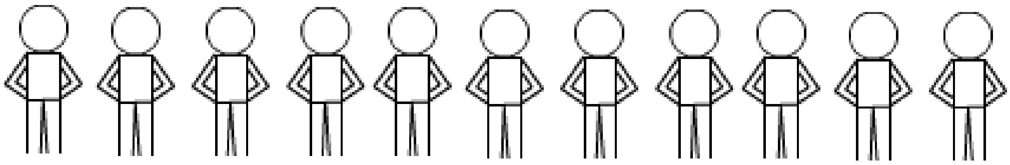
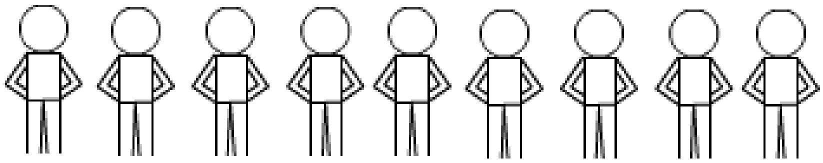
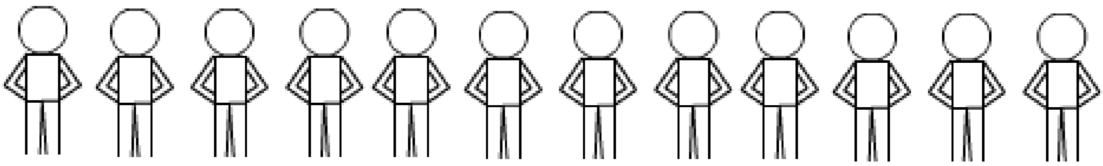
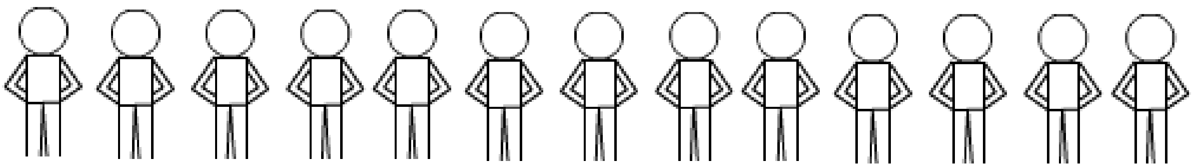
(i) 6 icons represent the total number of students in the year 2002.

(ii) 5 and half icons represent the total number of students in the year 1998.

(b) Let one icon represent 50 students.

Then, the numbers of icons for different years are as follows:

Year	Number of students
1996	400 / 50 = 8
1998	550 / 50 = 11
2000	450 / 50 = 9
2002	600 / 50 = 12
2006	650 / 50 = 13

Year	*Number of students*
1996	
1998	
2000	
2002	
2004	

The second pictograph is more informative.

Explanation: in the second pictograph, every icon is complete, therefore more convenient to understand.

Data Handling III (Bar Graphs)

Exercise 23.1

Question: 1

The following table shows the daily production of T.V sets in an industry for 7 days of a week:

Days	Number of TV sets
Mon	300
Tue	400
Wed	150
Thurs	250
Fri	100
Sat	350
Sun	200

Represent the above information by a pictograph.

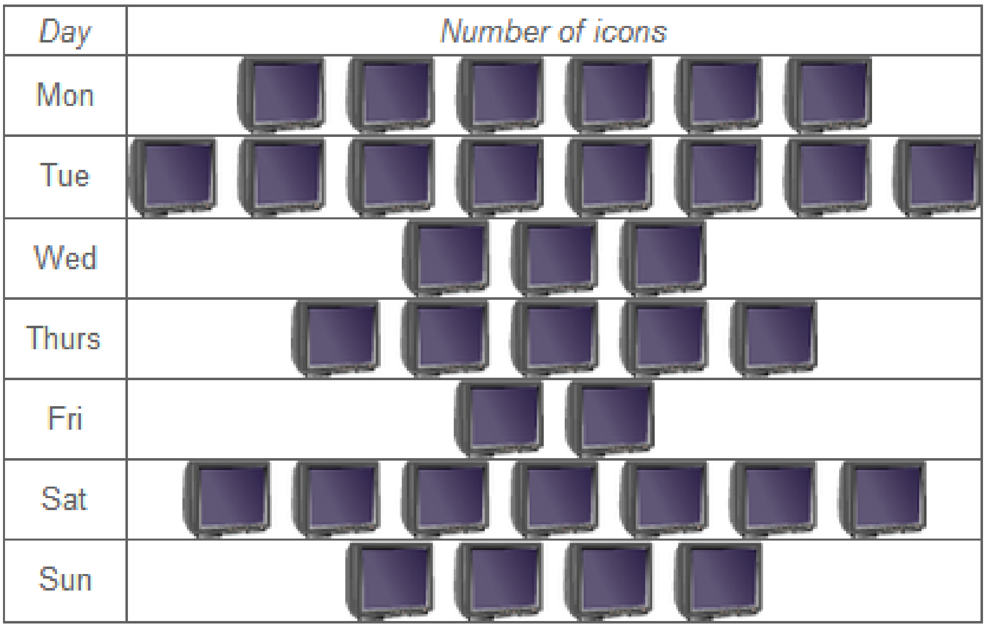
Solution:

Let an icon of a T.V represent 50 T.Vs.

Then, the number of icons produced by the industry on different days of a week is as follows:

Days	Number of icons
Mon	300 / 50 = 6
Tue	400 / 50 = 8
Wed	150 / 50 = 3
Thurs	250 / 50 = 5
Fri	100 / 50 = 5
Sat	350 / 50 = 7
Sun	200 / 50 = 4

The pictograph representing the above data is as follows:



Question: 2

The following table shows the number of Maruti cars sold by five dealers in a particular month:

Dealer	Cars sold
Saya	60
Bagga links	40
D.D Motors	20
Bhasin Motor	15
Competent motor	10

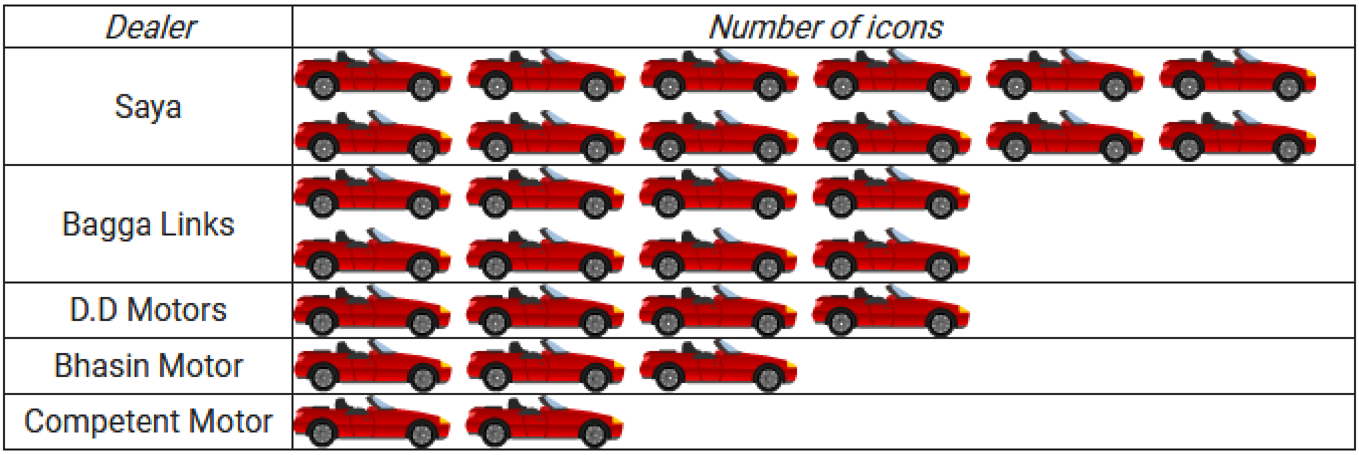
Solution:

Let one car icon represent 5 Maruti cars.

Then, the numbers of icons sold by the five dealers in a particular month are as follows:

Dealer	Number of icons
Saya	60 / 5 = 12
Bagga links	40 / 5 = 8
D.D Motors	20 / 5 = 4
Bhasin Motor	15 / 5 = 3
Competent motor	10 / 5 = 3

The pictograph representing the above data is as follows:



Question: 3

The population of Delhi state in different census years is as given below:

Census year	1961	1971	1981	1991	2001
Population in lakhs	30	55	70	110	150

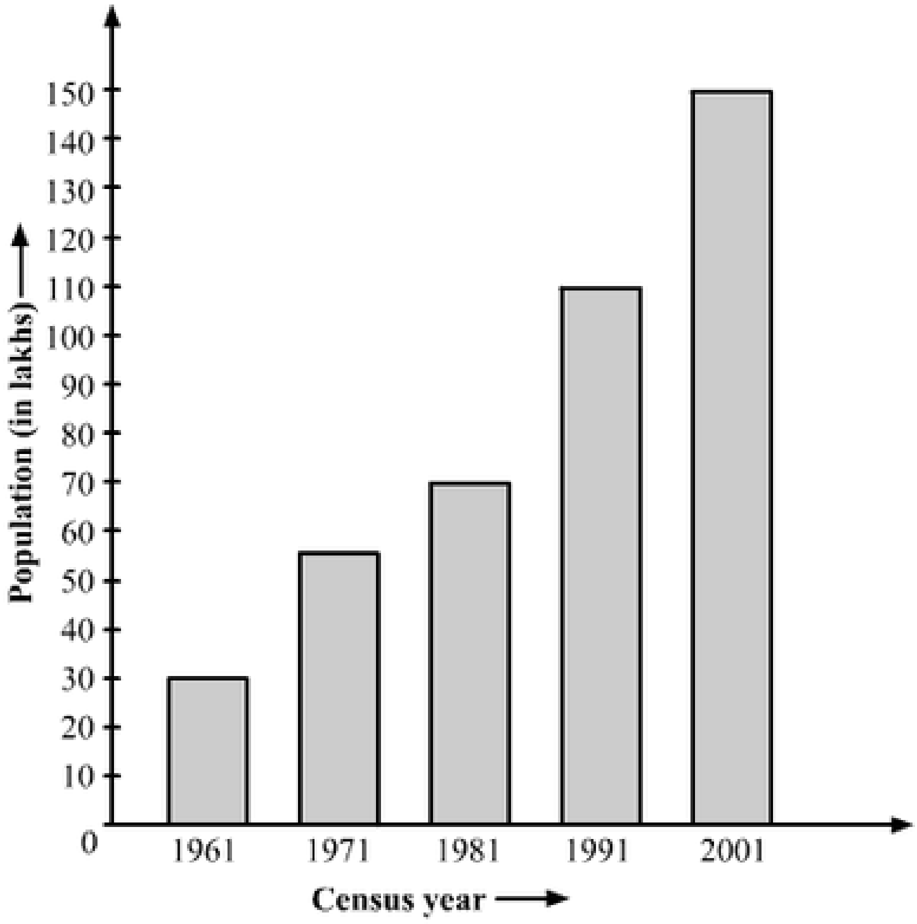
Represents the above information by a pictograph.

Solution:

To represent the given data on a bar graph, we should first draw a horizontal and a vertical line. Here, the horizontal line will show the census year and the vertical line will show represent the population.

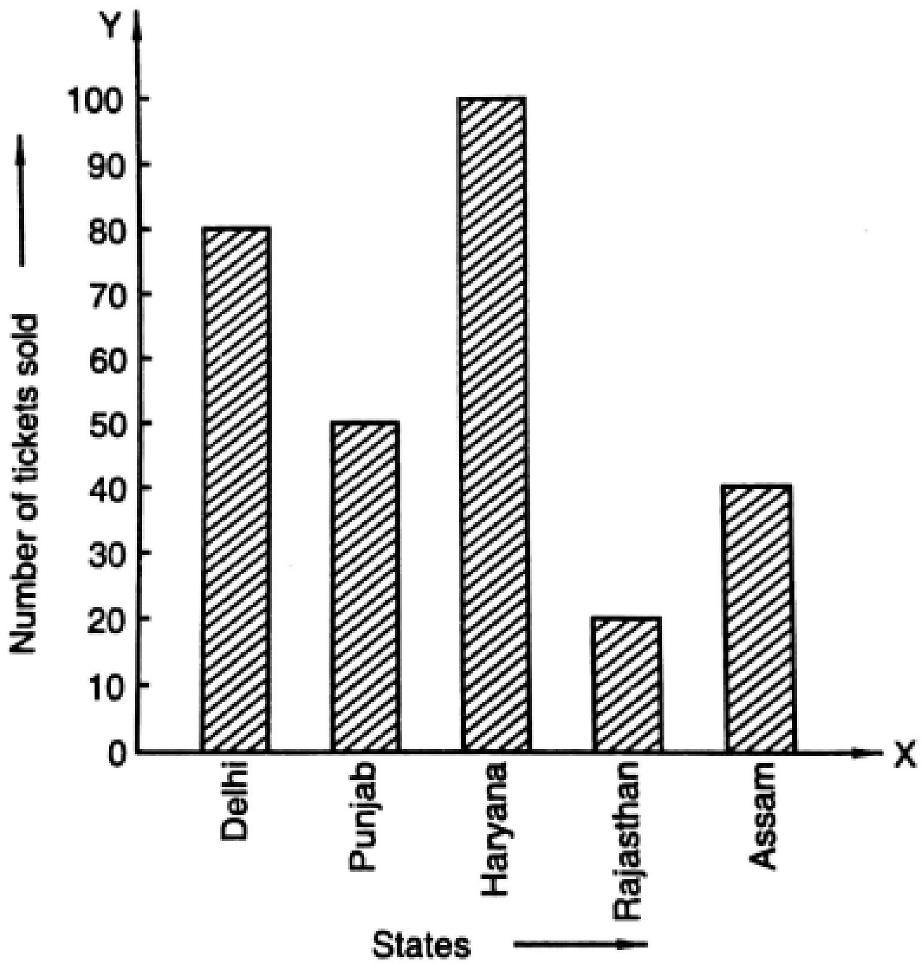
Since 5 values or data are given, we mark 5 points on the horizontal axis at equal distances and will erect rectangles of the same width with their heights proportional to the given data.

Also, on the vertical axis, each difference of 10 will represent a population of 10 lakhs.



Question: 4

Read the bar graph shown in Fig. and answer the following question:



(i) What is the information given by the bar graph?

(ii) How many tickets of Assam States Lottery were sold by the agent?

(iii) Of which state, where the maximum number of tickets sold?

(iv) State whether true or false

The maximum number of tickets sold is three times the minimum number of tickets sold

(v) of which states were the minimum number of tickets sold.

Solution:

(i) The bar graph represents the number of tickets of different states lotteries sold by an agent on a single day.

(ii) The agent sold 40 tickets of Assam state lottery.

Explanation: The vertical height of the rectangle against Assam, on the bar graph, has ended on the 40^{th} mark against the vertical axis.

(iii) Haryana

Explanation: The vertical height of the rectangle against Haryana I the maximum compared to those against the other states.

(iv) False

Explanation: Maximum vertical length (against the state of Haryana) = 100 units

Minimum vertical length (against the state of Rajasthan) = 20 units

Therefore, Maximum number of lottery sold for one state = 100 tickets

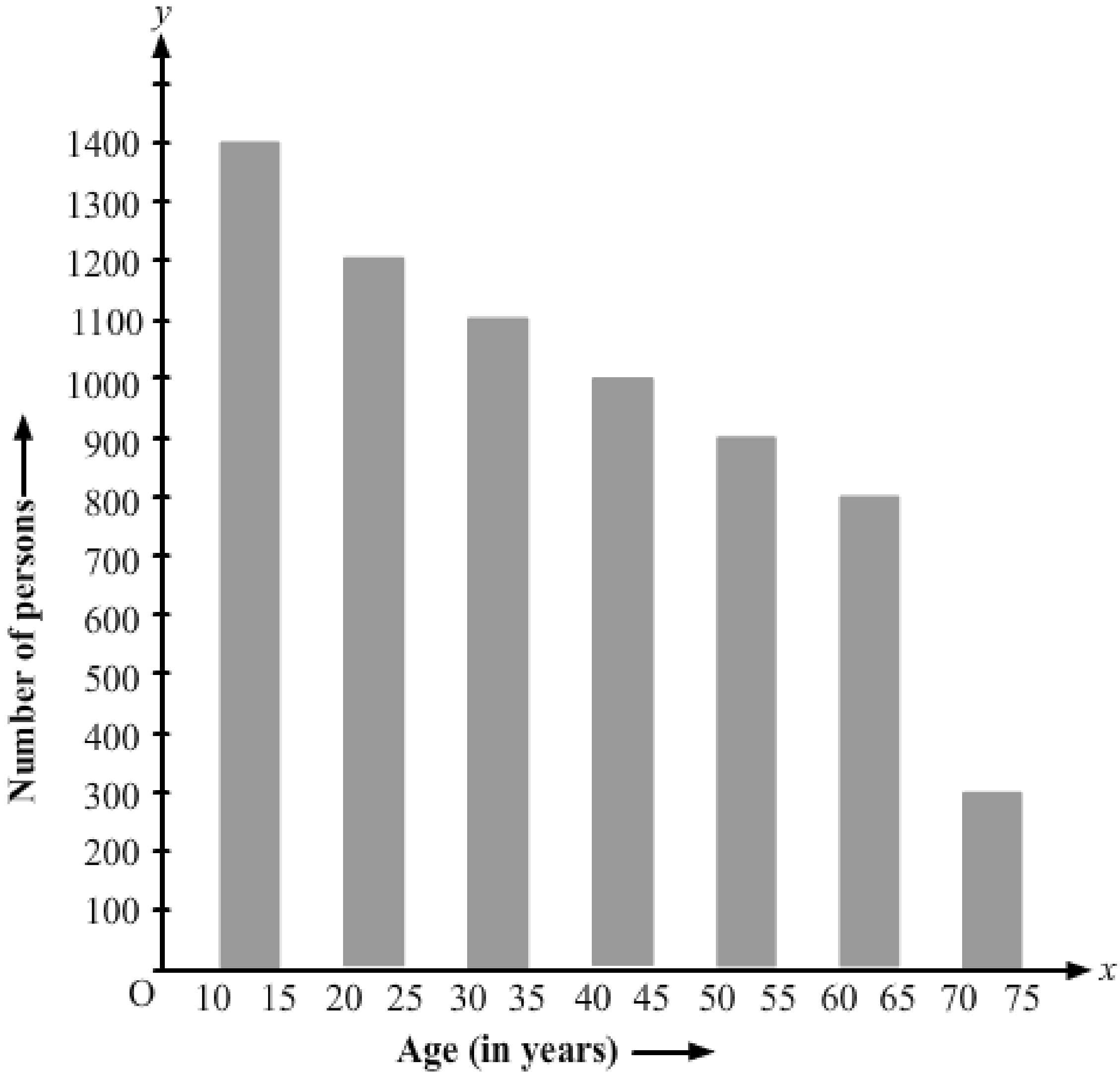
Minimum number of lottery tickets sold for one state = 20 tickets

(v) Rajasthan

Explanation: From the bar graph we can say that the Rajasthan State Lottery tickets were sold the minimum i.e. only 20 tickets.

Question: 5

Study the bar graph representing the number of persons in various age groups in a town shown in Fig. observe the bar graph and answer the following questions:



(i) What is the percentage of the youngest age – group persons over those in the oldest age group?

(ii) What is the total population of the town?

(iii) What is the number of persons in the age group 60 – 65?

(iv) How many persons are more in the age – group 10 -15 than in the age group 30 – 35?

(v) What is the age – group of exactly 1200 persons living in the town?

(vi) What is the total number of persons living in the town in the age – group 50 – 65?

(vii) What is the total number of persons living in the town in the age – group 10 – 15 and 60 – 65?

(viii) Whether the population in general increases decreases or remains constants with the increase in the age – group.

Solution:

(i) The youngest age group is 10 – 15 years.

Number of persons in the youngest age group = 1400

The oldest age group is 70 – 75 years.

Number of persons in the oldest age group = 300

Difference in the number of people in the youngest age oldest age group = 1400 – 300 = 1100

Therefore, The youngest group has 1100 more people than the oldest group.

Therefore, % of the youngest group over oldest group

$$\frac{1100}{300} \times 100\% = \frac{1100}{3}\% = 366\frac{2}{3}\%$$

(ii) Total population of the town

= Total number of people from all age groups

= 1400 + 1200 + 1100 + 1000 + 900 + 800 + 300 = 6700.

(iii) There are 800 persons in the age group 60 – 65 years.

Explanation: The vertical length of the rectangle against the age group 60 – 65 is up to 800 units.

(iv) Number of persons in the age group 10 – 15 = 1400

Number of persons in the age group 30 – 35 = 1100

Therefore, number of more persons in the age group 10 – 15 as compared to that in the age group 30 – 35 = 1400 – 1100 = 300.

(v) the age – group of exactly 1200 people living in the town is 20 – 25 years.

Explanation: Looking at the bar graph we can say that the vertical length of the rectangle against the age group 20 – 25 is up to 1200 units.

(vi) The number of people of the age group 50 – 55 years is 900.

Explanation: The vertical length of the rectangle against the age group 50 – 55 years is up to 900 units.

(vii) The number of persons in the age group 10 – 15 years is 1400, and that in the age group 60 – 65 years is 800.

Therefore, Total number of persons in the age group 10 – 15 years and 60 – 65 years = 1400 + 800 = 2200

(viii) With the increase in the age group, the population decreases.

Explanation: As the age group increases, the heights of the rectangle start falling.

Question: 6

Read the bar graph shown in fig 23.10 and answer the following questions:

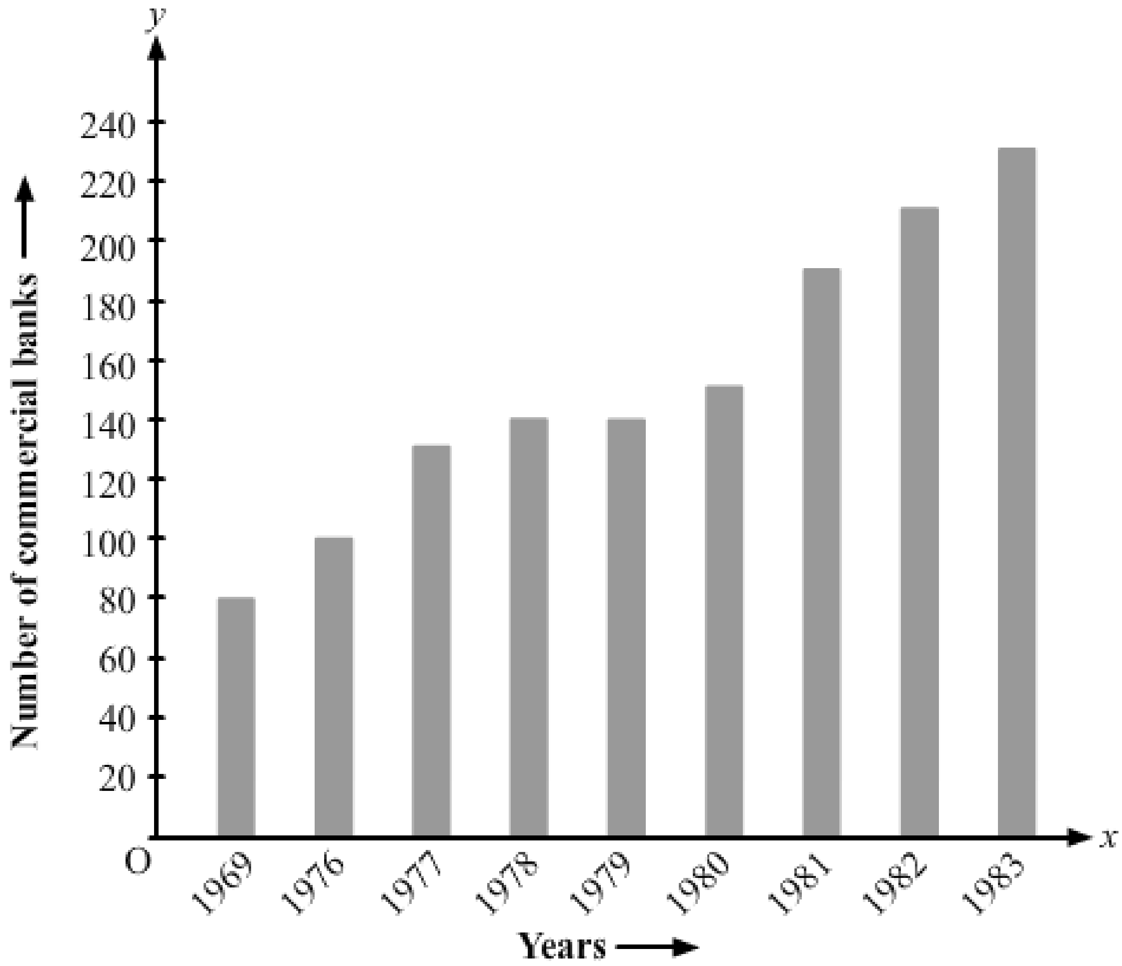
(i) What is the information given by the bar graph?

(ii) What was the number of commercial banks in 1977?

(iii) What is the ratio of the number of commercial banks in 1969 to that in 1980?

(iv) State whether true or false:

The number of commercial banks in 1983 is less than double the number of commercial banks in 1969.



Solution:

(i) The bar graph represents the number of commercial banks in India during the respective years.

(ii) In 1977, there were 130 commercial banks.

Explanation: The height of the rectangle against the year 1977 is up to 130 units.

(iii) Number of commercial banks in 1969 = 90

Number of commercial banks in 1980 = 150

Therefore, Ratio of the number of commercial banks in 1969 to that in 1980 = 90/150 = 3/5 = 3:5

(iv) False

Explanation: Number of commercial banks in 1983 = 230

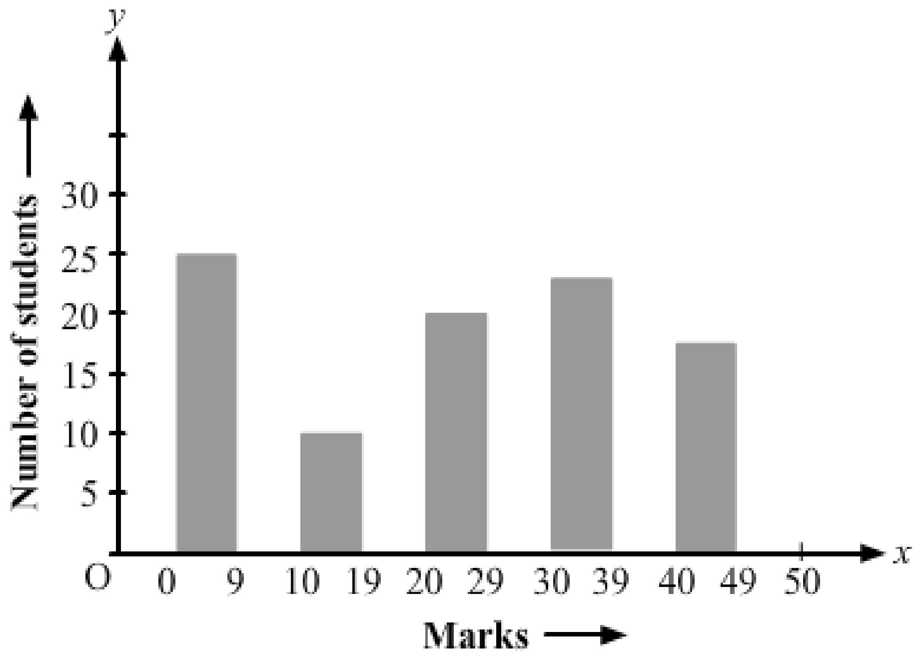
Number of commercial banks in 1969 = 90

Therefore, 2× 90 =180

As 230 is greater than 180, the number of commercial banks in 1983 is not less than double the number of commercial banks in 1969.

Question: 7

Given below is the bar graph indicating the marks obtained out of 50 in mathematics paper by 100 students. Read the bar graph and answer the following questions:



(i) It is decided to distribute workbooks on mathematics to the students obtaining less than 20 marks, giving one workbook to each of such students. If a workbook costs Rs. 5, what sure is required to buy the workbooks?

(ii) Every student belonging to the highest mark group is entitled to get a prize of Rs. 10. How much amount of money is required for distributing the prize money?

(iii) Every student belonging to the lowest mark-group has to solve 5 problems per day. How many problems, in all, will be solved by the students of this group per day?

(iv) State whether true or false.

(a) 17% students have obtained marks ranging from 40 to 49.

(b) 59 students have obtained marks ranging from 10 to 29.

(v) What is the number of students getting less than 20 marks?

(vi) What is the number of students getting more than 29 marks?

(vii) What is the number of students getting marks between 9 and 40?

(Viii) What is the number, of students belonging to the highest mark group?

(ix) What is the number of students obtaining more than 19 marks?

Solution:

Let us prepare a chart of the 100 students using the data from the bar graph.

Marks	Number of students
0 – 9	27
10 – 19	12
20 – 29	20
30 – 39	24
40 – 49	17

(i) Number of students with less than 20 marks = 27 + 12 = 39

Therefore, Required sum to buy the workbooks = Rs 5 × 39 = Rs 195.

(ii) Highest marks group = 40 – 49

Number of students in this marks group = 17

Therefore, Required money to distribute the prize = Rs 10 × 17 = Rs 170.

(iii) Lowest marks group = 0 – 9

Number of students in this marks group = 27

Therefore, Number of problems that will be solved by the students per day = 5 x 27 = 135.

(iv) (a) True, (b) False

(v) Number of students scoring less than 20 marks.

= Number of students in the marks group 0 – 9 + Number of students in the marks group 10 – 19 = 27 + 12 = 39

(vi) Number of students scoring more than 29 marks

= Number of students in the marks group 30 - 39 + number of students in the marks group 40 – 49 = 24 +17 = 41

(vii) Number of students scoring between 9 and 40

= Number of students in the marks group 10 – 19 + Number of students in the marks group 20 - 29 + Number of students in the marks group 30 – 39

= 12 + 30 + 24 = 56

(viii) The highest marks group is 40 - 49.

Number of students in this marks group = 17

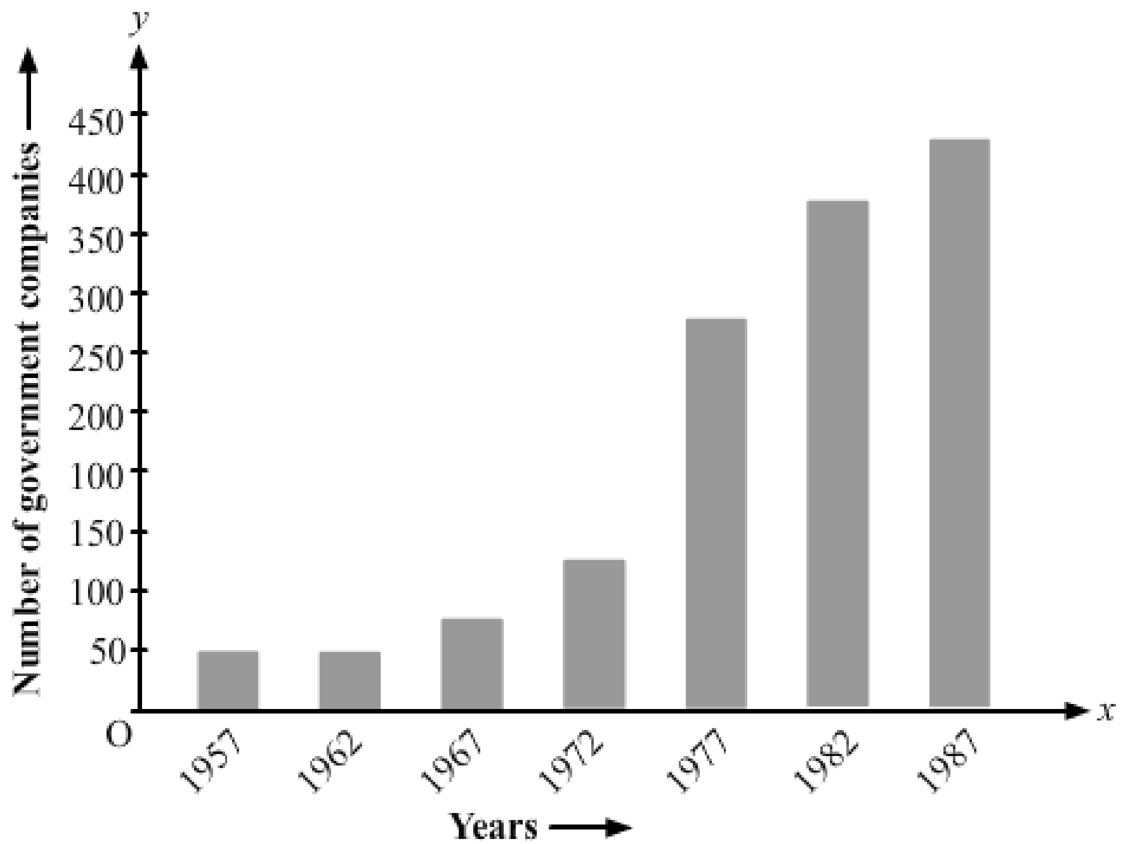
(ix) Number of students scoring more than 19 marks

= Number of students in the marks group 20 - 29 + Number of students in the marks group 30 - 39 + Number of students in the marks group 40 - 49

= 20 + 24 + 17 = 61

Question: 8

Read the following bar graph and answer the following questions:



(i) What is the information given by the bar graph?

(ii) State each of the following whether true or false.

(a) The number of government companies in 1957 is that of 1982 is 1: 9.

(b) The number of government companies has decreased over the year 1957 to 1983.

Solution:

(i) The bar graph represents the number of government companies in India from 1957 to 1987.

(ii) (a) False

Explanation: Number of government companies in 1957 = 50

Number of government companies in 1982 = 375

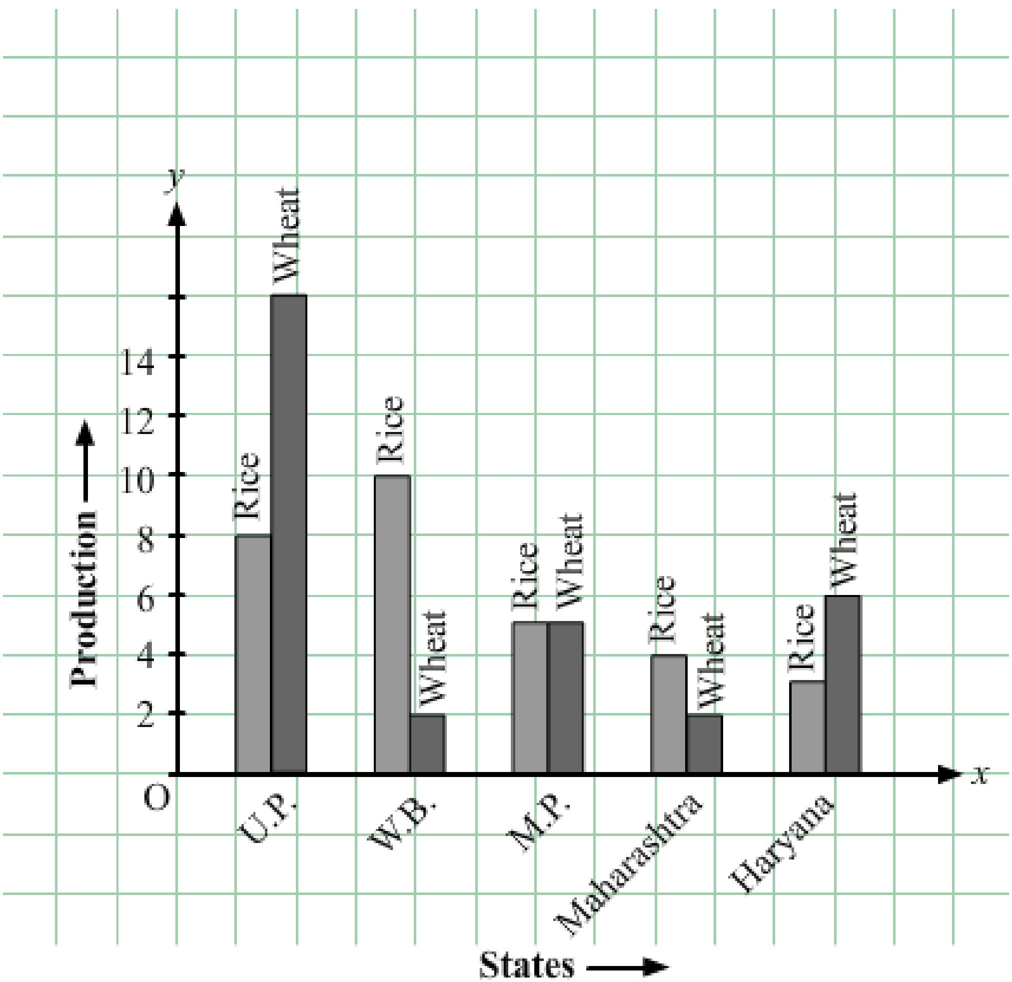
The ratio of the number of government companies in 1957 to that in 1982 = 50/375 = 2/15 = 2:15

(b) False

Explanation: As no data is given for the year 1983, we cannot tell anything about this. Hence, the given statement is false.

Question: 9

Read the following bar graph and answer the following questions:



(i) What information is given by the bar graph?

(ii) Which state is the largest producer of rice?

(iii) Which state is the largest producer of wheat?

(iv) Which state has total production of rice and wheat as its maximum?

(v) Which state has the total production of wheat and rice minimum?

Solution:

Let's draw a chart using the data from the above bar graph:

States	Rice Production	Wheat Production	Total Production
U.P	8	16	24
W.B	10	2	12
M.P	5	5	10
Maharashtra	4	2	6
Haryana	3	6	9

(i) The above bar graph provides information on the production of rice and wheat in various states of India.

(ii) W.B. is the largest producer of rice.

Explanation: The height of the rectangle representing rice production in W.B. is up to 10 units, i.e., the highest compared to those in the other states.

(iii) U.P. is the largest producer of wheat.

Explanation: The height of the rectangle representing wheat production in U.P. is up to 16 units, i.e., the highest compared to those in the other states.

(iv) U.P. has the total production of rice and wheat as its maximum.

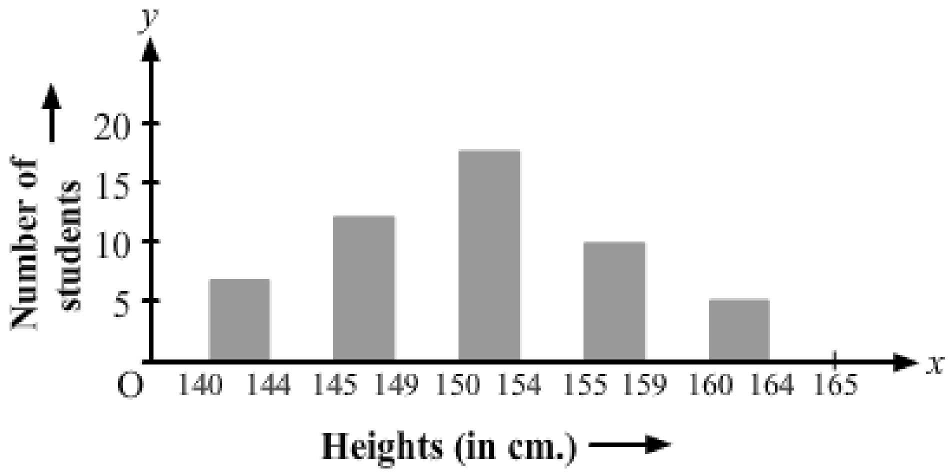
Explanation: From the bar graph we can say that U.P. exceeds the other states in the total production of rice and wheat, i.e., 16 units wheat + 8 units of rice = 24 units.

(v) Maharashtra has the total production of rice and wheat as its minimum.

Explanation: From the bar graph we can say that the total production of rice and wheat in Maharashtra is the minimum, i.e., 4 units rice + 2 units of wheat = 6 units.

Question: 10

The following bar graph represents the heights (in cm) of 50 students of class XI of a particular school. Study the graph and answer the questions:



(i) What percentage of the total number of students have their heights more than 149 cm?

(ii) How many students in the class are in the range of maximum height of the class?

(iii) The school wants to provide a particular type of tonic to each student below the height of 150 cm to improve his height. If the cost of the tonic for each student comes out to be Rs 55, how much amount of money is required?

(iv) How many students are in the range of shortest height of the class?

(v) State whether true or false:

(a) There are 9 students in the class whose heights are in the range of 155-159 cm.

(b) Maximum height (in cm) of a student in the class is 17.

(c) There are 29 students in the class whose heights are in the range of 145-154 cm.

(d) Minimum height (in cm) of a student is the class is in the range of 140-144 cms.

(e) The number of students in the class having their heights less than150 cm is 12.

(f) There are 14 students each of whom has height more than 154 cm.

Solution:

Let's draw a chart based on the above bar graph:

Heights (in cm)	Number of students
140 – 144	7

145 – 149	12
150 – 154	17
155 – 159	9
160 – 164	5

(i) Number of students whose height is more than 149 cm = 17 + 9 + 5 = 31

Total number of students = 50

Percentage of students whose height is more than 149 cm = 31/50% = 31 × 2% = 62%

(ii) The maximum height-range of the class is 160 — 164. Number of students in this range = 5

(iii) Number of students measuring less than 150 cm = 7 + 12 = 19 Required amount of money to be spent for the tonic = 19 × Rs. 55 = Rs. 1045

(iv) The minimum height-range of the class is 140 — 144 Number of students in this range = 7

(v) (a) True

Explanation: From the above chart we can say that the number of students in the height-range 155 — 159 is 9.

(b) False

Explanation: 17 is the number of students found in the maximum height-range, i.e., 160 — 164.

(c) True

Explanation: Number of students in the class whose heights are in the range of 145 — 154 cm = Number of students in the class whose heights are in the range of 145 — 149 + Number of students in the class whose heights are in the range of 150 — 154 = 12 + 17 = 29

(d) True

Explanation: The minimum height-range of the students in the class is 140 — 144 cm.

(e) False

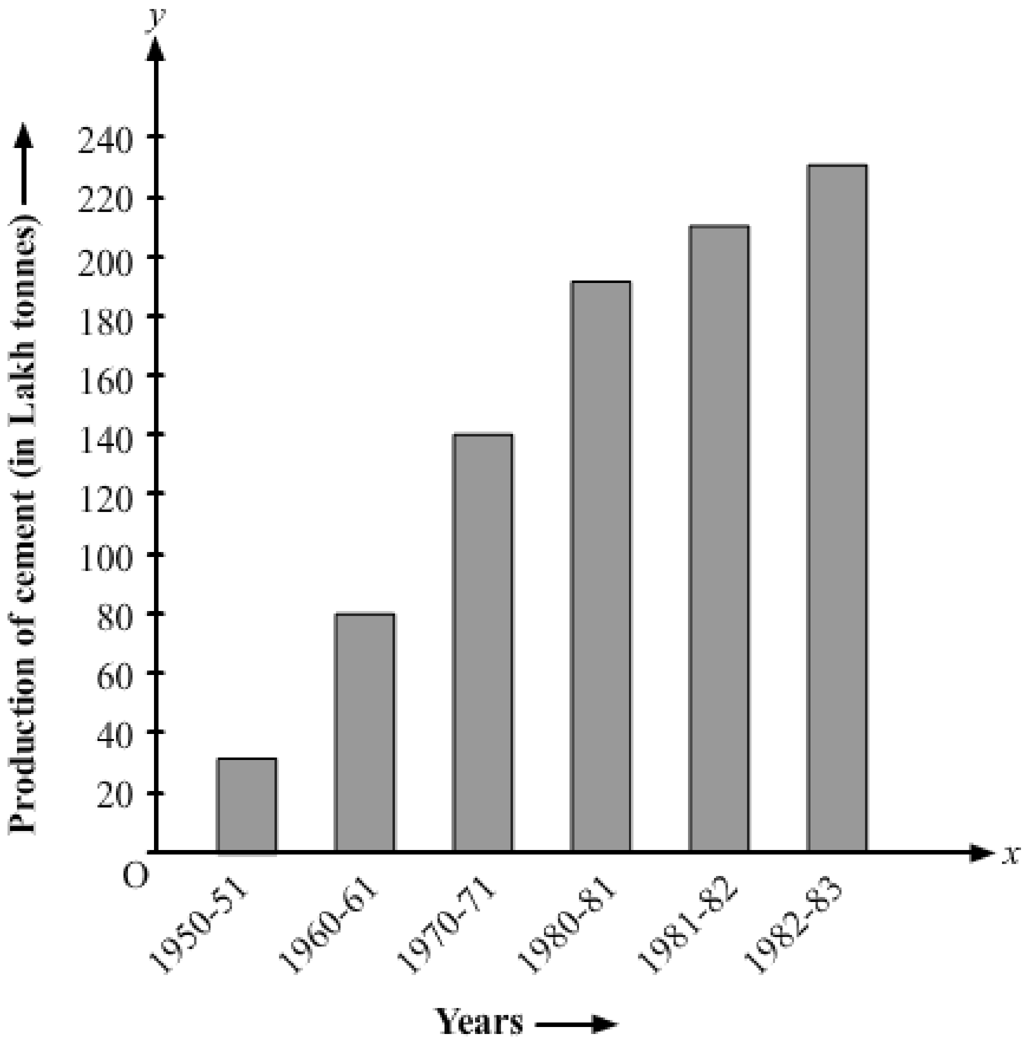
Explanation: Number of students measuring less than 150 cm = 7 + 12 = 19

(f) True

Explanation: Number of students measuring more than 154 cm = 9 + 5 = 14

Question: 11

Read the following bar graph (Fig. 23.15) and answer the following questions:



(i) What is the information given by the bar graph?

(ii) What was the production of cement in the year 1980 – 81?

(iii) What are the minimum and maximum productions of cement and corresponding years?

Solution:

(i) The bar graph informs us about the industrial production of cement in India in different financial years.

(ii) 186 lakh tones of cement were produced in the year 1980 – 81.

Explanation: The height of the bar against the year 1980 — 81 is up to186 units, and production of cement is shown in lakh tones.

(iii) Minimum height of a bar is 30 units against the year 1950 — 51.

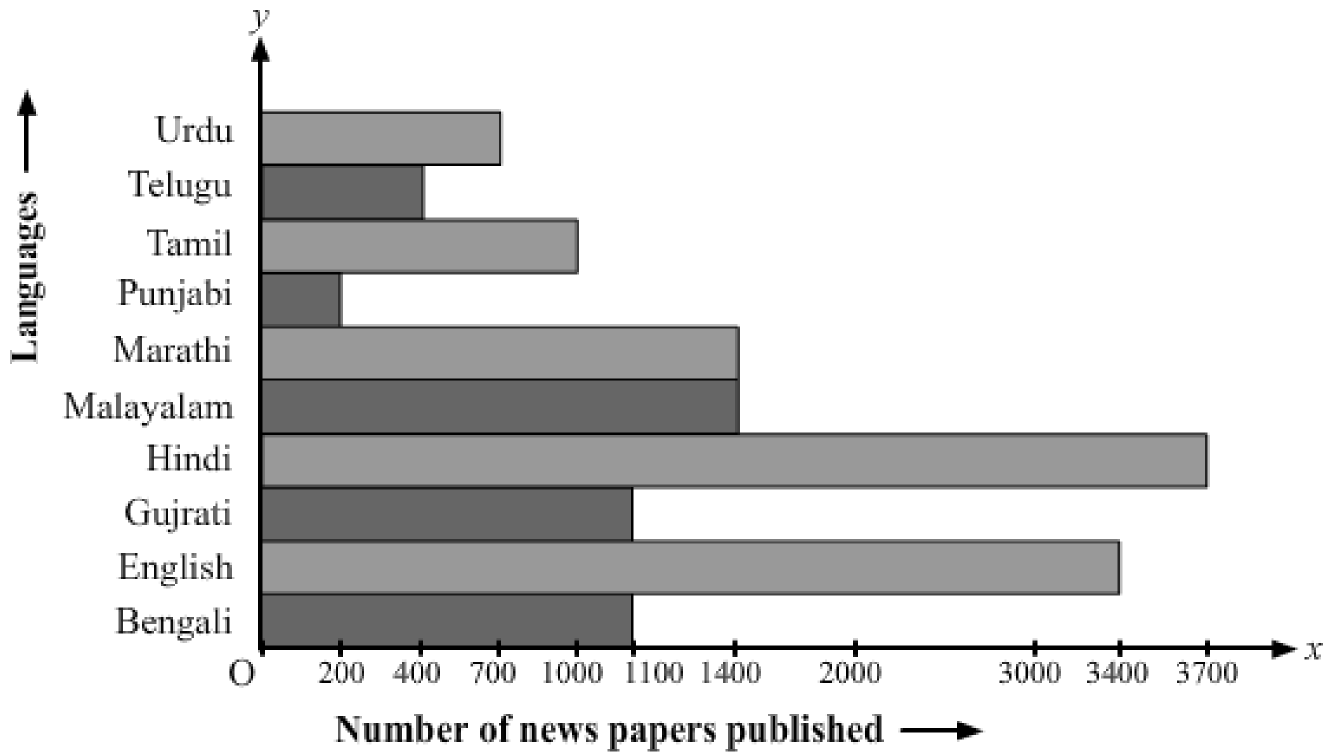
Therefore, Minimum production of cement is 30 lakh tonnes in the year 1950 — 51.

The maximum height of a bar is 232 units against the year 1982 — 83.

Maximum production of cement is 232 lakh tonnes in the year 1982 — 83.

Question: 12

The bar graph shown in fig 23.16 represents the circulation of newspapers in 10 languages. Study the graph and answer the following questions:



(i) What is the total number of newspapers published in Hindi, English, Urdu, Punjabi, and Bengali?

(ii) What percent is the number of newspapers published in Hindi of the total number of newspapers?

(iii) Find the excess of the number of newspapers published in English over those published in Urdu.

(iv) Name two pairs of languages which publish the same number of newspapers.

(v) State the language, in which the smallest number of newspapers is published,

(vi) State the language in which the largest number of newspapers is published.

(vii) State the language in which the number of newspapers published is between 2500 and 3500.

(viii) State whether true or false:

(a) The number of newspapers published in Malayalam and Marathi together is less than those published in English.

(b) The number of newspapers published in Telugu is more than those published in Tamil.

Solution:

Let’s draw a chart using the information from the above bar graph:

Language	Number of newspapers published
Urdu	700
Telugu	400
Tamil	1000
Punjabi	200
Marathi	1400
Malayalam	1400
Hindi	3700
Gujarati	1100
English	3400
Bengali	1100

(i) Total number of newspapers published in Hindi, English, Urdu, Punjabi and Bengali = 3700 + 3400 + 700 + 200 + 1100 = 9100

(ii) Number of newspaper published in Hindi = 3700

Total number of newspapers published = 700 + 400 + 1000 + 200 + 1400 + 1400 + 3700 + 1100 + 3400 + 1100 = 14400

Therefore, Percentage of Hindi newspaper published = 3700/14400 × 100%%

= 25.69%

= 25.7%

(iii) Number of newspapers published in English = 3400

Number of newspapers published in Urdu = 700

Therefore, Excess number of the newspapers published in English over Urdu = 3400 — 700 = 2700

(iv) “Marathi” & Malayalam” and “Gujarati & Bengali’ are the two pairs of languages in which same number of newspapers are published.

Explanation: Newspapers published in Marathi = Newspapers published in Malayalam = 1400

Newspapers published in Gujarati = Newspapers published in Bengali = 1100

(v) Punjabi is the language in which the least number of newspapers are published.

Explanation: In Punjabi, only 200 newspapers are published.

(vi) Hindi is the language in which the maximum numbers of newspapers are published.

Explanation: In Hindi, 3700 newspapers are published.

(vii) The number of English newspapers published is between 2500 and 3500.

Explanation: In English, 3400 newspapers are published.

(viii)

(a) True

Explanation: Total number of newspapers published in Malayalam and Marathi = 1400 + 1400 = 2800

The number of newspapers published in English are 3400, which is more than the total numbers of Malayalam and Marathi newspapers.

(b) False Explanation: Number of newspapers published in Telugu = 400

Number of newspapers published in Tamil = 1000

Exercise 23.2

Question: 1

Explain the reading and interpretation of bar graphs.

Solution:

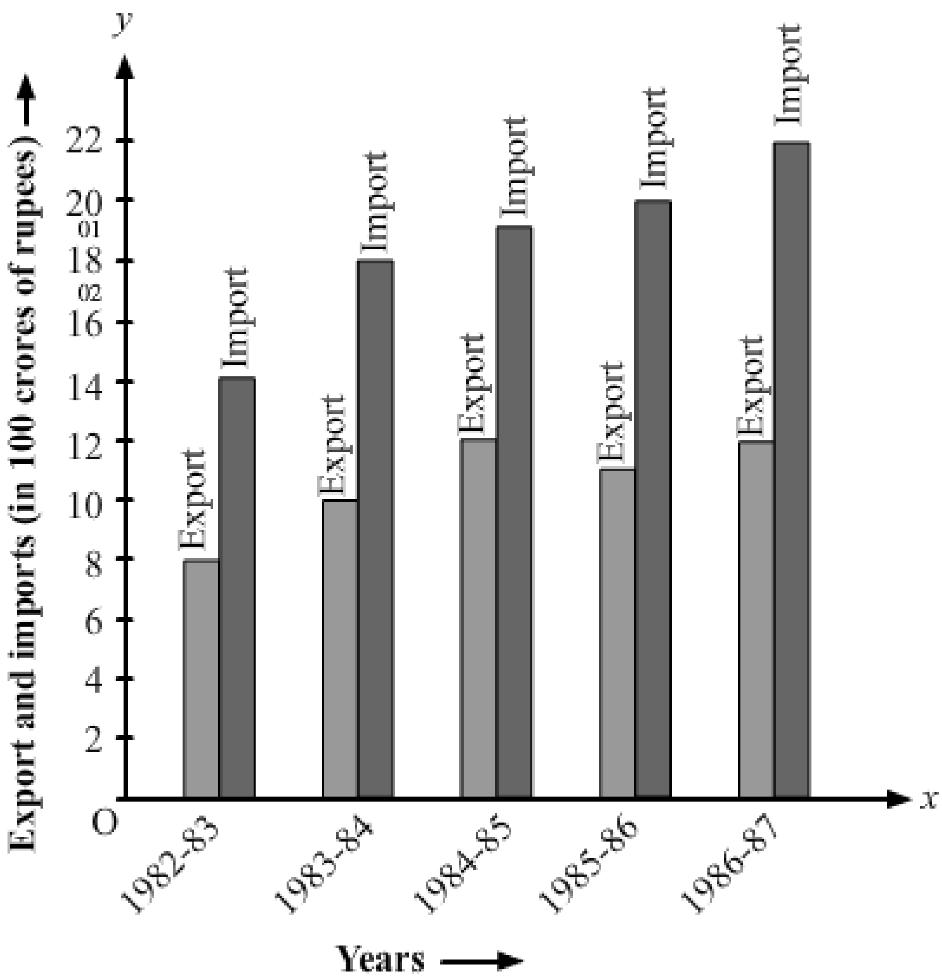
A bar graph is a graph with its length proportional to the value it represents. The bars in a bar graph can be plotted vertically or horizontally. A bar graph is a visual display used to compare the amount or frequency of occurrence of different characteristics of data.

Bar graph allows us to

- Compare groups of data
- Make generalizations about the data quickly

Question: 2

Read the following bar graph and answer the following questions:



(i) What information is given by the bar graph?

(ii) in which year the export is minimum?

(iii) In which year the import is maximum?

(iv) In which year the difference of the values of export and import is maximum?

Solution:

Let’s draw a chart using the information from the above bar graph:

Years	Export (in 100 crores of Rs)	Imports (in 100 crores of Rs)	Difference of import and export (in 100 crores of Rs)
1982 – 83	8	14	6
1983 – 84	10	18	8
1984 – 85	12	19	7
1985 – 86	11	20	9
1986 – 87	12	22	10

(i) It provides us the information on the total amount of imports and exports in different years between 1982 and 1987.

(ii) In the year 1982 — 83, the export is at its lowest.

Explanation: In the year 1982 — 83, exports amounted to 800 crores rupees, i.e., the lowest from all other years.

(iii) In the year 1986 — 87, the import is at its maximum.

Explanation: In the year 1986 — 87, imports amounted to 22,000 crores rupees, i.e., the highest from all other years.

(iv) In the year 1986 — 87, the difference in the amount of exports and imports is the maximum.

Explanation: In the year 1986 — 87, the difference in the values of export and import is 1000 crores rupees.

Question: 3

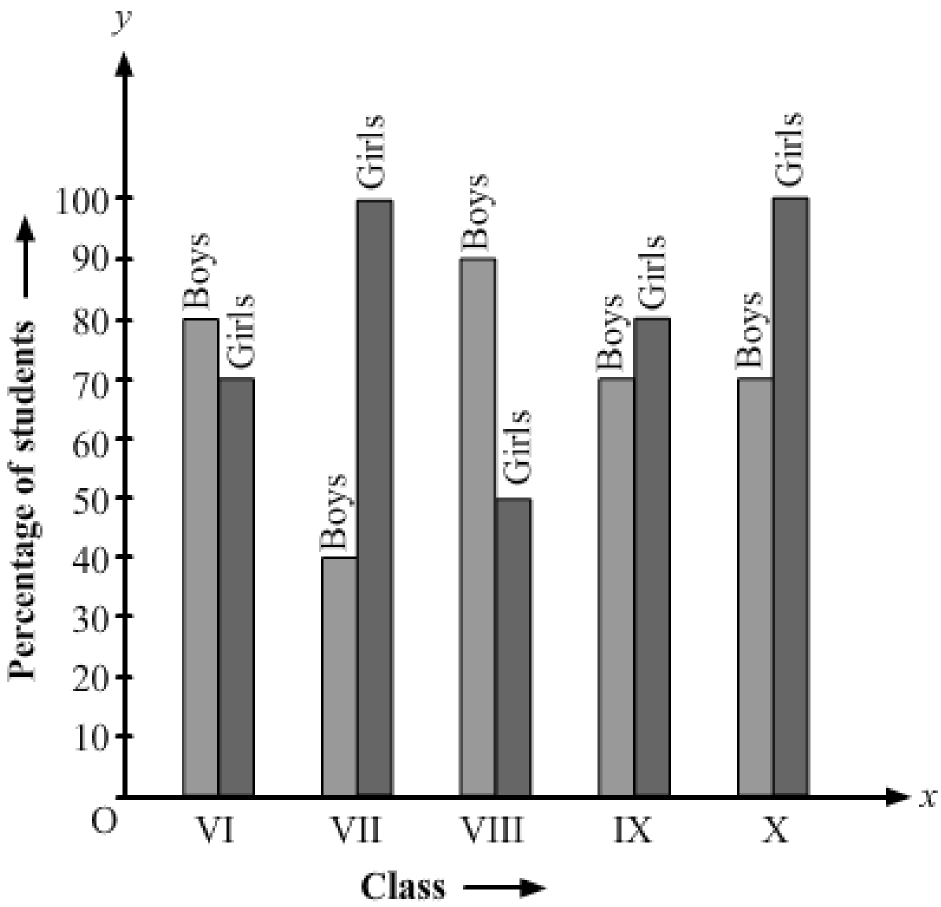
The following bar graph shows the results of an annual examination in a secondary school. Read the bar graph (Fig. 23.22) and choose the correct alternative in each of the following:

(i) The pair of classes in which the results of boys and girls are inversely proportional are:

(a) VI, VIII (b) VI, IX (c) VIII, IX (d) VIII, X

(ii) The class having the lowest failure rate of girls is

(a) VII (b) X (c) IX (d) VIII



(iii) The class having the lowest pass rate of students is:

(a) VI (b) VII (c) VIII (d) IX

Solution:

Let’s draw a chart using the information from the above bar graph.

Class	Percentage of boys	Percentage of girls
VI	80	70
VII	40	100
VIII	90	50

IX	70	80
X	70	90

(i) (b) VI, IX

Explanation: In Class VI, the percentage of boys = 80

In Class IX, the percentage of girls = 80

In Class VI, the percentage of girls = 70

In class IX, the percentage of boys = 70

(ii) (a) VII

Explanation: In class VII, the passing percentage of girls is at its peak i.e. 100%.

In this class, 0% of girls failed.

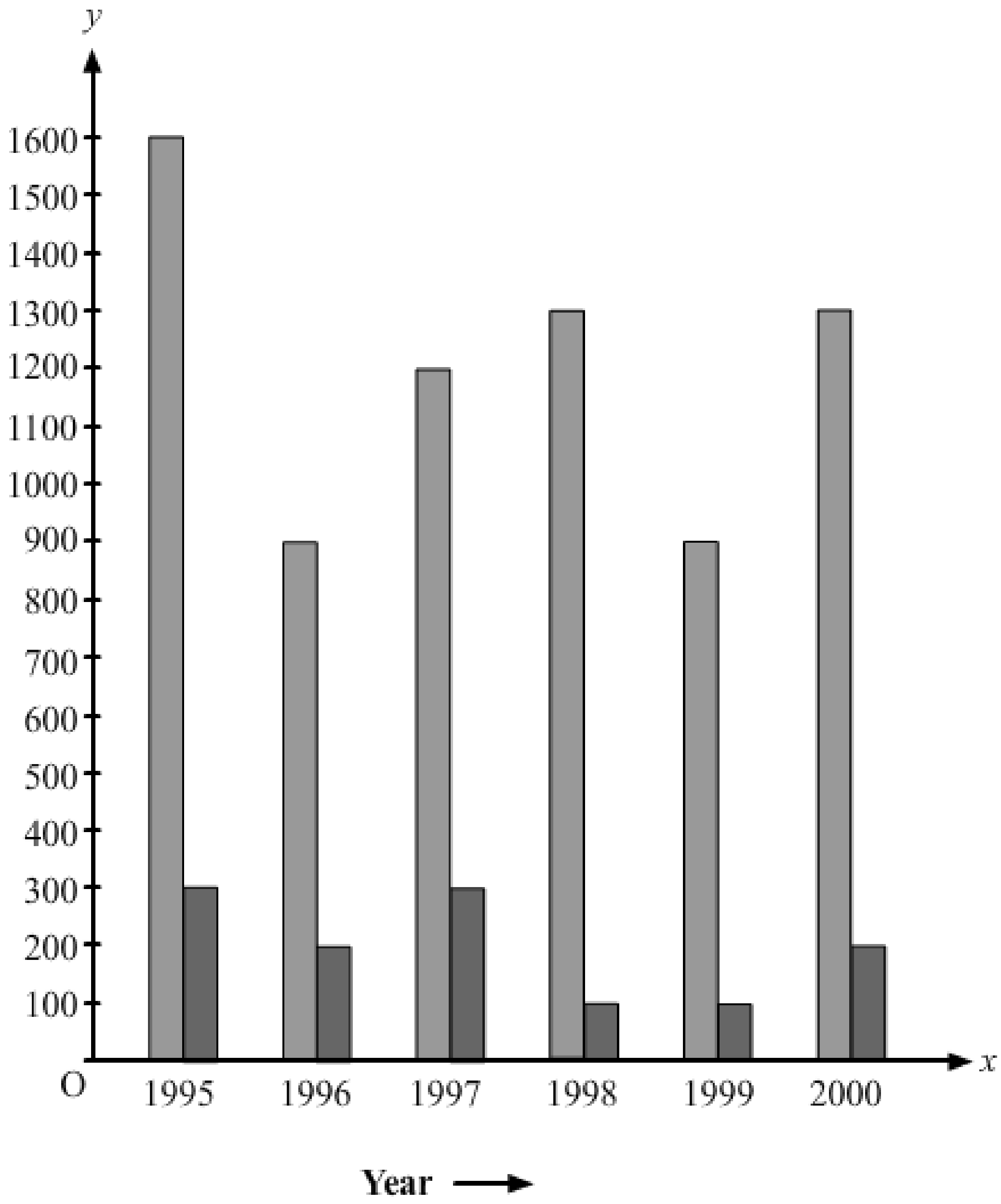
(iii) (b) VII and (c) VIII

Explanation: In class VII and VIII, the sum of vertical heights of the percentage of boys and girls in the given bar graph is same and that is 140 units. And this sum of heights is the least compared to all other

classes.

Question: 4

The following bar graph shows the number of persons killed in industrial accidents in a country for some years (Fig 23.23)



Read the bar graph and choose the correct alternative in each of the following:
(i) The year which shows the maximum percentage increase in the number of persons killed in coal mines over the preceding year is:

(a) 1996 (b) 1997 (c) 1999 (d) 2000

(ii) The year which shows the maximum decrease in the number of persons killed in industrial accidents over the preceding year is:

(a) 1996 (b) 1997 (c) 1998 (d) 1999

(iii) The year in which the maximum number of persons was killed in industrial accidents other than those killed in coal mines are:

(a) 1995 (b) 1997 (c) 1998 (d) 1999

Solution:

Let's draw a chart using the information from the above bar graph.

Year	Persons killed in industries accidents	Persons killed in coal mines
1995	1600	300
1996	900	200
1997	1200	300
1998	1300	100
1999	900	100
2000	1300	200

(i) (d) 2000

Explanation: In 1997, the death increased to 300 from 200, and in 2000, the death increased to 200 from 100.

Therefore, percentage increase in the amount of death in coal mines in the year 1997 ⇒ from 200 to 300 ⇒ 50% increase

Therefore, percentage increase in the amount of death in coal mines in the year 2000 ⇒ from 100 to 200 ⇒ 100% increase

(ii) (a) 1996

Explanation: Both the years, 1996 and in 1999, show a decrease in the amount of persons killed by industrial accidents.

Therefore, percentage decrease in the amount of death due to industrial accidents in the year 1996 => from 1600 to 900 = 43.75%

Therefore, percentage decrease in the amount of death due to industrial accidents in the year 1999 => from 1300 to 1900 = 30.77%

(iii) (a) 1995

Explanation: In the year 1995, 1600 persons were killed by industrial accidents, which is the highest compared to the other years.

Question: 5

The production of saleable steel in some of the steel plants of our country during 1999 is given below:

Plant	Bhilai	Durgapur	Rourkela	Bokaro
Production	160	80	200	150

Construct a bar graph to represent the above data on a graph paper by using the scale 1 big divisions = 20 thousand tonnes.

Solution:

Let’s draw two mutually perpendicular lines OX and OY.

Along the horizontal line OX, let’s mark plants; and along the vertical line OY, let’s mark the production.

Along the axis OX, let’s measure an equal width for each bar, the gap between the bars being the same.

We will now choose a suitable scale to determine the heights of the bar.

Here, let’s choose 1 big division = 20 thousand tons

Therefore, the heights of the bars as follows:

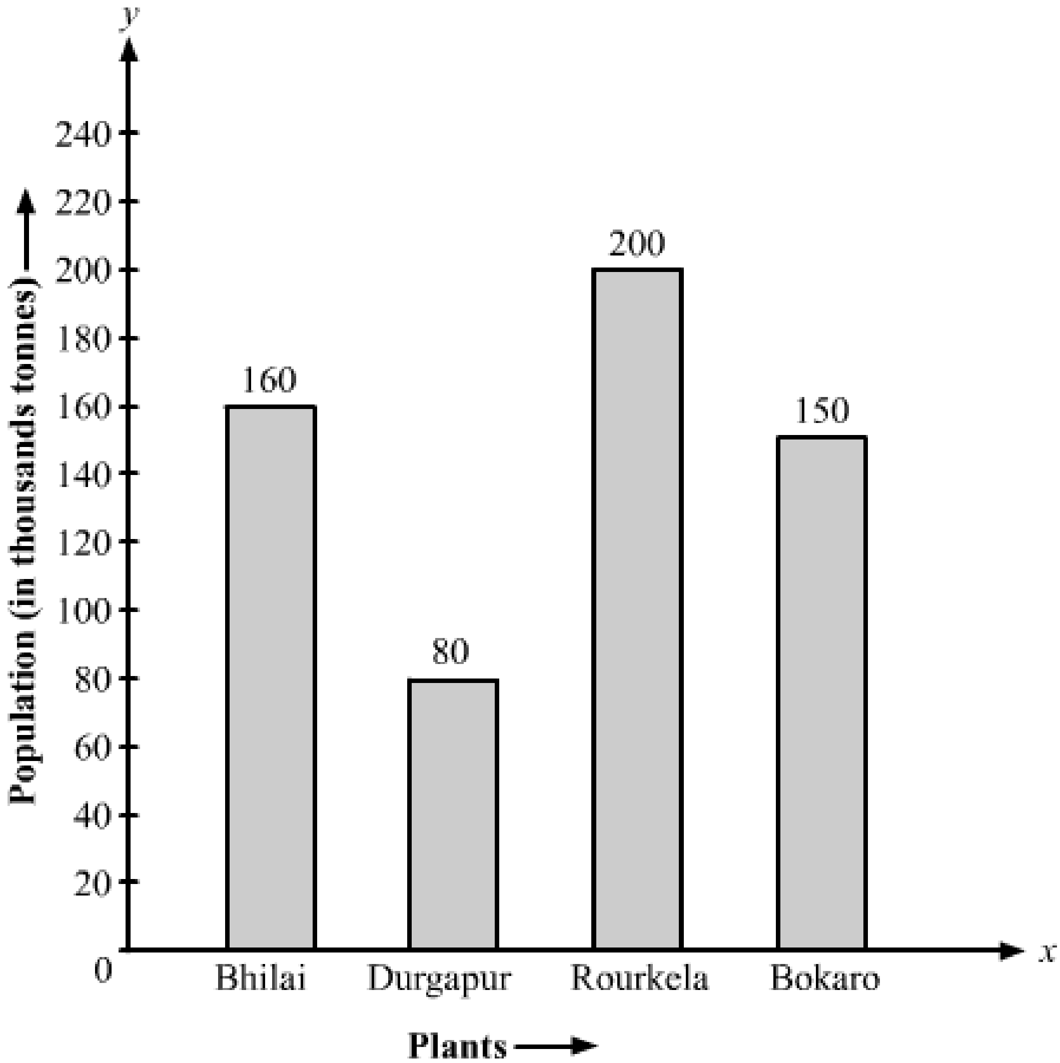
Height of the bar against Bhilai = 160/20 = 8 units.

Height of the bar against Durgapur = 80/20 = 4 units.

Height of the bar against Rourkela = 200/20 = 10 units.

Height of the bar against Bokaro = 150/20 = 7.5 units.

Now, based on the above calculation the graph is as follows:



Question: 6

The following data gives the number (in thousands) of applicants registered with a divisions = 20 thousand tonnes.

Year	1995	1996	1997	1998	1999	2000
Number of applicants registered	18	20	24	28	30	34

Construct a bar graph to represent the above data.

Solution:

Let’s draw two mutually perpendicular lines OX and OY.

Along the horizontal line OX, let’s mark years; and along the vertical line OY, let’s mark the number of applicants registered.

Along the axis OX, let’s choose a suitable width for each bar, the gap between the bars is the same.

We will now choose a suitable scale to determine the heights of the bars.

Here, let’s choose 1 big division = 4 thousand, applicants

Therefore, the heights of the bars are as follow:

Height of the bar against the year 1995 = 18/4 = 4.5 units.

Height of the bar against the year 1996 = 20/4 = 5 units.

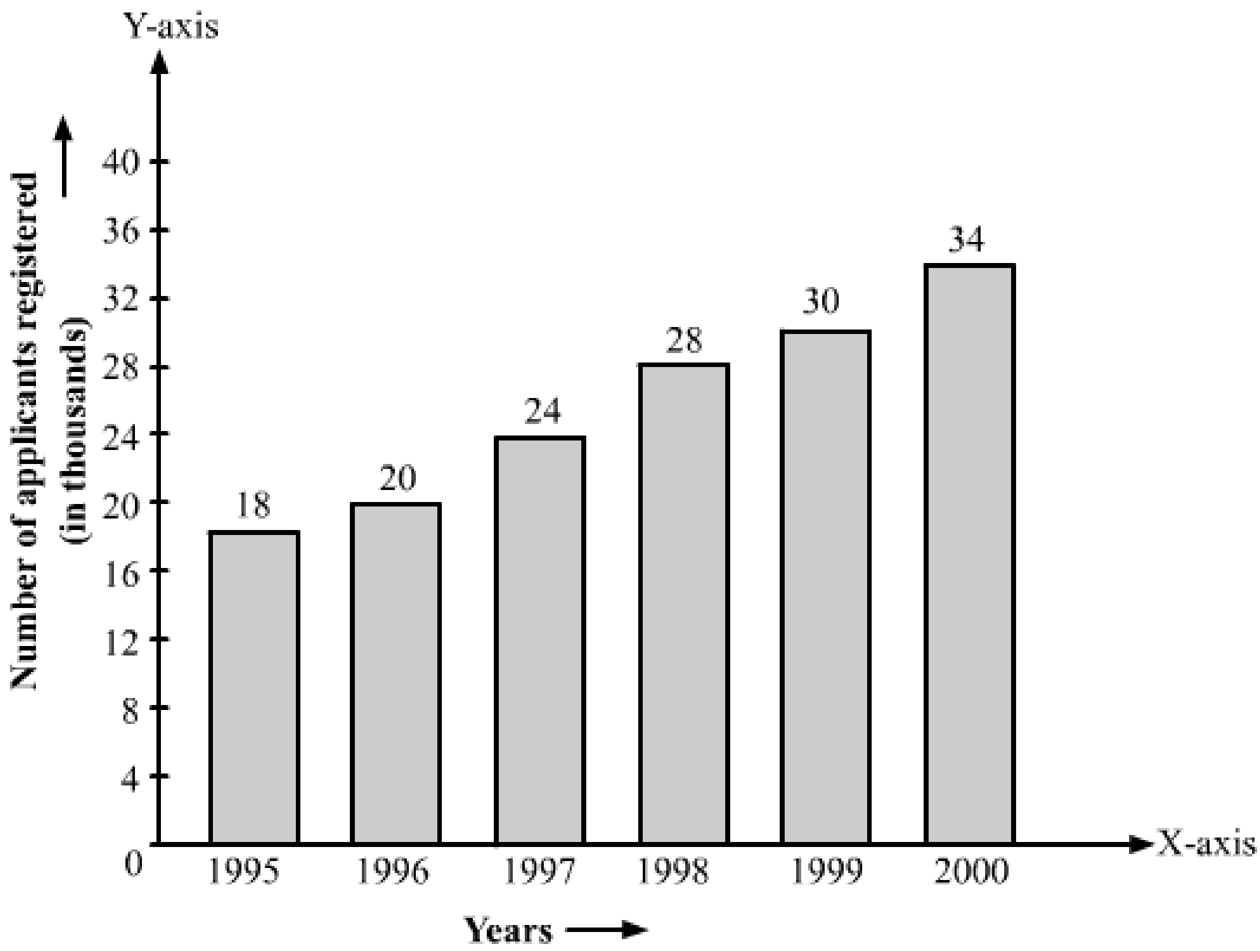
Height of the bar against the year 1997 = 24/4 = 6 units.

Height of the bar against the year 1998 = 28/4 = 7 units.

Height of the bar against the year 1999 = 30/4 = 7.5 units.

Height of the bar against the year 2000 = 34/4 = 8.5 units.

Based on the above calculation, the bar graph is as follows:



Question: 7

The following table gives the route length (in thousand kilometers) of the Indian Railways in some of the years:

Year	1960 – 61	1970 – 71	1980 – 81	1990 – 91	2000 – 01
Route length	56	60	61	74	98

Represent the above data with the help of a bar graph.

Solution:

Let’s draw two mutually perpendicular lines OX and OY.

Along the horizontal line OX, let’s mark years; and along the vertical line OY, let’s mark the route length.

Along the axis OX, let’s choose a suitable width for each bar, the gap between the bars is the same.

We will now choose a suitable scale to determine the heights of the bars.

Here, let’s take 1 big division = 10 thousand kilometres

Therefore, heights of the various bar are as follows:

Height of the bar against 1960 – 61 = 56/10 = 5.6 units.

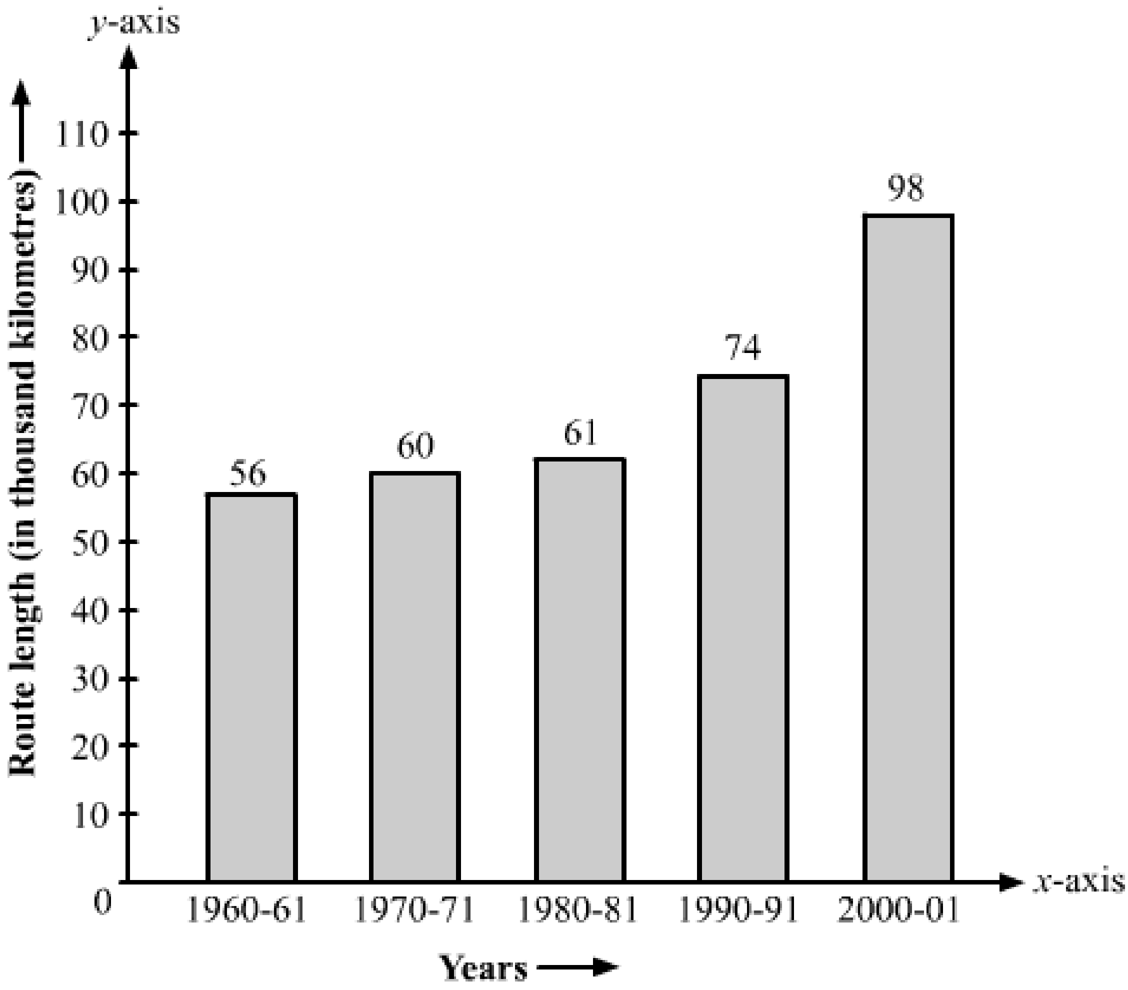
Height of the bar against 1970 –71 = 60/10 = 6.0 units.

Height of the bar against 1980 – 81 = 61/10 = 6.1 units.

Height of the bar against 1990 – 91 = 74/10 = 7.4 units.

Height of the bar against 2000 – 2001 = 9810 = 9.8 units.

Based on the above calculation, the bar graph is as follows:



Question: 8

he following data gives the amount of loans (in crores of rupees) disbursed by a bank during some years:

Year	1992	1993	1994	1995	1996
Loan	28	33	55	55	80

(i) Represent the above data with the help of a bar graph.

(ii) With the help of the bar graph, indicate the year in which amount of loan is not increased over that of the preceding year.

Solution:

Let's draw two mutually perpendicular lines OX and OY.

Along the horizontal line OX, let's mark years; and along the vertical line OY, let's mark loans in crores.

Along the axis OX, let's choose a suitable width for each bar, keeping the gap between the bars the same.

We will now choose a suitable scale to determine the heights of the bars.

Here, let's consider 1 big division = 10 crores of loan

Therefore, the heights of the various bars are as follows:

Height of the bar against the year 1992 = 28/10 = 2.8 units.

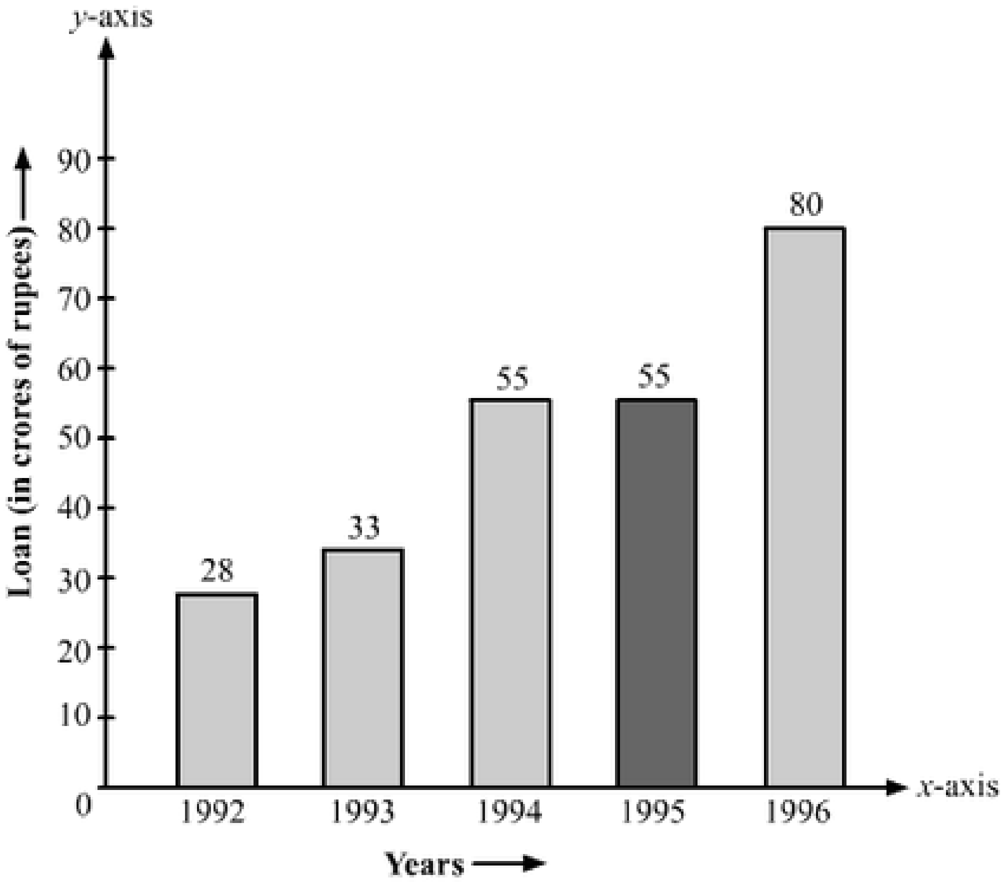
Heights of the bar against the year 1993 = 33/10 = 3.3 units.

Heights of the bar against the year 1994 = 55/10 = 5.5 units.

Heights of the bar against the year 1995 = 55/10 = 5.5 units.

Heights of the bar against the year 1996 = 80/10 = 8.0 units.

Based on the above calculation, the bar graph is as follows:



(ii) The year in which the loan amount has not increased than its previous year is 1995.

Explanation: In the year 1994, 55 crore rupees of loan was disbursed by the bank.

Also, in the year 1995, 55 crore rupees of loan was disbursed by the bank.

Question: 9

The following table shows the interest paid by a company (in lakhs):

Year	1995 – 96	1996 – 97	1997 – 98	1998 – 99	1999 – 2000
Interest	20	25	15	18	30

Draw the bar graph to represent the above information.

Solution:

Let’s draw two mutually perpendicular lines OX and OY.

Along the horizontal line OX, let’s mark years; and along the vertical line OY, let’s mark the amount of interest paid by the company.

Along the axis OX, let’s choose a suitable width for each bar, keeping the gap between the bars the same.

We will now choose a suitable scale to determine the heights of the bars.

Here, let’s consider 1 big division = 5 lakhs of rupees paid as interest by the company

Therefore, the heights of the various bars are as follows:

Height of the bar against the year 1995 — 96 = 20/5 = 4 units.

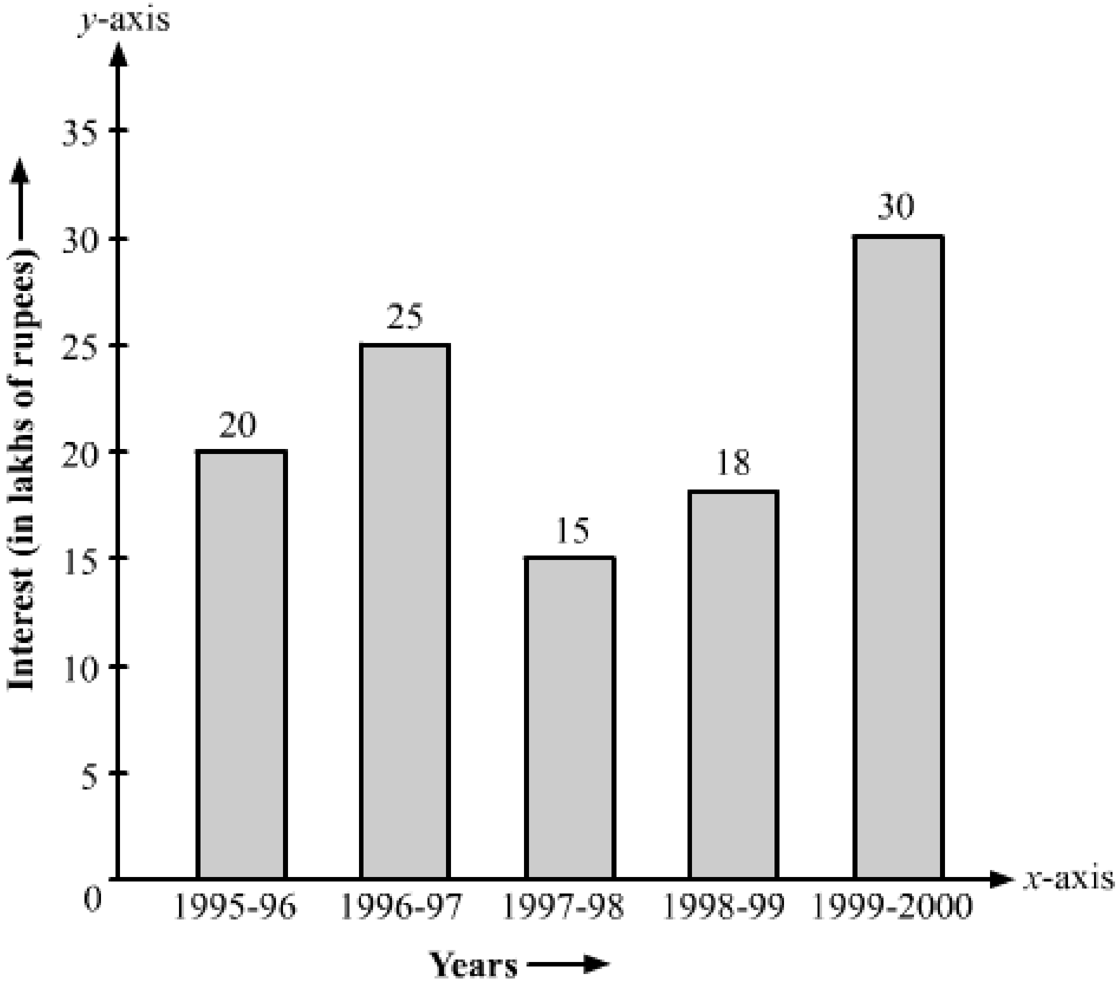
Height of the bar against the year 1996 — 97 = 25/5 = 5 units.

Height of the bar against the year 1997 — 98 = 15/5 = 3 units.

Height of the bar against the year 1998 — 99 = 18/5 = 3.6 units.

Height of the bar against the year 1999 — 2000 = 30/5 = 6 units.

Based on the above calculation, the bar graph is as follows:



Question: 10

The following data shows the average age of men in various countries in a certain year.

Country	India	Nepal	China	Pakistan	U.K	U.S.A
Average age	55	52	60	50	70	75

Represent the above information by a bar graph.

Solution:

Let's draw two mutually perpendicular lines OX and OY.

Along the horizontal line OX, let's mark the countries; and along the vertical line OY, let's mark the average age for men.

Along the axis OX, we will choose a suitable width for each bar, keeping the gap between the bars the same.

We will now choose a suitable scale to determine the heights of the bars.

Here, let's consider 1 big division = 10 years

Therefore, the heights of the various bars are as follows:

Height of the bar against India = 55/10 = 5.5 units.

Height of the bar against Nepal = 52/10 = 5.2 units.

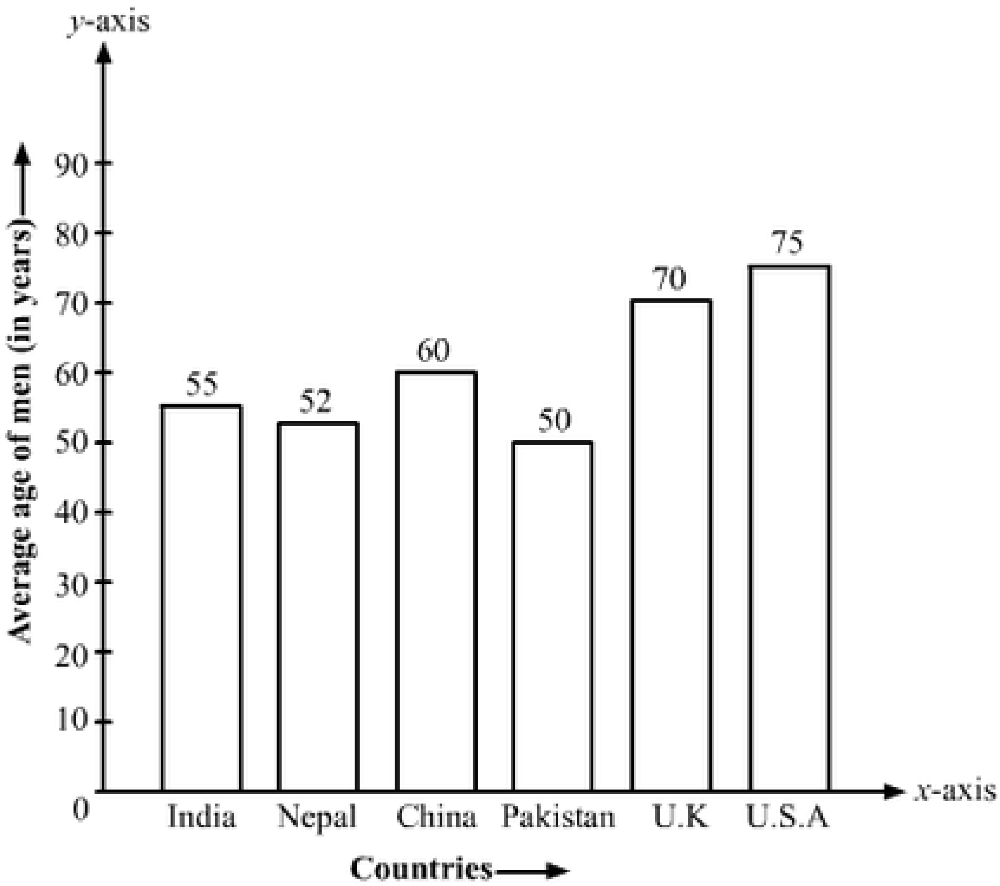
Height of the bar against China = 60/10 = 6.0 units.

Height of the bar against Pakistan = 50/10 = 5.0 units.

Height of the bar against U.K. = 70/10 = 7.0 units.

Height of the bar against U.S.A. = 75/10 = 7.5 units.

Based on the above calculation, the bar graph is as follows:



Question: 11

The following data gives the production of food grains (in thousand tones) for some years:

Solution:

Years	1995	1996	1997	1998	1999	2000
Production	120	150	140	180	170	190

Represent the above data with the help of a bar graph.

Let’s draw two mutually perpendicular lines OX and OY.

Along the horizontal line OX, let’s mark the years; and along the vertical line OY, let’s mark the production of food grains in tons.

Along the axis OX, let’s choose an equal width for each bar, keeping the gap between the bars the same.

We will now choose a suitable scale to determine the heights of the bar

Here, let’s consider 1 big division = 20 thousand tons.

Therefore, the heights of the various bars are as follows:

Height of the bar against the year 1995 = 120/20 = 6 units.

Height of the bar against the year 1996 = 150/20 = 7.5 units.

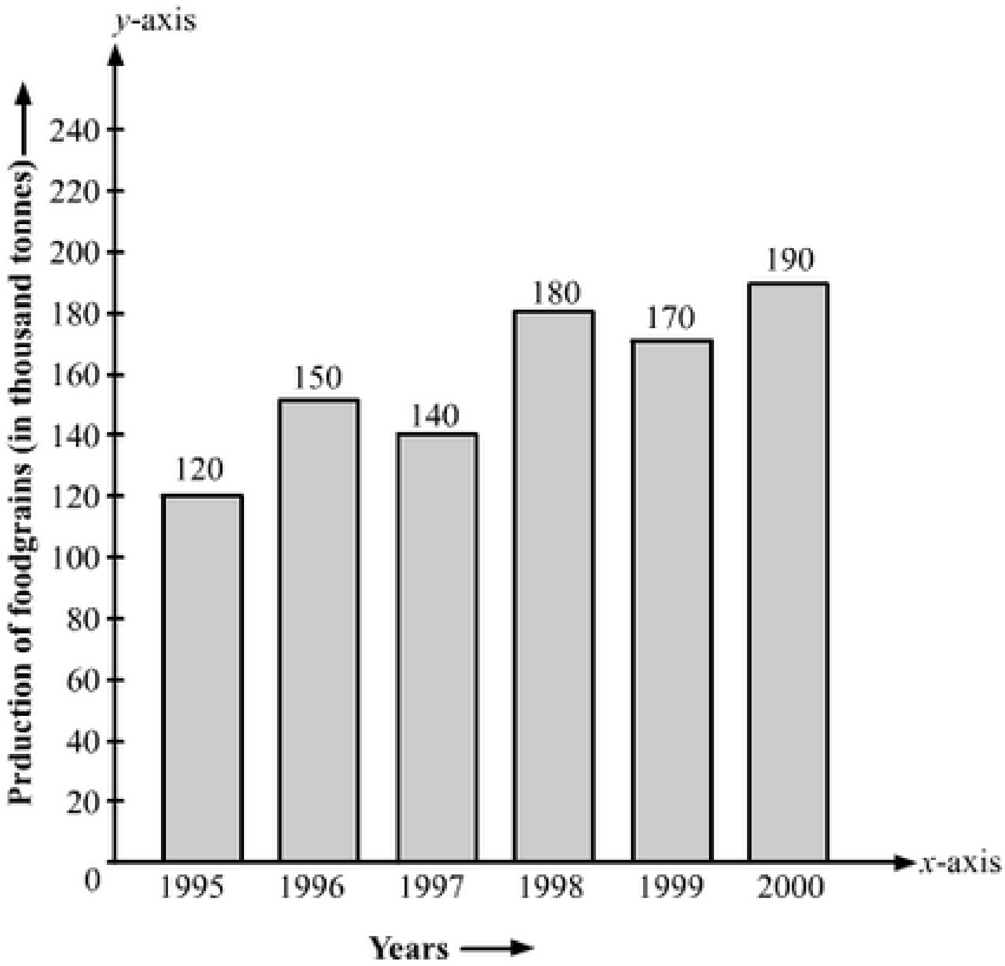
Height of the bar against the year 1997 = 140/20 = 7 units.

Height of the bar against the year 1998 = 180/20 = 9 units.

Height of the bar against the year 1999 = 170/20 = 8.5 units.

Height of the bar against the year 2000 = 190/20 = 9.5 units.

Based on the above calculations, the bar graph is as follows:



Question: 12

The following data gives the amount of mature (in thousand tones) manufactured by a company during some years:

Years	1992	1993	1994	1995	1996	1997
Manure	15	35	45	30	40	20

(i) Represent the above data with the help of a bar graph.

(ii) Indicate will the help of the bar graph the year in which the amount of manure manufactured by the company was maximum.

(iii) Choose the correct alternative.

The consecutive years during which there was a maximum decrease in manure production are:

(a) 1994 and 1995 (b) 1992 and 1993

(c) 1996 and 1997 (d) 1995 and 1996

Solution:

Let's draw two mutually perpendicular lines OX and OY.

Along the horizontal line OX, let's mark the years; and along the vertical line OY, let's mark the amount of manure in tons.

Along the axis OX, let's choose an equal width of each bar, keeping the gap between the bars the same.

We will now choose a suitable scale to determine the heights of the bars.

Here, let's consider 1 big division = 5 thousand tons of manure

Therefore, the heights of the various bars are as follows:

Height of the bar against the year 1992 = 15/5 = 3 units.

Height of the bar against the year 1993 = 35/5 = 7 units.

Height of the bar against the year 1994 = 45/5 = 9 units.

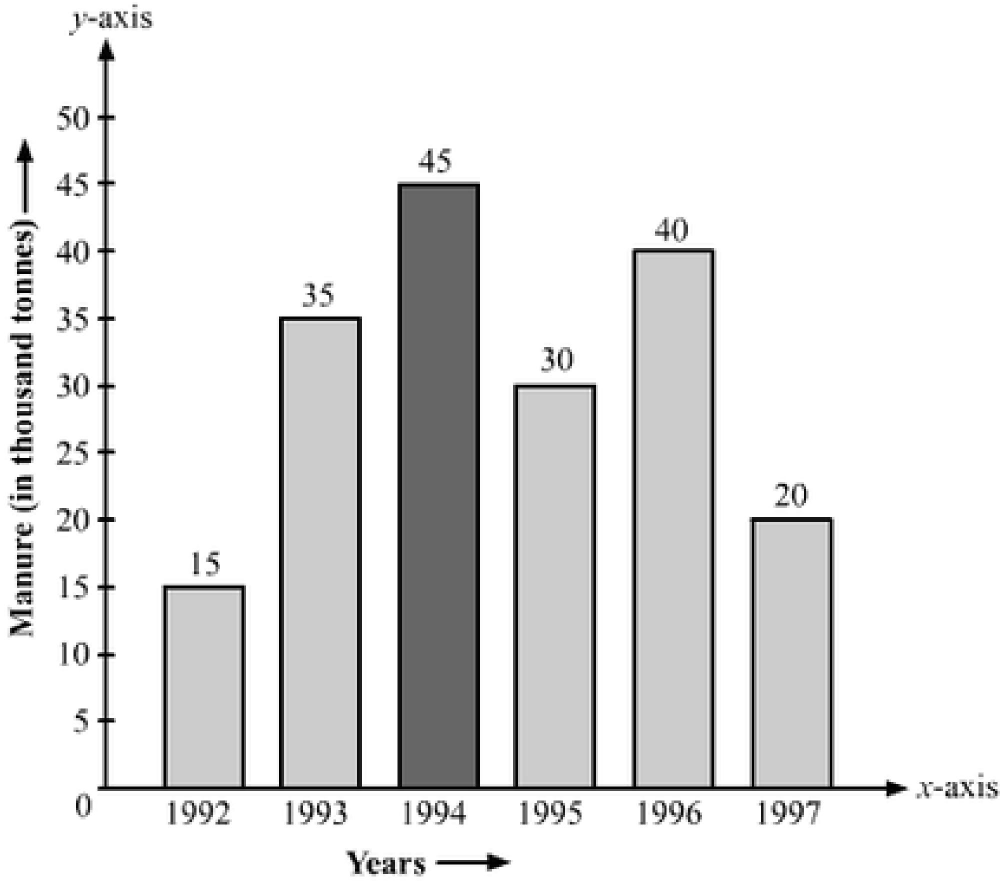
Height of the bar against the year 1995 = 30/5 = 6 units.

Height of the bar against the year 1996 = 40/5 = 8 units.

Height of the bar against the year 1997 = 20/5 = 4 units.

Based on the above calculation, the bar graph is as follows:

(i)



(ii) The amount of manure manufactured in the year 1994 was the maximum.

(iii) (c) 1996 and 1997

Explanation: The production decreased by 15 thousand tons from the year 1994 to 1995, and from 1996 and 1997 the production of manure decreased by 20 thousand tons.