पुना International School

ukul, Zundal

MATHEMATICS

GRADE VII

Specimen Copy

INDEX

CH-5 DATA HANDLING

KEY POINTS TO REMEMBER

1. Data mostly available to us in an unorganised form is called raw data.
2. In order to draw meaningful inferences from any data, we need to organise the data systematically
. 3. Frequency gives the number of times that a particular entry occurs.
4. Raw data can be 'grouped' and presented systematically through 'grouped frequency distribution'
. 5. Grouped data can be presented using histogram. Histogram is a type of bar diagram, where the class intervals are shown on the horizontal axis and the heights of the bars show the frequency of the class interval. Also, there is no gap between the bars as there is no gap between the class intervals.
6. Data can also presented using circle graph or pie chart. A circle graph shows the relationship between a whole and its part.
7. There are certain experiments whose outcomes have an equal chance of occurring. 8.
A random experiment is one whose outcome cannot be predicted exactly in advance.
9. Outcomes of an experiment are equally likely if each has the same chance of occurring.
10. Probability of an event = Number of outcomes that make an event Total number of outcomes of the experiment , when the outcomes are equally likely
11. One or more outcomes of an experiment make an event.
12. Chances and probability are related to real life.

Exercise 5.1

Exercise 5.1

Ex 5.1 Class 8 MathsQuestion 1.
For which of these would you use a histogram to show the data?
(i) The number of letters for different areas in a postman's bag.
(ii) The height of competitors in an athletics meet.
(iii) The number of cassettes produced by 5 companies.
(iv) The number of passengers boarding trains from 7 a.m to 7 p.m at a station.
Give a reason for each.
Solution:
(i) The number of areas cannot be represented in class-intervals. So, we cannot use the histogram to show the data.
(ii) Height of competitors can be divided into intervals. So, we can use histogram here.
For example:

Height in (cm)	No. of competitors
150–160	10
160–170	12
170–180	5
180–190	2

(iii) Companies cannot be divided into intervals. So, we cannot use histogram here.

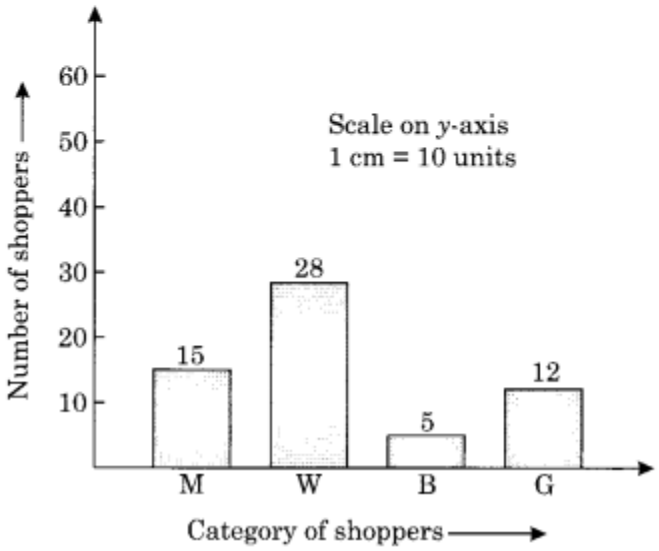
(iv) Time for boarding the train can be divided into intervals. So, we can use histogram here.
For example:

Time in hours	Number of passengers
7 am–10 am	1500
10 am–1 pm	2000
1 pm–4 pm	1000
4 pm–7 pm	800

Question 2.
The shoppers who come to a departmental store are marked as: man (M), woman (W), boy (B) or girl (G). The following list gives the shoppers who came during the first hour in the morning.
W WW G B W W M G G M M W WWW
G B M W B G G M W W M M W WW
M W B W G M W WWW G W M M W
W M W G W M G W M M B G G W
Make a frequency distribution table using tally marks. Draw a bar graph to illustrate it.
Solution:

Shoppers	Tally marks	Frequency
M	𝍸 𝍸 𝍸	15
W	𝍸 𝍸 𝍸 𝍸 𝍸 |||	28
B	𝍸	5
G	𝍸 𝍸 ||	12
Total		**60**

Bar Graph



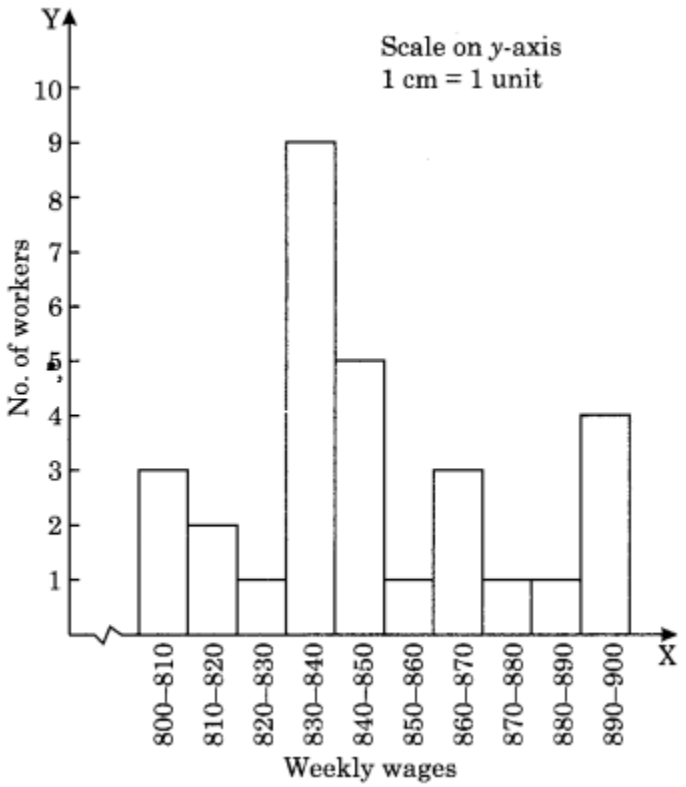
Question 3.
The weekly wages (in ₹) of 30 workers in a factory are:
830, 835, 890, 810, 835, 836, 869, 845, 898, 890,

820, 860, 832, 833, 855, 845, 804, 808, 812, 840,
885, 835, 835, 836, 878, 840, 868, 890, 806, 840
Using tally marks make a frequency table with intervals as 800-810, 810-820 and so on.
Solution:

850–860	|	1
860–870	|||	3
870–880	|	1
880–890	|	1
890–900	||||	4
Total		30

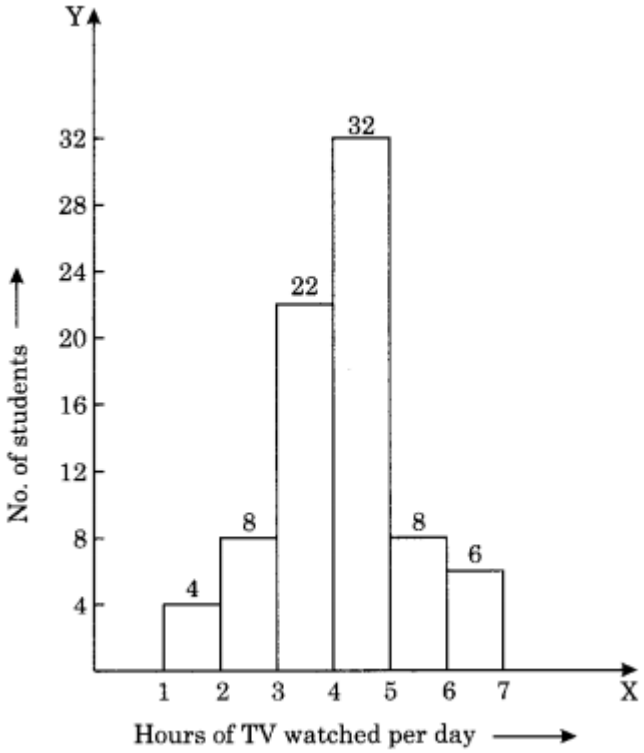
Class-intervals	Tally marks	Frequency
800–810	|||	3
810–820	||	2
820–830	|	1
830–840	𝍸 ||||	9
840–850	𝍸	5

Question 4.
Draw a histogram for the frequency table made for the data in Question 3, and answer the following questions:
(i) Which group has the maximum number of workers?
(ii) How many workers earn ₹ 850 and more?
(iii) How many workers earn less than ₹ 850?
Solution:
Refer to the frequency table of Question No. 3.



(i) Group 830-840 has the maximum number of workers, i.e., 9.
(ii) 10 workers earn equal and more than ₹ 850.
(iii) 20 workers earn less than ₹ 850.

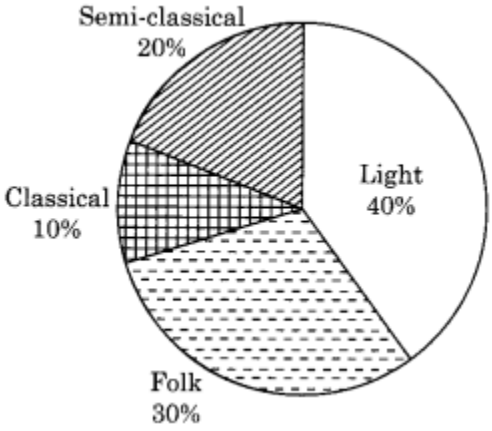
Question 5.
The number of hours for which students of a particular class watched television during holidays is shown through the given graph.
Answer the following questions.
(i) For how many hours did the maximum number of students watch TV?
(ii) How many students watched TV for less than 4 hours?
(iii) How many students spent more than 5 hours watching TV?



Solution:
(i) 32 is the maximum number of students who watched TV for 4 to 5 hours.
(ii) 4 + 8 + 22 = 34 students watched TV for less than 4 hours.
(iii) 8 + 6 = 14 students watched TV for more than 5 hours.

Exercise 5.2

A survey was made to find the type of music that a certain group of young people liked in a city. The adjoining pie chart shows the findings of this survey.



From this pie chart answer the following:
(i) If 20 people liked classical music, how many young people were surveyed?
(ii) Which type of music is liked by the maximum number of people?
(iii) If a cassette company were to make 1000 CDs. How many of each type would they make?
Solution:

(i) Number of young people who were surveyed = $\frac{100 \times 20}{10}$ = 200 people.

(ii) Light music is liked by the maximum people, i.e., 40%

(iii) Total number of CD = 1000

Number of viewers who like classical music = $\frac{10 \times 1000}{100}$ = 100

Number of viewer who like semi-classical music = $\frac{20 \times 1000}{100}$ = 200

Number of viewers who like light music = $\frac{40 \times 1000}{100}$ = 400

Number of viewers who like folk music = $\frac{30 \times 1000}{100}$ = 300

Question 2.

A group of 360 people were asked to vote for their favourite season from the three seasons rainy, winter and summer.

Season	No. of votes
Summer 	90
Rainy 	120
Winter 	150

(i) Which season got the most votes?

(ii) Find the central angle of each sector.

(iii) Draw a pie chart to show this information.

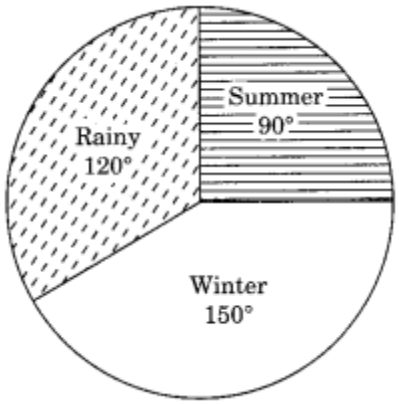
Solution:

(i) Winter season got the most votes, i.e. 150

(ii)

Season	Number of votes	Central angle
Summer	90	$\frac{90}{360} \times 360° = 90°$
Rainy	120	$\frac{120}{360} \times 360° = 120°$
Winter	150	$\frac{150}{360} \times 360° = 150°$
Total	**360**	

(iii) Pie chart



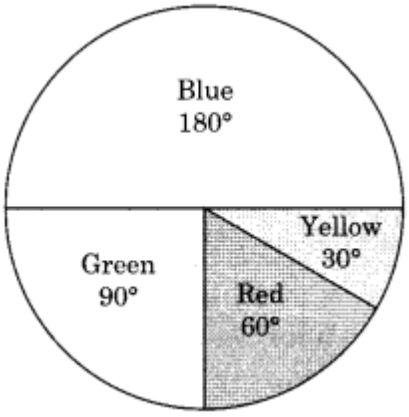
Question 3.
Draw a pie chart showing the following information. The table shows the colours preferred by a group of people.

Colours	Number of People
Blue	18
Green	9
Red	6
Yellow	3
Total	**36**

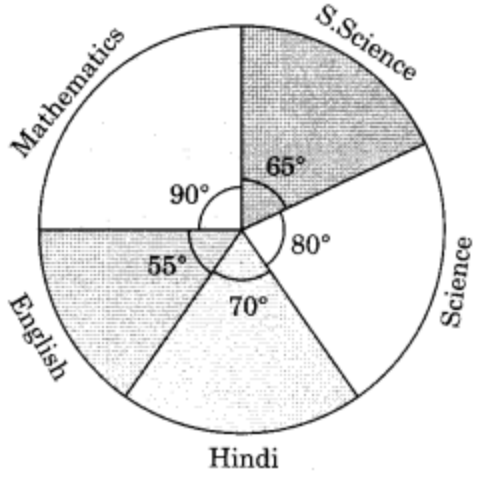
Solution:

Table to find the central angle of each sector

Colours	Number of People	Central angle
Blue	18	$\frac{18}{36} \times 360^\circ = 180^\circ$
Green	9	$\frac{9}{36} \times 360^\circ = 90^\circ$
Red	6	$\frac{6}{36} \times 360^\circ = 60^\circ$
Yellow	3	$\frac{3}{36} \times 360^\circ = 30^\circ$
Total	**36**	



Question 4.
The following pie chart gives the marks scored in an examination by a student in Hindi, English, Mathematics, Social Science and Science. If the total marks obtained by the students were 540, answer the following questions.



(i) In which subject did the student score 105 marks?
(Hint: for 540 marks, the central angle = 360°. So, for 105 marks, what is the central angle?)

(ii) How many more marks were obtained by the student in Mathematics than in Hindi?
(iii) Examine whether the sum of the marks obtained in Social Science and Mathematics is more than that in Science and Hindi.
(Hint: Just study the central angles).
Solution:

Subjects	Central angles
Mathematics	90°
English	55°
Hindi	70°
Science	80°
S. Science	65°

(i) For 540 marks, the central angle = 360°

For 105 marks the central angle = $\frac{360}{540} \times 105 = 70°$

Corresponding subject = Hindi

(ii) Marks obtained in Mathematics = $\frac{90}{360} \times 540 = 135$

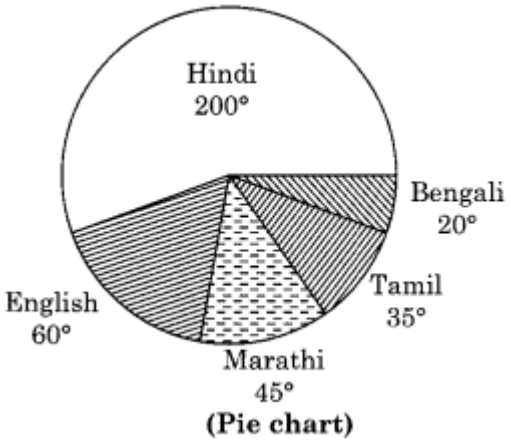
Marks obtained in Mathematics more than Hindi = 135 – 105 = 30
(iii) Central angle of Social Science + Mathematics = 65° + 90° = 155°
Central angle of Science + Hindi = 80° + 70° = 150°

Question 5.
Marks obtained in Social Science and Mathematics are more than that of the marks obtained in Science and Hindi.
The number of students in a hostel, speaking different languages is given below. Display the data in a pie chart.

Language	Number of students
Hindi	40
English	12
Marathi	9
Tamil	7
Bengali	4
Total	**72**

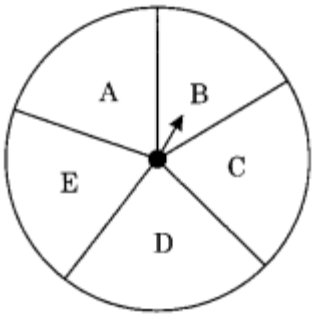
Language	Number of students	Central angle
Hindi	40	$\frac{40}{72} \times 360° = 200°$
English	12	$\frac{12}{72} \times 360° = 60°$
Marathi	9	$\frac{9}{72} \times 360° = 45°$
Tamil	7	$\frac{7}{72} \times 360° = 35°$
Bengali	4	$\frac{4}{72} \times 360° = 20°$
Total	**72**	

Solution:



(Pie chart)

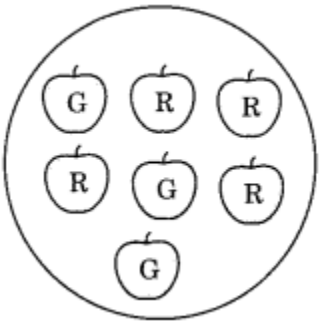
Question 1.
List the outcomes you can see in these experiments.
(i) Spinning a wheel



(ii) Tossing two coins together
Solution:
(i) On spinning the wheel, we can get the following outcomes B, C, D, E and A.
(ii) When two coins are tossed together, we get the following outcomes
HH, HT, TH, TT (Where H denotes Head and T denotes Tail)

Question 2.
When a die is thrown, list the outcomes of an event of getting
(i) (a) a prime number
(b) not a prime number
(ii) (a) a number greater than 5
(b) a number not greater than 5
Solution:
(i) (a) The prime number are 2, 3 and 5
Required outcomes = 2, 3 and 5
(b) Outcomes for not a prime number are 1, 4 and 6
Required outcomes = 1, 4, 6.
(ii) (a) Outcomes for a number greater than 5 = 6
Required outcome = 6
(b) Outcomes for a number not greater than 5 are 1, 2, 3, 4, 5
Required outcomes = 1, 2, 3, 4, 5.

Question 3.
Find the
(i) Probability of the pointer stopping on D in (Question 1-(a))?
(ii) Probability of getting an ace from a well-shuffled deck of 52 playing cards?
(iii) Probability of getting a red apple, (see figure below)



Solution:

(i) Refer to fig. Question 1-(a)
Total number of sectors = 5
Number of sector where the pointer stops = 1, i.e. D
Probability of pointer stopping at D = 1/5
(ii) Number of aces = 4 (one from each suit i.e. heart, diamond, club and spade)
Total number of playing cards = 52
Probability of getting an ace

$$= \frac{\text{Number of aces}}{\text{Total number of playing cards}}$$

$$= \frac{4}{52} = \frac{1}{13}$$

(iii) Total number of apples = 7
Number of red apples = 4
Probability of getting red apples

$$= \frac{\text{Number of red apples}}{\text{Total number of apples}} = \frac{4}{7}$$

Question 4.
Numbers 1 to 10 are written on ten separate slips (one number on one slip), kept in a box and mixed well. One slip is choosen from the box without looking into it. What is the probability of:
(i) getting a number 6?
(ii) getting a number less than 6?
(iii) getting a number greater than 6?
(iv) getting a 1-digit number?

Solution:

(i) Probability of getting a number 6 = $\frac{1}{10}$

(ii) Probability of getting a number less than 6 = $\frac{5}{10} = \frac{1}{2}$ [∵ Numbers less than 6 are 1, 2, 3, 4, 5]

(iii) Probability of getting a number greater than 6 = $\frac{4}{10} = \frac{2}{5}$ [∵ Number greater than 6 are 7, 8, 9, 10]

(iv) Probability of getting a 1-digit number = $\frac{9}{10}$

[∵ 1-digit numbers are 9, i.e. 1, 2, 3, 4, 5, 6, 7, 8, 9]

Question 5.
If you have a spinning wheel with 3 green sectors, 1 blue sector and 1 red sector, what is the probability of getting a green sector? What is the probability of getting a non-blue sector?
Solution:
Total number of sectors are = 3 green + 1 blue + 1 red = 5 sectors
Probability of getting a green sector

$$= \frac{\text{Number of green sectors}}{\text{Total number of sectors}} = \frac{3}{5}$$

Number of non-blue sectors are = 3 green + 1 red = 4 sectors
Probability of getting non-blue sector

$$= \frac{\text{Number of non-blue sectors}}{\text{Total number of sectors}} = \frac{4}{5}$$

Question 6.
Find the probabilities of the events given in Question 2.
Solution:
Refer to Question 2, we have
(i) (a) Probability of getting a prime number

$$= \frac{\text{Number of prime numbers}}{\text{Total number of outcomes}}$$

$$= \frac{3}{6} = \frac{1}{2}$$

(b) Probability of getting a non-prime number

$$= \frac{\text{Number of non-prime numbers}}{\text{Total number of outcomes}}$$

$$= \frac{3}{6} = \frac{1}{2}$$

(ii) (a) Probability of getting a number greater than 5 = $\frac{1}{6}$

(b) Probability of a number not greater than 5 = $\frac{5}{6}$ or, $1 - \frac{1}{6} = \frac{5}{6}$

CH-6 square and square root

KEY POINTS TO REMEMBER

1. If a natural number m can be expressed as n2 , where n is also a natural number, then m is a square number.
2. All square numbers end with 0, 1, 4, 5, 6 or 9 at unit's place.
3. Square numbers can only have even number of zeros at the end.
4. Square root is the inverse operation of square.
5. There are two integral square roots of a perfect square number. Positive square root of a number is denoted by the symbol . For example, 32 = 9 gives 9 3

Exercise 6.1

Q1 : What will be the unit digit of the squares of the following numbers?

(i) 81 (ii) 272

(iii) 799 (iv) 3853

(v) 1234 (vi) 26387

(vii) 52698 (viii) 99880

(ix) 12796 (x) 55555

Answer :

We know that if a number has its unit's place digit as *a*, then its square will end with the unit digit of the multiplication *a* x *a*.

(i) 81

Since the given number has its unit's place digit as 1, its square will end with the unit digit of the multiplication (1 x 1 = 1) i.e., 1.

(ii) 272

Since the given number has its unit's place digit as 2, its square will end with the unit digit of the multiplication (2 x 2 = 4) i.e., 4.

(iii) 799

Since the given number has its unit's place digit as 9, its square will end with the unit digit of the multiplication (9 x 9 = 81) i.e., 1.

(iv) 3853

Since the given number has its unit's place digit as 3, its square will end with the unit digit of the multiplication (3 x 3 = 9) i.e., 9.

(v) 1234

Since the given number has its unit's place digit as 4, its square will end with the unit digit of the multiplication (4 x 4 = 16) i.e., 6.

(vi) 26387

Since the given number has its unit's place digit as 7, its square will end with the unit digit of the multiplication (7 x 7 = 49) i.e., 9.

(vii) 52698

Since the given number has its unit's place digit as 8, its square will end with the unit digit of the multiplication (8 x 8 = 64) i.e., 4.

(viii) 99880

Since the given number has its unit's place digit as 0, its square will have two zeroes at the end. Therefore, the unit digit of the square of the given number is 0.

(xi) 12796

Since the given number has its unit's place digit as 6, its square will end with the unit digit of the multiplication (6 x 6 = 36) i.e., 6.

(x) 55555

Since the given number has its unit's place digit as 5, its square will end with the unit digit of the multiplication (5 x 5 = 25) i.e., 5.

Q2 : The following numbers are obviously not perfect squares. Give reason.

(i) 1057 (ii) 23453

(iii) 7928 (iv) 222222

(v) 64000 (vi) 89722

(vii) 222000 (viii) 505050

Answer :

The square of numbers may end with any one of the digits 0, 1, 5, 6, or 9. Also, a perfect square has even number of zeroes at the end of it.

(i) 1057 has its unit place digit as 7. Therefore, it cannot be a perfect square.

(ii) 23453 has its unit place digit as 3. Therefore, it cannot be a perfect square.

(iii) 7928 has its unit place digit as 8. Therefore, it cannot be a perfect square.

(iv) 222222 has its unit place digit as 2. Therefore, it cannot be a perfect square.

(v) 64000 has three zeros at the end of it. However, since a perfect square cannot end with odd number of zeroes, it is not a perfect square.

(vi) 89722 has its unit place digit as 2. Therefore, it cannot be a perfect square.

(vii) 222000 has three zeroes at the end of it. However, since a perfect square cannot end with odd number of zeroes, it is not a perfect square.

(viii) 505050 has one zero at the end of it. However, since a perfect square cannot end with odd number of zeroes, it is not a perfect square.

Q3 : The squares of which of the following would be odd numbers?

(i) 431 (ii) 2826

(iii) 7779 (iv) 82004

Answer :

The square of an odd number is odd and the square of an even number is even. Here, 431 and 7779 are odd numbers.

Thus, the square of 431 and 7779 will be an odd number.

Q4 : Observe the following pattern and find the missing digits.

$11^2 = 121$

$101^2 = 10201$

$1001^2 = 1002001$

$100001^2 = 1...2...1$

$10000001^2 = ...$

Answer :

In the given pattern, it can be observed that the squares of the given numbers have the same number of zeroes before and after the digit 2 as it was in the original number. Therefore,

$100001^2 = 10000200001$

$10000001^2 = 100000020000001$

Q5 : Observe the following pattern and supply the missing number.

$11^2 = 121$

$101^2 = 10201$

$10101^2 = 102030201$

$1010101^2 = ...$

$...^2 = 10203040504030201$

Answer :

By following the given pattern, we obtain

$1010101^2 = 1020304030201$

$101010101^2 = 10203040504030201$

Q6 : Using the given pattern, find the missing numbers.

$1^2 + 2^2 + 2^2 = 3^2$

$2^2 + 3^2 + 6^2 = 7^2$

$3^2 + 4^2 + 12^2 = 13^2$

$4^2 + 5^2 + \_^2 = 21^2$

$5^2 + \_^2 + 30^2 = 31^2$

$6^2 + 7^2 + \_^2 = \_^2$

Answer :

From the given pattern, it can be observed that,

(i) The third number is the product of the first two numbers.

(ii) The fourth number can be obtained by adding 1 to the third number.

Thus, the missing numbers in the pattern will be as follows.

$4^2 + 5^2 + \underline{20^2} = 21^2$

$5^2 + \underline{6^2} + 30^2 = 31^2$

$6^2 + 7^2 + \underline{42^2} = \underline{43^2}$

Q7 : Without adding find the sum

(i) 1 + 3 + 5 + 7 + 9

(ii) 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19

(iii) 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23

Answer :

We know that the sum of first n odd natural numbers is n^2.

(i) Here, we have to find the sum of first five odd natural numbers.

Therefore, $1 + 3 + 5 + 7 + 9 = (5)^2 = 25$

(ii) Here, we have to find the sum of first ten odd natural numbers.

Therefore, $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 = (10)^2 = 100$

(iii) Here, we have to find the sum of first twelve odd natural numbers.

Therefore, $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23 = (12)^2 = 144$

Q8 : (i) Express 49 as the sum of 7 odd numbers.

(ii) Express 121 as the sum of 11odd numbers.

Answer :

We know that the sum of first n odd natural numbers is n^2.

(i) $49 = (7)^2$

Therefore, 49 is the sum of first 7 odd natural numbers.

$49 = 1 + 3 + 5 + 7 + 9 + 11 + 13$

(ii) $121 = (11)^2$

Therefore, 121 is the sum of first 11 odd natural numbers.

$121 = 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21$

Q9 : How many numbers lie between squares of the following numbers?

(i) 12 and 13 (ii) 25 and 26 (iii) 99 and 100

Answer :

We know that there will be $2n$ numbers in between the squares of the numbers n and $(n + 1)$.

(i) Between 12^2 and 13^2, there will be $2 \times 12 = 24$ numbers

(ii) Between 25^2 and 26^2, there will be $2 \times 25 = 50$ numbers

(iii) Between 99^2 and 100^2, there will be $2 \times 99 = 198$ numbers

Ex 6.2

Q1 : Find the square of the following numbers

(i) 32 (ii) 35

(iii) 86 (iv) 93

(v) 71 (vi) 46

Answer :

(i) $32^2 = (30 + 2)^2$

$= 30 (30 + 2) + 2 (30 + 2)$

$= 30^2 + 30 \times 2 + 2 \times 30 + 2^2$

$= 900 + 60 + 60 + 4$

$= 1024$

(ii) The number 35 has 5 in its unit's place. Therefore,

$35^2 = (3) (3 + 1)$ hundreds + 25

$= (3 \times 4)$ hundreds + 25

$= 1200 + 25 = 1225$

(iii) $86^2 = (80 + 6)^2$

$= 80 (80 + 6) + 6 (80 + 6)$

$= 80^2 + 80 \times 6 + 6 \times 80 + 6^2$

$= 6400 + 480 + 480 + 36$

$= 7396$

(iv) $93^2 = (90 + 3)^2$

$= 90 (90 + 3) + 3 (90 + 3)$

$= 90^2 + 90 \times 3 + 3 \times 90 + 3^2$

$= 8100 + 270 + 270 + 9$

$= 8649$

(v) $71^2 = (70 + 1)^2$

$= 70 (70 + 1) + 1 (70 + 1)$

$= 70^2 + 70 \times 1 + 1 \times 70 + 1^2$

$= 4900 + 70 + 70 + 1$

$= 5041$

(vi) $46^2 = (40 + 6)^2$

$= 40 (40 + 6) + 6 (40 + 6)$

$= 40^2 + 40 \times 6 + 6 \times 40 + 6^2$

$= 1600 + 240 + 240 + 36$

$= 2116$

Q2 : Write a Pythagorean triplet whose one member is

(i) 6 (ii) 14

(iii) 16 (iv) 18

Answer :

For any natural number $m > 1$, $2m$, $m^2 - 1$, $m^2 + 1$ forms a Pythagorean triplet.

(i) If we take $m^2 + 1 = 6$, then $m^2 = 5$

The value of m will not be an integer.

If we take $m^2 - 1 = 6$, then $m^2 = 7$

Again the value of m is not an integer.

Let $2m = 6$

$m = 3$

Therefore, the Pythagorean triplets are 2×3, $3^2 - 1$, $3^2 + 1$ or 6, 8, and 10.

(ii) If we take $m^2 + 1 = 14$, then $m^2 = 13$

The value of m will not be an integer.

If we take $m^2 - 1 = 14$, then $m^2 = 15$

Again the value of m is not an integer.

Let $2m = 14$

$m = 7$

Thus, $m^2 - 1 = 49 - 1 = 48$ and $m^2 + 1 = 49 + 1 = 50$

Therefore, the required triplet is 14, 48, and 50.

(iii) If we take $m^2 + 1 = 16$, then $m^2 = 15$

The value of m will not be an integer.

If we take $m^2 - 1 = 16$, then $m^2 = 17$

Again the value of m is not an integer.

Let $2m = 16$

$m = 8$

Thus, $m^2 - 1 = 64 - 1 = 63$ and $m^2 + 1 = 64 + 1 = 65$

Therefore, the Pythagorean triplet is 16, 63, and 65.

(iv) If we take $m^2 + 1 = 18$,

$m^2 = 17$

The value of m will not be an integer.

If we take $m^2 - 1 = 18$, then $m^2 = 19$

Again the value of m is not an integer.

Let $2m = 18$

$m = 9$

Thus, $m^2 - 1 = 81 - 1 = 80$ and $m^2 + 1 = 81 + 1 = 82$

Therefore, the Pythagorean triplet is 18, 80, and 82.

Ex 6.3

Question 1.
What could be the possible 'one's' digits of the square root of each of the following numbers?
(i) 9801
(ii) 99856
(iii) 998001
(iv) 657666025
Solution:
(i) One's digit in the square root of 9801 maybe 1 or 9.
(ii) One's digit in the square root of 99856 maybe 4 or 6.
(iii) One's digit in the square root of 998001 maybe 1 or 9.
(iv) One's digit in the square root of 657666025 can be 5.

Question 2.
Without doing any calculation, find the numbers which are surely not perfect squares.
(i) 153
(ii) 257
(iii) 408

(iv) 441
Solution:
We know that the numbers ending with 2, 3, 7 or 8 are not perfect squares.
(i) 153 is not a perfect square number. (ending with 3)
(ii) 257 is not a perfect square number. (ending with 7)
(iii) 408 is not a perfect square number. (ending with 8)
(iv) 441 is a perfect square number.

Question 3.
Find the square roots of 100 and 169 by the method of repeated subtraction.
Solution:
Using the method of repeated subtraction of consecutive odd numbers, we have
(i) 100 – 1 = 99, 99 – 3 = 96, 96 – 5 = 91, 91 – 7 = 84, 84 – 9 = 75, 75 – 11 = 64, 64 – 13 = 51, 51 – 15 = 36, 36 – 17 = 19, 19 – 19 = 0
(Ten times repetition)
Thus $\sqrt{100} = 10$

(ii) 169 – 1 = 168, 168 – 3 = 165, 165 – 5 = 160, 160 – 7 = 153, 153 – 9 = 144, 144 – 11 = 133, 133 – 13 = 120, 120 – 15 = 105, 105 – 17 = 88, 88 – 19 = 69, 69 – 21 = 48, 48 – 23 = 25, 25 – 25 = 0
(Thirteen times repetition)
Thus $\sqrt{169} = 13$

Question 4.
Find the square roots of the following numbers by the prime factorisation Method.
(i) 729
(ii) 400
(iii) 1764
(iv) 4096
(v) 7744
(vi) 9604
(vii) 5929
(viii) 9216
(ix) 529
(x) 8100
Solution:
(i) We have 729
Prime factors of 729
$729 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 3^2 \times 3^2 \times 3^2$
$\sqrt{729} = 3 \times 3 \times 3 = 27$

3	729
3	243
3	81
3	27
3	9
3	3
	1

(ii) We have 400
Prime factors of 400
$400 = 2 \times 2 \times 2 \times 2 \times 5 \times 5 = 2^2 \times 2^2 \times 5^2$
$\sqrt{400} = 2 \times 2 \times 5 = 20$

2	400
2	200
2	100
2	50
5	25
5	5
	1

(iii) 1764
$1764 = 2 \times 2 \times 3 \times 3 \times 7 \times 7 = 2^2 \times 3^2 \times 7^2$
$\sqrt{1764} = 2 \times 3 \times 7 = 42$

2	1764
2	882
3	441
3	147
7	49
7	7
	1

(iv) 4096
$4096 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$
$= 2^2 \times 2^2 \times 2^2 \times 2^2 \times 2^2 \times 2^2$
$\sqrt{4096} = 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 64$

2	4096
2	2048
2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

(v) Prime factorisation of 7744 is
$7744 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 11 \times 11$
$= 2^2 \times 2^2 \times 2^2 \times 11^2$
$\sqrt{7744} = 2 \times 2 \times 2 \times 11 = 88$

2	7744
2	3872
2	1936
2	968
2	484
2	242
11	121
11	11
	1

(vi) Prime factorisation of 9604 is
$9604 = 2 \times 2 \times 7 \times 7 \times 7 \times 7 = 2^2 \times 7^2 \times 7^2$
$\sqrt{9604} = 2 \times 7 \times 7 = 98$

2	9604
2	4802
7	2401
7	343
7	49
7	7
	1

(vii) Prime factorisation of 5929 is
$5929 = 7 \times 7 \times 11 \times 11 = 7^2 \times 11^2$
$\sqrt{5929} = 7 \times 11 = 77$

7	5929
7	847
11	121
11	11
	1

(viii) Prime factorisation of 9216 is
$9216 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3$
$= 2^2 \times 2^2 \times 2^2 \times 2^2 \times 2^2 \times 3^2$

$\sqrt{9216} = 2 \times 2 \times 2 \times 2 \times 2 \times 3 = 96$

2	9216
2	4608
2	2304
2	1152
2	576
2	288
2	144
2	72
2	36
2	18
3	9
3	3
	1

(ix) Prime factorisation of 529 is
$529 = 23 \times 23 = 23^2$
$\sqrt{529} = 23$

23	529
23	23
	1

(x) Prime factorisation of 8100 is
$8100 = 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5 = 2^2 \times 3^2 \times 3^2 \times 5^2$
$\sqrt{8100} = 2 \times 3 \times 3 \times 5 = 90$

2	8100
2	4050
3	2025
3	675
3	225
3	75
5	25
5	5
	1

Question 5.
For each of the following numbers, find the smallest whole number by which it should be multiplied so as to get a perfect square number. Also, find the square root of the square number so obtained.
(i) 252
(ii) 180
(iii) 1008
(iv) 2028
(v) 1458
(vi) 768
Solution:

(i) Prime factorisation of 252 is
$252 = 2 \times 2 \times 3 \times 3 \times 7$
Here, the prime factorisation is not in pair. 7 has no pair.
Thus, 7 is the smallest whole number by which the given number is multiplied to get a perfect square number.
The new square number is $252 \times 7 = 1764$
Square root of 1764 is
$\sqrt{1764} = 2 \times 3 \times 7 = 42$

2	252
2	126
3	63
3	21
7	7
	1

(ii) Primp factorisation of 180 is
$180 = 2 \times 2 \times 3 \times 3 \times 5$
Here, 5 has no pair.
New square number = $180 \times 5 = 900$
The square root of 900 is
$\sqrt{900} = 2 \times 3 \times 5 = 30$
Thus, 5 is the smallest whole number by which the given number is multiplied to get a square number.

2	180
2	90
3	45
3	15
5	5
	1

(iii) Prime factorisation of 1008 is
$1008 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 7$
Here, 7 has no pair.
New square number = $1008 \times 7 = 7056$
Thus, 7 is the required number.
Square root of 7056 is
$\sqrt{7056} = 2 \times 2 \times 3 \times 7 = 84$

2	1008
2	504
2	252
2	126
3	63
3	21
7	7
	1

(iv) Prime factorisation of 2028 is
2028 = 2 × 2 × 3 × 13 × 13
Here, 3 is not in pair.
Thus, 3 is the required smallest whole number.
New square number = 2028 × 3 = 6084
Square root of 6084 is
√6084 = 2 × 13 × 3 = 78

2	2028
2	1014
3	507
13	169
13	13
	1

(v) Prime factorisation of 1458 is
1458 = 2 × 3 × 3 × 3 × 3 × 3 × 3
Here, 2 is not in pair.
Thus, 2 is the required smallest whole number.
New square number = 1458 × 2 = 2916
Square root of 1458 is
√2916 = 3 × 3 × 3 × 2 = 54

2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

(vi) Prime factorisation of 768 is
768 = 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 3
Here, 3 is not in pair.
Thus, 3 is the required whole number.
New square number = 768 × 3 = 2304
Square root of 2304 is

√2304 = 2 × 2 × 2 × 2 × 3 = 48

2	768
2	384
2	192
2	96
2	48
2	24
2	12
2	6
3	3
	1

Ex 6.3 Class 8 Maths Question 6.
For each of the following numbers, find the smallest whole number by which it should be divided so as to get a perfect square. Also, find the square root of the square number so obtained.
(i) 252
(ii) 2925
(iii) 396
(iv) 2645
(v) 2800
(vi) 1620
Solution:
(i) Prime factorisation of 252 is
252 = 2 × 2 × 3 × 3 × 7
Here 7 has no pair.
7 is the smallest whole number by which 252 is divided to get a square number.
New square number = 252 ÷ 7 = 36
Thus, √36 = 6

2	252
2	126
3	63
3	21
7	7
	1

(ii) Prime factorisation of 2925 is
2925 = 3 × 3 × 5 × 5 × 13
Here, 13 has no pair.
13 is the smallest whole number by which 2925 is divided to get a square number.
New square number = 2925 ÷ 13 = 225

Thus √225 = 15

3	2925
3	975
5	325
5	65
13	13
	1

(iii) Prime factorisation of 396 is
396 = 2 × 2 × 3 × 3 × 11
Here 11 is not in pair.
11 is the required smallest whole number by which 396 is divided to get a square number.
New square number = 396 ÷ 11 = 36
Thus √36 = 6

2	396
2	198
3	99
3	33
11	11
	1

(iv) Prime factorisation of 2645 is
2645 = 5 × 23 × 23
Here, 5 is not in pair.
5 is the required smallest whole number.
By which 2645 is multiplied to get a square number
New square number = 2645 ÷ 5 = 529
Thus, √529 = 23

5	2645
23	529
23	23
	1

(v) Prime factorisation of 2800 is
2800 = 2 × 2 × 2 × 2 × 5 × 5 × 7
Here, 7 is not in pair.
7 is the required smallest number.
By which 2800 is multiplied to get a square number.
New square number = 2800 ÷ 7 = 400

Thus √400 = 20

2	2800
2	1400
2	700
2	350
5	175
5	35
7	7
	1

(vi) Prime factorisation of 1620 is
1620 = 2 × 2 × 3 × 3 × 3 × 3 × 5
Here, 5 is not in pair.
5 is the required smallest prime number.
By which 1620 is multiplied to get a square number = 1620 ÷ 5 = 324
Thus √324 = 18

2	1620
2	810
3	405
3	135
3	45
3	15
5	5
	1

Question 7.
The students of class VIII of a school donated ₹ 2401 in all, for Prime Minister's National Relief Fund. Each student donated as many rupees as the number of students in the class. Find the number of students in the class.
Solution:
Total amount of money donated = ₹ 2401
Total number of students in the class = √2401
= $7_2 \times 7_2$−−−−−−√
= 7×7×7×7−−−−−−−−−−√
= 7 × 7
= 49

7	2401
7	343
7	49
7	7
	1

Question 8.
2025 plants are to be planted in a garden in such a way that each row contains as many plants as the number of rows. Find the number of rows and the number of plants in each row.

Solution:
Total number of rows = Total number of plants in each row = $\sqrt{2025}$
$= \sqrt{3\times3\times3\times3\times5\times5}$
$= \sqrt{3^2\times3^2\times5^2}$
= 3 × 3 × 5
= 45
Thus the number of rows and plants = 45

3	2025
3	675
3	225
3	75
5	25
5	5
	1

Question 9.
Find the smallest square number that is divisible by each of the numbers 4, 9 and 10.
Solution:
LCM of 4, 9, 10 = 180
The least number divisible by 4, 9 and 10 = 180
Now prime factorisation of 180 is
180 = 2 × 2 × 3 × 3 × 5
Here, 5 has no pair.
The required smallest square number = 180 × 5 = 900

2	4, 9, 10
2	2, 9, 5
3	1, 9, 5
3	1, 3, 5
5	1, 1, 5
	1, 1, 1

EX6.4

Question 1.
Find the square root of each of the following numbers by Long Division method.
(i) 2304
(ii) 4489
(iii) 3481
(iv) 529
(v) 3249
(vi) 1369
(vii) 5776
(viii) 7921
(ix) 576

(x) 1024
(xi) 3136
(xii) 900
Solution:

(i)

$$\begin{array}{r|l} & 48 \\ \hline 4 & \overline{2}\overline{3}04 \\ & 16 \\ \hline 88 & 704 \\ & 704 \\ \hline & 0 \end{array}$$

Thus, $\sqrt{2304} = 48$

(ii)

$$\begin{array}{r|l} & 67 \\ \hline 6 & \overline{4}\overline{4}89 \\ & 36 \\ \hline 127 & 889 \\ & 889 \\ \hline & 0 \end{array}$$

Thus, $\sqrt{4489} = 67$

(iii)

$$\begin{array}{r|l} & 59 \\ \hline 5 & \overline{3}\overline{4}81 \\ & 25 \\ \hline 109 & 981 \\ & 981 \\ \hline & 0 \end{array}$$

Thus, $\sqrt{3481} = 59$

(*iv*)

$$\begin{array}{r|l} & 23 \\ \hline 2 & \overline{5}\overline{29} \\ & 4 \\ \hline 43 & 129 \\ & 129 \\ \hline & 0 \\ \hline \end{array}$$

Thus, $\sqrt{529} = 23$

(*v*)

$$\begin{array}{r|l} & 57 \\ \hline 5 & \overline{3}\overline{2}\overline{49} \\ & 25 \\ \hline 107 & 749 \\ & 749 \\ \hline & 0 \\ \hline \end{array}$$

Thus, $\sqrt{3249} = 57$

(*vi*)

$$\begin{array}{r|l} & 37 \\ \hline 3 & \overline{1}\overline{3}\overline{69} \\ & 9 \\ \hline 67 & 469 \\ & 469 \\ \hline & 0 \\ \hline \end{array}$$

Thus, $\sqrt{1369} = 37$

(*vii*)

$$\begin{array}{r|l} & 76 \\ \hline 7 & \overline{5776} \\ & 49 \\ \hline 146 & 876 \\ & 876 \\ \hline & 0 \end{array}$$

Thus, $\sqrt{5776} = 76$

(*viii*)

$$\begin{array}{r|l} & 89 \\ \hline 8 & \overline{7921} \\ & 64 \\ \hline 169 & 1521 \\ & 1521 \\ \hline & 0 \end{array}$$

Thus, $\sqrt{7921} = 89$

(*ix*)

$$\begin{array}{r|l} & 24 \\ \hline 2 & \overline{576} \\ & 4 \\ \hline 44 & 176 \\ & 176 \\ \hline & 0 \end{array}$$

Thus, $\sqrt{576} = 24$

(x)

$$\begin{array}{r|l} & 32 \\ \hline 3 & \overline{1024} \\ & 9 \\ \hline 62 & 124 \\ & 124 \\ \hline & 0 \end{array}$$

Thus, $\sqrt{1024} = 32$

(xi)

$$\begin{array}{r|l} & 56 \\ \hline 5 & \overline{3136} \\ & 25 \\ \hline 106 & 636 \\ & 636 \\ \hline & 0 \end{array}$$

Thus, $\sqrt{3136} = 56$

(xii)

$$\begin{array}{r|l} & 30 \\ \hline 3 & \overline{900} \\ & 9 \\ \hline & 00 \end{array}$$

Thus, $\sqrt{900} = 30$

Question 2.
Find the number of digits in the square root of each of the following numbers (without any calculation)
(i) 64
(ii) 144
(iii) 4489
(iv) 27225
(v) 390625
Solution:
We know that if n is number of digits in a square number then
Number of digits in the square root = $n2$ if n is even and $n+12$ if n is odd.
(i) 64
Here n = 2 (even)
Number of digits in $\sqrt{64} = 22 = 1$
(ii) 144
Here n = 3 (odd)
Number of digits in square root = $3+12 = 2$
(iii) 4489
Here n = 4 (even)
Number of digits in square root = $42 = 2$
(iv) 27225
Here n = 5 (odd)
Number of digits in square root = $5+12 = 3$
(iv) 390625

Here n = 6 (even)
Number of digits in square root = $\frac{6}{2}$ = 3

Question 3.

Find the square root of the following decimal numbers.
(i) 2.56
(ii) 7.29
(iii) 51.84
(iv) 42.25
(v) 31.36
Solution:

(i)

$$\begin{array}{r|l} & 1.6 \\ \hline 1 & \overline{2.56} \\ & 1 \\ \hline 26 & 156 \\ & 156 \\ \hline & 0 \end{array}$$

Thus, $\sqrt{2.56} = 1.6$

(ii)

$$\begin{array}{r|l} & 2.7 \\ \hline 2 & \overline{7.29} \\ & 4 \\ \hline 47 & 329 \\ & 329 \\ \hline & 0 \end{array}$$

Thus, $\sqrt{7.29} = 2.7$

(iii)

```
      7.2
   ---------
7 | 51.84
  | 49
---------
142 | 284
    | 284
    -----
      0
```

Thus, $\sqrt{51.84} = 7.2$

(iv)

```
      6.5
   ---------
6 | 42.25
  | 36
---------
125 | 625
    | 625
    -----
      0
```

Thus, $\sqrt{42.25} = 6.5$

(v)

```
      5.6
   ---------
5 | 31.36
  | 25
---------
106 | 636
    | 636
    -----
      0
```

Thus, $\sqrt{31.36} = 5.6$

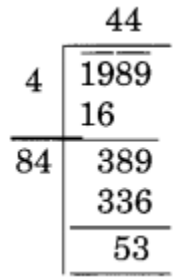
Question 4.
Find the least number which must be subtracted from each of the following numbers so as to get a perfect square. Also find the square root of the perfect square so obtained.
(i) 402
(ii) 1989
(iii) 3250
(iv) 825
(v) 4000
Solution:
(i)

```
     20
  ---------
2 | 4 02
  | 4
---------
4 | 02
```

Here remainder is 2
2 is the least required number to be subtracted from 402 to get a perfect square

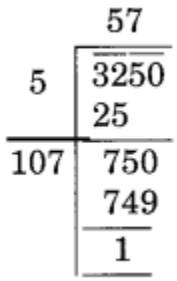
New number = 402 – 2 = 400
Thus, √400 = 20

(ii)



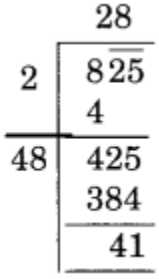
Here remainder is 53
53 is the least required number to be subtracted from 1989.
New number = 1989 – 53 = 1936
Thus, √1936 = 44

(iii)



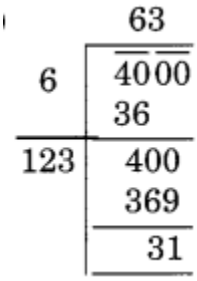
Here remainder is 1
1 is the least required number to be subtracted from 3250 to get a perfect square.
New number = 3250 – 1 = 3249
Thus, √3249 = 57

(iv)



Here, the remainder is 41
41 is the least required number which can be subtracted from 825 to get a perfect square.
New number = 825 – 41 = 784
Thus, √784 = 28

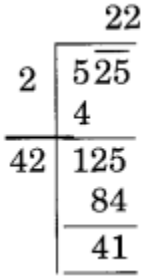
(v)



Here, the remainder is 31
31 is the least required number which should be subtracted from 4000 to get a perfect square.
New number = 4000 – 31 = 3969
Thus, $\sqrt{3969} = 63$

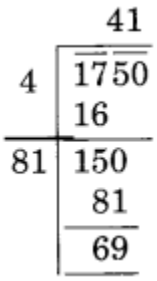
Question 5

.
Find the least number which must be added to each of the following numbers so as to get a perfect square. Also, find the square root of the perfect square so obtained.
(i) 525
(ii) 1750
(iii) 252
(iv) 1825
(v) 6412
Solution:
(i)



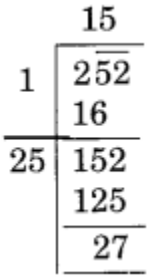
Here remainder is 41
It represents that square of 22 is less than 525.
Next number is 23 an $23^2 = 529$
Hence, the number to be added = 529 – 525 = 4
New number = 529
Thus, $\sqrt{529} = 23$

(ii)



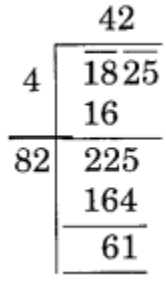
Here the remainder is 69
It represents that square of 41 is less than in 1750.
The next number is 42 and $42^2 = 1764$
Hence, number to be added to 1750 = 1764 – 1750 = 14
Require perfect square = 1764
$\sqrt{1764} = 42$

(iii)



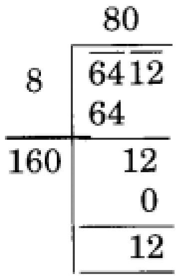
Here the remainder is 27.
It represents that a square of 15 is less than 252.
The next number is 16 and $16^2 = 256$
Hence, number to be added to 252 = 256 – 252 = 4
New number = 252 + 4 = 256
Required perfect square = 256
and $\sqrt{256} = 16$

(iv)



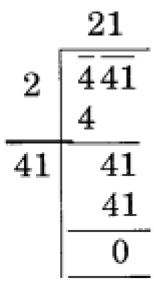
The remainder is 61.
It represents that square of 42 is less than in 1825.
Next number is 43 and $43^2 = 1849$
Hence, number to be added to 1825 = 1849 – 1825 = 24
The required perfect square is 1848 and $\sqrt{1849} = 43$

(v)



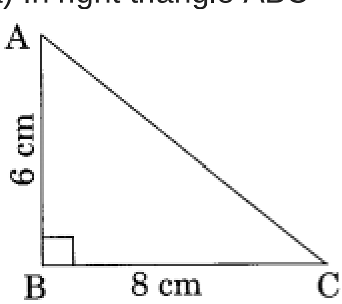
Here, the remainder is 12.
It represents that a square of 80 is less than in 6412.
The next number is 81 and $81^2 = 6561$
Hence the number to be added = 6561 – 6412 = 149
The require perfect square is 6561 and $\sqrt{6561} = 81$

Question 6.
Find the length of the side of a square whose area = 441 m^2
Solution:
Let the length of the side of the square be x m.
Area of the square = $(\text{side})^2 = x^2\ m^2$
$x^2 = 441 \Rightarrow x = \sqrt{441} = 21$



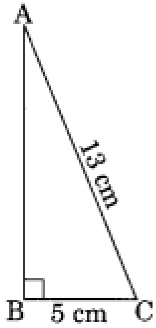
Thus, x = 21 m.
Hence the length of the side of square = 21 m.

Question 7.
In a right triangle ABC, ∠B = 90°.
(a) If AB = 6 cm, BC = 8 cm, find AC
(b) If AC = 13 cm, BC = 5 cm, find AB
Solution:
(a) In right triangle ABC



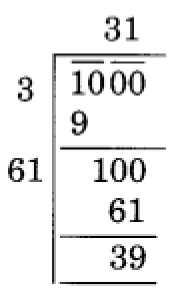
$AC^2 = AB^2 + BC^2$ [By Pythagoras Theorem]

⇒ $AC^2 = (6)^2 + (8)^2 = 36 + 64 = 100$
⇒ $AC = \sqrt{100} = 10$
Thus, AC = 10 cm.
(b) In right triangle ABC



$AC^2 = AB^2 + BC^2$ [By Pythagoras Theorem]
⇒ $(13)^2 = AB^2 + (5)^2$
⇒ $169 = AB^2 + 25$
⇒ $169 – 25 = AB^2$
⇒ $144 = AB^2$
$AB = \sqrt{144} = 12$ cm
Thus, AB = 12 cm.

Question 8.
A gardener has 1000 plants. He wants to plant these in such a way that the number of rows and the number of columns remain the same. Find the minimum number of plants he needs more for this.
Solution:
Let the number of rows be x.
And the number of columns also be x.
Total number of plants = $x \times x = x^2$
$x^2 = 1000 \Rightarrow x = \sqrt{1000}$



Here the remainder is 39
So the square of 31 is less than 1000.
Next number is 32 and $32^2 = 1024$
Hence the number to be added = 1024 – 1000 = 24
Thus the minimum number of plants required by him = 24.
Alternative method:

$$
\begin{array}{r|l}
 & 32 \\
\hline
3 & \overline{1000} \\
 & -9 \\
\hline
62 & 100 \\
 & -124 \\
\hline
 & -24
\end{array}
$$

The minimum number of plants required by him = 24.

Question 9.

There are 500 children in a school. For a P.T. drill, they have to stand in such a manner that the number of rows is equal to the number of columns. How many children would be left out in this arrangement?

Solution:

Let the number of children in a row be x. And also that of in a column be x.

Total number of students = $x \times x = x^2$

$x^2 = 500 \Rightarrow x = \sqrt{500}$

$$
\begin{array}{r|l}
 & 22 \\
\hline
2 & \overline{500} \\
 & 4 \\
\hline
42 & 100 \\
 & 84 \\
\hline
 & 16
\end{array}
$$

Here the remainder is 16

New Number 500 – 16 = 484

and, $\sqrt{484} = 22$

Thus, 16 students will be left out in this arrangement.

Q1 : Find the square root of each of the following numbers by division method.

(i) 2304 (ii) 4489

(iii) 3481 (iv) 529

(v) 3249 (vi) 1369

(vii) 5776 (viii) 7921

(ix) 576 (x) 1024

(xi) 3136 (xii) 900

Answer :

(i) The square root of 2304 can be calculated as follows.

	48
4	$\overline{23}\,\overline{04}$ -16
88	704 704
	0

$\therefore \sqrt{2304} = 48$

(ii) The square root of 4489 can be calculated as follows.

	67
6	$\overline{44}\,\overline{89}$ -36
127	889 889
	0

$\therefore \sqrt{4489} = 67$

(iii) The square root of 3481 can be calculated as follows.

	59
5	$\overline{34}\,\overline{81}$ -25
109	981 981
	0

Therefore, $\sqrt{3481} = 59$

(iv) The square root of 529 can be calculated as follows.

	23
2	$\overline{5}\,\overline{29}$ -4
43	129 129
	0

$\therefore \sqrt{529} = 23$

(v) The square root of 3249 can be calculated as follows.

	57
5	$\overline{32}\,\overline{49}$ -25
107	749 749
	0

$\therefore$