पुना International School

Shree Swaminarayan Gurukul, Zundal

Class -VIII

Mathematics

Year- 2020-21

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CHAPTER – 5
DATA HANDLING

- **SUMMARY**
- **INTRODUCTION**
- **BAR GRAPH**
- **PIE CHART**
- **CHANCE AND PROBABILITY**

- **INTRODUCTION:**
- **Raw data:**

Data mostly available to us in an unorganized form is called raw data.

- **Event:**

One or more outcomes of an experiment make an event.

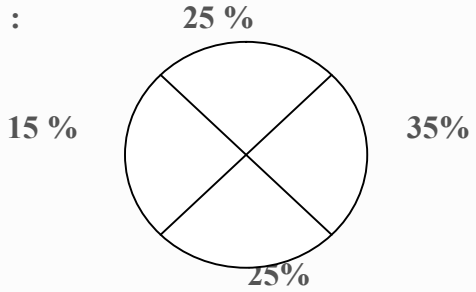
Probability = Number of outcomes that make an event

Total number of outcomes of the experiment

Pictograph:

A data which is represent in to the form of pictorial is called pictograph.

Pie chart :



15% for children
25% for dress
25% for food
35% for house.

(EXERCISE - 5.1)

1. For which of these would you use a histogram to show the data:
(a) The number of letters for different areas in a postman's bag.
(b) The height of competitors in an athletics meet.
(c) The number cassettes produced by 5 companies.
(d) The number of passengers boarding trains from 7.00 a.m. to 7.00 p.m. at a station.

Give reason for each.
Ans. Since, Histogram is a graphical representation of data, if data represented in manner of class-interval.
Therefore, for case (b) and (d), we would use a histogram to show the data, because in these cases, data can be divided into class-intervals.

In case (b), a group of competitions having different heights in an athletics meet.

In case (d), the number of passengers boarding trains in an interval of one hour at a station.

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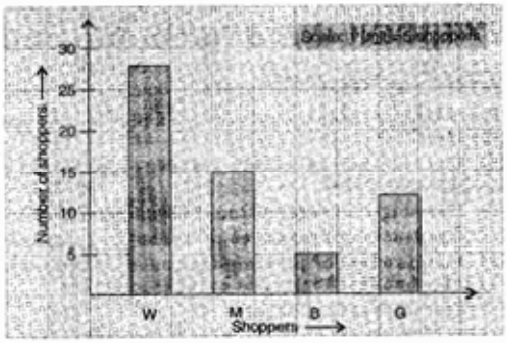
2. The shoppers who come to a departmental store are marked as: man (M), woman (W), boy (B) or girl (G). The following list gives the shoppers who came during the first hour in the morning.
W WW G B W W M G G M M W WWW G B M W B G G M W W M M W WW M W B W G M W WWW G W M M W M W G W M G W M M B G G W.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

Shopper	Tally Marks	Number of shoppers
W	𝍸 𝍸 𝍸 𝍸 𝍸 III	28
M	𝍸 𝍸 𝍸	15
B	𝍸	5
G	𝍸 𝍸 II	12
	Total	60

The illustration of data by bar-graph is as follows:



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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.
Ans. The representation of data by frequency distribution table using tally marks is as follows:

4. Draw a histogram for the frequency table made for the data in Question 3 and answer the following questions.
(i) How many workers earn ` 850 and more?
(ii) How many workers earn less than ` 850?
Ans. 830 – 840 group has the maximum number of workers.
(i) 10 workers can earn more than ` 850.
(ii) 20 workers earn less than ` 850.

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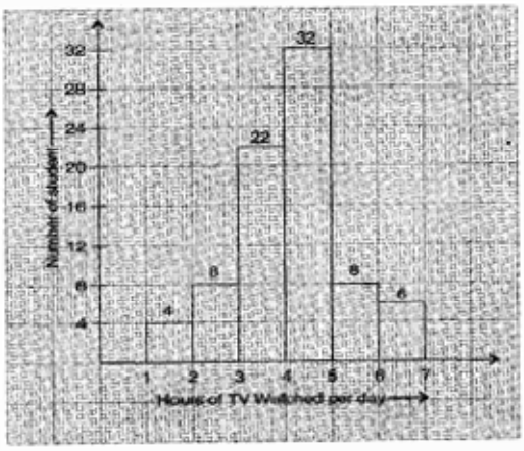
5. The number of hours for which students of a particular class watched television during holidays is shown through the given graph.
We draw the histogram for above frequency table:



Answer the following:
(i) For how many hours did the maximum number of students watch T.V.?
(ii) How many students watched TV for less than 4 hours?
(iii) How many students spent more than 5 hours in watching TV?
Ans. (i) The maximum number of students watched T.V. for 4 – 5 hours.
(ii) 34 students watched T.V. for less than 4 hours.
(iii) 14 students spent more than 5 hours in watching T.V.

(Ex. 5.2)

1. A survey was made to find the type of music that a certain group of young people liked in a city.
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 CD's, how many of each type would they make?
Ans. (i) 10% represents 100 people.

Therefore 20% represents = $\frac{100 \times 20}{10}$

= 200 people

Hence, 200 people were surveyed.

(ii) Light music is liked by the maximum number of people.

(iii) CD's of classical music = $\frac{10 \times 1000}{100}$
= 100

CD's of semi-classical music = $\frac{20\times1000}{100}$ = 200

CD's of light music = $\frac{40\times1000}{100}$ = 400

CD's of folk music = $\frac{30\times1000}{100}$ = 300

---

2. A group of 360 people were asked to vote for their favourite season from the three seasons rainy, winter and summer.
(i) Which season got the most votes?
(ii) Find the central angle of each sector.
(iii) Draw a pie chart to show this information.

Season	Number of votes
Summer	90
Rainy	120
Winter	150

Ans. (i) Winter season got the most votes.

(ii) Central angle of summer season = $\frac{90^\circ\times360^\circ}{360^\circ}=90^\circ$

Central angle of rainy season

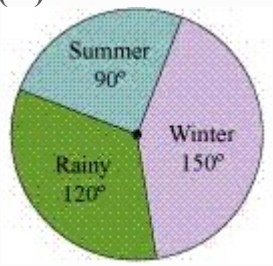
$= \frac{120^\circ\times360^\circ}{360^\circ}=120^\circ$

Central angle of winter season

$= \frac{150^\circ\times360^\circ}{360^\circ}=150^\circ$

Season	Number of votes	In fraction	Central angle
Summer	90	$\frac{90}{360}$	$\frac{90}{360}\times 360^\circ = 90^\circ$
Rainy	120	$\frac{120}{360}$	$\frac{120}{360}\times 360^\circ = 120^\circ$
Winter	150	$\frac{150}{360}$	$\frac{150}{360}\times 360^\circ = 150^\circ$

(iii)



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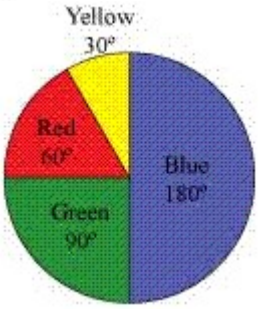
3. Draw a pie chart showing the following information. The table shows the colours preferred by a group of people.

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

Ans. Here, central angle = 360° and total number of people = 36

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



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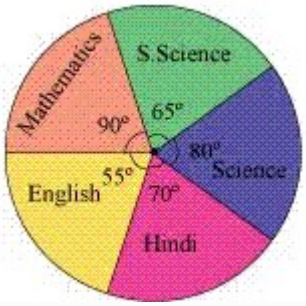
4. The adjoining pie chart gives the marks scored in an examination by a student in Hindi, English, Mathematics, Social Science and Science. If the total marks obtained by the students were 540, answer the following questions:



(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)
Ans.

Subject	Central Angle	Marks obtained
Mathematics	90°	$\frac{90^\circ}{360^\circ}\times 540 = 135$
Social Science	65°	$\frac{65^\circ}{360^\circ}\times 540 = 97.5$
Science	80°	$\frac{80^\circ}{360^\circ}\times 540 = 120$
Hindi	70°	$\frac{70^\circ}{360^\circ}\times 540 = 105$
English	55°	$\frac{55^\circ}{360^\circ}\times 540 = 82.5$

(i) The student scored 105 marks in Hindi.
(ii) Marks obtained in Mathematics = 135
Marks obtained in Hindi = 105

Difference = 135 – 105 = 30

Thus, 30 more marks were obtained by the student in Mathematics than in Hindi.

(iii) The sum of marks in Social Science and Mathematics = 97.5 + 135 = 232.5
The sum of marks in Science and Hindi = 120 + 105 = 225

Yes, the sum of the marks in Social Science and Mathematics is more than that in Science and Hindi.

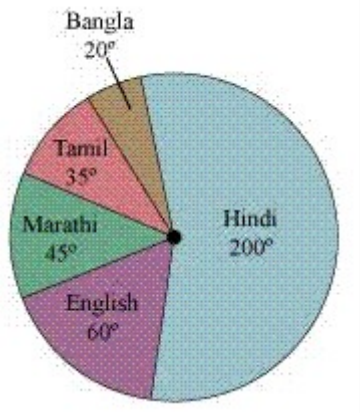
---

5. The number of students in a hostel, speaking different languages is given below. Display the data in a pie chart.

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

Ans.

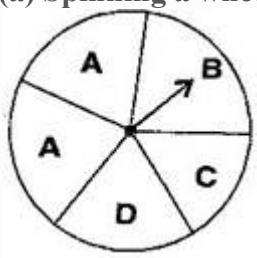
Language	Number of students	In fraction	Central angle
Hindi	40	$\frac{40}{72}$	$\frac{40}{72} \times 360° = 200°$
English	12	$\frac{12}{72}$	$\frac{12}{72} \times 360° = 60°$
Marathi	9	$\frac{9}{72}$	$\frac{9}{72} \times 360° = 45°$
Tamil	7	$\frac{7}{72}$	$\frac{7}{72} \times 360° = 35°$
Bengali	4	$\frac{4}{72}$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



Pie chart at above given data is as follows.

(Ex. 5.3)

1. List the outcomes you can see in these experiments.
(a) Spinning a wheel (b) Tossing two coins together



Ans. (a) There are four letters A, B, C and D in a spinning wheel. So there are 4 outcomes.
(b) When two coins are tossed together. There are four possible outcomes HH, HT, TH, TT.
(Here HT means head on first coin and tail on second coin and so on.)

---

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
Ans. (i) (a) Outcomes of event of getting a prime number are 2, 3 and 5.
(b) Outcomes of event of not getting a prime number are 1, 4 and 6.

(ii) (a) Outcomes of event of getting a number greater than 5 is 6.
(b) Outcomes of event of not getting a number greater than 5 are 1, 2, 3, 4 and 5.

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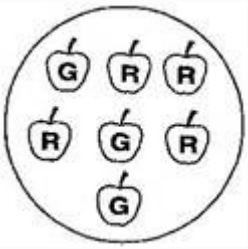
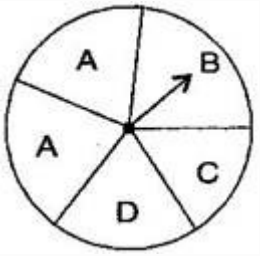
3. Find the:



(a) Probability of the pointer stopping on D in (Question 1 (a)).
(b) Probability of getting an ace from a well shuffled deck of 52 playing cards.
(c) Probability of getting a red apple. (See figure alongside)
Ans. **(a)** In a spinning wheel, there are five pointers A, A, B, C, D. So there are five outcomes. Pointer stops at D which is one outcome.



So the probability of the pointer stopping on D = $\frac{1}{5}$

(b) There are 4 aces in a deck of 52 playing cards. So, there are four events of getting an ace.

So, probability of getting an ace = $\frac{4}{42} = \frac{1}{4}$

(c) Total number of apples = 7
Number of red apples = 4

Probability of getting red apple = $\frac{4}{7}$

---

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 chosen 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.
Ans. **(i)** Outcome of getting a number 6 from ten separate slips is one.

Therefore, probability of getting a number 6 = $\frac{1}{10}$

(ii) Numbers less than 6 are 1, 2, 3, 4 and 5 which are five. So there are 5 outcomes.

Therefore, probability of getting a number less than 6 = $\frac{5}{10} = \frac{1}{2}$

(iii) Number greater than 6 out of ten that are 7, 8, 9, 10.So there are 4 possible outcomes.

Therefore, probability of getting a number greater than 6 = $\frac{4}{10} = \frac{2}{5}$

(iv) One digit numbers are 1, 2, 3, 4, 5, 6, 7, 8, 9 out of ten.

Therefore, probability of getting a 1-digit number = $\frac{9}{10}$

---

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 none-blue sector?
Ans. There are five sectors. Three sectors are green out of five sectors.

Therefore, probability of getting a green sector = $\frac{3}{5}$

There is one blue sector out of five sectors.

Non-blue sectors = 5 – 1 = 4 sectors

Therefore, probability of getting a non-blue sector = $\frac{4}{5}$

---

6. Find the probability of the events given in Question 2.
Ans. When a die is thrown, there are total six outcomes, i.e., 1, 2, 3, 4, 5 and 6.
(i) (a) 2, 3, 5 are prime numbers. So there are 3 outcomes out of 6.

Therefore, probability of getting a prime number = $\frac{3}{6} = \frac{1}{2}$

(b) 1, 4, 6 are not the prime numbers. So there are 3 outcomes out of 6.

Therefore, probability of getting a prime number = $\frac{3}{6} = \frac{1}{2}$

(ii) (a) Only 6 is greater than 5. So there is one outcome out of 6.

Therefore, probability of getting a number greater than 5 = $\frac{1}{6}$

(b) Numbers not greater than 5 are 1, 2, 3, 4 and 5. So there are 5 outcomes out of 6.

Therefore, probability of not getting a number greater than 5 = $\frac{5}{6}$

CHAPTER – 6 square and square root

- **SUMMARY**
- **INTRODUCTION**
- **SQUARE OF NUMBERS**
- **SQUAREROOTS OF NUMBER**

- **INTRODUCTION:**

NUMBER	EXPANDED FORM	SQUARE ROOT
1	1x1	1
2	2x2	4
3	3x3	9
4	4x4	16
5	5x5	25
6	6x6	36
7	7x7	49

(Exercise 6.1)

1. 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
Ans. (i) The number 81 contains its unit's place digit 1. So, square of 1 is 1.

Hence, unit's digit of square of 81 is 1.

(ii) The number 272 contains its unit's place digit 2. So, square of 2 is 4.
Hence, unit's digit of square of 272 is 4.

(iii) The number 799 contains its unit's place digit 9. So, square of 9 is 81.
Hence, unit's digit of square of 799 is 1.

(iv) The number 3853 contains its unit's place digit 3. So, square of 3 is 9.
Hence, unit's digit of square of 3853 is 9.

(v) The number 1234 contains its unit's place digit 4. So, square of 4 is 16.
Hence, unit's digit of square of 1234 is 6.

(vi) The number 26387 contains its unit's place digit 7. So, square of 7 is 49.
Hence, unit's digit of square of 26387 is 9.

(vii) The number 52698 contains its unit's place digit 8. So, square of 8 is 64.
Hence, unit's digit of square of 52698 is 4.

(viii) The number 99880 contains its unit's place digit 0. So, square of 0 is 0.
Hence, unit's digit of square of 99880 is 0.

(ix) The number 12796 contains its unit's place digit 6. So, square of 6 is 36.
Hence, unit's digit of square of 12796 is 6.

(x) The number 55555 contains its unit's place digit 5. So, square of 5 is 25.
Hence, unit's digit of square of 55555 is 5.

---

2. The following numbers are obviously not perfect squares. Give reasons.
(i) 1057
(ii) 23453
(iii) 7928
(iv) 222222
(v) 64000
(vi) 89722
(vii) 222000
(viii) 505050
Ans. (i) Since, perfect square numbers contain their unit's place digit 1, 4, 5, 6, 9 and even numbers of 0.
Therefore 1057 is not a perfect square because its unit's place digit is 7.

(ii) Since, perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore 23453 is not a perfect square because its unit's place digit is 3.
(iii) Since, perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore 7928 is not a perfect square because its unit's place digit is 8.
(iv) Since, perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore 222222 is not a perfect square because its unit's place digit is 2.
(v) Since, perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore 64000 is not a perfect square because its unit's place digit is single 0.
(vi) Since, perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore 89722 is not a perfect square because its unit's place digit is 2.
(vii) Since, perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore 222000 is not a perfect square because its unit's place digit is triple 0.
(viii) Since, perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore 505050 is not a perfect square because its unit's place digit is 0.

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3. The squares of which of the following would be odd number:
(i) 431
(ii) 2826
(iii) 7779
(iv) 82004
Ans. **(i)** 431 – Unit's digit of given number is 1 and square of 1 is 1. Therefore, square of 431 would be an odd number.
(ii) 2826 – Unit's digit of given number is 6 and square of 6 is 36. Therefore, square of 2826 would not be an odd number.
(iii) 7779 – Unit's digit of given number is 9 and square of 9 is 81. Therefore, square of 7779 would be an odd number.
(iv) 82004 – Unit's digit of given number is 4 and square of 4 is 16. Therefore, square of 82004 would not be an odd number.\

---

4. Observe the following pattern and find the missing digits:
11^2 **= 121**
101^2 **= 10201**
1001^2 **= 1002001**
100001^2 **= 1…….2…….1**

1000000^2 **= 1……**

Ans. $11^2 = 121$

$101^2 = 10201$

$1001^2 = 1002001$

$100001^2 = 10000200001$

$1000000^2 = 100000020000001$

---

5. Observe the following pattern and supply the missing numbers:

11^2 **= 121**

101^2 **= 10201**

10101^2 **= 102030201**

1010101^2 **= ……**

……^{2} = 10203040504030201

Ans. $11^2 = 121$

$101^2 = 10201$

$10101^2 = 102030201$

$1010101^2 = 10203040504030201$

$101010101^2 = 102030405040302 01$

---

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

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

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

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

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

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

$6^2 + \_^2 + \_^2 = 43^2$

Ans. $1^2 + 2^2 + 2^2 = 3^2$

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

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

$4^2 + 5^2 + 20^2 = 21^2$

$5^2 + 6^2 + 30^2 = 31^2$

$6^2 + 7^2 + 42^2 = 43^2$

---

7. 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
Ans. (i) Here, there are five odd numbers. Therefore square of 5 is 25.
$\therefore$ $1 + 3 + 5 + 7 + 9 = {}^{5^2} = 25$

(ii) Here, there are ten odd numbers. Therefore square of 10 is 100.

$\therefore$ $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 = {}^{10^2} = 100$

(iii) Here, there are twelve odd numbers. Therefore square of 12 is 144.

$\therefore$ $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23 = {}^{12^2} = 144$

---

8. (i) Express 49 as the sum of 7 odd numbers.
(ii) Express 121 as the sum of 11 odd numbers.
Ans. (i) 49 is the square of 7. Therefore it is the sum of 7 odd numbers.
$49 = 1 + 3 + 5 + 7 + 9 + 11 + 13$

(ii) 121 is the square of 11. Therefore it is the sum of 11 odd numbers

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

---

9. How many numbers lie between squares of the following numbers:
(i) 12 and 13
(ii) 25 and 26
(iii) 99 and 100

Ans. (i) Since, non-perfect square numbers between n^2 and $(n+1)^2$ are $2n$.
Here, $n = 12$

Therefore, non-perfect square numbers between 12 and 13 = $2n = 2\times12 = 24$

(ii) Since, non-perfect square numbers between n^2 and $(n+1)^2$ are $2n$.
Here, $n = 25$

Therefore, non-perfect square numbers between 25 and 26 = $2n = 2\times25 = 50$

(iii) Since, non-perfect square numbers between n^2 and $(n+1)^2$ are $2n$.
Here, $n = 99$

Therefore, non-perfect square numbers between 99 and 100 = $2n = 2\times99 = 198$

(Ex. 6.2)

1. Find the squares of the following numbers:
(i) 32
(ii) 35
(iii) 86
(iv) 93
(v) 71
(vi) 46

Ans. (i) $(32)^2 = (30+2)^2 = (30)^2 + 2\times30\times2 + (2)^2$
$\left[\because (a+b)^2 = a^2 + 2ab + b^2\right]$

= 900 + 120 + 4 = 1024

(ii) $(35)^2 = (30+5)^2 = (30)^2 + 2\times30\times5 + (5)^2$
$\left[\because (a+b)^2 = a^2 + 2ab + b^2\right]$

= 900 + 300 + 25 = 1225

(iii) $(86)^2 = (80+6)^2 = (80)^2 + 2\times80\times6 + (6)^2$
$\left[\because (a+b)^2 = a^2 + 2ab + b^2\right]$

= 1600 + 960 + 36 = 7386

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

$\left[\because\ (a+b)^2 = a^2 + 2ab + b^2\right]$

= 8100 + 540 + 9 = 8649

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

$\left[\because\ (a+b)^2 = a^2 + 2ab + b^2\right]$

= 4900 + 140 + 1 = 5041

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

$\left[\because\ (a+b)^2 = a^2 + 2ab + b^2\right]$

= 1600 + 480 + 36 = 2116

---

2. Write a Pythagoras triplet whose one member is:
(i) 6
(ii) 14
(iii) 16
(iv) 18

Ans. (i) There are three numbers $2m, m^2-1$ and m^2+1 in a Pythagorean Triplet.

Here, $2m = 6 \Rightarrow m = \frac{6}{2} = 3$

Therefore, Second number $(m^2-1) = (3)^2 - 1 = 9 - 1 = 8$

Third number $m^2 + 1 = (3)^2 + 1 = 9 + 1 = 10$

Hence, Pythagorean triplet is (6, 8, 10).

(ii) There are three numbers $2m, m^2-1$ and m^2+1 in a Pythagorean Triplet.

Here, $2m=14 \Rightarrow m=\frac{14}{2}=7$

Therefore, Second number $\left(m^2-1\right)=(7)^2-1=49-1=48$

Third number $m^2+1=(7)^2+1=49+1=50$

Hence, Pythagorean triplet is (14, 48, 50).

(iii) There are three numbers $2m, m^2-1$ and m^2+1 in a Pythagorean Triplet.

Here, $2m=16 \Rightarrow m=\frac{16}{2}=8$

Therefore, Second number $\left(m^2-1\right)=(8)^2-1=64-1=63$

Third number $m^2+1=(8)^2+1=64+1=65$

Hence, Pythagorean triplet is (16, 63, 65).

(iv) There are three numbers $2m, m^2-1$ and m^2+1 in a Pythagorean Triplet.

Here, $2m=18 \Rightarrow m=\frac{18}{2}=9$

Therefore, Second number $\left(m^2-1\right)=(9)^2-1=81-1=80$

Third number $m^2+1=(9)^2+1=81+1=82$

Hence, Pythagorean triplet is (18, 80, 82).

(Ex. 6.3)

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
Ans. Since, Unit's digits of square of numbers are 0, 1, 4, 5, 6 and 9. Therefore, the possible unit's digits of the given numbers are:
(i) 1 (ii) 6 (iii) 1 (iv) 5

---

2. Without doing any calculation, find the numbers which are surely not perfect squares:
(i) 153
(ii) 257
(iii) 408
(iv) 441
Ans. Since, all perfect square numbers contain their unit's place digits 0, 1, 4, 5, 6 and 9.
(i) But given number 153 has its unit digit 3. So it is not a perfect square number.

(ii) Given number 257 has its unit digit 7. So it is not a perfect square number.

(iii) Given number 408 has its unit digit 8. So it is not a perfect square number.

(iv) Given number 441 has its unit digit 1. So it would be a perfect square number

---

3. Find the square roots of 100 and 169 by the method of repeated subtraction.
Ans. By successive subtracting odd natural numbers from 100,
$100 - 1 = 99$

$99 - 3 = 96$

$96 - 5 = 91$

91 – 7 = 84

84 – 9 = 75

75 – 11 = 64

64 – 13 = 51

51 – 15 = 36

36 – 17 = 19

19 – 19 = 0

This successive subtraction is completed in 10 steps.

Therefore $\sqrt{100} = 10$

By successive subtracting odd natural numbers from 169,

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

This successive subtraction is completed in 13 steps.

Therefore $\sqrt{169} = 13$

---

4. Find the square roots of the following numbers by the Prime Factorization method:
(i) 729
(ii) 400
(iii) 1764
(iv) 4096
(v) 7744
(vi) 9604
(vii) 5929
(viii) 9216
(ix) 529
(x) 8100

Ans. (i) 729

$\sqrt{729} = \sqrt{3\times3\times3\times3\times3\times3}$

$= 3\times3\times3$

$= 27$

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

(ii) 400

$\sqrt{400} = \sqrt{2\times2\times2\times2\times5\times5}$

$= 2\times2\times5$

$= 20$

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

(iii) 1764

$\sqrt{1764} = \sqrt{2\times2\times3\times3\times7\times7}$

$= 2\times3\times7$

$= 42$

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

(iv) 4096

$\sqrt{4096} = \sqrt{2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2} = 2\times2\times2\times2\times2\times2$

$= 64$

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) 7744

$\sqrt{7744} = \sqrt{2\times2\times2\times2\times2\times2\times11\times11}$

$= 2\times2\times2\times11$

$= 88$

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

(vi) 9604

$\sqrt{9604} = \sqrt{2\times 2\times 7\times 7\times 7\times 7}$

$= 2\times 7\times 7$

$= 98$

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

(vii) 5929

$\sqrt{5929} = \sqrt{7\times 7\times 11\times 11}$

$= 7\times 11$

$= 77$

7	5929
7	847
11	121
11	11
	1

(viii) 9216

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

$= 2\times 2\times 2\times 2\times 2\times 3$

$= 96$

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) 529

$\sqrt{529} = \sqrt{23 \times 23}$

= 23

23	529
23	23
	1

(x) 8100

$\sqrt{8100} = \sqrt{2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5}$

$= 2 \times 3 \times 3 \times 5$

= 90

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

---

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

Ans. (i) $252 = 2\times2\times3\times3\times7$

Here, prime factor 7 has no pair. Therefore 252 must be multiplied by 7 to make it a perfect square.

$\therefore\ 252\times7 = 1764$

And **(i)** $\sqrt{1764} = 2\times3\times7 = 42$

2	252
2	126
3	63
3	21
7	7
	1

(ii) $180 = 2\times2\times3\times3\times5$

Here, prime factor 5 has no pair. Therefore 180 must be multiplied by 5 to make it a perfect square.

$\therefore$ 180 x 5 = 900

And $\sqrt{900} = 2\times3\times5 = 30$

2	180
2	90
3	45
3	15
5	5
	1

(iii) $1008 = 2\times2\times2\times2\times3\times3\times7$

Here, prime factor 7 has no pair. Therefore 1008 must be multiplied by 7 to make it a perfect square.

$\therefore\ 1008\times7 = 7056$

And $\sqrt{7056} = 2\times2\times3\times7 = 84$

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

(iv) $2028 = 2\times2\times3\times13\times13$

Here, prime factor 3 has no pair. Therefore 2028 must be multiplied by 3 to make it a perfect square.

$\therefore\ 2028\times3 = 6084$

And $\sqrt{6084} = 2\times2\times3\times3\times13\times13 = 78$

2	2028
2	1014
3	507
13	169
13	13
	1

(v) $1458 = 2\times3\times3\times3\times3\times3$

Here, prime factor 2 has no pair. Therefore 1458 must be multiplied by 2 to make it a perfect square.

$\therefore\ 1458\times2 = 2916$

And $\sqrt{2916} = 2\times3\times3\times3 = 54$

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

(vi) $768 = 2\times2\times2\times2\times2\times2\times2\times2\times3$

Here, prime factor 3 has no pair. Therefore 768 must be multiplied by 3 to make it a perfect square.

$\therefore\ 768\times3 = 2304$

And $\sqrt{2304} = 2\times2\times2\times2\times3 = 48$

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

---

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
Ans. (i) $252 = 2\times2\times3\times3\times7$
Here, prime factor 7 has no pair. Therefore 252 must be divided by 7 to make it a perfect square.

$\therefore 252 \div 7 = 36$

And $\sqrt{36} = 2\times3 = 6$

2	252
2	126
3	63
3	21
7	7
	1

(ii) $2925 = 3\times3\times5\times5\times13$
Here, prime factor 13 has no pair. Therefore 2925 must be divided by 13 to make it a perfect square.

$\therefore 2925 \div 13 = 225$

And $\sqrt{225} = 3\times5 = 15$

3	2925
3	975
5	325
5	65
13	13
	1

(iii) $396 = 2\times2\times3\times3\times11$

Here, prime factor 11 has no pair. Therefore 396 must be divided by 11 to make it a perfect square.

$\therefore 396 \div 11 = 36$

And $\sqrt{36} = 2\times3 = 6$

2	396
2	198
3	99
3	33
11	11
	1

(iv) $2645 = 5\times23\times23$

Here, prime factor 5 has no pair. Therefore 2645 must be divided by 5 to make it a perfect square.

$\therefore 2645 \div 5 = 529$

And $\sqrt{529} = 23\times23 = 23$

5	2645
23	529
23	23
	1

(v) $2800 = 2\times2\times2\times2\times5\times5\times7$

Here, prime factor 7 has no pair. Therefore 2800 must be divided by 7 to make it a perfect square.

$\therefore 2800 \div 7 = 400$

And $\sqrt{400} = 2\times2\times5 = 20$

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

(vi) $1620 = 2\times2\times3\times3\times3\times3\times5$

Here, prime factor 5 has no pair. Therefore 1620 must be divided by 5 to make it a perfect square.

$\therefore\ 1620 \div 5 = 324$

And $\sqrt{324} = 2\times3\times3 = 18$

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

---

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.

Ans. Here, Donated money = ` 2401

Let the number of students be x

Therefore donated money = $x\times x$

According to question,

$x^2 = 2401$

$\Rightarrow\ x = \sqrt{2401} = \sqrt{7\times7\times7\times7}$

$\Rightarrow\ x = 7\times7 = 49$

Hence, the number of students is 49.

7	2401
7	343
7	49
7	7
	1

---

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.

Ans. Here, Number of plants = 2025

Let the number of rows of planted plants be x.

And each row contains number of plants = x

According to question,

$x^2 = 2025$

$\Rightarrow x = \sqrt{2025} = \sqrt{3\times3\times3\times3\times5\times5}$

$\Rightarrow x = 3\times3\times5 = 45$

Hence, each row contains 45 plants.

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

---

9. Find the smallest square number that is divisible by each of the numbers 4, 9 and 10.

Ans. L.C.M. of 4, 9 and 10 is 180.

Prime factors of 180 = $2\times2\times3\times3\times5$

Here, prime factor 5 has no pair. Therefore 180 must be multiplied by 5 to make it a perfect square.

$\therefore\ 180 \times 5 = 900$

Hence, the smallest square number which is divisible by 4, 9 and 10 is 900.

2	180
2	90
3	45
3	15
5	5
	1

---

10. Find the smallest square number that is divisible by each of the numbers 8, 15 and 20.

Ans. L.C.M. of 8, 15 and 20 is 120.

Prime factors of 120 = $2 \times 2 \times 2 \times 3 \times 5$

Here, prime factor 2, 3 and 5 has no pair. Therefore 120 must be multiplied by

$2 \times 3 \times 5$ to make it a perfect square.

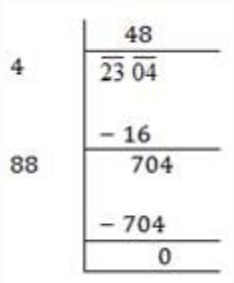
$\therefore\ 120 \times 2 \times 3 \times 5 = 3600$

Hence, the smallest square number which is divisible by 8, 15 and 20 is 3600.

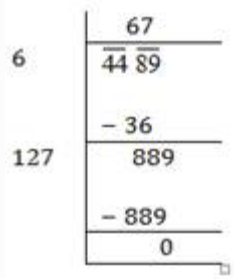
2	120
2	60
3	30
3	15
5	5
	1

(Ex. 6.4)

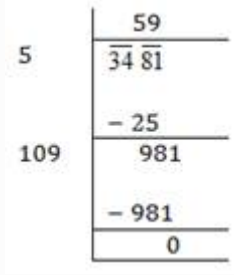
1. Find the square roots of each of the following numbers by Division method:
(i) 2304 (ii) 4489
(iii) 3481 (iv) 529
(v) 3249 (vi) 1369
(vii) 5776 (viii) 7921
(ix) 576 (x) 1024
(xi) 3136 (xii) 900
Ans. (i) 2304
Hence, the square root of 2304 is 48.



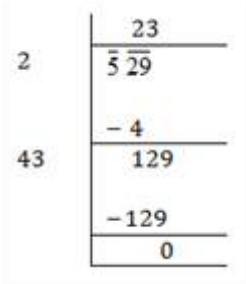
(ii) 4489
Hence, the square root of 4489 is 67.



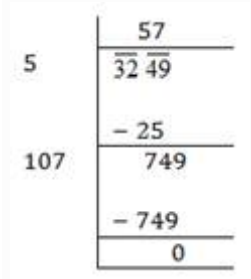
(iii) 3481
Hence, the square root of 3481 is 59.



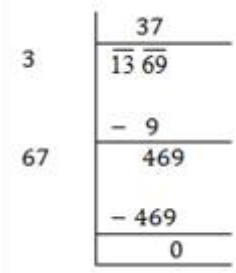
(iv) 529
Hence, the square root of 529 is 23.



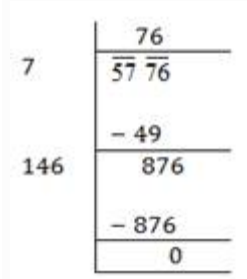
(v) 3249
Hence, the square root of 3249 is 57.



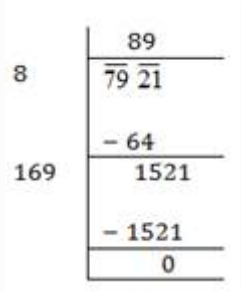
(vi) 1369
Hence, the square root of 1369 is 37.



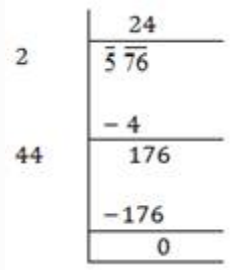
(vii) 5776
Hence, the square root of 5776 is 76.



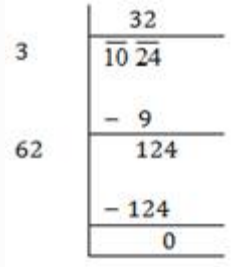
(viii) 7921
Hence, the square root of 7921 is 89.



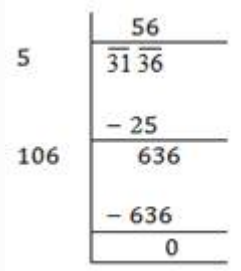
(ix) 576
Hence, the square root of 576 is 24.



(x) 1024
Hence, the square root of 1024 is 32.



(xi) 3136
Hence, the square root of 3136 is 56.



(xii) 900
Hence, the square root of 900 is 30.

$$\begin{array}{r|l} & 30 \\ \hline 3 & \bar{9}\,\overline{00} \\ & -9 \\ \hline 00 & 000 \\ & -000 \\ \hline & 0 \end{array}$$

---

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
Ans. (i) Here, 64 contains two digits which is even.

Therefore, number of digits in square root = $\frac{n}{2}=\frac{2}{2}=1$

(ii) Here, 144 contains three digits which is odd.

Therefore, number of digits in square root = $\frac{n+1}{2}=\frac{3+1}{2}=\frac{4}{2}=2$

(iii) Here, 4489 contains four digits which is even.

Therefore, number of digits in square root = $\frac{n}{2}=\frac{4}{2}=2$

(iv) Here, 27225 contains fivr digits which is odd.

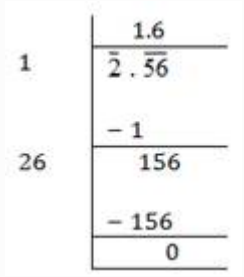
Therefore, number of digits in square root = $\frac{n}{2}=\frac{5+1}{2}=3$

(v) Here, 390625 contains six digits which is even.

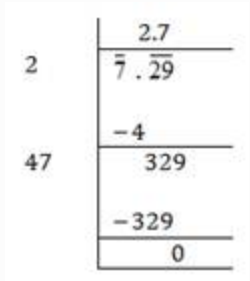
Therefore, number of digits in square root = $\frac{n}{2}=\frac{6}{2}=3$

---

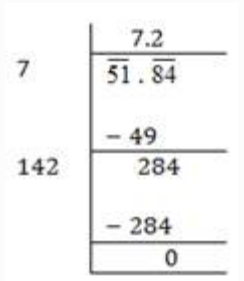
3. Find the square root of the following decimal numbers:
(i) 2.56
(ii) 7.29
(iii) 51.84
(iv) 42.25
(v) 31.36
Ans. (i) 2.56
Hence, the square root of 2.56 is 1.6.



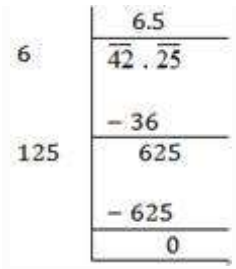
(ii) 7.29
Hence, the square root of 7.29 is 2.7.



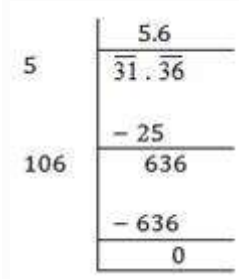
(iii) 51.84
Hence, the square root of 51.84 is 7.2.



(iv) 42.25
Hence, the square root of 42.25 is 6.5.



(v) 31.36
Hence, the square root of 31.36 is 5.6.



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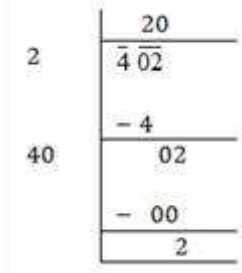
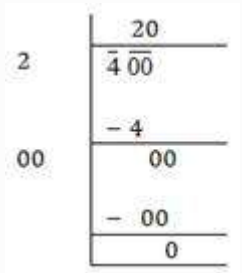
4. Find the least number which must be subtracted from each of the following numbers so as to get a perfect square. Also, find the square root of the perfect square so obtained:
(i) 402
(ii) 1989
(iii) 3250
(iv) 825
(v) 4000
Ans. (i) 402
We know that, if we subtract the remainder from the number, we get a perfect square.

Here, we get remainder 2. Therefore 2 must be subtracted from 402 to get a perfect square.



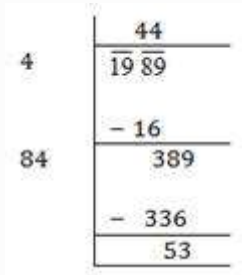
∴ 402 – 2 = 400

Hence, the square root of 400 is 20.



(ii) 1989

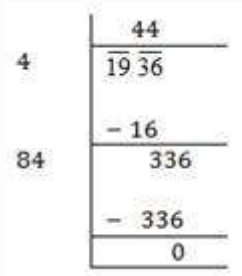
We know that, if we subtract the remainder from the number, we get a perfect square.



Here, we get remainder 53. Therefore 53must be subtracted from 1989 to get a perfect square.

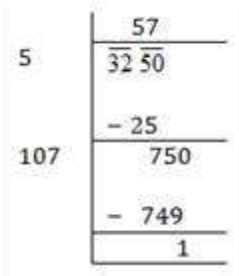
∴ 1989 – 53 = 1936

Hence, the square root of 1936 is 44.



(iii) 3250

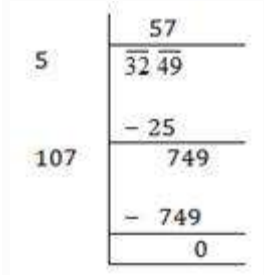
We know that, if we subtract the remainder from the number, we get a perfect square.



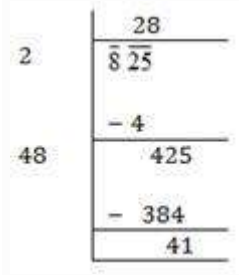
Here, we get remainder 1. Therefore 1 must be subtracted from 3250 to get a perfect square.

∴ 3250 – 1 = 3249

Hence, the square root of 3249 is 57.



(iv) 825
We know that, if we subtract the remainder from the number, we get a perfect square.



Here, we get remainder 41. Therefore 41 must be subtracted from 825 to get a perfect square.

∴ 825 – 41 = 784

Hence, the square root of 784 is 28.

```
      28
   ---------
2 | 7 84
    - 4
   ---------
48 |  384
    - 384
   ---------
        0
```

(v) 4000

We know that, if we subtract the remainder from the number, we get a perfect square.

```
      63
   ---------
6 | 40 00
    - 36
   ---------
123 |  400
    - 369
   ---------
        31
```

Here, we get remainder 31. Therefore 31 must be subtracted from 4000 to get a perfect square.

$\therefore$ 4000 – 31 = 3969

Hence, the square root of 3969 is 63.

```
      63
   ---------
6 | 39 69
    - 36
   ---------
123 |  369
    - 369
   ---------
        0
```

---

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
Ans. (i) 525

Since remainder is 41.

Therefore $22^2 < 525$

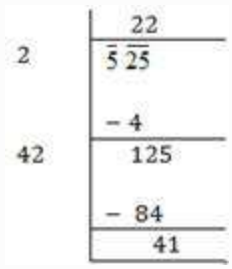
Next perfect square number $23^2 = 529$

Hence, number to be added

$= 529 - 525 = 4$

$\therefore 525 + 4 = 529$

Hence, the square root of 529 is 23.



(ii) 1750
Since remainder is 69.

Therefore $41^2 < 1750$

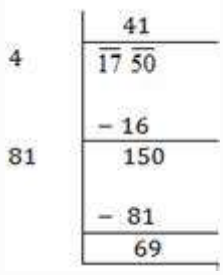
Next perfect square number $42^2 = 1764$

Hence, number to be added

$= 1764 - 1750 = 14$

$\therefore 1750 + 14 = 1764$

Hence, the square root of 1764 is 42.



(iii) 252
Since remainder is 27.

Therefore $15^2 < 252$

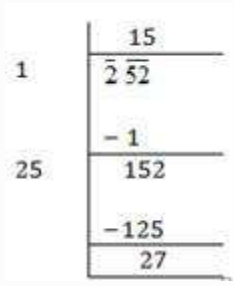
Next perfect square number $16^2 = 256$

Hence, number to be added

$= 256 - 252 = 4$

$\therefore 252 + 4 = 256$

Hence, the square root of 256 is 16.



(iv) 1825
Since remainder is 61.

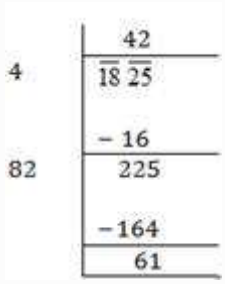
Therefore $42^2 < 1825$

Next perfect square number $43^2 = 1849$

Hence, number to be added = 1849 – 1825 = 24

$\therefore$ 1825 + 24 = 1849

Hence, the square root of 1849 is 43.



(v) 6412
Since remainder is 12.

Therefore $80^2 < 6412$

Next perfect square number 81^2 = 6561

Hence, number to be added

= 6561 – 6412 = 149

$\therefore$ 6412 + 149 = 6561

Hence, the square root of 6561 is 81.

	80
8	$\overline{64}\ \overline{12}$
	– 64
160	0012
	– 0000
	12

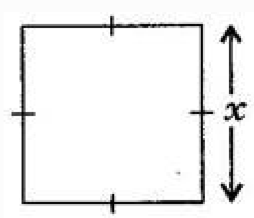
---

6. Find the length of the side of a square whose area is $441\ m^2$?

Ans. Let the length of side of a square be x meter.

Area of square $= (side)^2 = x^2$

According to question,



x^2 = 441

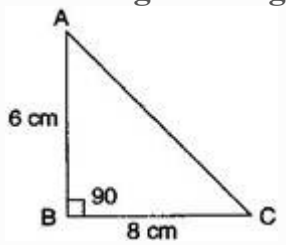
$\Rightarrow\ x = \sqrt{441} = \sqrt{3\times3\times7\times7}$

$= 3\times7$

$\Rightarrow\ x$ = 21 m

Hence, the length of side of a square is 21 m.

7. In a right triangle ABC, $\angle B = 90^\circ$.



(i) If AB = 6 cm, BC = 8 cm, find AC.
(ii) If AC = 13 cm, BC = 5 cm, find AB.
Ans. (a) Using Pythagoras theorem,

$AC^2 = AB^2 + BC^2$

$\Rightarrow AC^2 = (6)^2 + (8)^2$

$\Rightarrow AC^2 = 36 + 84 = 100$

$\Rightarrow$ AC = 10 cm

(b) Using Pythagoras theorem,

$AC^2 = AB^2 + BC^2$

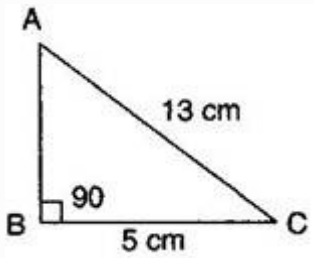
$\Rightarrow (13)^2 = AB^2 + (5)^2$

$\Rightarrow 169 = AB^2 + 25$

$\Rightarrow AB^2 = 169 - 25$

$\Rightarrow AB^2 = 144$

$\Rightarrow$ AB= 12 cm



8. A gardener has 1000 plants. He wants to plant these in such a way that the number of rows and number of columns remain same. Find the minimum number of plants he needs more for this.

Ans. Here, plants = 1000

Since remainder is 39.

Therefore $31^2 < 1000$

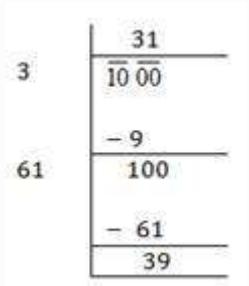
Next perfect square number $32^2 = 1024$

Hence, number to be added

= 1024 – 1000 = 24

$\therefore$ 1000 + 24 = 1024

Hence, the gardener required 24 more plants.



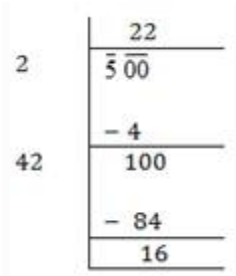
9. There are 500 children in a school. For a P.T. drill they have to stand in such a manner that the number of rows is equal to number of columns. How many children would be left out in this arrangement?

Ans. Here, Number of children = 500

By getting the square root of this number, we get,

In each row, the number of children is 22.

And left out children are 16.


22
2
5 00
– 4
42
100
– 84
16

CHAPTER – 7

- **SUMMARY**
- **INTRODUCTION**
- **CUBES OF NUMBERS**
- **CUBEROOTS OF NUMBER**

- **INTRODUCTION:**

CUBE TABLE

NUMBER	EXPANDED FORM	CUBE
1	1x1x1	1
2	2x2x2	8
3	3x3x3	27
4	4x4x4	64
5	5x5x5	125
6	6x6x6	216
7	7x7x7	343

(Exercise- 7.1)

1. Which of the following numbers are not perfect cubes:
(i)216
(ii)128
(iii)1000
(iv)100
(v)46656
Ans. (i)216
Prime factors of 216 = $2 \times 2 \times 2 \times 3 \times 3 \times 3$

Here all factors are in groups of 3's (in triplets)

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

Therefore, 216 is a perfect cube number.

(ii) 128
Prime factors of 128

$= 2\times2\times2\times2\times2\times2\times2$

Here one factor 2 does not appear in a 3's group.

2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

Therefore, 128 is not a perfect cube.

(iii) 1000
Prime factors of 1000 = $2\times2\times2\times3\times3\times3$

Here all factors appear in 3's group.

Therefore, 1000 is a perfect cube.

2	1000
2	500
2	250
5	125
5	25
5	5
	1

(iv) 100
Prime factors of 100 = 2 x 2 x 5 x 5

Here all factors do not appear in 3's group.

Therefore, 100 is not a perfect cube.

2	100
2	50
5	25
5	5
	1

(v) 46656
Prime factors of 46656

$= 2\times2\times2\times2\times2\times2\times3\times3\times3\times3\times3\times3$

Here all factors appear in 3's group.

Therefore, 46656 is a perfect cube.

2	46656
2	23328
2	11664
2	5832
2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

---

2. Find the smallest number by which each of the following numbers must be multiplied to obtain a perfect cube:
(i)243
(ii)256
(iii)72
(iv)675
(v)100

Ans. (i)243
Prime factors of 243 = $3\times3\times3\times3\times3$

Here 3 does not appear in 3's group.

Therefore, 243 must be multiplied by 3 to make it a perfect cube.

3	243
3	81
3	27
3	9
3	3
	1

(ii) 256
Prime factors of 256

$= 2\times2\times2\times2\times2\times2\times2\times2$

Here one factor 2 is required to make a 3's group.

Therefore, 256 must be multiplied by 2 to make it a perfect cube.

2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

(iii) 72
Prime factors of 72 = $2\times2\times2\times3\times3$

Here 3 does not appear in 3's group.

Therefore, 72 must be multiplied by 3 to make it a perfect cube.

2	72
2	36
2	18
3	9
3	3
	1

(iv) 675
Prime factors of 675 = $3\times3\times3\times5\times5$

Here factor 5 does not appear in 3's group.

Therefore 675 must be multiplied by 3 to make it a perfect cube.

3	675
3	225
3	75
5	25
5	5
	1

(v) 100
Prime factors of 100 = $2\times2\times5\times5$

Here factor 2 and 5 both do not appear in 3's group.

Therefore 100 must be multiplied by 2×5 = 10 to make it a perfect cube.

2	100
2	50
5	25
5	5
	1

---

3. Find the smallest number by which each of the following numbers must be divided to obtain a perfect cube:
(i)81

(ii)128
(iii)135
(iv)192
(v)704
Ans. (i)81
Prime factors of 81 = $3\times3\times3\times3$

Here one factor 3 is not grouped in triplets.

Therefore 81 must be divided by 3 to make it a perfect cube.

3	81
3	27
3	9
3	3
	1

(ii) 128
Prime factors of 128 = $2\times2\times2\times2\times2\times2$

Here one factor 2 does not appear in a 3's group.

Therefore, 128 must be divided by 2 to make it a perfect cube.

2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

(iii) 135
Prime factors of 135 = $3\times3\times3\times5$

Here one factor 5 does not appear in a triplet.

Therefore, 135 must be divided by 5 to make it a perfect cube.

3	135
3	45
3	15
5	5
	1

(iv) 192

Prime factors of 192 = $2\times2\times2\times2\times2\times3$

Here one factor 3 does not appear in a triplet.

Therefore, 192 must be divided by 3 to make it a perfect cube.

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

(v) 704

Prime factors of 704

$= 2\times2\times2\times2\times2\times2\times11$

Here one factor 11 does not appear in a triplet.

Therefore, 704 must be divided by 11 to make it a perfect cube.

2	704
2	352
2	176
2	88
2	44
2	22
2	11
	1

4. Parikshit makes a cuboid of plasticine of sides 5 cm, 2 cm, 5 cm. How many such cuboids will he need to form a cube?

Ans. Given numbers = $5 \times 2 \times 5$

Since, Factors of 5 and 2 both are not in group of three.

Therefore, the number must be multiplied by $2 \times 5 \times 2 = 20$ to make it a perfect cube.

Hence he needs 20 cuboids.

(Ex. 7.2)

1. Find the cube root of each of the following numbers by prime factorization method:

(i) 64
(ii) 512
(iii) 10648
(iv) 27000
(v) 15625
(vi) 13824
(vii) 110592
(viii) 46656
(ix) 175616
(x) 91125

Ans. (i) 64

$\sqrt[3]{64} = \sqrt[3]{2 \times 2 \times 2 \times 2 \times 2 \times 2}$

$\sqrt[3]{64} = 2 \times 2$

$= 4$

2	64
2	32
2	16
2	8
2	4
2	2
	1

(ii) 512

$\sqrt[3]{512} = \sqrt[3]{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2}$

$= 2 \times 2 \times 2 = 8$

2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

(iii) 10648

$\sqrt[3]{10648} = \sqrt[3]{2\times 2\times 2\times 11\times 11\times 11}$

$= 2\times 11$

$= 22$

2	10648
2	5324
2	2662
11	1331
11	121
11	11
	1

(iv) 27000

$\sqrt[3]{27000} = \sqrt[3]{2\times 2\times 2\times 3\times 3\times 3\times 5\times 5\times 5}$

$= 2\times 3\times 5$

$= 30$

2	27000
2	13500
2	6750
3	3375
3	1125
3	375
5	125
5	25
5	5
	1

(v) 15625

$\sqrt[3]{15625} = \sqrt[3]{5\times 5\times 5\times 5\times 5\times 5}$

$= 5 \times 5$

$= 25$

5	15625
5	3125
5	625
5	125
5	25
5	5
	1

(vi) 13824

$\sqrt[3]{13824} = \sqrt[3]{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3}$

$= 2 \times 2 \times 2 \times 3$

$= 24$

2	13824
2	6912
2	3456
2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

(vii) 110592

$\sqrt[3]{110592} = \sqrt[3]{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3}$

$= 2 \times 2 \times 2 \times 2 \times 3$

$= 48$

2	110592
2	55296
2	27648
2	13824
2	6912
2	3456
2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

(viii) 46656

$\sqrt[3]{46656} = \sqrt[3]{2\times2\times2\times2\times2\times2\times3\times3\times3\times3\times3\times3} = 2\times2\times3\times3$

= 36

2	46656
2	23328
2	11664
2	5832
2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

(ix) 175616

$\sqrt[3]{175616} = \sqrt[3]{2\times2\times2\times2\times2\times2\times2\times2\times2\times7\times7\times7} = 2\times2\times2\times7$

= 56

2	175616
2	87808
2	43904
2	21952
2	10976
2	5488
2	2744
2	1372
2	686
7	343
7	49
7	7
	1

(x) 91125

$\sqrt[3]{91125} = \sqrt[3]{3\times3\times3\times3\times3\times3\times5\times5\times5}$

$= 3\times3\times5 = 45$

3	91125
3	30375
3	10125
3	3375
3	1125
3	375
5	125
5	25
5	5
	1

---

2. State true or false:
(i) Cube of any odd number is even.
(ii) A perfect cube does not end with two zeroes.
(iii) If square of a number ends with 5, then its cube ends with 25.
(iv) There is no perfect cube which ends with 8.
(v) The cube of a two digit number may be a three digit number.
(vi) The cube of a two digit number may have seven or more digits.
(vii) The cube of a single digit number may be a single digit number.
Ans. (i) False

Since, $1^3 = 1, 3^3 = 27, 5^3 = 125, \ldots$ are all odd.

(ii) True

Since, a perfect cube ends with three zeroes. e.g. $10^3 = 1000, 20^3 = 8000, 30^3 = 27000, \ldots$ so on

(iii) False

Since, $5^2 = 25, 5^3 = 125, 15^2 = 225, 15^3 = 3375$

(Did not end with 25)

(iv) False

Since $12^3 = 1728$

[Ends with 8]

And $22^3 = 10648$

[Ends with 8]

(v) False Since $10^3 = 1000$

[Four digit number]

And $11^3 = 1331$

[Four digit number]

(vi) False Since $99^3 = 970299$

[Six digit number]

(vii) True

$1^3 = 1$

[Single digit number]

$2^3 = 8$

[Single digit number]

3. You are told that 1,331 is a perfect cube. Can you guess with factorization what is its cube root? Similarly guess the cube roots of 4913, 12167, 32768.

Ans. We know that $10^3 = 1000$ and Possible cube of $11^3 = 1331$

Since, cube of unit's digit $1^3 = 1$

Therefore, cube root of 1331 is 11.

4913

We know that $7^3 = 343$

Next number comes with 7 as unit place $17^3 = 4913$

Hence, cube root of 4913 is 17.

12167

We know that $3^3 = 27$

Here in cube, ones digit is 7

Now next number with 3 as ones digit

$13^3 = 2197$

And next number with 3 as ones digit

$23^3 = 12167$

Hence cube root of 12167 is 23.

32768

We know that $2^3 = 8$

Here in cube, ones digit is 8

Now next number with 2 as ones digit

$12^3 = 1728$

And next number with 2 as ones digit

$22^3 = 10648$

And next number with 2 as ones digit

$32^3 = 32768$

Hence cube root of 32768 is 32.

- **SUMMARY**
- **INTRODUCTION**
- **PROFIT AND LOSS**
- **SIMPLE INTEREST AND INTEREST**
- **RATIO AND PERCENTAGES**

INTRODUCTION :

Ratio is the form of fractions . that is a comparison between two figures.

DISCOUNT :

Discount is a reduction given on marked price/

Discount = Marked price – Sale price

Profit = selling price - cost price

Loss = Cost price – selling price

Simple t=interest = PXRXT / 100

Compound interest =:

A = P + 1

(Exercise- 8.1)

1. Find the ratio of the following:

(a) Speed of a cycle 15 km per hour to the speed of scooter 30 km per hour.
(b) 50 m to 10 km
(c) 50 paise to Rs.5
Ans. (a) Speed of cycle = 15 km/hr
Speed of scooter = 30 km/hr

Hence ratio of speed of cycle to that of scooter = 15 : 30 = $\frac{15}{30} = \frac{1}{2}$ = 1 : 2

(b) $\because$ 1 km = 1000 m
$\therefore$ 10 km = 10×1000 = 10000 m

$\therefore$ Ratio $= \frac{5\text{ m}}{10000\text{ m}} = \frac{1}{2000} = 1 : 2000$

(c) $\because$ `1 = 100 paise

$\therefore$ `5 $= 5 \times 100 = 500$ paise

Hence Ratio $= \frac{50\text{ paise}}{500\text{ paise}} = \frac{1}{10} = 1 : 10$

---

2. Convert the following ratios to percentages:

(a) 3 : 4
(b) 2 : 3

Ans. (a) Percentage of 3 : 4 $= \frac{3}{4} \times 100\ \%$
$= 75\%$

(b) Percentage of 2 : 3 $= \frac{2}{3} \times 100\ \%$
$= 66\frac{2}{3}\%$

---

3. 72% of 25 students are good in mathematics. How many are not good in mathematics?

Ans. Total number of students = 25

Number of good students in mathematics = 72% of 25 $= \frac{72}{100} \times 25 = 18$

Number of students not good in mathematics = 25 – 18 = 7

Hence percentage of students not good in mathematics $= \frac{7}{25} \times 100 = 28\%$

4. A football team won 10 matches out of the total number of matches they played. If their win percentage was 40, then how many matches did they play in all?

Ans. Let total number of matches be x.
According to question,

40% of total matches = 10

$\Rightarrow$ 40% of x = 10

$$\Rightarrow \frac{40}{100} \times x = 10$$

$$\Rightarrow x = \frac{10 \times 100}{40} = 25$$

Hence total number of matches are 25.

---

5. If Chameli had Rs. 600 left after spending 75% of her money, how much did she have in the beginning?

Ans. Let her money in the beginning be ` x.
According to question,

$x - 75\%$ of $x = 600$

$$\Rightarrow x - \frac{75}{100} \times x = 600$$

$$\Rightarrow x - \frac{3}{4}x = 600$$

$$\Rightarrow x\left(1 - \frac{3}{4}\right) = 600$$

$$\Rightarrow x\left(\frac{4-3}{4}\right) = 600$$

$\Rightarrow x\left(\frac{1}{4}=600\right)$

$\Rightarrow x = 600\times4 = `2400$

Hence the money in the beginning was `2,400.

---

6. If 60% people in a city like cricket, 30% like football and the remaining like other games, then what percent of the people like other games? If the total number of people are 50 lakh, find the exact number who like each type of game.

Ans. Number of people who like cricket
= 60%

Number of people who like football

= 30%

Number of people who like other games

= 100% – (60% + 30%) = 10%

Now Number of people who like cricket

= 60% of 50,00,000

$= \frac{60}{100}\times50,00,000$ = 30,00,000

And Number of people who like football

= 30% of 50,00,000

$= \frac{30}{100}\times50,00,000$ = 15,00,000

∴ Number of people who like other games = 10% of 50,00,000

$= \frac{10}{100}\times50,00,000$ = 5,00,000

Hence, number of people who like other games are 5 lakh.

(Ex. 8.2)

1. A man got 10% increase in his salary. If his new salary is Rs.1,54,000, find his original salary.

Ans. Let original salary be Rs.100.
Therefore New salary i.e., 10% increase

= 100 + 10 = Rs.110

$\because$ New salary is Rs.110, when original salary = Rs.100

$\therefore$ New salary is Rs.1, when original salary = $\frac{100}{110}$

$\therefore$ New salary is Rs.1,54,000, when original salary = $\frac{100}{110} \times 154000$ = Rs.1,40,000

Hence original salary is Rs. 1,40,000.

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2. On Sunday 845 people went to the Zoo. On Monday only 169 people went. What is the percent decrease in the people visiting the Zoo on Monday?

Ans. On Sunday, people went to the Zoo
= 845

On Monday, people went to the Zoo = 169

Number of decrease in the people

= 845 – 169 = 676

Decrease percent = $\frac{676}{845} \times 100$ = 80%

Hence decrease in the people visiting the Zoo is 80%.

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3. A shopkeeper buys 80 articles for Rs.2,400 and sells them for a profit of 16%. Find the selling price of one article.

Ans. No. of articles = 80
Cost Price of articles = Rs. 2,400And Profit

= 16%

∵ Cost price of articles is Rs.100, then selling price = 100 + 16 = Rs.116

∴ Cost price of articles is Rs.1, then selling price = $\frac{116}{100}$

∴ Cost price of articles is Rs.2400, then selling price = $\frac{116}{100} \times 2400$ = Rs.2784

Hence, Selling Price of 80 articles = Rs.2784

Therefore Selling Price of 1 article

= $\frac{2784}{80}$ = Rs.34.80

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4. The cost of an article was Rs.15,500, Rs.450 were spent on its repairs. If it sold for a profit of 15%, find the selling price of the article.

Ans. Here, C.P. = Rs.15,500 and Repair cost = Rs.450
Therefore Total Cost Price = 15500 + 450 = Rs.15,950

Let C.P be Rs.100, then S.P. = 100 + 15

= Rs.115

∵ When C.P. is Rs.100, then S.P. = Rs.115

∴ When C.P. is Rs.1, then S.P. = $\frac{115}{100}$

∴ When C.P. is Rs.15950, then S.P.

= $\frac{115}{100} \times 15950$ = Rs.18,342.50

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5. A VCR and TV were bought for Rs.8,000 each. The shopkeeper made a loss of 4% on the VCR and a profit of 8% on the TV. Find the gain or loss percent on the whole transaction.

Ans. Cost price of VCR = Rs.8000 and Cost price of TV = Rs.8000
Total Cost Price of both articles

= Rs.8000 + Rs.8000 = Rs. 16,000

Now VCR is sold at 4% loss.

Let C.P. of each article be Rs.100, then S.P. of VCR = 100 – 4 = Rs.96

∵ When C.P. is Rs.100, then S.P. = Rs.96

∴ When C.P. is Rs.1, then S.P. = $\frac{96}{100}$

∴ When C.P. is Rs.8000, then S.P.

= $\frac{96}{100} \times 8000$ = Rs.7,680

And TV is sold at 8% profit, then S.P. of TV = 100 + 8 = Rs.108

∵ When C.P. is Rs.100, then S.P. = Rs.108

∴ When C.P. is Rs.1, then S.P. = $\frac{108}{100}$

∴ When C.P. is Rs.8000, then S.P.

$= \frac{108}{100} \times 8000$ = Rs.8,640

Then, Total S.P.

= Rs.7,680 + Rs.8,640 = Rs. 16,320

Since S.P. >C.P.,

Therefore Profit = S.P. – C.P.

= 16320 – 16000 = Rs.320

And Profit% = $\frac{\text{Profit}}{\text{Cost Price}} \times 100$

$= \frac{320}{16000} \times 100$ = 2%

(Ex. 8.3)

1. Calculate the amount and compound interest on:

(a) Rs.10,800 for 3 years at $12\frac{1}{2}\%$ per annum compounded annually.

(b) Rs.18,000 for $2\frac{1}{2}$ years at 10% per annum compounded annually.

(c) Rs.62,500 for $1\frac{1}{2}$ years at 8% per annum compounded annually.

(d) Rs.8,000 for 1 years at 9% per annum compounded half yearly. (You could the year by year calculation using S.I. formula to verify).

(e) Rs.10,000 for 1 years at 8% per annum compounded half yearly.

Ans. (a) Here, Principal (P) = Rs. 10800, Time (n) = 3 years,

Rate of interest (R) = $12\frac{1}{2}\% = \frac{25}{2}\%$

Amount (A) = $P\left(1+\frac{R}{100}\right)^n$

$= 10800\left(1+\frac{25}{2\times100}\right)^3 = 10800\left(1+\frac{1}{2\times4}\right)^3$

$= 10800\left(1+\frac{1}{8}\right)^3 = 10800\left(\frac{9}{8}\right)^3$

$= 10800\times\frac{9}{8}\times\frac{9}{8}\times\frac{9}{8}$

= Rs. 15,377.34

Compound Interest (C.I.) = A – P

= Rs. 10800 – Rs. 15377.34 = Rs. 4,577.34

(b) **Here, Principal (P) = Rs. 18,000, Time (n) = $2\frac{1}{2}$ years, Rate of interest (R)**

= 10% p.a.

Amount (A) = $P\left(1+\frac{R}{100}\right)^n$

$= 18000\left(1+\frac{10}{100}\right)^2 = 18000\left(1+\frac{1}{10}\right)^2$

$= 18000\left(\frac{11}{10}\right)^2 = 18000\times\frac{11}{10}\times\frac{11}{10}$

= Rs. 21,780

Interest for $\frac{1}{2}$ years on Rs. 21,780 at rate of 10% = $\frac{21780\times10\times1}{100}$ = Rs. 1,089

Total amount for $2\frac{1}{2}$ years

= Rs. 21,780 + Rs. 1089 = Rs. 22,869

Compound Interest (C.I.) = A – P

= Rs. 22869 – Rs. 18000 = Rs. 4,869

(c) **Here, Principal (P) = Rs. 62500, Time (n) = $1\frac{1}{2} = \frac{3}{2}$ years = 3 years (compounded half yearly)**

Rate of interest (R) = 8% = 4% (compounded half yearly)

Amount (A) = $P\left(1+\frac{R}{100}\right)^n$

$= 62500\left(1+\frac{4}{100}\right)^2$

$= 62500\left(1+\frac{1}{25}\right)^3$

$= 62500\left(\frac{26}{25}\right)^3$

$= 62500\times\frac{26}{25}\times\frac{26}{25}\times\frac{26}{25}$

= Rs. 70,304

Compound Interest (C.I.) = A – P

= Rs. 70304 – Rs. 62500 = Rs. 7,804

(d) **Here, Principal (P) = Rs. 8000, Time (n) = 1 years = 2 years(compounded half yearly)**

Rate of interest (R) = 9% = $\frac{9}{2}\%$ (compounded half yearly)

Amount (A) = $P\left(1+\frac{R}{100}\right)^n$

$= 8000\left(1+\frac{9}{2\times100}\right)^2$

$= 8000\left(1+\frac{9}{200}\right)^2$

$= 8000\left(\frac{209}{200}\right)^2$

$= 8000\times\frac{209}{200}\times\frac{209}{200}$

= Rs. 8,736.20

Compound Interest (C.I.) = A – P

= Rs. 8736.20 – Rs. 8000

= Rs. 736.20

(e) **Here, Principal (P) = Rs. 10,000, Time (n) = 1 years = 2 years (compounded half yearly)**

Rate of interest (R) = 8% = 4% (compounded half yearly)

Amount (A) = $P\left(1+\frac{R}{100}\right)^n$

$= 10000\left(1+\frac{4}{100}\right)^2$

$= 10000\left(1+\frac{1}{25}\right)^2$

$= 10000\left(\frac{26}{25}\right)^2$

$= 10000\times\frac{26}{25}\times\frac{26}{25}$

= Rs. 10,816

Compound Interest (C.I.) = A – P

= Rs. 10,816 – Rs. 10,000 = Rs. 816