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2019-20 Edition

ISBN : 978-81-8449-620-8
Code No. : T3-7-M-EM

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It gives me great pride and pleasure in bringing to you **Sura's Mathematics Guide** for **7th Standard Term-III**. It is prepared as per the Revised Textbook for Term-III for the year 2019.

This guide encompasses all the requirements of the students to comprehend the text and the evaluation of the textbook.

- Additional questions have been provided exhaustively for clear understanding of the units under study.
- Chapter-wise Unit Tests with Answers.

In order to learn effectively, I advise students to learn the subject section-wise and practice the exercises given. It will be a teaching companion to teachers and a learning companion to students.

Though these salient features are available in this Guide, I cannot negate the indispensable role of the teachers in assisting the student to understand the subject thoroughly.

I sincerely believe this guide satisfies the needs of the students and bolsters the teaching methodologies of the teachers.

I pray the almighty to bless the students for consummate success in their examinations.

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CONTENTS

Chapter 1

Number System

Representing a Decimal Number

- To round a decimal
  - First underline the digit that is to be rounded. Then look at the digit to the right of the underlined digit.
  - If that digit is less than 5, then the underlined digit remains the same.
  - If that digit is greater than or equal to 5, add 1 to the underlined digit.
  - After rounding of leave all the digits after the underlined digit.

TRY THESE

(Text book Page No. 1)

1. Represent the fraction $\frac{1}{4}$ in decimal form.

Sol. $\frac{1}{4} = \frac{1 \times 25}{4 \times 25} = \frac{25}{100} = 0.25$

2. What is the place value of 5 in 63.257.

Sol. Place value of 5 in 63.257 is 5 hundredths (Hundreth place)

3. Identify the digit in the tenth place of 75.036.

Sol. 0

4. Express the decimal number 3.75 as a fraction.

Sol. $3.75 = \frac{375}{100} = \frac{15}{4}$

5. Write the decimal number for the fraction $5\frac{1}{5}$.

Sol. $5\frac{1}{5} = \frac{26}{5} = \frac{26 \times 2}{5 \times 2} = \frac{52}{10} = 5.2$

6. Identify the biggest number : 0.567 and 0.576.

Sol. Comparing the digits of 0.567 and 0.576 from left to right, we have the tenths place same comparing the hundredths place $7 > 6$.

$\Rightarrow$ $0.576 > 0.567$

7. Compare 3.30 and 3.03 and identify the smaller number.

Sol. The whole number is equal in both the numbers.

Now comparing the tenths place we have $3 > 0$

$\Rightarrow$ $3.03 < 3.30$ Smaller number is 3.03

Additional Questions

1. Match the following:

1.	$39.814 \approx 39.8$	(i)	Rounded to hundredth place
2.	$35.0014 \approx 35.001$	(ii)	Rounded to ten thousandth place
3.	$21.805 \simeq 21.81$	(iii)	Rounded to nearest whole number
4.	$8.71 \approx 9$	(iv)	Rounded to thousandth place
5.	$61.00208 \approx 61.00221$	(v)	Rounded to tenth place

[Ans : 1-(v); 2-(iv); 3-(i); 4-(iii); 5-(ii)]

2. Round 89.357 to the nearest whole number.

Sol. Underlining the digit to be rounded 8$\underline{9}$.357. Since the digit next to the underlined digit 3 which is less than 5, the underlined digit remains the same.

$\therefore$ The nearest whole number 89.357 rounds to 89.

3. Round 110.929 to the nearest tenths place.

Sol. Underlining the digit to be rounded 110.$\underline{9}$29. Since the digit next to the underlined digit is 2 which is less than 5.

$\therefore$ The underlined digit 9 remains the same. Hence the rounded number is 110.9

4. Round 87.777 upto 2 places of decimal.

Sol. Rounding 87.777 upto 2 places of decimal means round to the nearest hundredths place. Underlining the digit in the hundredth place of 87.777 gives 87.7$\underline{7}$7. Since the digit after the hundredth place value is 7 which is more than 5, we add 1 to the underlined digit. So the rounded value of 87.777 upto 2 places of decimal is 87.78

Operations on Decimal Numbers

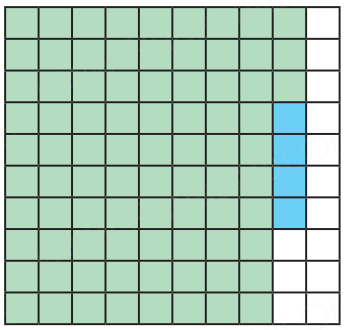
- Adding zeros at the right end of decimal digits will not change the value of the number.
- Zeros are added at the right end of decimal digits of a decimal number that are to be added or subtracted.

TRY THESE

(Text book Page No. 6)

i. Find the following using grid models:

(i) 0.83 + 0.04 **(ii) 0.35 – 0.09**



Sol. **(i)** 0.83 + 0.04

$0.83 = \frac{83}{100}$ and $0.04 = \frac{4}{100}$

Shading the regions

0.83 and 0.04

The sum is the total shaded region.

S = 0.83 + 0.04 = 0.87

Amount paid = ₹ 50.00 (–)
Amount to be paid = ₹ 47.40
Amount to get back = ₹ 2.60
∴ Amount to get back = ₹ 2.60

10. Find the perimeter of an equilateral triangle with a side measuring 3.8 cm.

Sol. Perimeter of an equilateral triangle = (Side + Side + Side) Sq. units.
Given side = 3.8
∴ Perimeter = 3.8 + 3.8 + 3.8
Perimeter of the triangle = 11.4 cm

	3.8
(+)	3.8
(+)	3.8
	11.4

Objective Type Questions

11. 1.0 + 0.83 =?

(i) 0.17 (ii) 0.71
(iii) 1.83 (iv) 1.38

Hint :

	1.0
(+)	0.83
	1.83

[Ans : (iii) 1.83]

12. 7.0 – 2.83 = ?

(i) 3.47 (ii) 4.17
(iii) 7.34 (iv) 4.73

Hint :

	6 9 10 7.00
(–)	2.83
	4.17

[Ans : (ii) 4.17]

13. Subtract 1.35 from 3.51

(i) 6.21 (ii) 4.86
(iii) 8.64 (iv) 2.16

Hint :

	4 11 3.51
(–)	1.35
	2.16

[Ans : (iv) 2.16]

14. Sum of two decimals is 4.78 and one decimal is 3.21 then the other one is

(i) 1.57 (ii) 1.75
(iii) 1.59 (iv) 1.58

Hint :

	4.78
(–)	3.21
	1.57

[Ans : (i) 1.57]

15. The difference of two decimals is 86.58 and one of the decimal is 42.31 Find the other one

(i) 128.89 (ii) 128.69
(iii) 128.36 (iv) 128.39

Hint :

	86.58
(+)	42.31
	128.89

[Ans : (i) 128.89]

7. **Find the product of the following.**

(i) 3.6×0.3 **(ii)** 52.3×0.1 **(iii)** 537.4×0.2
(iv) 0.6×0.06 **(v)** 62.2×0.23 **(vi)** 1.02×0.05
(vii) 10.05×1.05 **(viii)** 101.01×0.01 **(ix)** 100.01×1.1

Sol. **(i)** 3.6×0.3

$36 \times 3 = 108$
$3.6 \times 0.3 = 1.08$

3.6	1 decimal place
×0.3	1 decimal place
1.08	2 decimal places

(ii) 52.3×0.1

$523 \times 1 = 523$
$52.3 \times 0.1 = 5.23$

(iii) 537.4×0.2

$5374 \times 2 = 10748$
$537.4 \times 0.2 = 107.48$

537.4	1 decimal place
× 0.2	1 decimal place
107.48	2 decimal places

(iv) 0.6×0.06

$6 \times 6 = 36$
$0.6 \times 0.06 = 0.036$

(v) 62.2×0.23

$622 \times 23 = 14306$
$62.2 \times 0.23 = 14.306$

62.2	1 decimal place
× 0.23	2 decimal places
1866	
12440	
14.306	3 decimal places

(vi) 1.02×0.05

$102 \times 5 = 510$
$1.02 \times 0.05 = 0.0510$

(vii) 10.05×1.05

$1005 \times 105 = 105525$
$10.05 \times 1.05 = 10.5525$

10.05	2 decimal places
× 1.05	2 decimal places
5025	
00000	
100500	
10.5525	4 decimal places

(viii) 101.01×0.01

$10101 \times 1 = 10101$
$101.01 \times 0.01 = 1.0101$

(ix) 100.01×1.1

$10001 \times 11 = 110011$
$100.01 \times 1.1 = 110.011$

Objective Type Questions

8. **1.07×0.1 _____**

(i) 1.070 (ii) 0.107 (iii) 10.70 (iv) 11.07 **[Ans : (ii) 0.107]**

Hint : $107 \times 1 = 107$
$1.07 \times 0.1 = 0.107$

9. **$2.08 \times 10 =$ _____**

(i) 20.8 (ii) 208.0 (iii) 0.208 (iv) 280.0 **[Ans : (i) 20.8]**

Hint : $208 \times 10 = 2080$
$2.08 \times 10 = 20.80 = 20.8$

3. **Simplify the following.**

(i) 0.7 ÷ 100 (ii) 3.8 ÷ 100 (iii) 49.3 ÷ 100 (iv) 463.85 ÷ 100
(v) 0.3 ÷ 100 (vi) 27.4 ÷ 100

Sol. **(i)** $0.7 \div 100 = \frac{7}{10} \times \frac{1}{100} = \frac{7}{1000} = 0.007$

(ii) $3.8 \div 100 = \frac{38}{10} \times \frac{1}{100} = \frac{38}{1000} = 0.038$

(iii) $49.3 \div 100 = \frac{493}{10} \times \frac{1}{100} = \frac{493}{1000} = 0.493$

(iv) $463.85 \div 100 = \frac{46385}{100} \times \frac{1}{100} = \frac{46385}{10000} = 4.6385$

(v) $0.3 \div 100 = \frac{3}{10} \times \frac{1}{100} = \frac{3}{1000} = 0.003$

(vi) $27.4 \div 100 = \frac{274}{10} \times \frac{1}{100} = \frac{274}{1000} = 0.274$

4. **Simplify the following.**

(i) 18.9 ÷ 1000 (ii) 0.87 ÷ 1000 (iii) 49.3 ÷ 1000 (iv) 0.3 ÷ 1000
(v) 382.4 ÷ 1000 (vi) 93.8 ÷ 1000

Sol. **(i)** $18.9 \div 1000 = \frac{189}{10} \times \frac{1}{1000} = \frac{189}{10000} = 0.0189$

(ii) $0.87 \div 1000 = \frac{87}{100} \times \frac{1}{1000} = \frac{87}{100000} = 0.00087$

(iii) $49.3 \div 100 = \frac{493}{10} \times \frac{1}{100} = \frac{493}{1000} = 0.493$

(iv) $0.3 \div 1000 = \frac{3}{10} \times \frac{1}{1000} = \frac{3}{10000} = 0.0003$

(v) $382.4 \div 1000 = \frac{3824}{10} \times \frac{1}{1000} = \frac{3824}{10000} = 0.3824$

(vi) $93.8 \div 1000 = \frac{938}{10} \times \frac{1}{1000} = \frac{938}{10000} = 0.0938$

5. **Simplify the following.**

(i) 19.2 ÷ 2.4 (ii) 4.95 ÷ 0.5 (iii) 19.11 ÷ 1.3 (iv) 0.399 ÷ 2.1
(v) 5.4 ÷ 0.6 (vi) 2.197 ÷1.3

Sol. **(i)** $19.2 \div 2.4 = \frac{\left(\frac{192}{10}\right)}{\left(\frac{24}{10}\right)} = \frac{192}{10} \times \frac{10}{24} = \frac{192}{24} = 8$

(ii) $4.95 \div 0.5 = \frac{\left(\frac{495}{100}\right)}{\left(\frac{5}{10}\right)} = \frac{495}{100} \times \frac{10}{5} = \frac{495}{5} \times \frac{10}{100} = 99 \times \frac{1}{10} = \frac{99}{10} = 9.9$

13. $0.05 \div 0.5 = ?$

(i) 0.01 (ii) 0.1 (iii) 0.10 (iv) 1.0 **[Ans: (ii) 0.1]**

Hint :

$$\frac{0.05}{0.5} = \frac{\frac{5}{100}}{\frac{5}{10}} = \frac{5}{100} \times \frac{10}{5} = \frac{1}{10}$$

$$= 0.1$$

Additional Questions

1. **A wire of length 363.987m is cut into 30 pieces. What is the length of each piece?**

Sol.

Length of the wire = 363.987m

i.e Total length of 30 pieces $= \frac{363987}{1000}$ m

$$\therefore \text{ Length of 1 piece } = \frac{\left(\frac{363987}{1000}\right)}{30} = \frac{363987}{1000} \times \frac{1}{30} = \frac{363987}{30} \times \frac{1}{1000}$$

$$= 12132.9 \times \frac{1}{1000}$$

Length of 1 piece of wire = 12.1329m

2. **A cake of 50kg needs 23.4 kg sugar. Find the weight of cake made by 1 kg of sugar.**

Sol.

Weight of cake made using 23.4 kg sugar = 50 kg

Weight of cake made using 1 kg sugar $= \frac{50}{23.4}$

$$= \frac{50}{23.4} \times \frac{10}{10}$$

$$= \frac{500}{234} = 2.1367 \text{ kg}$$

$$\simeq 2.14 \text{ kg}$$

Weight of cake made using 1 kg sugar = 2.14 kg.

3. **A pack of 20 pencils cost ₹ 94.4. What is the cost of each pencil?**

Sol.

Cost of 20 pencils = ₹94.4

$$\text{Cost of 1 pencil } = \frac{94.4}{20} = \frac{944/10}{20/1}$$

$$= \frac{944}{10} \times \frac{1}{20} = \frac{944}{20} \times \frac{1}{10}$$

$$= \frac{47.2}{10} = 4.72$$

$\therefore$ Cost of 1 pencil = ₹ 4.72

Number System

13. Ramesh paid ₹ 97.75 per hour for a taxi and he used 35 hours in a week. How much he has to pay totally as taxi fare for a week?

Sol.

Payment for the taxi for an hour = ₹ 97.75

Total hours the taxi was used = 35 hrs.

∴ Total payment for the taxi for the week

= 97.75 × 35

= 3421.25

Total payment for a week = ₹ 3421.25

97.75	2 decimal places
35	
48875	
293250	
3421.25	2 decimal places

14. An Aeroplane travelled 2781.20 kms in 6 hours. Find the average speed of the aeroplane in Km/hr.

Sol.

In 6 hours the distance travelled = 2781.20 km

In 1 hour the distance travelled = $\frac{2781.20}{6}$ km

$= \frac{\left(278120/100\right)}{\left(6/1\right)}$

$= \frac{278120}{100} \times \frac{1}{6}$

$= \frac{278120}{6} \times \frac{1}{100}$

$= 46353 \times \frac{1}{100}$

= 463.53 km

Average speed of the aroplane = 463.53 km/hr.

15. Kumar's car gives 12.6 km mileage per litre. If his fuel tank holds 25.8 litres then how far can he travel?

Sol.

Distance travelled with 1 litre fuel = 12.6 km

∴ with 25.8 litres distance travelled = 12.6 × 25.8

= 325.08 km

The car can travel 325.08 km

12.6	1 decimal place
× 25.8	1 decimal place
1008	
6300	
25200	
325.08	2 decimal places

TRY THESE

(Text book Page No. 28)

Find the percentage of children whose scores fall in different categories given in table below.

Colour	Number of Students	Fraction	Percentage
Below 60	25	$\frac{25}{100}$	25%
60 – 80	23	$\frac{23}{100}$	23%
81 – 90	42	$\frac{42}{100}$	42%
91 – 99	9	$\frac{9}{100}$	9%
Centum	1	$\frac{1}{100}$	1%
Total	100	$\frac{100}{100}$	100%

TRY THESE

(Text book Page No. 29)

There are 50 students in class VII of a school. The number of students involved in these activities are :

Scout : 7 Red Ribbon Club : 6 Junior Red Cross : 9

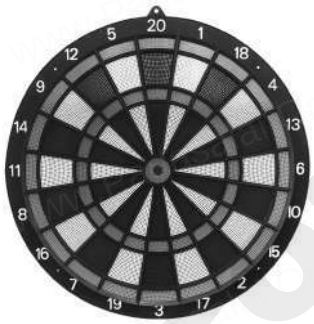
Green Force : 3 Sports : 14 Cultural activity : 11

Find the percentage of students who involved in various activities.

Sol.

S. No.	Activity	Students Involved	Fraction	Percentage
1.	Scout	7	$\frac{7}{50}$	$\frac{7\times2}{50\times2}=\frac{14}{100}\Rightarrow 14\%$
2.	Red Ribbon Club	6	$\frac{6}{50}$	$\frac{6\times2}{50\times2}=\frac{12}{100}\Rightarrow 12\%$
3.	Junior Red Cross	9	$\frac{9}{50}$	$\frac{9\times2}{50\times2}=\frac{18}{100}\Rightarrow 18\%$
4.	Green Force	3	$\frac{3}{50}$	$\frac{3\times2}{50\times2}=\frac{6}{100}\Rightarrow 6\%$
5.	Sports	14	$\frac{14}{50}$	$\frac{14\times2}{50\times2}=\frac{28}{100}\Rightarrow 28\%$
6.	Cultural Activity	11	$\frac{11}{50}$	$\frac{11\times2}{50\times2}=\frac{22}{100}\Rightarrow 22\%$
	Total	50	$\frac{100}{100}$	100%

3. **A picture of dart board is given. Find the percentage of white coloured portion and black coloured portion.**



Sol.

Total sector = 20

White coloured sector = 10

Black coloured sector = 10

Percentage of white : $\frac{10}{20} \times \frac{100}{100}$

Decimal : $\frac{10}{20} \times 100\% = 50\%$

Percentage of black colour : $\frac{10}{20} \times \frac{100}{100}$

Decimal : $\frac{10}{20} \times 100\% = 50\%$

4. **Write each of the following fraction as percentage.**

(i) $\frac{36}{50}$ **(ii)** $\frac{81}{30}$ **(iii)** $\frac{42}{56}$ **(iv)** $2\frac{1}{4}$ **(v)** $1\frac{3}{5}$

Sol.

(i) $\frac{36}{50} = \frac{36}{50} \times \frac{100}{100} = \frac{36}{50} \times 100\% = 72\%$

(ii) $\frac{81}{30} = \frac{81}{30} \times \frac{100}{100} = \frac{81}{30} \times 100\% = 270\%$

(iii) $\frac{42}{56} = \frac{42}{56} \times \frac{100}{100} = \frac{42}{56} \times 100\% = \frac{21}{28} \times 100\% = 75\%$

(iv) $2\frac{1}{4} = \frac{9}{4} = \frac{9}{4} \times \frac{100}{100} = \frac{9}{4} \times 100\% = 225\%$

(v) $1\frac{3}{5} = \frac{8}{5} = \frac{8}{5} \times \frac{100}{100} = \frac{8}{5} \times 100\% = 160\%$

5. **Anbu scored 436 marks out of 500 in his exams. What was the percentage he scored?**

Sol.

Total marks = 500

Anbu's Score = 436

Percentage = $\frac{436}{500} \times \frac{100}{100}$

$= \frac{436}{500} \times 100\% = 87.2\%$

Anbu's Score = 87.2%

Objective Type Questions

10. **Thendral saved one fourth of her salary. Her savings percentage is**

(i) $\frac{3}{4}$ (ii) $\frac{1}{4}\%$ (iii) 25% (iv) 1%

Hint : $\frac{1}{4}\times\frac{100}{100}=\frac{1}{4}\times100\%=25\%$ **[Ans : (iii) 25%]**

11. **Kavin scored 15 out of 25 in a test. The percentage of his marks is**

(i) 60% (ii) 15% (iii) 25% (iv) 15/25

Hint : $\frac{15}{25}\times\frac{100}{100}=\frac{15}{25}\times100\%=60\%$ **[Ans : (i) 60%]**

12. **0.07% is**

(i) $\frac{7}{10}$ (ii) $\frac{7}{100}$ (iii) $\frac{7}{1000}$ (iv) $\frac{7}{10,000}$

Hint : $0.07\%=\frac{0.07}{100}=\frac{\frac{7}{100}}{100}=\frac{7}{100\times100}=\frac{7}{10,000}$ **[Ans : (iv) $\frac{7}{10,000}$]**

Additional Questions

1. **72% of 25 students are good at science. How many are not good at science?**

Sol. Number of students who are good at science

$= 72\% \text{ of } 25 = \frac{72}{100}\times 25 = 18$ students

$\therefore$ Number of students who are not good at science

$= 25 - 18 = 7$ students

2. **A flower garden has 1000 plants. 5% of the plants are roses and 1% are daisy plants. What is the total number of other plants.**

Sol.

Total plants = 1000

Number of rose plants = $5\% \text{ of } 1000 = \frac{5}{100}\times 1000 = 50$

Number of Daisy plants = $1\% \text{ of } 1000 = \frac{1}{100}\times1000 = 10$

Total of rose and daisy = $50 + 10 = 60$

Number of other plants = $1000 - 60 = 940$

3. **Find 135% of 80 ₹.**

Sol. $135\% \text{ of } 80 = \frac{135}{100}\times 80 = ₹108$

6. **The height of a flag pole in school is 6.75m. Write it as percentage.**

Sol. Height of flag pole $= 6.75\text{m} = \frac{675}{100} = 6.75\%$

7. **The weights of two chemical substances are 20.34 g and 18.78 g. Write the difference in percentage?**

Sol. Weight of substance 1 $= 20.34\text{g}$

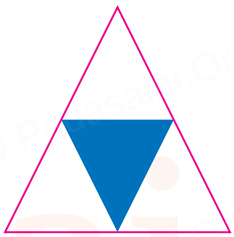
Percentage of substance 1 $= \frac{2034}{100} = 2034\%$

Weight of substance 2 $= 18.78\text{g}$

Percentage of substance 2 $= \frac{1878}{100} = 1878\%$

Their difference $= 2034 - 1878 = 156\%$

8. **Find the percentage of shaded region in the following figure.**



Sol. Total region $= 4$ parts

Shaded region $= 1$ part

Fraction of shaded region $= \frac{1}{4}$

Percentage of shaded region $= \frac{1}{4} \times \frac{100}{100} = \frac{1}{4} \times 100\% = 25\%$

Objective Type Questions

9. **Decimal value of 142.5% is**

(i) 1.425 (ii) 0.1425 (iii) 142.5 (iv) 14.25

Hint : $142.5\% = \frac{1425}{10}\% = \frac{1425}{10} \times \frac{1}{100} = 1.425$ **[Ans : (i) 1.425]**

10. **The percentage of 0.005 is**

(i) 0.005% (ii) 5% (iii) 0.5% (iv) 0.05%

Hint : $0.005 = \frac{5}{1000} = \frac{5}{1000} \times \frac{100}{100} = 0.5\%$ **[Ans : (ii) 0.5%]**

11. **The percentage of 4.7 is**

(i) 0.47% (ii) 4.7% (iii) 47% (iv) 470%

Hint : $4.7 = \frac{47}{10} = \frac{47}{10} \times \frac{100}{100} = 470\%$ **[Ans : (iv) 470%]**

9. **Kayal scored 225 marks out of 500 in revision test 1 and 265 out of 500 marks in revision test 2. Find the percentage of increase in her score.**

Sol.

Marks scored in revision I = 225

Marks scored in revision II = 265

Change in marks = 265 – 225 = 40

$$\text{Percentage of increase} = \frac{\text{Change in marks}}{\text{Original marks}} \times 100$$

$$= \frac{40}{225} \times 100 = 17.777\%$$

Percentage of increase in marks = 17.78%

10. **Roja earned ₹ 18,000 per month. She utilized her salary in the ratio 2:1:3 for education, savings and other expenses respectively. Express her usage of income in percentage.**

Sol.

Amount of Salary = ₹ 18,000

(i) Total number of parts of salary = 2 + 1 + 3 = 6

Salary is divided into 3 portions as $\frac{2}{6}, \frac{1}{6}$ and $\frac{3}{6}$

Portion of salary used for education = $\frac{2}{6}$

Salary used for education = $\frac{2}{6} \times 18{,}000 = ₹\ 6{,}000$

(ii) Usage of salary for savings = $\frac{1}{6} \times 18{,}000 = ₹\ 3{,}000$

(iii) Usage of salary for other expenses = $\frac{3}{6} \times 18{,}000 = ₹\ 9{,}000$

Additional Questions

1. **If Gayathri had ₹ 600 left after spending 75% of her money, how much did she have in the beginning?**

Sol. Suppose Gayathri had ₹ X in the beginning.

$$\text{Then money spend} = 75\% \text{ of } X = \frac{75}{100} X = \frac{3X}{4}$$

$$\text{Money left with her} = X - \frac{3X}{4} = \frac{4X - 3X}{4} = \frac{X}{4}$$

But it is given that money left = ₹ 600

$$\text{i.e.} \frac{X}{4} = 600$$

$$X = 600 \times 4 = 2400$$

∴ Gayathri had ₹ 2,400

Time (n) = 2 years

Simple Interest (I) = $\frac{Pnr}{100} = \frac{8000 \times 2 \times 7}{100}$

I = ₹1120

Amount = P + I

I = ₹8000 + 1120 = 9120

Interest to be paid = ₹1,120

Amount to be paid = ₹9, 120

3. Sheela has paid simple interest on a certain sum for 4 years at 9.5% per annum is ₹ 21,280. Find the sum.

Sol. Let the Principal be ₹ P

Rate of interest r = 9.5% per annum

Time (n) = 4 years

Simple Interest I = $\frac{Pnr}{100}$

Given I = ₹21,280

$\therefore \frac{Pnr}{100}$ = ₹21,280

$\frac{P \times 4 \times 9.5}{100}$ = ₹21,280

$\frac{P \times 4 \times 95}{1000}$ = ₹21,280

P = $\frac{21280 \times 1000}{4 \times 95}$ = ₹56,000

$\therefore$ Sum of money Sheela bought = ₹56,000

4. Basha borrowed ₹ 8,500 from a bank at a particular rate of simple interest. After 3 years, he paid ₹ 11,050 to settle his debt. At what rate of interest he borrowed the money?

Sol. Let the rate of interest be r% per annum

Here Principal P = ₹8,500

Time n = 3 years

Total amount paid = ₹11,050

A = P + I = ₹11,050

i.e. 8,500 + I = ₹11,050

I = ₹11,050 – ₹8,500 = ₹2,550

Also we know that I = $\frac{Pnr}{100}$ = ₹2,550

$\frac{8,500 \times 3 \times r}{100}$ = ₹2,550

$r = \frac{2550 \times 100}{8500 \times 3}$

r = 10%

Rate of interest r = 10%

Additional Questions

1. On what sum of money lent out at 9% per annum for 6 years does the simple interest amount to ₹810?

Sol. Given Simple Interest I = ₹810

Let the sum of money (Principal) be P

Rate of interest r = 9% per annum

Time n = 6 years

$$I = \frac{Pnr}{100}$$

$$810 = \frac{P \times 6 \times 9}{100}$$

$$P = \frac{810 \times 100}{6 \times 9}$$

$$P = ₹1500$$

Sum of money required = ₹1500

2. Find the amount of Principal ₹500 rate of interest 6% per annum and time 4 months.

Sol. r = 6% per annum ; n = 4 months = $\frac{4}{12}$ years

$$A = P + I$$

$$= P + \frac{Pnr}{100}$$

$$A = 500 + \left(500 \times \frac{4}{12} \times \frac{6}{100}\right) = 500 + 10 = ₹510$$

3. Find the simple interest on ₹1120 for $2\frac{2}{5}$ years at the rate of 5% per annum.

Sol. Simple Interest $I = \frac{Pnr}{100}$

Principal P = ₹1120

Time n = $2\frac{2}{5}$ years = $\frac{12}{5}$ years

Rate of Interest r = 5%

$$\therefore I = 1120 \times \frac{12}{5} \times \frac{5}{100} = \frac{672}{5} = ₹134.4$$

Simple interest = ₹134.4

$$\frac{\overset{6}{\cancel{1120}} \times \cancel{2} \times \overset{1}{\cancel{5}}}{\underset{1}{\cancel{5}} \times \underset{5}{\cancel{100}}}$$

11. Stephen invested ₹10,000 in a savings bank account that earned 2% simple interest. Find the interest earned if the amount was kept in the bank for 4 years.

Sol.

Principal (P) = ₹10,000

Rate of interest (r) = 2%

Time (n) = 4 years

$$\therefore \text{Simple Interest I} = \frac{Pnr}{100} = \frac{10000 \times 4 \times 2}{100} = ₹800$$

Stephen will earn ₹800

12. Riya bought ₹15,000 from a bank to buy a car at 10% simple interest. If she paid ₹ 9,000 as interest while clearing the loan, find the time for which the loan was given.

Sol.

Here Principal (P) = ₹15,000

Rate of interest (r) = 10%

Simple Interest (I) = ₹9000

$$I = \frac{Pnr}{100}$$

$$9000 = \frac{15000 \times n \times 10}{100}$$

$$n = \frac{9000 \times 100}{15000 \times 10}$$

n = 6 years

$\therefore$ The loan was given for 6 years.

13. In how much time will the simple interest on ₹ 3,000 at the rate of 8% per annum be the same as simple interest on ₹4,000 at 12% per annum for 4 years?

Sol. Let the required number of years be x

$$\text{Simple Interest I} = \frac{Pnr}{100}$$

Principal P_1 = ₹3000

Rate of interest (r) = 8%

Time (n_1) = n_1 years

$$\text{Simple Interest } I_1 = \frac{3000 \times 8 \times n_1}{100} = 240\, n_1$$

Principal (P_2) = ₹4000

Rate of interest (r) = 12%

Time n_2 = 4 years

$$\text{Simple Interest } I_2 = \frac{4000 \times 12 \times 4}{100}$$

I_2 = 1920

If I_1 = I_2

240 n_1 = 1920

25. **A sum of ₹46,900 was lent out at simple interest and at the end of 2 years, the total amount was ₹ 53,466.Find the rate of interest per year.**

Sol.

Here principal P = ₹46900

Time n = 2 years

Amount A = ₹53466

Let r n be the rate of interest per year

$$\text{Interest I} = \frac{Pnr}{100}$$

$$A = P + I$$

$$53466 = 46900 + \frac{46900 \times 2 \times r}{100}$$

$$53466 - 46900 = \frac{46900 \times 2 \times r}{100}$$

$$6566 = 469 \times 2 \times r$$

$$r = \frac{6566}{2 \times 469}\% = 7\%$$

Rate of interest = 7% per year

26. **Arun lent ₹ 5,000 to Balaji for 2 years and ₹ 3,000 to Charles for 4 years on simple interest at the same rate of interest and received ₹ 2,200 in all from both of them as interest. Find the rate of interest per year.**

Sol.

Principal lent to Balaji P_1 = ₹5000

Time n_1 = 2 years

Let r be the rate of interest per year

$$\text{Simple interest got from Balaji} = \frac{Pnr}{100}$$

$$I_1 = \frac{5000 \times 25 \times r}{100}$$

Again principal let to Charles P_2 = ₹3000

Time (n_2) = 4 years

$$\text{Simple interest got from Charles } (I_2) = \frac{3000 \times 4 \times r}{100}$$

Altogether Arun got ₹2200 as interest.

$$\therefore I_1 + I_2 = 2200$$

$$\frac{5000 \times 2 \times r}{100} + \frac{3000 \times 4 \times r}{100} = 2200$$

$$100r + 120r = 2200$$

$$220r = 2200$$

$$r = \frac{2200}{220}$$

$$r = 10\%$$

Rate of interest per year = 10%

Chapter 3

Algebra

Algebraic Identities

- Algebraic equalities which hold true for all the values of the variables are called identities.
- The following identities are proved geometrically:
  $(x + a)(x + b) = x^2 + x(a + b) + ab$;
  $(a + b)^2 = a^2 + 2ab + b^2$;
  $(a - b)^2 = a^2 - 2ab + b^2$ and
  $(a + b)(a - b) = a^2 - b^2$
- Also we have
  $(x + a)(x - b) = x^2 + x(a - b) - ab$;
  $(x - a)(x + b) = x^2 + x(b - a) - ab$;
  $(x - a)(x - b) = x^2 - x(a + b) + ab$
- The factors of an algebraic expression is two or more expressions whose product is the given expression.
- The process of writing an algebraic expression as the product of its factors is called factorisation.

Think

(Text book Page No. 50)

1. Is it the only way to decompose the numbers representing length and breadth? Discuss.

Sol. No, for example 15 can be decompose into 1×15, 3×5, 5×3, 15×1

Think

(Text book Page No. 60)

Can we factorize the following expressions using any basic identities? Justify your answer.

(i) $x^2 + 5x + 4$ **(ii)** $x^2 - 5x + 4$

Sol. **(i)** $x^2 + 5x + 4 = x^2 + (1 + 4)x + (1 \times 4)$

Which is of the form $x^2 + (a + b)\,x + ab$

$= (x + a)\,(x + b)$

$x^2 + (1+ 4)\,x + (1 \times 4) = (x + 1)\,(x + 4)$

$\therefore x^2 + 5x + 4 = (x + 1)\,(x + 4)$

(ii) $x^2 - 5x + 4 = x^2 + ((-1) + (-4))x + (-1)\,(-4)$

Which is of the form $x^2 + (a + b)\,x + ab$

$= (x + a)\,(x + b)$

$x^2 + ((-1) + (-4))x + ((-1)(-4)) = (x + (-1))\,(x + (-4)) = (x - 1)\,(x - 4)$

$x^2 - 5x + 4 = (x - 1)\,(x - 4))$

Exercise 3.1

1. Fill in the blanks.

(i) $(p - q)^2 =$ _____ **[Ans : $p^2 - 2pq + q^2$]**

(ii) The product of $(x + 5)$ and $(x - 5)$ is _____ **[Ans : $x^2 - 25$]**

(iii) The factors of $x^2 - 4x + 4$ are _____ **[Ans : $(x - 2)$ and $(x - 2)$]**

(iv) Express $24ab^2c^2$ as product of its factors is _____

[Ans: $2 \times 2 \times 2 \times 3 \times a \times b \times b \times c \times c$]

2. Say whether the following statements are True or False.

(i) $(7x + 3)(7x - 4) = 49x^2 - 7x - 12$. **[Ans : True]**

(ii) $(a - 1)^2 = a^2 - 1$. **[Ans : False]**

(iii) $(x^2 + y^2)(y^2 + x^2) = (x^2 + y^2)^2$ **[Ans : True]**

(iv) $2p$ is the factor of $8pq$. **[Ans : True]**

3. Express the following as the product of its factors.

(i) $24ab^2c^2$ **(ii)** $36\,x^3y^2z$ **(iii)** $56\,mn^2p^2$

Sol. **(i)** $24ab^2c^2 = 2 \times 2 \times 2 \times 3 \times a \times b \times b \times c \times c$

(ii) $36\,x^3y^2z = 2 \times 2 \times 3 \times 3 \times x \times x \times x \times y \times y \times z$

(iii) $56\,mn^2p^2 = 2 \times 2 \times 2 \times 7 \times m \times n \times n \times p \times p$

$(1000 - 10)(1000 + 10) = 1000^2 - 10^2$

$990 \times 1010 = 1000000 - 100$

$990 \times 1010 = 999900$

(vii) 51 × 52

$51 \times 52 = (50 + 1)(50 + 1)$

Taking $x = 50$, $a = 1$ and $b = 2$

then $(x + a)(x + b) = x^2 + (a + b)x + ab$ becomes

$(50 + 1)(50 + 2) = 50^2 + (1 + 2)50 + (1 \times 2)$

$= 2500 + (3)50 + 2 = 2500 + 150 + 2$

$51 \times 52 = 2652$

8. Simplify: $(a + b)^2 - 4ab$

Sol.

$(a + b)^2 - 4ab = a^2 + b^2 + 2ab - 4ab$

$= a^2 + b^2 - 2ab = (a - b)^2$

9. Show that $(m - n)^2 + (m + n)^2 = 2(m^2 + n^2)$

Sol.

Taking the LHS $= (m - n)^2 + (m + n)^2$

$= m^2 - \cancel{2mn} + n^2 + m^2 + \cancel{2mn} + n^2 = m^2 + n^2 + m^2 + n^2$

$= 2m^2 + 2n^2$

$= 2(m^2 + n^2) = \text{RHS}$

$\therefore (m - n)^2 + (m + n)^2 = 2(m^2 + n^2)$

$[\because (a + b)^2 - 4ab = a^2 + 2ab + b^2$
$(a - b)^2 = a^2 - 2ab + b^2]$

10. If $a + b = 10$, and $ab = 18$, find the value of $a^2 + b^2$.

Sol.

We have $(a + b)^2 = a^2 + 2ab + b^2$

$(a + b)^2 = a^2 + b^2 + 2ab$

given $a + b = 0$ and $ab = 18$

$10^2 = a^2 + b^2 + 2(18)$

$100 = a^2 + b^2 + 36$

$100 - 36 = a^2 + b^2$

$a^2 + b^2 = 64$

11. Factorise the following algebraic expressions by using the identity $a^2 - b^2 = (a + b)(a - b)$.

(i) $z^2 - 16$ **(ii) $9 - 4y^2$**

(iii) $25a^2 - 49b^2$ **(iv) $x^4 - y^4$**

Sol. **(i) $z^2 - 16$**

$z^2 - 16 = z^2 - 4^2$

We have $a^2 - b^2 = (a + b)(a - b)$

let $a = z$ and $b = 4$,

$z^2 - 4^2 = (z + 4)(z - 4)$

We have $(a+b)^2 = a^2 + 2ab + b^2$

Here $a = \frac{2}{3}x^2 \quad b = 5y^2$

$$\left(\frac{2}{3}x^2 + 5y^2\right)^2 = \left(\frac{2}{3}x^2\right)^2 + 2 \times \frac{2}{3}x^2 \times 5y^2 + (5y^2)^2$$

$$= \left(\frac{2}{3}\right)^2 (x^2)^2 + \frac{20x^2y^2}{3} + 5^2\,(y^2)^2$$

$$\left(\frac{2}{3}x^2 + 5y^2\right)^2 = \frac{4}{9}x^4 + \frac{20x^2y^2}{3} + 25y^4$$

Inequations

- The algebraic statement that shows two algebraic expression being unequal is known as an algebraic inequation.
- The algebraic expressions are connected with any one of the four signs of inequalities, namely, $>$, $\geq$,$<$ and $\leq$.
- When both sides of an inequation are added, subtracted, multiplied and divided by the same non-zero positive number, the inequality remains the same.
- When both sides of an inequation are multiplied or divided by the same non-zero negative number, the sign of inequality is reversed. For example, $x < y \Rightarrow -x > -y$.
- The solution set of an inequation can be represented on the number line by marking the true values of solutions with different colour on the number line.

TRY THESE

(Text book Page No. 63)

Construct inequations for the following statements:

1. **Ramesh's salary is more than ₹25,000 per month.**
2. **This lift can carry maximum of 5 persons.**
3. **The exhibition will be there in town for at least 100 days.**

Sol.

1. $x > 25{,}000$, where x is Ramesh's Salary per month.
2. $y \leq 5$, where y is the maximum number of persons the left can carry.
3. $z \geq 100$, where z is the number of days when the exhibition is there.

Think

(Text book Page No. 65)

Hameed saw a stranger in the street. He told his parent, "The stranger's age is between 40 to 45 years, and his height is between 160 to 170 cm".

Convert the above verbal statement into algebraic inequations by using x and y as variables of age and height.

Sol. Let x be the age and y be the height then

$40 \leq x \leq 45$ and $160 \leq y \leq 170$

Its graph on number line is shown below

(iv) **$3m - 5 \leq 2m + 1$, m is an integer.**

$3m - 5 \leq 2m + 1$

Subtracting 1 on both the sides

$3m - 5 - 1 \leq 2m + 1 + 1$

$3m - 6 \leq 2m$

Subtracting $2m$ on both the sides

$3m - 6 - 2m \leq 2m - 2m$

$m - 6 \leq 0$

Adding 6 on both the sides

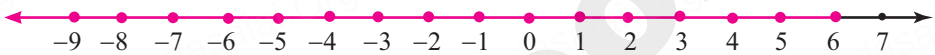
$m - 6 + 6 \leq 0 + 6$

$m \leq 6$

Since the solution belongs to the set of integers, the solution is

6, 5, 4, 3, 2, 1, 0, –1, ...

Its graph on number line is shown below



5. **An artist can spend any amount between ₹80 to ₹200 on brushes. If cost of each brush is ₹ 5 and there are 6 brushes in each packet, then how many packets of brush can the artist buy?**

Sol. Given the artist can spend any amount between ₹80 to ₹200

Let the number of packets of brush he can buy be x

Given cost of 1 brush = ₹5

Cost of 1 packet brush (6 brushes) = ₹5 × 6 = ₹30

∴ Cost of x packets of brushes = $30x$

∴ The inequation becomes $80 \leq 30x \leq 200$

Dividing throughout by 30 we get $\frac{80}{30} \leq \frac{30x}{30} \leq \frac{200}{30}$

$$\frac{8}{3} \leq x \leq \frac{20}{3} \; ; \; 2\frac{2}{3} \leq x \leq 6\frac{2}{3}$$

brush packets cannot get in fractions.

∴ The artist can buy $3 \leq x \leq 6$ packets of brushes.

or x = 3, 4, 5 and 6 packets of brushes.

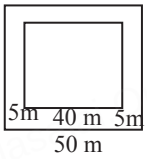
Objective Type Questions

6. **The solutions set of the inequation $3 \leq p \leq 6$ are (where p is a natural number)**

(i) 4,5 and 6 (ii) 3,4 and 5 (iii) 4 and 5 (iv) 3,4,5 and 6

[Ans : (iv) 3,4,5 and 6]

Area of the path way = area of large square – area of smaller square
= $50^2 - 40^2$
Substituting a = 50 and b = 40 in
$a^2 - b^2$ = $(a + b)(a - b)$ we have
$50^2 - 40^2$ = $(50 + 40)(50 - 40)$
Area of pathway = 90×10
Area of the pathway = $900\ m^2$



Challenge Problems

6. If $X = a^2 - 1$ and $Y = 1 - b^2$, then find $X + Y$ and factorize the same.

Sol.

Given X = $a^2 - 1$
Y = $1 - b^2$
X + Y = $(a^2 - 1) + (1 - b^2)$
= $a^2 - 1 + 1 - b^2$
We know the identity that $a^2 - b^2$ = $(a + b)(a - b)$
$\therefore$ X + Y = $(a + b)(a - b)$

7. Find the value of $(x - y)(x + y)(x^2 + y^2)$.

Sol.

We know that $(a - b)(a + b) = a^2 - b^2$ ... (1)
Put $a = x$ and $b = y$ in the identity (1) then
$(x - y)(x + y) = x^2 - y^2$
Now $(x - y)(x + y)(x^2 + y^2) = (x^2 - y^2)(x^2 + y^2)$
Again put $a = x^2$ and $b = y^2$ in (1)
We have $(x^2 - y^2)(x^2 + y^2) = (x^2)^2 - (y^2)^2 = x^4 - y^4$
So $(x - y)(x + y)(x^2 + y^2) = x^4 - y^4$

8. Simplify $(5x - 3y)^2 - (5x + 3y)^2$.

Sol. We have the identities ... (1)

$(a + b)^2 = a^2 + 2ab + b^2$
$(a - b)^2 = a^2 - 2ab + b^2$
So $(5x - 3y)^2 - (5x + 3y)^2 = (5x)^2 - (2 \times 5x \times 3y) + (3y)^2$
$- [(5x)^2 + 2(5x)(3y) + (3y)^2]$
$= 5^2x^2 - 30xy + 3^2y^2 - [5^2x^2 - 30xy + 3^2y^2]$
$= 25x^2 - 30xy + 9y^2 - [25x^2 + 30xy + 9y^2]$
$= 25x^2 - 30xy + 9y^2 - 25x^2 - 30xy - 9y^2$
$= x^2(25 - 25) - xy(30 + 30) + y^2(9 - 9)$
$= 0x^2 - 60xy + 0y^2 = -60xy$
$\therefore (5x - 3y)^2 - (5x + 3y)^2 = -60xy$

9. Simplify : (i) $(a + b)^2 - (a - b)^2$ (ii) $(a + b)^2 + (a - b)^2$.

Sol. Applying the identities

$(a + b)^2 = a^2 + 2ab + b^2$
$(a - b)^2 = a^2 - 2ab + b^2$

Chapter 4

Geometry

Symmetry

- The line that divides any figure into two equal halves such that each half exactly coincides with the other is known as the line of symmetry or axis of symmetry.
- Mirror symmetry is called reflection symmetry.
- An object is said to have a rotational symmetry if it looks the same after being rotated about its centre through an angle less than 360°.
- The minimum number of tomes a figure coincides with itself in one complete rotation is called the order of roational symmetry.
- All figures have rotational symmetry of order 1.
- A object has rotational symmetry, only when the order of symmetry is more than 1.
- 2 is the smallest order of rotational symmetry.
- Translation symmetry occurs when a pattern slides to a new position.
- The sliding movement involves neither rotation nor reflection.

TRY THESE

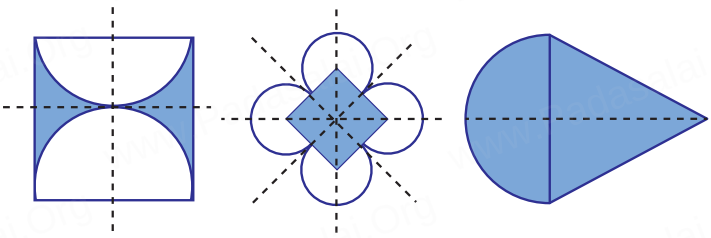
(Text book Page No. 72)

1. Can you draw a shape which has no line of symmetry?

Sol. Yes,

2. Draw all possible line of symmetry for the following shapes.

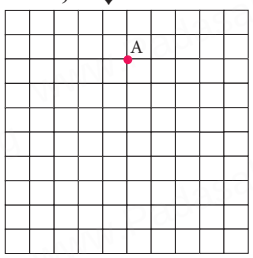
Sol.



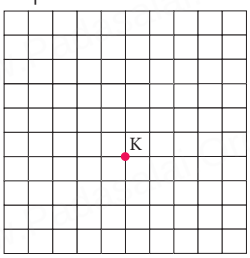
Exercise 4.1

1. **Find the new position of each point using the translation given.**

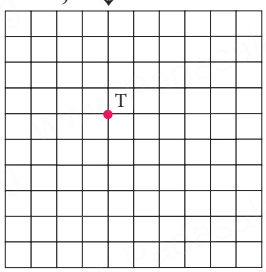
(i) 2 →, 4 ↓



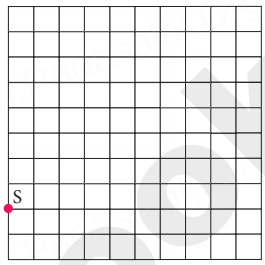
(ii) 6 ↑



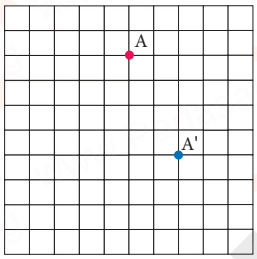
(iii) 3 ←, 5 ↓



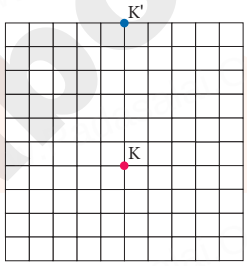
(iv) 4 →, 3 ↑



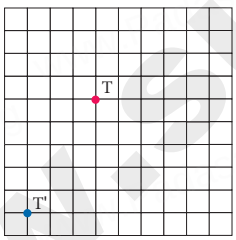
Sol. **(i)**



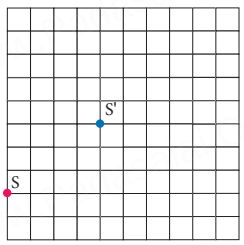
(ii)



(iii)

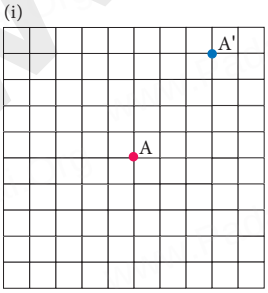


(iv)

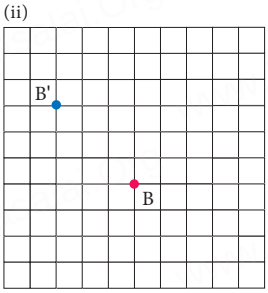


2. **How is the pre-image translated to the image?**

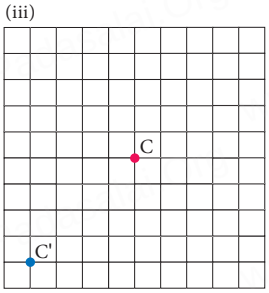
(i)



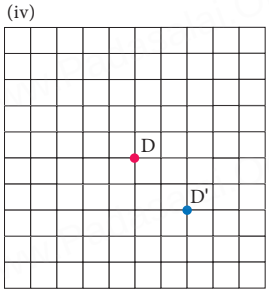
(ii)



(iii)



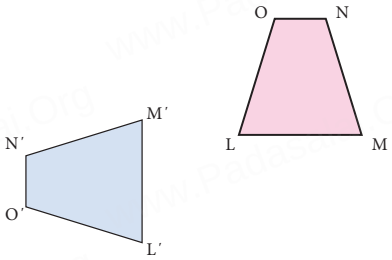
(iv)



Sol. **(i)** 3→, 4↑ **(ii)** 3 ←, 3 ↑

(iii) 4 ←, 4↓ **(iv)** 2→, 2↓

12. **In given diagram, the blue figure is an image of the pink figure.**



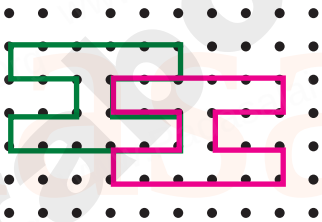
(i) **Choose an angle or a vertex from the preimage and name its image.**

(ii) **List all pairs of corresponding sides.**

Sol. **(i)** Image of ∠L is ∠L′, Image of ∠M is ∠M′,
Image of ∠N is ∠N′, Image of ∠O is ∠O′
Image of vertex L is L′, Image of vertex M is ∠M′
Image of vertex N is ∠N′, Image of vertex O is O′

(ii) Corresponding sides are LM and L′M′, MN and M′N′, NO and N′O′ and OL and O′L′

13. **In the diagram at the right, the green figure is a translation image of the pink figure. Write a coordinate rule that describes the translation.**



Sol. The rule bind here in 3→, 1↓

Objective Type Questions

14. **A _____ is a turn about a point.**

(i) Translation (ii) Rotation (iii) Reflection (iv) Glide Reflection

[Ans : (ii) Rotation]

15. **A _____ is a flip over a line.**

(i) Translation (ii) Rotation (iii) Reflection (iv) Glide Reflection

[Ans : (iii) Reflection]

16. **A _____ is a slide; move without turning or flipping the shape.**

(i) Translation (ii) Rotation (iii) Reflection (iv) Glide Reflection

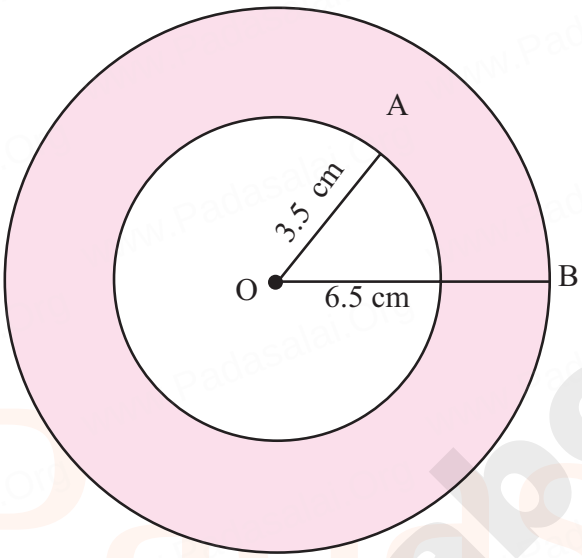
[Ans : (i) Translation]

Step 3 : With O as center drawn a circle of radius OA = 3 cm.

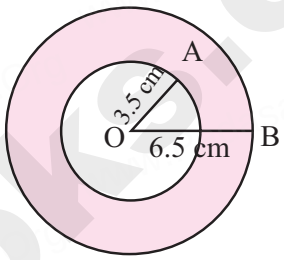
Step 4 : With O as center drawn a circle of radius OB = 5 cm. Thus concentric circles C_1 and C_2 are drawn.

Width of the circular ring = OB – OA
= 5 – 3
= 2 cm

(ii) $r = 3.5$ cm and $r = 6.5$ cm



Rough Diagram



Step 1 : Drawn a rough diagram and market the given measurements

Step 2 : Taken any point O and marked it as the center.

Step 3 : With O as center drawn a circle of radius OA = 3.5 cm.

Step 4 : With O as center drawn a circle of radius OB = 6.5 cm. Thus the concentric circles C_1 and C_2 are drawn.

Width of the circular ring = OB – OA
= 6.5 – 3.5
= 3 cm

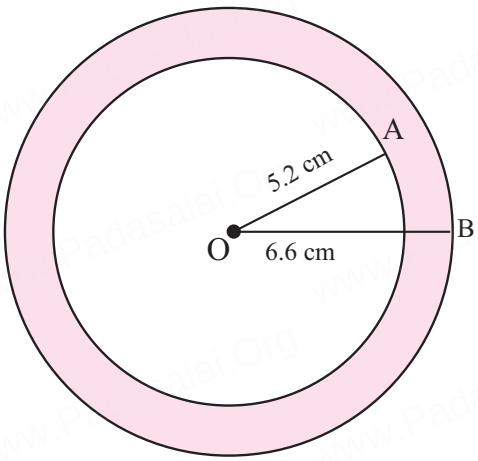
(iii) $d = 6.4$ cm and $d = 11.6$ cm.

$$r = \frac{d}{2}$$

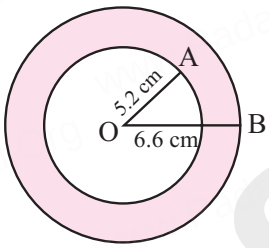
$$r = \frac{6.4}{2} = 3.2 \text{ cm}; \quad r = \frac{11.6}{2} = 5.8 \text{ cm}$$

2. **Draw concentric circles with radii 5.2cm and 6.6cm. Find the width of the circular ring.**

Sol.



Rough Diagram



Step 1 : Drawn a rough diagram and marked the given measurements

Step 2 : Taken any point O and marked it as the center.

Step 3 : With O as center, drawn a circle of radius OA = 5.2 cm.

Step 4 : With O as center, drawn a circle of radius OB = 6.6 cm. Thus the concentric circles C_1 and C_2 are drawn.

Width of the circular ring = OB – OA

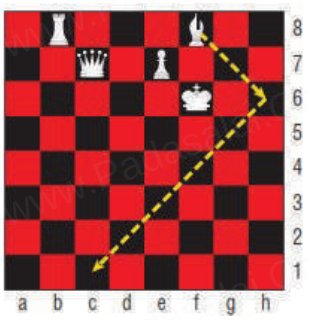
= 6.6 – 5.2

= 1.4 cm

Exercise 4.3

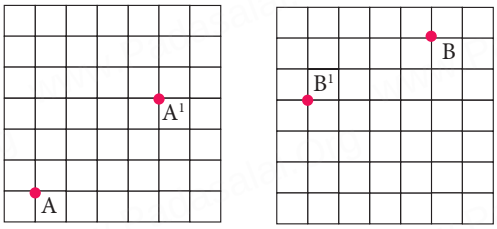
Miscellaneous Practice problems

1. **The bishop, in given picture of chess board, can move diagonally along dark squares. Describe the translations of the bishop after two moves as shown in the figure.**



Sol. For first move: 2→,2↓; For second move: 5←,5↓

II. **6.**



7. (i) 5← 4↑ (ii) 3→ 1↑

8. The total number of times the figure coincides with itself in one complete rotational is complete rotaion is called the order of rotational symmetry. An object is said to have a rotational symmetry if it looks the same after being rotated about its centre through an angle less than 360°.

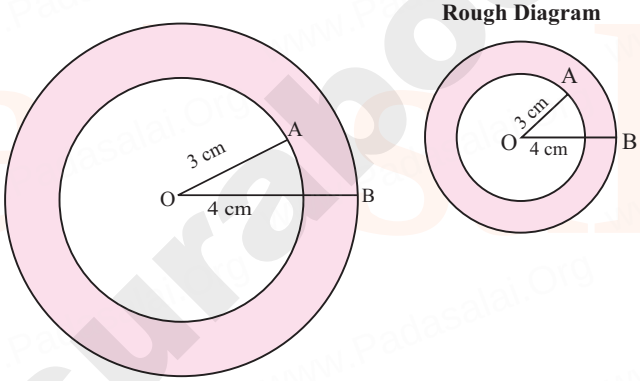
9. Translation symmetry occurs when a pattern slides to a new position. The sliding movement involves neither rotation not reflection.

10. A reflection is a transformation that 'flips' or 'reflects' a figure about a line.

III. **11.** Diameter = 8cm and 6cm

radius = 4 cm and 3 cm

Rough Diagram

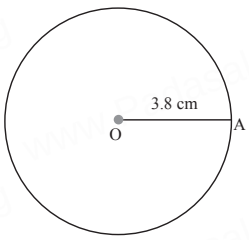


Width of the circular ring = OB – OA

= 4 – 3

= 1 cm

12.



7. Arithmetic mean of 10 observations was found to be 22. If one more observation 44 was to be added to the data, what would be the new mean?

Sol. Arithmetic mean of 10 observation is 22.

$$\text{Arithmetic mean} = \frac{\text{Sum of all observations}}{\text{Number of observations}}$$

$$22 = \frac{\text{sum of 10 observations}}{10}$$

$$\text{Sum of 10 observations} = 22 \times 10$$

$$= 220$$

Now if new number is added, then

$$\text{Mean of 11 observations} = \frac{\text{Sum of 10 observation} + 44}{11}$$

$$= \frac{220 + 44}{11}$$

$$= \frac{264}{11} = 24$$

$$\text{New mean} = 24$$

Objective Type Questions

8. _____ is a representative value of the entire data.

(1) Mean (2) range

(3) minimum value (4) maximum value **[Ans : (1) Mean]**

9. The mean of first fifteen even numbers is _____.

(1) 4 (2) 16 (3) 5 (4) 10 **[Ans : (2) 16]**

Hint : $\frac{2+4+6+....+30}{15} = \frac{2[1+2+3+....15]}{15} = 2 \times \frac{120}{15} = 16$

10. The average of two numbers are 20. One number is 24, another number is _____.

(1) 16 (2) 26 (3) 20 (4) 40 **[Ans : (1) 16]**

Hint :

$$\frac{x+y}{2} = 20$$

$$x + y = 40$$

$$24 + y = 40$$

$$y = 40 - 24 = 16$$

Think

(Text book Page No. 108)

Complete the table given below and observe it to answer the following questions.

Series	Values	Mean	Median
A	99,100,101	100	100
B	90,100,110	100	100
C	50,100,150	100	100
D	99,100,200	99.99	100

(i) Which are all the series having common mean and median?

Sol. A, B and C.

(ii) Why median is same for all the 4 series?

Sol. Since the middle value is 100.

(iii) How mean is unchanged in the series A, B and C?

Sol. The difference between the given numbers are equal.

(iv) What change is to be made in the data, so that mean and median of 'D' series is equal to other series?

Sol. If 99 becomes 0 or 200 becomes 101 then mean becomes 100.

Exercise 5.3

1. Fill in the blanks.

(i) The median of the data 12, 14, 23, 25, 34, 11, 42, 45, 32, 22, 44 is _____.

[Ans : 25]

(ii) The median of first ten even natural numbers is _____. **[Ans : 11]**

2. Find the median of the given data: 35, 25, 34, 36, 45, 18, 28.

Sol. Arranging the given data in ascending order 18, 25, 28, 34, 35, 36, 45.

Here the number of observations $n = 7$, which is odd.

$$\therefore \text{Median} = \left(\frac{n+1}{2}\right)^{th} \text{term}$$

$$= \left(\frac{7+1}{2}\right)^{th} \text{term}$$

$$= \left(\frac{8}{2}\right)^{th} \text{term}$$

$$= 4^{th} \text{ term}$$

$$\text{Hence Median} = 34$$

2. Find the median of 25, 16, 15, 10, 8, 30.

Sol. Arranging is ascending order : 8, 10, 15, 16, 25, 30

Here $n = 6$, even

$$\therefore \text{Median} = \frac{1}{2}\left\{\left(\frac{n}{2}\right)^{th} \text{term} + \left(\frac{n}{2}+1\right)^{th} \text{term}\right\}$$

$$= \frac{1}{2}\left\{\left(\frac{6}{2}\right)^{th} \text{term} + \left(\frac{6}{2}+1\right)^{th} \text{term}\right\}$$

$$= \frac{1}{2}\{3^{rd} \text{ term} + 4^{th} \text{ term}\} = \frac{1}{2}\{15 + 16\}$$

$$= \frac{1}{2}(31) = 15.5$$

$$\therefore \text{Median} = 15.5$$

3. Find the mode of 2, 5, 5, 1, 3, 2, 2, 1, 3, 5, 3.

Sol. Arranging the data in ascending order: 1, 1, 2, 2, 2, 3, 3, 3, 5, 5, 5

Here 2, 3 and 5 occurs 3 times each.

Which is the maximum number of times.

$\therefore$ Mode is 2, 3 and 5.

4. The marks scored by the students in social test out of 20 marks are as follows. 12, 10, 8, 18, 14, 16. Find the mean and the median?

Sol. Arranging the given data in ascending order: 8, 10, 12, 14, 16, 18.

$$\text{Mean} = \frac{\text{Sum of all observations}}{\text{Number of observations}}$$

$$= \frac{8+10+12+14+16+18}{6}$$

$$= \frac{78}{6}$$

$$\text{Mean} = 13$$

There are $n = 6$ observations, which is even

$$\therefore \text{Median} = \frac{1}{2}\left\{\left(\frac{n}{2}\right)^{th} \text{term} + \left(\frac{n}{2}+1\right)^{th} \text{term}\right\}$$

$$= \frac{1}{2}\left\{\left(\frac{6}{2}\right)^{th} \text{term} + \left(\frac{6}{2}+1\right)^{th} \text{term}\right\}$$

$$= \frac{1}{2}\{3^{th} \text{ term} + 4^{th} \text{ term}\}$$

$$= \frac{1}{2}\{8 + 18\} = \frac{1}{2}(26) = 13$$

$$\therefore \text{Median} = 13$$

Unit Test

Time: 1 hr **Max Marks : 25**

I. Fill in the blanks. **5 × 1 = 5**

1. Mean of 19, 21, 18, 17, 18, 22, 46 is _____.
2. Median of 19, 21, 18, 17, 18, 22, 46 is _____.
3. Mode of 9, 8, 15, 8, 20 is _____.
4. Mode of 36, 38, 33, 34, 32, 30, 34, 35 is _____.
5. Median of 36, 38, 33, 34, 32, 30, 34, 35 is _____.

II. Answer the following questions. **5 × 2 = 10**

6. Find the mean 50, 40, 5, 50, 2, 30, 80, 6, 50.
7. Find the mode 1, 5, 3, 4, 2, 5, 5, 3, 6, 2, 1, 3, 2, 5, 4, 3, 3, 5
8. Find the median of 1, 5, 3, 5, 1, 3, 4, 1, 2.
9. The mean height of 5 children is 1.63m. If another child who is 1.75m tall joined this group find the mean height?
10. Find the median of 8, 9, 10, 10, 10, 11, 11, 11, 12, 13.

III. Answer the following questions. **2 × 5 = 10**

11. Find the mean median and mode of 13, 18, 13, 14, 13, 16, 14, 21, 13.
12. Find the mean, median, mode of 1, 2, 4, 7.

Answers

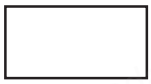
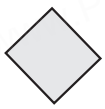
I. **1.** 23 **2.** 19 **3.** 8 **4.** 34 **5.** 34

II. **6.** 34.78 **7.** 3 and 5 **8.** 3 **9.** 1.65 m
10. 10.5

III. **11.** Mean = 15, Median = 14, Mode = 8
12. Mean = 3.5, Median = 3, Mode = None.

Exercise 6.1

1. Match the following:

S. No.	Symbols	Uses
1.		Input / Output
2.		$c = a + b$
3.		Start / End
4.		$a >= 0$
5.		It shows direction of flow

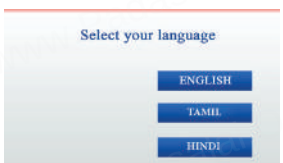
Sol.

S. No.	Symbols	Uses
1.		Input / Output
2.		$c = a + b$
3.		Start / End
4.		$a >= 0$
5.		It shows direction of flow

2. The steps of withdrawing cash from your saving bank account using ATM card are explained in the figures given below. Construct an appropriated flow chart.

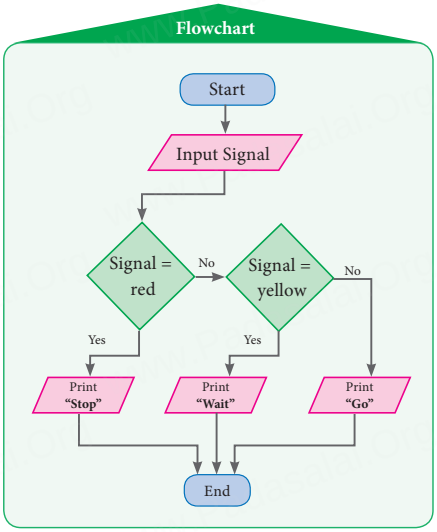
(i) 

Insert a ATM debit /credit card

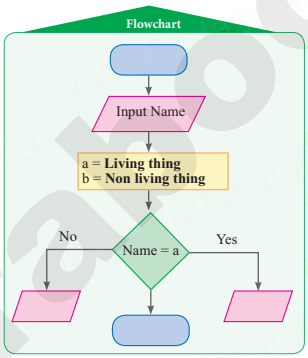
(ii) 

Select your language

Sol.



5. Complete the given flowchart, input names of things and check whether it is living or non - living.

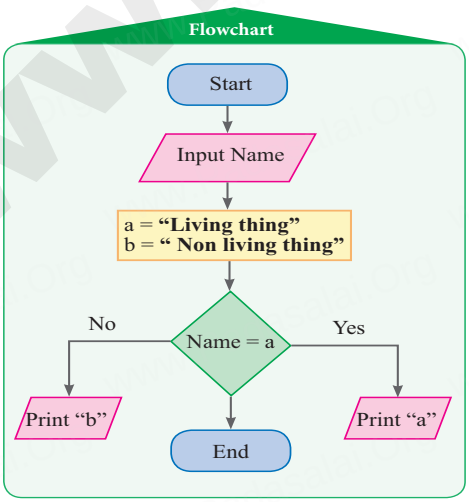


Sol. Input name Horse

Horse = *a*

Yes

Print Living thing



Algorithm:

(i) Read principal

(ii) Read years

(iii) Read rate of interest per year

(iv) Calculate the interest with formula

Interest = Principal × Years × Rate / 100

(v) Print Interest

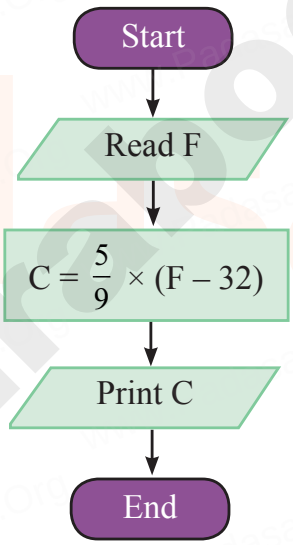
2. Draw a flowchart to convert the given Fahrenheit temperature to Celsius. Formula is $C = \frac{5}{9} \times (F - 32)$

Sol. **Algorithm:**

(i) Read temperature in Fahrenheit

(ii) Calculate temperature in Celsius using formula $C = \frac{5}{9} \times (F - 32)$

(iii) Print C



UNIT TEST

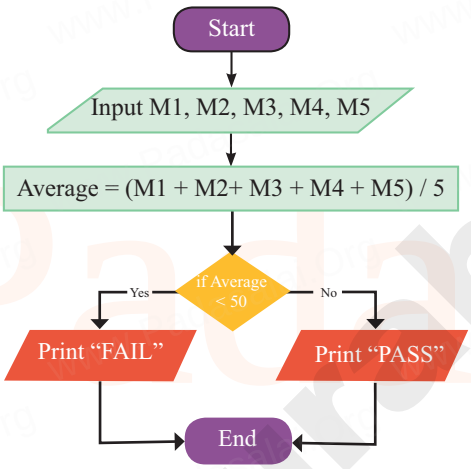
Time: 1 hr **Max Marks : 25**

I. Answer the following questions. **5 × 5 = 25**

1. Draw a flowchart to determine whether a student passed the exam or not. If average of 5 marks ≥ 50, he passed.
2. Draw a flowchart to find the area and perimeter of a square.
3. Draw a flowchart to find the area and perimeter of a rectangle.
4. Draw a flow chart to find the sum of two numbers.
5. Draw a flow chart to find the perimeter of a triangle.

ANSWERS

I. 1.



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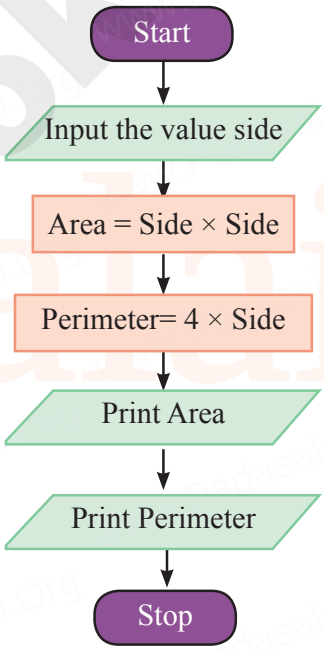

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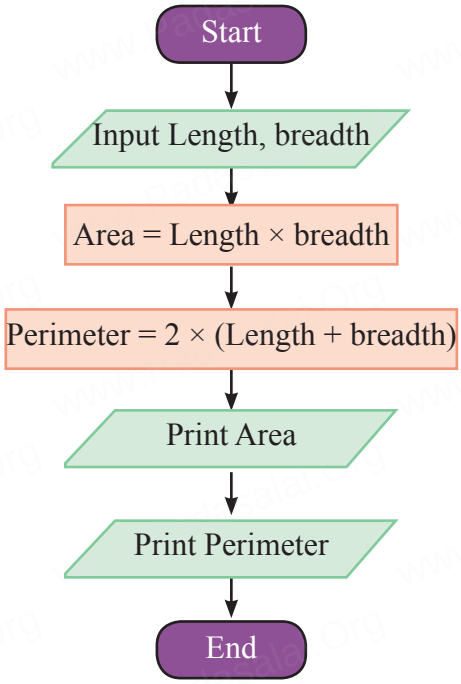

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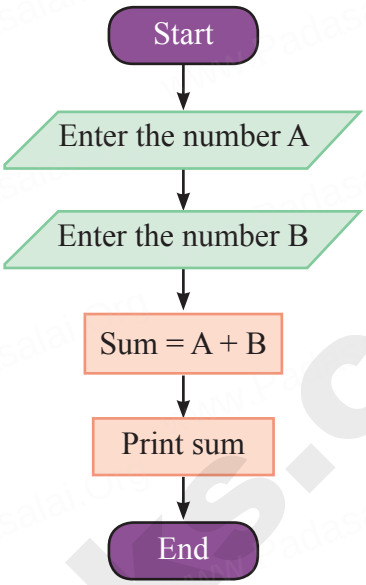
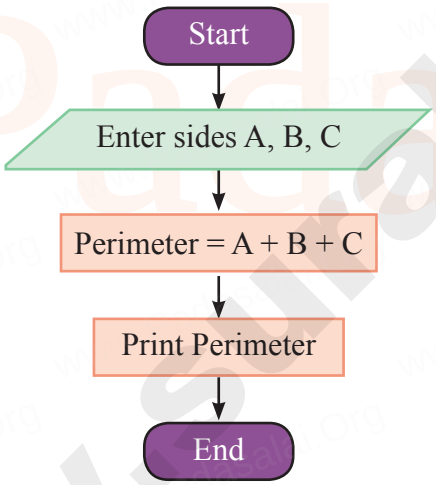
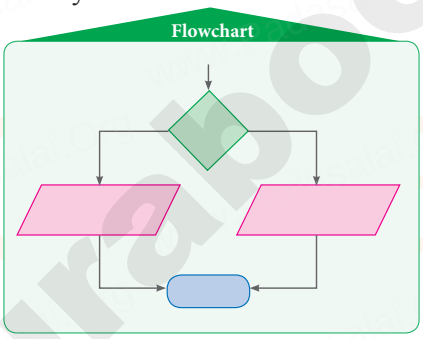


5.



37. Simplify the following. (i) 18.9 ÷ 1000, (ii) 0.87 ÷ 1000
38. In how much time will the simple interest on ₹ 3,000 at the rate of 8% per annum be the same as simple interest on ₹4,000 at 12% per annum for 4 years?
39. In what time will ₹ 17800 amount to ₹ 19936 at 6% per annum?
40. Solve the following inequations and represent the solution on the number line:
$3m - 5 \leq 2m + 1$, m is an integer.
41. Write a possible translation for each of chess piece for a single move.

42. Arithmetic mean of 10 observations was found to be 22. If one more observation 44 was to be added to the data, what would be the new mean?
43. Construct the flow chart to print teachers comment as "very good" if your average mark is above 75 out of 100 or else, as "still try more" can be inserted in the flow chart with earlier one.



Part - D

VII. Answer any one question : **1×5= 5**

44. Draw concentric circles for the following measurements of radii / diameters. Find out the width of each circular ring. $d = 6.4$ cm and $d = 11.6$ cm.
45. Draw concentric circles for the following measurements of radii / diameters. Find out the width of each circular ring. $r = 7.1$ cm and $d = 12$ cm.

Answers

Part - A

I. **1.** (ii) 4.17 **2.** (iii) –625
3. (i) 60% **4.** (ii) Rotation
5. (i) ₹500

II. **6.** False **7.** True
8. False **9.** False
10. False

III. **11.** $39.814 \approx 39.8$ - Rounded to tenth place
12. $35.0014 \approx 35.001$ - Rounded to thousandth place
13. $21.805 \simeq 21.81$ - Rounded to hundredth place
14. $8.71 \approx 9$ - Rounded to nearest whole number
15. $61.00208 \approx 61.00221$ - Rounded to ten thousandth place

IV. **16.** $(x-2)$ and $(x-2)$ **17.** $p^2 - 2pq + q^2$
18. 5.5 **19.** 0
20. 25

Part - B

V. **21.** Refer Sura Guide Chapter -1.2 Q.No. 2
22. Refer Sura Guide Chapter -1.3 Q.No. 3
23. Refer Sura Guide Chapter -2.1 Q.No. 7
24. Refer Sura Guide Chapter -2.1 Q.No. 1
25. Refer Sura Guide Chapter -2.5 Q.No. 3
26. Refer Sura Guide Chapter -2, Challenge Problems Q.No. 16
27. Refer Sura Guide Chapter -3 Trythis TB Page No.58
28. Refer Sura Guide Chapter -3.1 Q.No. 8
29. Refer Sura Guide Chapter -3.3 Q.No. 1 (i)
30. Refer Sura Guide Chapter -4.1Q.No. 1 (i)
31. Refer Sura Guide Chapter - 4.1 (A) Q.No. 1
32. Refer Sura Guide Chapter - 5.1 Q.No. 2
33. Refer Sura Guide Chapter - 5.2 Q.No. 3
34. Refer Sura Guide Chapter - 5.3 (A) Q.No. 1
35. Refer Sura Guide Chapter - 5, Challenge Problems Q.No. 9

Part - C

VI. **36.** Refer Sura Guide Chapter -1.2 Q.No. 6
37. Refer Sura Guide Chapter -1.4 Q.No. 4 (i), (ii)
38. Refer Sura Guide Chapter -2.5 Q.No. 13
39. Refer Sura Guide Chapter -2.4 Q.No. 6
40. Refer Sura Guide Chapter -3.2 Q.No. 4 (iv)
41. Refer Sura Guide Chapter - 4.3 Q.No. 2
42. Refer Sura Guide Chapter -5.1 Q.No. 7
43. Refer Sura Guide Chapter -6.1 Q.No. 6 (ii)

Part - D

VII. **44.** Refer Sura Guide Chapter -4.2 Q.No. 2 (iii)
45. Refer Sura Guide Chapter -4.2 Q.No. 2 (vi)