पु॰ना International School

Shree Swaminarayan Gurukul, Zundal

MATHEMATICS

GRADE VI

SPECIMEN COPY

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INDEX

Chapter 1 knowning our number

Key points to remember

- Given two numbers, one with more digits is the greater number. If the number of digits in two given numbers is the same, that number is larger, which has a greater leftmost digit. If this digit also happens tobe the same, we look at the next digit and so on.
- In forming numbers from given digits, we should be careful to see if the conditions under which the numbers are to be formed are satisfied. Thus, to form the greatest four-digit number from 7, 8, 3, 5 without repeating a single digit, we need to use all four digits, the greatest number can have only 8 as theleftmost digit.
- The smallest four-digit number is 1000 (one thousand). It follows the largest three digit number 999. Similarly, the smallest five digit number is 10,000. It is ten thousand and follows the largest four digitnumber 9999. Further, the smallest six digit number is 100,000. It is one lakh and follows the largest five-digit number 99,999. This carries on for higher digit numbers in a similar manner.
- Use of commas helps in reading and writing large numbers. In the Indian system of numeration we havecommas after 3 digits starting from the right and thereafter every 2 digits. The commas after 3, 5 and 7 digits separate thousand, lakh and crore respectively. In the International system of numeration commasare placed after every 3 digits starting from the right. The commas after 3 and 6 digits separate thousandand million respectively.
- Large numbers are needed in many places in daily life. For example, for giving number of students in aschool, number of people in a village or town, money paid or received in large transactions (paying andselling), in measuring large distances say between various cities in a country or in the world and so on.
- Remember kilo shows 1000 times larger, Centi shows 100 times smaller and milli shows 1000 timessmaller, thus, 1 kilometre = 1000 metres, 1 metre = 100 centimetres or 1000 millimetres etc.
- There are a number of situations in which we do not need the exact quantity but need only a reasonable guess or an estimate. For example, while stating how many spectators watched a particular internationalhockey match, we state the approximate number, say 51,000, we do not need to state the exact number.
- Estimation involves approximating a quantity to an accuracy required. Thus, 4117 may be approximatedto 4100 or to 4000, i.e. to the nearest hundred or to the nearest thousand depending on our need.
- In number of situations, we have to estimate the outcome of number operations. This is done byrounding off the numbers involved and getting a quick, rough answer.
- Estimating the outcome of number operations is useful in checking answers.
- Use of brackets allows us to avoid confusion in the problems where we need to carry out more than onenumber operation.

We use the Hindu-Arabic system of numerals. Another system of writing numerals is the Roman system

Exercise 1.1

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1. Fill in the blanks:

(a) 1 lakh = ………….. ten thousand.

(b) 1 million = ………… hundred thousand.

(c) 1 crore = ………… ten lakh.

(d) 1 crore = ………… million.

(e) 1 million = …………lakh

Solutions:

(a) 1 lakh = 10 ten thousand = 1,00,000

(b) 1 million = 10 hundred thousand = 10,00,000

(c) 1 crore = 10 ten lakh = 1,00,00,000

(d) 1 crore = 10 million = 1,00,00,000

(e) 1 million = 10 lakh = 1,000,000

2. Place commas correctly and write the numerals:

(a) Seventy three lakh seventy five thousand three hundred seven.

(b) Nine crore five lakh forty one.

(c) Seven crore fifty two lakh twenty one thousand three hundred two.

(d) Fifty eight million four hundred twenty three thousand two hundred two.

(e) Twenty three lakh thirty thousand ten.

Solutions:

(a) The numeral of seventy three lakh seventy five thousand three hundred seven is 73,75,307

(b) The numeral of nine crore five lakh forty one is 9,05,00,041

(c) The numeral of seven crore fifty two lakh twenty one thousand three hundred two is 7,52,21,302

(d) The numeral of fifty eight million four hundred twenty three thousand two hundred two is 5,84,23,202

(e) The numeral of twenty three lakh thirty thousand ten is 23,30,010

3. Insert commas suitably and write the names according to Indian System of Numeration:

(a) 87595762 (b) 8546283 (c) 99900046 (d) 98432701

Solutions:

(a) 87595762 – Eight crore seventy five lakh ninety five thousand seven hundred sixty two

(b) 8546283 – Eighty five lakh forty six thousand two hundred eighty three

(c) 99900046 – Nine crore ninety nine lakh forty six

(d) 98432701 – Nine crore eighty four lakh thirty two thousand seven hundred one

4. Insert commas suitably and write the names according to International System of Numeration:

(a) 78921092 (b) 7452283 (c) 99985102 (d) 48049831

Solutions:

(a) 78921092 – Seventy eight million nine hundred twenty one thousand ninety two

(b) 7452283 – Seven million four hundred fifty-two thousand two hundred eighty three

(c) 99985102 – Ninety-nine million nine hundred eighty five thousand one hundred two

(d) 48049831 – Forty-eight million forty-nine thousand eight hundred thirty-one

Exercise 1.2

PAGE NO: 16

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

Solutions:

Number of tickets sold on 1st day = 1094

on 2nd day = 1812

on 3rd day = 2050

on 4th day = 2751

Hence, number of tickets sold on all the four days = 1094 + 1812 + 2050 + 2751 = 7707 tickets

2. Shekhar is a famous cricket player. He has so far scored 6980 runs in test matches. He wishes to complete 10,000 runs. How many more runs does he need?

Solutions:

Shekhar scored = 6980 runs

He want to complete = 10000 runs

Runs need to score more = 10000 – 6980 = 3020

Hence, he need 3020 more runs to score.

3. In an election, the successful candidate registered 5,77,500 votes and his nearest rival secured 3,48,700 votes. By what margin did the successful candidate win the election?

Solutions:

No. of votes secured by the successful candidate = 577500

No. of votes secured by his rival = 348700

Margin by which he won the election = 577500 – 348700 = 228800 votes

∴ Successful candidate won the election by 228800 votes

4. Kirti bookstore sold books worth Rs 2,85,891 in the first week of June and books worth Rs 4,00,768 in the second week of the month. How much was the sale for the two weeks together? In which week was the sale greater and by how much?

Solutions:

Price of books sold in June first week = Rs 285891

Price of books sold in June second week = Rs 400768

No. of books sold in both weeks together = Rs 285891 + Rs 400768 = Rs 686659

The sale of books is the highest in the second week

Difference in the sale in both weeks = Rs 400768 – Rs 285891 = Rs 114877

∴ Sale in second week was greater by Rs 114877 than in the first week.

5. Find the difference between the greatest and the least 5-digit number that can be written using the digits 6, 2, 7, 4, 3 each only once.

Solutions:

Digits given are 6, 2, 7, 4, 3

Greatest 5-digit number = 76432

Least 5-digit number = 23467

Difference between the two numbers = 76432 – 23467 = 52965

∴ The difference between the two numbers is 52965

6. A machine, on an average, manufactures 2,825 screws a day. How many screws did it produce in the month of January 2006?

Solutions:

Number of screws manufactured in a day = 2825

Since January month has 31 days

Hence, number of screws manufactured in January = 31 × 2825 = 87575

Hence, machine produce 87575 screws in the month of January 2006

7. A merchant had Rs 78,592 with her. She placed an order for purchasing 40 radio sets at Rs 1200 each. How much money will remain with her after the purchase?

Solutions:

Total money the merchant had = Rs 78592

Number of radio sets she placed an order for purchasing = 40 radio sets

Cost of each radio set = Rs 1200

So, cost of 40 radio sets = Rs 1200 × 40 = Rs 48000

Money left with the merchant = Rs 78592 – Rs 48000 = Rs 30592

Hence, money left with the merchant after purchasing radio sets is Rs 30592

8. A student multiplied 7236 by 65 instead of multiplying by 56. By how much was his answer greater than the correct answer?

Solutions:

Difference between 65 and 56 i.e (65 – 56) = 9

The difference between the correct and incorrect answer = 7236 × 9 = 65124

Hence, by 65124, the answer was greater than the correct answer

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

Solutions:

Given

Total length of the cloth = 40 m

= 40 × 100 cm = 4000 cm

Cloth required to stitch one shirt = 2 m 15 cm

= 2 × 100 + 15 cm = 215 cm

Number of shirts that can be stitched out of 4000 cm = 4000 / 215 = 18 shirts

Hence 18 shirts can be stitched out of 40 m and 1m 30 cm of cloth is left out

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

Solutions:

Weight of one box = 4 kg 500 g = 4 × 1000 + 500= 4500 g

Maximum weight carried by the van = 800 kg = 800 × 1000= 800000 g

Hence, number of boxes that can be loaded in the van = 800000 / 4500 = 177 boxes

11. The distance between the school and a student's house is 1 km 875 m. Everyday she walks both ways. Find the total distance covered by her in six days.

Solutions:

Distance covered between school and house = 1 km 875 m = 1000 + 875 = 1875 m

Since, the student walk both ways.

Hence, distance travelled by the student in one day = 2 × 1875 = 3750 m

Distance travelled by the student in 6 days = 3750 m × 6 = 22500 m = 22 km 500 m

∴ Total distance covered by the student in six days is 22 km and 500 m

12. A vessel has 4 litres and 500 ml of curd. In how many glasses, each of 25 ml capacity, can it be filled?

Solutions:

Quantity of curd in the vessel = 4 l 500 ml = 4 × 1000 + 500 = 4500 ml

Capacity of 1 glass = 25 ml

∴ Number of glasses that can be filled with curd = 4500 / 25 = 180 glasses

Hence, 180 glasses can be filled with curd.

Exercise 1.3

PAGE NO: 23

1. Estimate each of the following using general rule:

(a) 730 + 998 (b) 796 – 314 (c) 12904 + 2888 (d) 28292 – 21496

Make ten more such examples of addition, subtraction and estimation of their outcome.

Solutions:

(a) 730 + 998

Round off to hundreds

730 rounds off to 700

998 rounds off to 1000

Hence, 730 + 998 = 700 + 1000 = 1700

(b) 796 – 314

Round off to hundreds

796 rounds off to 800

314 rounds off to 300

Hence, 796 – 314 = 800 – 300 = 500

(c) 12904 + 2888

Round off to thousands

12904 rounds off to 13000

2888 rounds off to 3000

Hence, 12904 + 2888 = 13000 + 3000 = 16000

(d) 28292 – 21496

Round off to thousands

28292 round off to 28000

21496 round off to 21000

Hence, 28292 – 21496 = 28000 – 21000 = 7000

Ten more such examples are

(i) 330 + 280 = 300 + 300 = 600

(ii) 3937 + 5990 = 4000 + 6000 = 10000

(iii) 6392 – 3772 = 6000 – 4000 = 2000

(iv) 5440 – 2972 = 5000 – 3000 = 2000

(v) 2175 + 1206 = 2000 + 1000 = 3000

(vi) 1110 – 1292 = 1000 – 1000 = 0

(vii) 910 + 575 = 900 + 600 = 1500

(viii) 6400 – 4900 = 6000 – 5000 = 1000

(ix) 3731 + 1300 = 4000 + 1000 = 5000

(x) 6485 – 4319 = 6000 – 4000 = 2000

2. Give a rough estimate (by rounding off to nearest hundreds) and also a closer estimate (by rounding off to nearest tens):

(a) 439 + 334 + 4317 (b) 108734 – 47599 (c) 8325 – 491 (d) 489348 – 48365

Make four more such examples.

Solutions:

(a) 439 + 334 + 4317

Rounding off to nearest hundreds

439 + 334 + 4317 = 400 + 300 + 4300 = 5000

Rounding off to nearest tens

439 + 334 + 4317 = 440 + 330 + 4320= 5090

(b) 108734 – 47599

Rounding off to nearest hundreds

108734 – 47599 = 108700 – 47600= 61100

Rounding off to nearest tens

108734 – 47599 = 108730 – 47600= 61130

(c) 8325 – 491

Rounding off to nearest hundreds

8325 – 491 = 8300 – 500= 7800

Rounding off to nearest tens

8325 – 491 = 8330 – 490= 7840

(d) 489348 – 48365

Rounding off to nearest hundreds

489348 – 48365 = 489300 – 48400= 440900

Rounding off to nearest tens

489348 – 48365 = 489350 – 48370= 440980

Four more examples are as follows

(i) 4853 + 662

Rounding off to nearest hundreds

4853 + 662 = 4800 + 700= 5500

Rounding off to nearest tens

4853 + 662 = 4850 + 660= 5510

(ii) 775 – 390

Rounding off to nearest hundreds

775 – 390 = 800 – 400= 400

Rounding off to nearest tens

775 – 390 = 780 – 400= 380

(iii) 6375 – 2875

Rounding off to nearest hundreds

6375 – 2875 = 6400 – 2900= 3500

Rounding off to nearest tens

6375 – 2875 = 6380 – 2880= 3500

(iv) 8246 – 6312

Rounding off to nearest hundreds

8246 – 6312 = 8200 – 6300= 1900

Rounding off to nearest tens

8246 – 6312 = 8240 – 6310= 1930

3. Estimate the following products using general rule:

(a) 578 × 161

(b) 5281 × 3491

(c) 1291 × 592

(d) 9250 × 29

Make four more such examples.

Solutions:

(a) 578 × 161

Rounding off by general rule

578 and 161 rounded off to 600 and 200 respectively

600

× 200

____

120000

____

(b) 5281 × 3491

Rounding off by general rule

5281 and 3491 rounded off to 5000 and 3500 respectively

5000

× 3500

____

17500000

____

(c) 1291 × 592

Rounding off by general rule

1291 and 592 rounded off to 1300 and 600 respectively

1300

× 600

____

780000

(d) 9250 × 29

Rounding off by general rule

9250 and 29 rounded off to 9000 and 30 respectively

9000

× 30

270000

THANK YOU

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CLASS 6 MATHS

CHAPTER 2 WHOLE NUMBERS

Key Points:

1) Natural Numbers

Counting numbers are called natural numbers.

2) Whole numbers :

All natural numbers togetherwith'0' are called whole numbers.

Thus 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11,…… are whole numbers

Clearly, every natural number is a whole number but 0 is not a whole number.

3) Successor of a whole number:

If we add 1 to a whole number, we get the next whole number, called its successor.

Thus, the successor of 0 is 1, the successor of 1 is 2, the successor of 11 is 12, and so on. Every whole number has its successor.

4) Predecessor of a Whole number :

One less than a given whole number(other than 0), is called its predecessor.

Thus, the predecessor of 1 is 0, the predecessor of 2 is 1, the predecessor of 10 is 9, and so on. The whole number 0 does not have its predecessor.

Every whole number other than 0 has its predecessor.

Example : Write the successor and predecessor of :

(i)1000 (ii)1005399 (iii)999999

Solution (i) The successor of 1000 = (1000 + 1) = 1001

The predecessor of 1000 = (1000 – 1) = 999

(ii) The successor of 1005399 = (1005399 + 1) = 1005400

The predecessor of 1005399= (1005399 – 1) = 1005398

(iii)The successor of 999999 = (999999 + 1) = 1000000

The predecessor of 999999 = (999999 – 1) = 999998

Exercise 2.1

PAGE NO: 31

1. Write the next three natural numbers after 10999.

Solutions:

The next three natural numbers after 10999 are 11000, 11001 and 11002

2. Write the three whole numbers occurring just before 10001.

Solutions:

The three whole numbers occurring just before 10001 are 10000, 9999 and 9998

3. Which is the smallest whole number?

Solutions:

The smallest whole number is 0

4. How many whole numbers are there between 32 and 53?

Solutions:

The whole numbers between 32 and 53 are

(33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52)

Hence, there are 20 whole numbers between 32 and 53

5. Write the successor of:

(a) 2440701

(b) 100199

(c) 1099999

(d) 2345670

Solutions:

The successors are

(a) 2440701 + 1 = 2440702

(b) 100199 + 1 = 100200

(c) 1099999 + 1 = 1100000

(d) 2345670 + 1 = 2345671

6. Write the predecessor of:

(a) 94 (b) 10000 (c) 208090 (d) 7654321

Solutions:

The predecessors are

(a) 94 – 1 = 93

(b) 10000 – 1 = 9999

(c) 208090 – 1 = 208089

(d) 7654321 – 1 = 7654320

7. In each of the following pairs of numbers, state which whole number is on the left of the other number on the number line. Also write them with the appropriate sign (>, <) between them.

(a) 530, 503 (b) 370, 307 (c) 98765, 56789 (d) 9830415, 10023001

Solutions:

(a) Since, 530 > 503

Hence, 503 is on the left side of 530 on the number line

(b) Since, 370 > 307

Hence, 307 is on the left side of 370 on the number line

(c) Since, 98765 > 56789

Hence, 56789 is on the left side of 98765 on the number line

(d) Since, 9830415 < 10023001

Hence, 9830415 is on the left side of 10023001 on the number line

8. Which of the following statements are true (T) and which are false (F)?

(a) Zero is the smallest natural number.

Solution: False

0 is not a natural number

(b) 400 is the predecessor of 399.

Solution: False

The predecessor of 399 is 398 Since, (399 – 1 = 398)

(c) Zero is the smallest whole number.

Solution: True

Zero is the smallest whole number

(d) 600 is the successor of 599.

Solution: True

Since (599 + 1 = 600)

(e) All natural numbers are whole numbers.

Solution: True

All natural numbers are whole numbers

(f) All whole numbers are natural numbers.

Solution: False

0 is a whole number but is not a natural number

(g) The predecessor of a two digit number is never a single digit number.

Solution: False

Example the predecessor of 10 is 9

(h) 1 is the smallest whole number.

Solution: False

0 is the smallest whole number

The natural number 1 has no predecessor.

Solution: True

The predecessor of 1 is 0 but is not a natural number

(j) The whole number 1 has no predecessor.

Solution: False

0 is the predecessor of 1 and is a whole number

(k) The whole number 13 lies between 11 and 12.

Solution: False

13 does not lie between 11 and 12

(l) The whole number 0 has no predecessor.

Solution: True

The predecessor of 0 is -1 and is not a whole number

(m) The successor of a two digit number is always a two digit number.

Solution: False

As the successor of 99 is 100

Exercise 2.2

PAGE NO: 40

1. Find the sum by suitable rearrangement:

(a) 837 + 208 + 363
(b) 1962 + 453 + 1538 + 647
Solutions:
(a) Given 837 + 208 + 363

= (837 + 363) + 208

= 1200 + 208

= 1408

(b) Given 1962 + 453 + 1538 + 647

= (1962 + 1538) + (453 + 647)

= 3500 + 1100

= 4600

2. Find the product by suitable rearrangement:

(a) 2 × 1768 × 50

(b) 4 × 166 × 25

(c) 8 × 291 × 125

(d) 625 × 279 × 16

(e) 285 × 5 × 60

(f) 125 × 40 × 8 × 25

Solutions:

(a) Given 2 × 1768 × 50

= 2 × 50 × 1768

= 100 × 1768

= 176800

(b) Given 4 × 166 × 25

= 4 × 25 × 166

= 100 × 166

= 16600

(c) Given 8 × 291 × 125

= 8 × 125 × 291

= 1000 × 291

= 291000

(d) Given 625 × 279 × 16

= 625 × 16 × 279

= 10000 × 279

= 2790000

(e) Given 285 × 5 × 60

= 285 × 300

= 85500

(f) Given 125 × 40 × 8 × 25

= 125 × 8 × 40 × 25

= 1000 × 1000

= 1000000

3. Find the value of the following:

(a) 297 × 17 + 297 × 3

(b) 54279 × 92 + 8 × 54279

(c) 81265 × 169 – 81265 × 69

(d) 3845 × 5 × 782 + 769 × 25 × 218

Solutions:

(a) Given 297 × 17 + 297 × 3

= 297 × (17 + 3)

= 297 × 20

= 5940

(b) Given 54279 × 92 + 8 × 54279

= 54279 × 92 + 54279 × 8

= 54279 × (92 + 8)

= 54279 × 100

= 5427900

(c) Given 81265 × 169 – 81265 × 69

= 81265 × (169 – 69)

= 81265 × 100

= 8126500

(d) Given 3845 × 5 × 782 + 769 × 25 × 218

= 3845 × 5 × 782 + 769 × 5 × 5 × 218

= 3845 × 5 × 782 + 3845 × 5 × 218

= 3845 × 5 × (782 + 218)

= 19225 × 1000

= 19225000

4. Find the product using suitable properties.

(a) 738 × 103

(b) 854 × 102

(c) 258 × 1008

(d) 1005 × 168

Solutions:

(a) Given 738 × 103

= 738 × (100 + 3)

= 738 × 100 + 738 × 3 (using distributive property)

= 73800 + 2214

= 76014

(b) Given 854 × 102

= 854 × (100 + 2)

= 854 × 100 + 854 × 2 (using distributive property)

= 85400 + 1708

= 87108

(c) Given 258 × 1008

= 258 × (1000 + 8)

= 258 × 1000 + 258 × 8 (using distributive property)

= 258000 + 2064

= 260064

(d) Given 1005 × 168

= (1000 + 5) × 168

= 1000 × 168 + 5 × 168 (using distributive property)

= 168000 + 840

= 168840

5. A taxidriver filled his car petrol tank with 40 litres of petrol on Monday. The next day, he filled the tank with 50 litres of petrol. If the petrol costs Rs.44 per litre, how much did he spend in all on petrol?

Solutions:

Petrol quantity filled on Monday = 40 litres

Petrol quantity filled on Tuesday = 50 litres

Total petrol quantity filled = (40 + 50) litre

Cost of petrol per litre = ₹ 44

Total money spent = 44 × (40 + 50)

= 44 × 90

= Rs. 3960

6. A vendor supplies 32 litres of milk to a hotel in the morning and 68 litres of milk in the evening. If the milk costs ₹ 45 per litre, how much money is due to the vendor per day?

Solutions:

Milk quantity supplied in the morning = 32 litres

Milk quantity supplied in the evening = 68 litres

Cost of milk per litre = ₹ 45

Total cost of milk per day = 45 × (32 + 68)

= 45 × 100

= Rs. 4500

Hence, the money is due to the vendor per day is Rs. 4500

7. Match the following:

(i) 425 × 136 = 425 × (6 + 30 + 100)	**(a) Commutativity under multiplication.**
(ii) 2 × 49 × 50 = 2 × 50 × 49	**(b) Commutativity under addition.**
(iii) 80 + 2005 + 20 = 80 + 20 + 2005	**(c) Distributivity of multiplication over addition**

Solutions:

(i) 425 × 136 = 425 × (6 + 30 + 100)   (c) Distributivity of multiplication over addition**.**

Hence (c) is the correct answer

(ii) 2 × 49 × 50 = 2 × 50 × 49   (a) Commutativity under multiplication

Hence, (a) is the correct answer

(iii) 80 + 2005 + 20 = 80 + 20 + 2005   (b) Commutativity under addition

Hence, (b) is the correct answer

Exercise 2.3

PAGE NO: 43

1. Which of the following will not represent zero:

(a) 1 + 0

(b) 0 × 0

(c) 0 / 2

(d) (10 – 10) / 2

Solutions:

(a) $1 + 0 = 1$

Hence, it does not represent zero

(b) $0 \times 0 = 0$

Hence, it represents zero

(c) $0 / 2 = 0$

Hence, it represents zero

(d) $(10 – 10) / 2 = 0 / 2 = 0$

Hence, it represents zero

2. If the product of two whole numbers is zero, can we say that one or both of them will be zero? Justify through examples.

Solutions:

If product of two whole numbers is zero, definitely one of them is zero

Example: $0 \times 3 = 0$ and $15 \times 0 = 0$

If product of two whole numbers is zero, both of them may be zero

Example: $0 \times 0 = 0$

Yes, if the product of two whole numbers is zero, then both of them will be zero

3. If the product of two whole numbers is 1, can we say that one or both of them will be 1? Justify through examples.

Solutions:

If the product of two whole numbers is 1, both the numbers should be equal to 1

Example: $1 \times 1 = 1$

But $1 \times 5 = 5$

Hence, its clear that the product of two whole numbers will be 1, only in situation when both numbers to be multiplied are 1

4. Find using distributive property:

(a) 728 × 101

(b) 5437 × 1001

(c) 824 × 25

(d) 4275 × 125

(e) 504 × 35

Solutions:

(a) Given 728 × 101

= 728 × (100 + 1)

= 728 × 100 + 728 × 1

= 72800 + 728

= 73528

(b) Given 5437 × 1001

= 5437 × (1000 + 1)

= 5437 × 1000 + 5437 × 1

= 5437000 + 5437

= 5442437

(c) Given 824 × 25

= (800 + 24) × 25

= (800 + 25 – 1) × 25

= 800 × 25 + 25 × 25 – 1 × 25

= 20000 + 625 – 25

= 20000 + 600

= 20600

(d) Given 4275 × 125

= (4000 + 200 + 100 – 25) × 125

= (4000 × 125 + 200 × 125 + 100 × 125 – 25 × 125)

= 500000 + 25000 + 12500 – 3125

= 534375

(e) Given 504 × 35

= (500 + 4) × 35

= 500 × 35 + 4 × 35

= 17500 + 140

= 17640

5. Study the pattern:

1 × 8 + 1 = 9 1234 × 8 + 4 = 9876

12 × 8 + 2 = 98 12345 × 8 + 5 = 98765

123 × 8 + 3 = 987

Write the next two steps. Can you say how the pattern works?

(Hint: 12345 = 11111 + 1111 + 111 + 11 + 1)

Solutions:

123456 × 8 + 6 = 987654

1234567 × 8 + 7 = 9876543

Given 123456 = (111111 + 11111 + 1111 + 111 + 11 + 1)

123456 × 8 = (111111 + 11111 + 1111 + 111 + 11 + 1) × 8

= 111111 × 8 + 11111 × 8 + 1111 × 8 + 111 × 8 + 11 × 8 + 1 × 8

= 888888 + 88888 + 8888 + 888 + 88 + 8

= 987648

123456 × 8 + 6 = 987648 + 6

= 987654

Yes, here the pattern works

1234567 × 8 + 7 = 9876543

Given 1234567 = (1111111 + 111111 + 11111 + 1111 + 111 + 11 + 1)

1234567 × 8 = (1111111 + 111111 + 11111 + 1111 + 111 + 11 + 1) × 8

= 1111111 × 8 + 111111 × 8 + 11111 × 8 + 1111 × 8 + 111 × 8 + 11 × 8 + 1 × 8

= 8888888 + 888888 + 88888 + 8888 + 888 + 88 + 8

= 9876536

1234567 × 8 + 7 = 9876536 + 7

= 9876543

Yes, here the pattern works

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CLASS 6 MATHS

CHAPTER 3 PLAYING WITH NUMBERS

KEY POINTS TO REMEMBER

1. **Factors and Multiples**

A factor of a number is an exact divisor of that number. In turn, a number is a multiple of each of its factors. Some interesting facts about factors and multiples are as follows:

- 1 is a factor of every number.
- Every number is a factor of itself.
- Every factor of a number is an exact divisor of that number.
- Every factor of a number is less than or equal to that number.
- The factors of a given number are finite in number.
- Every multiple of a number is greater than or equal to that number.
- The multiples of a given number are infinite in number.
- Every number is a multiple of itself.

2. Perfect number: If the sum of all the factors of a number is equal to twice the number, then that number is called a perfect number.

For example: 28 is a perfect number because all the factors of 28 are 1,2,4,7,14 and 28 whose sum = 1 + 2 +4 + 7 + 14 + 28 = 56 = 2 × 28, whereas 10 is not a perfect number because all the factors of 10 are 1, 2, 5

and 10 whose sum = 1 + 2 + 5 + 10 = 18 ≠ 2 × 10.

3. Prime and Composite Number:

Prime numbers: The numbers having exactly two factors 1 and the number itself are called prime numbers. For example, 2, 3, 5, 7, 11, etc. are prime numbers.

4. Composite numbers: The numbers having more than two factors are called composite numbers. For example 4, 6, 8, 9, 10. etc. are composite numbers.

Note: The number 1 is neither prime nor composite.

5. Even number: A number which is a multiple of 2 is called an even number. For example: 2, 4, 6, 8, 10,….

6. Odd number: A number which is not a multiple of 2 is called an odd number. For example: 1, 3, 5, 7, 9,…

7. A number with 0, 2, 4, 6, 8 at the unit's place is an even number. So, 250, 2732, 29354, 34596 are even numbers.

Obviously, the numbers 257, 3249, 7321 are odd numbers. 2 is the smallest prime number which is even . Every prime number except 2 is odd.

A number is divisible by 10 if it has 0 in its units place

Test for divisibility for number

a) A number is divisible by 5 if it has either 0 or 5 in its units place.

b) A number is divisible by 2 if it has any of the digits 0, 2, 4, 6 or 8 in its units place

c) A number is divisible by 3 if the sum of its digits is a multiple of 3.

d) A number is divisible by 6 if it is divisible by 2 and 3 both.

e) A number with 3 or more digits is divisible by 4 if the number formed by its last two digits (i.e., units and tens) is divisible by 4.

f) A number with 4 or more digits is divisible by 8 if the number formed by its last three digit divisible by 8.

g) A number is divisible by 9 if the sum of all the digits of the number is divisible by 9.

h) A number is divisible by 11 if the difference between the sum of the digits at odd places (from the right) and the sum of the digits at even places (from the right) of the number is either 0 or divisible by 11

Match A with B

Column I	Column II
(*i*) 35	(*a*) Multiple of 8
(*ii*) 15	(*b*) Multiple of 7
(*iii*) 16	(*c*) Multiple of 70
(*iv*) 20	(*d*) Factor of 30
(*v*) 25	(*e*) Factor of 50
	(*f*) Factor of 20

Solution

(i)↔ (b) [∵ 7 x 5 = 35]
(ii) ↔ (d) [∵ 15 x 2 = 30]
(iii) ↔ (a) [∵ 8 x 2 = 16]
(iv) ↔ (f) [∵ 20 x 1 = 20]
(v) ↔ (e) [∵ 25 x 2 = 50]

Exercise 3.1

PAGE NO: 50

1. Write all the factors of the following numbers:

(a) 24 (b) 15 (c) 21 (d) 27 (e) 12 (f) 20 (g) 18 (h) 23 (i) 36

Solutions:

(a) 24

$24 = 1 \times 24$

$24 = 2 \times 12$

$24 = 3 \times 8$

$24 = 4 \times 6$

$24 = 6 \times 4$

Stop here since 4 and 6 have occurred earlier

Hence, the factors of 24 are 1, 2, 3, 4, 6, 8, 12 and 24

(b) 15

$15 = 1 \times 15$

$15 = 3 \times 5$

$15 = 5 \times 3$

Stop here since 3 and 5 have occurred earlier

Hence, the factors of 15 are 1, 3, 5 and 15

(c) 21

$21 = 1 \times 21$

$21 = 3 \times 7$

$21 = 7 \times 3$

Stop here since 3 and 7 have occurred earlier

Hence, the factors of 21 are 1, 3, 7 and 21

(d) 27

$27 = 1 \times 27$

$27 = 3 \times 9$

$27 = 9 \times 3$

Stop here since 3 and 9 have occurred earlier

Hence, the factors of 27 are 1, 3, 9 and 27

(e) 12

12 = 1 × 12

12 = 2 × 6

12 = 3 × 4

12 = 4 × 3

Stop here since 3 and 4 have occurred earlier

Hence, the factors of 12 are 1, 2, 3, 4, 6 and 12

(f) 20

20 = 1 × 20

20 = 2 × 10

20 = 4 × 5

20 = 5 × 4

Stop here since 4 and 5 have occurred earlier

Hence, the factors of 20 are 1, 2, 4, 5 10 and 20

(g) 18

18 = 1 × 18

18 = 2 × 9

18 = 3 × 6

18 = 6 × 3

Stop here since 3 and 6 have occurred earlier

Hence, the factors of 18 are 1, 2, 3, 6, 9 and 18

(h) 23

23 = 1 × 23

23 = 23 × 1

Since 1 and 23 have occurred earlier

Hence, the factors of 23 are 1 and 23

(i) 36

36 = 1 × 36

36 = 2 × 18

36 = 3 × 12

36 = 4 × 9

36 = 6 × 6

Stop here, since both the factors (6) are same. Thus the factors of 36 are 1, 2, 3, 4, 6, 9, 12, 18 and 36

2. Write first five multiples of:

(a) 5

(b) 8

(c) 9

Solutions:

(a) The required multiples are:

5 × 1 = 5

5 × 2 = 10

5 × 3 = 15

5 × 4 = 20

5 × 5 = 25

Hence, the first five multiples of 5 are 5, 10, 15, 20 and 25

(b) The required multiples are:

8 × 1 = 8

8 × 2 = 16

8 × 3 = 24

8 × 4 = 32

8 × 5 = 40

Hence, the first five multiples of 8 are 8, 16, 24, 32 and 40

(c) The required multiples are:

9 × 1 = 9

9 × 2 = 18

9 × 3 = 27

9 × 4 = 36

9 × 5 = 45

Hence, the first five multiples of 9 are 9, 18, 27, 36 and 45

3. Match the items in column 1 with the items in column 2.

Column 1	Column 2
(i) 35	**(a)Multipleof 8**
(ii) 15	**(b) Multiple of 7**
(iii) 16	**(c) Multiple of 70**
(iv) 20	**(d) Factor of 30**
(v) 25	**(e) Factor of 50**
	(f) Factor of 20

Solutions:

(i) 35 is a multiple of 7

Hence**, option (b)**

(ii) 15 is a factor of 30

Hence, **option (d)**

(iii) 16 is a multiple of 8

Hence, **option (a)**

(iv) 20 is a factor of 20

Hence, **option (f)**

(v) 25 is a factor of 50

Hence, **option (e)**

4. Find all the multiples of 9 upto 100.

Solutions:

$9 \times 1 = 9$

$9 \times 2 = 18$

$9 \times 3 = 27$

$9 \times 4 = 36$

$9 \times 5 = 45$

$9 \times 6 = 54$

$9 \times 7 = 63$

$9 \times 8 = 72$

$9 \times 9 = 81$

9 × 10 = 90

9 × 11 = 99

∴ All the multiples of 9 upto 100 are 9, 18, 27, 36, 45, 54, 63, 72, 81, 90 and 99

Exercise 3.2

PAGE NO: 53

1. What is the sum of any two (a) Odd numbers? (b) Even numbers?

Solutions:

(a)The sum of any two odd numbers is even numbers.

Examples: 5 + 3 = 8

15 + 13 = 28

(b) The sum of any two even numbers is even numbers

Examples: 2 + 8 = 10

12 + 28 = 40

2. State whether the following statements are True or False:

(a) The sum of three odd numbers is even.

(b) The sum of two odd numbers and one even number is even.

(c) The product of three odd numbers is odd.

(d) If an even number is divided by 2, the quotient is always odd.

(e) All prime numbers are odd.

(f) Prime numbers do not have any factors.

(g) Sum of two prime numbers is always even.

(h) 2 is the only even prime number.

(i) All even numbers are composite numbers.

(j) The product of two even numbers is always even.

Solutions:

(a) False. The sum of three odd numbers is odd.

Example: 7 + 9 + 5 = 21 i.e odd number

(b) True. The sum of two odd numbers and one even numbers is even.

Example: 3 + 5 + 8 = 16 i.e is even number.

(c) True. The product of three odd numbers is odd.

Example: $3 \times 7 \times 9 = 189$ i.e is odd number.

(d) False. If an even number is divided by 2, the quotient is even.

Example: $8 \div 2 = 4$

(e) False, All prime numbers are not odd.

Example: 2 is a prime number but it is also an even number.

(f) False. Since, 1 and the number itself are factors of the number

(g) False. Sum of two prime numbers may also be odd number

Example: $2 + 5 = 7$ i.e odd number.

(h) True. 2 is the only even prime number.

(i) False. Since, 2 is a prime number.

(j) True. The product of two even numbers is always even.

Example: $2 \times 4 = 8$ i.e even number.

3. The numbers 13 and 31 are prime numbers. Both these numbers have same digits 1 and 3. Find such pairs of prime numbers upto 100.

Solutions:

The prime numbers with same digits upto 100 are as follows:

17 and 71

37 and 73

79 and 97

4. Write down separately the prime and composite numbers less than 20.

Solutions:

2, 3, 5, 7, 11, 13, 17 and 19 are the prime numbers less than 20

4, 6, 8, 9, 10, 12, 14, 15, 16 and 18 are the composite numbers less than 20

5. What is the greatest prime number between 1 and 10?

Solutions:

2, 3, 5 and 7 are the prime numbers between 1 and 10. 7 is the greatest prime number among them.

6. Express the following as the sum of two odd primes.

(a) 44 (b) 36 (c) 24 (d) 18

Solutions:

(a) $3 + 41 = 44$

(b) 5 + 31 = 36

(c) 5 + 19 = 24

(d) 5 + 13 = 18

7. Give three pairs of prime numbers whose difference is 2. [Remark: Two prime numbers whose difference is 2 are called twin primes].

Solutions:

The three pairs of prime numbers whose difference is 2 are

3, 5

5, 7

11, 13

8. Which of the following numbers are prime?

(a) 23 (b) 51 (c) 37 (d) 26

Solutions:

(a) 23

$1 \times 23 = 23$

$23 \times 1 = 23$

Therefore 23 has only two factors 1 and 23. Hence, it is a prime number.

(b) 51

$1 \times 51 = 51$

$3 \times 17 = 51$

Therefore 51 has four factors 1, 3, 17 and 51. Hence, it is not a prime number, it is a composite number.

(c) 37

$1 \times 37 = 37$

$37 \times 1 = 37$

Therefore 37 has two factors 1 and 37. Hence, it is a prime number.

(d) 26

$1 \times 26 = 26$

$2 \times 13 = 26$

Therefore 26 has four factors 1, 2, 13 and 26. Hence, it is not a prime number, it is a composite number.

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

Solutions:

Seven composite numbers between 89 and 97 both which are prime numbers are 90, 91, 92, 93, 94, 95 and 96

Numbers	Factors
90	1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90
91	1, 7, 13, 91
92	1, 2, 4, 23, 46, 92
93	1, 3, 31, 93
94	1, 2, 47, 94
95	1, 5, 19, 95
96	1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 96

10. Express each of the following numbers as the sum of three odd primes:

(a) 21 (b) 31 (c) 53 (d) 61

Solutions:

(a) 3 + 5 + 13 = 21

(b) 3 + 5 + 23 = 31

(c) 13 + 17 + 23= 53

(d) 7 + 13 + 41 = 61

11. Write five pairs of prime numbers less than 20 whose sum is divisible by 5. (Hint: 3 + 7 = 10)

Solutions:

The five pairs of prime numbers less than 20 whose sum is divisible by 5 are

2 + 3 = 5

2 + 13 = 15

3 + 17 = 20

7 + 13 = 20

19 + 11 = 30

12. Fill in the blanks:

(a) A number which has only two factors is called a ______.

(b) A number which has more than two factors is called a ______.

(c) 1 is neither ______ nor ______.

(d) The smallest prime number is ______.

(e) The smallest composite number is _____.

(f) The smallest even number is ______.

Solutions:

(a) A number which has only two factors is called **a prime number**.

(b) A number which has more than two factors is called **a composite number**.

(c) 1 is neither **prime number** nor **composite number.**

(d) The smallest prime number is **2**

(e) The smallest composite number is **4**

(f) The smallest even number is **2.**

Exercise 3.3

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1. **Using divisibility tests, determine which of the following numbers are divisible by 2; by 3; by 4; by 5; by 6; by 8; by 9; by 10; by 11 (say, yes or no):**

Numbers	Divisible by								
	2	3	4	5	6	8	9	10	11
128	Yes	No	Yes	No	No	Yes	No	No	No
990	…….	…….	…….	…….	…….	…….	…….	…….	…….
1586	…….	…….	…….	…….	…….	…….	…….	…….	…….
275	…….	…….	…….	…….	…….	…….	…….	…….	…….
6686	…….	…….	…….	…….	…….	…….	…….	…….	…….
639210	…….	…….	…….	…….	…….	…….	…….	…….	…….
429714	…….	…….	…….	…….	…….	…….	…….	…….	…….
2856	…….	…….	…….	…….	…….	…….	…….	…….	…….
3060	…….	…….	…….	…….	…….	…….	…….	…….	…….
406839	…….	…….	…….	…….	…….	…….	…….	…….	…….

Solutions:

Numbers	Divisible by								
	2	3	4	5	6	8	9	10	11
128	Yes	No	Yes	No	No	Yes	No	No	No
990	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes
1586	Yes	No	No	No	No	No	No	No	No
275	No	No	No	Yes	No	No	No	No	Yes
6686	Yes	No	No	No	No	No	No	No	No
639210	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes
429714	Yes	Yes	No	No	Yes	No	Yes	No	No
2856	Yes	Yes	Yes	No	Yes	Yes	No	No	No
3060	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
406839	No	Yes	No	No	No	No	No	No	No

2. Using divisibility tests, determine which of the following numbers are divisible by 4; by 8:

(a) 572 (b) 726352 (c) 5500 (d) 6000 (e) 12159

(f) 14560 (g) 21084 (h) 31795072 (i) 1700 (j) 2150

Solutions:

(a) 572

72 are the last two digits. Since, 72 is divisible by 4. Hence, 572 is also divisible by 4

572 are the last three digits. Since, 572 is not divisible by 8. Hence, 572 is not divisible by 8

(b) 726352

52 are the last two digits. Since, 52 is divisible by 4. Hence, 726352 is divisible by 4

352 are the last three digits. Since 352 is divisible by 8. Hence, 726352 is divisible by 8

(c) 5500

Since, last two digits are 00. Hence 5500 is divisible by 4

500 are the last three digits. Since, 500 is not divisible by 8. Hence, 5500 is not divisible by 8

(d) 6000

Since, last two digits are 00. Hence 6000 is divisible by 4

Since, last three digits are 000. Hence, 6000 is divisible by 8

(e) 12159

59 are the last two digits. Since, 59 is not divisible by 4. Hence, 12159 is not divisible by 4

159 are the last three digits. Since, 159 is not divisible by 8. Hence, 12159 is not divisible by 8

(f) 14560

60 are the last two digits. Since 60 is divisible by 4. Hence, 14560 is divisible by 4

560 are the last three digits. Since, 560 is divisible by 8. Hence, 14560 is divisible by 8

(g) 21084

84 are the last two digits. Since, 84 is divisible by 4. Hence, 21084 is divisible by 4

084 are the last three digits. Since, 084 is not divisible by 8. Hence, 21084 is not divisible by 8

(h) 31795072

72 are the last two digits. Since, 72 is divisible by 4. Hence, 31795072 is divisible by 4

072 are the last three digits. Since, 072 is divisible by 8. Hence, 31795072 is divisible by

(i) 1700

Since, the last two digits are 00. Hence, 1700 is divisible by 4

700 are the last three digits. Since, 700 is not divisible by 8. Hence, 1700 is not divisible by 8

(j) 2150

50 are the last two digits. Since, 50 is not divisible by 4. Hence, 2150 is not divisible by 4

150 are the last three digits. Since, 150 is not divisible by 8. Hence, 2150 is not divisible by 8

3. Using divisibility tests, determine which of following numbers are divisible by 6:

(a) 297144 (b) 1258 (c) 4335 (d) 61233 (e) 901352

(f) 438750 (g) 1790184 (h) 12583 (i) 639210 (j) 17852

Solutions:

(a) 297144

Since, last digit of the number is 4. Hence, the number is divisible by 2

By adding all the digits of the number, we get 27 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is divisible by both 2 and 3. Hence, the number is divisible by 6

(b) 1258

Since, last digit of the number is 8. Hence, the number is divisible by 2

By adding all the digits of the number, we get 16 which is not divisible by 3. Hence, the number is not divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

(c) 4335

Since, last digit of the number is 5 which is not divisible by 2. Hence, the number is not divisible by 2

By adding all the digits of the number, we get 15 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

(d) 61233

Since, the last digit of the number is 3 which is not divisible by 2. Hence, the number is not divisible by 2

By adding all the digits of the number, we get 15 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

(e) 901352

Since, the last digit of the number is 2. Hence, the number is divisible by 2

By adding all the digits of the number, we get 20 which is not divisible by 3. Hence, the number is not divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

(f) 438750

Since, the last digit of the number is 0. Hence, the number is divisible by 2

By adding all the digits of the number, we get 27 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is divisible by both 2 and 3. Hence, the number is divisible by 6

(g) 1790184

Since, the last digit of the number is 4. Hence, the number is divisible by 2

By adding all the digits of the number, we get 30 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is divisible by both 2 and 3. Hence, the number is divisible by 6

(h) 12583

Since, the last digit of the number is 3. Hence, the number is not divisible by 2

By adding all the digits of the number, we get 19 which is not divisible by 3. Hence, the number is not divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

(i) 639210

Since, the last digit of the number is 0. Hence, the number is divisible by 2

By adding all the digits of the number, we get 21 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is divisible by both 2 and 3. Hence, the number is divisible by 6

(j) 17852

Since, the last digit of the number is 2. Hence, the number is divisible by 2

By adding all the digits of the number, we get 23 which is not divisible by 3. Hence, the number is not divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

4. Using divisibility tests, determine which of the following numbers are divisible by 11:

(a) 5445 (b) 10824 (c) 7138965 (d) 70169308 (e) 10000001 (f) 901153

Solutions:

(a) 5445

Sum of the digits at odd places = 5 + 4= 9

Sum of the digits at even places = 4 + 5= 9

Difference = 9 – 9 = 0

Since, the difference between sum of digits at odd places and sum of digits at even places is 0. Hence, 5445 is divisible by 11

(b) 10824

Sum of digits at odd places = 4 + 8 + 1= 13

Sum of digits at even places = 2 + 0= 2

Difference = 13 – 2 = 11

Since, the difference between sum of digits at odd places and sum of digits at even places is 11 which is divisible by 11. Hence, 10824 is divisible by 11

(c) 7138965

Sum of digits at odd places = 5 + 9 + 3 + 7 = 24

Sum of digits at even places = 6 + 8 + 1 = 15

Difference = 24 – 15 = 9

Since, the difference between sum of digits at odd places and sum of digits at even places is 9 which is not divisible by 11. Hence, 7138965 is not divisible by 11

(d) 70169308

Sum of digits at odd places = 8 + 3 + 6 + 0

= 17

Sum of digits at even places = 0 + 9 + 1 + 7

= 17

Difference = 17 – 17 = 0

Since, the difference between sum of digits at odd places and sum of digits at even places is 0. Hence, 70169308 is divisible by 11

(e) 10000001

Sum of digits at odd places = 1

Sum of digits at even places = 1

Difference = 1 – 1 = 0

Since, the difference between sum of digits at odd places and sum of digits at even places is 0. Hence, 10000001 is divisible by 11

(f) 901153

Sum of digits at odd places = 3 + 1 + 0

= 4

Sum of digits at even places = 5 + 1 + 9

= 15

Difference = 15 – 4 = 11

Since, the difference between sum of digits at odd places and sum of digits at even places is 11 which is divisible by 11. Hence, 901153 is divisible by 11

5. Write the smallest digit and the greatest digit in the blank space of each of the following numbers so that the number formed is divisible by 3:

(a) __ 6724 (b) 4765 __ 2

Solutions:

(a) __ 6724
Sum of the given digits = 19
Sum of its digit should be divisible by 3 to make the number divisible by 3
Since, 21 is the smallest multiple of 3 which comes after 19
So, smallest number = 21 – 19
= 2
Now 2 + 3 + 3 = 8
But 2 + 3 + 3 + 3 = 11
Now, if we put 8, sum of digits will be 27 which is divisible by 3
Therefore the number will be divisible by 3
Hence, the largest number is 8
(b) 4765 __ 2
Sum of the given digits = 24
Sum of its digits should be divisible by 3 to make the number divisible by 3
Since, 24 is already divisible by 3. Hence, the smallest number that can be replaced is 0
Now, 0 + 3 = 3
3 + 3 = 6
3 + 3 + 3 = 9
3 + 3 + 3 + 3 = 12
If we put 9, sum of its digits becomes 33. Since, 33 is divisible by 3.
Therefore the number will be divisible by 3
Hence, the largest number is 9

6. Write a digit in the blank space of each of the following numbers so that the number formed is divisible by 11:
(a) 92 __ 389

(b) 8 __ 9484

Solutions:

(a) 92 __ 389

Let ‘a’ be placed here
Sum of its digits at odd places = 9 + 3 + 2
= 14
Sum of its digits at even places = 8 + a + 9
= 17 + a
Difference = 17 + a – 14
= 3 + a
The difference should be 0 or a multiple of 11, then the number is divisible by 11
If 3 + a = 0
a = -3
But it cannot be a negative
Taking a closest multiple of 11 which is near to 3
It is 11 which is near to 3
Now, 3 + a = 11
a = 11 – 3
a = 8
Therefore the required digit is 8
(b) 8 __ 9484
Let ‘a’ be placed here
Sum of its digits at odd places = 4 + 4 + a
= 8 + a
Sum of its digits at even places = 8 + 9 + 8
= 25
Difference = 25 – (8 + a)
= 17 – a
The difference should be 0 or a multiple of 11, then the number is divisible by 11
If 17 – a = 0
a = 17 (which is not possible)
Now, take a multiple of 11.
Let’s take 11
17 – a = 11
a = 17 – 11
a = 6
Therefore the required digit is 6

Exercise 3.4

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1**. Find the common factors of:**

(a) 20 and 28

(b) 15 and 25
(c) 35 and 50
(d) 56 and 120
Solutions:
(a) 20 and 28
1, 2, 4, 5, 10 and 20 are factors of 20
1, 2, 4, 7, 14 and 28 are factors of 28
Common factors = 1, 2, 4
(b) 15 and 25
1, 3, 5 and 15 are factors of 15
1, 5 and 25 are factors of 25
Common factors = 1, 5
(c) 35 and 50
1, 5, 7 and 35 are factors of 35
1, 2, 5, 10, 25 and 50 are factors of 50
Common factors = 1, 5
(d) 56 and 120
1, 2, 4, 7, 8, 14, 28 and 56 are factors of 56
1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60 and 120 are factors of 120
Common factors = 1, 2, 4, 8
2. Find the common factors of:
(a) 4, 8 and 12

(b) 5, 15 and 25

Solutions:

(a) 4, 8 and 12

1, 2, 4 are factors of 4

1, 2, 4, 8 are factors of 8

1, 2, 3, 4, 6, 12 are factors of 12

Common factors = 1, 2, 4

(b) 5, 15 and 25

1, 5 are factors of 5

1, 3, 5, 15 are factors of 15

1, 5, 25 are factors of 25

Common factors = 1, 5

3. Find first three common multiples of:

(a) 6 and 8

(b) 12 and 18

Solutions:

(a) 6 and 8

6, 12, 18, 24, 30 are multiples of 6

8, 16, 24, 32 are multiples of 8

Three common multiples are 24, 48, 72

(b) 12 and 18

12, 24, 36, 48 are multiples of 12

18, 36, 54, 72 are multiples of 18

Three common factors are 36, 72, 108

4. Write all the numbers less than 100 which are common multiples of 3 and 4.

Solutions:

Multiples of 3 are 3, 6, 9, 12, 15

Multiples of 4 are 4, 8, 12, 16, 20

Common multiples are 12, 24, 36, 48, 60, 72, 84 and 96

5. Which of the following numbers are co-prime?

(a) 18 and 35   (b) 15 and 37

(c) 30 and 415 (d) 17 and 68

(e) 216 and 215 (f) 81 and 16

Solutions:

(a) 18 and 35

Factors of 18 are 1, 2, 3, 6, 9, 18

Factors of 35 are 1, 5, 7, 35

Common factor = 1

Since, their common factor is 1. Hence, the given two numbers are co-prime

(b) 15 and 37

Factors of 15 are 1, 3, 5, 15

Factors of 37 are 1, 37

Common factors = 1

Since, their common factor is 1. Hence, the given two numbers are co-prime

(c) 30 and 415

Factors of 30 are 1, 2, 3, 5, 6, 10, 15, 30

Factors of 415 are 1, 5, 83, 415

Common factors = 1, 5

Since, their common factor is other than 1. Hence, the given two numbers are not co-prime

(d) 17 and 68

Factors of 17 are 1, 17

Factors of 68 are 1, 2, 4, 17, 34, 68

Common factors = 1, 17

Since, their common factor is other than 1. Hence, the given two numbers are not co-prime

(e) 216 and 215

Factors of 216 are 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 27, 36, 54, 72, 108, 216

Factors of 215 are 1, 5, 43, 215

Common factors = 1

Since, their common factor is 1. Hence, the given two numbers are co-prime

(f) 81 and 16

Factors of 81 are 1, 3, 9, 27, 81

Factors of 16 are 1, 2, 4, 8, 16

Common factors = 1

Since, their common factor is 1. Hence, the given two numbers are co-prime

6. A number is divisible by both 5 and 12. By which other number will that number be always divisible?

Solutions:

Factors of 5 are 1, 5

Factors of 12 are 1, 2, 3, 4, 6, 12

Their common factor = 1

Since, their common factor is 1. The given two numbers are co-prime and is also divisible by their product 60

Factors of 60 are 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60

7. A number is divisible by 12. By what other numbers will that number be divisible?

Solutions:

Since, the number is divisible by 12. Hence, it also divisible by its factors i.e 1, 2, 3, 4, 6, 12

Therefore 1, 2, 3, 4, 6 are the numbers other than 12 by which this number is also divisible

---

Exercise 3.5

PAGE NO: 61

1. Which of the following statements are true?

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

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

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

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

(e) If two numbers are co-primes, at least one of them must be prime.

(f) All numbers which are divisible by 4 must also be divisible by 8.

(g) All numbers which are divisible by 8 must also be divisible by 4.

(h) If a number exactly divides two numbers separately, it must exactly divide their sum.

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

Solutions:

(a) False, 6 is divisible by 3 but is not divisible by 9

(b) True, as $9 = 3 \times 3$. Hence, if a number is divisible by 9, it will also be divisible by 3

(c) False. Since 30 is divisible by both 3 and 6 but is not divisible by 18

(d) True, as $9 \times 10 = 90$. Hence, if a number is divisible by both 9 and 10 then it is divisible by 90

(e) False. Since 15 and 32 are co-primes and also composite numbers

(f) False, as 12 is divisible by 4 but is not divisible by 8

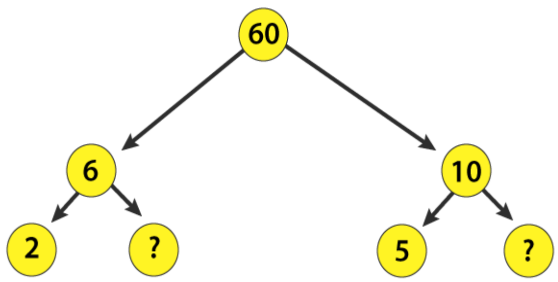
(g) True, as $2 \times 4 = 8$. Hence, if a number is divisible by 8, it will also be divisible by 2 and 4

(h) True, as 2 divides 4 and 8 and it also divides 12 ($4 + 8 = 12$)

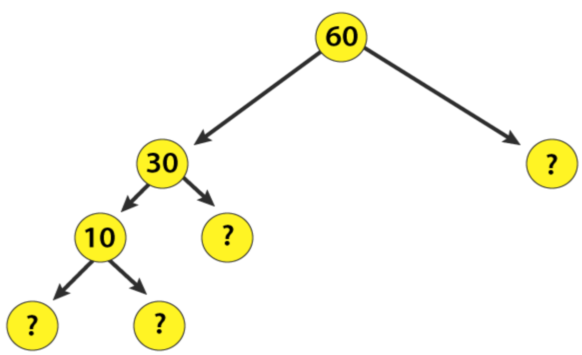
(i) False, since, 2 divides 12 but it does not divide 7 and 5

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

(a)

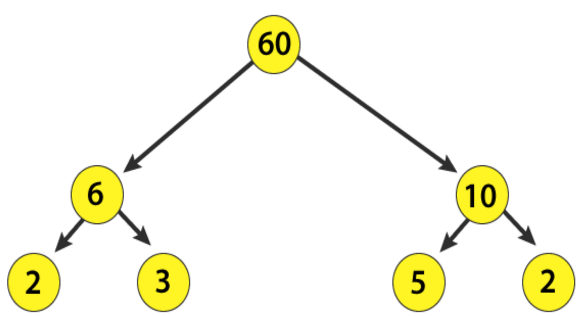


(b)

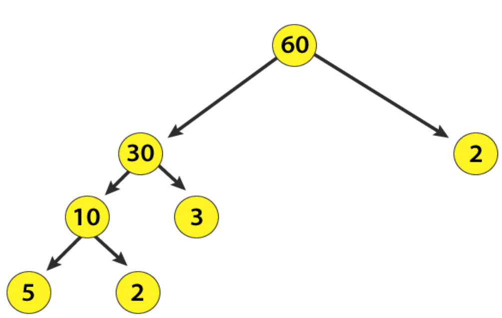


Solutions:

(a) Since, $6 = 2 \times 3$ and $10 = 5 \times 2$



(b) Since, $60 = 30 \times 2$



30 = 10 × 3
10 = 5 × 2

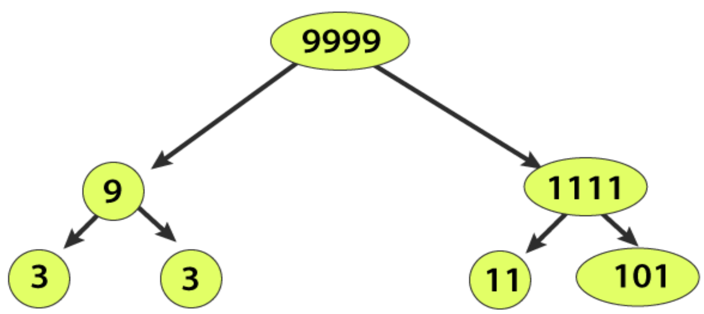
3. Which factors are not included in the prime factorisation of a composite number?

Solutions:

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

4. Write the greatest 4-digit number and express it in terms of its prime factors.

Solutions:

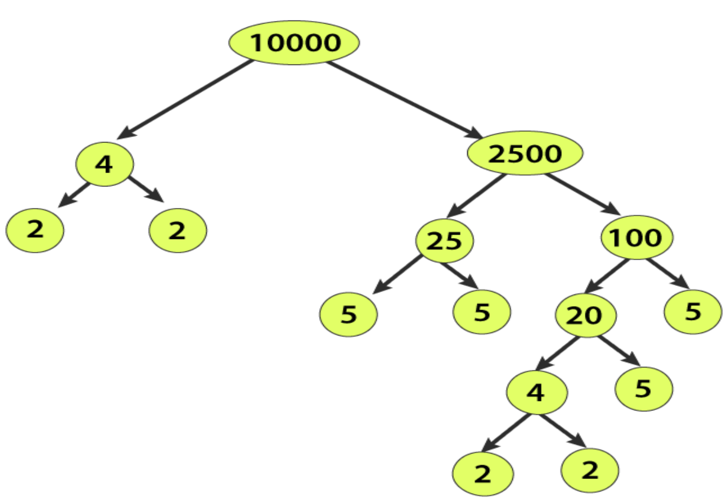


The greatest four digit number is 9999

Therefore 9999 = 3 × 3 × 11 × 101

5. Write the smallest 5-digit number and express it in the form of its prime factors.

Solutions:



The smallest five digit number = 10000

10000 = 2 × 2 × 2 × 2 × 5 × 5 × 5 × 5

6. Find all the prime factors of 1729 and arrange them in ascending order. Now state the relation, if any; between two consecutive prime factors.

Solutions:

7	1729
13	247
19	19
	1

1729 = 7 × 13 × 19

13 – 7 = 6

19 – 13 = 6

Hence, the difference between two consecutive prime factors is 6.

7. The product of three consecutive numbers is always divisible by 6. Verify this statement with the help of some examples.

Solutions:

(i) 2 × 3 × 4 = 24 which is divisible by 6

(ii) 5 × 6 × 7 = 210 which is divisible by 6

8. The sum of two consecutive odd numbers is divisible by 4. Verify this statement with the help of some examples.

Solutions:

(i) 5 + 3 = 8 which is divisible by 4

(ii) 7 + 9 = 16 which is divisible by 4

(iii) 13 + 15 = 28 which is divisible by 4

9. In which of the following expressions, prime factorisation has been done?

(a) 24 = 2 × 3 × 4

(b) 56 = 7 × 2 × 2 × 2

(c) 70 = 2 × 5 × 7

(d) 54 = 2 × 3 × 9

Solutions:

(a) 24 = 2 × 3 × 4

Since, 4 is composite. Hence, prime factorisation has not been done

(b) 56 = 7 × 2 × 2 × 2

Since, all the factors are prime. Hence, prime factorisation has been done

(c) 70 = 2 × 5 × 7

Since, all the factors are prime. Hence, prime factorisation has been done

(d) 54 = 2 × 3 × 9

Since, 9 is composite. Hence prime factorisation has not been done

10. Determine if 25110 is divisible by 45. [Hint: 5 and 9 are co-prime numbers. Test the divisibility of the number by 5 and 9].

Solutions:

45 = 5 × 9

1, 5 are factors of 5

1, 3, 9 are factors of 9

Hence, 5 and 9 are co-prime numbers

The last digit of 25110 is 0. Hence, it is divisible by 5

Sum of digits 25110

2 + 5 + 1 + 1 + 0

= 9

Since, the sum of digits of 25110 is divisible by 9. Hence, 25110 is divisible by 9

Since the number is divisible by both 5 and 9

Therefore 25110 is divisible by 45

11. 18 is divisible by both 2 and 3. It is also divisible by 2 × 3 = 6. Similarly, a number is divisible by both 4 and 6. Can we say that the number must also be divisible by 4 × 6 = 24? If not, give an example to justify your answer.

Solutions:

No, since, 12 and 36 are both divisible by 4 and 6. But 12 and 36 are not divisible by 24

12. I am the smallest number, having four different prime factors. Can you find me?

Solutions:

Since, it is the smallest number. Therefore it will be the product of 4 smallest prime numbers

2 × 3 × 5 × 7 = 210

Exercise 3.6

PAGE NO: 63

1. Find the HCF of the following numbers :

(a) 18, 48 (b) 30, 42 (c) 18, 60 (d) 27, 63 (e) 36, 84

(f) 34, 102 (g) 70, 105, 175 (h) 91, 112, 49 (i) 18, 54, 81 (j) 12, 45, 75

Solutions:

(a) 18, 48

2	18
3	9
3	3
	1

2	48
2	24
2	12
2	6
3	3
	1

18 **=** 2 × 3 × 3

48 = 2 × 2 × 2 × 2 × 3

HCF = 2 × 3 = 6

Therefore the HCF of 18, 48 is 6

(b)30, 42

2	30
3	15
5	5
	1

2	42
3	21
7	7
	1

30 = 2 × 3 × 5

42 = 2 × 3 × 7

HCF = 2 × 3 = 6

Therefore the HCF of 30, 42 is 6

(c) 18, 60

2	18
3	9
3	3
	1

2	48
2	24
2	12
2	6
3	3
	1

18 = 2 × 3 × 3

60 = 2 × 2 × 3 × 5

HCF = 2 × 3 = 6

Therefore the HCF of 18, 60 is 6

(d) 27, 63

3	27
3	9
3	3
	1

3	63
3	21
7	7
	1

27 = 3 × 3 × 3

63 = 3 × 3 × 7

HCF = 3 × 3 = 9

Therefore the HCF of 27, 63 is 9

(e) 36, 84

2	36
2	18
3	9
3	3
	1

2	84
2	42
3	21
7	7
	1

36 = 2 × 2 × 3 × 3

84 = 2 × 2 × 3 × 7

HCF = 2 × 2 × 3 = 12

Therefore the HCF of 36, 84 is 12

(f) 34, 102

2	34
17	17
	1

2	102
3	51
17	17
	1

34 = 2 × 17

102 = 2 × 3 × 17

HCF = 2 × 17 = 34

Therefore the HCF of 34, 102 is 34

(g) 70, 105, 175

2	70
5	35
7	7
	1

3	105
5	35
7	7
	1

5	175
5	35
7	7
	1

70 = 2 × 5 × 7

105 = 3 × 5 × 7

175 = 5 × 5 × 7

HCF = 5 × 7 = 35

Therefore the HCF of 70, 105, 175 is 35

(h) 91, 112, 49

7	91
13	13
	1

2	112
2	56
2	28
2	14
7	7
	1

7	49
7	7
	1

91 = 7 × 13

112 = 2 × 2 × 2 × 2 × 7

49 = 7 × 7

HCF = 7

Therefore the HCF of 91, 112, 49 is 7

(i) 18, 54, 81

18 = 2 × 3 × 3

54 = 2 × 3 × 3 × 3

81 = 3 × 3 × 3 × 3

HCF = 3 × 3 = 9

Therefore the HCF of 18, 54, 81 is 9

(j) 12, 45, 75

12 = 2 × 2 × 3

45 = 3 × 3 × 5

75 = 3 × 5 × 5

HCF = 3

Therefore the HCF of 12, 45, 75 is 3

2. What is the HCF of two consecutive

(a) numbers?

(b) even numbers?

(c) odd numbers?

Solutions:

(a) The HCF of two consecutive numbers is 1

Example: The HCF of 2 and 3 is 1

(b) The HCF of two consecutive even numbers is 2

Example: The HCF of 2 and 4 is 2

(c) The HCF of two consecutive odd numbers is 1

Example: The HCF of 3 and 5 is 1

3. HCF of co-prime numbers 4 and 15 was found as follows by factorisation:

4 = 2 × 2 and 15 = 3 × 5 since there is no common prime factor, so HCF of 4 and 15 is 0. Is the answer correct? If not, what is the correct HCF?

Solutions:

No. The answer is not correct. The correct answer is 1.

Exercise 3.7 page no: 67

1. Renu purchases two bags of fertiliser of weights 75 kg and 69 kg. Find the maximum value of weight which can measure the weight of the fertiliser exact number of times.

Solutions:

Given, weight of two bags of fertiliser = 75 kg and 69 kg

Maximum weight = HCF of two bags weight i.e (75, 69)

75 = 3 × 5 × 5

69 = 3 × 23

HCF = 3

Hence, 3 kg is the maximum value of weight which can measure the weight of the fertiliser exact number of times.

2. Three boys step off together from the same spot. Their steps measure 63 cm, 70 cm and 77 cm respectively. What is the minimum distance each should cover so that all can cover the distance in complete steps?

Solutions:

First boy steps measure = 63 cm

Second boy steps measure = 70 cm

Third boy steps measure = 77 cm

LCM of 63, 70, 77

LCM = 2 × 3 × 3 × 5 × 7 × 11 = 6930

Hence, 6930 cm is the distance each should cover so that all can cover the distance in complete steps.

3. The length, breadth and height of a room are 825 cm, 675 cm and 450 cm respectively. Find the longest tape which can measure the three dimensions of the room exactly.

Solutions:

Given length of a room = 825 cm

Breadth of a room = 675 cm

Height of a room = 450 cm

825 = 3 × 5 × 5 × 11

675 = 3 × 3 × 3 × 5 × 5

450 = 2 × 3 × 3 × 5 × 5

HCF = 3 × 5 × 5 = 75 cm

Hence longest tape is 75 cm which can measure the three dimensions of the room exactly.

4. Determine the smallest 3-digit number which is exactly divisible by 6, 8 and 12.

Solutions:

LCM of 6, 8, 12 = smallest number

LCM = 2 × 2 × 2 × 3 = 24

Now we need to find the smallest 3-digit multiple of 24

We know that 24 × 4 = 96 and 24 × 5 = 120

Hence, 120 is the smallest 3-digit number which is exactly divisible by 6, 8 and 12

5. Determine the greatest 3-digit number exactly divisible by 8, 10 and 12.

Solutions:

LCM of 8, 10 and 12

LCM = 2 × 2 × 2 × 3 × 5 = 120

Now we need to find the greatest 3-digit multiple of 120

We may find 120 × 8 = 960 and 120 × 9 = 1080

Hence, 960 is the greatest 3-digit number exactly divisible by 8, 10 and 12

6. The traffic lights at three different road crossings change after every 48 seconds, 72 seconds and 108 seconds respectively. If they change simultaneously at 7 a.m., at what time will they change simultaneously again?

Solutions:

LCM of 48, 72, 108 = time period after which these lights change

LCM = 2 × 2 × 2 × 2 × 3 × 3 × 3 = 432

Hence, lights will change together after every 432 seconds

Therefore the lights will change simultaneously at 7 minutes 12 seconds.

7. Three tankers contain 403 litres, 434 litres and 465 litres of diesel respectively. Find the maximum capacity of a container that can measure the diesel of the three containers exact number of times.

Solutions:

HCF of 403, 434, 465 = Maximum capacity of tanker required

403 = 13 × 31

434 = 2 × 7 × 31

465 = 3 × 5 × 31

HCF = 31

Hence, a container of 31 litres can measure the diesel of the three containers exact number of times.

8. Find the least number which when divided by 6, 15 and 18 leave remainder 5 in each case.

Solutions:

LCM of 6, 15, 18

LCM = 2 × 3 × 3 × 5 = 90

Required number = 90 + 5

= 95

Hence, 95 is the required number.

9. Find the smallest 4-digit number which is divisible by 18, 24 and 32.

Solutions:

LCM of 18, 24, 32

LCM = 2 × 2 × 2 × 2 × 2 × 3 × 3 = 288

Here, we need to find the smallest 4-digit multiple of 288

We find 288 × 3 = 864 and 288 × 4 = 1152

Hence, 1152 is the smallest 4-digit number which is divisible by 18, 24 and 32

10. Find the LCM of the following numbers:

(a) 9 and 4 (b) 12 and 5 (c) 6 and 5 (d) 15 and 4

Observe a common property in the obtained LCMs. Is LCM the product of two numbers in each case?

Solutions:

(a) LCM of 9, 4

LCM = 2 × 2 × 3 × 3 = 36

(b) LCM of 12, 5

LCM = 2 × 2 × 3 × 5 = 60

(c) LCM of 6, 5

LCM = 2 × 3 × 5 = 30

(d) LCM of 15, 4

LCM = 2 × 2 × 3 × 5 = 60

Yes in each case the LCM of given numbers is the product of these numbers.

11. Find the LCM of the following numbers in which one number is the factor of the other.

(a) 5, 20 (b) 6, 18 (c) 12, 48 (d) 9, 45

What do you observe in the results obtained?

Solutions:

(a) 5, 20

LCM = 2 × 2 × 5 = 20

(b) 6, 18

LCM = 2 × 3 × 3 = 18

(c) 12, 48

LCM = 2 × 2 × 2 × 2 × 3 = 48

(d) 9, 45

LCM = 3 × 3 × 5 = 45

∴ Hence, in each case the LCM of given numbers is the larger number. When a number is a factor of other number then their LCM will be the larger number.

पुना International School

Shree Swaminarayan Gurukul, Zundal

MATHEMATICS

GRADE VI

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INDEX

Chapter 4 Basic Geometrical ideas

Key points to remember

The term 'Geometry' is the English equivalent of the Greak word 'Geometron'. 'Geo' mean Earth and 'metron' means Measurement. Geometrical ideas are reflected in fill forms of art, measurements, architecture, engineering, etc. We observe and use different objects. These objects have different shapes. The ruler is straight whereas a ball is round. In this chapter, we shall learn some interesting facts which enable us to know more about the shapes around us.

Let us mark a dot on the paper by a sharp tip of the pencil. Sharper the tip, thinner will be the dot. This almost invisible thinner dot gives us an idea of a point. A point determines a location. The following are some models for a point.

A Line Segmen

A line segment is the shortest join of two points. The line segment joining two points A and B is denoted by $\overline{AB}$ or $\overline{BA}$ .The points A and B are called the endpoints of the segment.

Note: $\overline{AB}$ and $\overline{BA}$ denote the same line segment.

A Line

A line is obtained when a line segment like $\overline{AB}$is extended on both sides indefinitely. It is denoted by $\overline{AB}$. Sometimes it is denoted by a single letter like l. Although a line contains a countless number of points, yet two points are enough to determine a line. We say 'two points determine a line'.

Intersecting Lines

Two lines are called intersecting lines if they have one common point.

Parallel Lines

Two lines in a plane are said to be a parallel line if they do not intersect.

A ray is a portion of a line. It starts at one point (called starting point) and goes endlessly in a direction.

Curves

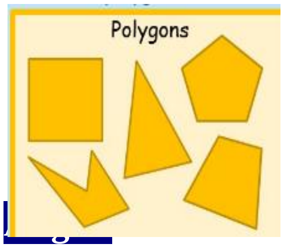
Any drawing (straight or non-straight) drawn without lifting the pencil from the paper and without the use of a ruler is called a curve. In everyday use curve means 'not straight' but in mathematics, a curve can be a straight line also. A curve is called a simple curve if it does not cross itself. A curve is said to be a closed curve if its ends are joined; otherwise, it is said to be open.

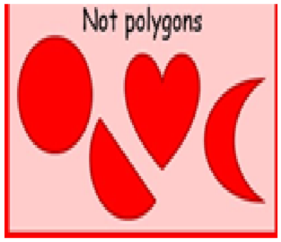
In a closed curve, there are three disjoint parts:

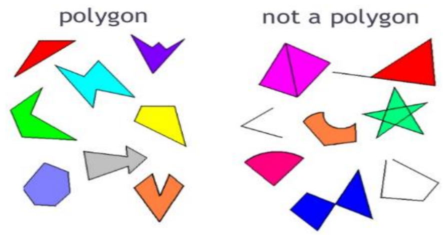
- Interior
- Boundary
- Exterior

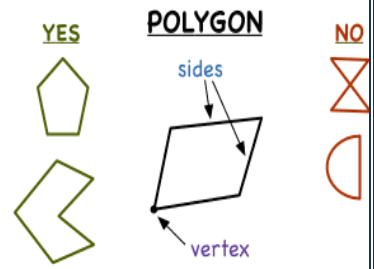
Polygons

A polygon is a closed curve made up entirely of line segments. The line segments forming a polygon are called its sides. The meeting point of a pair of sides is called its vertex. Any two sides with a common endpoint are called the adjacent sides. The endpoints of the same side are called the adjacent vertices. The join of any two non-adjacent vertices is called a diagonal of the polygon.

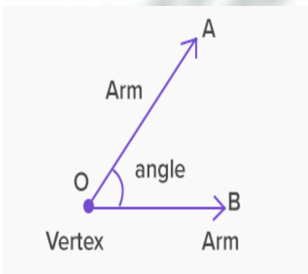








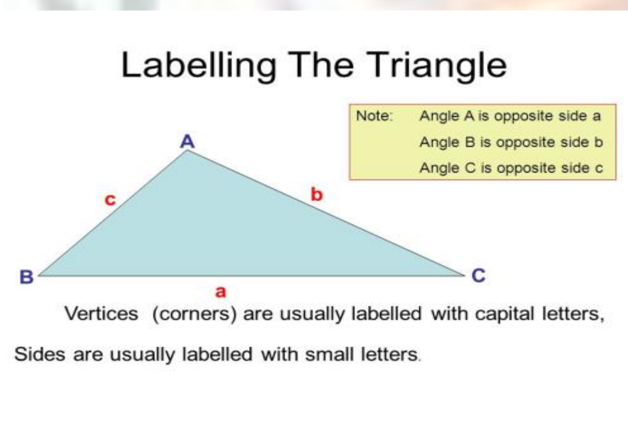
An angle is made up of two rays starting from a common endpoint. Two rays OP and OQ starting from the common endpoint O form ∠POQ (or also called ∠QOP) at O. Point O is called the vertex of ∠POQ. Rays OP and OQ form two sides of ∠POQ. Note that in specifying an angle, the vertex is always written as the middle letter.

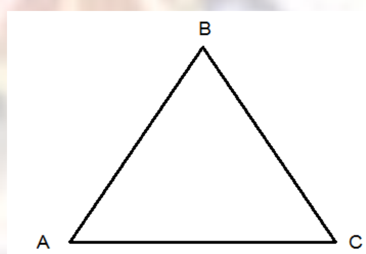


An angle leads to three divisions of a region:

On the angle
1. The interior of the angle
2. The exterior of the angle.

Triangles

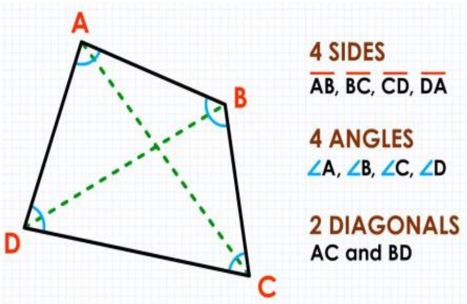


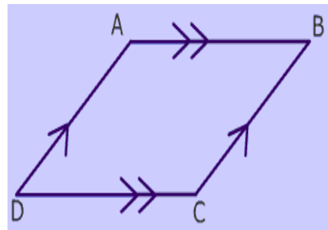


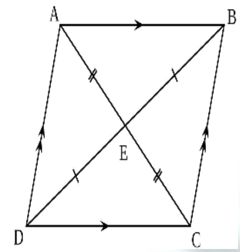
A triangle is a three-sided polygon. Actually, it is a polygon with the least number of sides. Triangle ABC is written as ΔABC. There are three sides of a triangle. Thus, sides of ΔABC are AB‾, BC‾ and CA‾. There are three angles in a triangle. Thus, angles of ΔABC are ∠BAC, ∠ABC, and ∠BCA. The points A, B, and C are called the vertices of the triangle ABC. Like angle, a triangle also has three regions associated with it.

On the triangle
The interior of the triangle
The exterior of the triangle.

Quadrilaterals





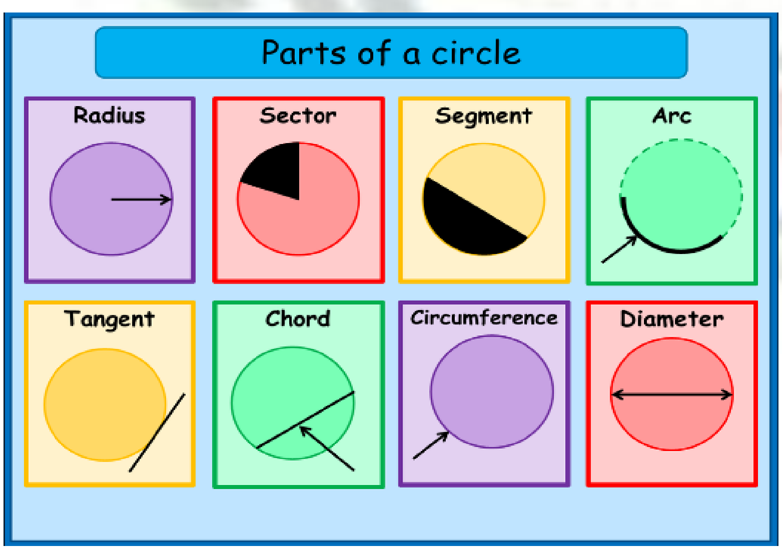


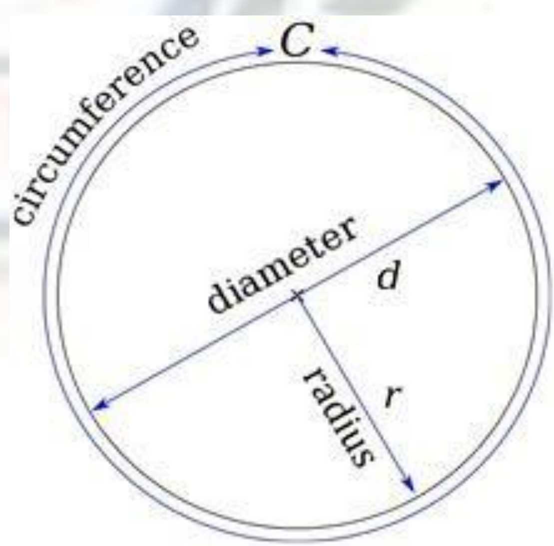
A quadrilateral is a four-sided polygon. It has 4 sides and 4 angles. A quadrilateral has 4 vertices which should be named cyclically.
In the quadrilateral ABCD,
$\overline{AB}$, $\overline{BC}$, $\overline{CD}$, $\overline{DA}$ are the four sides
∠A , ∠B , ∠C ,$\angle D$ are the four angles.

$\overline{AB}$, $\overline{BC}$, CD
AB¯, BC¯; [latex1]\bar { BC }[/latex], CD¯; CD¯, DA¯; DA¯, AB¯ are adjacent sides;
AB¯ & DC¯; AD¯ & BC¯ are pairs of opposite sides;
∠A &∠C; ∠B &∠D are pairs of opposite angles;
∠A &∠B; ∠B &∠C; ∠C &∠D; ∠D &∠A are adjacent angles.

Circle

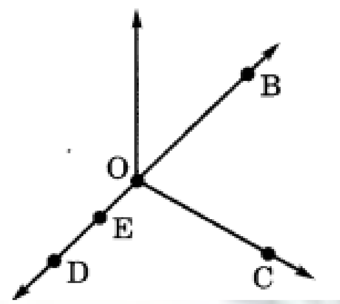
A circle is a path of a point moving at the same distance from a fixed point. The fixed point is called the center, the fixed distance is called the radius and the distance around the circle is called the circumference. A chord of a circle is a line segment joining any two points on the circumference. A diameter is a chord passing through the center. A diameter is double the size of a radius. Any diameter of a circle divides it into two semi-circles. Any portion of a circle is called an arc. For two points P and Q on the circle, we get the arc PQ denoted $\widehat{PQ}$. Like a simple closed curve, there are three regions associated with a circle.
On the circle
The interior of the circle
The exterior of the circle.





EXERCISE 4.1

Q.1.Use the figure to name:
(a) Five points
(b) A line
(c) Four rays
(d) Five line segments

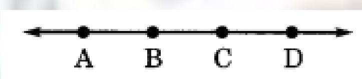


Solution:
(a) Five points are: O, B, C, E and D
(b) (b) Name of the line is $\overleftrightarrow{DB}$or $\overleftrightarrow{BD}$

(c) Four rays are: $\overrightarrow{OC}$; $\overrightarrow{OB}$; $\overrightarrow{OE}$,$\overrightarrow{OD}$
(d) Five line segments are:
$\overline{OE}$; $\overline{ED}$; $\overline{OD}$; $\overline{OB}$; $\overline{EB}$
(c) Name of the line is $\overleftrightarrow{DB}$ or $\overleftrightarrow{BD}$
(d) Four rays are :$\overrightarrow{OC}$; $\overrightarrow{OB}$; $\overrightarrow{OE}$; $\overrightarrow{OD}$
(e) Five line segments are:
(f) $\overline{OE}$; $\overline{ED}$; $\overline{OD}$;$\overline{OB}$;$\overline{EB}$

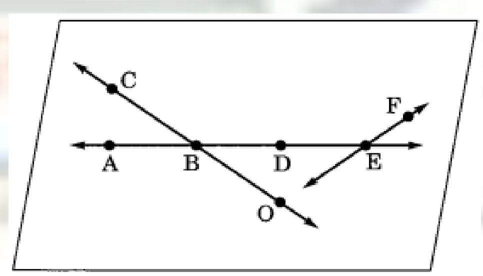
Q.2. Name the line given in all possible (twelve) ways, choosing only two letters at a times from the four given:

Solution: The given lines can be named as follows:



(*i*) $\overleftrightarrow{AB}$	(*ii*) $\overleftrightarrow{AC}$	(*iii*) $\overleftrightarrow{AD}$
(*iv*) $\overleftrightarrow{BC}$	(*v*) $\overleftrightarrow{BD}$	(*vi*) $\overleftrightarrow{CD}$
(*vii*) $\overleftrightarrow{BA}$	(*viii*) $\overleftrightarrow{CA}$	(*ix*) $\overleftrightarrow{DA}$
(*x*) $\overleftrightarrow{CB}$	(*xi*) $\overleftrightarrow{DB}$	(*xii*) $\overleftrightarrow{DC}$

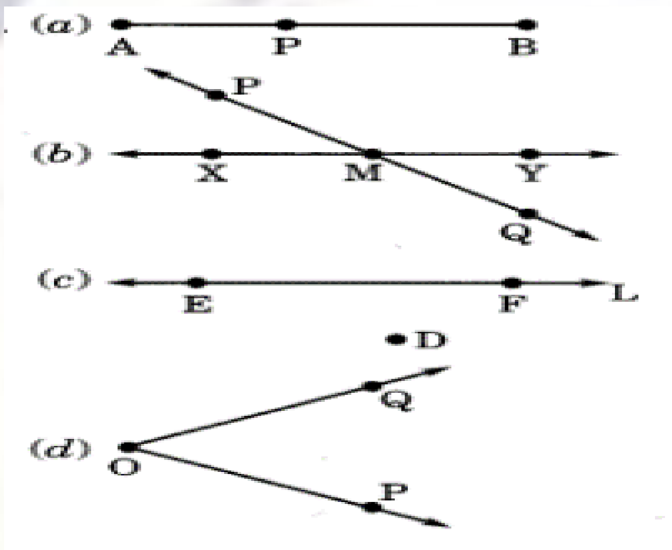
Q.3.Use the figure to name:
(a) Line containing point E.
(b) Line passing through A.
(c) Line on which 0 lies.
(d) Two pairs of intersecting lines.



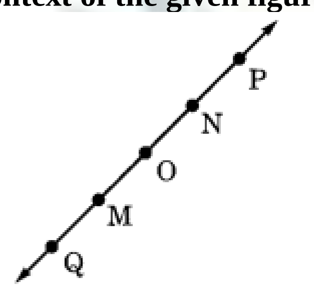
Solution:
(a) $\overleftrightarrow{EF}$
(b) $\overleftrightarrow{AE}$
(c) $\overleftrightarrow{BC}$ or $\overleftrightarrow{BO}$
(d) $\overleftrightarrow{CO}$ or $\overleftrightarrow{AE}$ or $\overleftrightarrow{AE}$ or $\overleftrightarrow{EF}$

Q.4.How many lines can pass through
(a) one given point?
(b) two given points?
Solution:
(a) Infinitely many lines can pass through a given points.
(b) Only one line can pass through two given points.

Q.5.Draw a rough figure and label suitably in each of the following cases:
(a) Point P lies on $\overline{AB}$.
(b) $\overleftrightarrow{XY}$ and $\overleftrightarrow{PQ}$intersect at M.
(c) Linel contains E and F but not D.
(d) $\overleftrightarrow{OP}$ and $\overleftrightarrow{OQ}$ meet at O.
Solution:



Q.6. Consider the following figure of line $\overleftrightarrow{MN}$. Say whether following statements are true or false in context of the given figure.



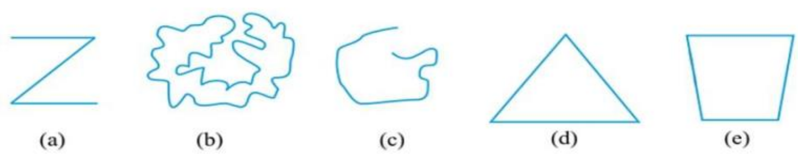
(a) Q, M, O, N, P are points on the line$\overleftrightarrow{MN}$.
(b) M, O, N are points on a line segment $\overline{MN}$.
(c) M and N are end points of line segment $\overline{MN}$.
(d) O and N are end points of line segment $\overline{OP}$.
(e) M is one of the end points of line segment $\overline{QO}$.
(f) M is point on ray $\overrightarrow{OP}$.
(g) Ray $\overrightarrow{OP}$is different from ray $\overrightarrow{QP}$.
(h) Ray $\overrightarrow{OP}$is same as ray $\overrightarrow{OM}$.
(i) Ray $\overrightarrow{OM}$ is not opposite to ray $\overrightarrow{OP}$.
(j) O is not an initial point of $\overrightarrow{OP}$.
(k) N is the initial point of $\overrightarrow{NP}$ and $\overrightarrow{NM}$.

Solution:
(a) True
(b) True
(c) True
(d) False
(e) False
(f) False
(g) True
(h) False
(i) False
(j) False
(k) True

Exercise 4.2

Q.1. Classify the following curves as (i) open or (ii) closed.

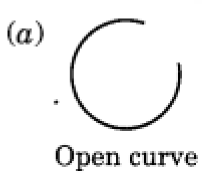
Classify the following curves as (i) Open or (ii) Closed.

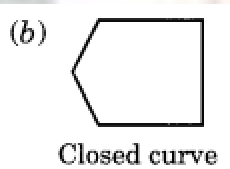


(a) Open
(b) Closed
(c) Open
(d) Closed
(e) Closed

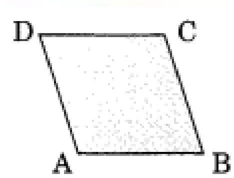
Closed curve
A curve which has no open ends

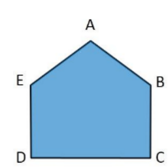
Q.2.Draw rough diagrams to illustrate the following:
(a) Open curve
(b) Closed curve
Solution:



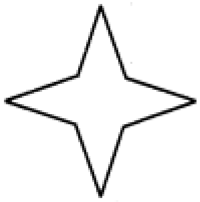


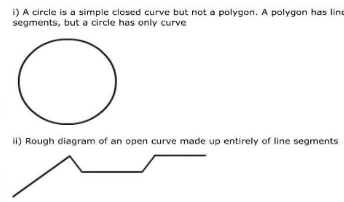
Q.3. Draw any polygon and shade its interior.
Solution:
ABCDE is the required polygon.





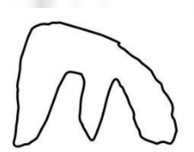
Q.4. Consider the given figure and answer the questions.
(a) Is it a curve?
(b) Is it closed?

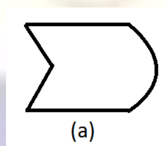


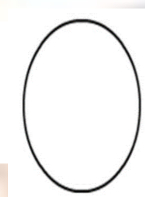


Solution:
(a) Yes, it is a curve.
(b) Yes, it is closed curve.

Q.5. Illustrate, if possible, each one of the following with a rough diagram:
(a) A closed curve that is not a polygon.
(b) An open curve made up entirely of line segments.
(c) A polygon with two sides.
Solution:
(a)

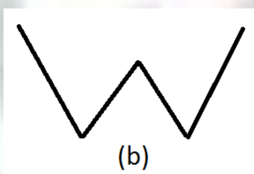


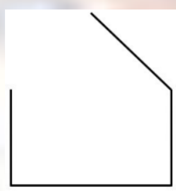


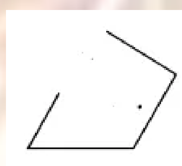


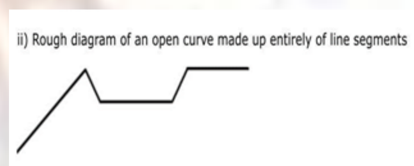
(b) ABCD is an open curve made up of the line segments

(b)





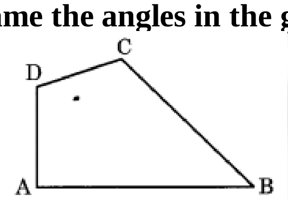




(c) A polygon with two sides is not possible.

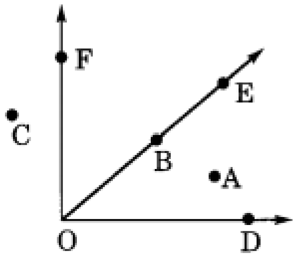
Exercise 4.3

Q.1. Name the angles in the given figure.



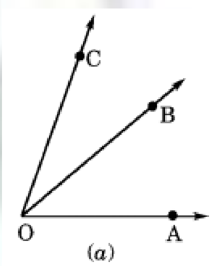
Solution:
The angles are:
(i) ∠A or ∠DAB
(ii) ∠B or ∠CBA
(iii) ∠C or ∠DCB
(iv) ∠D or ∠ADC.

Q.2.In the given diagram, name the point(s):

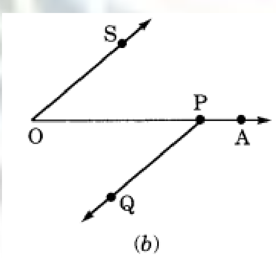


(a) In the interior of ∠DOE
(b) In the exterior of ∠EOF
(c) On ∠EOF
Solution:
(a) A is the point in the interior ∠DOE.
(b) C is the point in the exterior ∠EOF.
(c) B is the point on ∠EOF.

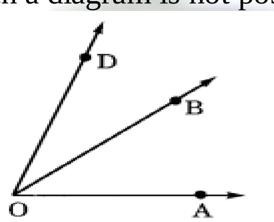
Q.3.Draw rough diagrams of two angles such that they have
(a) one point in common.
(b) two points in common.
(c) three points in common.
(d) four points in common.
(e) One ray in common.
Solution:
(a) In figure (a), O is the common point of ∠AOB and ∠COB.



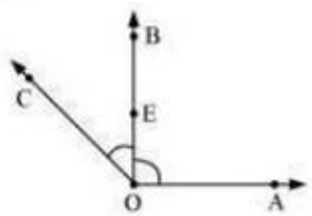
(b) In figure (b), O and P are the common points in ∠SOA and ∠OPQ.



(c) Such a diagram is not possible.
(d) Such a diagram is not possible.

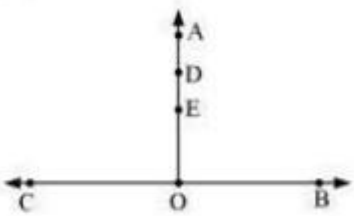


(c)



∠AOB and ∠BOC have points O, E, B in common.

(d)



∠BOA and ∠COA have points O, E, D, A in common.

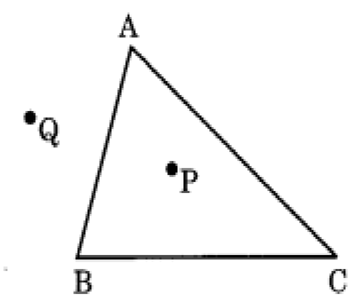
(e) $\overrightarrow{OB}$ is the common ray of ∠AOB and ∠DOB.

EXERCISE 4.4

Q.1. Draw a rough sketch of a triangle ABC. Mark a point P in its interior and a point Q in its exterior. Is the point A in its exterior or in its interior?

Solution:

Triangle ABC is the given triangle.



P is in the interior of ΔABC.

Q is in the exterior of ΔABC.

A is neither in the exterior nor in the interior.

Q.2. (a) Identify three triangles in the figure.

(b) Write the names of seven angles.

(c) Write the names of six line segments.

(d) Which two triangles have ∠B as common?

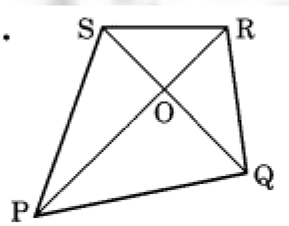
Solution:

(a) Three triangles are: ΔABC, ΔABD and ΔADC.
(b) (i) ∠ABC
(ii) ∠ADB
(iii) ∠BAD
(iv) ∠ADC
(v) ∠ACD
(vi) ∠DAC
(vii) ∠BAC.

(c) $\overline{AB}$; $\overline{BD}$; $\overline{AD}$; $\overline{AC}$; $\overline{DC}$; $\overline{BC}$;
(d) ΔABC and ΔABD have ∠B as common.

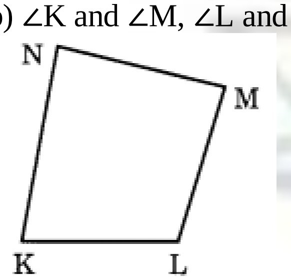
EXERCISE 4.5

Q.1. Draw a rough sketch of a quadrilateral PQRS. Draw its diagonals. Name them. Is the meeting point of the diagonals in the interior or exterior of the quadrilateral?
Solution:



i) We have a quadrilateral PQRS.
(ii) PR and QS are its two diagonals.
(iii) O is the meeting point of the diagonals PR and QS which is in the interior of the quadrilateral.

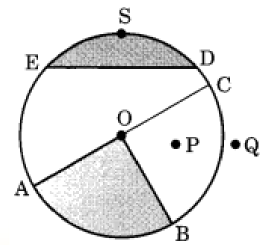
Q.2.Draw a rough sketch of a quadrilateral KLMN. State:
(a) two pairs of opposite sides
(b) two pairs of opposite angles
(c) two pairs of adjacent sides
(d) two pairs of adjacent angles.
Solution:
KLMN is the given quadrilateral.
(a) $\overline{KL}$; $\overline{NM}$; and $\overline{KN}$; $\overline{LM}$ are the pairs of opposite sides.
(b) ∠K and ∠M, ∠L and ∠N are the pairs of opposite angles.



c)$\overline{KL}$ and $\overline{KN}$; $\overline{NM}$ and $\overline{ML}$ are the pairs of adjacent sides OR
OR $\overline{KN}$ and $\overline{NM}$ and $\overline{ML}$ and $\overline{KL}$ are the pairs of adjacent sides.
(c) ∠K and ∠L, ∠N and ∠M are the pairs of adjacent angles.

EXERCISE 4.6

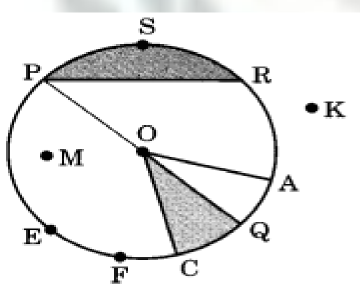
Q.1. From the figure, identify:
(a) the centre of circle
(b) three radii
(c) a diameter
(d) a chord
(e) two points in the interior
(f) a point in the exterior
(g) a sector
(h) a segment.



Solution:
In the given figure,
(a) O is the centre of the circle.
(b) Three radii of the given circle are $\overline{OA}$; $\overline{OB}$; $\overline{OC}$
(c) $\overline{AC}$ is a diameter of the circle.
(d) $\overline{ED}$ is a chord of the circle.
(e) O and P are in the interior of the circle.
(f) Q is a point in the exterior of the circle.
(g) OBA is a sector of the circle.
(h) EDSE, the shaded region is a segment of the circle.

Q.2.(a) Is every diameter of a circle also a chord?
(b) Is every chord of a circle also a diameter?
Solution:
(a) Yes, every diameter is the longest chord of a circle.
(b) No, every chord is not diameter of a circle.

Q.3.Draw any circle and mark



(a) its centre **(b) a radius**
(c) a diameter **(d) a sector**
(e) a segment **(f) a point in its interior**
(g) a point in its exterior **(h) an arc.**

Solution:
In the given circle,
(a) O is the center.
(b) $\overline{OA}$ is a radius.
(c) $\overline{PQ}$ is a diameter.
(d) OQC is a sector (shaded part)
(e) PSR (shaded part) in the segment.
(f) M is in the interior of the circle.

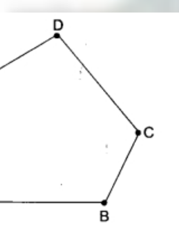
(g) K is in the exterior of the circle.
(h) $\widehat{EF}$ or $\breve{EF}$ is an arc of the circle.

Q.4. Say 'true' or 'false'.
(a) Two diameters of a circle will necessarily intersect.
(b) The centre of a circle is always in its interior.

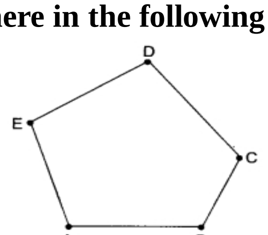
Solution:
(a) True
(b) True

MCQs Questions
Q. 1. How many points are enough to fix a line?
(a) 1
(b) 2
(c) 3
(d) 4
Answer (b)
Q.2.Two intersecting lines intersect in
(a) 1 point
(b) 2 points
(c) 3 points
(d) 4 points
Answer: (a)
Q.3. How many lines can pass through one given point?
(a) 1
(b) 2
(c) 4
(d) Countless
Answer: (d)

Q.4. How many lines can pass through two given points?
(a) Only one
(b) 2
(c) 4
(d) Countless
Answer: (a)
Q.5. How many vertices are there in the following figure?

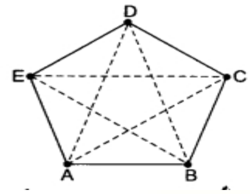


(a) 5
(b) 3
(c) 2
(d) 4
Answer: (a)
Q.6.How many sides are there in the following figure?



(a) 5
(b) 4
(c) 2
(d) 3
Answer: (a)

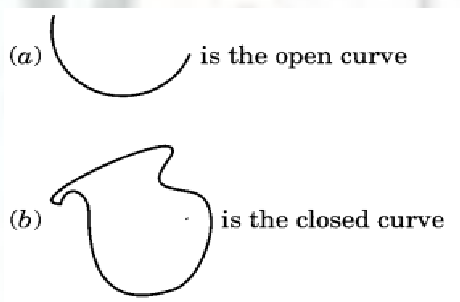
Q.7. How many diagonals are there in the following figure?
(a) 4
(b) 5
(C) 2
(d) 3
Answer: (b)



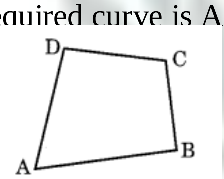
Q.8. How many vertices are there in a triangle?
(a) 1
(b) 2
(c) 3
(d) 4
Answer: (c)

Extra Questions Very Short Answer Type:

Q.1. Draw a rough sketch of:
(a) open curve
(b) closed curve
Solution:

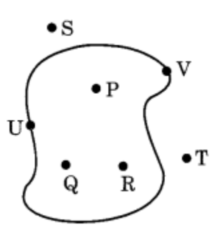


Q.2. Draw a rough sketch of closed curve made up of line segments.
Solution:
Required curve is ABCD closed with the line segments $\overline{AB}$; $\overline{BC}$; $\overline{CD}$ and $\overline{DA}$.



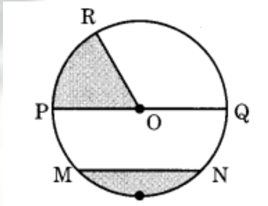
Q.3 Draw two different angles having common point and a common arm.
Solution:
∠AOB and ∠COB are two different angles with common point O and common arm $\overrightarrow{OB}$

Q.4.Identify the points which are:
(i) in the interior
(ii) in the exterior
(iii) on the closed curve in the given figure.



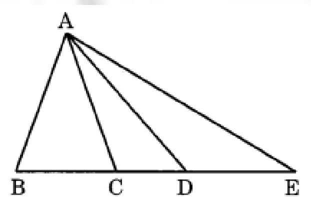
Solution:
(i) Points P, Q and R are in the interior of the closed curve.
(ii) points S and T are in the exterior of the closed curve.
(iii) U and V are on the closed curve.

Q.5.Identify the following in the given figure:
(a) Sector
(b) Chord
(c) Diameter
(d) Segment.



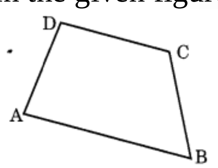
Solution:
(a) OPR (shaded) is the sector of the circle.
(b) $\overline{MN}$is the chord.
(c) $\overline{PQ}$ is the diameter.
(d) MXN (shaded) is the segment.

Q.6.In the given figure, name all the possible triangles



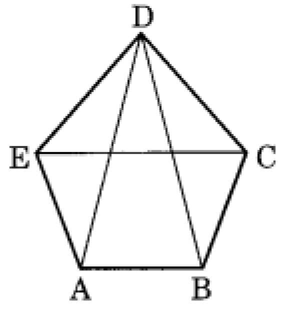
Solution:
Possible triangles are:
(i) ΔABC
(ii) ΔABD
(iii) ΔABE
(iv) ΔACD
(a) ΔACE
(vi) ΔADE

Q.7. Name all the angles in the given figure.
Solution:
In the given figure, the names of all the angles are:



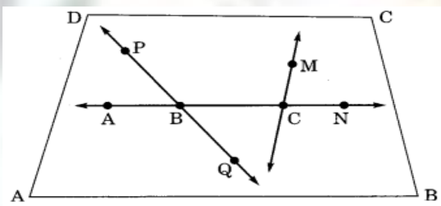
i) ∠ABC
(ii) ∠BCD
(iii) ∠CDA
(iv) ∠DAB

Q.8. In the given figure, name all the line segments:



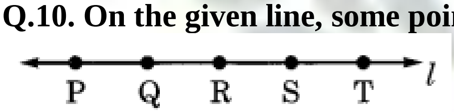
Solution:
In the given figure, the name of the line segments are:
$\overline{AB}$; $\overline{BC}$; $\overline{CD}$; $\overline{DE}$; $\overline{EA}$; $\overline{DA}$; $\overline{DB}$; $\overline{EC}$

Short Answer Type
Q.9. Using the given figure, name the following:



a) Line containing point M.
(b) Line passing through four points.
(c) Line passing through three points.
(d) Two pairs of intersecting lines.
Solution:
(a) $\overleftrightarrow{MC}$ is the line containing the point M.
(b) $\overleftrightarrow{AN}$ is the line passing through four points A, B, C and N.
(c) $\overleftrightarrow{PQ}$ is the line passing through three points P, B and Q.
(d) Pairs for intersecting lines are
(i) $\overleftrightarrow{AN}$ and $\overleftrightarrow{PQ}$
(ii) $\overleftrightarrow{AN}$ and $\overleftrightarrow{MC}$

Q.10. On the given line, some points are given, write down the names of all segments

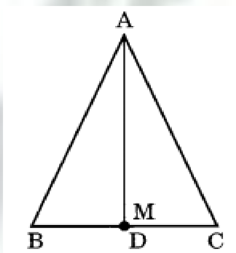


Solution:
Segments are:
$\overline{PQ}$; $\overline{PR}$; $\overline{PS}$; $\overline{PT}$; $\overline{QR}$; $\overline{QS}$; $\overline{QT}$; $\overline{RS}$; $\overline{RT}$; $\overline{ST}$

Q.11.How many lines can pass through
(i) one given point?
(ii) two given points?
(iii) three non-collinear points
Solution:
(i) Infinite number of lines can be passed through one given point.
(ii) Only one line can pass through two given points.
(iii) Three lines can pass through three non- collinear points.

HIGHER ORDER THINKING SKILL (HOTS)

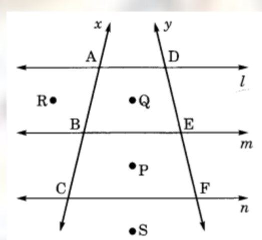
Q.I. Draw an equilateral ∆ABC of any size. Draw AD as its median and an altitude AM.
(i) Does AD coincide with AM?
(ii) Name the point on the median which divides it in the ratio 1:2.
(iii) What is the measure of ∠ADC and ∠ADB?
(iv) Are D and M the same points?
Solution:
(i) Yes, AD coincides with AM.



(ii) The point on the median which divides it in the ratio 1 : 2 is called centroid of the triangle.
(iii) ∠ADC = ∠ADB = 90°
(iv) Yes, D and M are the same points.

Q.II. In the given figure, l, m and n are three parallel lines, x andy intersect these lines.
(i) Name the points lying on the line x.
(ii) Name the points lying on the liney.
(iii) Name the points inside the quadrilateral ABED.
(iv) Name the points outside the quadrilaterals ABED and BCFE.
(v) Name the lines passing through three points.

Solution:
(i) A, B and C lie on the line x.
(ii) D, E and F lie on the liney.
(iii) Q is the point inside ▢ABED



(iv) Points R and S are outside the quadrilaterals ABED and BCFE.
(v) Lines x andy pass through the three points A, B, C and D, E, F respectively.

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MATHEMATICS

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INDEX

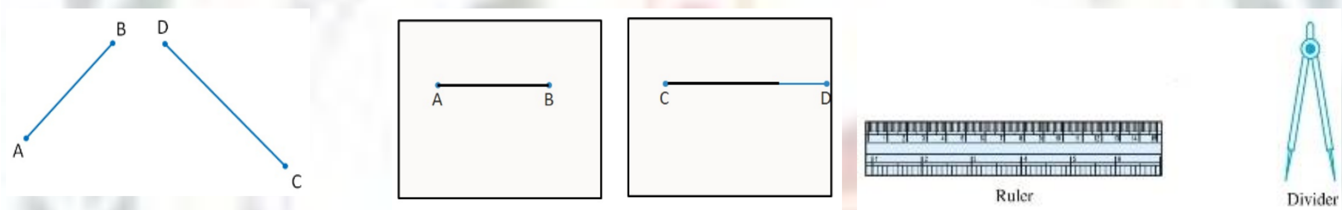
CHAPTER – 5 Understanding Elementary Shapes

KEY POINTS TO REMEMBER

Measuring Line

A line segment is a fixed portion of a line. So, we can measure a line segment. The distance between the endpoints of a line segment is Called its length. The measure of a line segment is a unique number. Actually, the measure of a line segment is called its length. it helps us in comparing two line segments.
This can be done in several ways:

- Comparison by observation
- Comparison by tracing
- Comparison using a ruler and a divider.



The turn from north to east is by a right angle. The turn from north to south is by two right angles. It is called a straight angle.
There are four main directions. They are North (N), South (S), East (E) and West (W)
If we turn by two straight angles or four right angles in the same direction, then it makes a full turn and we reach our original position. This one complete turn is called one revolution. The angle for one revolution is a complete angle.
We can see such revolutions on clock faces. When the hand of a clock moves from one position to another, it turns through an angle. Suppose the hand of a clock starts at 12 and goes around until it reaches 12 again. Clearly, it has made one revolution. It has turned through one complete angle or two straight angles or four right angles.

Angles – Acute, Obtuse, and Reflex

An angle is called an acute angle if it is smaller than a right angle. An angle is called an obtuse angle, if it is larger than a right angle, but less than a straight angle.
An angle is called a reflex angle if it is larger than a straight angle.
Acute angle: An angle smaller than a right angle is called an acute angle. An acute angle is less than one-fourth of a revolution.
Obtuse angle: An angle larger than a right angle but less than a straight angle is called an obtuse angle. An obtuse angle is greater than one-fourth of a revolution but less than half a revolution.
Reflex angle: A reflex angle is larger than a straight angle.

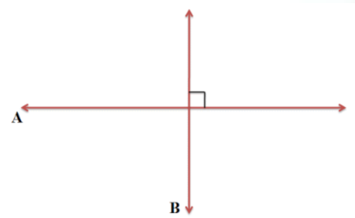
Measuring Angles

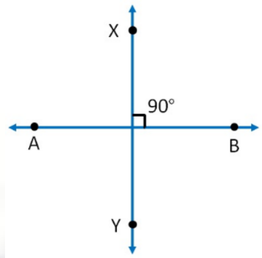
To compare two angles exactly, we need the measures of the angles. This is done with the help of a protractor.

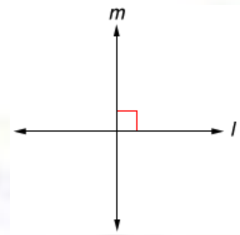
One complete revolution is divided into 360 parts. Each part is called a degree. The measure of the angle is called ‘degree measure’. We write 360 degrees as 360°

Perpendicular Lines

If two lines intersect each other and the angle between them is a right angle, then they are called perpendicular lines. If a line AB is perpendicular to line CD, then we write AB ⊥ CD.

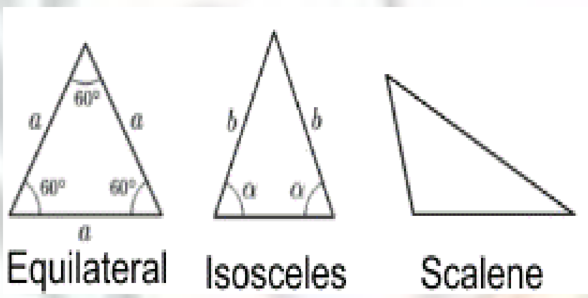


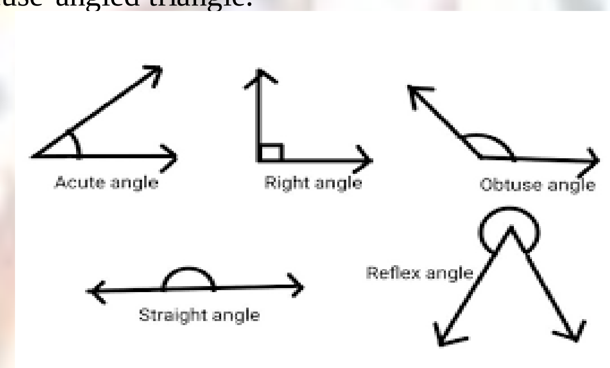




Classification of Triangles

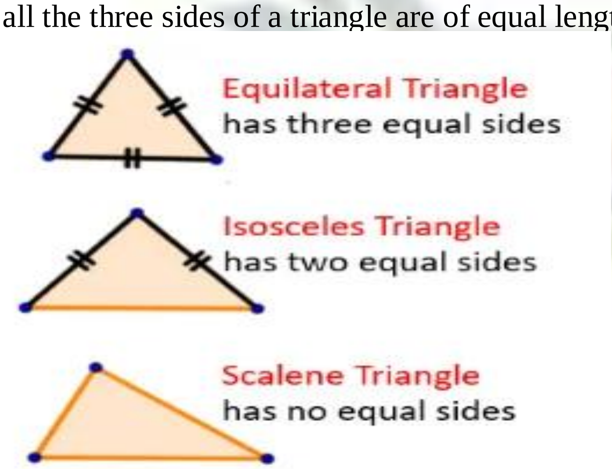
We know that a triangle is a polygon with the least number of sides. There are different types of triangle.
Triangles can be classified on the basis of their angles as follows:
If each angle of a triangle is acute, it is called an acute-angled triangle.
If anyone angle of a triangle is a right angle, it is called a right-angled triangle.
If anyone angle of a triangle is obtuse, it is called an obtuse-angled triangle.

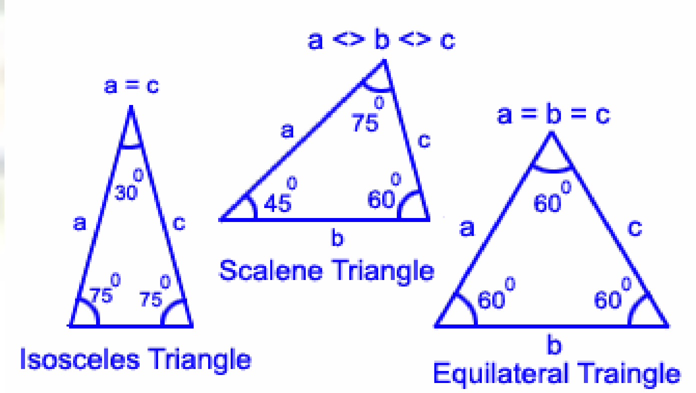




The triangles can also be classified on the basis of the lengths of their sides as follows:

If all the three sides of a triangle are of unequal length, it is called a scalene triangle.
If any two of the sides of a triangle are equal, it is called an isosceles triangle.
If all the three sides of a triangle are of equal length, it is called an equilateral triangle.





We know that a quadrilateral is a four-sided polygon. A quadrilateral has four sides, four angles, and two diagonals. Quadrilaterals can be classified with reference to their properties as follows:

If the quadrilateral has only one pair of parallel sides, then the quadrilateral is called a trapezium.
If two pairs of sides are parallel, then the quadrilateral is called a parallelogram.

Polygons

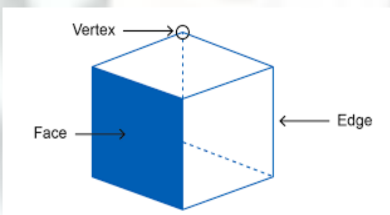
We know that a polygon of 3 sides is called a triangle and a polygon of 4 sides is called a quadrilateral. We may have polygons of still more number of sides. We may classify the polygons according to the number of their sides. A polygon of 5 sides is called a pentagon, a polygon of 6 sides is called a hexagon and a polygon of 8 sides is called an octagon.

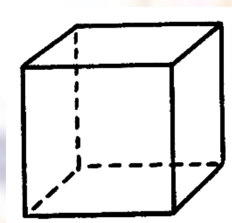
Three Dimensional Shapes

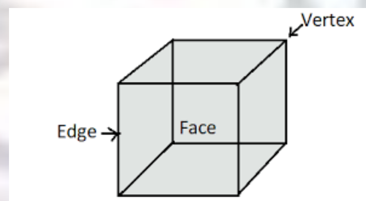
We see around us many three dimensional shapes. Cubes, cuboids, spheres, cylinders, cones and pyramids are some of them.

Cube

Each side is called a face, Two faces intersect in a line segment called an edge. Three edges meet at a point called a vertex.





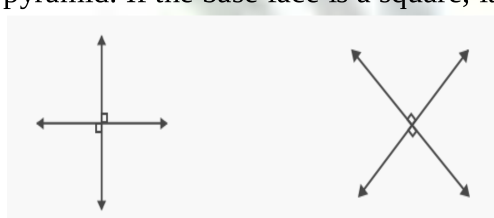


Prism

One of its faces is a triangle. So it is called a triangular prism. The triangular face is known as its base. A prism has two identical bases. Its other faces are parallelograms. If the prism has a rectangular base, it is called a rectangular prism, (or cuboid).

Pyramid

It is a shape with a single base. The other faces are triangles. If the base face is a triangle, it is called a triangular pyramid. If the base face is a square, it is called a square pyramid.

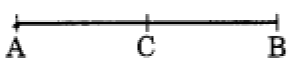


EXERCISE 5.1

Q.1.What is the disadvantage in comparing line segment by mere observation?
Solution:
Comparing the lengths of two line segments simply by 'observation' may not be accurate. So we use divider to compare the length of the given line segments.

Q.2. Why is it better to use a divider than a ruler, while measuring the length of a line segment?
Solution:
Measuring the length of a line segment using a ruler, we may have the following errors:
(i) Thickness of the ruler
(ii) Angular viewing
These errors can be eradicated by using the divider. So, it is better to use a divider than a ruler, while measuring the length of a line segment.

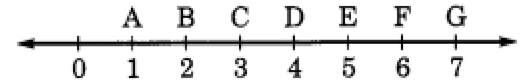
Q.3. Draw any line segment, say $\overline{AB}$. Take any point C lying in between A and B. Measure the lengths of AB, BC and AC. Is AB = AC + CB?
[Note: If A, B, C are any three points on a line such AC + CB = AB, then we can be sure that C lies between A and B]
Solution:
Let us consider



A, B and C such that C lies between A and B and AB = 7 cm.
AC = 3 cm, CB = 4 cm.
∴ AC + CB = 3 cm + 4 cm = 7 cm.
But, AB = 7 cm.
So, AB = AC + CB.

Q.4. If A, B, C are three points on a line such that AB = 5 cm, BC = 3 cm and AC = 8 cm, which one of them lies between the other two?
Solution:
We have, AB = 5 cm; BC = 3 cm
∴ AB + BC = 5 + 3 = 8 cm
But, AC = 8 cm
Hence, B lies between A and C.

Q.5. Verify, whether D is the mid point of $\overline{AG}$

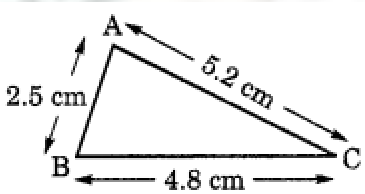


Solution:
From the given figure, we have
AG = 7 cm – 1 cm = 6 cm
AD = 4 cm – 1 cm = 3 cm
and DG = 7 cm – 4 cm = 3 cm
∴ AG = AD + DG.
Hence, D is the mid point of $\overline{AG}$.

Q.6. If B is the mid point of $\overline{AC}$ and C is the mid point of $\overline{BD}$, where A, B, C, D lie on a straight line, say why AB = CD?
Solution:
We have

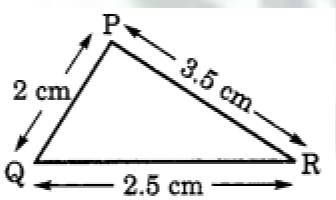
B is the mid point of $\overline{AC}$.
∴ AB = BC …(i)
C is the mid-point of $\overline{BD}$.
BC = CD
From Eq.(i) and (ii), We have
AB = CD

Q.7. Draw five triangles and measure their sides. Check in each case, if the sum of the length of any two sides is always less than the third side.
Solution:
Case I. In ΔABC



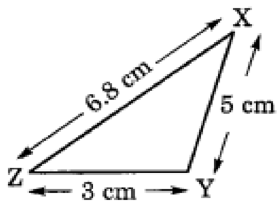
Let AB = 2.5 cm
BC = 4.8 cm
and AC = 5.2 cm
AB + BC = 2.5 cm + 4.8 cm
= 7.3 cm
Since, 7.3 > 5.2
So, AB + BC > AC
Hence, sum of any two sides of a triangle is greater than the third side.

Case II. In ΔPQR,



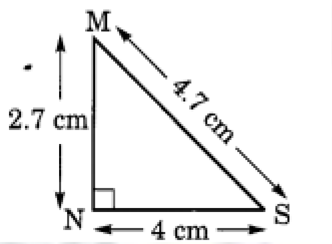
Let PQ = 2 cm
QR = 2.5 cm
and PR = 3.5 cm
PQ + QR = 2 cm + 2.5 cm = 4.5 cm
Since, 4.5 > 3.5
So, PQ + QR > PR
Hence, sum of any two sides of a triangle is greater than the third side.

Case III. In ΔXYZ,



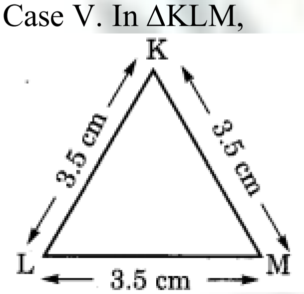
Let XY = 5 cm
YZ = 3 cm
and ZX = 6.8 cm
XY + YZ = 5 cm + 3 cm
= 8 cm
Since, 8 > 6.8
So, XY + YZ > ZX
Hence, the sum of any two sides of a triangle is greater than the third side.

Case IV. In ΔMNS,



Let MN = 2.7 cm
NS = 4 cm
MS = 4.7 cm
and MN + NS = 2.7 cm + 4 cm = 6.7 cm
Since, 6.7 >4.7
So, MN + NS > MS
Hence, the sum of any two sides of a triangle is greater than the third side.

Case V. In ΔKLM,



Let KL = 3.5 cm
LM = 3.5 cm
KM = 3.5 cm
and KL + LM = 3.5 cm + 3.5 cm = 7 cm
7 cm > 3.5 cm
Solution:
(i) For one-fourth revolution, we have
So, KL + LM > KM
Hence, the sum of any two sides of a triangle is greater than the third side.
Hence, we conclude that the sum of any two sides of a triangle is never less than the third side.

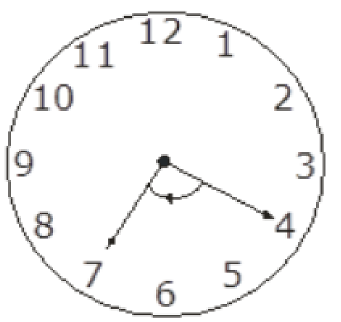
EXERCISE 5.2

1(1). What fraction of a clockwise revolution does the hour hand of a clock turn through, when it goes from 3 to 9

Sol.
By looking at the clock we can see when the hour hand goes from 3 to 9 it complete half of a single revolution which is 180° out of 360°.
So, the Fraction = 180 / 360 = 1/2
As we know 180° is the half of the 360°, so it covers 1 / 2.

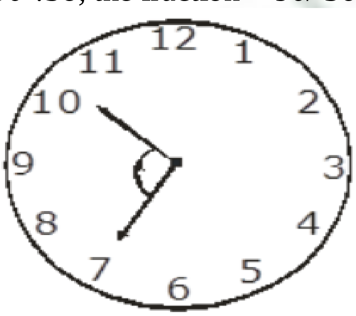
1(2). What fraction of a clockwise revolution does the hour hand of a clock turn through, when it goes from 4 to 7

Sol.
By looking at the clock we can see when the hour hand goes from 4 to 7 it makes a right angle which is of 90°.
So, the required Fraction = 90 / 360 = 1/ 4



1(3). What fraction of a clockwise revolution does the hour hand of a clock turn through, when it goes from 7 to 10

Sol. By looking at the clock we can see when the hour hand goes from 7 to 10 it makes a right angle which is of 90°.So, the fraction = 90/ 360=1 /4



1(4). What fraction of a clockwise revolution does the hour hand of a clock turn through, when it goes from 12 to 9

Sol.

By looking at the clock we can see when the hour hand goes from 12 to 9 it basically covers three right angles which is of = 90 + 90 + 90 = 270°.

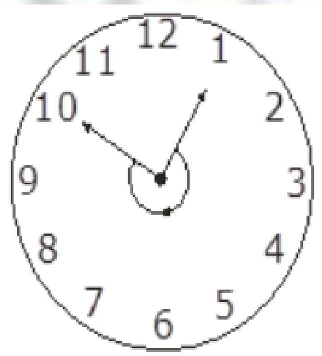
Therefore, required Fraction = 270 / 360 = 3/ 4

1(5). What fraction of a clockwise revolution does the hour hand of a clock turn through, when it goes from 1 to 10

Sol.

By looking at the clock we can see when the hour hand goes from 1 to 10 it basically covers three right angles which is of 270°.

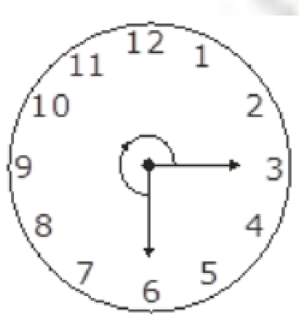
So, required Fraction = 270/ 360 = 3 / 4



1(6). What fraction of a clockwise revolution does the hour hand of a clock turn through, when it goes from 6 to 3

Sol.

By looking at the clock we can see when the hour hand goes from 6 to 3 it basically covers three right angles which is of 270°.Therefore, required Fraction = 270 / 360 = 3 / 4



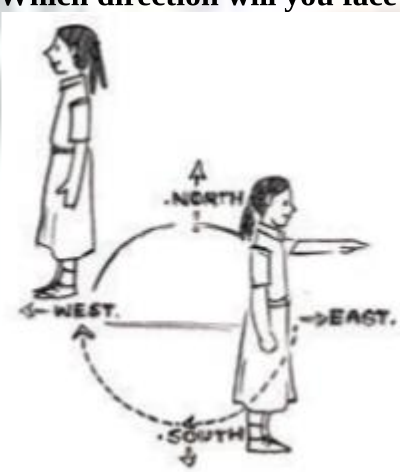
2(1). Where will the hand of a clock stop if it starts at 12 and makes 1/ 2 of a revolution, clockwise?
Sol.
In one complete revolution the hand of clock covers the 360°.
When the hand of the clock starts from 12 and makes half of the revolution clockwise, so it will stop at 6 because half of the revolution is 180°, which it covers upto 6.

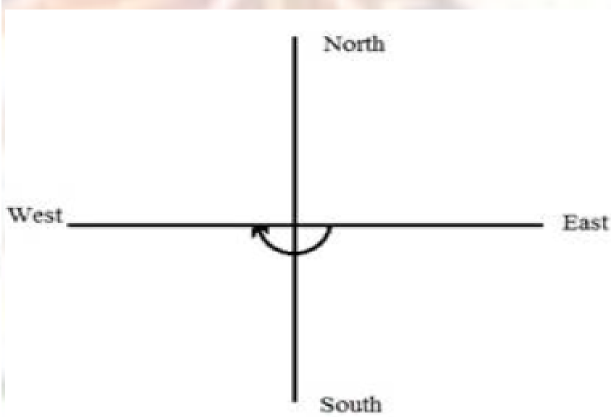
2(2). Where will the hand of a clock stop if it starts at 2 and makes 1 / 2 of a revolution, clockwise?
Sol.
In one complete revolution the hand of clock covers the 360°.
When the hand of the clock starts from 2 and makes half of the one single revolution clockwise which is of 180°, it will stop at 8.

2(3). Where will the hand of a clock stop if it starts at 5 and makes 1 / 4 of a revolution, clockwise?
/Sol.
In one complete revolution the hand of clock covers the 360°.
When hand of the clock starts from 5 and makes one fourth of a revolution clockwise, which is a right angle (90°), It will stop at 8.

2(4). Where will the hand of a clock stop if it starts at 5 and makes 3434 of a revolution, clockwise?
Sol.
In one complete revolution the hand of clock covers the 360°.
When the hand of a clock starts from 5 and makes 34th34th of the revolution clockwise which is of 120°, so it will stop at 2.

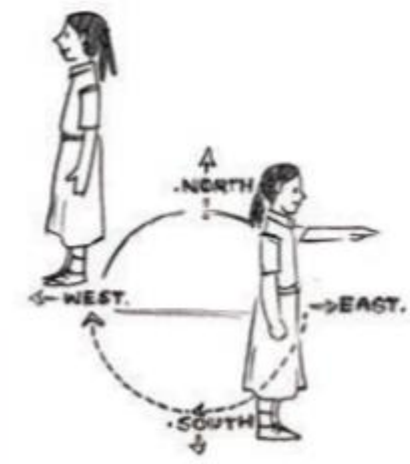
3(1). Which direction will you face if you start facing east and make 1212 of a revolution clockwise?





Sol. When one revolve one complete round in either clockwise or anti-clockwise direction he complete an angle of 360° and the two adjacent directions will be at 90°.
Therefore, If one starts from East and makes half of the complete revolution clockwise, he will be facing the west direction.

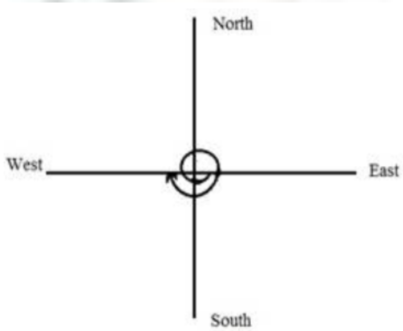
3(2). Which direction will you face if you start facing east and make 112112 of a revolution clockwise?



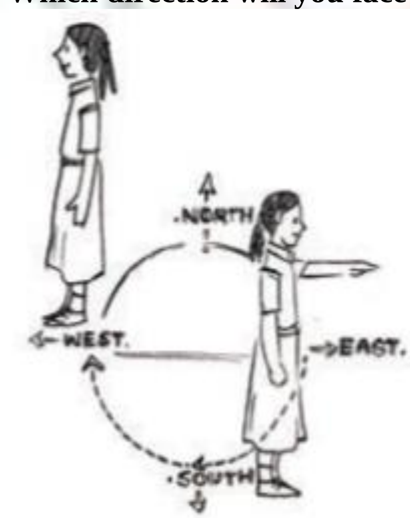
Sol.

When we revolve one complete round in either clockwise or anti-clockwise direction we complete an angle of 360° and the two adjacent directions will be at 90°.

Therefore, If we start from East and make one and half of the complete revolution clockwise, we will be facing the west direction as shown below.



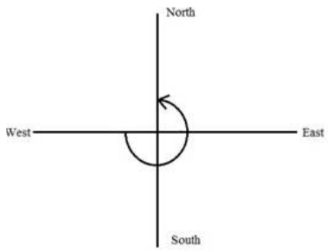
3(3). Which direction will you face if you start facing west and make 3434 of a revolution anti-clockwise?



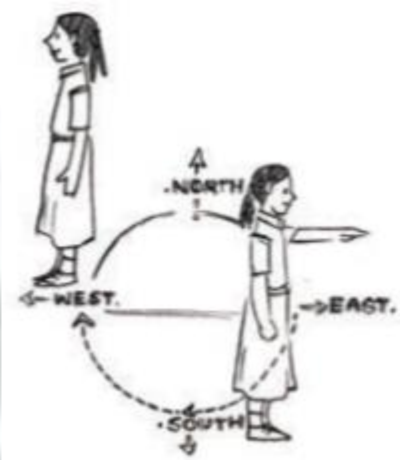
Sol.

When we revolve one complete round in either clockwise or anti-clockwise direction we complete an angle of 360° and the two adjacent directions will be at 90°.

If we start from West and make three fourth of the complete revolution anti-clockwise, we will be facing the north direction as shown in figure.



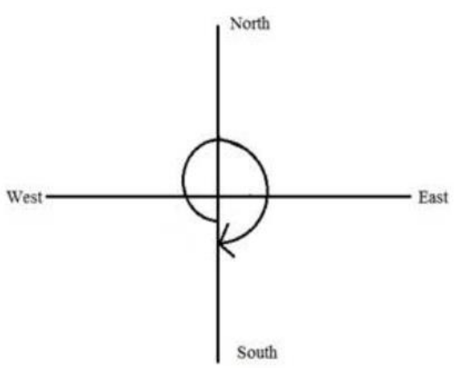
3(4). Which direction will you face if you start facing south and make one full revolution? (Should we specify clockwise or anti-clockwise? Why not?)



Sol.

When we revolve one complete round in either clockwise or anti-clockwise direction we complete an angle of 360° and the two adjacent directions will be at 90°.

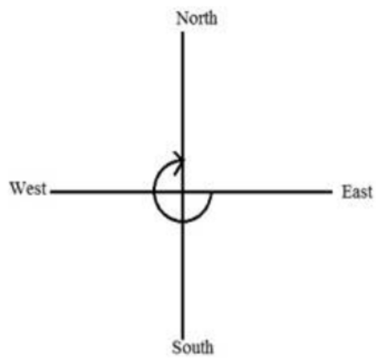
If we start from South and make a complete revolution clockwise or anti-clockwise, we will be facing the South direction again as shown in figure below.



4(1). What part of a revolution have you turned through if you stand facing east and turn clockwise to face north?

Sol.

As we know that if we complete one revolution whether clockwise or anti-clockwise we will be making an angle of 360°.If we start from East and turn clockwise to face north then we will be completing the three fourth of the revolution which is of 270° as shown in figure below.

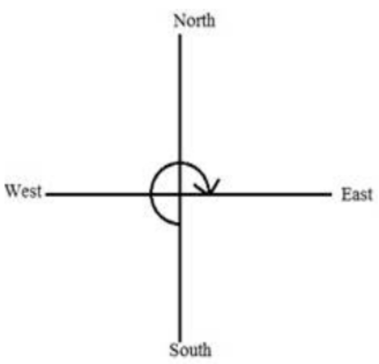


4(2). What part of a revolution have you turned through if you stand facing south and turn clockwise to face east?

Sol.

As we know that if we complete one revolution whether clockwise or anti-clockwise we will be making an angle of 360°.

If we start from South and turn clockwise to face East then we will be completing the three fourth of the revolution which is of 270° as shown in figure below.

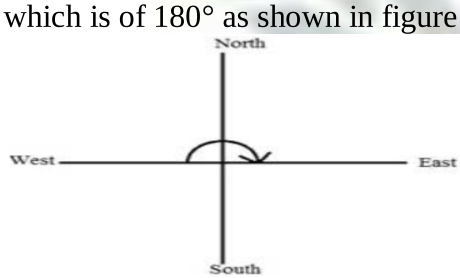


4(3). What part of a revolution have you turned through if you stand facing west and turn clockwise to face east?

Sol.

As we know that if we complete one revolution whether clockwise or anti-clockwise we will be making an angle of 360°.

If we start from West and turn clockwise to face east then we will be completing the half of the revolution which is of 180° as shown in figure below.



5(1). Find the number of right angle turned through by the hour hand of a clock when it goes from 3 to 6.

Sol.

A clock hand makes an angle of 360° in one complete round which also makes of 4 right angles.

When a clock hand moves from 3 to 6 it covers only one right angle as it covers only one fourth of one complete revolution.

5(2). Find the number of right angles turned through by the hour hand of a clock when it goes from 2 to 8

Sol.

We know that a clock hand makes an angle of 360° in on complete round which is also made of 4 right angles. When a clock hand goes from 2 to 8, it makes 2 right angles as it covers half of the complete revolution which is 180°.

5(3). Find the number of right angles turned through by the hour hand of a clock when it goes from 5 to 11

Sol.

We know that a clock hand makes an angle of 360° in on complete round which is also made of 4 right angles. When a clock hand goes from 5 to 11, it makes 2 right angles as it covers half of one complete revolution which is 180°.

5(4). Find the number of right angle turned through by the hour hand of a clock when it goes from 10 to 1

Sol.

We know that clock hand makes an angle of 360° in on complete round which is also made of 4 right angles. When a clock hand goes from 10 to 1 it makes only 1 right angle as it covers only one-fourth of the complete revolution.

5(5). Find the number of right angle turned through by the hour hand of a clock when it goes from 12 to 9.

Sol.

We know that clock hand makes an angle of 360° in one complete round which is also made of 4 right angles. When a clock hand moves from 12 to 9, it makes 3 right angles as it covers three fourth of the complete revolution which is of 270°.

5(6). Find the number of right angles turned through by the hour hand of a clock when it goes from 12 to 6.

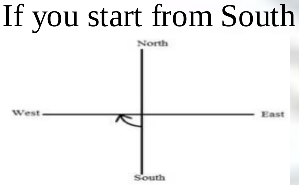
Sol.

We know that clock hand makes an angle of 360° in on complete round which is also made of 4 right angles. When a clock hand goes from 12 to 6, it makes 2 right angles as it covers half of the complete revolution which is of 180°.

6(1). How many right angle do you make if you start facing south and turn clockwise to west?

Sol. One complete revolution is of 360° or we can say 4 right angles.

If you start from South and turn clockwise to west then you are making 1 right angle as shown in figure below.

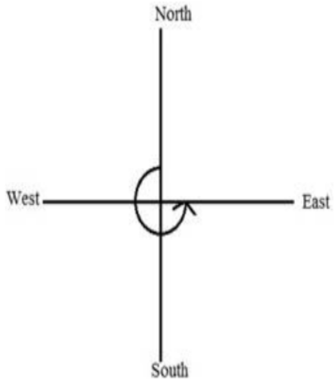


6(2). How many right angle do you make if you start facing north and turn anti-clockwise to east?

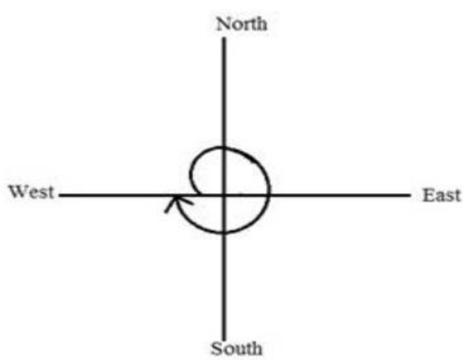
Sol.

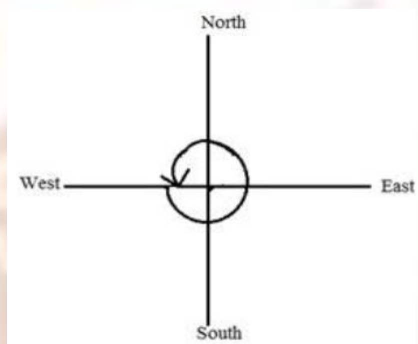
One complete revolution is of 360° or we can say 4 right angles.

If you start from North and turn anti-clockwise to east then you are making 3 right angles as shown in figure below.

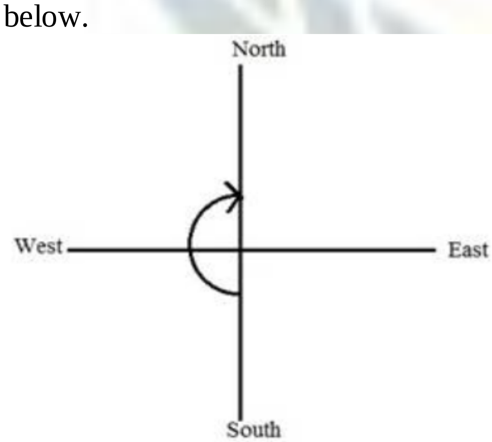


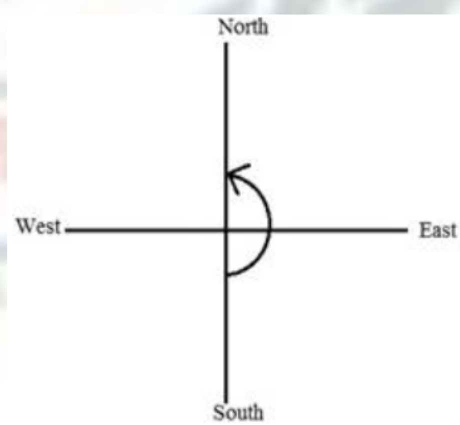
6(3). How many right angle do you make if you start facing west and turn to west?
Sol.
One complete revolution is of 360° or we can say 4 right angles.
If you start from west and turn to west again then you are completing one revolution which is of 4 right angles, as shown in figure below.





6(4). How many right angles do you make if you start facing south and turn to north?
Sol.
One complete revolution is of 360° or we can say 4 right angles.
If you start from South and turn clockwise to north then you are making 2 right angles as shown in figure below.





7(1). Where will the hour hand of a clock stop if it starts from 6 and turns through 1 right angle?

Sol.

As we know that one complete revolution is of 360° which consists of 4 right angles. By looking at the clock we can say that If the hour hand of the clock start from 6 and make 1 right angle then it will stop at 9.

7(2). Where will the hour hand of a clock stop if it start from 8 and turns through 2 right angles?

Sol.

As we know one complete revolution is of 360° which consists of 4 right angles.

By looking at the clock we can say that If the hour hand of the clock start from 8 and make 2 right angles then it will stop at 2.

7(3). Where will the hour hand of a clock stop if it start from 10 and turns through 3 right angles?

Sol.

As we know one complete revolution is of 360° which consists of 4 right angles.

By looking at the clock we can say that if the hour hand of the clock start from 10 and make 3 right angles then it will stop at 7.

7(4). Where will the hour hand of a clock stop if it starts from 7 and turns through 2 straight angles?

Sol.

As we know one complete revolution is 360° which is consists of 4 right angles. By looking at the clock we can say that if the hour hand of the clock starts from 7 and make 2 straight angles then it will surely stop at 7.

EXERCISE : 5.3

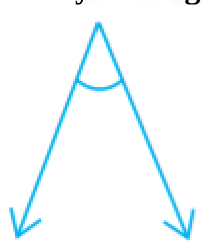
1. Match the following:

(a) Straight angle	(i) Less than one-fourth a revolution
(b) Right angle	(ii) More than half a revolution
(c) Acute angle	(iii) Half of a revolution
(d) Obtuse angle	(iv) One-fourth a revolution
(v)Reflex angle	(v)Between 1414 and 1212 of a revolution
	(vi)One complete revolution

Sol.

(a) - (iv); (b) - (v); (c) - (i); (d) - (vi); (e) - (ii)

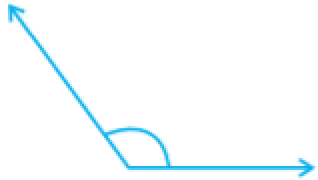
2(1). Classify the angle as right, straight, acute, obtuse or reflex:



Sol.

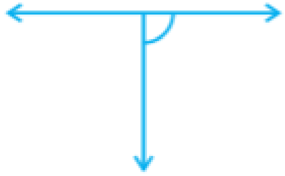
Since the measure is less than 90º, it is an acute angle.

2(2). Classify the angle as right, straight, acute, obtuse or reflex :



Sol.
It is an obtuse angle because its measure lies between 90^o and 180^o.

2(3). Classify the angle as right, straight, acute, obtuse or reflex:

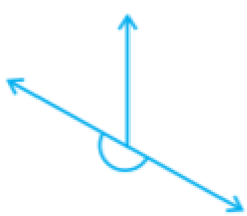


Sol.
Since its measure is 90^o . It is a Right angle.

2(4). Classify the angle as right, straight, acute, obtuse or reflex:

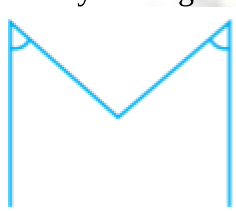
Sol.
It is a Reflex angle as its measure is more than 180^o but less 360^o.

2(5). Classify the angle given below as right, straight, acute, obtuse or reflex:



Sol.
It is a Straight angle as its measure is 180^o.

2(6). Classify the angle as right, straight, acute, obtuse or reflex:



Sol.
It is an Acute angle as its measure is less than 90^o.

EXERCISE : 5.4

1(1). What is the measure of a right angle?
Sol.
The measure of a right angle is always of 90°

1(2). What is the measure of a straight angle?
Sol.
A straight angle always measures 180°

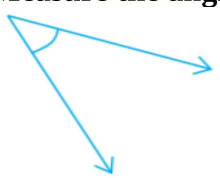
2(1). The measure of an acute angle < 90°.
1) True
2) False
Sol. 1) True
2(2). The measure of an obtuse angle < 90°.
1) True
2) False

Sol. 2) False
2(3). The measure of a reflex angle > 180°.
1) True
2) False
Sol. 1) True

2(4). The measure of one complete revolution = 360°.
1) True
2) False
Sol. 1) True

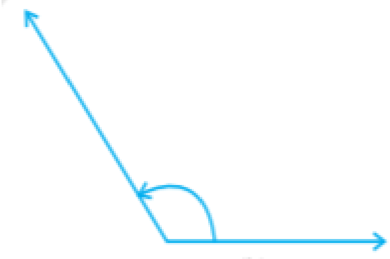
2(5). If m∠∠A = 53º and m∠∠B = 35º, then m∠∠A > m∠∠B.
1) True
2) False
Sol. 1) True
3(1). Write down the measures of some acute angles. Give at least two examples.
Sol.
Acute angle is the angle whose measure is less than 90° so the examples are; 30°, 45°, 60° and 70°.

3(2). Write down the measures of some obtuse angles. Give at least two examples.
Sol.
Obtuse angle is the angle which is greater than 90° but less than 180°. The examples are: 110°, 120°, 135° and 170°.
4(1). Measure the angle given below using the Protractor and write down the measure.



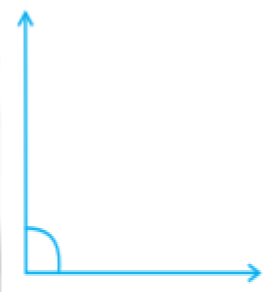
Sol.
On measuring the angle we get its value as 45º

4(2). Measure the angle given below using the protractor and write down the measure.

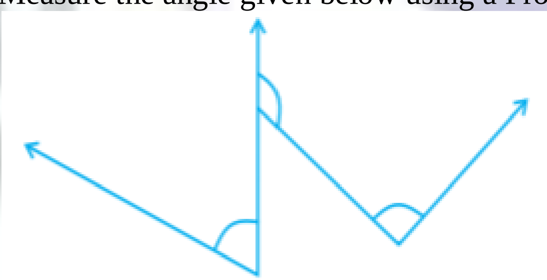


Sol.
Using protractor the measure comes out to be 120º

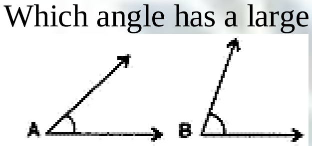
4(3). Measure the angle given below using the Protractor and write down the measure.



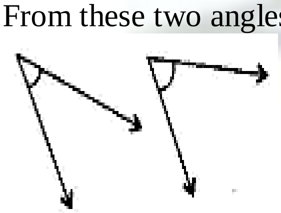
Sol.
The measure of the angle comes out to be 90º
4(4). Measure the angle given below using a Protractor and write down the measure.



Sol.
On measuring with a protractor the measures of the required angles are 60º, 130º and 90º
5. Which angle has a large measure? First estimate and then measure.



Measure of Angle A, Measure of Angle B.
Sol. Measure of Angle A = 40°.
Measure of Angle B = 65°.
The angle B has a larger measure.
6. From these two angles which has larger measure? Estimate and then confirm by the measuring them.



Sol.

Measure of first angle = 45°
Measure of second angle = 60°.
The second angle has larger measure.

7(1). An angle whose measure is less than that of the right angle is ________angle.

Sol 1.

Acute

7(2). An angle whose measure is greater than that of a right angle is ________ angle.

Sol 1.

Obtuse

7(3). An angle whose measure is the sum of the measures of two right angles is ________angle.

Sol 1.

Straight

7(4). When the sum of the measures of two angles is that of a right angle, then each one of them is ________.

Sol 1.

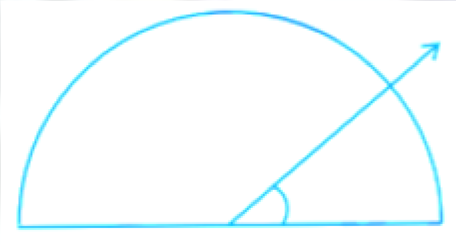
Acute angle

7(5). When the sum of the measures of two angles is that of a straight angle and if one of them is acute then the other should be ________.

Sol 1.

Obtuse angle

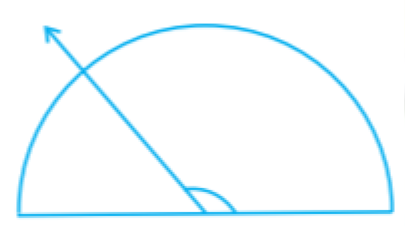
8(1). Find the measure of the angle shown in figure. (First estimate with your eyes and then find the actual measure with a protractor).



Sol.

By measuring the figure with the help of protractor, we get that the measure of the angle as 40^{o}.

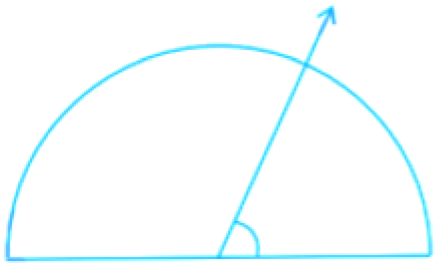
8(2). Find the measure of the angle shown in figure. (First estimate with your eyes and then find the actual measure with a protractor).



Sol.

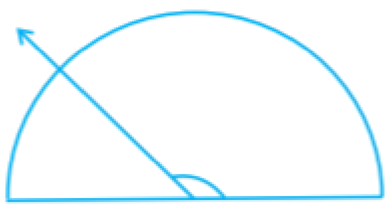
By measuring the angle with the help of protractor we find that the angle is 130^{o}

8(3). Find the measure of the angle shown in figure. (First estimate with your eyes and then find the actual measure with a protractor).



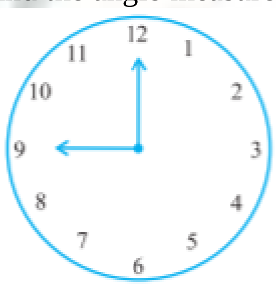
Sol.
By measuring the angle with the help of protractor we see that the angle is 65 degree.

8(4). Find the measure of the angle shown in figure. (First estimate with your eyes and then find the actual measure with a protractor).



Sol.
By measuring the angle with the help of protractor we get the angle as 135º in the figure.

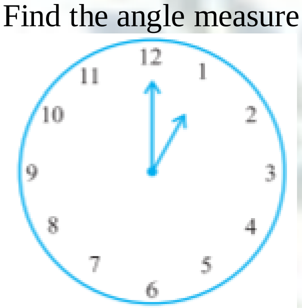
9(1). Find the angle measure between the hands of the clock in a figure:



9.00 a.m.

Sol.
Clearly, the angle is 90°

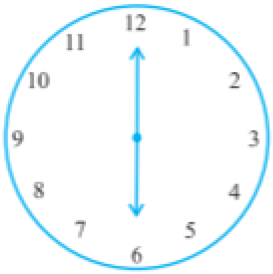
9(2). Find the angle measure between the hands of the clock in a figure:



1.00 p.m.

Sol.
Required angle = 3601236012 = 30°

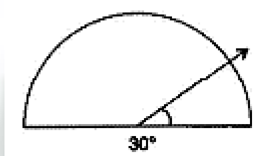
9(3). Find the angle measure between the hands of the clock in a figure:



6.00 p.m.

Sol.
Required angle is 180° as it is forming a straight line which is always of 180°.

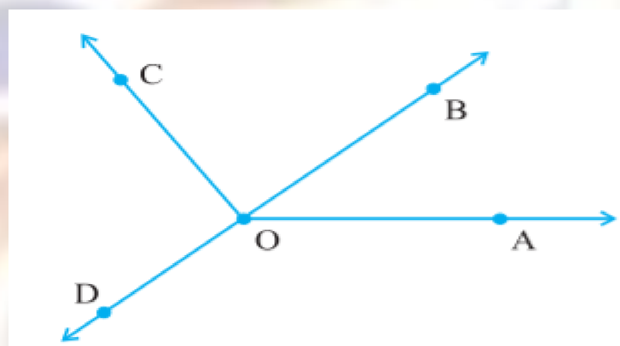
10. Investigate: In the given figure, protractor shows 30°. Look at the same figure through a magnifying glass. Does the angle becomes larger? Does the size of the angle change?



Sol.
No.

11. Measure and classify each angle:

Angle	Measure	Type
∠AOB		
∠AOC		
∠BOC		
∠DOC		
∠DOA		
∠DOB		



Sol.

Angle	Measure of the angle	Type of angle
∠AOB	40°	Acute angle
∠AOC	125°	Obtuse angle
∠BOC	85°	Acute angle
∠DOC	95°	Obtuse angle
∠DOA	140°	Obtuse angle
∠DOB	180°	Straight angle

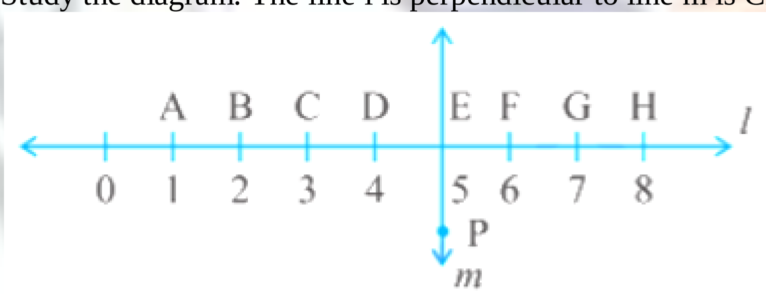
EXERCISE : 5.5

1. Which of the following are models for perpendicular lines :

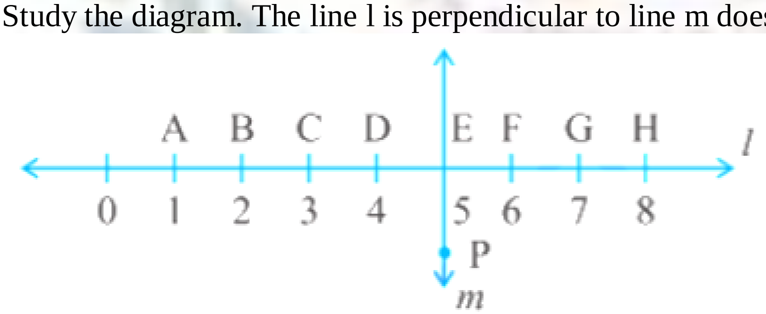
a. The adjacent edges of a table top.
b. The lines of a railway track.
c. The line segments forming the letter "L".
d. The letter V.

Sol.
(a) and (c) are models for perpendicular lines.

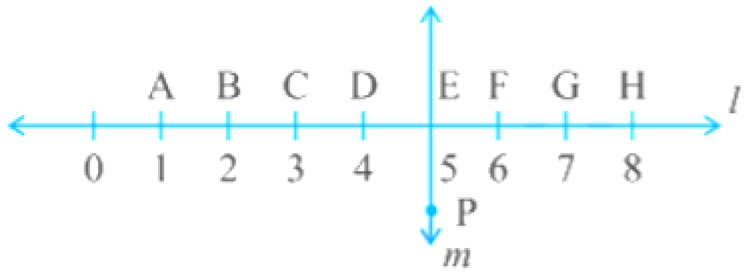
2. Let $\overline{PQ}$ $\overline{PQ}$ be the perpendicular to the line segment $\overline{XY}$ $\overline{XY}$.
Let $\overleftrightarrow{PQ}$ $\overleftrightarrow{PQ}$ and $\overline{XY}$ $\overline{XY}$ intersect in the point A. What is the measure of ∠PAY?
Sol.
The measure of ∠PAY is 90°.
3. There are two set-squares in your box. What are the measure of the angles that are formed at their corners? Do they have any angle measure that is common?
Sol.
One is a 30° - 60° - 90° set square; the other is a 45° - 45° - 90° set square. The angle of measure 90° (i.e. a right angle) is common between them.
4(1). Study the diagram. The line l is perpendicular to line m is CE = EG?



Sol.
Yes, CE = EG as both have same distance of 2 units from the point of intersection.
4(2). Study the diagram. The line l is perpendicular to line m does PE bisect CG?

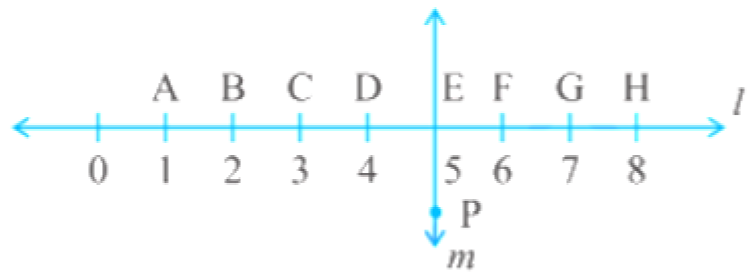


Sol.
Yes, PE bisect CG as E is the mid-point of CG and PE divides the line segment into two equal parts which is CE = EG
4(3). Study the diagram. The line l is perpendicular to line m identify any two line segments for which PE is the perpendicular bisector.



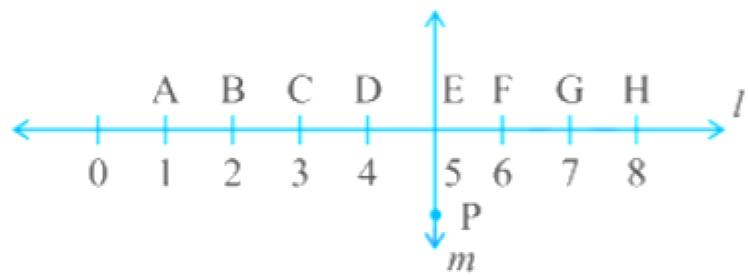
Sol.
The two line segments can be taken as BH and CG.

4(4). Study the diagram. The line l is perpendicular to line m, Is AC > FG?



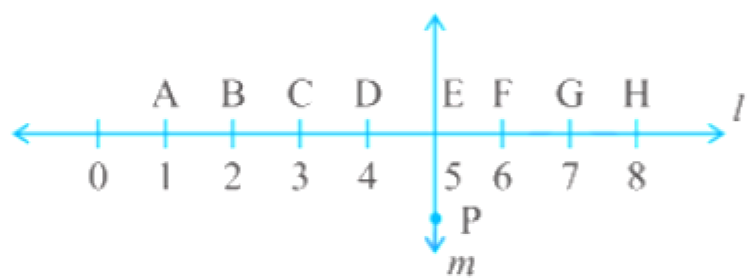
Sol.
Yes, AC > FG is True
As length of AC = 2 units
Length of FG = 1 units

4(5). Study the diagram. The line l is perpendicular to line m Is CD = GH?



Sol.
Yes, CD = GH
Since both are of the same length viz. 1 unit

4(6). Study the diagram. The line l is perpendicular to line m, Is BC < EH?



Sol.
Yes, BC < EH
Because, length of BC = 1 units
Length of EH = 3 units

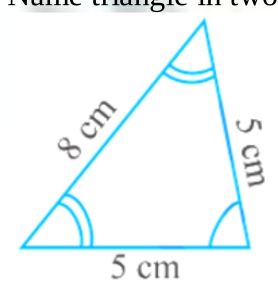
EXERCISE : 5.6

1(1). Name the type of triangle: Triangle with lengths of sides 7 cm, 8 cm and 9 cm
Sol. It is a scalene triangle as it has all unequal sides.
1(2). Name the type of triangle: ∆∆ABC with AB = 8.7 cm, AC = 7 cm and BC = 6 cm
Sol. ∆∆ABC is a scalene triangle as it has three unequal sides.
1(3). Name the type of triangle: ∆∆PQR such that PQ = QR = PR = 5 cm.
Sol. ∆∆ PQR is equilateral triangle as all sides of triangle are equal and according to the property of equilateral triangle has all equal sides.
1(4). Name the type of triangle: ∆∆DEF with ∠∠D = 90°
Sol. ∆DEF is a Right-angled triangle as it has ∠∠ D = 90^o
1(5). Name the type of triangle: ∆∆XYZ with ∠∠Y = 90° and XY = YZ.
Sol. ∆∆XYZ Right-angled isosceles angle as it has one right angle of 90^o and two equal sides.
1(6). Name the type of triangle: ∆∆LMN with ∠∠L = 30°, ∠∠M = 70° and ∠∠N = 80°.
Sol. ∆∆ LMN is an acute angle as it has all angles less than 90^o and according to property of acute angles it is a triangle with all three angles as acute (less than 90^o).

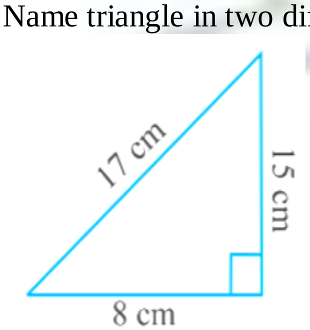
2. Match the following:

Measures of Triangle	Type of Triangle
(a) 3 sides of equal length	(i) Scalene
(b) 2 sides of equal length	(ii) Isosceles right angled
(c) All sides are of different length	(iii) Obtuse angled
(d) 3 acute angles	(iv) Right angled
(e) 1 right angle	(v) Equilateral
(f) 1 obtuse angle	(vi) Acute angled
(g)1 right angle with two sides of equal length	(vii) Isosceles

Sol. We can match the above as follows:
(a) - (v), (b) - (vii), (c) - (i), (d) - (vi), (e) - (iv), (f) - (iii), (g) - (ii)
3(1). Name triangle in two different ways: (you may judge the nature of the angle by observation)

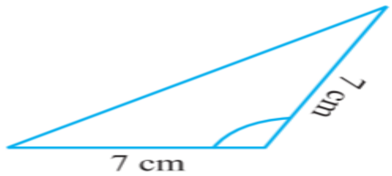


Sol. It is an Acute-angled and isosceles triangle. As in this figure, we can see all angles are less than 90^o and it has two equal sides which is the property isosceles triangle.
3(2). Name triangle in two different ways: (you may judge the nature of the angle by observation)



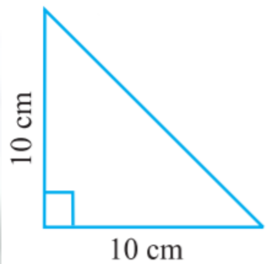
Sol.
It is a Right-angled scalene triangle. Since the triangle has one right angle and three unequal sides and these are the property of right-angled and scalene triangle.

3(3). Name triangle in two different ways: (you may judge the nature of the angle by observation)



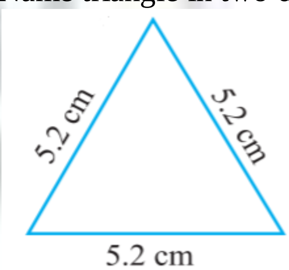
Sol. It is an Obtuse-angled and isosceles triangle. Since we can see one angle is greater than 90^{o} and it has two equal sides which are the property of the isosceles triangle.

3(4). Name triangle in two different ways: (you may judge the nature of the angle by observation)



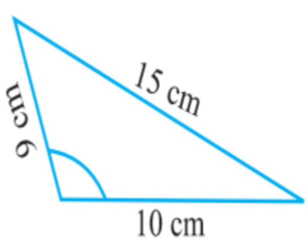
Sol. It is a Right-angled and isosceles triangle. As it has one angle of 90^{o} and two equal sides which is the property of an isosceles triangle.

3(5). Name triangle in two different ways: (you may judge the nature of the angle by observation)



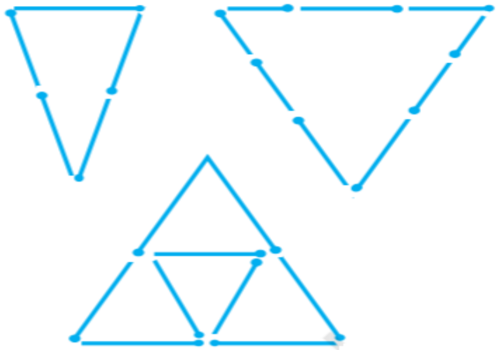
Sol. It is an Acute-angled and equilateral triangle. As in the figure we can see all angles are less than 90^{o} and it has all sides equal and this is the property of an equilateral triangle.

3(6). Name triangle in two different ways: (you may judge the nature of the angle by observation)

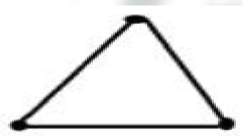


Sol. It is an Obtuse-angled and scalene triangle.
As we can see one angle is greater than 90^{o} and three unequal sides and according to the property of triangles only scalene triangle has this property.

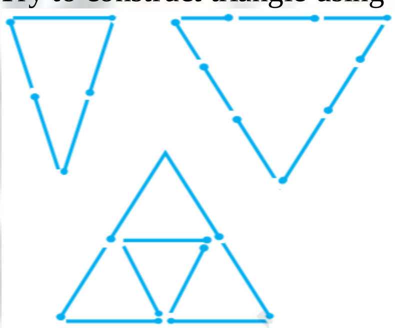
4(1). Try to construct triangle using 3 match sticks. Some are shown here.
name the type of triangle in given case. If you cannot make a triangle, think of reasons for it.



Sol. Clearly, we can make a triangle by using 3 matchsticks. According to the property of a triangle, the sum of two sides is greater than the length of the remaining side. It is an equilateral triangle as it has all equal sides.



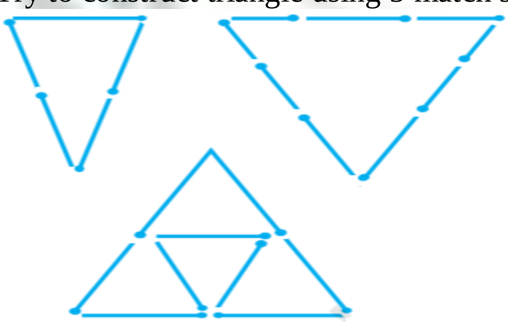
4(2). Try to construct triangle using 4 match sticks. Some are shown here.



Name the type of triangle in given case. If you cannot make a triangle, think of reasons for it.

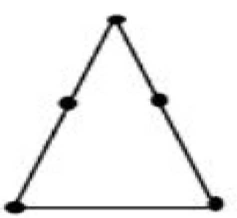
Sol. By using 4 matchsticks it is not possible to make a triangle as in a triangle, sum of the two sides is greater than the length of the remaining side.

4(3). Try to construct triangle using 5 match sticks. Some are shown here.

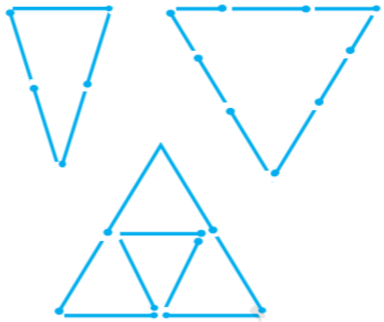


Name the type of triangle in given case. If you cannot make a triangle, think of reasons for it.

Sol. Yes, we can form a triangle by using 5 matchsticks as shown in figure below.

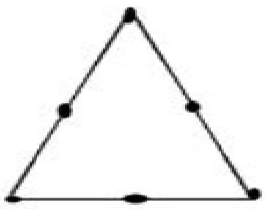


4(4). Try to construct triangle using 6 match sticks. Some are shown here.



Name the type of triangle in given case. If you cannot make a triangle, think of reasons for it.

Sol. With the help of 6 matchsticks we can form a triangle as shown in figure below.



EXERCISE : 5.7

1(1). Each angle of a rectangle is a right angle.

1) True
2) False

Sol. 1) True

By definition, all the angles of a rectangle are 90 degree.

1(2). The opposite sides of a rectangle are equal in length.

1) True
2) False

Sol. 1) True

It is a property of a rectangle that its opposite sides are equal.

1(3). The diagonals of a square are perpendicular to one another.

1) True
2) False

Sol. 1) True.

Diagonals of a square are perpendicular to one another.

1(4). All the sides of a rhombus are of equal length.

1) True
2) False

Sol. 1) True

A rhombus is a quadrilateral in which all sides are of equal length.

1(5). All the sides of a parallelogram are of equal length.

1) True
2) False

Sol. 2) False

1(6). The opposite sides of a trapezium are parallel.
1) True
2) False
Sol. 2) False
False; as in general only one pair of opposite sides is parallel.

2(1). Give reason for a square can be thought of as a special rectangle.
Sol. Yes, a square is a special rectangle, as a rectangle has its all angle of 90^o and opposite sides are equals to each other. In the case of a square, all the angles are also 90^o and it has all the sides equals to each other. So, it is a special rectangle.

2(2). Give reason that a rectangle can be thought of as a special parallelogram.
Sol. A rectangle has all its angles of 90^o and opposite sides are equals and parallel to each other. A parallelogram also has opposite sides equal and parallel to each other. So we can say that a parallelogram with all of its angles as right angles becomes a rectangle and this rectangle can be thought of as a special parallelogram.

2(3). Give reason for a square can be thought of as a special rhombus.
Sol. All side of a rhombus are equal and a square also has all of its sides equals to each other with all the interior angles of 90^o. A rhombus with each angle a right angle becomes a square. So, a square can be thought of as a special rhombus.

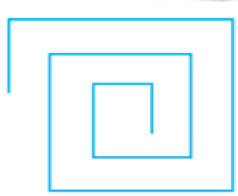
2(4). Give reason for squares, rectangles, parallelograms are all quadrilaterals.
Sol. Squares, rectangles, parallelograms are all quadrilaterals because all of them have four line segments and all are closed figures.

2(5). Give reason for square is also a parallelogram.
Sol. In a parallelogram opposite sides are equal and parallel and in a square opposite side are equal and all the sides have same length. So, yes a square is a special parallelogram.

3. A figure is said to be regular, if its sides are equal in length and angles are equal in measure. Can you identify the regular quadrilateral?
Sol. A square is a 'regular' quadrilateral.

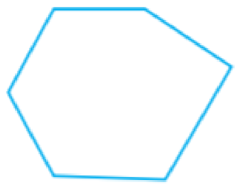
EXERCISE : 5.8

1(1). Examine whether the given figure is polygon and if not why?



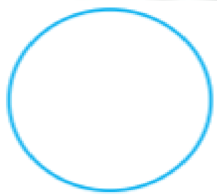
Sol. No, it is not a polygon because it is not a closed figure.

1(2). Examine whether the given figure is polygon and if not why?



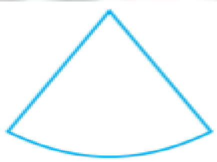
Sol. Yes, it is a polygon as it is made of 6 line segments and is closed.

1(3). Examine whether the given figure is polygon and if not why?



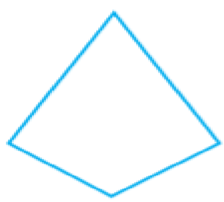
Sol. No, it is not a polygon. It’s a circle and is not made of line segments.

1(4). Examine whether the given figure is polygon and if not why?



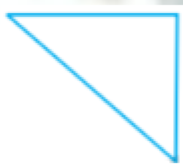
Sol. No, it’s not a polygon as it is not only made of line segments but has a circular part as well.

2(1). Name the given polygon.



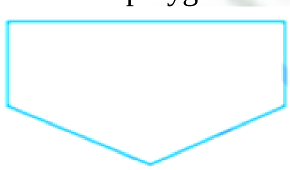
Sol. As the given figure is made of 4 line segments, therefore it is a quadrilateral.

2(2). Name the below polygon.



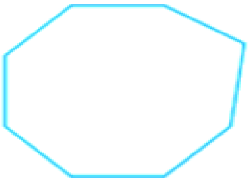
Sol. The given figure is a triangle as we can see it is made of 3 line segments and is closed.

2(3). Name the polygon.



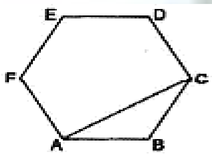
Sol. The given figure is a pentagon because it is made up of 5 line segments.

2(4). Name the given polygon in the figure.



Sol. The given figure is of octagon because it is made of 8 line segments.

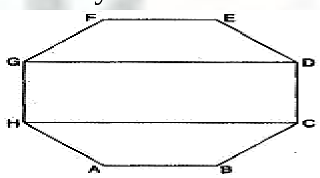
3. Draw a rough sketch of a regular hexagon. Connecting any three of its vertices, draw a triangle. Identify the type of the triangle you have drawn.



Sol.

The triangle drawn is an obtuse-angled and isosceles triangle.

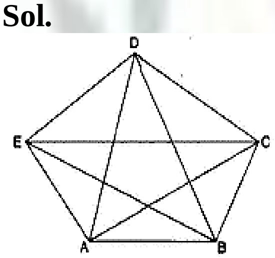
4. Draw a rough sketch of a regular octagon. (Use squared paper if you wish). Draw a rectangle by joining exactly four of the vertices of the octagon



Sol.

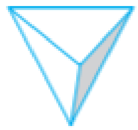
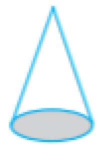
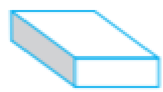
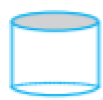
5. A diagonal is a line segment that joins any two vertices of the polygon and is not a side of the polygon. Draw a rough sketch of a pentagon and draw its diagonals.

Sol.



EXERCISE : 5.9

1. Match the following: Give two new examples of each shape.

(a) Cone	(i) 
(b) Sphere	(ii) 
(c) Cylinder	(iii) 
(c) Cuboid	(iv) 
(e) Pyramid	(v) 

Sol.
We can match the above as follows:
(a) - (ii), (b) - (iv), (c) - (v), (d) - (iii), (e) - (i)

i. Cone – a cone is a three-dimensional geometric shape that has a circular base and a single vertex.
ii. Sphere – It is like a circle with the set of points that are all at the same distance from a given point.
iii. Cylinder- It is the curvilinear geometric shape formed by the points at a fixed distance from a given straight line called axis of the cylinder.
iv. Cuboid – A cuboid is a box-shaped solid object. It has six flat sides and all angles are right angles and all its faces are rectangles.
v. Pyramid – A polyhedron formed by connecting a polygonal base and a point called the apex.

2(1). What shape is your instrument box?
Sol.
It is a Cuboid.

2(2). What shape is a brick?
Sol.
It is a Cuboid.

2(3). What shape is a match box?
Sol.
It is of Cuboid shape.

2(4). What shape is a road-roller?
Sol.
Cylinderical shape

2(5). What shape is a sweet laddu?
Sol.
it is Spherical in shape.

Worksheet
Ch - 5 Understanding Elementary Shapes

1. How many right angles do you make if you start facing south and turn clockwise to west?
   a. 1
   b. 2
   c. 3
   d. 4
2. Find the number of right angles turned through by the hour hand of a clock when it goes from 3 to 6.
   a. 4
   b. 2
   c. 1
   d. 3
3. What fraction of a clockwise revolution does the hour hand of a clock turn through, when it goes from 12 to 3?
   a. 1313
   b. 1
   c. 1212
   d. 1414
4. What is the angle name for half a revolution?
   a. Right angle
   b. Straight angle
   c. Complete angle
   d. Reflex angle
5. How do we write "PQ−→−PQ→ is perpendicular to RS−→RS→" symbolically?
   a. PQ←→//RS←→PQ↔//RS↔
   b. PQ←→≠RS←→PQ↔≠RS↔
   c. PQ←→⊥RS←→PQ↔⊥RS↔
   d. PQ←→=RS←→PQ↔=RS↔

6. **Match the following 3D shape and its edges.**

Column A	Column B
1. Cube	(a) 6
2. Square pyramid	(b) 12
3. Triangular prism	(c) 8
4. Triangular pyramid	(d) 9

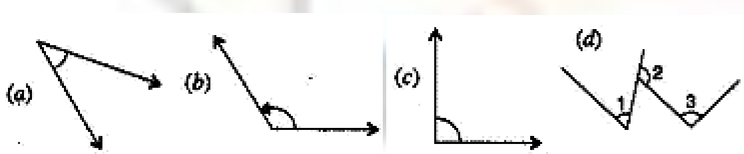
7. **Fill up the following:**

   a. Measure of a complete angle is ____________^{o}.
   b. The triangle in which ____________ sides are equal is called isosceles triangle.
   c. Each of its angles rectangle measures ____________^{o}.
   d. A cube has ____________ vertices.

8. **State true or false:**

   a. Sum of any two sides of a triangle is greater than the third side.
   b. An equilateral triangle is also considered as an isosceles triangle
   c. A polygon is regular if its all sides are equal.
   d. Opposite faces of a cuboid are equal in size.

9. How many faces a tetrahedron have?
10. What is the angle name for half a revolution?
11. Draw a hexagon and write its sides and diagonals?
12. If B is the mid point of AC $\overline{\quad}$ AC‾ and C is the point of BD $\overline{\quad}$ BD‾ . where A, B, C, D lie on a straight line, say why AB = CD?
13. Draw a rough sketch of a regular octagon. Draw a rectangle by joining exactly four of the vertices of the octagon.
14. Measure the angles given below, using the Protractor and write down the measure.



15. All equilateral triangle are isosceles, but all isosceles triangle are not equilateral. Justify the statement.

CHAPTER – 6 Integers

We have seen that there are times when we need to use numbers with a negative sign. This is when we want to go below zero on the number line. These are called negative numbers. Some examples of their use can be in temperature scale, water level in lake or river, level of oil in tank etc. They are also used to denote debit account or outstanding dues.

The collection of numbers..., – 4, – 3, – 2, – 1, 0, 1, 2, 3, 4, ... is called integers. So, – 1, – 2, – 3, – 4, ... called negative numbers are negative integers and 1, 2, 3, 4, ... called positive numbers are the positive integers.

We have also seen how one more than given number gives a successor and one less than given number give predecessor.

We observe that

(a) When we have the same sign, add and put the same sign.

(i) When two positive integers are added, we get a positive integer [e.g.. (+3) + (+2) = + 5].

(ii) When two negative integers are added, we get a negative integer [e.g.. (–2) +(–1)= – 3].

(b) When one positive and one negative integers are added we subtract them as whole numbers by considering the numbers without their sign and then put the sign of the bigger number with the subtraction obtained. The bigger integer is decided by ignoring the signs of the integers [e.g.. (+4) + (–3) = + 1 and (–4) + (+3) = – 1].

(c) The subtraction of an integer is the same as the addition of its additive inverse.

We have shown how addition and subtraction of integers can also be shown on a number line.

EXERCISE : 6.1

1(1). Write opposite of Increase in weight.
Sol. Decrease in weight

1(2). Write opposite of the 30 km north.
Sol. 30 km south

1(3). Write opposite of the 80 m east.
Sol. The opposite is 80 m west

1(4). Write opposite of the Loss of ₹ 700.
Sol. Gain of Rs 700

1(5). Write opposite of the 100 m above sea level.
Sol. 100 m below sea level

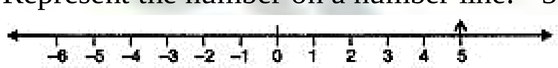
2(1). Represent the number as an integer with an appropriate sign.
An aeroplane is flying at a height two thousand metre above the ground.
Sol. +2000

2(2). Represent the number as an integer with an appropriate sign. A submarine is moving at a depth, eight hundred metre below the sea level.
Sol. –800

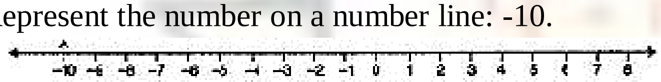
2(3). Represent the number as an integer with an appropriate sign.
A deposit of rupees two hundred.
Sol. +200

2(4). Represent the number as an integer with an appropriate sign.
Withdrawal of rupees seven hundred.
Sol. –700

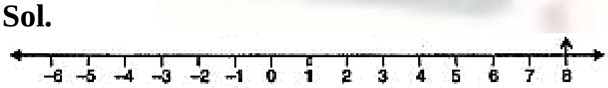
3(1). Represent the number on a number line: +5.

Sol. 

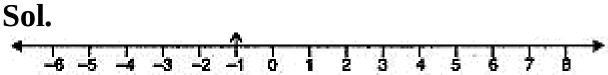
3(2). Represent the number on a number line: -10.

Sol. 

3(3). Represent the number on a number line: +8.
Sol.

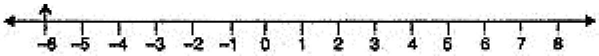


3(4). Represent the number on a number line: -1.
Sol.

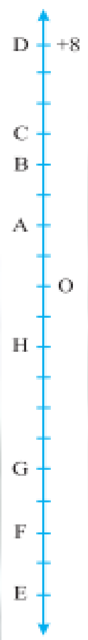


3(5). Represent the number on a number line: -6.

Sol.



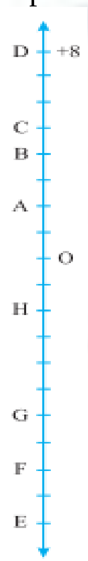
4(1). Adjacent figure is a vertical number line, representing an integer. Observe it and locate the points:
If point D is + 8, then which point is – 8?



Sol.

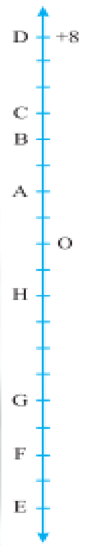
Since D is +8 then,
-8 will be a mirror image of D through 0 on the number line.
Hence,
According to the given vertical line,
-8 will be the point F on the number line.

4(2). Adjacent figure is a vertical number line, representing an integer. Observe it and locate the points:
Is point G a negative integer or a positive integer?



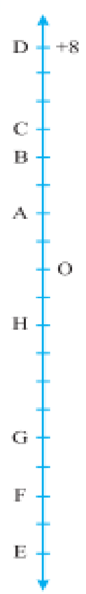
Sol.
The numbers that lie on the line above 0 are positive numbers
And, The numbers that lie on the line below 0 are negative numbers
Now, Since G lies on the line below 0
Hence, G corresponds to (-6) and is a negative number.

4(3). Adjacent figure is a vertical number line, representing an integer. Observe it and locate the points: Write integers for points B and E.



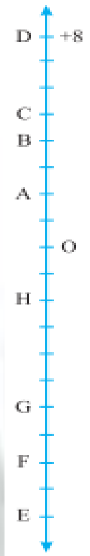
Sol.
Clearly from the figure we can easily see that
Point B lies above the point 0 at a distance of 4 units
Hence, the integer for point B is 4
Now, point E lies below the point 0
And, it is at a distance of 10 units from 0 on lower side
Hence,
The integer for point E is -10

4(4). Adjacent figure is a vertical number line, representing an integer. Observe it and locate the points: Which point marked on this number line has the least value?



Sol. It is clear from the figure that on the given vertical number line,
E has the least value
Because it corresponds to -10.

4(5). Adjacent figure is a vertical number line, representing an integer. Observe it and locate the points:
Arrange all the points in decreasing order of value.



Sol. By looking at the given diagram,
We can conclude that,
The given points can be arranged in the decreasing order as shown below:
D > C > B > A > O > H > G > F > E

5(1). Following is the list of temperatures of five places in India on a particular day of the year.

Places	Temperature recorded	
Siachin	10°C below 0°C	__________
Shimla	2°C below 0°C	__________
Ahmedabad	30°C above 0°C	__________
Delhi	20°C above 0°C	__________
Srinagar	5°C below 0°C	__________

Write the temperatures of these places in the form of integers in the blank column.

Sol.

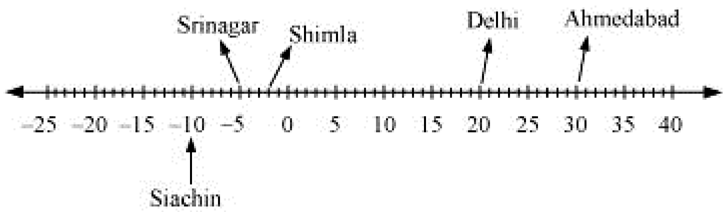
Places	Temperature Recorded
Siachin	-10°C
Shimla	-2°C
Ahmedabad	+30°C
Delhi	+20°C
Srinagar	-5°C

5(2). Following is the list of temperatures of five places in India on a particular day of the year.

Place	Temperature	
Siachin	10°C below 0°C	__________
Shimla	2°C below 0°C	__________
Ahmedabad	30°C above 0°C	__________
Delhi	20°C above 0°C	__________
Srinagar	5°C below 0°C	__________

Following is the number line representing the temperature in degree Celsius. Plot the name of the city against its temperature.

Sol.



5(3). Following is the list of temperatures of five places in India on a particular day of the year.

Place	**Temperature**	
Siachin	10°C below 0°C	________
Shimla	2°C below 0°C	________
Ahmedabad	30°C above 0°C	________
Delhi	20°C above 0°C	________
Srinagar	5°C below 0°C	________

Which is the coolest place?

Sol.
We can see that,
The temperature recorded in Siachin is -10° C, which is the lowest.
Hence,
It is the coolest place.

5(4). Following is the list of temperatures of five places in India on a particular day of the year. Write the names of the places where temperatures are above 10°C

Place	**Temperature**	
Siachin	10°C below 0°C	________
Shimla	2°C below 0°C	________
Ahmedabad	30°C above 0°C	________
Delhi	20°C above 0°C	________
Srinagar	5°C below 0°C	________

Sol. We can see that,
There are two places that have recorded the temperatures more than 10°C.
These places are as follows:
Ahmedabad and Delhi.

6(1). In the pair 2, 9, which number is to the right of the other on the number line?
Sol. The number 9 is to the right of the number 2.

6(2). In the pair -3, -8, which number is to the right of the other on the number line?
Sol. The number –3 is to the right of the number –8.

6(3). In the pair 0, -1, which number is to the right of the other on the number line?

Sol. The number 0 is to the right of the number –1.

6(4). In the pair -11, 10, which number is to the right of the other on the number line?
Sol. The number 10 is to the right of the number –11.

6(5). In the pair -6, 6, which number is to the right of the other on the number line?
Sol. The number 6 is to the right of the number –6.

6(6). In the pair 1, -100, which number is to the right of the other on the number line?
Sol. The number 1 is to the right of the number –100.

7(1). Write all the integers between 0 and -7. (Write them in the increasing order.)
Sol. The integers between 0 and –7 in increasing order are –6, –5, –4, –3, –2 and –1.

7(2). Write all the integers between -4 and 4. (Write them in the increasing order.)
Sol. The integers between –4 and 4 in increasing order are –3, –2, –1, 0, 1, 2 and 3.

7(3). Write all the integers between -8 and -15. (Write them in the increasing order.)
Sol. The integers between –8 and –15 in increasing order are –14, –13, –12, –11, –10 and –9.

7(4). Write all the integers between –30 and –23. (Write them in the increasing order.)
Sol. The integers between –30 and –23 in increasing order are –29, –28, –27, –26, –25 and –24.

8(1). Write four negative integers greater than –20.
Sol. Four negative integers greater than –20 are –19, –18, –17 and –16

8(2). Write four integers less than – 10.
Sol. Four negative integers less than -10 are as follows:
-12, -13, -14, -15

9(1). – 8 is to the right of – 10 on a number line.
1) True
2) False
Sol. 1) True

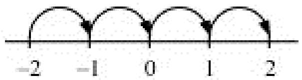
9(2). – 100 is to the right of – 50 on a number line.
1) True
2) False
Sol. 2) False

9(3). Smallest negative integer is – 1.
1) True
2) False
Sol. 2) False
As the greatest negative number is -1

9(4). – 26 is greater than – 25.
1) True
2) False
Sol. 2) False
On the number line -26 is smaller than -25.

10(1). Draw a number line and answer the given statement:
Which number will we reach if we move 4 numbers to the right of – 2.

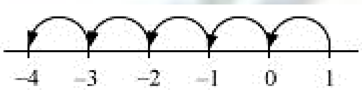
Sol.



If we move 4 numbers to the right of -2, then we will reach number 2.

10(2). Draw a number line and answer the given statement:
Which number will we reach if we move 5 numbers to the left of 1.

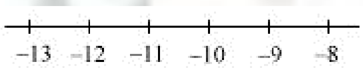
Sol.



If we move 5 numbers to the left of 1, we will reach the number -4.

10(3). Draw a number line and answer the given statement:
If we are at – 8 on the number line, in which direction should we move to reach – 13?

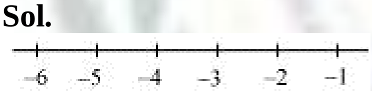
Sol.



From the figure we can observe that,
-13 is to the left of -8
Hence, we should move towards the left direction.

10(4). Draw a number line and answer the given statement:
If we are at – 6 on the number line, in which direction should we move to reach – 1?

Sol.



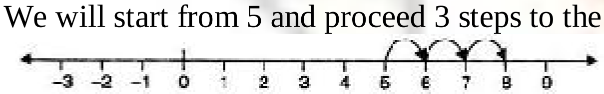
Here from the figure above, we can observe that,
-1 is to the right of -6
Hence, we should move towards the right direction.

EXERCISE : 6.2

1(1). Using number line write the integer which is 3 more than 5.

Sol.

We will start from 5 and proceed 3 steps to the right of 5 to reach 8 as shown below :

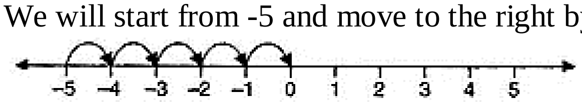


Therefore, 3 more than 5 is 8.

1(2). Using number line write the integer which is 5 more than -5.

Sol.

We will start from -5 and move to the right by 5 steps and obtain 0 as shown below:

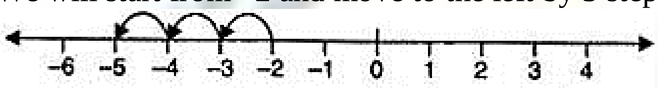


Therefore, 5 more than -5 is 0.

1(3). Using number line write the integer which is 6 less than 2.
Sol.
We will start from 2 and move 6 steps to the left of 2 to reach -4 as shown below:

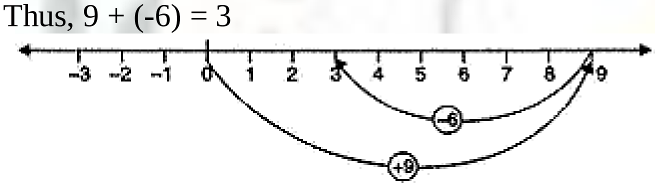
Therefore, 6 less than 2 is -4.

1(4). Using number line write the integer which is 3 less than -2.
Sol.
We will start from –2 and move to the left by 3 steps to reach -5 as shown below :

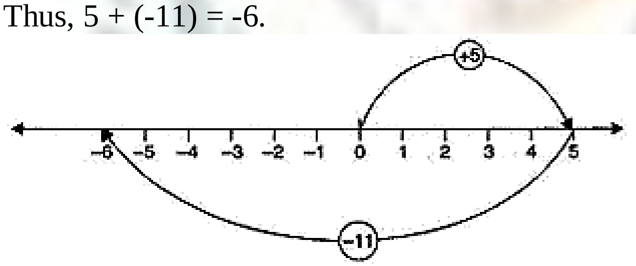


Therefore, 3 less than -2 is -5.

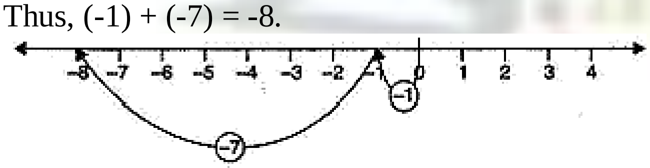
2(1). Use number line and add the integers: 9 + (-6).
Sol.
On the number line we first move 9 steps to the right from 0 reaching 9 and then we move 6 steps to the left of 9 and reach 3.
Thus, 9 + (-6) = 3



2(2). Use number line and add the integers: 5 + (-11)
Sol.
On the number line we first move 5 steps to the right from 0 reaching 5 and then we move 11 steps to the left of 5 to reach -6.
Thus, 5 + (-11) = -6.



2(3). Use number line and add the integers: (-1) + (-7).
Sol.
On the number line we first move 1 step to the left of 0 reaching -1, then we move 7 steps to the left of -1 and reach -8.
Thus, (-1) + (-7) = -8.

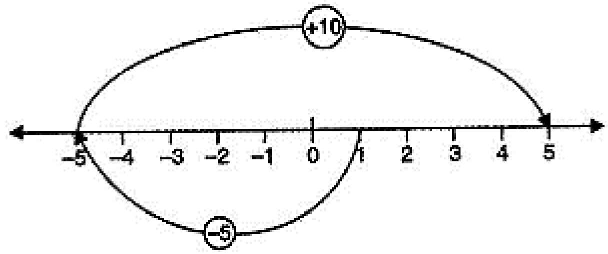


2(4). Use number line and add the integers: (-5) + 10

Sol.

First we move 5 steps to the left of 0 reaching -5, then from - 5 we move 10 steps to the right. We reach the point +5.

Thus, (-5) + 10 = 5.

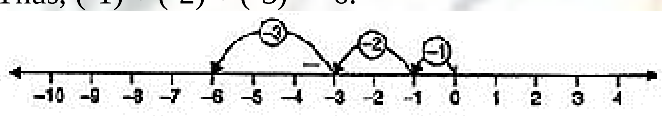


2(5). Use number line and add the integers: (-1) + (-2) + (-3)

Sol.

First, we move 1 step to the left of 0 reaching -1, then from -1 we move 2 steps to the left to reach -3 and finally from -3 we move 3 steps to the left. We reach the point -6.

Thus, (-1) + (-2) + (-3) = -6.

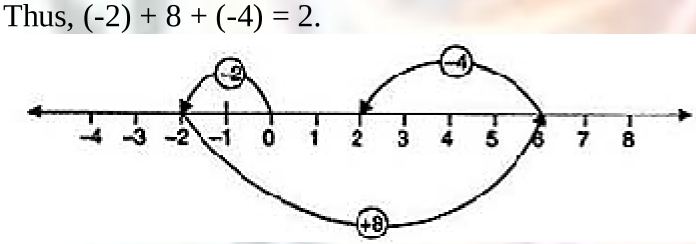


2(6). Use number line and add the integers: (-2) + 8 + (-4)

Sol.

First, we move 2 steps to the left of 0 reaching -2, then from -2 we move 8 steps to the right to reach + 6 and finally from + 6 we move 4 steps to the left. We reach the point 2.

Thus, (-2) + 8 + (-4) = 2.



3(1). Add without using number line :11 + (–7)

Sol.

11 + (–7)

= 4 + 7 + (–7)

= 4 + 0 = 4

3(2). Add without using number line :(–13) + (+18)

Sol.

(–13) + (+18)

= (–13) + (+13) + (+5)

= 0 + (+5) = 5

3(3). Add without using number line :(–10) + (+19)

Sol.(–10) + (+19)

= (–10) + (+10) + (+9)

= 0 + (+9) = 9

3(4). Add without using number line :(–250) + (+150)

Sol.

(–250) + (+150)

= (–100) + (–150) + (+150)

= (–100) + 0 = –100

3(5). Add without using number line :(–380) + (–270)

Sol.

(–380) + (–270)

= –650

3(6). Add without using number line :(–217) + (–100)

Sol.

(–217) + (–100)

= –317

4(1). Find the sum of :137 and –354

Sol.

137 + (–354)

= 137 + (–137) + (–217)

= 0 + (–217) = –217

4(2). Find the sum of :–52 and 52

Sol.

–52 + (52)

= 0

4(3). Find the sum of :–312, 39 and 192

Sol.

(–312) + (39) + (192)

= (–312) + (231)

= (–81) + (–231) + (231)

= (–81) + 0 = –81

4(4). Find the sum of :–50, –200 and 300

Sol.

(–50) + (–200) + (300)

= (–250) + (300)

= (–250) + (250) + (50)

= 0 + (50) = 50.

5(1). Find the sum: (– 7) + (– 9) + 4 + 16

Sol.

The sum of given numbers is obtained as follows:

= (- 7) + (- 9) + 4 + 16

= - 7 – 9 + 4 + 16

= - 16 + 20

= 4

Therefore, sum is 4.

5(2). Find the sum: (37) + (– 2) + (– 65) + (– 8)

Sol.

The required sum of given numbers is:

= 37 + (- 2) + (- 65) + (- 8)

= 37 – 2 – 65 – 8

= 37 – 67 – 8

= 37 – 75

= - 38

Therefore, sum is – 38.

EXERCISE : 6.3

1(1). Find 35 - (20)

Sol.

35- (20)

= 35 -20

= 15

Hence, the result is 15.

1(2). Find 72 – 90

Sol.

72 – 90

= 72 + (additive inverse of 90)

= 72 + (–90)

= 72 + (–72) + (–18)

= 0 + (–18) = –18

1(3). Find (–15) – (–18)

Sol.

(–15) – (–18)

= (–15) + (additive inverse of –18)

= (–15) + (18)

= (–15) + (15) + (3)

= 0 + (3) = 3

1(4). Find (–20) – (–13)

Sol.

(–20) – (–13)

= (–20) + (additive inverse of -13)

= (–20) + (13) = –7

1(5). Find 23 – (–12)

Sol.

23 – (–12)

= 23 + (additive inverse of –12)

= 23 + 12 = 35

1(6). Find (–32) – (–40)
Sol.
(–32) – (–40)
= (–32) + (additive inverse of –40)
= (–32) + (+40)
= (–32) + (+32) + (+8)
= 0 + (+8) = 8.

2(1). (-3) + (-6) ________ (-3) - (-6). (>, < or =)
Sol 1. <

2(2). (-21) - (-10) ________ (-31) + (-11). (>, < or =)
Sol 1. >

2(3). 45 - (-11) ________ 57 + (-4). (>, < or =)
Sol 1. >

2(4). (-25) - (-42) ________ (-42) - (-25). (>, < or =)
Sol 1. >

3(1). (-8) + ________ = 0
Sol 1. 8

3(2). 13 + ________ = 0
Sol 1. -13

3(3). 12 + (-12) = ________
Sol 1. 0

3(4). (-4) + ________ = -12
Sol 1. - 8

3(5). ________ - 15 = - 10
Sol 1. 5

4(1). Find (–7) –8 – (–25)
Sol. (–7) –8 – (–25)
= (–7) + (additive inverse of 8) (–25)
= (–7) + (–8) – (–25)
= –15 – (–25)
= –15 + (additive inverse of –25)
= -15 + (+25)
= -15 + (+15) + (+10)
= 0 + (+10) = 10

4(2). Find (–13) + 32 – 8 – 1
Sol. (–13) + 32 – 8 – 1
= (–13) + 32 – 9
= (–13) + 32 + (additive inverse of 9)

= (–13) + 32 + (–9)
= (–13) + 23 + 9 + (–9)
= (–13) + 23 + 0
= (–13) +23
= (–13) + 13 + 10
= 0 + 10 = 10

4(3). Find (–7) + (–8) + (–90)

Sol. (–7) + (–8) + (–90)
= (–15) + (–90)
= –105

4(4). Find 50 – (–40) – (–2)

Sol.
50 – (–40) – (–2)
= 50 + (additive inverse of –40) – (–2)
= 50 + (40) – (–2)
= 90 – (–2)
= 90 + (additive inverse of –2)
= 90 + 2 = 92.

Worksheet
Ch-6 Integers

1. Write numbers with appropriate signs: 40◦◦C below 0◦◦C temperature.
   a. 30
   b. 40
   c. -40
   d. None of these
2. 2 subtracted from 7 gives
   a. -5
   b. 5
   c. -9
   d. 9
3. Fill in the blanks with >, < or = sign. (– 3) + (– 6) ______ (– 3) – (– 6)
   a. <
   b. >
   c. None of these
   d. =
4. The number of integers between -2 and 2 is
   a. 3
   b. 5
   c. 4
   d. 2
5. Sum of (– 9) and 15.
   a. 90
   b. -6
   c. 6
   d. 20

6. **Match the following:**

Column A	Column B
(a) 10 steps to the right	(p) -1000
(b) 10 km below sea level	(q) 1000
(c) Deposit Rs. 1000 in a bank	(r) 10
(d) Spending Rs. 1000	(s) -10

7. **Fill in the blanks:**

a. When we subtract -10 from 18 we get ______.

b. _____ is an integer which is neither positive nor negative.

c. 272 - 198 - ______ = 0.

d. 15 + _____ =0

8. **State whether the following statements are true or false:**

a. If a and b are any two integers such that a > b, then -a > - b.

b. If the sum of an integer and its opposite is zero, then they are called additive inverses of each other.

c. The negative of 0 is -0.

d. The sum of positive and negative integers is always negative.

9. Write four negative integers less than –20.

10. Write all the integers between -8 and -15. (Write them in the increasing order.)

11. Find the solution of the following :(–9) + (+13)

12. Subtract :(–20) – (–13)

13. Find the value of :(–7) + (–9) + 4 + 16

14. Using number line, add the following integers: 9 + (-6).

15. The temperature on a certain morning is -11°C at 5 a. m. If the temperature drops 3 degree at 6 a.m. and rises 5 degree at 8 a.m. and again drops 3 degree at 9 a.m. What is the temperature at 9 a.m.?