

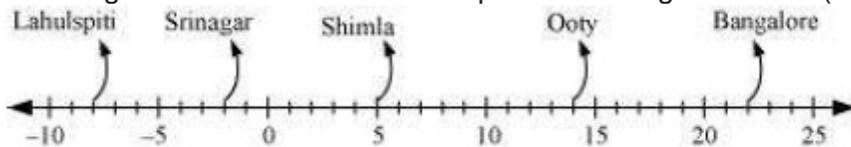
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Class 7th Maths CH - 1 Integers CBSE Answers NCERT Solutions For PDF Download 2018 2019
Exercise 1.1

Question 1:

Following number line shows the temperature in degree celsius ($^{\circ}\text{C}$) at different places on a particular day.



- (a) Observe this number line and write the temperature of the places marked on it.
(b) What is the temperature difference between the hottest and the coldest places among the above?
(c) What is the temperature difference between Lahulspiti and Srinagar?
(d) Can we say temperature of Srinagar and Shimla taken together is less than the temperature at Shimla? Is it also less than the temperature at Srinagar?

Answer:

(a) By observing the given data, the temperatures of these cities are as follows.

Lahulspiti : -8°C

Srinagar : -2°C

Shimla : 5°C

Ooty : 14°C

Bangalore : 22°C

(b) Temperature at the hottest place, i.e., Bangalore = 22°C

Temperature at the coldest place, i.e., Lahulspiti = -8°C

Temperature difference = $22^{\circ}\text{C} - (-8^{\circ}\text{C})$

= 30°C

Therefore, the temperature difference between the hottest and the coldest places is 30°C .

(c) Temperature at Lahulspiti = -8°C

Temperature at Srinagar = -2°C

Temperature difference = $-2^{\circ}\text{C} - (-8^{\circ}\text{C})$

= 6°C

Therefore, the temperature difference between Lahulspiti and Srinagar is 6°C .

(d) Temperature at Srinagar = -2°C

Temperature at Shimla = 5°C

Temperature of Srinagar and Shimla taken together = $-2^{\circ}\text{C} + 5^{\circ}\text{C}$

= 3°C

$3^{\circ}\text{C} < 5^{\circ}\text{C}$

$3^{\circ}\text{C} <$ Temperature of Shimla Yes, the temperature of Srinagar and Shimla taken together is less than the temperature of Shimla. However, $3^{\circ}\text{C} > -2^{\circ}\text{C}$

Hence, the temperature of Srinagar and Shimla taken together is not less than the temperature of Srinagar.

Question 2:

In a quiz, positive marks are given for correct answers and negative marks are given for incorrect answers. If Jack's scores in five successive rounds were 25, -5, -10, 15 and 10, what was his total at the end?

Answer:

Jack's scores in five successive rounds are 25, -5, -10, 15, and 10. Total score of Jack at the end will be the sum of these scores.

Therefore, Jack's total score at the end = $25 - 5 - 10 + 15 + 10 = 35$

Question 3:

At Srinagar temperature was -5°C on Monday and then it dropped by 2°C on Tuesday.

What was the temperature of Srinagar on Tuesday? On Wednesday, it rose by 4°C . What was the temperature on this day?

Answer:

Temperature on Monday = -5°C

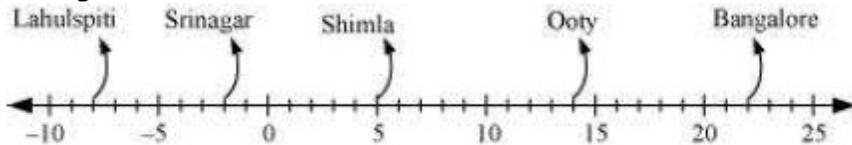
Temperature on Tuesday = Temperature on Monday -2°C
 $= -5^{\circ}\text{C} - 2^{\circ}\text{C} = -7^{\circ}\text{C}$

Temperature on Wednesday = Temperature on Tuesday $+4^{\circ}\text{C}$
 $= -7^{\circ}\text{C} + 4^{\circ}\text{C} = -3^{\circ}\text{C}$

Therefore, the temperature on Tuesday and Wednesday was -7°C and -3°C respectively.

Question 4:

A plane is flying at the height of 5000 m above the sea level. At a particular point, it is exactly above a submarine floating 1200 m below the sea level. What is the vertical distance between them?



Answer:

Height of plane = 5000 m

Depth of submarine = -1200 m

Distance between plane and submarine = $5000\text{ m} - (-1200)\text{ m}$
 $= 5000\text{ m} + 1200\text{ m} = 6200\text{ m}$

Question 5:

Mohan deposits Rs 2,000 in his bank account and withdraws Rs 1,642 from it, the next day. If withdrawal of amount from the account is represented by a negative integer, then how will you represent the amount deposited? Find the balance in Mohan's account after the withdrawal.

Answer:

Since the amount withdrawn is represented by a negative integer, the amount deposited will be represented by a positive integer.

Amount deposited = Rs 2000

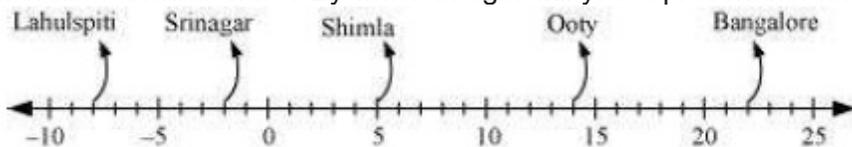
Amount withdrawn = $-\text{Rs } 1642$

Balance in Mohan's account = Money deposited + Money withdrawn
 $= 2000 + (-1642) = 2000 - 1642 = 358$

Therefore, balance in Mohan's account after withdrawal is Rs 358.

Question 6:

Rita goes 20 km towards east from a point A to the point B. From B, she moves 30 km towards west along the same road. If the distance towards east is represented by a positive integer then, how will you represent the distance travelled towards west? By which integer will you represent her final position from A?



Answer:

Since the distance towards east is represented by a positive integer, the distance travelled towards west will be represented by a negative integer.

Distance travelled in east direction = 20 km

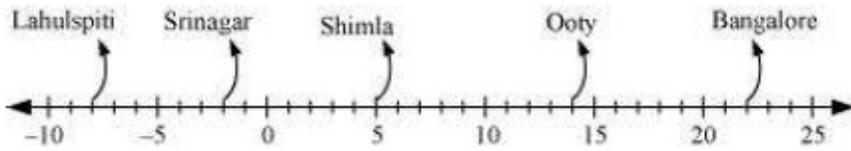
Distance travelled in west direction = -30 km

Distance travelled from A = $20 + (-30) = -10$ km

Therefore, we will represent the distance travelled by Rita from point A by a negative integer, i.e., -10 km (i.e., Rita is now in west direction).

Question 7:

In a magic square each row, column and diagonal have the same sum. Check which of the following is a magic square.



Answer:

It can be observed that in square (i), every row and column add up to give 0. However, the sum of one of its diagonals is not 0.

As $-4 - 2 = -6 \neq 0$,

Therefore, (i) is not a magic square.

Similarly, in square (ii), each row, column, and diagonal add up to give -9 . Therefore,

(ii) is a magic square.

Question 8:

Verify $a - (-b) = a + b$ for the following values of a and b .

(i) $a = 21, b = 18$

(ii) $a = 118, b = 125$

(iii) $a = 75, b = 84$

(iv) $a = 28, b = 11$

Answer:

(i) $a = 21, b = 18$

$a - (-b) = 21 - (-18) = 21 + 18 = 39$

$a + b = 21 + 18 = 39$

$\therefore a - (-b) = a + b = 39$

(ii) $a = 118, b = 125$

$a - (-b) = 118 - (-125) = 118 + 125 = 243$

$a + b = 118 + 125 = 243$

$\therefore a - (-b) = a + b = 243$

(iii) $a = 75, b = 84$

$a - (-b) = 75 - (-84) = 75 + 84 = 159$

$a + b = 75 + 84 = 159$

$\therefore a - (-b) = a + b = 159$

(iv) $a = 28, b = 11$

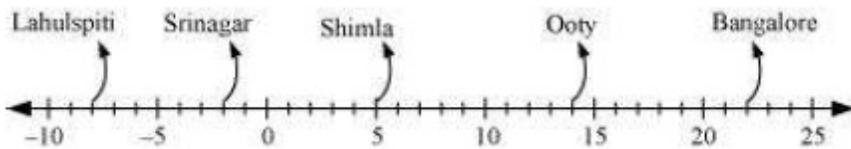
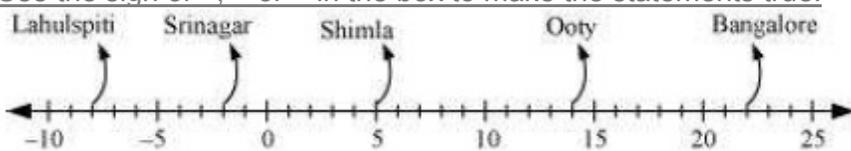
$a - (-b) = 28 - (-11) = 28 + 11 = 39$

$a + b = 28 + 11 = 39$

$\therefore a - (-b) = a + b = 39$

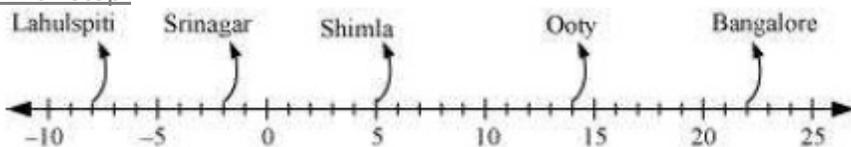
Question 9:

Use the sign of $>$, $<$ or $=$ in the box to make the statements true.



Question 10:

A water tank has steps inside it. A monkey is sitting on the topmost step (i.e., the first step). The water level is at the ninth step.



(i) He jumps 3 steps down and then jumps back 2 steps up. In how many jumps will he reach the water level?

(ii) After drinking water, he wants to go back. For this, he jumps 4 steps up and then jumps back 2 steps down in every move. In how many jumps will he reach back the top step?

(iii) If the number of steps moved down is represented by negative integers and the number of steps moved up by positive integers, represent his moves in part (i) and (ii) by completing the following; (a) $-3 + 2 - \dots = -8$ (b) $4 - 2 + \dots = 8$. In (a) the sum (-8) represents going down by eight steps. So, what will the sum 8 in (b) represent?

Answer:

Let the steps moved down be represented by positive integers and the steps moved up be represented by negative integers.

(i) Initially, the monkey was at step = 1

After 1st jump, the monkey will be at step = $1 + 3 = 4$

After 2nd jump, the monkey will be at step = $4 + (-2) = 2$

After 3rd jump, the monkey will be at step = $2 + 3 = 5$

After 4th jump, the monkey will be at step = $5 + (-2) = 3$

After 5th jump, the monkey will be at step = $3 + 3 = 6$

After 6th jump, the monkey will be at step = $6 + (-2) = 4$

After 7th jump, the monkey will be at step = $4 + 3 = 7$

After 8th jump, the monkey will be at step = $7 + (-2) = 5$

After 9th jump, the monkey will be at step = $5 + 3 = 8$

After 10th jump, the monkey will be at step = $8 + (-2) = 6$

After 11th jump, the monkey will be at step = $6 + 3 = 9$

Clearly, the monkey will be at water level (i.e., 9th step) after 11 jumps.

(ii) Initially, the monkey was at step = 9

After 1st jump, the monkey will be at step = $9 + (-4) = 5$

After 2nd jump, the monkey will be at step = $5 + 2 = 7$

After 3rd jump, the monkey will be at step = $7 + (-4) = 3$

After 4th jump, the monkey will be at step = $3 + 2 = 5$

After 5th jump, the monkey will be at step = $5 + (-4) = 1$

Clearly, the monkey will reach back at the top step after 5 jumps.

(iii) If steps moved down are represented by negative integers and steps moved up are represented by positive integers, then his moves will be as follows.

Moves in part (i)

$-3 + 2 - 3 + 2 - 3 + 2 - 3 + 2 - 3 + 2 - 3 = -8$

Moves in part (ii)

$4 - 2 + 4 - 2 + 4 = 8$

Moves in part (ii) represent going up 8 steps.

Exercise 1.2

Question 1:

Write down a pair of integers whose:

(a) sum is -7

(b) difference is -10

(c) sum is 0

Answer:

(a) $-8 + (+1) = -7$

(b) $-12 - (-2) = -10$

(c) $5 + (-5) = 0$

Question 2:

(a) Write a pair of negative integers whose difference gives 8.

(b) Write a negative integer and a positive integer whose sum is -5 .

(c) Write a negative integer and a positive integer whose difference is -3 .

Answer:

(a) $-2 - (-10) = 8$

(b) $-8 + 3 = -5$

(c) $-2 - (+1) = -3$

Question 3:

In a quiz, team A scored $-40, 10, 0$ and team B scored $10, 0, -40$ in three successive rounds. Which team scored more? Can we say that we can add integers in any order?

Answer:

Team A scored $-40, 10, 0$.

Total score = $-40 + 10 + 0$

= -30

Team B scored $10, 0, -40$.

Total score = $10 + 0 + (-40)$

= -30

\therefore The scores of both teams are equal.

Yes, we can add integers in any order. We had observed that the scores obtained by both teams in successive rounds were numerically equal but different in order. Yet, the total score of both teams were equal.

Question 4:

Fill in the blanks to make the following statements true:

(i) $(-5) + (-8) = (-8) + (\dots)$

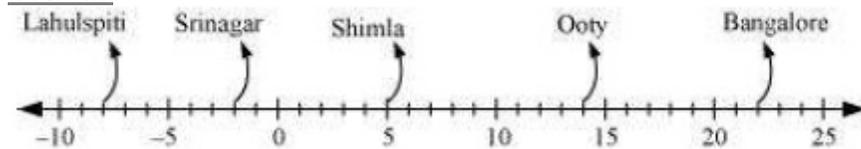
(ii) $-53 + \dots = -53$

(iii) $17 + \dots = 0$

(iv) $[13 + (-12)] + (\dots) = 13 + [(-12) + (-7)]$

(v) $(-4) + [15 + (-3)] = [(-4) + 15] +$

Answer:

**Exercise 1.3****Question 1:**

Find each of the following products:

(a) $3 \times (-1)$ (b) $(-1) \times 225$

(c) $(-21) \times (-30)$ (d) $(-316) \times (-1)$

(e) $(-15) \times 0 \times (-18)$ (f) $(-12) \times (-11) \times (10)$

(g) $9 \times (-3) \times (-6)$ (h) $(-18) \times (-5) \times (-4)$

(i) $(-1) \times (-2) \times (-3) \times 4$

(j) $(-3) \times (-6) \times (-2) \times (-1)$

Answer:

(a) $3 \times (-1) = -3$

(b) $(-1) \times 225 = -225$

(c) $(-21) \times (-30) = 630$

(d) $(-316) \times (-1) = 316$

(e) $(-15) \times 0 \times (-18) = 0$

(f) $(-12) \times (-11) \times 10 = 1320$

(g) $9 \times (-3) \times (-6) = 162$

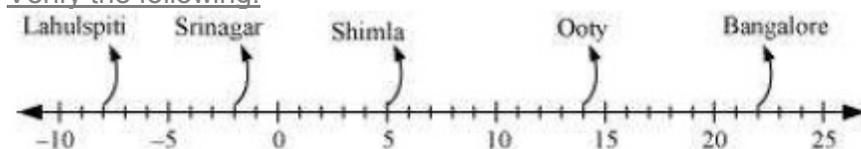
(h) $(-18) \times (-5) \times (-4) = -360$

(i) $(-1) \times (-2) \times (-3) \times 4 = -24$

(j) $(-3) \times (-6) \times (-2) \times (-1) = 36$

Question 2:

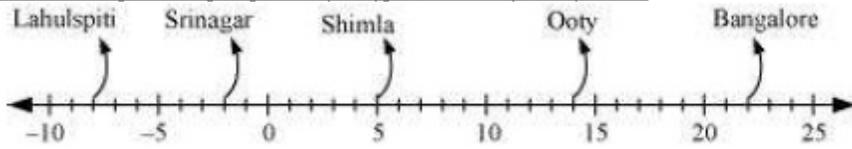
Verify the following:



Answer:

(a) L.H.S. = $18 \times [7 + (-3)] = 18 \times [7 - 3] = 18 \times 4 = 72$

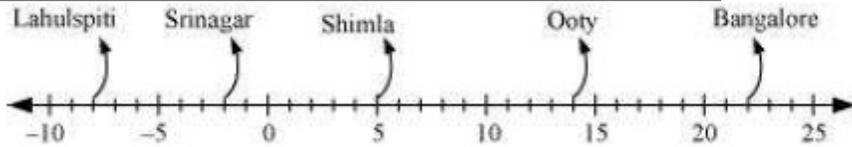
R.H.S. = $[18 \times 7] + [18 \times (-3)] = 126 + (-54) = 72$



Hence,

(b) L.H.S. = $(-21) \times [(-4) + (-6)] = (-21) \times [-4 - 6] = (-21) \times [-10] = 210$

R.H.S. = $[(-21) \times (-4)] + [(-21) \times (-6)] = 84 + 126 = 210$



Hence,

Question 3:

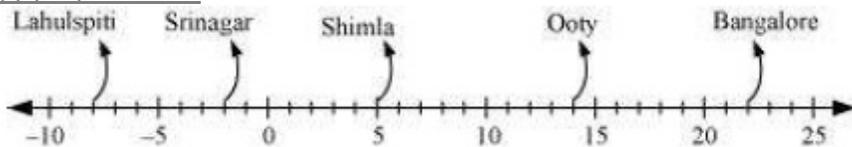
(i) For any integer a, what is $(-1) \times a$ equal to?

(ii) Determine the integer whose product with (-1) is

(a) -22 (b) 37 (c) 0

Answer:

(i) $(-1) \times a = -a$



Question 4:

Starting from $(-1) \times 5$, write various products showing some pattern to show $(-1) \times (-1) = 1$.

Answer:

$-1 \times 5 = -5$

$-1 \times 4 = -4 = -5 + 1$

$-1 \times 3 = -3 = -4 + 1$

$-1 \times 2 = -2 = -3 + 1$

$-1 \times 1 = -1 = -2 + 1$

$-1 \times 0 = 0 = -1 + 1$

Therefore, $-1 \times (-1) = 0 + 1 = 1$

Question 5:

Find the product, using suitable properties:

(a) $26 \times (-48) + (-48) \times (-36)$ (b) $8 \times 53 \times (-125)$

(c) $15 \times (-25) \times (-4) \times (-10)$ (d) $(-41) \times 102$

(e) $625 \times (-35) + (-625) \times 65$ (f) $7 \times (50 - 2)$

(g) $(-17) \times (-29)$ (h) $(-57) \times (-19) + 57$

Answer:

(a) $26 \times (-48) + (-48) \times (-36)$

$= (-48) \times 26 + (-48) \times (-36)$ ($b \times a = a \times b$)

$= (-48) [26 - 36]$ ($a \times b + a \times c = a(b + c)$)

$= (-48) \times (-10) = 480$

(b) $8 \times 53 \times (-125) = 8 \times [53 \times (-125)]$

$= 8 \times [(-125) \times 53]$ ($b \times a = a \times b$)

$= [8 \times (-125)] \times 53$ ($a \times (b \times c) = (a \times b) \times c$)

$= [-1000] \times 53 = -53000$

(c) $15 \times (-25) \times (-4) \times (-10)$

$= 15 \times [(-25) \times (-4)] \times (-10)$

$$= 15 \times [100] \times (-10)$$
$$= 15 \times (-1000) = -15000$$

$$(d) (-41) \times 102$$
$$= (-41) \times (100 + 2)$$
$$= (-41) \times 100 + (-41) \times 2 \quad a \times (b + c) = (a \times b) + (a \times c)$$
$$= -4100 - 82 = -4182$$

$$(e) 625 \times (-35) + (-625) \times 65$$
$$= 625 \times [(-35) + (-65)] \quad a \times (b + c) = a \times (b + c)$$
$$= 625 \times [-100] = -62500$$

$$(f) 7 \times (50 - 2)$$
$$= (7 \times 50) - (7 \times 2) \quad a \times (b - c) = (a \times b) - (a \times c)$$
$$= 350 - 14$$
$$= 336$$

$$(g) (-17) \times (-29)$$
$$= (-17) \times [-30 + 1]$$
$$= [(-17) \times (-30)] + [(-17) \times 1] \quad a \times (b + c) = (a \times b) + (a \times c)$$
$$= [510] + [-17] = 493$$

$$(h) (-57) \times (-19) + 57$$
$$= 57 \times 19 + 57 \times 1$$
$$= 57 [19 + 1] \quad a \times (b + c) = a \times (b + c)$$
$$= 57 \times 20 = 1140$$

Question 6:

A certain freezing process requires that room temperature be lowered from 40°C at the rate of 5°C every hour. What will be the room temperature 10 hours after the process begins?

Answer:

Initial temperature = 40°C

Change in temperature per hour = -5°C

Change in temperature after 10 hours = $(-5) \times 10 = -50^\circ\text{C}$

Final temperature = $40^\circ\text{C} + (-50^\circ\text{C}) = -10^\circ\text{C}$

Question 7:

In a class test containing 10 questions, 5 marks are awarded for every correct answer and (-2) marks are awarded for every incorrect answer and 0 for questions not attempted.

(i) Mohan gets four correct and six incorrect answers. What is his score?

(ii) Reshma gets five correct answers and five incorrect answers, what is her score?

(iii) Heena gets two correct and five incorrect answers out of seven questions she attempts. What is her score?

Answer:

(i) Marks given for 1 correct answer = 5

Marks given for 4 correct answers = $5 \times 4 = 20$

Marks given for 1 wrong answer = -2

Marks given for 6 wrong answers = $-2 \times 6 = -12$

Score obtained by Mohan = $20 - 12 = 8$

(ii) Marks given for 1 correct answer = 5

Marks given for 5 correct answers = $5 \times 5 = 25$

Marks given for 1 wrong answer = -2

Marks given for 5 wrong answers = $-2 \times 5 = -10$

Score obtained by Reshma = $25 - 10 = 15$

(iii) Similarly,

Marks given for 2 correct answers = $5 \times 2 = 10$

Marks given for 5 wrong answers = $-2 \times 5 = -10$

Score obtained by Heena = $10 - 10 = 0$

Question 8:

A cement company earns a profit of Rs 8 per bag of white cement sold and a loss of Rs 5 per bag of grey cement sold.

(a) The company sells 3,000 bags of white cement and 5,000 bags of grey cement in a month. What is its profit or

loss?

(b) What is the number of white cement bags it must sell to have neither profit nor loss, if the number of grey bags sold is 6,400 bags.

Answer:

Profit is denoted by a positive integer and loss is denoted by a negative integer.

(a) Profit earned while selling 1 bag of white cement = Rs 8

Profit earned while selling 3000 bags of white cement = 8×3000
= 24000

Loss incurred while selling 1 bag of grey cement = -Rs 5

Loss incurred while selling 5000 bags of grey cement = -5×5000
= -25000

Total profit/loss earned = Profit + Loss

= $24000 + (-25000) = -1000$

Therefore, a loss of Rs 1000 will be incurred by the company.

(b) Loss incurred while selling 1 bag of grey cement = -Rs 5

Loss incurred while selling 6400 bags of grey cement = $(-5) \times 6400$
= -32000

Let the number of bags of white cement to be sold be x .

Profit earned while selling 1 bag of white cement = Rs 8

Profit earned while selling x bags of white cement = $x \times 8$
= $8x$

In condition of no profit no loss,

Profit earned + Loss incurred = 0

$8x + (-32000) = 0$

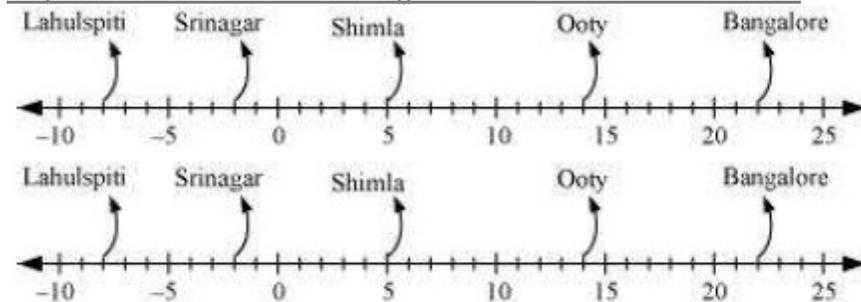
$8x = 32000$

$x = 4000$

Therefore, 4000 bags of white cement must be sold.

Question 9:

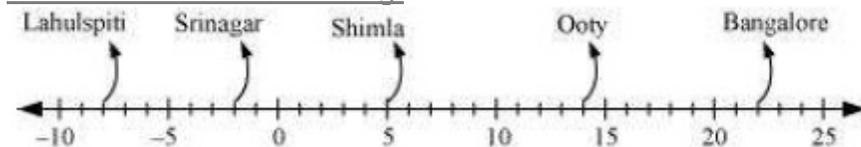
Replace the blank with an integer to make it a true statement.



Exercise 1.4

Question 1:

Evaluate each of the following:



Answer:

(a) $(-30) \div 10 = -3$

(b) $50 \div (-5) = -10$

(c) $(-36) \div (-9) = 4$

(d) $(-49) \div 49 = -1$

(e) $13 \div [-2 + 1] = 13 \div [-1] = -13$

(f) $0 \div (-12) = 0$

(g) $(-31) \div [(-30) + (-1)] = (-31) \div (-31) = 1$

(h) $[(-36) \div 12] \div 3 = [-3] \div 3 = -1$

(i) $[-6 + 5] \div [-2 + 1] = (-1) \div (-1) = 1$

Question 2:

Verify that $a \div (b + c) \neq (a \div b) + (a \div c)$ for each of the following values of a, b and c.

(a) $a = 12, b = -4, c = 2$

(b) $a = (-10), b = 1, c = 1$

Answer:

(a) $a = 12, b = -4, c = 2$

$a \div (b + c) = 12 \div (-4 + 2) = 12 \div (-2) = -6$

$(a \div b) + (a \div c) = [12 \div (-4)] + [12 \div 2] = -3 + 6 = 3$

Hence, $a \div (b + c) \neq (a \div b) + (a \div c)$

(b) $a = -10, b = 1, c = 1$

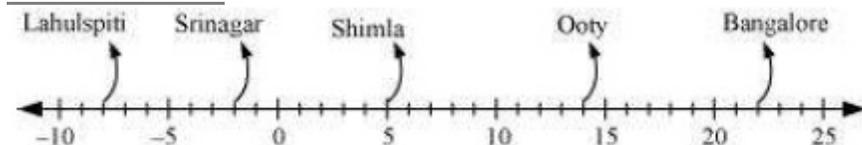
$a \div (b + c) = (-10) \div (1 + 1) = (-10) \div 2 = -5$

$(a \div b) + (a \div c) = [(-10) \div 1] + [(-10) \div 1] = -10 - 10 = -20$

Hence, $a \div (b + c) \neq (a \div b) + (a \div c)$

Question 3:

Fill in the blanks:



Question 4:

Write five pairs of integers (a, b) such $a \div b = -3$. One such pair is (6, -2) because $6 \div (-2) = (-3)$.

Answer:

(i) (3, -1)

Because $3 \div (-1) = -3$

(ii) (-3, 1)

Because $(-3) \div 1 = -3$

(iii) (9, -3)

Because $9 \div (-3) = -3$

(iv) (-9, 3)

Because $(-9) \div 3 = -3$

(v) (12, -4)

Because $12 \div (-4) = -3$

Question 5:

The temperature at 12 noon was 10°C above zero. If it decreases at the rate of 2°C per hour until midnight, at what time would the temperature be 8°C below zero? What would be the temperature at mid-night?

Answer:

Initial temperature i.e., at 12 noon = 10°C

Change in temperature per hour = -2°C

Temperature at 1:00 PM = $10^\circ\text{C} + (-2^\circ\text{C}) = 8^\circ\text{C}$

Temperature at 2:00 PM = $8^\circ\text{C} + (-2^\circ\text{C}) = 6^\circ\text{C}$

Temperature at 3:00 PM = $6^\circ\text{C} + (-2^\circ\text{C}) = 4^\circ\text{C}$

Temperature at 4:00 PM = $4^\circ\text{C} + (-2^\circ\text{C}) = 2^\circ\text{C}$

Temperature at 5:00 PM = $2^\circ\text{C} + (-2^\circ\text{C}) = 0^\circ\text{C}$

Temperature at 6:00 PM = $0^\circ\text{C} + (-2^\circ\text{C}) = -2^\circ\text{C}$

Temperature at 7:00 PM = $-2^\circ\text{C} + (-2^\circ\text{C}) = -4^\circ\text{C}$

Temperature at 8:00 PM = $-4^\circ\text{C} + (-2^\circ\text{C}) = -6^\circ\text{C}$

Temperature at 9:00 PM = $-6^\circ\text{C} + (-2^\circ\text{C}) = -8^\circ\text{C}$

Therefore, the temperature will be 8°C below zero at 9:00 PM.

It will take 12 hours to be midnight (i.e., 12:00 AM) after 12:00 noon.

Change in temperature in 12 hours = $-2^\circ\text{C} \times 12 = -24^\circ\text{C}$

At midnight, the temperature will be = $10 + (-24)$
= -14°C

Therefore, the temperature at midnight will be 14°C below 0.

Question 6:

In a class test (+ 3) marks are given for every correct answer and (-2) marks are given for every incorrect answer and no marks for not attempting any question. (i) Radhika scored 20 marks. If she has got 12 correct answers, how many questions has she attempted incorrectly? (ii) Mohini scores - 5 marks in this test, though she has got 7 correct answers. How many questions has she attempted incorrectly? (iii) Rakesh scores 18 marks by attempting 16 questions. How many questions has he attempted correctly and how many has he attempted incorrectly?

Answer:

Marks obtained for 1 right answer = +3

Marks obtained for 1 wrong answer = -2

(i) Marks scored by Radhika = 20

Marks obtained for 12 correct answers = $12 \times 3 = 36$

Marks obtained for incorrect answers = Total score - Marks obtained for 12 correct answers
= $20 - 36 = -16$

Marks obtained for 1 wrong answer = -2

Thus, number of incorrect answers = $(-16) \div (-2) = 8$

Therefore, she attempted 8 questions wrongly.

(ii) Marks scored by Mohini = -5

Marks obtained for 7 correct answers = $7 \times 3 = 21$

Marks obtained for incorrect answers = Total score - Marks obtained for 7 correct answers
= $-5 - 21 = -26$

Marks obtained for 1 wrong answer = -2

Thus, number of incorrect answers = $(-26) \div (-2) = 13$

Therefore, she attempted 13 questions wrongly.

(iii) Total marks scored by Rakesh = 18

Number of questions attempted = 16

(Number of correct answers)(3) + (Number of incorrect answers)(-2) = 18

\Rightarrow (Number of correct answers)(3) + (16 - Number of correct answers)(-2) = 18

\Rightarrow (Number of correct answers)(3) + -32 + 2(Number of correct answers) = 18

\Rightarrow (Number of correct answers)(5) + -32 = 18

\Rightarrow (Number of correct answers)(5) = 18 + 32 = 50

\Rightarrow Number of correct answers = 10

\therefore Number of incorrect answers = $16 - 10 = 6$

\therefore Total number of correct and incorrect answers scored by Rakesh is 10 and 6 respectively.

Question 7:

An elevator descends into a mine shaft at the rate of 6 m/min. If the descent starts from 10 m above the ground level, how long will it take to reach - 350 m.

Answer:

Distance descended is denoted by a negative integer.

Initial height = +10 m

Final depth = -350 m

Total distance to be descended by the elevator = $(-350) - (+10) = -360$ m

Time taken by the elevator to descend -6 m = 1 min

Thus, time taken by the elevator to descend -360 m = $(-360) \div (-6)$
= 60 minutes = 1 hour

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Exercise 3.1

Question 1:

Find the range of heights of any ten students of your class.

Answer:

Let the heights (in cm) of 10 students of our class be

125, 127, 132, 133, 134, 136, 138, 141, 144, 146

Highest value among these observations = 146

Lowest value among these observations = 125

Range = Highest value – Lowest value

= (146 – 125) cm

= 21 cm

Question 2:

Organise the following marks in a class assessment, in a tabular form.

4, 6, 7, 5, 3, 5, 4, 5, 2, 6, 2, 5, 1, 9, 6, 5, 8, 4, 6, 7

(i) Which number is the highest?

(ii) Which number is the lowest?

(iii) What is the range of the data?

(iv) Find the arithmetic mean.

Answer:

Marks	Tally marks
1	
2	
3	
4	

7	
8	
9	

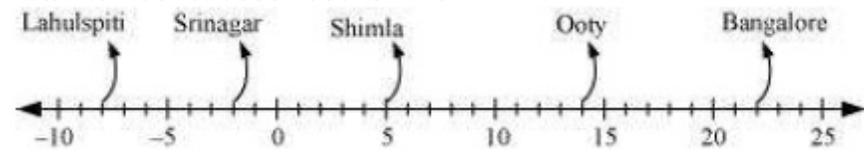
(i) Highest number = 9

(ii) Lowest number = 1

(iii) Range = $(9 - 1) = 8$

(iv) Sum of all the observations = $4 + 6 + 7 + 5 + 3 + 5 + 4 + 5 + 2 + 6 + 2 + 5 + 1 + 9 + 6 + 5 + 8 + 4 + 6 + 7 = 100$

Total number of observations = 20

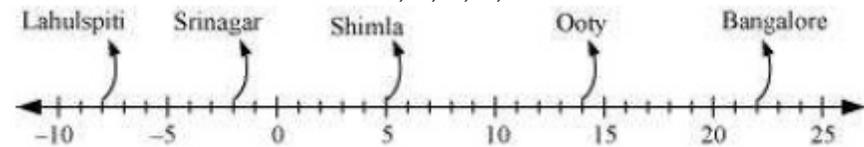


Question 3:

Find the mean of the first five whole numbers.

Answer:

First five whole numbers are 0, 1, 2, 3, and 4.



Therefore, the mean of first five whole numbers is 2.

Question 4:

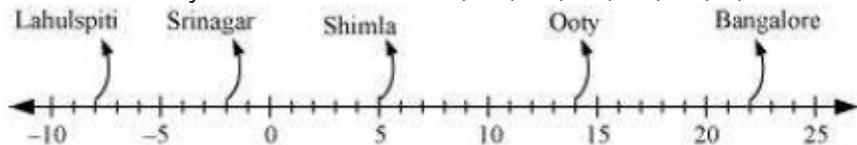
A cricketer scores the following runs in eight innings:

58, 76, 40, 35, 46, 45, 0, 100

Find the mean score.

Answer:

Runs scored by the cricketer are 58, 76, 40, 35, 46, 45, 0, and 100.



Therefore, mean score is 50.

Question 5:

Following table shows the points of each player scored in four games:

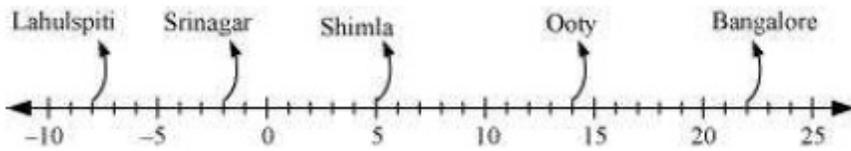
Player	Game 1	Game 2	Game 3
A	14	16	10
B	0	8	6

C	8	11	Di
---	---	----	----

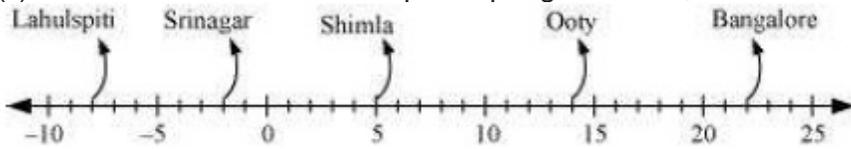
Now answer the following questions:

- Find the mean to determine A's average number of points scored per game.
- To find the mean number of points per game for C, would you divide the total points by 3 or by 4? Why?
- B played in all the four games. How would you find the mean?
- Who is the best performer?

Answer:



- To find the mean number of points per game for C, we will divide the total points by 3 because C played 3 games.



- The best performer will have the greatest average among all. Now we can observe that the average of A is 12.5 which is more than that of B and C. Therefore, A is the best performer among these three.

Question 6:

The marks (out of 100) obtained by a group of students in a science test are 85, 76, 90, 85, 39, 48, 56, 95, 81 and 75. Find the:

- Highest and the lowest marks obtained by the students.
- Range of the marks obtained.
- Mean marks obtained by the group.

Answer:

The marks obtained by the group of students in a science test can be arranged in an ascending order as follows.

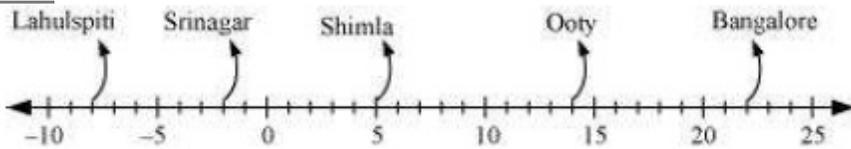
39, 48, 56, 75, 76, 81, 85, 85, 90, 95

(i) Highest marks = 95

Lowest marks = 39

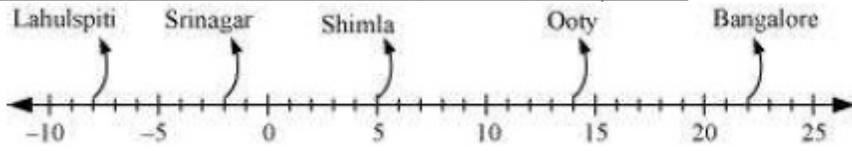
(ii) Range = 95 - 39

= 56



Question 7:

The enrolment in a school during six consecutive years was as follow: 1555, 1670, 1750, 2013, 2540, 2820
Find the mean enrolment of the school for this period.



Question 8:

The rainfall (in mm) in a city on 7 days of a certain week was recorded as follows:

Days Rain	fall (in mm)
Monday	0.0
Tuesday	12.2

Wednesday	2.1
Thursday	0.0
Friday	20.5
Saturday	5.5
Sunday	1.0

(i) Find the range of the rainfall in the above data.

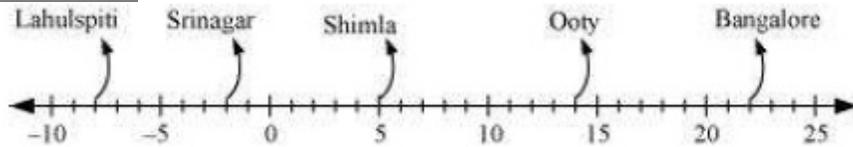
(ii) Find the mean rainfall for the week.

(iii) On how many days was the rainfall less than the mean rainfall.

Answer:

(i) Range = (20.5 – 0.0) mm

= 20.5 mm



(iii) For 5 days (i.e., Monday, Wednesday, Thursday, Saturday, Sunday), the rainfall was less than the average rainfall.

Question 9:

The heights of 10 girls were measured in cm and the results are as follows:

135, 150, 139, 128, 151, 132, 146, 149, 143, 141

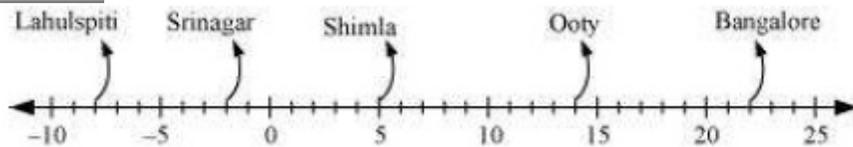
- (i) What is the height of the tallest girl?
- (ii) What is the height of the shortest girl?
- (iii) What is the range of the data?
- (iv) What is the mean height of the girls?
- (v) How many girls have heights more than the mean height.

Answer:

Arranging the heights of 10 girls in an ascending order,

128, 132, 135, 139, 141, 143, 146, 149, 150, 151

- (i) Height of the tallest girl = 151 cm
- (ii) Height of the shortest girl = 128 cm
- (iii) Range = (151 - 128) cm
= 23 cm



(v) The heights of 5 girls are greater than the mean height (i.e., 141.4 cm) and these heights are 143, 146, 149, 150, and 151 cm.

Exercise 3.2

Question 1:

The scores in mathematics test (out of 25) of 15 students is as follows:

19, 25, 23, 20, 9, 20, 15, 10, 5, 16, 25, 20, 24, 12, 20

Find the mode and median of this data. Are they same?

Answer:

Scores of 15 students in mathematics test are

19, 25, 23, 20, 9, 20, 15, 10, 5, 16, 25, 20, 24, 12, 20

Arranging these scores in an ascending order,

5, 9, 10, 12, 15, 16, 19, 20, 20, 20, 20, 23, 24, 25, 25

Mode of a given data is that value of observation which occurs for the most number of times. Median of a given data is the middle observation when the data is arranged in an ascending or descending order.

As there are 15 terms in the given data, therefore, the median of this data will be the 8th observation.

Hence, median = 20

Also, it can be observed that 20 occurs 4 times (i.e., maximum number of times).

Therefore, mode of this data = 20

Yes, both are same.

Question 2:

The run scored in a cricket match by 11 players is as follows:

6, 15, 120, 50, 100, 80, 10, 15, 8, 10, 15

Find the mean, mode and median of this data. Are the three same?

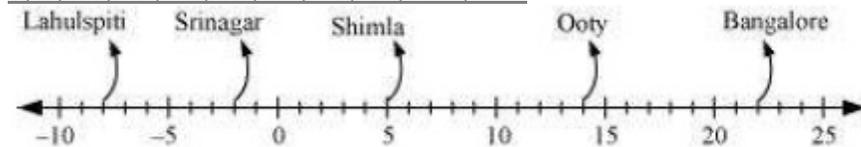
Answer:

The runs scored by 11 players are

6, 15, 120, 50, 100, 80, 10, 15, 8, 10, 15

Arranging these scores in an ascending order,

6, 8, 10, 10, 15, 15, 15, 50, 80, 100, 120



Mode of a given data is that value of observation which occurs for the most number of times and the median of the given data is the middle observation when the data is arranged in an ascending or descending order.

As there are 11 terms in the given data, therefore, the median of this data will be the 6th observation.

Median = 15

Also, it can be observed that 15 occurs 3 times (i.e., maximum number of times).

Therefore, mode of this data = 15

No, these three are not same.

Question 3:

The weights (in kg.) of 15 students of a class are:

38, 42, 35, 37, 45, 50, 32, 43, 43, 40, 36, 38, 43, 38, 47

(i) Find the mode and median of this data.

(ii) Is there more than one mode?

Answer:

The weights of 15 students are

38, 42, 35, 37, 45, 50, 32, 43, 43, 40, 36, 38, 43, 38, 47

Arranging these weights in ascending order,

32, 35, 36, 37, 38, 38, 38, 40, 42, 43, 43, 43, 45, 47, 50

(i)

Mode of a given data is that value of observation which occurs for the most number of times and the median of the given data is the middle observation when the data is arranged in an ascending or descending order.

As there are 15 terms in the given data, therefore, the median of this data will be the 8th observation.

Hence, median = 40

Also, it can be observed that 38 and 43 both occur 3 times (i.e., maximum number of times).

Therefore, mode of this data = 38 and 43

(ii)

Yes, there are 2 modes for the given data.

Question 4:

Find the mode and median of the data: 13, 16, 12, 14, 19, 12, 14, 13, 14

Answer:

The given data is

13, 16, 12, 14, 19, 12, 14, 13, 14

Arranging the given data in an ascending order,

12, 12, 13, 13, 14, 14, 14, 16, 19

Mode of a given data is that value of observation which occurs for the most number of times and the median of the given data is the middle observation when the data is arranged in an ascending or descending order.

As there are 9 terms in the given data, therefore, the median of this data will be the 5th observation.

Hence, median = 14

Also, it can be observed that 14 occurs 3 times (i.e., maximum number of times).

Therefore, mode of this data = 14

Question 5:

Tell whether the statement is true or false:

(i) The mode is always one of the numbers in a data.

(ii) The mean is one of the numbers in a data.

(iii) The median is always one of the numbers in a data.

(iv) The data 6, 4, 3, 8, 9, 12, 13, 9 has mean 9.

Answer:

(i) True

Mode of a given data is that value of observation which occurs for the most number of times. Therefore, it is one of the observations given in the data.

(ii) False

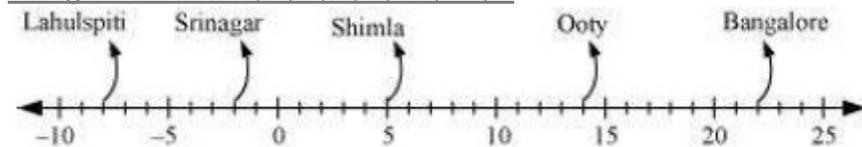
Mean may or may not be one of the numbers in the data.

(iii) True

The median of the given data is the middle observation when the data is arranged in an ascending or descending order.

(iv) False

The given data is 6, 4, 3, 8, 9, 12, 13, 9



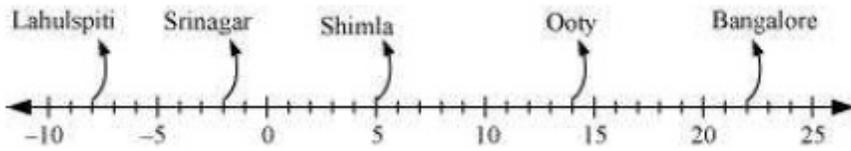
Exercise 3.3

Question 1:

Use the bar graph (see the given figure) to answer the following questions.

(a) Which is the most popular pet?

(b) How many children have dog as a pet?

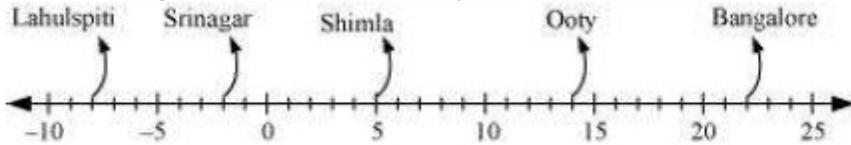


Answer:

- (a) Since the bar representing cats is the tallest, cat is the most popular pet.
 (b) The number of children having dog as a pet are 8.

Question 2:

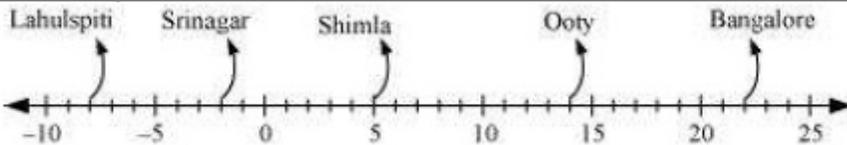
Read the bar graph (see the given figure) which shows the number of books sold by a bookstore during five consecutive years and answer the questions that follow:



- (i) About how many books were sold in 1989? 1990? 1992?
 (ii) In which year were about 475 books sold? About 225 books sold?
 (iii) In which years were fewer than 250 books sold?
 (iv) Can you explain how you would estimate the number of books sold in 1989?

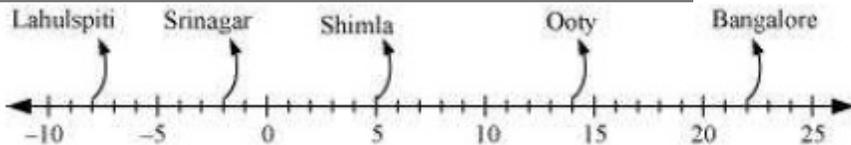
Answer:

- (i) In 1989, 175 books were sold. In 1990, 475 books were sold. In 1992, 225 books were sold.
 (ii) From the graph, it can be concluded that 475 books were sold in the year 1990 and 225 books were sold in the year 1992.
 (iii) From the graph, it can be concluded that in the years 1989 and 1992, the number of books sold were less than 250.
 (iv) From the graph, it can be concluded that the number of books sold in the year 1989 is about 1



and part of 1 cm.

We know that the scale is taken as 1 cm = 100 books.



Therefore, about 175 books were sold in the year 1989.

Question 3:

Number of children in six different classes are given below. Represent the data on a bar graph.

Class	Fifth	Sixth	Seventh
Number of children	135	120	95

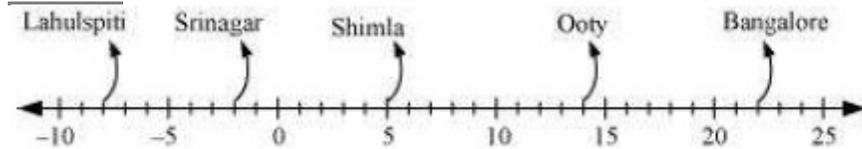
(a) How would you choose a scale?

(b) Answer the following questions:

(i) Which class has the maximum number of children? And the minimum?

(ii) Find the ratio of students of class sixth to the students of class eight.

Answer:



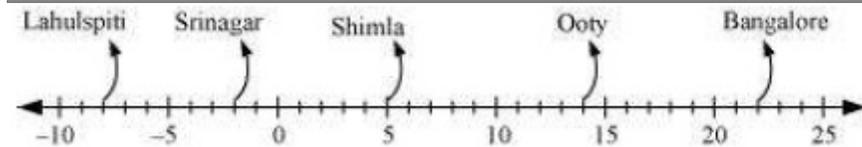
(a) We will choose a scale as 1 unit = 10 children because we can represent a more clear difference between the number of students of class 7th and that of class 9th by this scale.

(b)

(i) Since the bar representing the number of children for class fifth is the tallest, there are maximum number of children in class fifth. Similarly, since the bar representing the number of children for class tenth is the smallest, there are minimum number of children in class tenth.

(ii) The number of students in class sixth is 120 and the number of students in class eighth is 100.

Therefore, the ratio between the number of students of class sixth and the number of



Question 4:

The performance of students in 1st Term and 2nd Term is given. Draw a double bar graph choosing appropriate scale and answer the following:

Subject	English	Hindi
1st Term (M.M. 100)	67	72
2nd Term (M.M. 100)	70	65

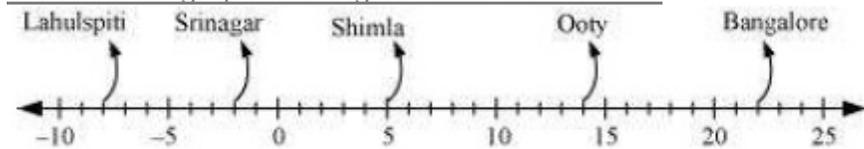
(i) In which subject, has the child improved his performance the most?

(ii) In which subject is the improvement the least?

(iii) Has the performance gone down in any subject?

Answer:

A double bar graph for the given data is as follows.



(i) There was a maximum increase in the marks obtained in Maths. Therefore, the child has improved his performance the most in Maths.

(ii) From the graph, it can be concluded that the improvement was the least in S. Science.

(iii) From the graph, it can be observed that the performance in Hindi has gone down.

Question 5:

Consider this data collected from a survey of a colony.

Favourite sport	Cricket	Basket Ball
Watching	1240	470
Participating	620	320

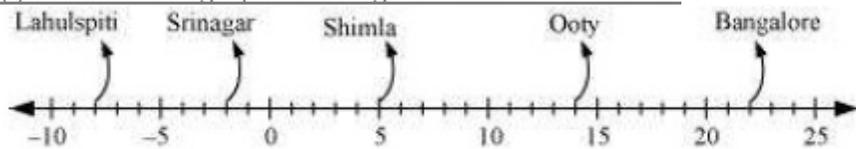
(i) Draw a double bar graph choosing an appropriate scale. What do you infer from the bar graph?

(ii) Which sport is most popular?

(iii) Which is more preferred, watching or participating in sports?

Answer:

(i) A double bar graph for the given data is as follows.



The double bar graph represents the number of people who like watching and participating in different sports. It can be observed that most of the people like watching and participating in cricket while the least number of people like watching and participating in athletics.

(ii) From the bar graph, it can be observed that the bar representing the number of people who like watching and participating in cricket is the tallest among all the bars. Hence, cricket is the most popular sport.

(iii) The bars representing watching sport are longer than the bars representing participating in sport. Hence, watching different types of sports is more preferred than participating in the sports.

Question 6:

Take the data giving the minimum and the maximum temperature of various cities given in the following table:

Temperatures of the cities as on 20.6.2006

City	Max.
Ahmedabad	38 °C
Amritsar	37 °C
Banglore	28 °C
Chennai	36 °C

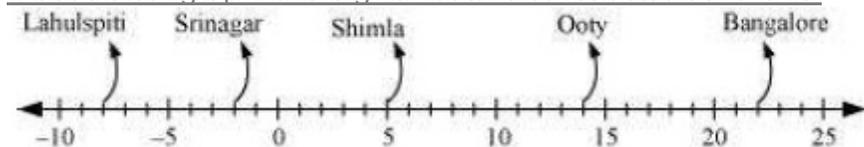
Delhi	38 °C
Jaipur	39 °C
Jammu	41 °C
Mumbai	32 °C

Plot a double bar graph using the data and answer the following:

- Which city has the largest difference in the minimum and maximum temperature on the given date?
- Which is the hottest city and which is the coldest city?
- Name two cities where maximum temperature of one was less than the minimum temperature of the other.
- Name the city which has the least difference between its minimum and the maximum temperature.

Answer:

A double bar graph for the given data is constructed as follows.



(i) From the graph, it can be concluded that Jammu has the largest difference in its minimum and maximum temperatures on 20.6.2006.

(ii) From the graph, it can be concluded that Jammu is the hottest city and Bangalore is the coldest city.

(iii) Bangalore and Jaipur, Bangalore and Ahmedabad

For Bangalore, the maximum temperature was 28°C, while minimum temperature of both cities, Ahmedabad and Jaipur, was 29°C.

(iv) From the graph, it can be concluded that the city which has the least difference between its minimum and maximum temperatures is Mumbai.

Exercise 3.4

Question 1:

Tell whether the following is certain to happen, impossible, can happen but not certain.

(i) You are older today than yesterday.

(ii) A tossed coin will land heads up.

(iii) A die when tossed shall land up with 8 on top.

(iv) The next traffic light seen will be green.

(v) Tomorrow will be a cloudy day.

Answer:

(i) Certain

(ii) Can happen but not certain

iii. Impossible as there are only six faces on a dice marked as 1, 2, 3, 4, 5, 6 on it.

(iv) Can happen but not certain

(v) Can happen but not certain

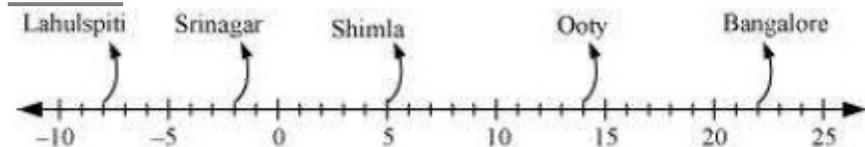
Question 2:

There are 6 marbles in a box with numbers from 1 to 6 marked on each of them.

(i) What is the probability of drawing a marble with number 2?

(ii) What is the probability of drawing a marble with number 5?

Answer:

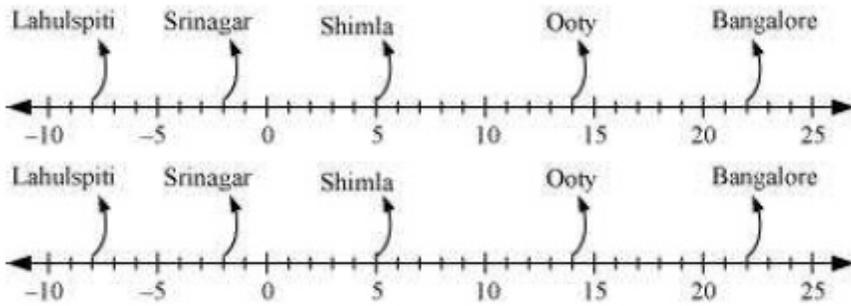


Question 3:

A coin is flipped to decide which team starts the game. What is the probability that your team will start?

Answer:

A coin has two faces – Head and Tail. One team can opt either Head or Tail.

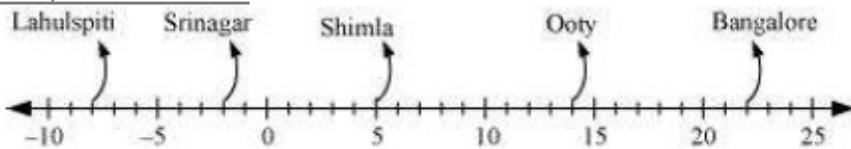


Question 4:

A box contains pairs of socks of two colours (black and white). I have picked out a white sock. I pick out one more with my eyes closed. What is the probability that it will make a pair?

Answer:

It can be observed that while closing the eyes, one can draw either a black sock or a white sock. Therefore, there are two possible cases.



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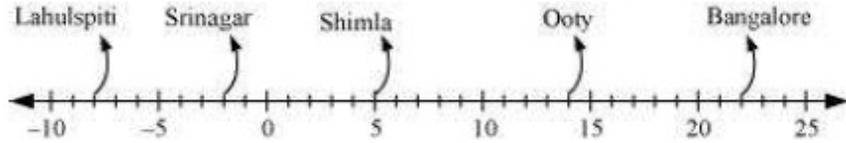
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Exercise 5.1

Question 1:

Find the complement of each of the following angles:

**Answer:**

The sum of the measures of complementary angles is 90° .

(i) 20°

$$\text{Complement} = 90^\circ - 20^\circ$$

$$= 70^\circ$$

(ii) 63°

$$\text{Complement} = 90^\circ - 63^\circ$$

$$= 27^\circ$$

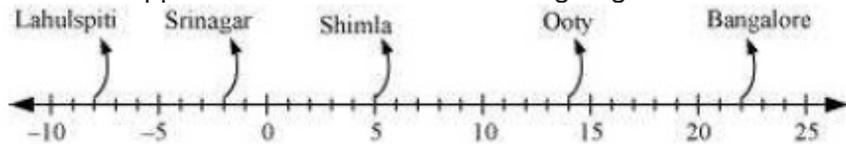
(iii) 57°

$$\text{Complement} = 90^\circ - 57^\circ$$

$$= 33^\circ$$

Question 2:

Find the supplement of each of the following angles:

**Answer:**

The sum of the measures of supplementary angles is 180° .

(i) 105°

$$\text{Supplement} = 180^\circ - 105^\circ$$

$$= 75^\circ$$

(ii) 87°

$$\text{Supplement} = 180^\circ - 87^\circ$$

$$= 93^\circ$$

(iii) 154°

$$\text{Supplement} = 180^\circ - 154^\circ$$

$$= 26^\circ$$

Question 3:

Identify which of the following pairs of angles are complementary and which are supplementary.

(i) 65° , 115° (ii) 63° , 27°

(iii) 112° , 68° (iv) 130° , 50°

(v) 45° , 45° (vi) 80° , 10°

Answer:

The sum of the measures of complementary angles is 90° and that of supplementary angles is 180° .

(i) 65° , 115°

Sum of the measures of these angles = $65^\circ + 115^\circ = 180^\circ$

\therefore These angles are supplementary angles.

(ii) 63° , 27°

Sum of the measures of these angles = $63^\circ + 27^\circ = 90^\circ$

\therefore These angles are complementary angles.

(iii) 112° , 68°

Sum of the measures of these angles = $112^\circ + 68^\circ = 180^\circ$

\therefore These angles are supplementary angles.

(iv) 130° , 50°

Sum of the measures of these angles = $130^\circ + 50^\circ = 180^\circ$

\therefore These angles are supplementary angles.

(v) 45° , 45°

Sum of the measures of these angles = $45^\circ + 45^\circ = 90^\circ$

\therefore These angles are complementary angles.

(vi) 80° , 10°

Sum of the measures of these angles = $80^\circ + 10^\circ = 90^\circ$

\therefore These angles are complementary angles.

Question 4:

Find the angle which is equal to its complement.

Answer:

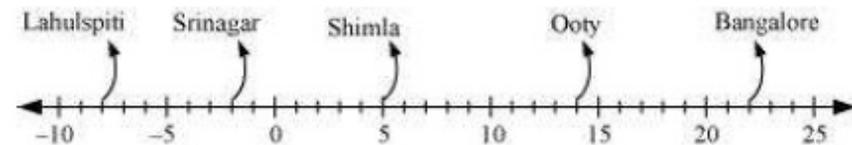
Let the angle be x .

Complement of this angle is also x .

The sum of the measures of a complementary angle pair is 90° .

$\therefore x + x = 90^\circ$

$2x = 90^\circ$



Question 5:

Find the angle which is equal to its supplement.

Answer:

Let the angle be x .

Supplement of this angle is also x .

The sum of the measures of a supplementary angle pair is 180° .

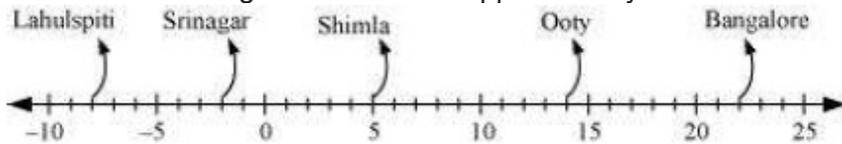
$$\therefore x + x = 180^\circ$$

$$2x = 180^\circ$$

$$x = 90^\circ$$

Question 6:

In the given figure, $\angle 1$ and $\angle 2$ are supplementary angles. If $\angle 1$ is decreased, what changes should take place in $\angle 2$ so that both the angles still remain supplementary.



Answer:

$\angle 1$ and $\angle 2$ are supplementary angles.

If $\angle 1$ is reduced, then $\angle 2$ should be increased by the same measure so that this angle pair remains supplementary.

Question 7:

Can two angles be supplementary if both of them are:

(i) Acute? (ii) Obtuse? (iii) Right?

Answer:

(i) No. Acute angle is always lesser than 90° . It can be observed that two angles, even of 89° , cannot add up to 180° . Therefore, two acute angles cannot be in a supplementary angle pair.

(ii) No. Obtuse angle is always greater than 90° . It can be observed that two angles, even of 91° , will always add up to more than 180° . Therefore, two obtuse angles cannot be in a supplementary angle pair.

(iii) Yes. Right angles are of 90° and $90^\circ + 90^\circ = 180^\circ$

Therefore, two right angles form a supplementary angle pair together.

Question 8:

An angle is greater than 45° . Is its complementary angle greater than 45° or equal to 45° or less than 45° ?

Answer:

Let A and B are two angles making a complementary angle pair and A is greater than 45° .

$$\underline{A + B = 90^\circ}$$

$$\underline{B = 90^\circ - A}$$

Therefore, B will be lesser than 45° .

Question 9:

In the adjoining figure:

(i) Is $\angle 1$ adjacent to $\angle 2$?

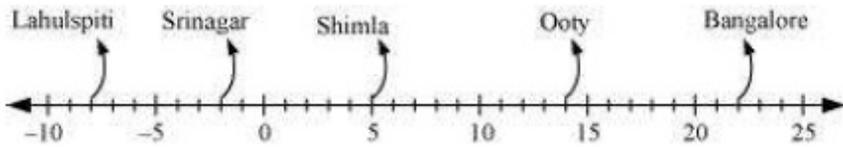
(ii) Is $\angle AOC$ adjacent to $\angle AOE$?

(iii) Do $\angle COE$ and $\angle EOD$ form a linear pair?

(iv) Are $\angle BOD$ and $\angle DOA$ supplementary?

(v) Is $\angle 1$ vertically opposite to $\angle 4$?

(vi) What is the vertically opposite angle of $\angle 5$?



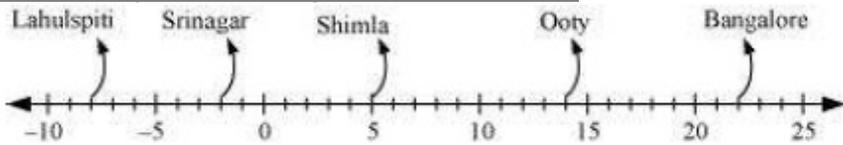
Answer:

- (i) Yes. Since they have a common vertex O and also a common arm OC. Also, their non-common arms, OA and OE, are on either side of the common arm.
- (ii) No. They have a common vertex O and also a common arm OA. However, their noncommon arms, OC and OE, are on the same side of the common arm. Therefore, these are not adjacent to each other.
- (iii) Yes. Since they have a common vertex O and a common arm OE. Also, their noncommon arms, OC and OD, are opposite rays.
- (iv) Yes. Since $\angle BOD$ and $\angle DOA$ have a common vertex O and their non-common arms are opposite to each other.
- (v) Yes. Since these are formed due to the intersection of two straight lines (AB and CD).
- (vi) $\angle COB$ is the vertically opposite angle of $\angle 5$ as these are formed due to the intersection of two straight lines, AB and CD.

Question 10:

Indicate which pairs of angles are:

- (i) Vertically opposite angles. (ii) Linear pairs.

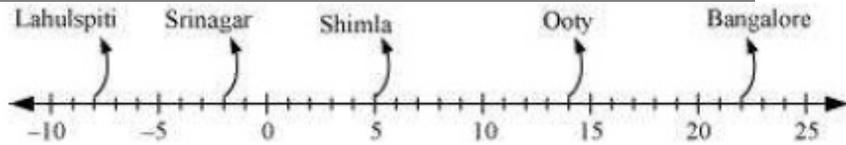


Answer:

- (i) $\angle 1$ and $\angle 4$, $\angle 5$ and $\angle 2 + \angle 3$ are vertically opposite angles as these are formed due to the intersection of two straight lines.
- (ii) $\angle 1$ and $\angle 5$, $\angle 5$ and $\angle 4$ as these have a common vertex and also have non-common arms opposite to each other.

Question 11:

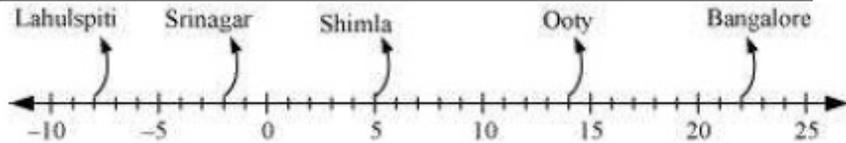
In the following figure, is $\angle 1$ adjacent to $\angle 2$? Give reasons.

**Answer:**

$\angle 1$ and $\angle 2$ are not adjacent angles because their vertex is not common.

Question 12:

Find the value of the angles x , y , and z in each of the following:

**Answer:**

(i) Since $\angle x$ and $\angle 55^\circ$ are vertically opposite angles,

$$\angle x = 55^\circ$$

$$\angle x + \angle y = 180^\circ \text{ (Linear pair)}$$

$$55^\circ + \angle y = 180^\circ$$

$$\angle y = 180^\circ - 55^\circ = 125^\circ$$

$$\angle y = \angle z \text{ (Vertically opposite angles)}$$

$$\angle z = 125^\circ$$

(ii) $\angle z = 40^\circ$ (Vertically opposite angles)

$$\angle y + \angle z = 180^\circ \text{ (Linear pair)}$$

$$\angle y = 180^\circ - 40^\circ = 140^\circ$$

$$40^\circ + \angle x + 25^\circ = 180^\circ \text{ (Angles on a straight line)}$$

$$65^\circ + \angle x = 180^\circ$$

$$\angle x = 180^\circ - 65^\circ = 115^\circ$$

Question 13:

Fill in the blanks:

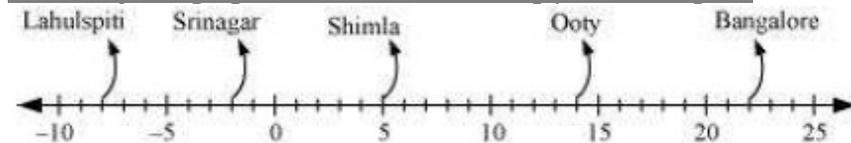
- (i) If two angles are complementary, then the sum of their measures is _____.
- (ii) If two angles are supplementary, then the sum of their measures is _____.
- (iii) Two angles forming a linear pair are _____.
- (iv) If two adjacent angles are supplementary, they form a _____.
- (v) If two lines intersect at a point, then the vertically opposite angles are always _____.
- (vi) If two lines intersect at a point, and if one pair of vertically opposite angles are acute angles, then the other pair of vertically opposite angles are _____.

Answer:

- (i) 90°
- (ii) 180°
- (iii) Supplementary
- (iv) Linear pair
- (v) Equal
- (vi) Obtuse angles

Question 14:

In the adjoining figure, name the following pairs of angles.



- (i) Obtuse vertically opposite angles
- (ii) Adjacent complementary angles
- (iii) Equal supplementary angles
- (iv) Unequal supplementary angles
- (v) Adjacent angles that do not form a linear pair

Answer:

- (i) $\angle AOD$, $\angle BOC$
- (ii) $\angle EOA$, $\angle AOB$
- (iii) $\angle EOB$, $\angle EOD$
- (iv) $\angle EOA$, $\angle EOC$
- (v) $\angle AOB$ and $\angle AOE$, $\angle AOE$ and $\angle EOD$, $\angle EOD$ and $\angle COD$

Exercise 5.2

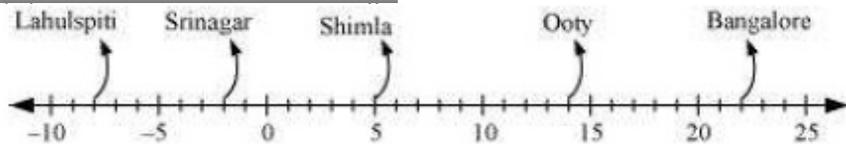
Question 1:

State the property that is used in each of the following statements?

(i) If $a \parallel b$, then $\angle 1 = \angle 5$

(ii) If $\angle 4 = \angle 6$, then $a \parallel b$

(iii) If $\angle 4 + \angle 5 = 180^\circ$, then $a \parallel b$



Answer:

(i) Corresponding angles property

(ii) Alternate interior angles property

(iii) Interior angles on the same side of transversal are supplementary.

Question 2:

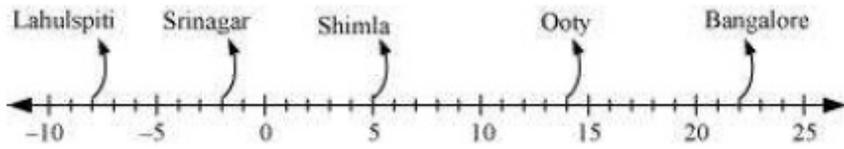
In the adjoining figure, identify

(i) The pairs of corresponding angles

(ii) The pairs of alternate interior angles

(iii) The pairs of interior angles on the same side of the transversal

(iv) The vertically opposite angles



Answer:

(i) $\angle 1$ and $\angle 5$, $\angle 2$ and $\angle 6$, $\angle 3$ and $\angle 7$, $\angle 4$ and $\angle 8$

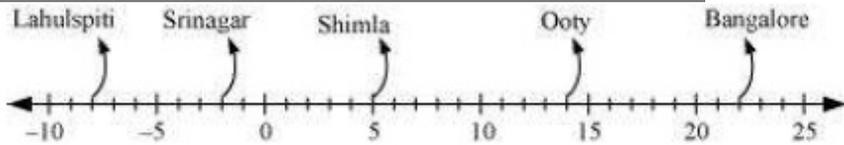
(ii) $\angle 2$ and $\angle 8$, $\angle 3$ and $\angle 5$

(iii) $\angle 2$ and $\angle 5$, $\angle 3$ and $\angle 8$

(iv) $\angle 1$ and $\angle 3$, $\angle 2$ and $\angle 4$, $\angle 5$ and $\angle 7$, $\angle 6$ and $\angle 8$

Question 3:

In the adjoining figure, $p \parallel q$. Find the unknown angles.



Answer:

$\angle d = 125^\circ$ (Corresponding angles)

$\angle e = 180^\circ - 125^\circ = 55^\circ$ (Linear pair)

$\angle f = \angle e = 55^\circ$ (Vertically opposite angles)

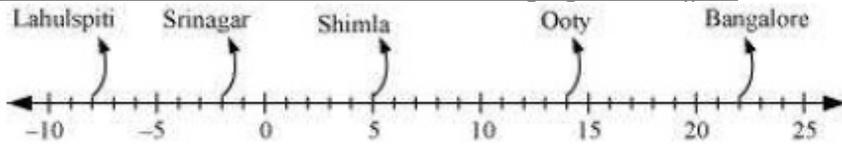
$\angle c = \angle f = 55^\circ$ (Corresponding angles)

$\angle a = \angle e = 55^\circ$ (Corresponding angles)

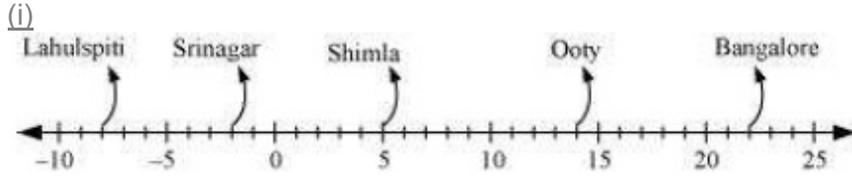
$\angle b = \angle d = 125^\circ$ (Vertically opposite angles)

Question 4:

Find the value of x in each of the following figures if $l \parallel m$.



Answer:

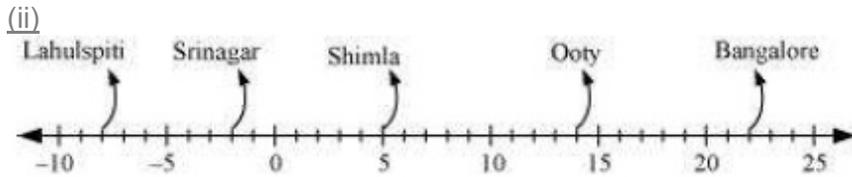


$\angle y = 110^\circ$ (Corresponding angles)

$\angle x + \angle y = 180^\circ$ (Linear pair)

$\angle y = 180^\circ - 110^\circ$

$= 70^\circ$



$\angle x = 100^\circ$ (Corresponding angles)

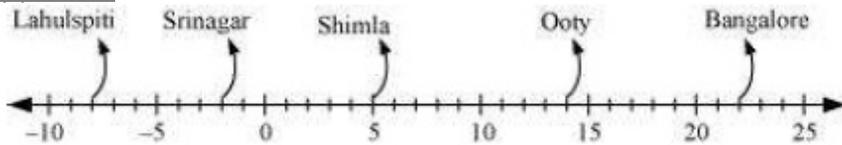
Question 5:

In the given figure, the arms of two angles are parallel.

If $\angle ABC = 70^\circ$, then find

(i) $\angle DGC$

(ii) $\angle DEF$



Answer:

(i) Consider that $AB \parallel DG$ and a transversal line BC is intersecting them.

$\angle DGC = \angle ABC$ (Corresponding angles)

$\angle DGC = 70^\circ$

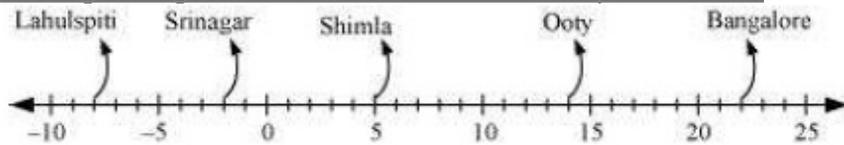
(ii) Consider that $BC \parallel EF$ and a transversal line DE is intersecting them.

$\angle DEF = \angle DGC$ (Corresponding angles)

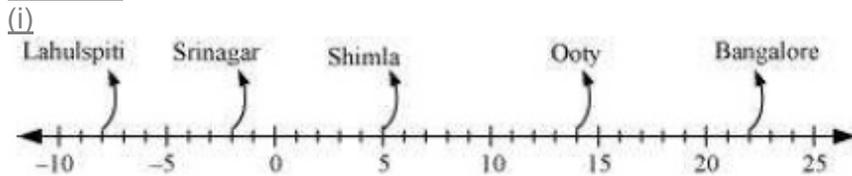
$\angle DEF = 70^\circ$

Question 6:

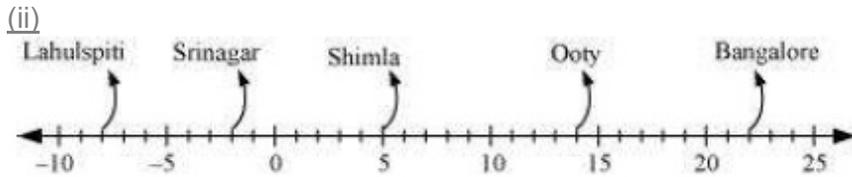
In the given figures below, decide whether l is parallel to m .



Answer:



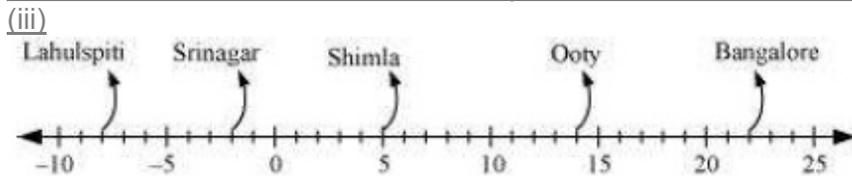
Consider two lines, l and m , and a transversal line n which is intersecting them. Sum of the interior angles on the same side of transversal = $126^\circ + 44^\circ = 170^\circ$. As the sum of interior angles on the same side of transversal is not 180° , therefore, l is not parallel to m .



$x + 75^\circ = 180^\circ$ (Linear pair on line l)

$x = 180^\circ - 75^\circ = 105^\circ$

For l and m to be parallel to each other, corresponding angles ($\angle ABC$ and $\angle x$) should be equal. However, here their measures are 75° and 105° respectively. Hence, these lines are not parallel to each other.

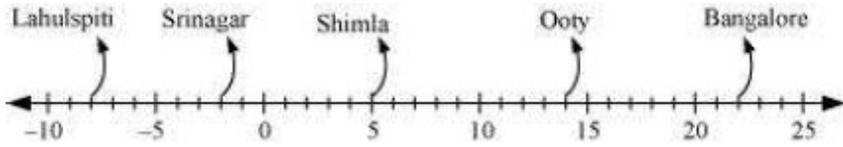


$\angle x + 123^\circ = 180^\circ$ (Linear pair)

$\angle x = 180^\circ - 123^\circ = 57^\circ$

For l and m to be parallel to each other, corresponding angles ($\angle ABC$ and $\angle x$) should be equal. Here, their measures are 57° and 57° respectively. Hence, these lines are parallel to each other.

iv.



$98 + \angle x = 180^\circ$ (Linear pair)

$\angle x = 82^\circ$

For l and m to be parallel to each other, corresponding angles ($\angle ABC$ and $\angle x$) should be equal. However, here their mea

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sures are 72° and 82° respectively. Hence, these lines are not parallel to each other.

Exercise 7.1

Question 1:

Complete the following statements:

- (a) Two line segments are congruent if _____.
- (b) Among two congruent angles, one has a measure of 70° ; the measure of the other angle is _____.
- (c) When we write $\angle A = \angle B$, we actually mean _____.

Answer:

- (a) They have the same length
- (b) 70°
- (c) $m \angle A = m \angle B$

Question 2:

Give any two real-life examples for congruent shapes.

Answer:

- (i) Sheets of same letter pad
- (ii) Biscuits in the same packet

Question 3:

If $\triangle ABC \cong \triangle FED$ under the correspondence $ABC \leftrightarrow FED$, write all the Corresponding congruent parts of the triangles.

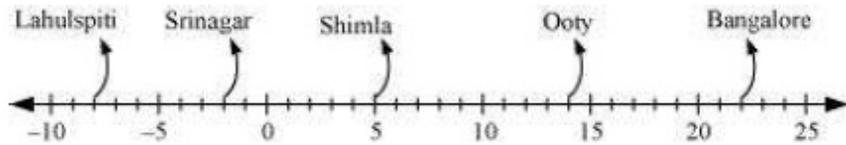
Answer:

If these triangles are congruent, then the corresponding angles and sides will be equal to each other.

$$\angle A \leftrightarrow \angle F$$

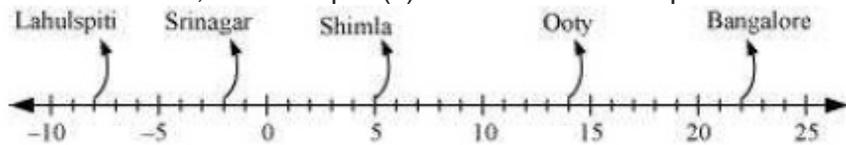
$$\angle B \leftrightarrow \angle E$$

$\angle C \leftrightarrow \angle D$



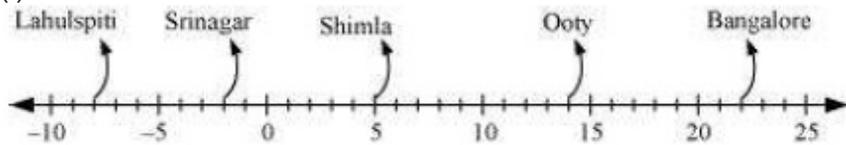
Question 4:

If $\triangle DEF \cong \triangle BCA$, write the part(s) of $\triangle BCA$ that correspond to



Answer:

(i) $\angle C$



Question 1:

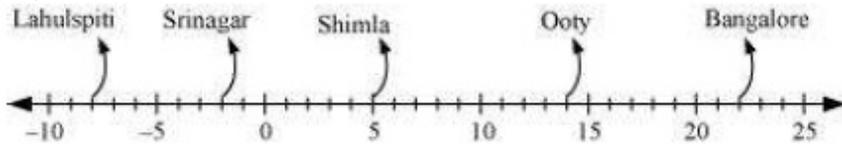
Which congruence criterion do you use in the following?

(a) **Given:** $AC = DF$

$AB = DE$

$BC = EF$

So, $\triangle ABC \cong \triangle DEF$

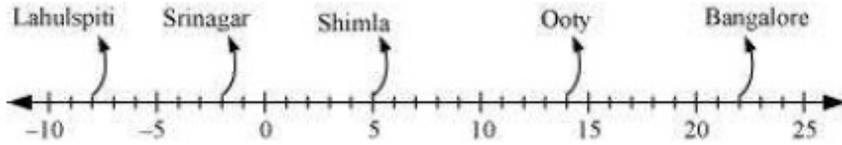


(b) **Given:** $ZX = RP$

$RQ = ZY$

$\angle PRQ = \angle XZY$

So, $\triangle PQR \cong \triangle XYZ$

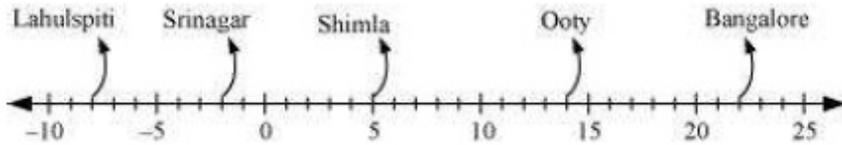


(c) **Given:** $\angle MLN = \angle FGH$

$\angle NML = \angle GFH$

$ML = FG$

So, $\triangle LMN \cong \triangle GFH$

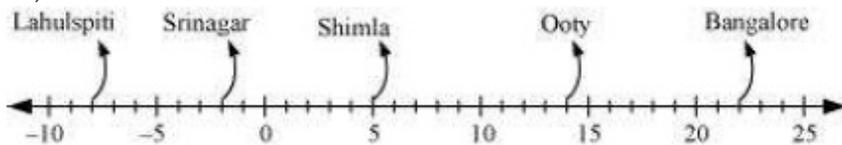


(d) **Given:** $EB = DB$

$AE = BC$

$\angle A = \angle C = 90^\circ$

So, $\triangle ABE \cong \triangle CDB$

**Answer:**

(a) SSS, as the sides of $\triangle ABC$ are equal to the sides of $\triangle DEF$.

(b) SAS, as two sides and the angle included between these sides of $\triangle PQR$ are equal to two sides and the angle included between these sides of $\triangle XYZ$.

(c) ASA, as two angles and the side included between these angles of $\triangle LMN$ are equal to two angles and the side included between these angles of $\triangle GFH$.

(d) RHS, as in the given two right-angled triangles, one side and the hypotenuse are respectively equal.

Question 2:

You want to show that $\triangle ART \cong \triangle PEN$.

(a) If you have to use SSS criterion, then you need to show

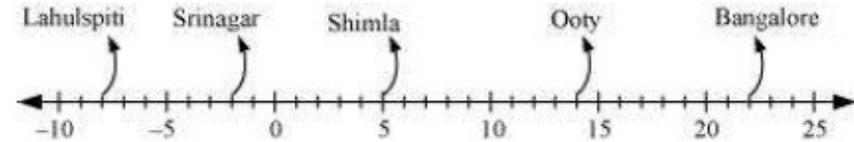
(i) $AR = PE$ (ii) $RT = EN$ (iii) $AT = PN$

(b) If it is given that $\angle T = \angle N$ and you are to use SAS criterion, you need to have

(i) $RT = EN$ and (ii) $PN = AT$

(c) If it is given that $AT = PN$ and you are to use ASA criterion, you need to have

(i) ? (ii) ?



Answer:

(a)

(i) $AR = PE$

(ii) $RT = EN$

(iii) $AT = PN$

(b)

(i) $RT = EN$

(ii) $PN = AT$

(c)

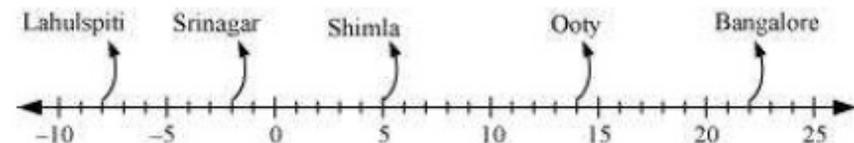
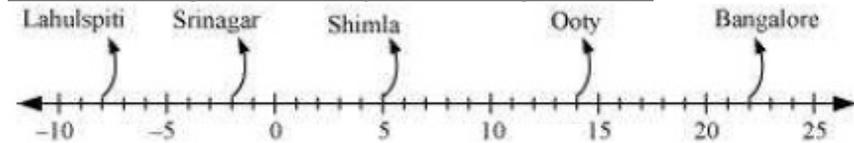
(i) $\angle ATR = \angle PNE$

(ii) $\angle RAT = \angle EPN$

Question 3:

You have to show that $\triangle AMP \cong \triangle AMQ$.

In the following proof, supply the missing reasons.



Answer:

(i) Given

(ii) Given

(iii) Common

(iv) SAS, as the two sides and the angle included between these sides of $\triangle AMP$ are equal to two sides and the angle included between these sides of $\triangle AMQ$.

Question 4:

In $\triangle ABC$, $\angle A = 30^\circ$, $\angle B = 40^\circ$ and $\angle C = 110^\circ$

In $\triangle PQR$, $\angle P = 30^\circ$, $\angle Q = 40^\circ$ and $\angle R = 110^\circ$

A student says that $\triangle ABC \cong \triangle PQR$ by AAA congruence criterion. Is he justified? Why or why not?

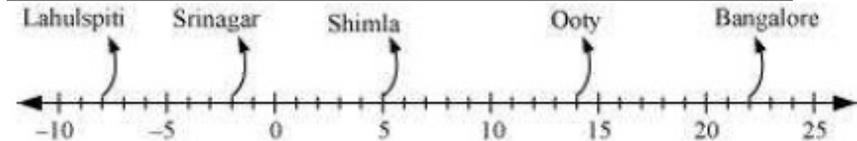
Answer:

No. This property represents that these triangles have their respective angles of equal measure. However, this gives no information about their sides. The sides of these triangles have a ratio somewhat different than 1:1. Therefore, AAA property does not prove the two triangles congruent.

Question 5:

In the figure, the two triangles are congruent.

The corresponding parts are marked. We can write $\triangle RAT \cong ?$



Answer:

It can be observed that,

$\angle RAT = \angle WON$

$\angle ART = \angle OWN$

$AR = OW$

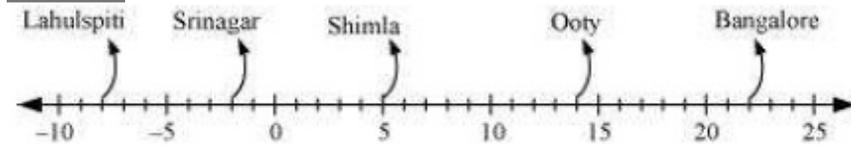
Therefore, $\triangle RAT \cong \triangle WON$, by ASA criterion.

Question 6:

Complete the congruence statement:

$\triangle BCA \cong ?$

$\triangle QRS \cong ?$



Answer:

Given that, $BC = BT$

$TA = CA$

BA is common.

Therefore, $\triangle BCA \cong \triangle BTA$

Similarly, $PQ = RS$

$TQ = QS$

$PT = RQ$

Therefore, $\triangle QRS \cong \triangle TPQ$

Question 7:

In a squared sheet, draw two triangles of equal area such that

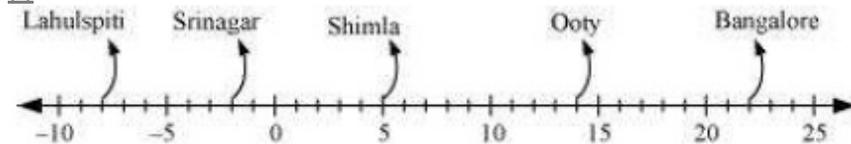
(i) The triangles are congruent.

(ii) The triangles are not congruent.

What can you say about their perimeters?

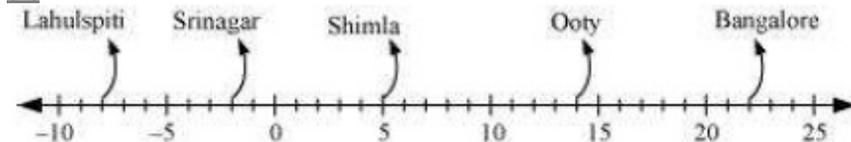
Answer:

(i)



Here, $\triangle ABC$ and $\triangle PQR$ have the same area and are congruent to each other also. Also, the perimeter of both the triangles will be the same.

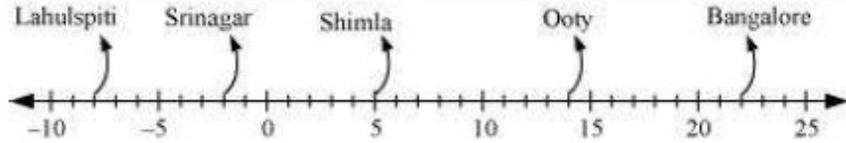
(ii)



Here, the two triangles have the same height and base. Thus, their areas are equal. However, these triangles are not congruent to each other. Also, the perimeter of both the triangles will not be the same.

Question 9:

If $\triangle ABC$ and $\triangle PQR$ are to be congruent, name one additional pair of corresponding parts. What criterion did you use?



Answer:

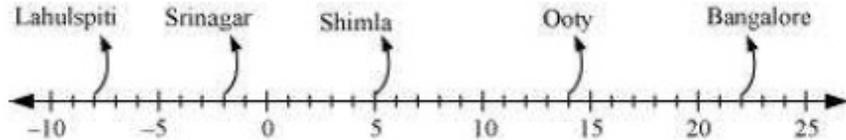
$BC = QR$

$\triangle ABC \cong \triangle PQR$ (ASA criterion)

Question 10:

Explain, why

$\triangle ABC \cong \triangle FED$



Answer:

Given that, $\angle ABC = \angle FED$ (1)

$\angle BAC = \angle EFD$ (2)

The two angles of $\triangle ABC$ are equal to the two respective angles of $\triangle FED$. Also, the sum of all interior angles of a triangle is 180° . Therefore, third angle of both triangles will also be equal in measure.

$\angle BCA = \angle EDF$ (3)

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Exercise 10.1

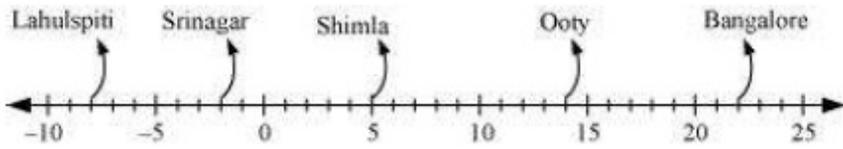
Question

Draw a line, say AB, take a point C outside it. Through C, draw a line parallel to AB using ruler and compasses only.

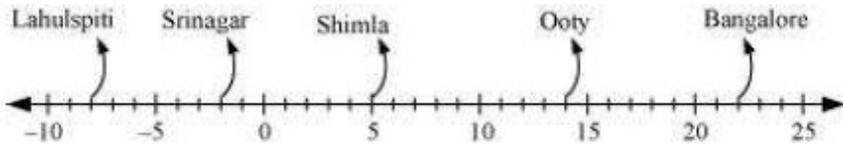
Answer: The steps of construction are as follows.

(i) Draw a line AB. Take a point P on it. Take a point C outside this line. Join C to P.

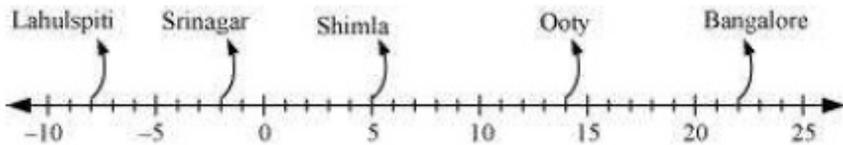
1:



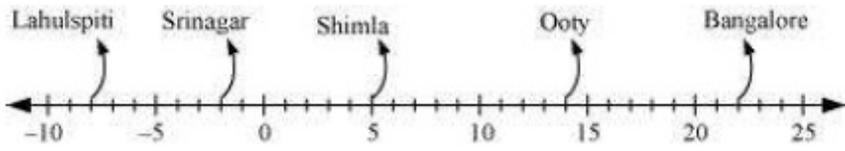
(ii) Taking P as centre and with a convenient radius, draw an arc intersecting line AB at point D and PC at point E.



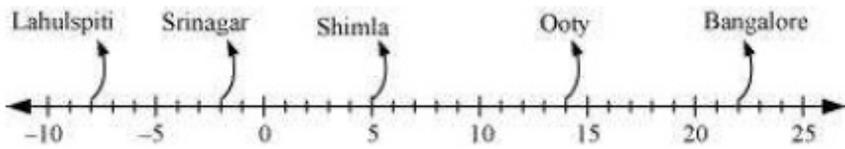
(iii) Taking C as centre and with the same radius as before, draw an arc FG intersecting PC at H.



(iv) Adjust the compasses up to the length of DE. Without changing the opening of compasses and taking H as the centre, draw an arc to intersect the previously drawn arc FG at point I.



(v) Join the points C and I to draw a line 'l'.



This is the required line which is parallel to line AB.

Question

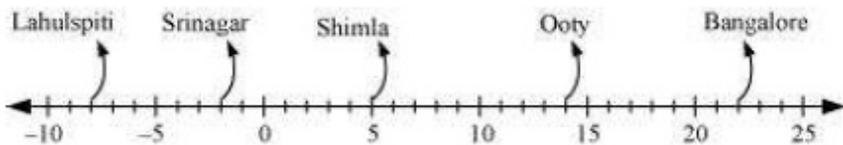
2:

Draw a line l. Draw a perpendicular to l at any point on l. On this perpendicular choose a point X, 4 cm away from l. Through X, draw a line m parallel to l.

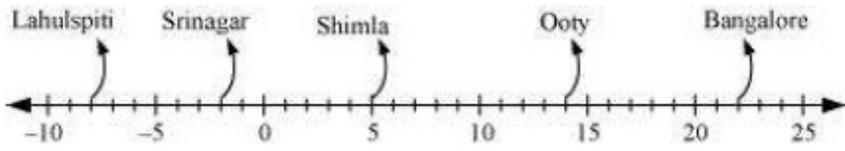
Answer:

The steps of construction are as follows.

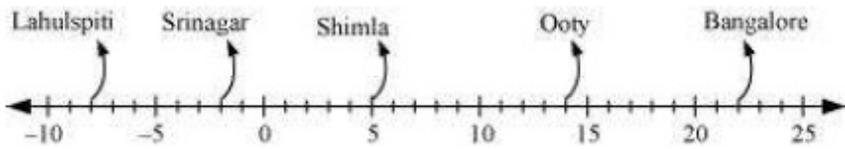
(i) Draw a line l and take a point P on line l. Then, draw a perpendicular at point P.



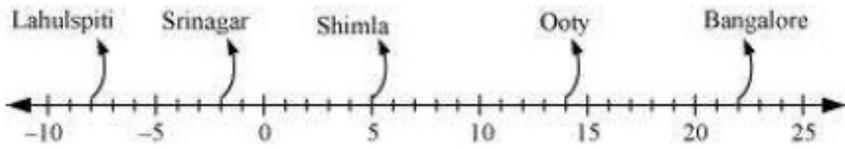
(ii) Adjusting the compasses up to the length of 4 cm, draw an arc to intersect this perpendicular at point X. Choose any point Y on line l. Join X to Y.



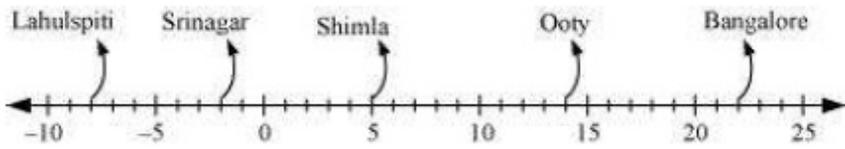
(iii) Taking Y as centre and with a convenient radius, draw an arc intersecting l at A and XY at B.



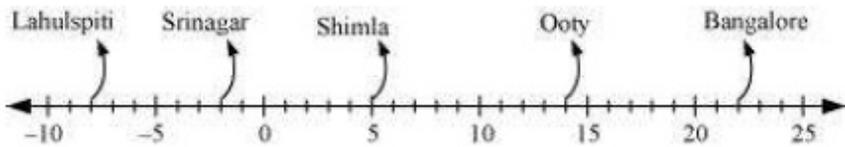
(iv) Taking X as centre and with the same radius as before, draw an arc CD cutting XY at E.



(v) Adjust the compasses up to the length of AB. Without changing the opening of compasses and taking E as the centre, draw an arc to intersect the previously drawn arc CD at point F.



(vi) Join the points X and F to draw a line m.



Line m is the required line which is parallel to line l.

Question

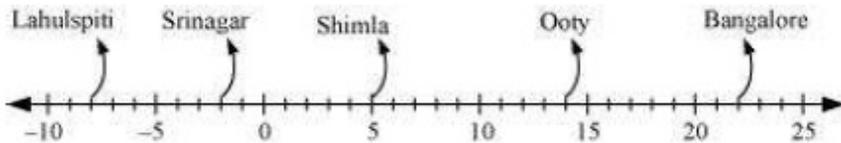
3:

Let l be a line and P be a point not on l. Through P, draw a line m parallel to l. Now join P to any point Q on l. Choose any other point R on m. Through R, draw a line parallel to PQ. Let this meet l at S. What shape do the two sets of parallel lines enclose?

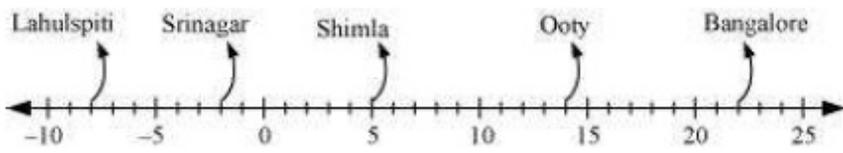
Answer:

The steps of construction are as follows.

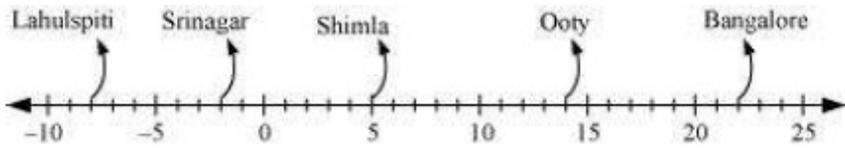
(i) Draw a line l and take a point A on it. Take a point P not on l and join A to P.



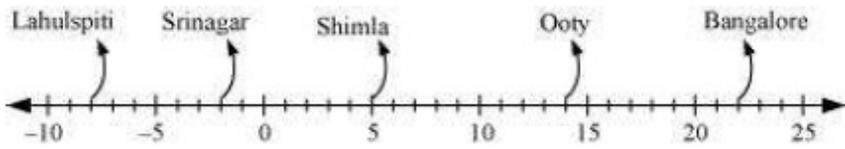
(ii) Taking A as centre and with a convenient radius, draw an arc cutting l at B and AP at C.



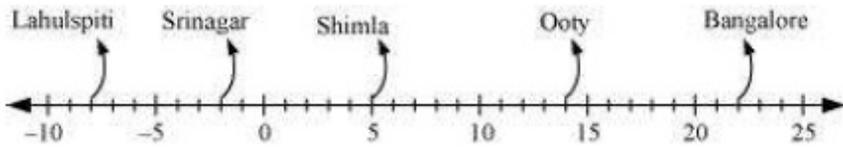
(iii) Taking P as centre and with the same radius as before, draw an arc DE to intersect AP at F.



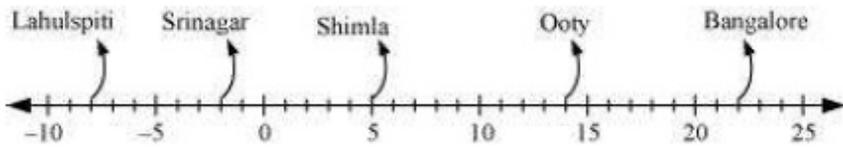
(iv) Adjust the compasses up to the length of BC. Without changing the opening of compasses and taking F as the centre, draw an arc to intersect the previously drawn arc DE at point G.



(v) Join P to G to draw a line m. Line m will be parallel to line l.



(vi) Join P to any point Q on line l. Choose another point R on line m. Similarly, a line can be drawn through point R and parallel to PQ.



Let it meet line l at point S. In quadrilateral PQSR, opposite lines are parallel to each other. $PQ \parallel RS$ and $PR \parallel QS$. Thus, PQSR is a parallelogram.

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Exercise 10.2

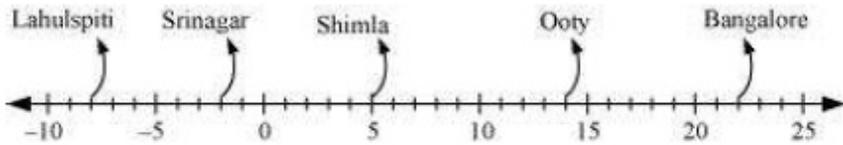
Question

1:

Construct $\triangle XYZ$ in which $XY = 4.5$ cm, $YZ = 5$ cm and $ZX = 6$ cm.

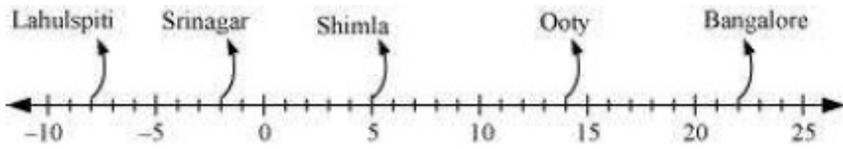
Answer:

The rough figure of this triangle is as follows.

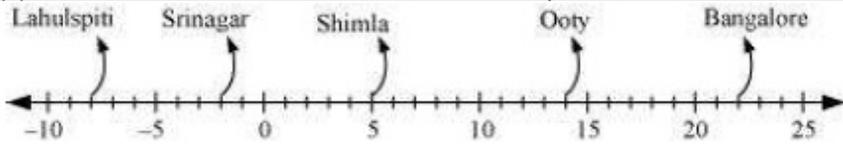


The required triangle is constructed as follows.

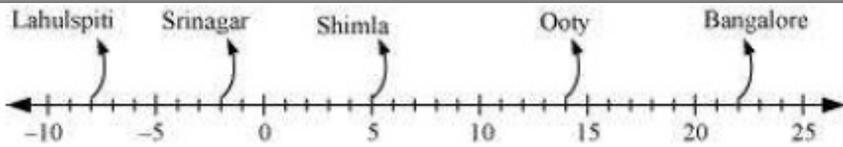
(i) Draw a line segment YZ of length 5 cm.



(ii) Point X is at a distance of 4.5 cm from point Y. Therefore, taking point Y as centre, draw an arc of 4.5 cm radius.



(iii) Point X is at a distance of 6 cm from point Z. Therefore, taking point Z as centre, draw an arc of 6 cm radius. Mark the point of intersection of the arcs as X. Join XY and XZ.



XYZ is the required triangle.

Question

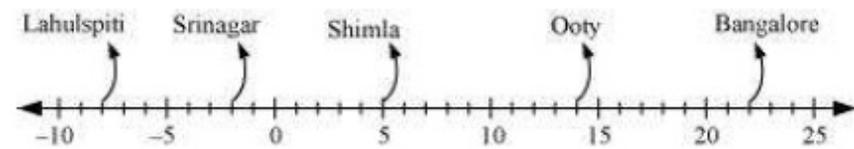
2:

Construct an equilateral triangle of side 5.5 cm.

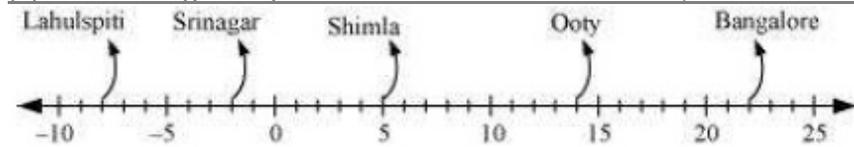
Answer:

An equilateral triangle of side 5.5 cm has to be constructed. We know that all sides of an equilateral triangle are of equal length. Therefore, a triangle ABC has to be constructed with $AB = BC = CA = 5.5$ cm. The steps of construction are as follows.

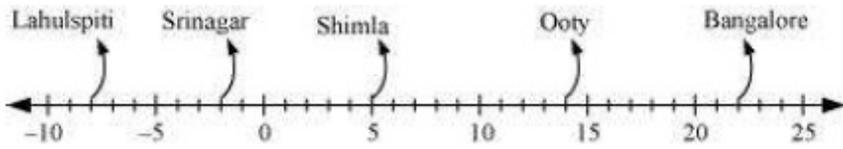
(i) Draw a line segment BC of length 5.5 cm.



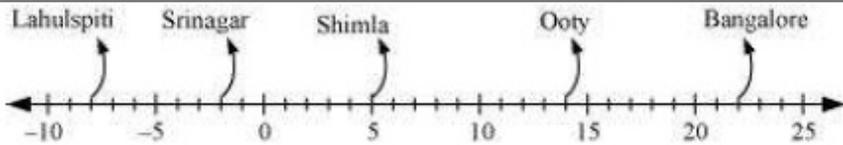
(ii) Taking point B as centre, draw an arc of 5.5 cm radius.



(iii) Taking point C as centre, draw an arc of 5.5 cm radius to meet the previous arc at point A.



(iv) Join A to B and C.



ABC is the required equilateral triangle.

Question

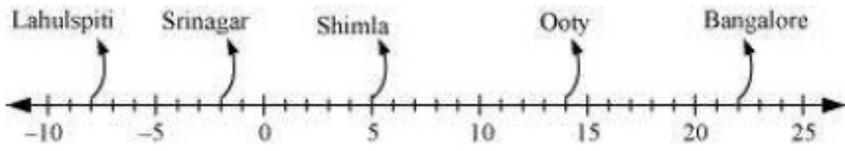
3:

Draw PQR with $PQ = 4$ cm, $QR = 3.5$ cm and $PR = 4$ cm. What type of triangle is this?

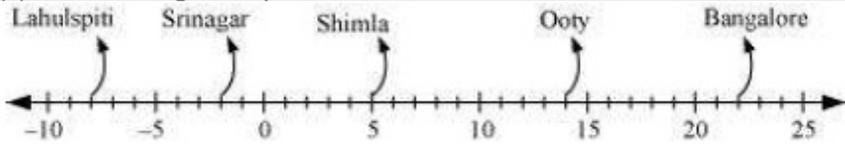
Answer:

The steps of construction are as follows.

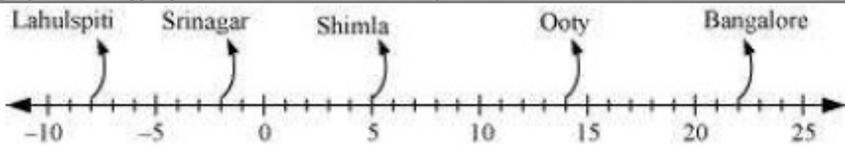
(i) Draw a line segment QR of length 3.5 cm.



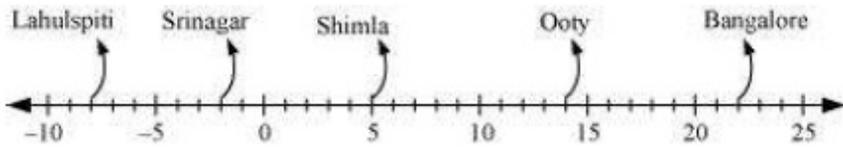
(ii) Taking point Q as centre, draw an arc of 4 cm radius.



(iii) Taking point R as centre, draw an arc of 4 cm radius to intersect the previous arc at point P.



(iv) Join P to Q and R.



PQR is the required triangle. As the two sides of this triangle are of the same length ($PQ = PR$), therefore, $\triangle PQR$ is an isosceles triangle.

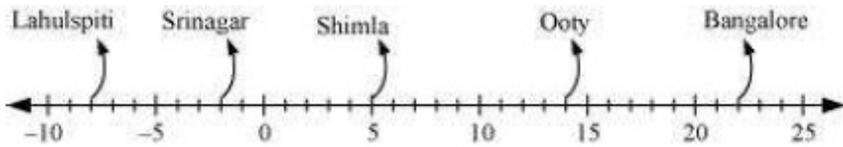
Question **4:**

Construct $\triangle ABC$ such that $AB = 2.5$ cm, $BC = 6$ cm and $AC = 6.5$ cm. Measure $\angle B$.

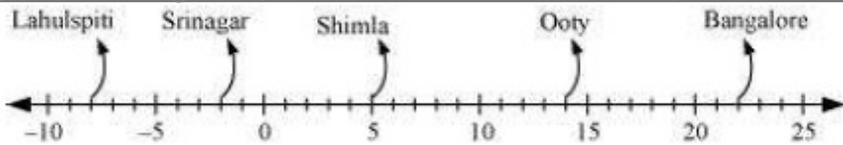
Answer:

The steps of construction are as follows.

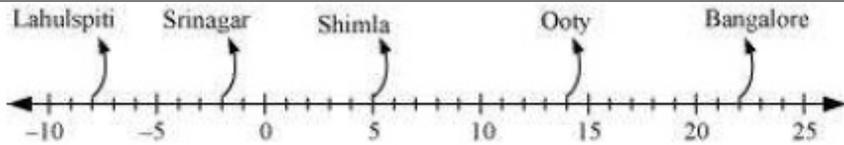
(i) Draw a line segment BC of length 6 cm.



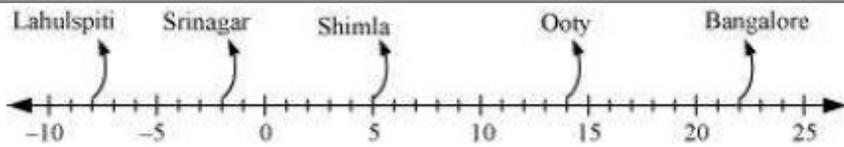
(ii) Taking point C as centre, draw an arc of 6.5 cm radius.



(iii) Taking point B as centre, draw an arc of radius 2.5 cm to meet the previous arc at point A.



(iv) Join A to B and C.



ABC is the required triangle. $\angle B$ can be measured with the help of protractor. It comes to 90° .



Exercise 10.3

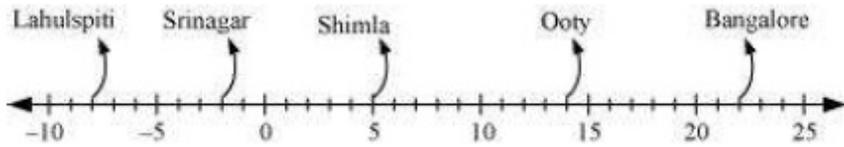
Question

1:

Construct $\triangle DEF$ such that $DE = 5$ cm, $DF = 3$ cm and $\angle EDF = 90^\circ$.

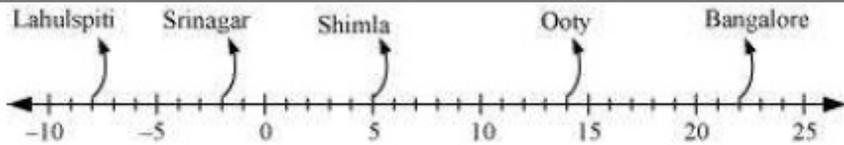
Answer:

The rough sketch of the required $\triangle DEF$ is as follows.

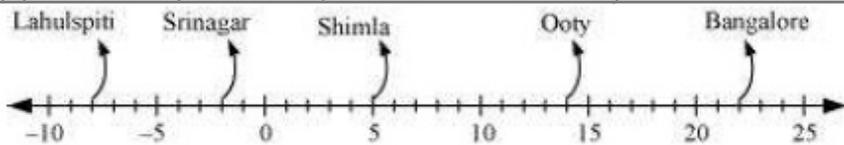


The steps of construction are as follows.

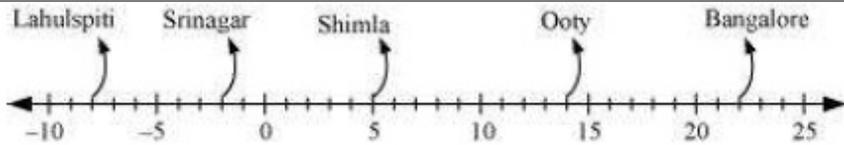
(i) Draw a line segment DE of length 5 cm.



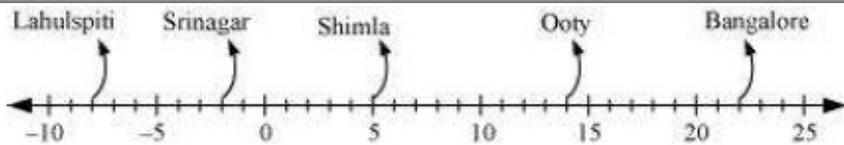
(ii) At point D, draw a ray DX making an angle of 90° with DE.



(iii) Taking D as centre, draw an arc of 3 cm radius. It will intersect DX at point F.



(iv) Join F to E. $\triangle DEF$ is the required triangle.



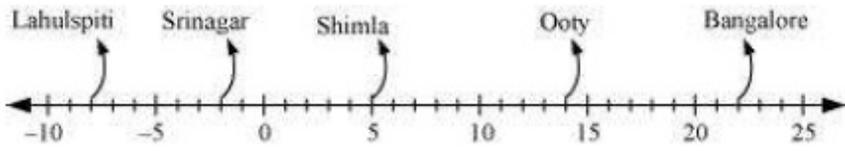
Question

2:

Construct an isosceles triangle in which the lengths of each of its equal sides is 6.5 cm and the angle between them is 110° .

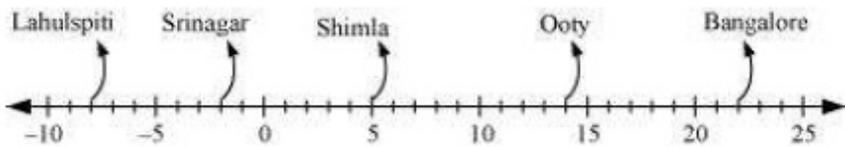
Answer:

An isosceles triangle PQR has to be constructed with $PQ = QR = 6.5$ cm. A rough sketch of the required triangle can be drawn as follows.

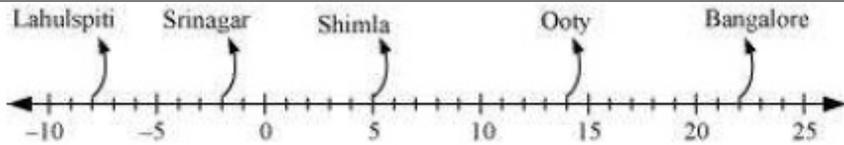


The _____ steps _____ of _____ construction _____ are _____ as _____ follows.

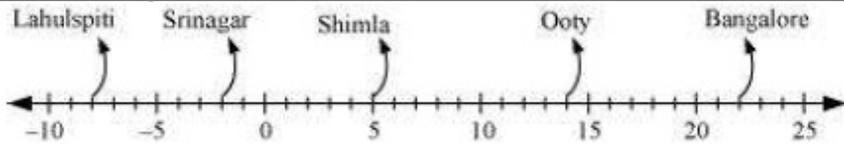
(i) Draw the line segment QR of length 6.5 cm.



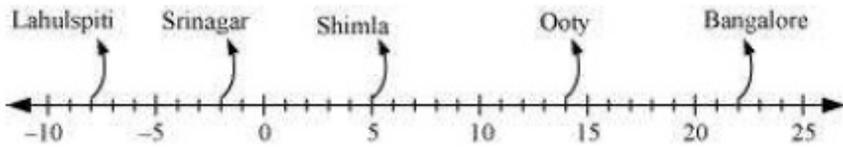
(ii) At point Q, draw a ray QX making an angle 110° with QR.



(iii) Taking Q as centre, draw an arc of 6.5 cm radius. It intersects QX at point P.



(iv) Join P to R to obtain the required triangle PQR.



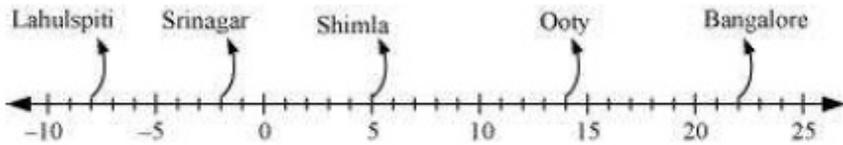
Question

3:

Construct $\triangle ABC$ with $BC = 7.5$ cm, $AC = 5$ cm and $m\angle C = 60^\circ$.

Answer:

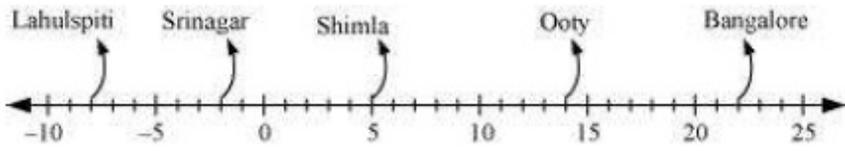
A rough sketch of the required triangle is as follows.



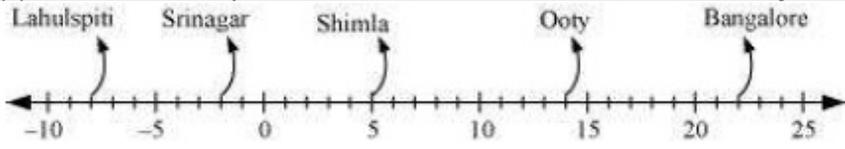
The steps of construction are as follows.

- (i) Draw a line segment BC of length 7.5 cm.

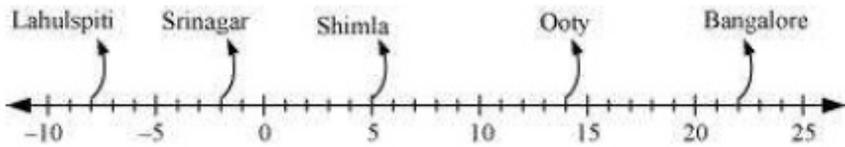
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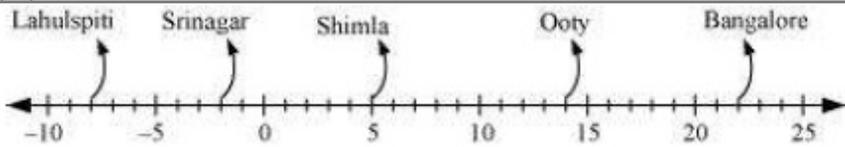
(ii) At point C, draw a ray CX making 60° with BC.



(iii) Taking C as centre, draw an arc of 5 cm radius. It intersects CX at point A.



(iv) Join A to B to obtain triangle ABC.



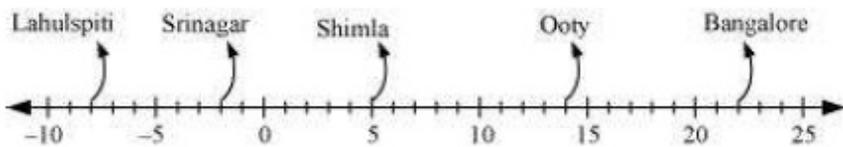
Exercise 10.4

Question 1:

Construct $\triangle ABC$, given $m\angle A = 60^\circ$, $m\angle B = 30^\circ$ and $AB = 5.8$ cm.

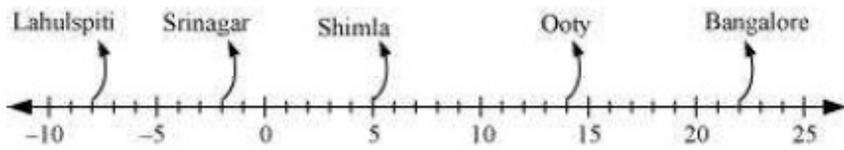
Answer:

A rough sketch of the required $\triangle ABC$ is as follows.

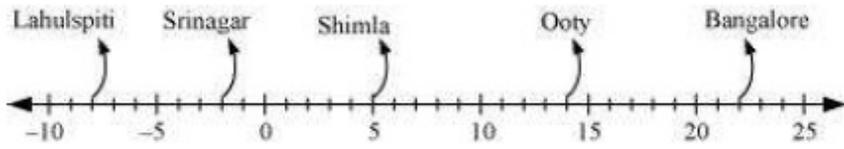


The steps of construction are as follows.

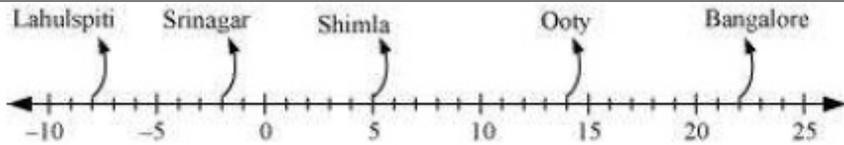
(i) Draw a line segment AB of length 5.8 cm.



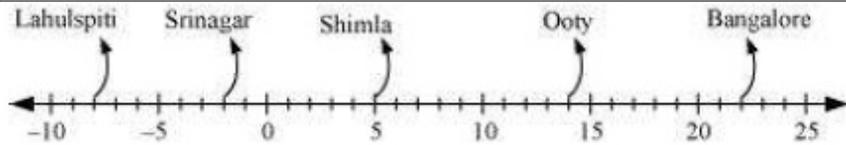
(ii) At point A, draw a ray AX making 60° angle with AB.



(iii) At point B, draw a ray BY, making 30° angle with AB.



(iv) Point C has to lie on both the rays, AX and BY. Therefore, C is the point of intersection of these two rays.

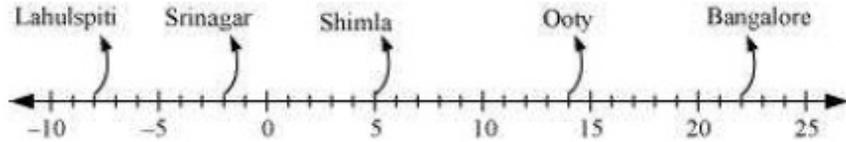


This is the required triangle ABC.

Question 2:

Construct $\triangle PQR$ if $PQ = 5$ cm, $m\angle PQR = 105^\circ$ and $m\angle QRP = 40^\circ$.
 (Hint: Recall angle sum property of a triangle).

Answer:
 A rough sketch of the required $\triangle PQR$ is as follows.



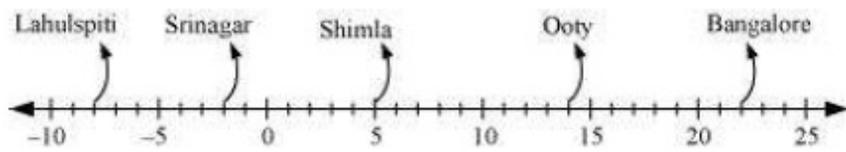
In order to construct $\triangle PQR$, the measure of $\angle RPQ$ has to be calculated.
 According to the angle sum property of triangles,
 $\angle PQR + \angle PRQ + \angle RPQ = 180^\circ$
 $105^\circ + 40^\circ + \angle RPQ = 180^\circ$

$$145^\circ + \angle RPQ = 180^\circ$$

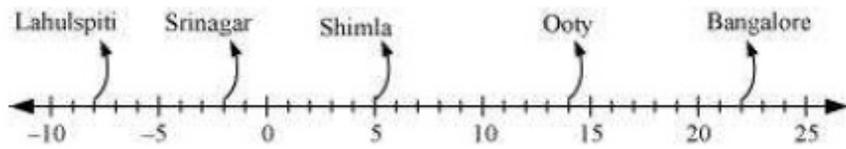
$$\angle RPQ = 180^\circ - 145^\circ = 35^\circ$$

The _____ steps _____ of _____ construction _____ are _____ as _____ follows.

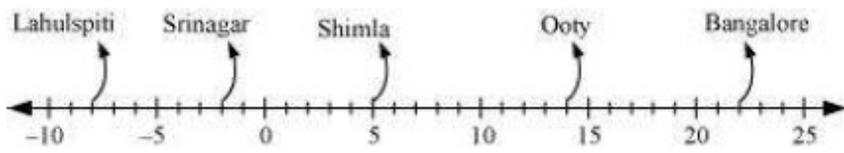
(i) Draw a line segment PQ of length 5 cm.



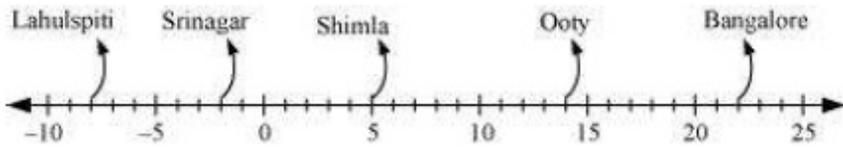
(ii) At P, draw a ray PX making an angle of 35° with PQ.



(iii) At point Q, draw a ray QY making an angle of 105° with PQ.



(iv) Point R has to lie on both the rays, PX and QY. Therefore, R is the point of intersection of these two rays.



This is the required triangle PQR.

Question **3:**

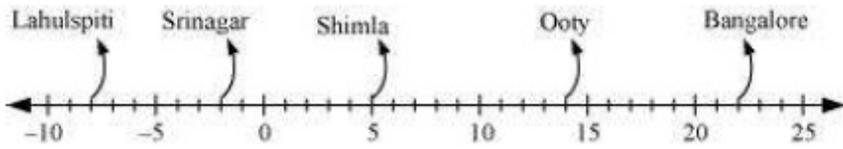
Examine whether you can construct $\triangle DEF$ such that $EF = 7.2$ cm, $m\angle E = 110^\circ$ and $m\angle F = 80^\circ$. Justify your answer.

Answer:

Given $m\angle E = 110^\circ$ and $m\angle F = 80^\circ$ that

Therefore,
 $m\angle E + m\angle F = 110^\circ + 80^\circ = 190^\circ$

However, according to the angle sum property of triangles, we should obtain $m\angle E + m\angle F + m\angle D = 180^\circ$. Therefore, the angle sum property is not followed by the given triangle. And thus, we cannot construct $\triangle DEF$ with the given measurements.



Also, it can be observed that point D should lie on both rays, EX and FY, for constructing the required triangle. However, both rays are not intersecting each other. Therefore, the required triangle cannot be formed

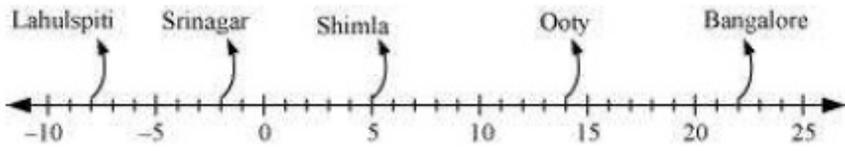
Exercise 10.5

Question

Construct the right angled $\triangle PQR$, where $m\angle Q = 90^\circ$, $QR = 8$ cm and $PR = 10$ cm. **1:**

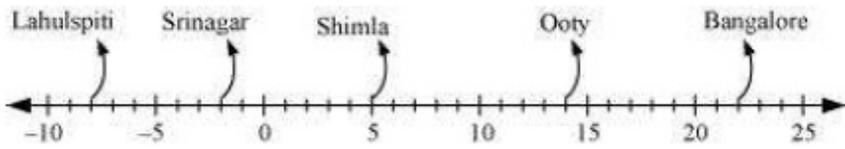
Answer:

A rough sketch of $\triangle PQR$ is as follows.

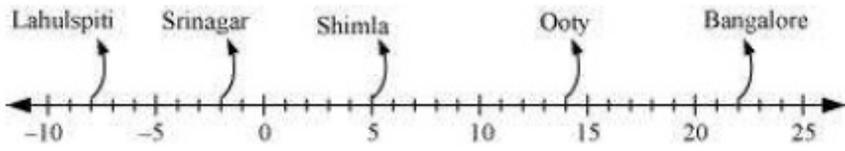


The steps of construction are as follows.

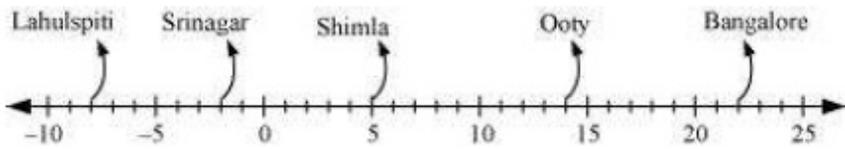
(i) Draw a line segment QR of length 8 cm.



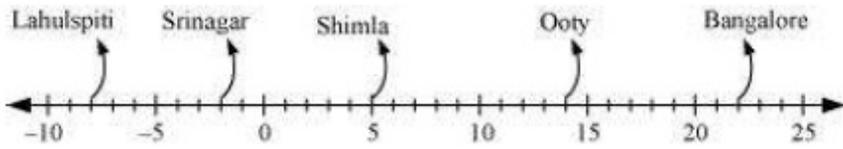
(ii) At point Q, draw a ray QX making 90° with QR.



(iii) Taking R as centre, draw an arc of 10 cm radius to intersect ray QX at point P.



(iv) Join P to R. $\triangle PQR$ is the required right-angled triangle.



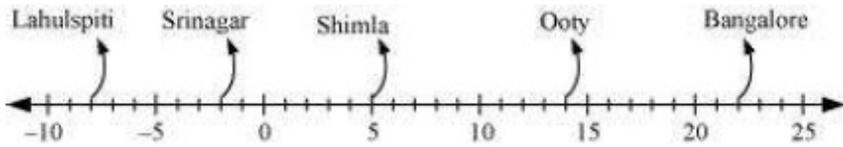
Question

2:

Construct a right-angled triangle whose hypotenuse is 6 cm long and one of the legs is 4 cm long.

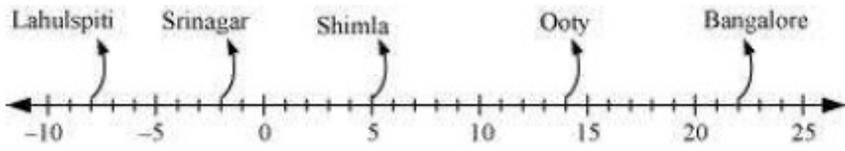
Answer:

A right-angled triangle ABC with hypotenuse 6 cm and one of the legs as 4 cm has to be constructed. A rough sketch of $\triangle ABC$ is as follows.

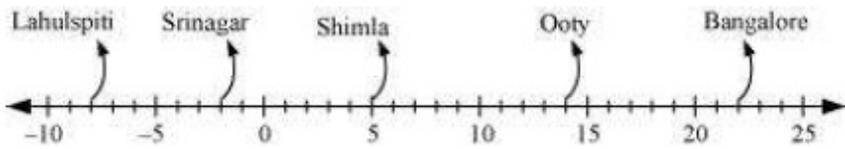


The steps of construction are as follows.

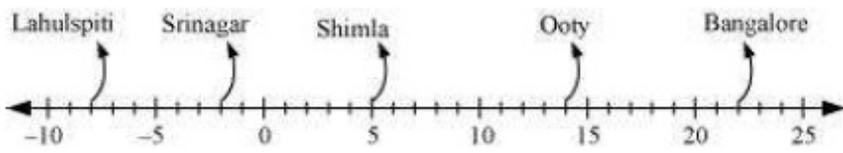
(i) Draw a line segment BC of length 4 cm.



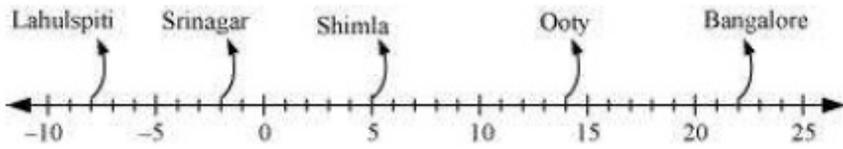
(ii) At point B, draw a ray BX making an angle of 90° with BC.



(iii) Taking C as centre, draw an arc of 6 cm radius to intersect ray BX at point A.



(iv) Join A to C to obtain the required $\triangle ABC$.



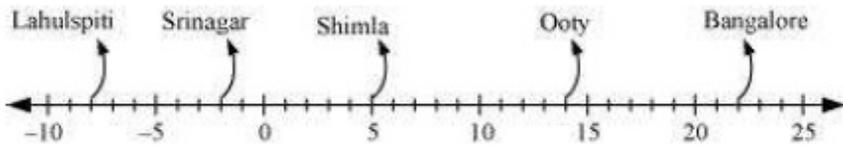
Question

3:

Construct an isosceles right-angled triangle ABC, where, $m\angle ACB = 90^\circ$ and $AC = 6$ cm.

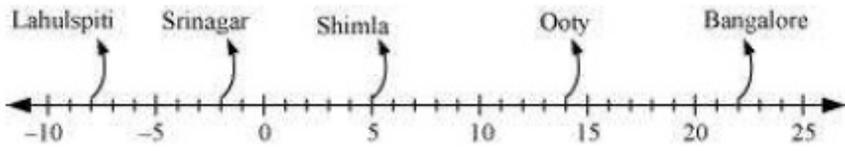
Answer:

In an isosceles triangle, the lengths of any two sides are equal. Let in $\triangle ABC$, $AC = BC = 6$ cm. A rough sketch of this $\triangle ABC$ is as follows.

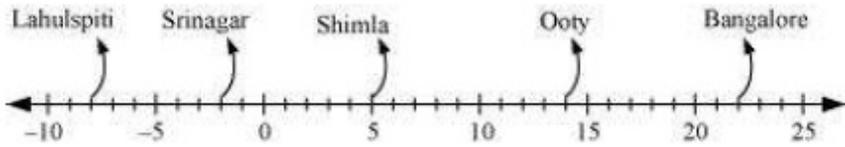


The steps of construction are as follows.

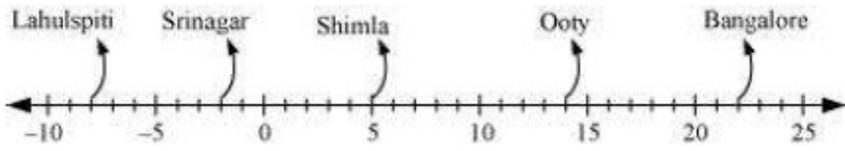
(i) Draw a line segment AC of length 6 cm.



(ii) At point C, draw a ray CX making an angle of 90° with AC.



(iii) Taking point C as centre, draw an arc of 6 cm radius to intersect CX at point B.



(iv) Join A to B to obtain the required ?ABC.

