

CBSE Board
Class VII Mathematics

Time: 2 ½ hours

Total Marks: 80

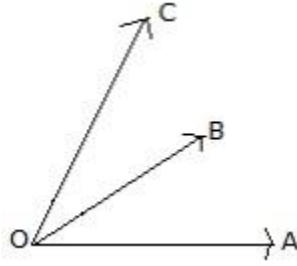
General Instructions:

1. All questions are **compulsory**.
 2. **Section A** comprises of **12** questions carrying 1 mark each.
 3. **Section B** comprises of **12** questions carrying 2 marks each.
 4. **Section C** comprises of **8** questions carrying 3 marks each.
 5. **Section D** comprises of **5** questions carrying 4 marks each.
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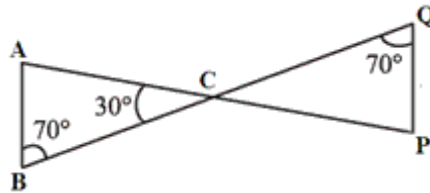
Section A
(Questions 1 to 12 carry 1 mark each)

1. $-5 + 9 + (-5) + (-10) + (1)$ is equal to
A. 13
B. -13
C. -10
D. 10
2. $0.2 \times 0.2 =$
A. 0.4
B. 0.04
C. 0.004
D. 4.0
3. The mode of following data is
14, 11, 12, 13, 11, 12, 11
A. 14
B. 11
C. 12
D. 13
4. The linear equation $\frac{p}{3} = q$ can be written in statement form as
A. 3 times p is q
B. One third of p is q
C. q times p is 3
D. One ninth of q is p

5. Number of acute angles in the following figure is



- A. 2
B. 1
C. 4
D. 3
6. In the adjoining figure, if $AB = PQ$ and $BC = CQ$, then find the measure of angle CPQ .

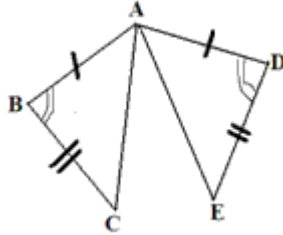


- A. 80°
B. 90°
C. 30°
D. 60°
7. $25 \times (-99)$ can be written as
A. $25 \times (-100) + 25 \times 1$
B. $25 \times (100) + 25 \times 1$
C. $25 \times (100) - 25 \times 1$
D. $25 \times (-100) - 25 \times 1$
8. If 12.543 is distributed in 100 parts, then each part equals
A. 125.43
B. 1254.3
C. 1.2543
D. 0.12543
9. If on adding 9 to twice of a whole number gives 31, then the whole number is
A. 21
B. 16
C. 11
D. 7

10. What is the difference between the measures of a straight angle and a right angle?

- E. 45°
- F. 60°
- G. 100°
- H. 90°

11. In the figure given below, name the parts of the triangles that can be used to prove the congruence of the two triangles.



- E. $AB = AD$; $BC = DE$; $\angle B = \angle D$
- F. $AC = AE$; $AB = AD$; $BC = DE$
- G. $\angle B = \angle D$; $\angle C = \angle E$
- H. $\angle B = \angle D$; $\angle C = \angle E$; $AB = AD$

12. The first step that we will use to separate variables and constants in the linear equation $2x + 3 = 7$ is

- A. Transposing 3 to RHS
- B. Transposing 7 to LHS
- C. Dividing both sides by 2
- D. Multiplying both sides with 3

Section B

(Questions 13 to 24 carry 2 marks each)

13. A bag has 12 balls colored yellow, blue, green and red. The number of balls of each colour is the same. A ball is drawn from the bag. Calculate the probability of drawing a yellow ball, a blue ball, a green ball and a red ball.

14. Write the linear equation for the following statement:

"5 added to three-fifth of a number gives $\frac{14}{3}$."

Hence, find the number.

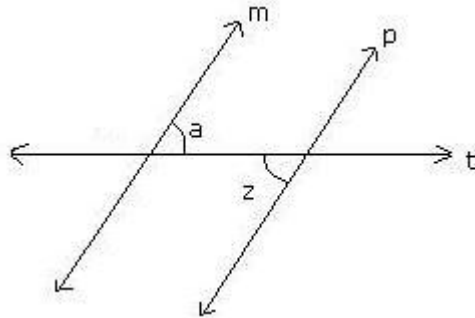
15. If $a = -8$, $b = -7$, $c = 6$, then verify that $(a + b) + c = a + (b + c)$.

16. Add the following:

3.25, 0.075 and 5

17. Is it possible to have a triangle with the sides having following lengths?
5 cm, 3 cm, 4 cm

18. In the figure below, lines m and p are parallel; t is a transversal. If $\angle a = 57^\circ$, then find $\angle z$.

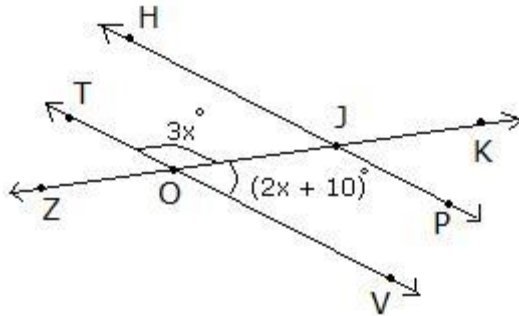


19. Calculate median and mode for following data:
23, 45, 46, 12, 34, 87, 78, 12, 65, 33, 19, 34, 55, 67, 81, 12, 56, 98, 11, 49, 50
20. Find the value of the following expression using suitable property:
 $725 \times (-35) + (-725) \times 65$
21. Mala finished drinking a glass of milk in $\frac{7}{8}$ minutes while Varun took $\frac{9}{16}$ minutes to drink the same amount of milk. Who took longer time and by how much?
22. What will you get on subtracting -134 from the sum of 38 and -87?
23. In a factory, 9.2 kilograms of pumpkin pie filling is made per minute. How many kilograms of pie filling will be made in 6 minutes?
24. Write the following equations in statement form:
(a) $6n + 4 = 10$
(b) $\frac{y}{7} - 3 = 9$

Section C

(Questions 25 to 32 carry 3 marks each)

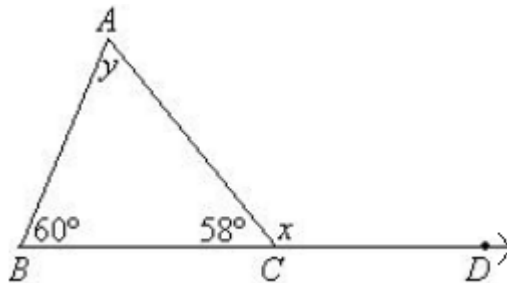
25. Find the value of x in the given figure.



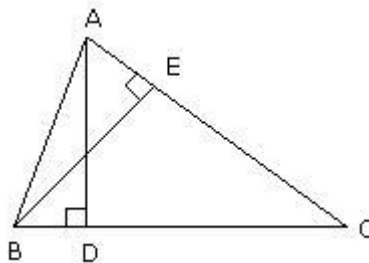
26. Simplify: $5.75 - \frac{3}{7} \times 15\frac{3}{4} + 2\frac{2}{35} \div 1.44$

27. The ages of Rahul and Karan are in the ratio 7:5. Ten years hence, the ratios of their ages will be 9:7. Find their present age?

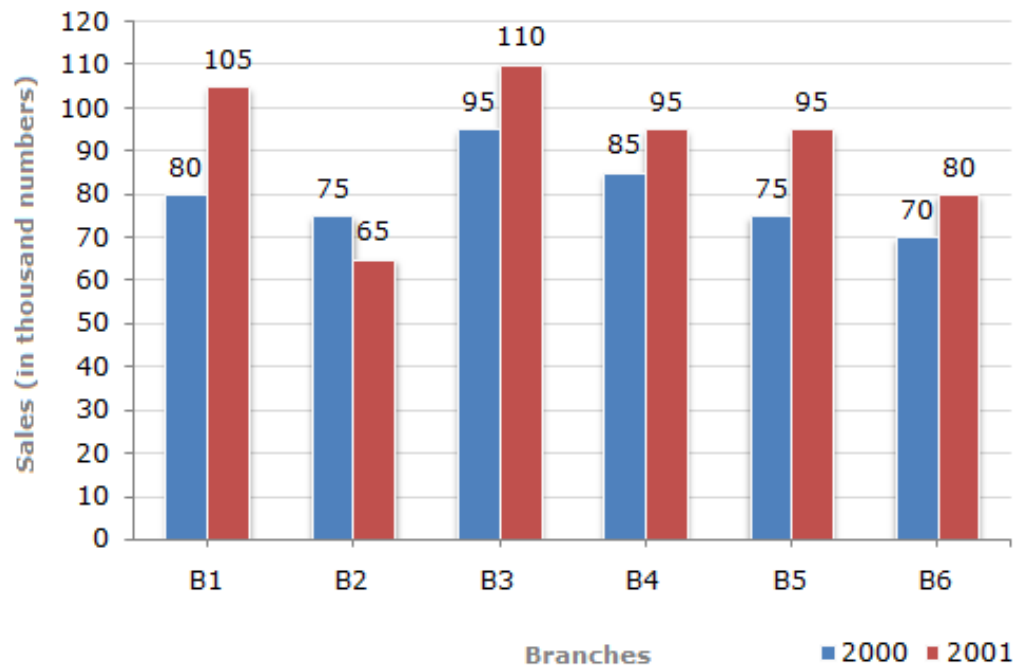
28. Find the values of x and y in the following figure.



29. In $\triangle ABC$ shown below, $AD \perp BC$, $BE \perp AC$ and $AD = BE$. Prove that $AE = BD$.



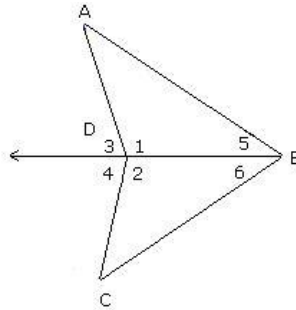
30. The bar graph given below shows the sales of books (in thousands) from six branches of a publishing company during two consecutive years 2000 and 2001.



1. What is the ratio of the total sales of branch B2 for both years to the total sales of branch B4 for both years?
 2. What is the average sale of all the branches (in thousand numbers) for the year 2000?
 3. Total sales of branch B6 for both the years is what percent of the total sales of 4 branches B3 for both the years?
31. If $\frac{1}{2}$ of $\frac{-3}{4}$ of a number is 6, then what is the number?
32. The given data is arranged in ascending order. The sum of mode and median of the given data is 15. Find the value of y.
y - 1, y - 1, y + 1, y + 4, 2y + 1, 3y, 4y

Section D
(Questions 33 to 37 carry 4 marks each)

33. Given below are two triangles ABD and CBD. $AD = CD$ and $\angle 3 = \angle 4$. Prove that DB bisects $\angle ABC$.



34. The number of trees planted by an agency in different years is given below:

Years	1997	1998	1999	2000	2001	2002
Number of trees planted	400	450	700	750	900	1500

Draw a bar graph.

35. Town A is 60 km from town B, and 61 km from town C. A road connects towns B and C directly. Find the length of this road.
36. Below are the numbers of goals scored in 1998 by the top five scorers on each of the three National Hockey League teams. Use this information to complete the chart.

Team	Goals	Goals	Goals	Goals	Goals	Mean	Median	Mode
India	35	25	30	19	19			
Sril Lanka	45	25	14	13	14			
China	32	18	14	21	21			

37. Simplify and reduce to standard form:

(a) $\frac{-15}{35} \times \left(\frac{27}{-63} \div \frac{81}{14} \right)$

(b) $\left(\frac{-2}{-72} \div \frac{4}{9} \right) \div \frac{-6}{14}$

**CBSE Board
Class VII Mathematics**

Solution

Time: 2 ½ hours

Total Marks: 80

Section A

1. Correct answer: C

$$-5 + 9 + (-5) + (-10) + (1)$$

$$-5 + 9 = 4$$

$$4 + (-5) = -1$$

$$-1 + (-10) = -1 - 10 = -11$$

$$-11 + 1 = -10$$

$$\text{So, } -5 + 9 + (-5) + (-10) + (1) = -10$$

2. Correct answer: B

$$0.2 \times 0.2 = \frac{2}{10} \times \frac{2}{10} = \frac{4}{100} = 0.04$$

3. Correct answer: B

Since 11 has highest frequency, the mode is 11.

4. Correct answer: B

The given equation can be written in the form of statement as "One third of p is q".

5. Correct answer: D

There are 3 acute angles, $\angle AOB$, $\angle BOC$ and $\angle AOC$.

6. Correct answer: A

In triangles ABC and PQC, we have:

$$AB = PQ$$

$$BC = CQ$$

$$\angle B = \angle Q$$

Thus, triangles ABC and PQC are congruent.

$$\text{Therefore, } \angle BAC = \angle CPQ$$

Now, applying angle sum property in triangle ABC, we get,

$$\angle BAC = 180^\circ - 70^\circ - 30^\circ = 80^\circ$$

$$\text{Therefore, } \angle CPQ = 80^\circ$$

7. Correct answer: A

25×-99 can be written as $25 \times (-100 + 1)$

Using distributive property of integers we can write

$$25 \times (-100 + 1) = 25 \times (-100) + 25 \times 1$$

8. Correct answer: D

$$12.543 \div 100 = \frac{12543}{1000} \times \frac{1}{100} = \frac{12543}{100000} = 0.12543$$

Thus, each part equals 0.12543.

9. Correct answer: C

Let the whole number be x .

Twice of the whole number = $2x$

9 added to twice of the whole number = $9 + 2x$

From the given information, we have:

$$9 + 2x = 31$$

$$2x = 31 - 9$$

$$2x = 22$$

$$x = 11$$

Thus, the required whole number is 11.

10. Correct answer: D

Measure of one right angle = 90°

Measure of one straight angle = 180°

$$\text{Difference} = 180^\circ - 90^\circ = 90^\circ$$

11. Correct answer: A

The two triangles can be proved to be congruent by using SAS congruency criterion.

The corresponding equal parts in triangles ABC and ADE are

$$AB = AD; BC = DE; \angle B = \angle D$$

12. Correct answer: A

$$2x + 3 = 7$$

If we will transpose 3 to RHS, the term with variable will remain on one side and the constants will be on other side.

So, first step is to Transpose 3 to RHS.

$$\text{i.e., } 2x = 7 - 3$$

Section B

13. Total number of balls = 12

It is also given that the bag contains equal number of balls of each of the four colours (yellow, blue, green and red).

Therefore,

Number of yellow balls = Number of blue balls = Number of green balls =
Number of red balls = 3

$$P(\text{yellow}) = \frac{\text{Number of yellow balls}}{\text{Total number of balls}} = \frac{3}{12} = \frac{1}{4}$$

$$P(\text{blue}) = \frac{\text{Number of blue balls}}{\text{Total number of balls}} = \frac{3}{12} = \frac{1}{4}$$

$$P(\text{green}) = \frac{\text{Number of green balls}}{\text{Total number of balls}} = \frac{3}{12} = \frac{1}{4}$$

$$P(\text{red}) = \frac{\text{Number of red balls}}{\text{Total number of balls}} = \frac{3}{12} = \frac{1}{4}$$

14. Let the number be x

Then, Three fifth of a number = $\frac{3}{5}x$

5 added to three-fifth of a number = $5 + \frac{3}{5}x$

Thus, the linear equation will be

$$5 + \frac{3}{5}x = \frac{14}{3}$$

Solving the linear equation to find x.

Transposing 5 to R.H.S., we get

$$\frac{3}{5}x = \frac{14}{3} - 5$$

$$\frac{3}{5}x = \frac{14-15}{3}$$

$$\frac{3}{5}x = \frac{-1}{3}$$

Multiplying both sides with $\frac{5}{3}$, we get

$$x = \frac{5}{3} \times \frac{-1}{3} = \frac{-5}{9}$$

Thus, the required number is $\frac{-5}{9}$.

15. Given: $a = -8$, $b = -7$, $c = 6$

$$(a + b) + c = [(-8) + (-7)] + 6 = -15 + 6 = -9$$

$$a + (b + c) = (-8) + [(-7) + 6] = -8 - 1 = -9$$

Hence, $(a + b) + c = a + (b + c)$.

16. First, we need to line up the decimals as follows:

$$3.25 = 3.250$$

$$0.075 = 0.075$$

$$5 = 5.000$$

Now, adding them gives

$$3.250$$

$$+ 0.075$$

$$+ \underline{5.000}$$

$$\underline{8.325}$$

17. We know that the sum of two sides of a triangle is always greater than the third.

The given lengths of the sides are 5 cm, 3 cm, 4 cm.

Let us check whether the above stated property holds true. We have:

$$5 + 3 = 8, \text{ which is greater than } 4$$

$$5 + 4 = 9, \text{ which is greater than } 3$$

$$3 + 4 = 7, \text{ which is greater than } 5$$

Thus, it is possible to draw a triangle with given side lengths.

18. Given that, $m \parallel p$ and t is the transversal

We know that, if two parallel lines are cut by a transversal, each pair of alternate interior angles are equal.

So, $\angle a = \angle z$ (pair of alternate interior angles)

Thus, $\angle z = 57^\circ$

19. The numbers in ascending order are:

11, 12, 12, 12, 19, 23, 33, 34, 34, 45, 46, 49, 50, 55, 56, 65, 67, 78, 81, 87, 98

As the number of observations (21) are odd,

Median = middle observation = 11th observation = 46

Mode is the observation that appears most often.

Here, 12 appears maximum number of times (thrice). So, 12 is the mode.

20. $725 \times (-35) + (-725) \times 65$

$$= 725 \times (-35) - 725 \times 65$$

$$= 725 \times (-35 - 65) \quad [\text{Using distributive property}]$$

$$= 725 \times (-100)$$

$$= -72500$$

21. Time taken by Mala to drink a glass of milk = $\frac{7}{8}$ mins

Time taken by Varun to drink a glass of milk = $\frac{9}{16}$ mins

To compare both the fractions, we have to change them into like fractions.

$$\frac{7}{8} = \frac{7 \times 2}{8 \times 2} = \frac{14}{16}, \quad \frac{9}{16} = \frac{9 \times 1}{16 \times 1} = \frac{9}{16}$$

Since, $14 > 9$, $\frac{7}{8} > \frac{9}{16}$

Thus, Mala took longer time to finish the glass of milk.

Now, we have to subtract the time durations of Mala and Varun to calculate how slow was Mala than Varun.

$$= \frac{14}{16} - \frac{9}{16}$$

$$= \frac{14 - 9}{16}$$

$$= \frac{5}{16} \text{ mins}$$

Thus, Mala took $\frac{5}{16}$ mins more than Varun to finish a glass of milk.

22. Sum of 38 and -87 = $38 + (-87) = 38 - 87 = -49$

Subtracting (-134) from -49, we get

$$-49 - (-134) = -49 + 134 = 85$$

23. Pie filling made in 1 minute = 9.2 kg

Pie filling made in 6 minutes = $6 \times 9.2 \text{ kg} = 55.2 \text{ kg}$

24.

(a) $6n + 4 = 10$

Statement:

For $6n$, six times of a number n .

For $6n + 4$, six times of a number n added to 4.

Thus, for $6n + 4 = 10$, the final statement is

‘Six times of a number n added to 4 gives 10’.

$$(b) \frac{y}{7} - 3 = 9$$

Statement:

For $\frac{y}{7}$, one-seventh of a number y.

For $\frac{y}{7} - 3$, 3 subtracted from one-seventh of a number y.

Thus, for $\frac{y}{7} - 3 = 9$, the final statement is

'3 subtracted from one-seventh of a number y gives 9'.

Section C

25. Here, $\angle TOJ$ and $\angle VOJ$ are linear pair of angles

$$\text{So, } \angle TOJ + \angle VOJ = 180^\circ$$

$$\angle TOJ = 3x^\circ ; \angle VOJ = (2x + 10)^\circ$$

$$3x^\circ + (2x + 10)^\circ = 180^\circ$$

$$(3x + 2x)^\circ + 10^\circ = 180^\circ$$

$$5x^\circ + 10^\circ = 180^\circ$$

$$5x^\circ = 170^\circ$$

$$x^\circ = 34^\circ$$

$$26. \quad 5.75 - \frac{3}{7} \times 15\frac{3}{4} + 2\frac{2}{35} \div 1.44$$

$$= \frac{575}{100} - \frac{3}{7} \times \frac{63}{4} + \frac{72}{35} \div \frac{144}{100}$$

$$= \frac{575}{100} - \frac{3}{7} \times \frac{63}{4} + \frac{72}{35} \times \frac{100}{144}$$

$$= \frac{23}{4} - \frac{3}{7} \times \frac{63}{4} + \frac{10}{7}$$

$$= \frac{23}{4} - \frac{27}{4} + \frac{10}{7}$$

$$= -\frac{4}{4} + \frac{10}{7} = -1 + \frac{10}{7} = \frac{-7+10}{7} = \frac{3}{7}$$

27. Let Rahul's and Karan's age be $7x$ and $5x$ respectively.

After 10 yrs, their ages are $7x + 10$, $5x + 10$ respectively.

As per the given condition, Ratio after 10 years is $9 : 7$

$$\text{So, } \frac{7x+10}{5x+10} = \frac{9}{7}$$

Cross Multiplying, we get

$$7(7x + 10) = 9(5x + 10)$$

$$49x + 70 = 45x + 90$$

$$4x = 20$$

$$x = 5$$

Therefore, Rahul's age = $7 \times 5 = 35$ years and Karan's age = $5 \times 5 = 25$ years

28. According to the given figure, we get

$$x + 58^\circ = 180^\circ \text{ (linear pair angles)}$$

$$x + 58^\circ - 58^\circ = 180^\circ - 58^\circ \text{ (subtract } 58^\circ \text{ from both sides)}$$

$$x = 122^\circ$$

$$\text{Also, } y + 60^\circ + 58^\circ = 180^\circ \text{ (angle sum property of a triangle)}$$

$$y + 118^\circ = 180^\circ$$

$$y = 62^\circ \text{ (subtracting } 118^\circ \text{ from both sides)}$$

$$\text{Thus, } x = 122^\circ, y = 62^\circ$$

29. Given: $AD \perp BC$, $BE \perp AC$ and $AD = BE$

To prove: $AE = BD$

Proof: $\angle ADB = \angle BEA$ (right angles)

$$AB = AB \text{ (common)}$$

$$AD = BE \text{ (given)}$$

Thus, $\triangle ABD \cong \triangle BAE$ (By RHS congruence rule).

Hence, $BD = AE$ (Since, corresponding parts of congruent triangles are equal)

30.

1. Sales of branch B2 for both years = $75 + 65 = 140$

Sales of branch B4 for both years = $85 + 95 = 180$

$$\text{Required ratio} = \frac{140}{180} = \frac{7}{9} = 7:9$$

2. Average sales of all the six branches (in thousand numbers) for the year 2000

$$= \frac{1}{6} \times (80 + 75 + 95 + 85 + 75 + 70) = 80$$

3. Total sales of branch B6 for both the years = $70 + 80 = 150$

Total sales of branch B3 for both the years = $95 + 110 = 205$

$$\text{Required percentage} = \left(\frac{150}{205} \times 100 \right) \% = 73.17\%$$

31. Let the unknown number be n.

$$\frac{1}{2} \text{ of } \frac{-3}{4} \text{ of } n = 6$$

$$\Rightarrow \frac{1}{2} \times \frac{-3}{4} \times n = 6$$

$$\Rightarrow \frac{-3}{8} \times n = 6$$

$$\Rightarrow n = 6 \times \frac{8}{-3}$$

$$\Rightarrow n = \frac{48}{-3} = -16$$

Thus, the required number is -16.

32. Mode is observation which appears most often.

$$\text{Mode} = y - 1$$

Median is the middle most value.

$$\text{Median} = 4^{\text{th}} \text{ observation} = y + 4$$

$$\text{Given, Mode} + \text{Median} = 15$$

$$y - 1 + y + 4 = 15$$

$$2y + 3 = 15$$

$$2y = 12$$

$$y = 6$$

Section D

33. Given: $AD = CD$

$$\angle 3 = \angle 4 \quad \dots (1)$$

To prove: DB bisects $\angle ABC$

Proof:

$$\angle 1 + \angle 3 = 180^\circ \quad (\text{Linear pair}) \dots (2)$$

$$\angle 2 + \angle 4 = 180^\circ \quad (\text{Linear pair}) \dots (3)$$

From (2) and (3),

$$\angle 1 + \angle 3 = \angle 2 + \angle 4$$

$$\text{Using (1), we have } \angle 1 = \angle 2$$

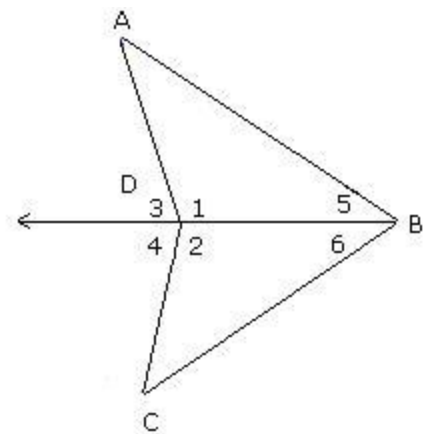
$$\text{Also, } DB = DB \quad (\text{common side})$$

$$AD = CD \quad (\text{Given})$$

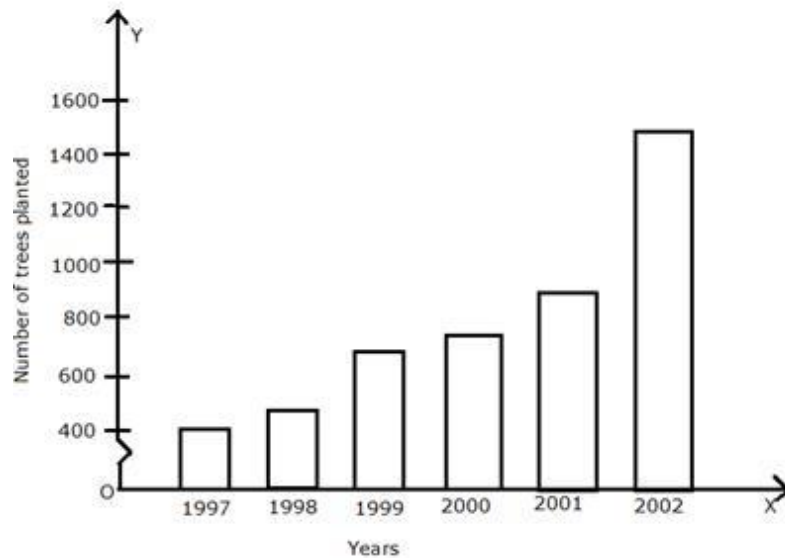
$$\text{So, } \triangle ABD \cong \triangle CBD \quad (\text{By SAS congruence rule})$$

$$\text{Thus, } \angle 5 = \angle 6 \quad (\text{Corresponding parts of congruent triangles are congruent})$$

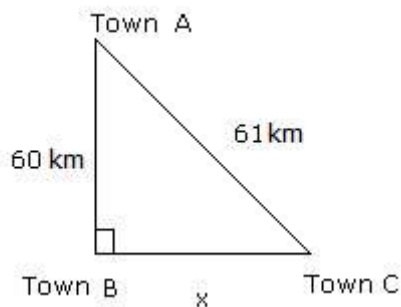
Hence, DB bisects $\angle ABC$.



- 34. Step 1:** We draw two perpendicular lines OX and OY.
Step 2: On OX, we represent years, from 1997-2002 and on OY, we represent the number of trees planted.
Step 3: On OY, we start with 400 and mark points at equal intervals of 200.
Step 4: The height of the bars are calculated according to the number of trees. A kink (~) has been shown on the vertical axis showing that the marking on the vertical axis starts from zero but has been shown to start from 400 as the data needs.



- 35.** We can show the diagram as below:



Let the road that connects towns B and C be x .

Applying Pythagoras theorem, we get

$$h = 61, b = x \text{ and } p = 60$$

$$p^2 + b^2 = h^2$$

$$60^2 + x^2 = 61^2$$

$$3600 + x^2 = 3721 \text{ (subtract 3600 from both sides)}$$

$$x^2 = 121$$

$$\text{Thus, } x = 11$$

Length of the road that connects towns B and C is 11 km.

36. Calculation is as follows:

$$\text{Mean} = \frac{\text{Sum of observations}}{\text{Total number of observations}}$$

As the number of observations are odd (5)

$$\text{Median} = \left(\frac{n+1}{2} \right)^{\text{th}} = \left(\frac{5+1}{2} \right)^{\text{th}} = 3^{\text{rd}} \text{ observation}$$

Mode = Most occurring value

For India,

$$\text{Thus, Mean} = \frac{35+25+30+19+19}{5} = \frac{128}{5} = 25.6$$

Arranging data in ascending order: 19, 19, 25, 30, 35

Thus, Median = 3rd observation = 25

Mode = 19 (occurring twice)

Team	Goals	Goals	Goals	Goals	Goals	Mean	Median	Mode
India	35	25	30	19	19	25.6	25	19
Sri Lanka	45	25	14	13	14	22.2	14	14
China	32	18	14	21	21	21.2	21	21

37. We have to first solve the bracket terms and then check for any common factors between the numerator and the denominator and then cancel them out.

$$\begin{aligned} \text{(a)} \quad \frac{-15}{35} \times \left(\frac{27}{-63} \div \frac{81}{14} \right) &= \frac{-15}{35} \times \left(\frac{27}{-63} \times \frac{14}{81} \right) \\ &= \frac{-15}{35} \times \left(\frac{1}{-9} \times \frac{2}{3} \right) \\ &= \frac{-15}{35} \times \left(\frac{2}{-27} \right) \\ &= \frac{-3}{7} \times \frac{-2}{27} \\ &= \frac{-1}{7} \times \frac{-2}{9} \\ &= \frac{2}{63} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad \left(\frac{-2}{-72} \div \frac{4}{9} \right) \div \frac{-6}{14} &= \left(\frac{2}{72} \times \frac{9}{4} \right) \div \frac{-6}{14} \\ &= \left(\frac{1}{8} \times \frac{1}{2} \right) \div \frac{-6}{14} \\ &= \frac{1}{16} \div \frac{-6}{14} \\ &= \frac{1}{16} \times \frac{-14}{6} \\ &= \frac{1}{8} \times \frac{-7}{6} \\ &= \frac{-7}{48} \end{aligned}$$