Topic: **Statistics**
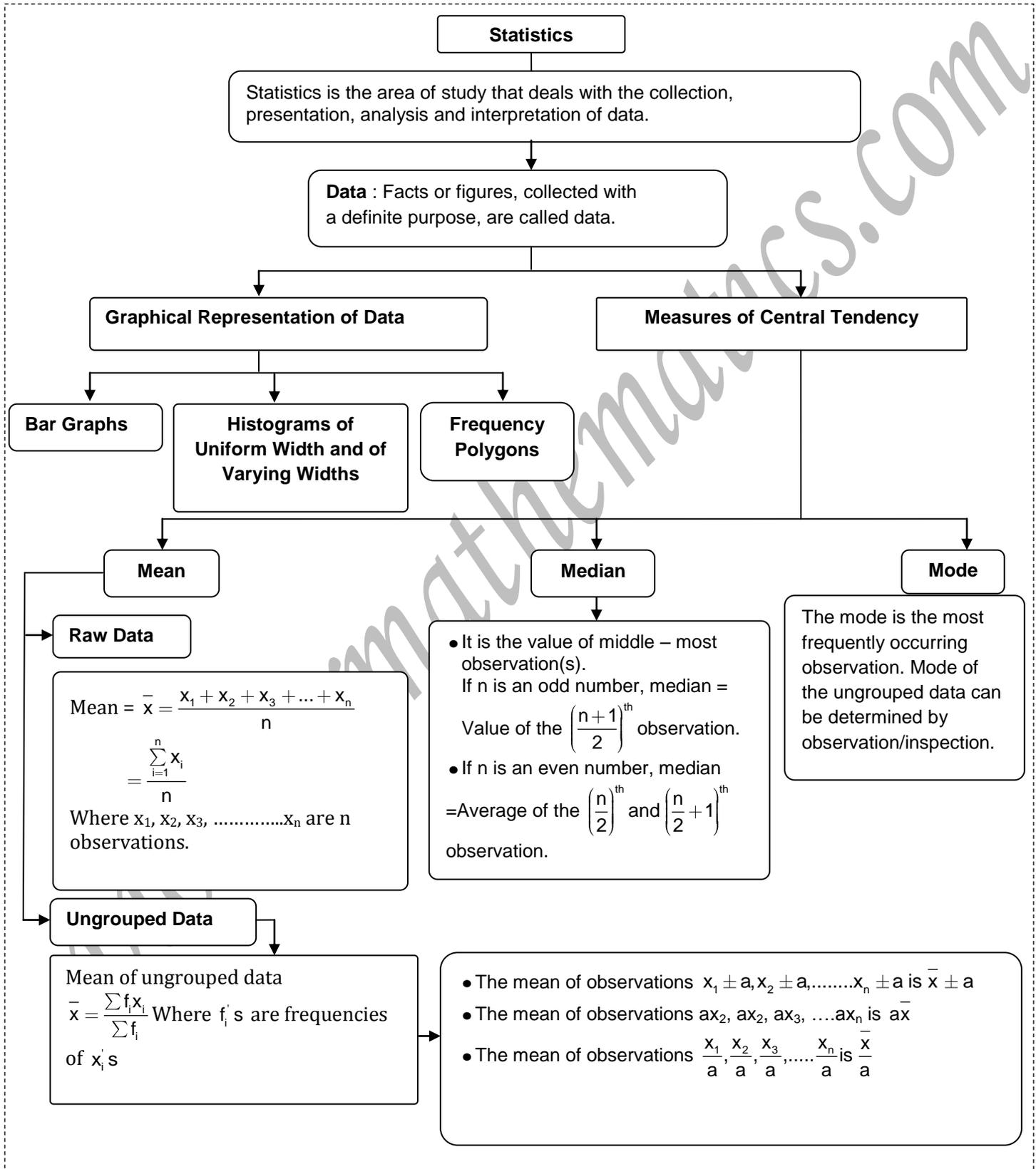
Chapter Flowchart

The Chapter Flowcharts give you the gist of the chapter flow in a single glance.

Statistics

Statistics is the area of study that deals with the collection, presentation, analysis and interpretation of data.

Data : Facts or figures, collected with a definite purpose, are called data.

Graphical Representation of Data

Measures of Central Tendency

Bar Graphs

Histograms of Uniform Width and of Varying Widths

Frequency Polygons

Mean

Median

Mode

Raw Data

Mean = $\bar{x} = \dfrac{x_1 + x_2 + x_3 + ... + x_n}{n}$

$= \dfrac{\sum\limits_{i=1}^{n} x_i}{n}$

Where $x_1, x_2, x_3, ...x_n$ are n observations.

- It is the value of middle – most observation(s).
  If n is an odd number, median = Value of the $\left(\dfrac{n+1}{2}\right)^{th}$ observation.
- If n is an even number, median = Average of the $\left(\dfrac{n}{2}\right)^{th}$ and $\left(\dfrac{n}{2}+1\right)^{th}$ observation.

The mode is the most frequently occurring observation. Mode of the ungrouped data can be determined by observation/inspection.

Ungrouped Data

Mean of ungrouped data
$\bar{x} = \dfrac{\sum f_i x_i}{\sum f_i}$ Where $f_i^{'}$ s are frequencies of $x_i^{'}$ s

- The mean of observations $x_1 \pm a, x_2 \pm a, ...x_n \pm a$ is $\bar{x} \pm a$
- The mean of observations $ax_2, ax_2, ax_3, ...ax_n$ is $a\bar{x}$
- The mean of observations $\dfrac{x_1}{a}, \dfrac{x_2}{a}, \dfrac{x_3}{a}, ...\dfrac{x_n}{a}$ is $\dfrac{\bar{x}}{a}$

Revision Question Bank

Subjective Type Questions

1. The class marks of a continuous distribution are: 1.04, 1.14, 1.24, 1.34, 1.44, 1.54 and 1.64

   Is it correct to say that the last interval will be 1.55-1.73? Justify your answer.

2. In a histogram, the areas of the rectangles are proportional to the frequencies. Can we say that the lengths of the rectangles are also proportional to the frequencies?

3. Ten observations 6, 14, 15, 17, x + 1, 2x – 13, 30, 32, 34, 43 are written in an ascending order. The median of the data is 24. Find the value of x.

4. The points scored by a basketball team in a series of matches are as follows:

   17, 2, 7, 27, 25, 5, 14, 18, 10, 24, 48, 10, 8, 7, 10, 28. Find the median and mode for the data.

5. Thirty children were asked about the number of hours they watched TV programmes in the previous week. The results were found as follows ;

1	6	2	3	5	12	5	8	4	8
10	3	4	12	2	8	15	1	17	6
3	2	8	5	9	6	8	7	14	12

   (i) Make a grouped frequency distribution table for this data, taking class width 5 and one of the class intervals as 5 – 10.

   (ii) How many children watched television for 15 or more hours a week ?

6. The length of 40 leaves of a plant are measured correct to one millimetre, and the obtained data is represented in the following table :

Length (in mm)	118-126	127-135	136-144	145-153	154-162	163-171	172-180
Number of leaves	3	5	9	12	5	4	2

   (i) Draw a histogram to represent the given data.

   (ii) Is there any other suitable graphical representation for the same data ?

   (iii) Is it correct to conclude that maximum number of leaves are 153 mm long? Why ?

7. A class consists of 50 students out of which 30 are girls. The mean marks scored by girls in a test is 73 (out of 100) and that of boys is 71. Determine the mean score of the whole class.

8. Prepare a continuous grouped frequency distribution from the following data :

Mid-point	5	15	25	35	45
Frequency	4	8	13	12	6

   Also find the size of class intervals.

9. The marks obtained (out of 100) by a class of 80 students are given below :

Marks	10-20	20-30	30-50	50-70	70-100
Number of students	6	17	15	16	26

   Construct a histogram to represent the data above.

10. The mean of five numbers is 30. If one number is excluded, their mean becomes 28.

    Find the excluded number.

Answers

1. It is not correct because the difference between two consecutive marks should be equal to the class size.
2. No It is true only when the class sizes are the same.
3. x = 20   4. Median = 12, Mode = 10   5. (ii) 2 children
6. (ii) Yes, frequency polygon.
   (iii) No, this frequency includes all leaves whose lengths are from 14.5 mm to less than 153.5 mm.
7. Mean = 72.2   8. Class size = 10.
10. 38

Previous Years Question Bank

1. The following are the runs made by 18 players in one day cricket match: **[CBSE Board, 2016-17]**

   79, 28, 45, 99, 3, 46, 8, 0, 3, 7, 24, 73, 122, 46, 27, 16, 7, 3

   Form a frequency table for above data with equal class intervals one of these being 0-25 (excluding 25).

2. The mean of 16 numbers is 8. If 2 is added to every number, what will be the new mean?

   [CBSE Board, 2016-17]

3. Represent the following data by means of histogram and frequency polygon.   **[CBSE Board, 2016-17]**

Weekly Wages (in thousand Rs)	10-15	15-20	20-25	25-30	30-40	40-60	60-80
No. of employees	7	9	8	5	12	12	8

4. Write the class size and class mark of the class 20-25.   **[CBSE Board, 2016-17]**

5. If the mode of the data 3, 9, 6, 9, 4, 3, x – 4 is 9, then find x.   **[CBSE Board, 2016-17]**

6. The mean of seven numbers is 24. If out of these seven numbers, the mean of first four numbers is 23 and the mean of last four numbers is 25.5, then find the 4th number.   **[CBSE Board, 2016-17]**

7. The mark (out of 100) of 80 students of a class are given below. Construct a histogram to represent the data.   **[CBSE Board, 2016-17]**

Marks	10-20	20-30	30-50	50-70	70-100
No. of Students	7	15	18	20	10

8. (a) The observations in ascending order are given below: **[CBSE Board, 2016-17]**

   29, 32, 48, 50, x, x + 2, 72, 78, 84, 95

   If the median of the data is 63, find the unknown observations.

   (b) If the mean of the data $x_1, x_2, x_3, \dots x_n$ is 72, find the mean of the data $3x_1, 3x_2, \dots 3x_n$.

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9. The electricity bills of twenty households in a locality are as follows: **[CBSE Board, 2016-17]**

    375, 415, 525, 275, 815, 720, 1085, 717, 807, 780, 315, 380, 417, 425, 375, 223, 245, 255, 615, 575.

    Construct a frequency distribution table with class size 100.

10. The median of the following observations arranged in ascending order is 24. Find x. 14, 18, x + 2, x + 4,

    30, 34. Using the value of x, find the mean of the above data.   **[CBSE Board, 2016-17]**

11. Convert the following frequency distribution into a continuous grouped frequency table:

Class-Interval	Frequency
150-153	7
154-157	7
158-161	15
162-165	10
166-169	5
170-173	6

    In which intervals would 153.5 and 167.5 be included?   **[CBSE Board, 2016-17]**

12. The following are the runs made by 18 players in one day cricket match: **[CBSE Board, 2016-17]**

    79. 28, 45, 99, 3, 46, 8, 0, 3, 7, 24, 73, 122, 46, 27, 16, 7, 3

    Form a frequency table for above data with equal class intervals one of these being 0-25 (excluding 25).

13. The following runs were scored by all the 11 players of a cricket team during a match:

    36, 55, 12, 110, 14, 72, 69, 20, 18, 25, 0

    Find the mean, median and mode of the data.   **[CBSE Board, 2016-17]**

14. Construct a histogram and frequency polygon for the following frequency distribution:
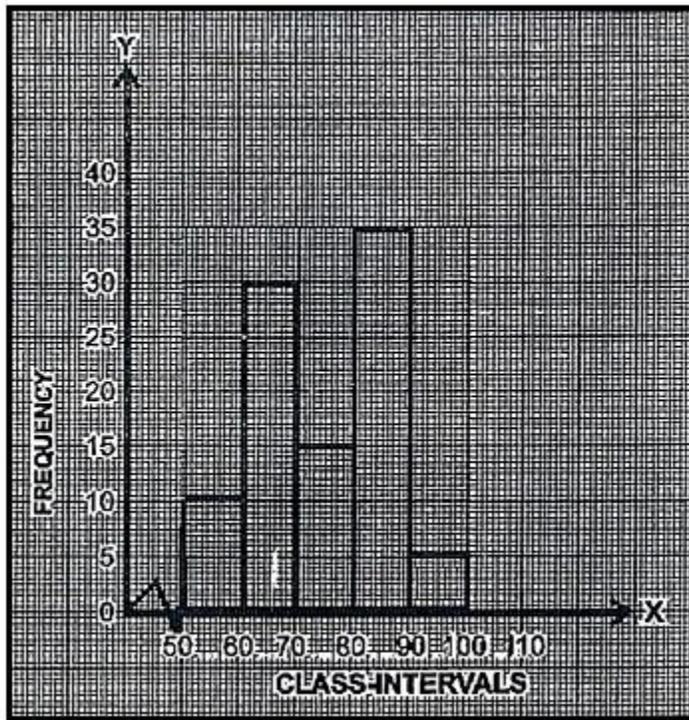
    [CBSE Board, 2016-17]

Weight (in kg)	40-45	45-50	50-55	55-60	60-65	65-70
Number of persons	15	25	28	15	12	5

15. What is the mean of first 10 prime numbers?

16. The distance (in km) of 40 engineers from their residence to their place of work were found as follows:

    [CBSE Board, 2016-17]

5	3	10	20	25	11	13	7	12	31
19	10	12	17	18	11	32	17	16	2
7	9	7	8	3	5	12	15	18	3
12	14	2	9	6	15	15	7	6	12

    Construct a grouped frequency distribution table with class size 5 for the data given above taking the

    first interval as 0-5 (5 not included).

17. Using the given histogram, prepare a grouped frequency distribution table.   **[CBSE Board, 2016-17]**

18. Find value of p if the mean of following data is 40.4:   **[CBSE Board, 2016-17]**

Variable (x)	10	20	30	40	50	60	70
Frequency (f)	3	8	12	5	p	7	5

19. The mean monthly salary of 12 teachers in a school is Rs. 15000. If one teacher retires from the school who gets Rs. 25, 000 per month, what will be the mean monthly salary now?   **[CBSE Board, 2015-16]**

20. In a data, 14 numbers are arranged in ascending order. If the 9th entry is increased by 5, what will be the corresponding effect on the median?   **[CBSE Board, 2015-16]**

21. The mean of monthly salary of the 12 employees of a firm is Rs 14, 500. If one more person joins the firm who gets Rs 18, 400 per month, then what will be the mean monthly salary now.

[CBSE Board, 2015-16]

22. The following table shows the marks scored by students of a class in a chemistry examination (max. marks 35)   **[CBSE Board, 2015-16]**

Marks	0-7	7-14	14-21	21-28	28-35
No. of Students	4	8	12	2	8

Represent the data using a histogram.

Find the mode of this data.

23. Find the mean of first five odd numbers.   **[CBSE Board, 2015-16]**

24. Find the class size of the classes – intervals 0 – 4, 5 – 9, 10 – 14 .... **[CBSE Board, 2015-16]**

25. Find the median of the given data: **[CBSE Board, 2015-16]**

15, 28, 72, 56, 44, 32, 31, 43, & 51.

If 31 is replaced by 46, calculate the new median.

26. Find the mean of first seven even natural numbers.   **[CBSE Board, 2014,17]**

27. If the mean of 7 observations 28, x, 32, 43, x + 2, x + 5, and 45 is 38, find x. Hence, find the median.

[CBSE Board, 2014,17]

28. Find the mean of the following frequency distribution.   **[CBSE Board, 2011-12]**

x:	4	6	9	10	15
f:	5	10	10	7	8

29. The relative humidity (in %) of a certain city for a month of 30 days was as follows

[CBSE Board, 2011-12]

98.1	98.6	99.2	90.3	86.5	95.3	92.9	96.3	94.2	95.1
89.2	92.3	97.1	93.5	92.7	95.1	97.2	91.3	95.2	97.3
96.2	92.1	84.9	90.2	95.7	98.3	97.3	96.1	92.1	89

Construct a grouped frequency distribution table with classes 84 – 86, 86 – 88 etc.

30. The following is the distribution of weights (in kg) of 50 persons :

Weight (in kg) :	50-55	55-60	60-65	65-70	70-75	75-80
Number of persons :	12	10	8	6	9	5

Draw a histogram for the above data   **[CBSE Board, 2011-12]**

31. Find the median of 78, 56, 22, 34, 45, 54, 39, 84, 54   **[CBSE Board, 2011-12]**

32. If the mean of the data $x_1, x_2, x_3, ...x_n$ is 72, find the mean of the data $3x_1, 3x_2, ...3x_n$.

[CBSE Board, 2011-12]

33. In a test given to 12 students, the following marks are recorded :   **[CBSE Board, 2011-12]**

41, 39, 48, 52, 46, 52, 54, 40, 96, 52, 40, 52. Find the mean, median and mode of the data.

34. The monthly profit (in Rs.) of 100 shops are distributed as follows :   **[CBSE Board, 2011-12]**

Profit per shop	0-50	50-100	100-150	150-200	200-250	250-300
No. of shops	12	18	27	20	17	6

Draw a frequency polygon for it.

## Chapter Test

Maximum Marks: 30   **Maximum Time: 1 hour**

1. The mean of 100 observations is 50. If one of the observations, which was 50 is replaced by 150, what will be the resulting mean? **[1]**

2. The means of two groups of 15 and 20 observations are 20 and 25 respectively. Find the mean of all the 35 observations. **[2]**

3. The mean of the following distribution is 50. **[3]**

x	f
10	17
30	5a+3
50	32
70	7a–11
90	19

Find the value of a and hence the frequencies of 30 and 70.

4. The mean marks (out of 100) of boys and girls in an examination are 70 and 73, respectively. If the mean marks of all the students in that examination is 71, find the ratio of the number of boys to the number of girls. **[3]**

5. In fig., there is a histogram depicting daily wages of workers in a factory. Construct the frequency distribution table. **[3]**
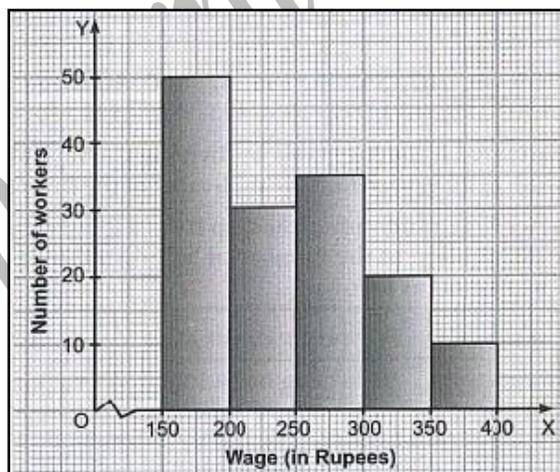
6. Find the median of the following observations: **[3]**

   46, 64, 87, 41, 58, 77, 35, 90, 55, 92, 33. If 92 is replaced by 49, what will be the new median.

7. The ten observations: 6, 14, 15, 17, x + 1, 2x –13, 30, 32, 34, 43 are written in an ascending order. The median of the data is 24. Find the value of x. **[3]**

8. The marks of 30 students in a Mathematics Test are given below:

62, 29, 36, 41, 52, 21, 50, 75, 78, 16, 20, 35, 46, 24, 57, 65, 82, 16, 25, 30, 42, 24, 18, 32, 36, 57, 75, 16, 30, 58

(i) Arrange these marks in a grouped distribution, where one of the groups is 35-45.

(ii) How many students have scored below 55 ?

(iii) How many have scored above 75 ?

(iv) Write the class-size of the distribution.   **[4]**

9. The number of workers in various age groups of an organization is given below:

Age group	10-15	15-20	20-25	25-30	30-35	35-40
Number of persons	15	25	28	15	12	5

Construct a histogram and frequency polygon for the above data.   **[4]**

10. The length of 40 beams of a plant are measured correct to one millimeter, and the obtained data is represented in the following table.

Length (in mm)	118-126	127-135	136-144	145-153	154-162	163-171	172-180
No. of beams	3	5	9	12	5	4	2

(i) Draw a histogram to represent above data.

(ii) Is there any other suitable graphical representation for the same data?

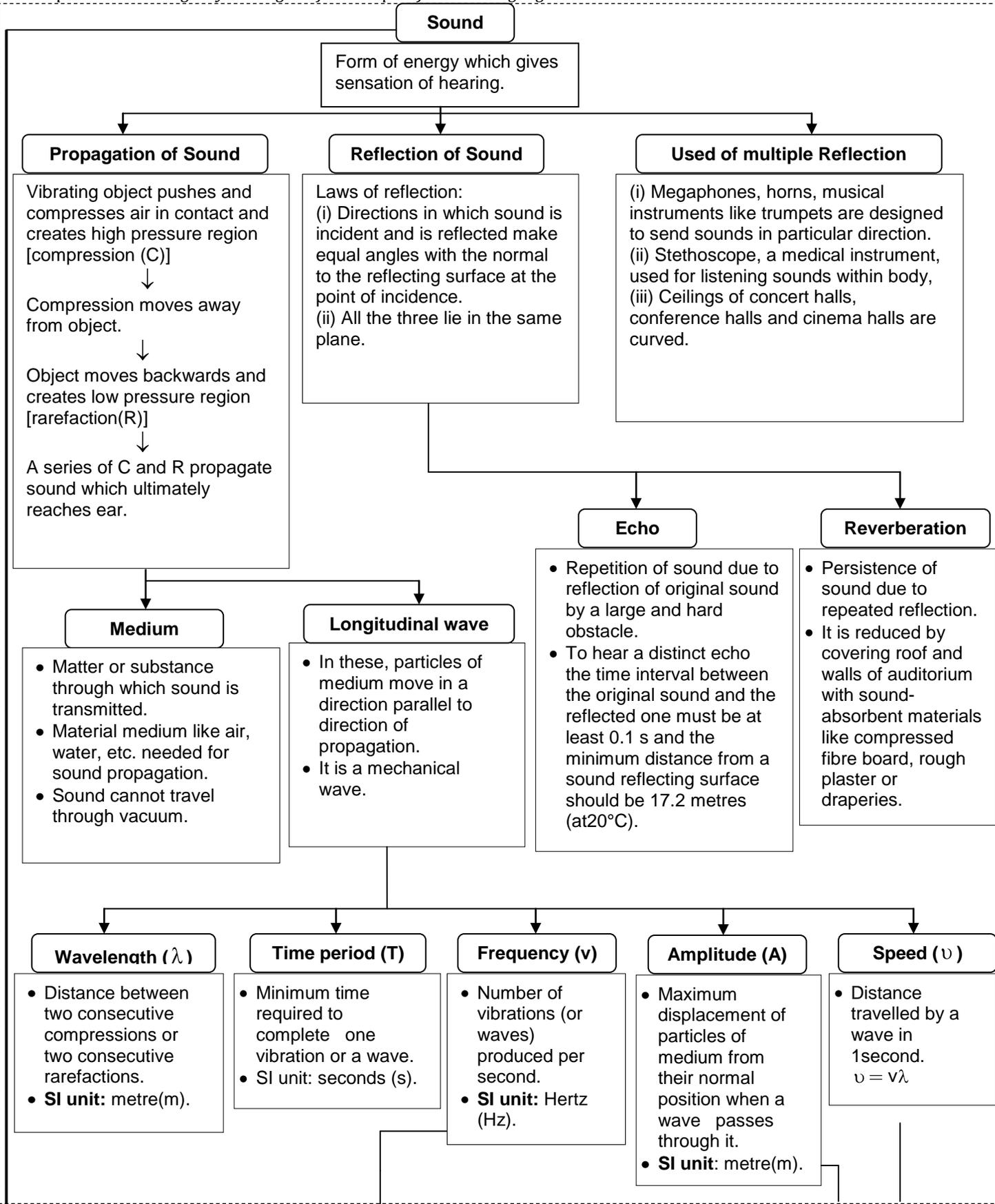(iii) Is it correct to conclude that maximum number of beams are 153 mm long? Why?

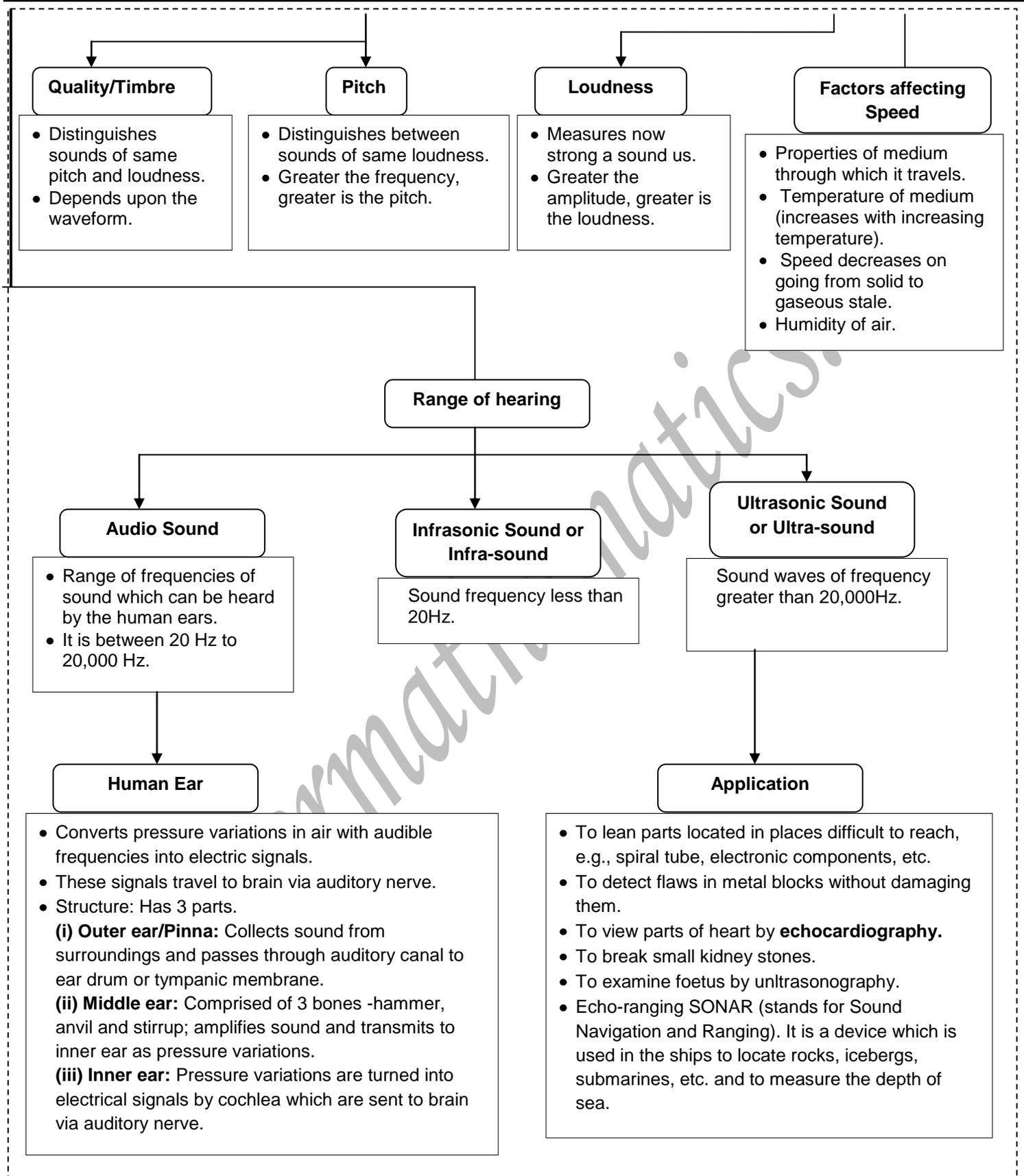**Answers**

1. 51   **2.** 22.857143   **3.** A=5; 28,24   **4.** 2 : 1 **6.** 58,55   **7.** x = 20.
8. (ii) 21   (iii) 2   (iv) 10   **10.** (ii) yes. Frequency polygon   (iii) No.

Topic: **Sound**

Chapter Flowchart
The Chapter Flowcharts give you the gist of the chapter flow in a single glance.

Sound

Form of energy which gives sensation of hearing.

Propagation of Sound

Vibrating object pushes and compresses air in contact and creates high pressure region [compression (C)]
↓
Compression moves away from object.
↓
Object moves backwards and creates low pressure region [rarefaction(R)]
↓
A series of C and R propagate sound which ultimately reaches ear.

Reflection of Sound

Laws of reflection:
(i) Directions in which sound is incident and is reflected make equal angles with the normal to the reflecting surface at the point of incidence.
(ii) All the three lie in the same plane.

Used of multiple Reflection

(i) Megaphones, horns, musical instruments like trumpets are designed to send sounds in particular direction.
(ii) Stethoscope, a medical instrument, used for listening sounds within body,
(iii) Ceilings of concert halls, conference halls and cinema halls are curved.

Echo

- Repetition of sound due to reflection of original sound by a large and hard obstacle.
- To hear a distinct echo the time interval between the original sound and the reflected one must be at least 0.1 s and the minimum distance from a sound reflecting surface should be 17.2 metres (at20°C).

Reverberation

- Persistence of sound due to repeated reflection.
- It is reduced by covering roof and walls of auditorium with sound-absorbent materials like compressed fibre board, rough plaster or draperies.

Medium

- Matter or substance through which sound is transmitted.
- Material medium like air, water, etc. needed for sound propagation.
- Sound cannot travel through vacuum.

Longitudinal wave

- In these, particles of medium move in a direction parallel to direction of propagation.
- It is a mechanical wave.

Wavelength (λ)

- Distance between two consecutive compressions or two consecutive rarefactions.
- **SI unit:** metre(m).

Time period (T)

- Minimum time required to complete one vibration or a wave.
- SI unit: seconds (s).

Frequency (v)

- Number of vibrations (or waves) produced per second.
- **SI unit:** Hertz (Hz).

Amplitude (A)

- Maximum displacement of particles of medium from their normal position when a wave passes through it.
- **SI unit**: metre(m).

Speed (υ)

- Distance travelled by a wave in 1second.
$\upsilon = v\lambda$

Quality/Timbre

- Distinguishes sounds of same pitch and loudness.
- Depends upon the waveform.

Pitch

- Distinguishes between sounds of same loudness.
- Greater the frequency, greater is the pitch.

Loudness

- Measures now strong a sound us.
- Greater the amplitude, greater is the loudness.

Factors affecting Speed

- Properties of medium through which it travels.
- Temperature of medium (increases with increasing temperature).
- Speed decreases on going from solid to gaseous stale.
- Humidity of air.

Range of hearing

Audio Sound

- Range of frequencies of sound which can be heard by the human ears.
- It is between 20 Hz to 20,000 Hz.

Infrasonic Sound or Infra-sound

Sound frequency less than 20Hz.

Ultrasonic Sound or Ultra-sound

Sound waves of frequency greater than 20,000Hz.

Human Ear

- Converts pressure variations in air with audible frequencies into electric signals.
- These signals travel to brain via auditory nerve.
- Structure: Has 3 parts.
  (i) Outer ear/Pinna: Collects sound from surroundings and passes through auditory canal to ear drum or tympanic membrane.
  (ii) Middle ear: Comprised of 3 bones -hammer, anvil and stirrup; amplifies sound and transmits to inner ear as pressure variations.
  (iii) Inner ear: Pressure variations are turned into electrical signals by cochlea which are sent to brain via auditory nerve.

Application

- To lean parts located in places difficult to reach, e.g., spiral tube, electronic components, etc.
- To detect flaws in metal blocks without damaging them.
- To view parts of heart by **echocardiography.**
- To break small kidney stones.
- To examine foetus by unltrasonography.
- Echo-ranging SONAR (stands for Sound Navigation and Ranging). It is a device which is used in the ships to locate rocks, icebergs, submarines, etc. and to measure the depth of sea.

Revision Question Bank

1. A ship on the surface of water sends a signal and receives it back after 4 s from a submarine inside the water. Calculate the distance of submarine from the ship.
    (Velocity of sound in water = 1450 ms⁻¹).

2. A man fires a gun towards a hill and hears its echo after 5 seconds. Then he moves 310 m towards the hill and fires his gun again. This time he hears echo after 3 seconds. Calculate velocity of sound.

3. A man fired a gun standing between two parallel cliffs. Two successive echoes are heard at 4 and 6 s. Calculate the distance between the cliffs. (Speed of sound in air =320 ms⁻¹)

4. A man standing between two cliffs fires a gun and hears echo after every one second. The distance of man from nearer cliff is 170 m. Calculate the distance between two cliffs and the velocity of sound.

5. A man stationed between two cliffs fires a gun. He hears the first echo after 2 seconds and the next after 5 seconds. What is his position between the cliffs and when would he hear the third echo ? (Velocity of sound in air = 340 ms⁻¹).

6. If some water waves are found to have a wavelength of 2 cm and a frequency 10 Hz, calculate the speed of the waves.

7. A body, vibrating with a frequency of 1500 Hz, sends waves of 0.05 m long. Calculate the velocity of sound.

8. Two sound waves in air have wavelength ratio 1 : 3. Find their frequency ratio.

9. The frequency of a tuning fork is 374 Hz, the velocity of sound in air is 352 ms⁻¹. Find how far the sound has travelled while the fork complete 36 vibrations

10. A source produces 15 crests and 15 troughs in 3 seconds. When the second crest is produced, the first is 2 cm away from the source. Calculate
    (i) the wavelength,   (ii) the frequency, and   (iii) the wave speed.

Answers
1. 2900m   **2.** 310 m/s   **3.** 1600m   **4.** (i) 340m (ii) 340m/s
5. (i) distance from nearest d if = 240m (ii) after 7 seconds   **6.** 20m/s
7. 75m/s   **8.** 3:1   **9.** 33.9m   **10.** (i)2 cm (ii)5 Hz.(iii) 10 cm/s

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MCQ's [Practical Based Questions]

EXPERIMENT: To verify the law of conservation of mass.

1. To verify the law of conservation of mass, the solutions of barium chloride and sodium sulphate taken in a conical flask should not be mixed before weighing the flask to find out initial mass because:

    (a) the mass will increase on mixing.   (b) the mass will decrease on mixing.

    (c) the products will be formed on mixing.

    (d) the solutions do not react with each other on mixing.   **[CBSE Board, 2012-13]**

2. To verify the law of conservation of mass in the case of a chemical change, sodium sulphate and barium chloride should be used in the form of :   **[CBSE Board, 2012-13]**

    (a) fine powder   (b) large crystals   (c) molten liquid   (d) aqueous solutions

3. The laboratory apparatus that is required to conduct the experiment to verify the law of conservation of mass in a chemical reaction is :

    (a) Conical flask, cork, ignition tube, thread

    (b) Beaker, U-tube, thread, cork

    (c) Round bottom flask, ignition tube, thread, petri dish

    (d) Beaker, ignition tube, thread, cork   **[CBSE Board, 2012-13]**

4. Colours of solid barium chloride and sodium sulphate respectively are :   **[CBSE Board, 2012-13]**

    (a) white and blue   (b) white and white   (c) blue and white   (d) green and blue

5. In the experiment to verify the law of conservation of mass weighing of the :

    (a) reactants is only required   (b) products is only required

    (c) reactants and the products is a must   (d) contents is not essential   **[CBSE Board, 2012-13]**

6. Which amongst the following is/are incorrect statement(s) for the given experimental setup?
    (A) On mixing X and Y, white precipitate is formed.
    (B) One mixing X and Y, brown colour gas is evolved.
    (C) Mass of the conical flask before and after the reaction is not equal.
    (D) Mass of the conical flask before and after the reaction is equal.

    (a) Only (A)   (b) Only(B)   (c) (B) and (C)   (d) (B)and(D)
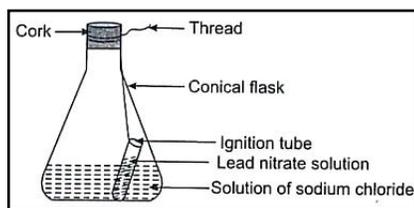
7. In a chemical reaction, A + B are reactants and C + D are products. According to law conservation of mass, Mass of: **[CBSE Board, 2012-13]**

    (a) A = C   (b) A + C = B + D   (c) A + B = C + D   (d) B = D

8. A reaction between barium chloride and sodium sulphate was carried out in a sealed conci flask. The masses of the reactants and the products were measured carefully. After the experime it was concluded that: **[CBSE Board, 2013-14]**

(a) Mass of barium chloride = Mass of sodium chloride

(b) Mass of sodium sulphate = Mass of barium sulphate

(c) Mass of (barium chloride + sodium sulphate) = Mass of (barium sulphate + sodium chloride

(d) Mass of (barium chloride + sodium chloride) = Mass of (barium sulphate + sodium sulphate

9. A change in physical state of a substance can be brought about:

(a) only when energy is given to the substance.

(b) only when energy is taken out from the substance.

(c) when energy is either given to or taken out from the substance.

(d) without any energy change. **[CBSE Board, 2012-13]**

10. To verify the law of conservation of mass, which one is the correct statement for the following chemical reactions ?

(A) Burning of 16 g of coal in 32 g of oxygen.

(B) Mixing of 208.5 g of BaCl2 solution and 142 g of Na2SO4 solution.

(a) Law of conservation of mass is not followed in these two cases.

(b) Law of conservation of mass is followed in (A) but not in (B).

(c) Law of conservation of mass is followed in both (A) and (B).

(d) Law of conservation of mass is followed in (B) but not in (A). **[CBSE Board, 2012-13]**

Answers

1.	C	2.	D	3.	A	4.	B	5.	C
6.	C	7.	C	8.	C	9.	C	10.	c

Previous Years Question Bank

1. (a) Establish the relation between velocity of a wave, its wavelength and frequency.

[CBSE Board, 2016-17]

(b) Flash and thunder are produced simultaneously, but thunder is heard a few seconds after the flash is seen. Why?

2. (a) The graph given below represent two different human voices. Out of a and b identify the graph that corresponds to comparatively shrill voice. Give reason for your answer.   **[CBSE Board, 2016-17]**
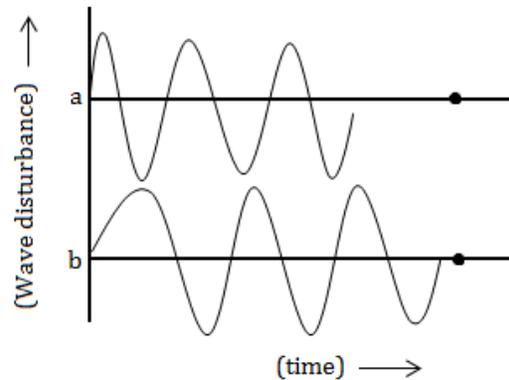
(b) Define wavelength and pitch. Write the relation of the quantity that determines pitch with wavelength and velocity of a wave.

3. (a) The sound of an explosion on the surface of a lake is heard by a boatman 100m away and a diver 100m below the point of explosion. Which of the two persons mentioned (boatman or diver) would hear the sound first and why? Explain.   **[CBSE Board, 2016-17]**

(b) Why do we hear the sound produced by the humming bees while sound of vibrations of a simple pendulum is not heard?

4. An echo of a sound is heard after 3 seconds. Find the distance of the reflecting surface from the source if the speed of sound in air is 340 m/s.   **[CBSE Board, 2016-17]**

5. A person when he standing between two vertical cliffs such that he was 640 m away from the nearest cliff when he shouted, he heard the first echo after 4 seconds and the second echo 3 seconds later. Calculate   **[CBSE Board, 2016-17]**

(a) the velocity of sound in air, and   (b) the distance between the cliffs

6. (a) Name the physical quantity described by   **[CBSE Board, 2016-17]**

(i) maximum displacement of a particle from its mean position.

(ii) distance between two consecutive crests.

(b) Identify the characteristics of sound which depend respectively on amplitude and frequency.

7. What is meant by sound board? Give their importance.   **[CBSE Board, 2016-17]**

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8. How does the sound produced by a musical instrument, reach to your ears? Astronauts needs radio telescopes to talk with each other on moon. Why? **[CBSE Board, 2016-17]**

9. (a) A stone is dropped on the surface of water in a pond. Identify and define the type of waves produced.

(b) Define wavelengths and amplitude. Show the two in a graphical diagram of a wave

[CBSE Board, 2016-17]

10. A boy stands at one end of a corridor, both the doors of which are closed. When he claps the echo of the clap continues for a new seconds with decreasing loudness. Why? **[CBSE Board, 2016-17]**

11. Define frequency and wavelengths with reference to sound. Explain what is echo. Write full form of SONAR. Give two applications of ultrasound. **[CBSE Board, 2016-17]**

12. On which day, a hot day or a cold day, an echo is heard sooner. Why? **[CBSE Board, 2016-17]**

13. (a) Hoes does the velocity of sound change in air with change in temperature?

(b) The shortest wavelength of the ultrasonic wave that a bat emits is 1.70mm. What is the frequency of these waves? Speed of sound in air at room temperature is 340 ms/sec.

(c) Explain how does a bat search its prey in dark. **[CBSE Board, 2016-17]**

14. Identify the part producing sound in the following musical instruments: **[CBSE Board, 2016-17]**

(a) Tabla   (b) Mouthorgan   (c) Veena

Name the type of wave produced in each case.

15. (a) Establish a relationship between speed of sound, its frequency and wavelength.

[CBSE Board, 2016-17]

(b) If the velocity of sound in air is 340m/sec. Find:

(i) frequency when wavelength is 0.65 m   (ii) wavelength when frequency is 400 Hz.

16. State the laws of reflection of sound waves. **[CBSE Board, 2016-17]**

17. (a) A particular transmitter of Aakashvani broadcasts at 420.5 m wavelength. Given the speed of radio waves 3×10^8 ms^{-1}. Calculate the frequency at which the radio station broadcasts its programme.

(b) What is the direction of oscillation of the medium particles through which is a:

(i) transverse wave is propagating?   (ii) longitudinal wave is propagatin? **[CBSE Board, 2016-17]**

Give one example of each.

18. (a) What is the meant by the characteristics "quality" of sound. **[CBSE Board, 2016,17]**

(b) Name any two other characteristics of sound and the factors on which they depend.

(c) Distinguish between musical sound and noise. Write any one difference.

19. Sound of explosions taking place on other planets is not heard by a person on the earth. Explain why?

[CBSE Board, 2015-16]

20. David while watching 'National Geographic' channel on television in which it was shown that Bats were easily flying during the night, He did not understand the concept and for this he surfed on internet, and finally found the answer th.it bats use ultrasound to fly and search their prey at night-

    (a) What is ultrasound ? Slate its one application,   **[CBSE Board, 2015-16]**

    (b) State- the principle used by bats.

    (c) What value of David's Nature is depicted by the way he collected information?

21. Name two sound waves inaudible to human beings. Give their range of frequencies.

                                                                    [CBSE Board, 2015-16]

22. (i) On which characteristics of a sound wave do the following properties depend   :

    (a) Loudness   (b) Pitch   **[CBSE Board, 2015-16]**

23. (ii) A man stands in between two high rise buildings and blows a whistle. He hears two successive echoes after 0.8 seconds and 2.4 seconds. Calculate the distance between the buildings.

    [Speed of sound =330m/s]   **[CBSE Board, 2015-16]**

24. (i) Represent graphically 2 sound waves having same amplitude but different frequencies.

    (ii) A source of sound produces 20 compressions and 20 rarefactions in 0.2 seconds. The distance between a compression and the successive rarefaction is 50 cm. Find the wavelength and frequency of the wave.   **[CBSE Board, 2015-16]**

25. How multiple echoes of a single sound be produced? Give example to justify your answer.

                                                                    [CBSE Board, 2015,16]

26. (a) How temperature effects the velocity sound?

    (b) Define velocity of sound and time period.   **[CBSE Board, 2015-16]**

27. An observer standing at a seacoast observes 60 waves reaching the coast per minute. If the wavelength of a wave is 10 m., find the velocity of the wave.   **[CBSE Board, 2015-16]**

28. A man has an audible range from 20 Hz to 20 kHz. What are the wavelengths of sound in air corresponding to these two frequencies. (Speed of sound in air is 344 m/s.)   **[CBSE Board, 2015,16]**

29. (a) When a sound is reflected from a distant object, an echo is heard. Let the distance between the reflecting surface and the source of sound production remain the same, will you still hear an echo on a hotter day? Explain with reason.

    (b) What is reverberation? How can it be reduced?   **[CBSE Board, 2015,16]**

30. When a Sound is reflected from a distant object, an echo is produced and heard on a winter night. Will you hear the echo of the same sound on a summer day if the distance between reflecting surface and the source of sound remains the same. Justify your answer.   **[CBSE Board, 2015,16]**

31. Amit is viewing live telecast of an India-Srilanka match on his TV screen. He saw a player hitting a boundary. He observed the he could see the ball racing towards the boundary first and then heard the sound. produced by ball striking the bat a bit later. Why? **[CBSE Board, 2014-15]**

32. (a) What is a stethoscope? **[CBSE Board, 2014-15]**

(b) Which principle of sound is made use of by a stethoscope?

(c) What is the function of ear drum?

33. The units of certain parameters of a mechanical waves are given : Name the corresponding parameter of a mechanical wave and define each, **[CBSE Board, 2014-15]**

(a) metre　　　　　(b) meter per second,

34. (a) Why sound waves are called pressure waves? **[CBSE Board, 2014-15]**

(b) State the SI units of wavelength and frequency.

35. If you hear thunder 7 sec after you see the lightning, how far are you from the place where lightning occurred ? (Speed of sound in air = 344 ms $^{-1}$) **[CBSE Board, 2015,17]**

36. Establish the relation $v = n\lambda$ between wavelength, frequency and velocity of a wave where symbols have their usual meanings. **[CBSE Board, 2014-15]**

37. Represent on a graph: **[CBSE Board, 2014-15]**

(a) Two sound waves having different amplitudes and also different wavelengths.

(b) A submarine emits a sonar pulse, which returns from an underwater cliff in 1.2 sec. If the speed of sound in sea water is 1530 m/s how far is the cliff from the submarine?

38. What is distinct echo? Show that the reflecting surface must be situated at some minimum distance from the listener to hear a distinct echo. Calculate this distance at room temperature.**[CBSE Board, 2014-15]**

39. A SONAR echo takes 3 sec to return from a whale. How for away is the whale from SONAR? Speed of sound in sea water is 1440 m/sec. **[CBSE Board, 2014-15]**

40. (a) Differentiate between loudness and intensity of sound.(Two point)

(b) Clarify difference between soft and loud sound. **[CBSE Board, 2014-15]**

41. If the time period of small ripples on water is 0.1 sec. and their wavelength is 6 cm. Find the speed of the ripple. **[CBSE Board, 2014-15]**

42. State reason for the following statements: **[CBSE Board, 2014-15]**

(a) Sound waves are called mechanical waves.　　(b) Ceilings of concert halls are curved,

(d) Curved sound board is used in a big hall.

43. Rushil's friend is having a party at home and is playing loud music using a loudspeaker. Rushil requested him to lower down the volume as it was disturbing others. **[CBSE Board, 2014-15]**

(a) What is a loudspeaker ? Explain its working ?　(b) What values are reflected by Rushil's conduct ?

44. In a tank, 10 ripples are produced in one second. If the distance between a crest and trough is 10 cm, find : **[CBSE Board, 2014-15]**

(a) wavelength,   (b) frequency   (c) velocity of the wave

45. Two waves are shown below :   **[CBSE Board, 2014-15]**
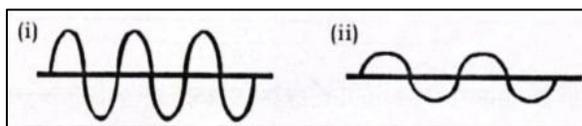
(a) Which of the two corresponds to low pitched sound.

(b) Identify the characteristic of sound the graphs represent. Define that characteristics. For which graph the value of this characteristic is more ?

(c) How is it possible to identify sounds of two musical instruments producing sounds of same intensity without seeing them

46. Rahul claps near a cliff and hears the echo after 6 sec. Find the distance of cliff from him ? Given speed of sound in air is 346 m/sec.   **[CBSE Board, 2014-15]**

47. (a) Draw a diagram showing sound propagation in air as density or pressure variations.

(b) Also show the amplitude and wavelength in the diagram. Write their SI units.

[CBSE Board, 2014-15]

48. Explain with the help of a diagram, how defects in a metal block can be detected using ultrasound.

[CBSE Board, 2014-15]

49. (a) Distinguish between transverse waves and longitudinal waves (three points)

(b) A person is listening to the sound of 50 Hz sitting at a distance of 450 m. from the source of sound. What is the time interval between successive compressions from the source.   **[CBSE Board, 2014-15]**

50. (a) What is meant by audible range of sound ?   Mention the range of frequency above which human beings cannot hear the sound produced,   **[CBSE Board, 2014-15]**

(b) How bats can detect their prey in dark?

51. (a) Distinguish between Music and Noise. (Mention any three points).   **[CBSE Board, 2014-15]**

(b) Name two animals who use ultrasound for navigation and location of food in the dark.

State the process.

52. Draw a diagram to show the compressions and rarefactions formed during the "propagation of longitudinal waves. Hence define the wavelength of a longitudinal wave.   **[CBSE Board, 2014-15]**

53. What is echo? What are the necessary conditions for echo? We cannot hear echo in a small room having some furniture in it. Why?   **[CBSE Board, 2014-15]**

54. Draw two separate diagrams to represent each of the following cases :   **[CBSE Board, 2014-15]**

(a) Two sound waves having the same amplitude but different frequencies.

(b) Two sound waves having the same frequency but different amplitudes.

(c) Two sound waves having different amplitudes and also different wavelengths.

55. Write full form of acronym SONAR. How the method of echo - ranging is used to determine the depth of the sea.   **[CBSE Board, 2014-15]**

56. (a) A boy watching the Dussehra celebrations from a distance sees the effigy of Ravana burst into flames and hears the explosion associated with it after 2 seconds. How far was he from the effigy if the speed of sound in air is 335m/s?   **[CBSE Board, 2013-14]**

(b)What is the average audible range of human ear?

(c)Which medical instrument is used for listening to sound produced inside the body?

57. (a) Which characteristic of the sound helps you to identify your friend by his voice while sitting with others in a dark room?   **[CBSE Board, 2013-14]**

(b) Two children are at the opposite ends of an aluminium pipe. One strikes the end of the

pipe with a stone. Find the ratio of times taken by the sound wave in air and in aluminium to reach the second child.

(Speed of sound (i)in aluminium = 6420 m/s (ii) in air = 344 m/s)

58. (a) The sound of which of the following frequencies is audible to human ears. 2 Hz, 5 Hz, 20 Hz, 200 Hz, 2000 Hz   **[CBSE Board, 2013-14]**

(b) How moths of certain families are able to escape capture?

59. With reference to sound what do you mean by frequency, wavelength and echo?

[CBSE Board, 2013-14]

Chapter Test

Maximum Marks: 30   **Maximum Time: 1 hour**

1. How does the sound produced by a vibrating object in a medium reach your ear? **[2]**

2. Why are the ceilings of concert halls curved? **[2]**

3. What is reverberation? How can it be reduced? **[2]**

4. How do bats use ultrasound to catch a prey? **[2]**

5. Explain the working and application of a **SONAR**? **[2]**

6. When a sound is reflected from a distant object, an echo is produced. Let the distance between the reflecting surface and the source of sound production remains the same. Do you hear echo sound on a hotter day? **[2]**

7. A longitudinal wave of wavelength 1 cm travels in air with a speed of 330 m/s. Calculate the frequency of wave. Can this wave be heard by a normal human body? **[2]**

8. Name the characteristic of sound, **[2]**
   (i) which helps to distinguish between a man's voice and a women's voice, even without seeing them?
   (ii) which helps to recognized the voice of our friend?

9. A stone is dropped from the top of a tower 500 m high into a pond of water at the base of the tower. When is the splash heard at the top? Given, g =10 ms^{-2} and speed of sound = 340 ms^{-1}. **[3]**

10. A sound wave has a frequency 2 kHz and wavelength 40 cm. How long will it take to travel 1.6 km? **[3]**

11. Differentiate between sound waves and light waves? **[3]**

12. Explain how the human ear works? **[5]**

Answers

7. Frequency = 33000 Hg.   **8.** (i) Pitch (ii) Quality   **9.** (i) After 11.47 second

10. 2 seconds