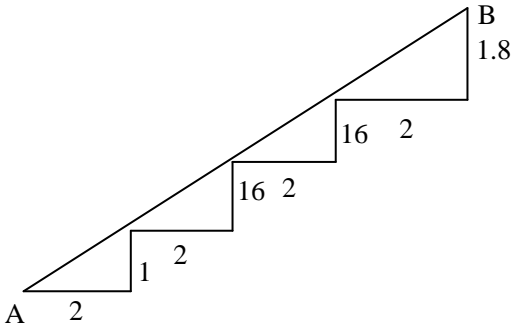




9. Write the formula for finding the curved surface of the frustum of a cone having slant height  $l$  and the radii of its circular ends as  $R$  and  $r$ .



10. There is a staircase as shown in the fig. The length of the distance between A and B is:  
 (a) 5 (b) 10 (c) 15 (d) 20

**(SECTION B)**

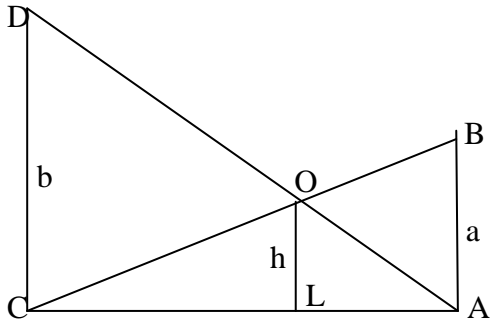
11. If  $u_i = \frac{x_i - 100}{20}$  where  $x_i = (i = 1, 2, 3 \dots)$  are the class marks of a grouped data and  $f_i$  are the corresponding frequencies. If  $\sum f_i = 200$  and  $\sum f_i u_i = 12$ , find  $\bar{x}$ .
12. A card is drawn at random from well shuffled deck of playing cards. Find the probability that the card drawn is (i) a card of spade or an ace. (ii) a red king (iii) neither a king nor a queen (iv) either a king or a queen.
13. A hemispherical bowl of internal diameter 36cm is full of some liquid. This liquid is to be filled in cylindrical bottles of radius 3cm and height 6cm. Find the number of bottles needed to empty the bowl.
14. Without using trigonometric tables evaluate;  

$$3 \left( \frac{\sin 36^\circ}{\cos 54^\circ} \right)^2 - 2 \left( \frac{\tan 18^\circ}{\cot 72^\circ} \right)^3 + 2 \tan 13^\circ \cdot \tan 21^\circ \cdot \tan 30^\circ \cdot \tan 69^\circ \cdot \tan 77^\circ$$
15. Find the roots of the equation  $ax^2 + bx + c = 0$  by method of completing the squares.

**(SECTION C)**

16. Draw the graphs of following equations:  
 $2x - y - 2 = 0$ ;  $4x + 3y - 24 = 0$ ;  $y + 4 = 0$ . Obtain the vertices of the triangle so obtained.  
 OR Solve the system of equation:  $\frac{bx}{a} - \frac{ay}{b} + a + b = 0$ ;  $bx - ay + 2ab = 0$ .
17. A passenger train takes 2 hours less for a journey of 300km. If its speed is increased by 5km/hr from its original speed. Find the original speed of the train.
18. On selling a T.V. at 5% gain and a fridge at 10% gain, a shopkeeper gains Rs2000. But if he sells the T.V. at 10% gain and the fridge at 5% loss, he gains Rs. 1500 on the transaction. Find the actual price of T.V. and fridge.

19. 150 workers were engaged to finish a piece of work in a certain number of days. Four workers dropped the second day, four more workers dropped in the third day and so on. It takes 8 more days to finish the work now. Find the number of days in which the work was completed.



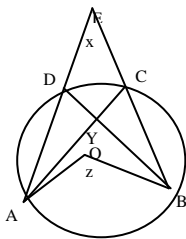
20. Two poles of height  $a$  metre and  $b$  metre are  $AC$  metre apart. Prove that height of point of intersection of the lines joining top of each pole to the foot of the opposite pole is given by  $\frac{1}{h} = \frac{1}{a} + \frac{1}{b}$

21. Prove that coordinates of the point dividing the line segment joining the points  $(x_1, y_1)$  and  $(x_2, y_2)$  internally in the ratio  $m_1:m_2$  are given by  $\left\{ \frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2} \right\}$

22. If  $x \sin^3 \alpha + y \cos^3 \alpha = \sin \alpha \cos \alpha$  and  $x \sin \alpha = y \cos \alpha$ , prove that  $x^2 + y^2 = 1$

OR

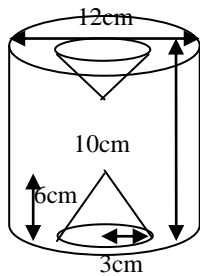
Prove the identity 
$$\frac{\cot \theta + \operatorname{cosec} \theta - 1}{\cot \theta + \operatorname{cosec} \theta + 1} = \frac{1 + \cos \theta}{\sin \theta}$$



23. 'O' is the centre of the circle in the given figure, Prove that  $\angle x + \angle y = \angle z$

OR If two chords of a circle are unequal then prove that longer chord is nearer to the centre whereas smaller chord is farther from the centre of the circle.

24. Draw a circle of radius 4cm. Take a point P outside the circle. Without using the centre of the circle, draw two tangents to the circle from point P.



25. A metallic cylinder has the diameter 12cm and height 10cm. It is made of iron. Two conical holes are drilled as shown in the figure. The radius of the conical hole is 3cm and depth is 6cm. Calculate the volume and the surface area of the remaining cylinder. **OR**

A hollow cone is cut by a plane parallel to its base and the upper portion is removed. If the curved surface of the remainder is  $\frac{8}{9}$  of the curved surface of the whole cone, find the ratio of the line segment into which the cone's altitude is divided by the plane.

**(SECTION D)**

26. An iron pillar has some part in the form of a right circular cylinder and remaining in the form of a right circular cone. The radius of the base of each of cone and cylinder is 8cm. The cylindrical part is 240cm high and the conical part is 36cm high. Find the weight of the pillar if one cubic cm of iron weighs 7.8gms.
27. If the angle of elevation of a cloud from a point  $h$  meters above a lake is  $\alpha$  and the angle of depression of its reflection in the lake is  $\beta$ , prove that height of the cloud is  $\frac{h(\tan \beta + \tan \alpha)}{\tan \beta - \tan \alpha}$  **OR**

If the angle of elevation of a cloud from a point 60metres above a lake is  $30^\circ$  and the angle of depression of its reflection in the lake is  $60^\circ$ , find that height of the cloud.

28. Prove that the square of the hypotenuse is equal to the sum of the squares of the other two sides.

Using the above statement solve the following:

In an obtuse triangle ABC, obtuse angled at B. If  $AD \perp CB$ , prove that  $AC^2 = AB^2 + BC^2 + 2BC \cdot BD$

29. Following is the age distribution of a group of students. Draw the cumulative frequency polygon, cumulative frequency curve (less than type) and hence obtain the median value.

CLASS INTERVAL	FREQUENCY
5-6	40
6-7	56
7-8	60
8-9	66
9-10	84
10-11	96
11-12	92
12-13	80
13-14	64
14-15	44
15-16	20
16-17	08

**30.** A pool is filled with three pipes. The first two pipes, operating together, fill the pool in as much time as the third pipe alone takes to fill it. The second pipe fills the pool 3 hours faster than the first pipe and 1 hour slower than the third pipe. How long would each pipe alone take to fill the pool?

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