

WINTER-HOLIDAY HOMEWORK

CLASS - X

Maths

Do all the questions in a separate small notebooks or on A4 sheets.

Q1) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.

Q2) Prove the following identities:-

a.) 
$$\frac{\sec \theta - \tan \theta}{\sec \theta + \tan \theta} = 1 - 2 \sec \theta \tan \theta + 2 \tan^2 \theta$$

b.) 
$$\frac{\tan \theta - \cot \theta}{\sin \theta \cos \theta} = \sec^2 \theta - \operatorname{cosec}^2 \theta = \tan^2 \theta - \cot^2 \theta$$

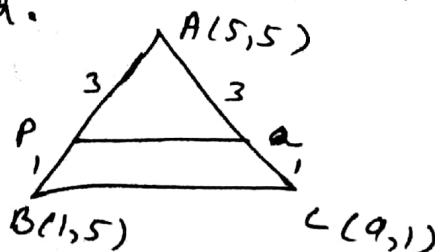
Q3) If  $\sec \theta + \tan \theta = x$ , obtain the values of  $\sec \theta$ ,  $\tan \theta$  and  $\sin \theta$ .

Q4) In an A.P., the sum of first  $n$  terms is  $\frac{3n^2}{2} + \frac{13}{2}n$ . Find its 25<sup>th</sup> term. [Ans 80]

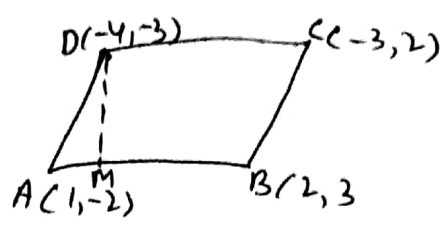
Q5) If  $A$ ,  $2A - 1$  and  $2A + 1$  are three consecutive terms of an AP, the value of  $A$  is :-

- a) -2      b) 3      c) -3      d) 6

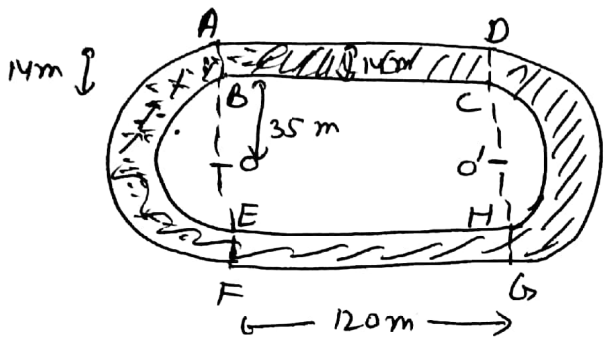
Q6) The vertices of a  $\triangle ABC$  are  $A(5,5)$ ,  $B(1,5)$  and  $C(9,1)$ . A line is drawn to intersect sides  $AB$  and  $AC$  at points  $P$  and  $Q$  respectively, such that  $\frac{AP}{PB} = \frac{AQ}{QC} = \frac{3}{4}$ . Find the length of the line segment  $PQ$ .



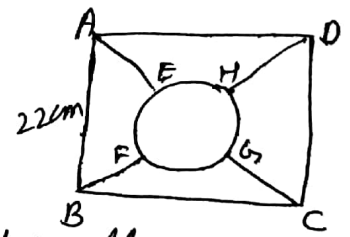
Q7) If the points  $A(1, -2)$ ,  $B(2, 3)$ ,  $C(-3, 2)$  and  $D(-4, -3)$  are the vertices of parallelogram  $ABCD$ , then taking  $AB$  as the base, find the height of the parallelogram.



Q8.) An athletic track 14 m wide consists of two straight sections 120 m long joining semi circular ends whose inner radius is 35 m. Calculate the area of shaded region.



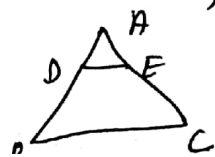
Q9.) In fig., the square  $ABCD$  is divided into five equal parts, all having same area. The central part is circular and the lines  $AE, GC, BF$  and  $HD$  lie along the diagonals  $AC$  &  $BD$  of the square. If  $AB = 22$  cm, find  
 i) the circumference of the central part.  
 ii) the perimeter of the part  $ABEF$ .



Q10.) Divide a line segment of length 9 cm internally in the ratio 4:3. Also, give justification to the construction.

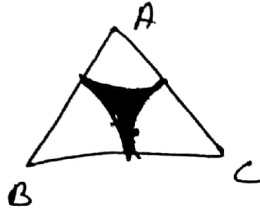
Q11.) Draw a right triangle  $ABC$  in which  $AB = 6$  cm,  $BC = 8$  cm &  $\angle B = 90^\circ$ . Draw  $BD$  perpendicular from  $B$  on  $AC$  and draw a circle passing through the points  $B, C$  and  $D$ . Construct tangents from  $A$  to this circle.

Q12.) In  $\triangle ABC$ ,  $DE$  is parallel to base  $BC$ , with  $D$  on  $AB$  and  $E$  on  $AC$ . If  $\frac{AD}{DB} = \frac{2}{3}$ , find  $\frac{BC}{DE}$ .



Q13) If  $\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$  is the Arithmetic Mean between  $a$  and  $b$ . Then, find the value of  $n$ .

Q14) In fig, ABC is an equilateral triangle of side 8 cm. A, B and C are the centres of circular arcs of radius 4 cm. Find the area of the shaded region correct upto 2 decimal places. (Take  $\pi = 3.142$  and  $\sqrt{3} = 1.732$ )



Q15) Prove that the parallelogram circumscribing a circle is a rhombus.

Answers

Ans(3)  $\sec \theta = \frac{1}{2} \left( x + \frac{1}{x} \right)$  ;  $\tan \theta = \frac{1}{2} \left( x - \frac{1}{x} \right)$  ;  $\sin \theta = \frac{x^2 - 1}{x^2 + 1}$

Ans(4) 80

Ans(5) 6

Ans(6)  $3\sqrt{5}$  units

Ans(7)  $\frac{24}{\sqrt{6}}$  units

Ans(8)  $7056 \text{ m}^2$

Ans(9) i) 34.88 cm ii) 150.64 cm

Ans(12)  $\frac{5}{2}$

Ans(13)  $n = 0$

Ans(14)  $2.576 \text{ cm}^2$

~~Ans~~