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## UR PERCENTILE

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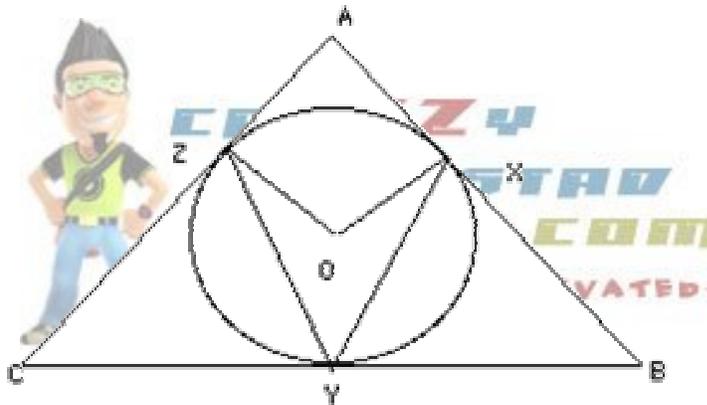
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LESSON P1057  
Minutes

Time Limit : 20

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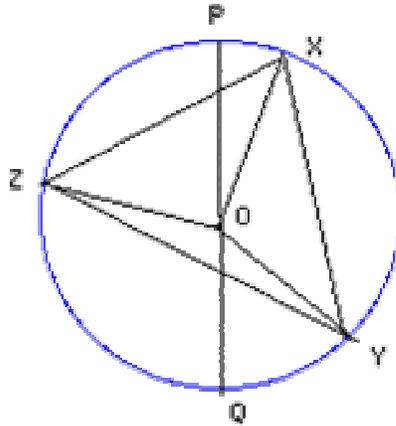
Q1 To Q3 are based on the diagram and the information provided about it .



ABC is a triangle with sides  $AC=12$ ,  $CB=16$ ,  $AB=15$ . A circle with center  $O$  touches the sides of the triangle as shown in the figure. Angle  $ZOX$  is  $110$  degrees, angle  $ZCY$  is  $40$  degrees, angle  $YZO$  and  $OXY$  are equal in measure.

- Q1. Find the length of  $ZC$  ?
- Q2. What is the measure of angle  $ABC$ ?
- Q3. What is the measure of angle  $OXY$ ?

Q4 to Q6 are based on the following diagram and the information provided about it.



Angle  $YOX = 80$  degrees

Angle  $ZYO = 20$  degrees

PQ is the diameter of length 56 cms.

Q4. Find Angle  $ZXO$

Q5. What is the sum of the area of sector  $POX$  and  $YOQ$  ?

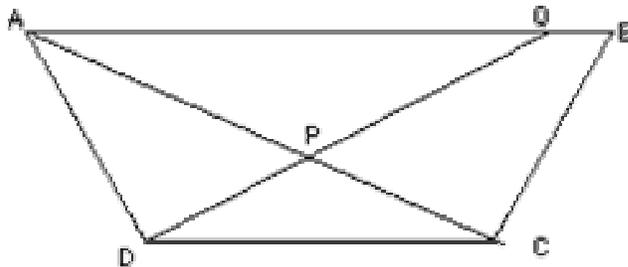
Q6. Find angle  $OZX$

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Q7 is based on the diagram and the information provided about it below.



Q7. ABCD is a trapezium with side AB parallel to side DC.

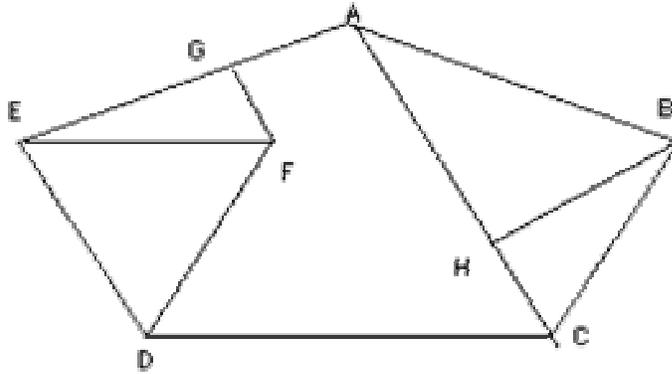
Angle  $DPA = 86$

Angle  $PDC = 50$

Angle  $ACB = 2 \times$  Angle  $ACD$

Find measure of angle  $ABC$  ?

Q8 to Q 11 are based on the diagram and the information provided about it below.



$EG=2 \cdot AG$ ,  $HB= 2 \cdot EG$ ,  $DC= 6 \cdot AG$

EGF is a right angle triangle with angle  $\angle EGF = 90$  degrees and  $GF=3$  cms

EFG is a equilateral triangle with perimeter 15 cms.

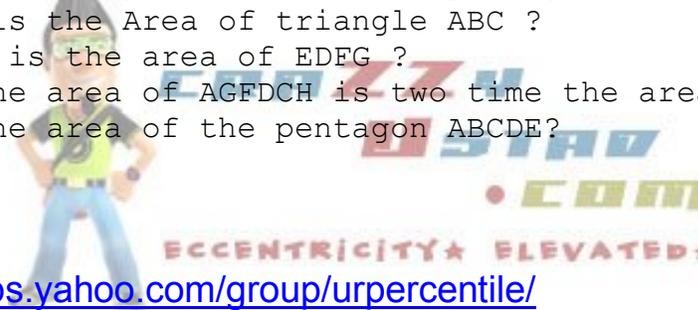
Triangle AHB and HBC are right angle triangle with AHC as straight line where AH is 2.5 times of HC and AC is equal to 21 Cms

Q8. What is the perimeter of the pentagon ABCDE ?

Q9. What is the Area of triangle ABC ?

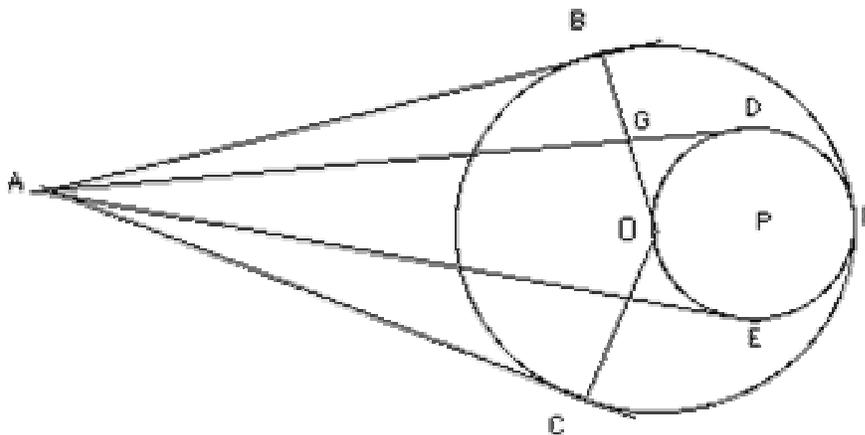
Q10. What is the area of EDEF ?

Q11. If the area of AGFDCH is two time the area of AHB what is the area of the pentagon ABCDE?



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Q12 to Q16 are based on the diagram and the information provided about it below.



AB, AC are tangent of the circle with radius O  
Another circle with diameter OF and center P, is drawn  
inside the big circle such that it touches the big circle  
at point O and F. The the diameter of circle with center O  
is 16 cms and the perimeter of the quadrilateral ABOC is 46  
Cms,

AD and AE are tangents to circle with center P. AOPF lie  
on a straight line on the same plane and measure of Arc BF=  
measure of Arc CF.

Q12. What is the length of AE ?

Q13. What is the length of AF.

Q14. If GD is 3.37 cms what is the length of BG?

Q15. If angle BOC is 100 degree what is angle ABF?

Q16. If angle BAG is 35 degrees what is the DGO?

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**MATCH THE WORDS IN SET A WITH THEIR MEANINGS IN SET B**

SET A Q17. Supplicate, Q18. Malevolent, Q19. Traduce ,  
Q20. Broach, Q21. Maudlin, Q22. Malapropism.

SET B

A. To appeal humbly.

B. Spoil by clumsy behavior

C. One who lives by robbery and plunder..

D. To introduce a subject for discussion that is awkward.

E. To surrender.

F. A desire to harm somebody or having an evil effect on  
something.

G. To be critical about somebody, slander.

H. Misuse of words that sound similar.

I. To steal somebody's property.

J. Perceptible by touch.

K. Sentimental in a tearful way especially as one is drunk.

L. Universal prevalence.

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**ANSWERS :**

Ans 1.  $AX = AZ$  as they are tangents to the circle from same point. Similarly  $CY = CZ$  and  $XB = YB$ .

$$AX + XB = 15 \quad \text{.....i}$$

$$AZ + ZC = 12 \quad \text{.....ii}$$

$$\text{And } CY + YB = 16 \quad \text{.....iii}$$

Adding ii and iii we get :

$$AZ + ZC + CY + YB = 28$$

Replacing AZ by AX and YB by XB we get

$$AX + ZC + CY + XB = 28$$

$$ZC + CY = 28 - (AX + XB)$$

As ZC and CY are equal and  $AX + XB = 15$  we get

$$2 \cdot ZC = 28 - 15$$

$$\text{or } ZC = 13/2 = 6.5$$

Ans 2. Angle  $ZOX = 110$  degrees.

$$\text{Angle } AZO = \text{Angle } AXO = 90$$

In quadrilateral  $AXOZ$ , we know three angles and so the 4<sup>th</sup> angle  $ZAX = 360 - \text{sum of the remaining three angles} = 360 - 90 - 90 - 110 = 70$ .

In triangle  $ABC$ , angle  $A = 70$ , and  $C = 40$  (given) so angle  $B = 180 - 70 - 40 = 70$ .

Ans 3. Angle  $ZOX = 110$  (Given)

$$\text{Exterior angle } ZOX = 360 - 110 = 250$$

$$\text{Angle } ZYX = 110/2 = 55, \text{ (Angle subtended by same arc } ZX \text{.)}$$

It is given that angle  $YZO = \text{angle } OXY$

In quadrilateral  $YZOX$ , Sum of the four angles = 360

$$\text{SO we get angle } YZO + \text{angle } OXY + \text{major angle } ZOX + \text{Angle } ZYX = 360$$

$$\text{Angle } YZO + \text{Angle } OXY + 250 + 55 = 360$$

$$2 * \text{Angle } OXY = 55$$

$$\text{or Angle } OXY = 27.5 \text{ degrees.}$$

Ans 4. Angle  $YOX = 80$ , so angle  $YZX = \text{angle } YOX/2 = 40$

$$\text{Major angle } YOX = 360 - 80 = 280$$

In quadrilateral  $YOXZ$  sum of the angle = 360.

$$\text{Angle } ZYO + \text{Major angle } YOX + \text{Angle } YZX + \text{angle } ZXO = 360$$

$$20 + 280 + 40 + \text{angle } ZXO = 360$$

$$\text{so angle } ZXO = 40 \text{ degrees.}$$

Ans 5. Area of circle =  $22 * 28 * 28 / 7 = 2464$  Sqcm

Area of sector  $PZQ = \text{half the area of circle} = 1232$  Sqcm.

$$\text{Area of sector } XOY = 2464 * 80 / 360 = 347.56 \text{ Sqcm}$$

Required area = Area of circle - Area of sector  $PZQ$  -

Area of sector  $XOY$

$$= 2464 - 1232 - 347.56 = 844.44 \text{ Sq Cm}$$

Ans 6. Angle  $\text{YOX} = 80$  (given)

$$\text{Angle } \text{YZX} = 80/2 = 40$$

In Triangle  $\text{OZY}$ , Angle  $\text{ZYO} = \text{Angle } \text{OZY}$  as opposite sides are equal (Radius of the circle). Angle  $\text{ZYO} = 20$  (Given), so angle  $\text{OZY} = 20$

$$\begin{aligned} \text{Angle } \text{OZX} &= \text{Angle } \text{YZX} - \text{Angle } \text{OZY} \\ &= 40 - 20 = 20 \text{ Degrees} \end{aligned}$$

Ans 7. Angle  $\text{PQB} = 180 - \text{Angle } \text{PDC} = 130$ , as  $\text{DQ}$  is line cutting two parallel lines  $\text{AB}$  and  $\text{DC}$ .

Angle  $\text{QPC} = \text{Angle } \text{DPA} = 86$ , vertically opposite angles.

$$\text{Angle } \text{DPC} = 180 - \text{Angle } \text{DPA} = 180 - 86 = \text{Angle } 94$$

$$\text{In triangle } \text{PDC}, \text{ Angle } \text{PCD} = 180 - \text{PDC} - \text{DPC} = 180 - 50 - 94 = 36$$

$$\text{Angle } \text{ACB} = 2 * \text{Angle } \text{ACD} \text{ (Given)}, \text{ Angle } \text{ACD} = \text{Angle } \text{PCD}$$

$$\text{So Angle } \text{ACB} = 2 * 36 = 72$$

In Quadrilateral  $\text{CPQB}$ . We know 3 angles, Angle  $\text{PCB}$ , Angle  $\text{QBC}$ , Angle  $\text{QPC}$  so the 4th angle can be calculated. Angle  $\text{QBC} = 360 - 130 - 86 - 72 = 72 \text{ Degrees}$

Ans 8. Triangle  $\text{EFD}$  is an equilateral triangle with perimeter 15 so each side should be 5 cms.

In right angle triangle  $\text{EGF}$ ,  $\text{GF} = 3$ ,  $\text{EF} = 5$ , so by Pythagoras theorem we get  $\text{EG} = 4$  cms.

As  $\text{EG} = 2 * \text{AG}$ , we get  $\text{AG} = 2$ .

$\text{AC} = 21 \text{ Cm}$ .  $\text{AH} + \text{AC} = 21$ , as  $\text{AH}$  is 2.5 times of  $\text{HC}$  we get  $2.5 \text{ HC} + \text{HC} = 21$  or  $\text{HC} = 6$  and  $\text{AH} = 15$ .

As  $\text{HB} = 2 * \text{EG}$  (Given) we get  $\text{HB} = 2 * 4 = 8$ .

Now in Right angle Triangle  $\text{ABH}$  we have  $\text{AH} = 15$  and  $\text{HB} = 8$  so using Pythagoras theorem we get  $\text{AB} = 17$ .

In Right angle Triangle  $\text{BHC}$  we have  $\text{HC} = 6$  and  $\text{HB} = 8$  so using Pythagoras theorem we get  $\text{BC} = 10$ .

As  $\text{DC} = 6 * \text{AG}$  (Given) we get  $\text{DC} = 6 * 2 = 12$ .

$$\begin{aligned} \text{The perimeter of the pentagon} &= \text{DE} + \text{EA} + \text{AB} + \text{BC} + \text{CD} \\ &= 5 + 6 + 17 + 10 + 12 = 50 \text{ Cms} \end{aligned}$$

Ans 9. Area of triangle  $\text{ABC} = \text{Area of } \text{ABH} + \text{Area of triangle } \text{BHC}$

$$\text{Area of triangle } \text{ABH} = \text{AH} * \text{BH} / 2 = 15 * 8 / 2 = 60 \text{ Sq Cm}$$

$$\text{Area of Triangle } \text{BHC} = \text{BH} * \text{HC} / 2 = 8 * 6 / 2 = 24 \text{ Sq Cm}$$

$$\text{Area of Triangle } \text{ABC} = 60 + 24 = 84 \text{ Sq Cm.}$$

Ans 10. Area of  $\text{EDFG} = \text{Area of Triangle } \text{EFD} + \text{Area of Triangle } \text{EGF}$ .

$$\text{Area of Triangle } \text{EFD} = 4 * 3 / 2 = 6 \text{ Sq Cm}$$

Area of equilateral triangle EFD =  $(3^{\sqrt{5}}) * 5 * 5 / 4 = 10.82$  Sq cm

Area of EDGH =  $6 + 10.82 = 16.82$

Ans 11. Area of AGFDCH =  $2 * \text{Area of AHB} = 2 * 60 = 120$ .  
Area of Pentagon = Area of EGFD + Area of AGFDCH + Area of ABC  
=  $16.82 + 120 + 84 = 220.82$  Sq cm.

Ans 12.  $AB = AC$  (tangents to circle from same point)  
 $OB = OC = 8$  (Given, that diameter = 16 cms so radius = 8 Cms).

As perimeter of ABOC = 46 we get  $AB + AC + 8 + 8 = 46$   
or  $2 * AB = 30$  or  $AB = 15$  cms.

Angle ABO = 90 degrees as AB is the tangent to circle.  
Consider a imaginary line joining A and O.

In Right angle triangle ABO, we use Pythagoras theorem to get

$$AO^2 = AB^2 + BO^2$$

Or  $AO^2 = 225 + 64$  so  $AO = 17$  cms.

Now  $OP = \text{half the radius of bigger circle} = 4$

$$AP = AO + OP = 17 + 4 = 21$$

In right angle triangle APE we get  $AE^2 = PE^2 + AP^2$

$$\text{Or } AE^2 = 16 + 441 \text{ or } AE = 21.37$$

Ans 13.  $AF = AO + \text{Radius of circle with center O}$

As calculated in the answer number 12,  $AO = 17$

$$AF = 17 + 8 = 25 \text{ Cms.}$$

Ans 14.  $AE = AD$  (Tangents of a circle from same point)

As  $AE = 21.37$  (Calculated in previous questions) so

$$AD = 21.37$$

$AD = AG + GD$ , GD is given as 3.37

$$\text{So } AG = 21.37 - 3.37 = 18 \text{ Cms}$$

In right angle Triangle ABG,  $AB = 15$  (as calculated in

Ans 12),  $AG = 18$  so using Pythagoras theorem,

$$BG^2 = 18^2 - 15^2 = 324 - 225 = 99^{\sqrt{5}} \text{ approximately equal to}$$

$$10.$$

Ans 15. If angle BOC is 100 degree, Angle BFC = half of 100 = 50 degrees

$$\text{Major Angle BOC} = 360 - 100 = 260$$

Triangle BOF and OFC are similar.

In triangle BOF, Angle BOF =  $260 / 2 = 130$ .

Angle BFO =  $50 / 2 = 25$ . So Angle OBF =  $180 - 130 - 25 = 25$ .

Angle ABF = Angle ABO + Angle OBF =  $90 + 25 = 115$  Degrees.

Ans 16. In triangle ABG , Angle ABG= 90 degrees, Angle BAG = 35 degrees so angle BGA =  $180-90-35= 55$  Degrees. Angle DGO = Angle BGA , vertically opposite angle = 55 Degrees.

Ans 17= A, Ans 18= F, Ans 19= G, Ans 20= D, Ans 21= K, Ans 22= H

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