MATHS
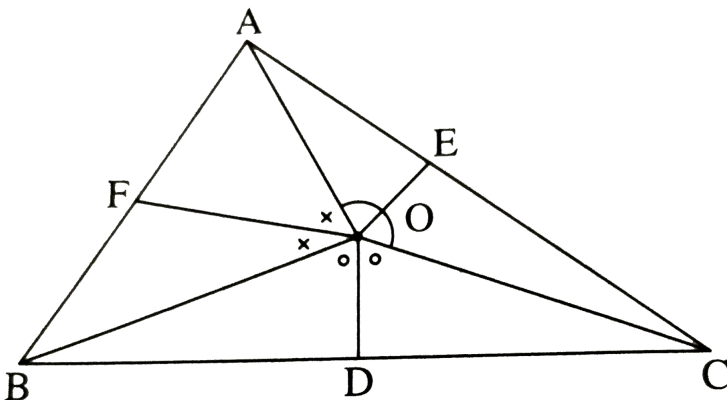
BOOKS - NAVBODH MATHS (HINGLISH)

CHALLENGING QUESTIONS

Challenging Questions 3 4 Marks

1. O is any point in the interior of ΔABC. Bisectors of $\angle AOB, BOC$ and AOC intersect sideAB, side BC, side AC in F,D and E respectively.

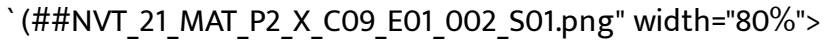Prove that $BF \times AE \times CD = AF \times CE \times BD$.

2. In ΔABC and ΔPQR, $\angle ABC \cong \angle PQR$ eg BD and seg QS are angles bisectors . If $\dfrac{l(AD)}{l(PS)} = \dfrac{l(DC)}{l(SR)} = $ then $\Delta ABC \sim \Delta PQR$
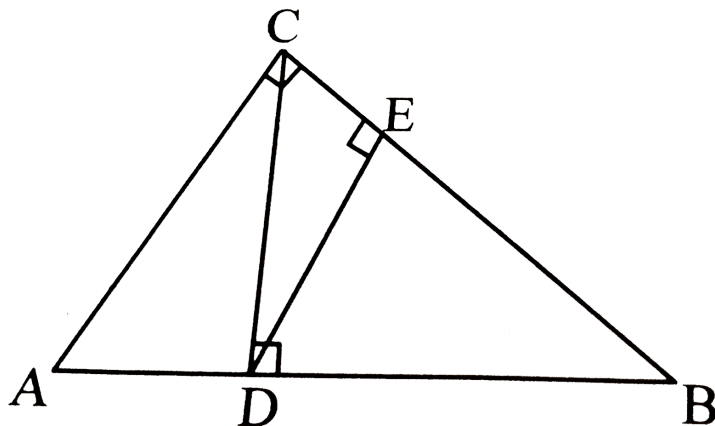
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3. In ΔABC, $\angle ACB = 90°$

seg CD $\perp$ seg AB

seg DE $\perp$ seg CB.

Show that: $CD^2 \times AC = AD \times AB \times DE$

4. In $\triangle ABC$, $\angle ACB = 90°$, seg $CD \perp$ side AB and seg CE is angle bisector of $\angle ACB$

Prove : $\dfrac{AD}{BD} = \dfrac{AE^2}{BE^2}$
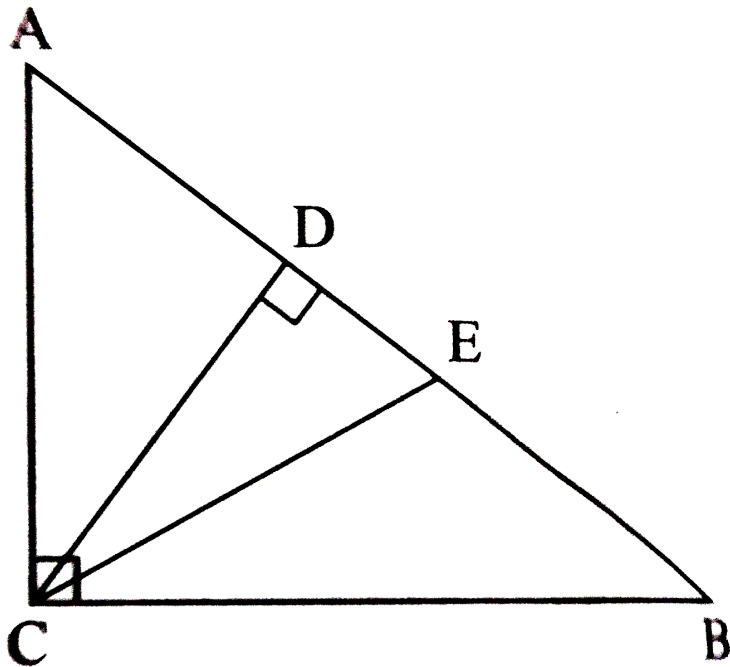
5. A circle with centre P is inscribed in the $\triangle ABC$ Side AB, side BC and side A C touch the circle at points L,M and N respectively . Prove that :

$$A(\triangle ABC) = \frac{1}{2}(AB + BC + AC) \times r$$
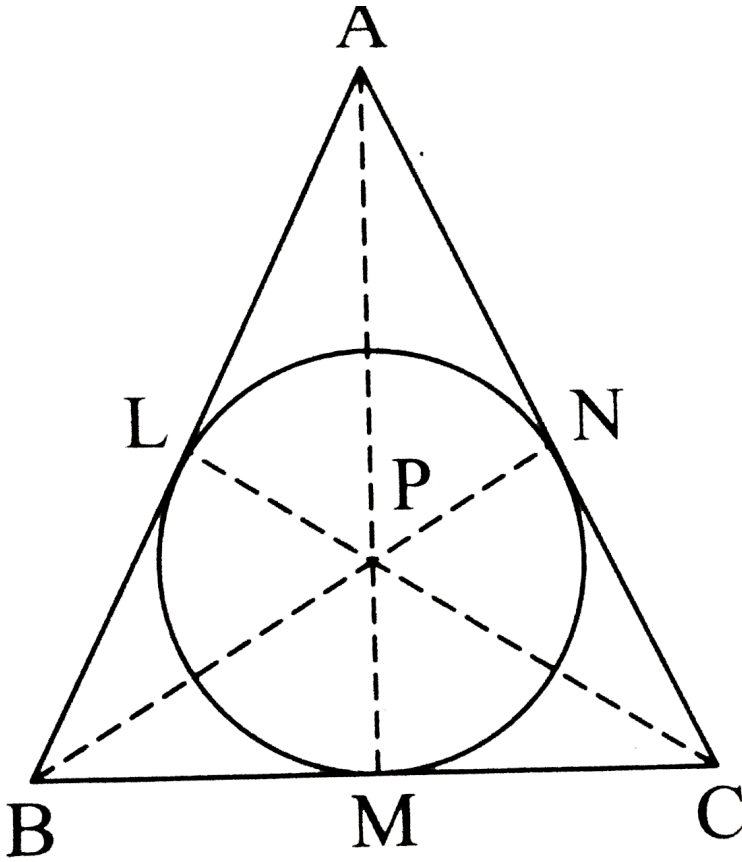
6. Seg AB is a diameter of a circle with centre P. Seg AC is a chord. A secant

through P and parallel to seg AC intersects the tangent drawn at C in D.

Prove that line DB is a tangent to the circle.
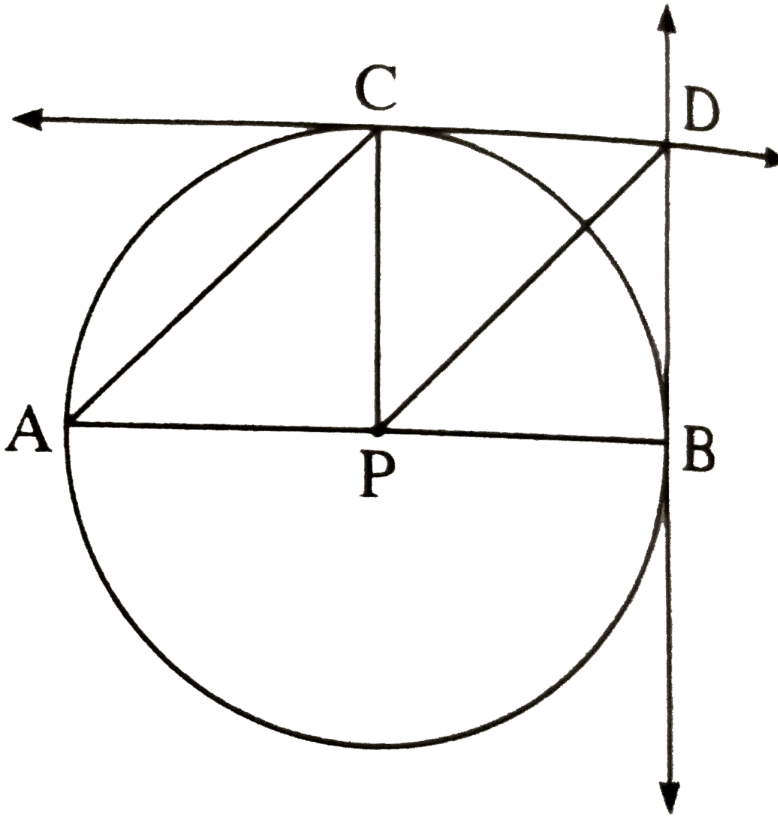
7. Point P divides the lne segment joning the points A (2,1) and $B(5, -8)$ such that $\dfrac{AP}{AB} = \dfrac{1}{3}$. If P lies on the line $2x - y + k = 0$, find the value of k

8. The angle of elevation of cloud from a point 60 m above a lake is $30°$ and the angle of depression of the reflection of cloud in the lake is $60°$. Find the height of the cloud .

9. Prove : $(1 - \cos^2 A) \cdot \sec^2 B + \tan^2 B(1 - \sin^2 A) = \sin^2 A + \tan^2 B$

10. A pilot in an aeroplane observes that Vashi bridge is one side of the plane and Worli sea - link is just on the oposite side . The angles of depressons of Vashi bridge and Wrli sea - link are $60°$ and $30°$ respectively . If the aeroplane is at a height of $5500\sqrt{3m}$ at that time , what is the distance between Vashi bridge and Wrli sea - link ?

11. The angle of elevation of a jet plane from a point A on the grund is 60^0 . After and flight of 30 seconds, the angle of elevation changes to 30^0. If the jet plane is flying at a constant height of $3600\sqrt{3}m,$ find the speed of the jet plane.

12. An ink container shape is filled with ink up to 71% Ball pen refills of length 12 cm and inner diameter 2 mm are filled upto 84 % . If the height and radius of the ink container are 14 cm and 6 cm respectively , find the number of refills that can be filled with this link .

13. Radius of circular base of an ear of corn is 6.6 cm and its length is 11.2 cm . If on an average 1 sq cm area contains 2 corn kernels , fnd the total

number of kernals on a corn

14. Height of a cylinfrical barrel is 50 cm and radius of its base is 20 cm .

Anurag started to fill the barrel with water, when it was empty by

cylindrical mug . The diameter and height of the mug are 10 cm and 15 cm

respectively. Find the no. of mugs required for the barrel to overflow ?

Section 3 Model Question Paper For Practice

1. In a right Delta, the sum of the squares of sides containing right angle

is 225 , then what is the length of its hypotenuse

A. 14

B. 13

C. 12

D. 15

Answer: D

2. (B) Solve the following subquestions :

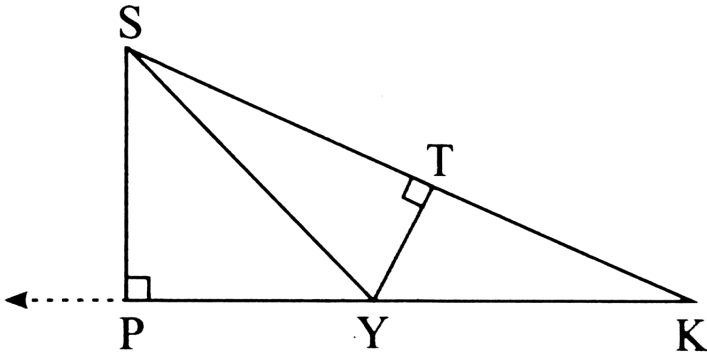Oberve the triplet (4,5,8) . State whether it is a Pythagorean triplet or not

.

3. (A) Complete any two out of three activites :

In the figure ,

seg SP $\perp$ side YK . Seg $YT \perp$ side SK . If SP = 6 , YK = 13, YT = 5 and TK = 12 then complete the following activity to find $A(\triangle SYK) : A(\triangle YTK)$

The ratio of the areas of the two Deltas is equal to the ratio of the products of their $\square$ and the corresponding heights

$$\therefore \frac{A(\triangle SYK)}{A(\triangle YTK)} = \frac{\square \times SP}{TK \times TY}$$

$$= \frac{13 \times 6}{12 \times \square}$$

$$= \frac{\square}{\square}$$

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4. (B) Solve any four of the following subquestions :

$\triangle ABC \sim \triangle PQR$, $A(\triangle ABC) = 9cm^2$ and $A(\triangle PQR) = 16cm^2$. If BC =

2.1 cm then find the length of segment QR .

5. (B) Solve any two of the following subquestions :

Prove that following statement, " If a line parallel to a side of a Delta intersects the remaining sides in two distinct points , then the line divides the sides in the same proportion . "

6. Solve any two of the following subquestions :

In the figure , O is the centre of the circles and AP is the tangent to the circle at point A . Ray AF is the bisector of $\angle BAC$

Prove : seg $AP \cong$ seg PE

7. Solve any one of the following sub-questions : The barrel of a fountain pen , cylindrical in shape , is 7 cm long and 5 mm in diameter . A full barrel of ink in the pen will be used up on writing 330 words on an average then (a) Find the volume of the barrel of the fountain pen . (b) If the ink in the bottle is $\frac{1}{5}th$ of a barrel write the volume of the ink in cm^3 Thus find how many words would be written by fountain pen utilizing all the ink present in the bottle ?

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Section 3 Model Question Paper For Practice Choose The Correct Alternative

1. (A) Choose the correct alternative :

O is a centre of a circle, Tangents TP and TQ of the circles itersect at point T in the exterior of the circle. Points P and Q lie on the circle . If $\angle POQ = 120°$ then $\angle PTQ = ?$

A. $120°$

B. $30°$

C. $60°$

D. $90°$

Answer: C

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2. The sum of x - coordinate of the vertices of the Delta is 18 and that of y - coorcinates is 24 then the coorinates of its centroid are . . . .

A. (6,8)

B. (8,6)

C. (9,12)

D. (12,9)

Answer: A

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3. (A) Choose the correct alternative :

$\cot \theta \times \tan \theta = \ldots\ldots\ldots$

   A. 0

   B. 1

   C. 2

   D. $\dfrac{1}{\sqrt{2}}$

Answer: B

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1. (B) Solve the following subquestions :

In cyclic quadrilateral ABCD, $\angle A = 65°$ then what is the mesure of $\angle C$?

2. (B) Solve the following subquestions :

What is the slope of line which makes an angle of $30°$ with positive direction of X- axis ?

3. (B) Solve the following subquestions :

A spherical ball is melted to form ' x' equal cones . Write the formula to find the value of x

Section 3 Model Question Paper For Practice Complete Any Two Out Of Three Activites

1. (A) Complete any two out of three activites :

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$\oint sofcontact.\,Oisthecentreofthe \circ \leq .\,Comp \leq tethefollow \in gactivity$

OC	=	OA	...	square	BC	=	square

$...\left(\tan \geq ntsegmentsdrawnomanexternalp\,\oint \rightarrow the \circ \leq areequal.\right)$

$\therefore \quad p\oint sO$ and $Bare$ square $omthep\oint sA$ and $Cofthech$ or dAC $\therefore$

$byperpendicrbi\sec \rightarrow rthe$ or $em,\,segOBisthe$square

$ofsegACi.\,esegODistheperpendicarbi\sec \rightarrow rofsegAC$(O-D_B)`

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2. (A) Complete any two out of three activites :

If $\tan \theta = \dfrac{49}{9}$, then complete the activity to find the value of $\sec \theta$

Activity

$\sec^2 \theta = 1 + \square \qquad ...$(Identify)

$\sec^2 \theta = 1 + \left(\dfrac{40}{9}\right)^2$

$\therefore \sec^2 \theta = 1 + \dfrac{\square}{\square}$

$\therefore \sec^2 \theta = \dfrac{81 + 1600}{81}$

$$\therefore \sec^2 \theta = \frac{\square}{\square}$$

$$\therefore \sec \theta = \frac{\square}{\square} \quad \ldots \text{ (By taking square roots of both the sides)}$$

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1. (B) Solve any four of the following subquestions :

Find the length of the diagonal of a square whose side is 16 cm

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2. (B) Solve any four of the following subquestions :

Draw a circle with centre O and radius 3.2 cm . Mark a point X on the circle . Draw a tangent passing through point X to the without using the centre .

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3. (B) Solve any four of the following subquestions :

If the slope of the line joining the points $B(k, -5)$ and $C(1, 2)$ is 7 then find the value of K .

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4. (B) Solve any four of the following subquestions :

The angular measure of an arc of a circle having radius 18 cm is $80°$. Find the length of that arc . $(\pi : 3.14)$

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Section 3 Model Question Paper For Practice Complete Any One Out Of Two Activities

1. (A) Complete any one out of two activities :

In Quadilateral ABCD , diagonals AC and BD intersect each other at point E

If $\dfrac{AE}{EC} = \dfrac{BE}{ED}$ then complete the following activity to prove

ABCD is a trapezium

2. (A) Complete any one out of two activities :

Complete the following activity to show the points

$P(3, 0)Q(6, -2)$ and $R(-3, 4)$ are collinear .

Let $P(3, 0) = (x_1, y_1)$

$Q(6, -2) = (x_2, y_2)$

$R(-3, 4) = (x_3, y_3)$

slope of a line $PQ = \dfrac{y_2 - \Box}{x_2 - x_1} = \dfrac{-2 - 0}{6 - 3} = \Box$ ...(1)

slope of line $QR = \dfrac{y_3 - y_2}{x_3 - x_2} = \dfrac{\Box - (-2)}{-3 - 6} = \dfrac{4 + 2}{-9}$

$= \dfrac{6}{-9}$

$= \Box$ ... (2)

$\therefore$ from (1) and (2)

the slopes of lines PQ and QR are $\Box$ and point $\Box$ is the

$\therefore$ points P,Q and R are collinear .

1. Find the height of an equilateral Delta whose side is $2\sqrt{3}$ cm .

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2. In the figure, m (arc NS) $= 130°$

m (arc EF) $= 60°$. Find

(i) $\angle NMS$

(ii) $\angle ENF$

(iii) $\angle NFS$

3. (B) Solve any two of the following subquestions :

$\triangle XYZ \sim \triangle DEF$, XY = 5.1 cm , Y Z = = 3.9 cm, XZ = 6 cm, XY : DE = 3: 2, Construct $\triangle XYZ$ and $\triangle DEF$.

4. Solve any two of the following subquestions :

A peacock is sitting on the tree and observes its prey on the ground . It makes an angle of depression of $22°$ to catch the prey . The speed of the peacock was observed to be 10 km/hr and it catches its prey in 1 min 12 seconds . At what height was the peacock on the tree ?

$(\cos 22° = 0.927, \sin 22° = 0.374, \tan 22° = 0.404)$

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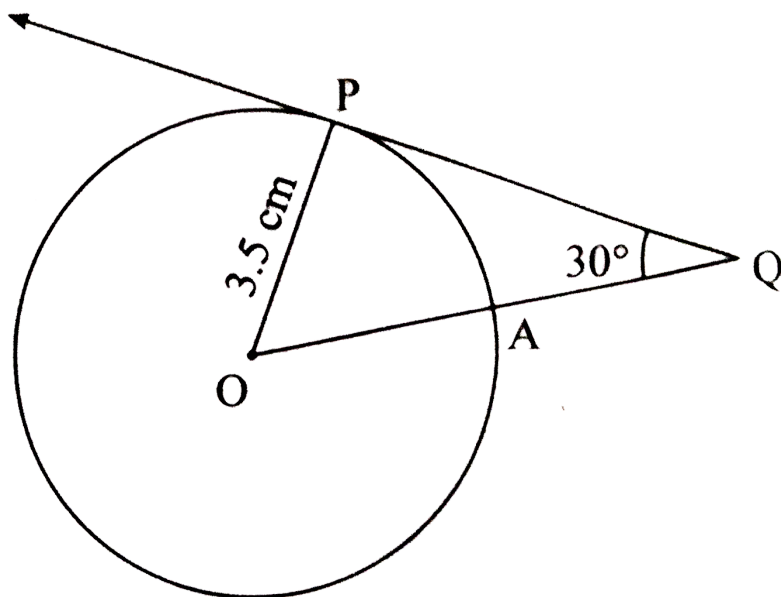**5.** Solve any two of the following subquestions :

A tin maker bought a sheet of tin of the length 4.40 m and width 1.16 m . He made cylindrical tins closed on both the sides of height 20 cm and radius 7 cm. While making each tin $88cm^2$ sheet is wasted , then how many tins can be made from that sheet ?

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1. Solve any one of the following subquestions :

(Analytical figure)

Draw a circle with centre O and radius 3.5 cm . Locate a point Q in the plane of the circle such the tangent drawn from Q to the circle makes an angle of $30°$ with OQ with the help of following steps. Consider the analytical figure as shown . Let OQ intersect the circle at A as hown and tangent from Q to the circle touch the circle at P then,

(a) What will be the measure of $\angle AOP$?

(b) Thus by drawing the central $\angle AOP$, P is located Construct tangent at P and locate Q.

(c) Measure OQ and relate it with OP

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