GEOMETRY

Question Paper: March 2011

Note :—

    (*i*)   *All* questions are compulsory. Draw the figure wherever necessary.

    (*ii*)   Marks of constructions should be distinct. They should not be rubbed off.

    (*iii*)   Do not use calculator.

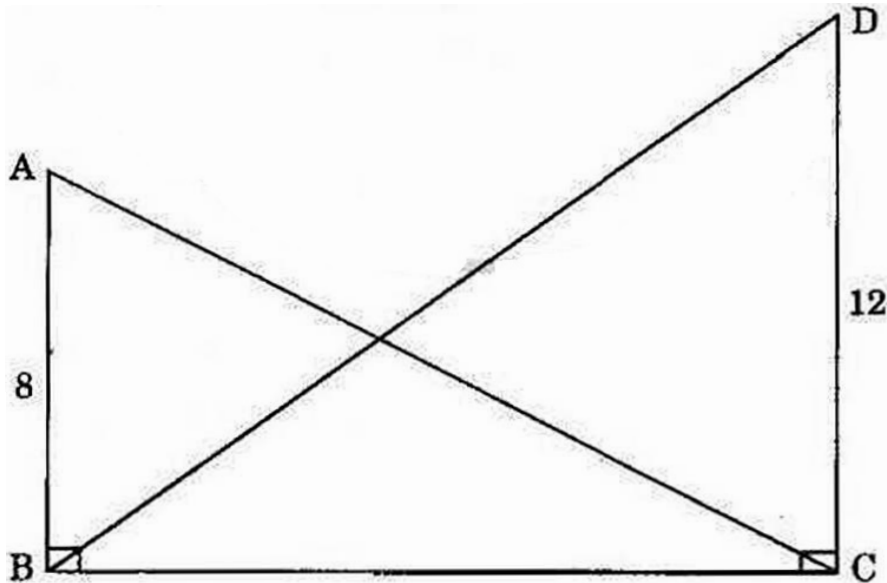   (*iv*)   Figure is necessary for the proof of the theorem.

1.   **Solve any *six* sub-questions :**   12

    (*i*)   In the following figure, $\angle$ ABC = $\angle$ DCB = 90°

$$AB = 8 \text{ and } DC = 12.$$

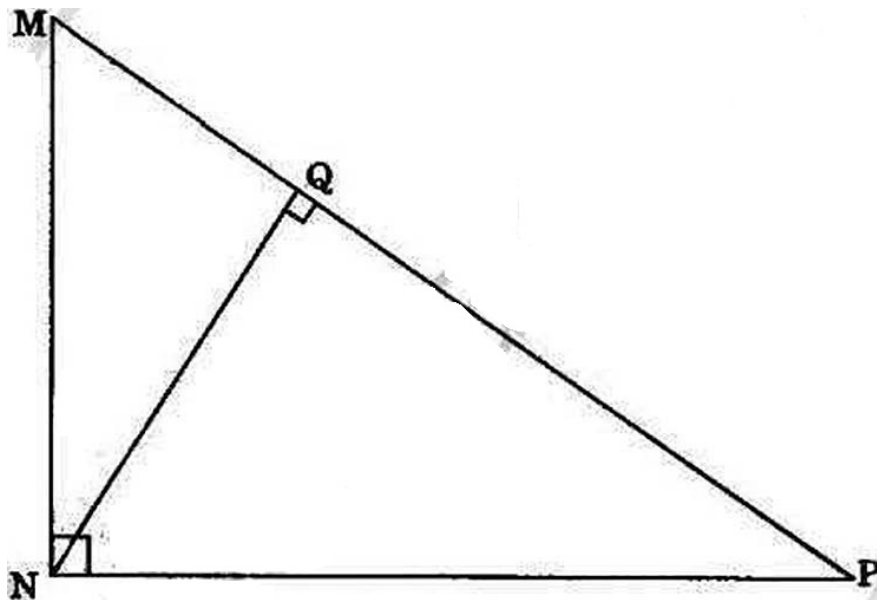Find the value of $\dfrac{A\,(\Delta\ ABC)}{A\,(\Delta\ DCB)}$.

(ii)   In the following figure, ∠ MNP = 90°
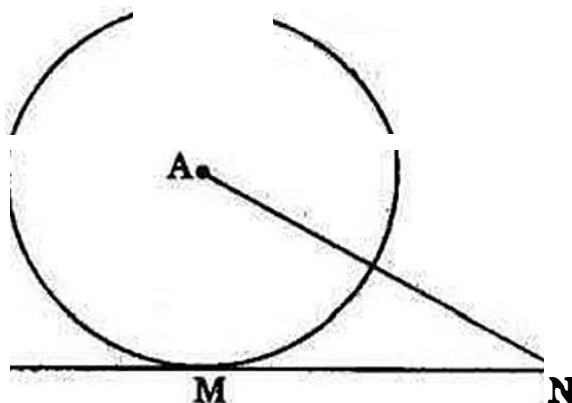
Line NQ ⊥ Side MP

MQ = 2, QP = 8.
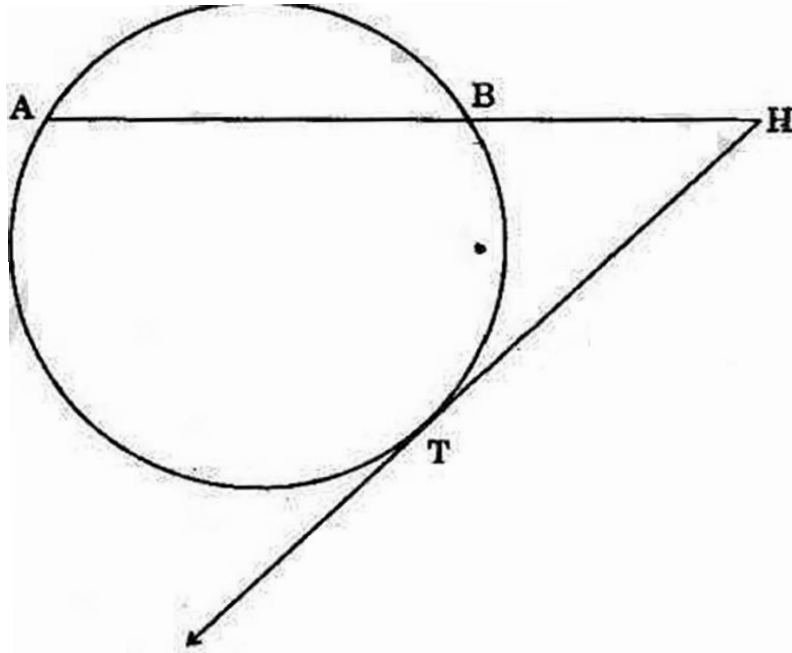
Find the value of NQ.

(iii)   In the following figure, A is the centre of the circle. AN = 6 cm. Line

NM is tangent at M. Determine the radius of the circle if MN = 4 cm.

(iv)   As shown in the following figure. T is the point of contact. If HA = 8 and HB = 2, then find the HT.

(v)   Draw a tangent to the circle with centre O and radius 2.5 cm at any point 'K' on the circle.

(vi)   If $\cos A = \dfrac{4}{5}$, then find $\sin A$.

(vii)   Find the volume of a cuboid with length 4 m, breadth 5 m and height 3 m.

(viii)   Find the distance between the points L(2, 3) and M(5, 6).
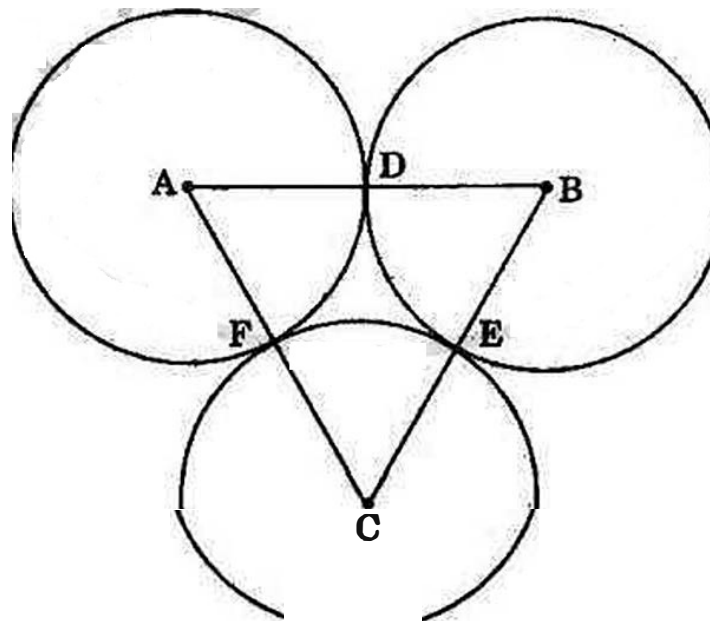
Solve any *four* sub-questions : 12

(*i*) In a right-angled triangle, sides making right angle are 7 cm and 24 cm. Find its hypotenuse.

(*ii*) Three congruent circles with centres A, B and C with radius 3 cm touch each other in points D, E, F as shown in the figure below
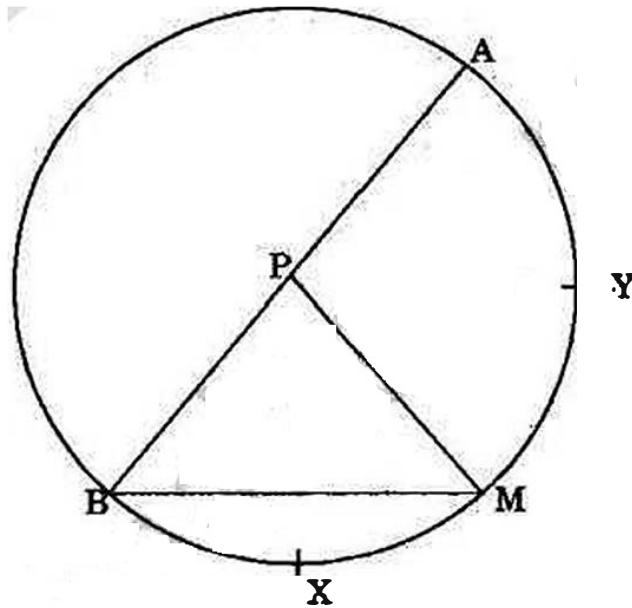
(1) What is the perimeter of Δ ABC ?

(2) What is the length of the side DE of Δ DEF ?

In the figure given below, P is the centre of the circle having diameter AB and M is a point on the circle. If $m\angle$ PMB = 50°, find :

(1) m(arc MXB)

(2) m(arc AYM)

(iv)   Draw the circumcircle of Δ ABC such that $\angle$ B = 90°, BC = 5.4 cm, AB = 6 cm.

(v)   If $\sin \theta = \dfrac{3}{5}$, then find the value of $\cos \theta$ and $\cot \theta$.

(vi)   Find the total surface area of a cone of radius 6 cm and slant height 8 cm. $\left(\pi = \dfrac{22}{7} \right)$

3. Solve any _four_ sub-questions :   12

(i)   Δ LMN ~ Δ RST and A(Δ LMN) = 100 sq. cm, A(Δ RST) = 144 sq. cm.,

LM = 5 cm, then find RS.

(ii) In the following figure, ☐ ABCD is a trapezium.
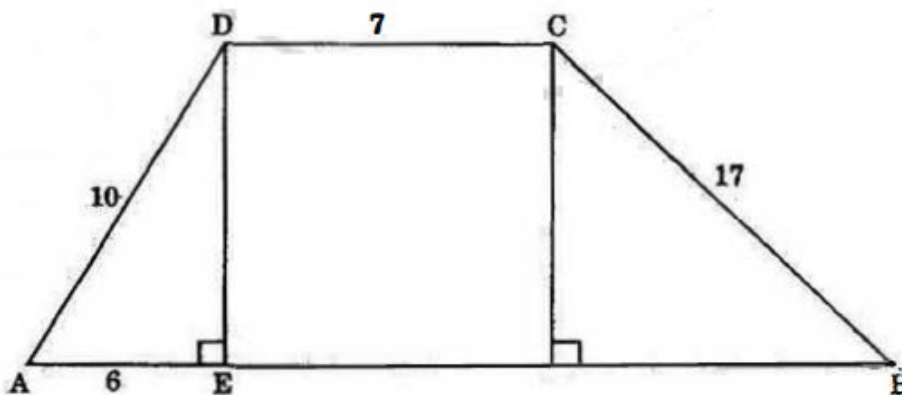
Side AB ∥ side DC

Seg DE ⊥ side AB
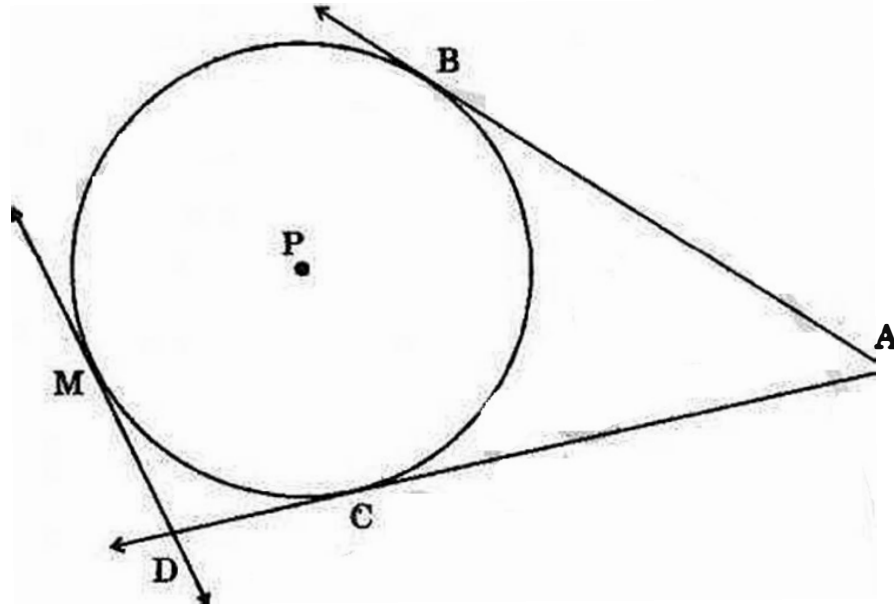
Seg CF ⊥ side AB

Find : .
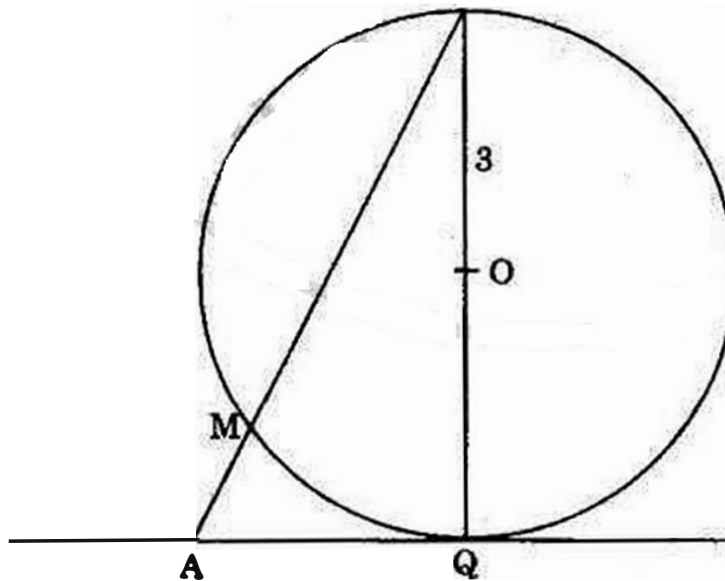
(1)   DE and CF

(2)   BF

(3)   AB

(iii) In the following figure, the point B, M and C lie on the circle with centre P. Tangents at B and C intersect in point A. Tangents at M and C intersect in point D. D-C-A. Show that AB + DM = AD.

(iv) In the following figure, O is the centre, seg PQ is diameter, line AQ is a tangent. If OP = 3 and m(arc PM) = 120°, determine AP.

(v)   An observer at a distance of 80 meters from a tower makes an angle of elevation of 60° with the top of the tower. What is the height of the tower ?

(vi)   Using distance formula, show that points P(2, 1), Q(8, −3) and R(−1, 3) are collinear.

Solve any *three* sub-questions :   12

(i)   The ratio of areas of two triangles is equal to the ratio of the products of a base and its corresponding height. Prove.

(ii)   In $\triangle$ ABC, $AB^2 + AC^2 = 122$, BC = 10, find the length of median on side BC.

(iii)   If four tangents of a circle determine a rectangle, then show that it must be a square.

(iv)   In the following figure, AB be the chord of a circle with centre P. Tangents at points A and B intersect at point C. Prove that :

$$AM^2 = PM \times CM.$$
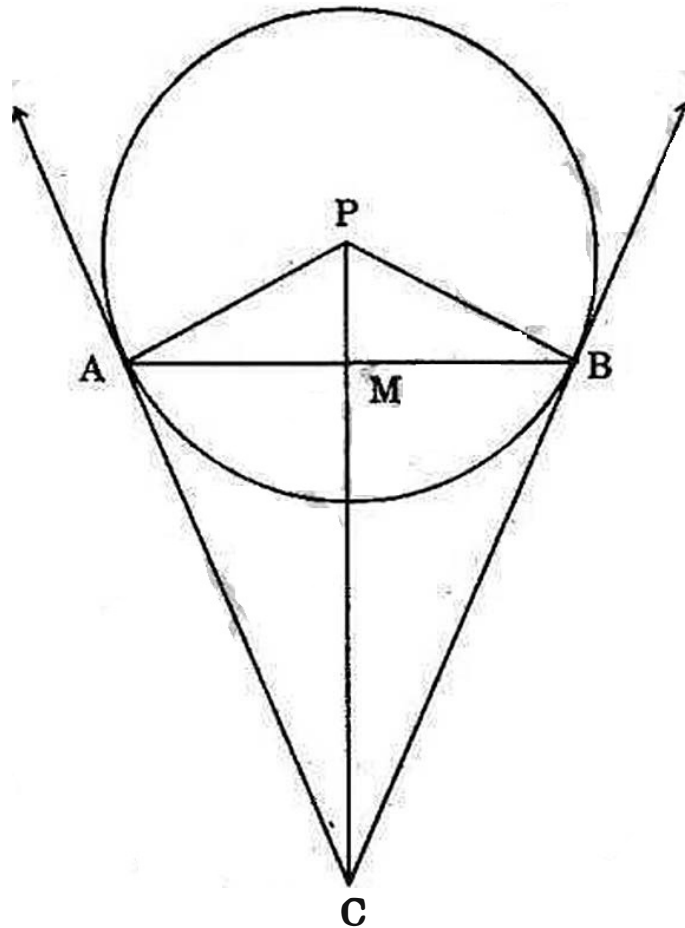
(v)   Draw the incircle of △ EFG such that EF = FG = 6 cm and EG = 8 cm. Measure the radius of the incircle.
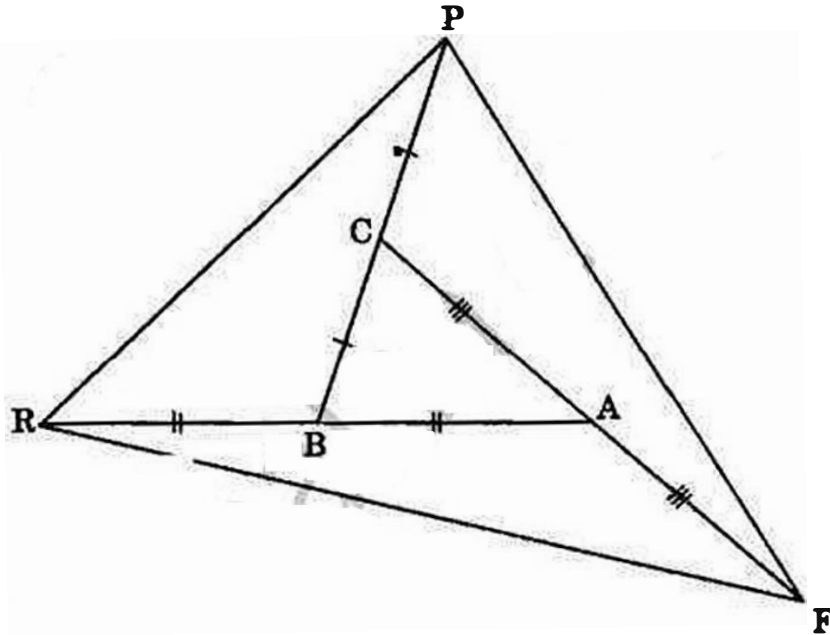
(vi)   A cylindrical ice-cream pot of radius 30 cm and height 60 cm is filled completely with ice-cream. It was packed in ready to sale cones of radius 3 cm and height 10 cm. How many such cones can be filled ?

Solve any _three_ sub-questions :

(i)   In the following figure, sides AB, BC, CA of △ ABC are produced upto points R, P, F respectively such that, AB = BR, BC = CP and CA = AF. Prove that :

$$A(\triangle \, PFR) = 7A(\triangle \, ABC).$$

(ii) Prove that :

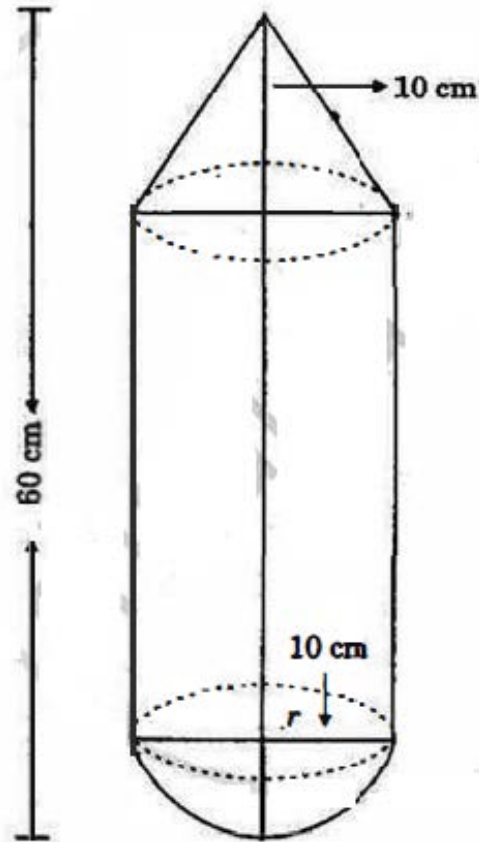The opposite angles of a cyclic quadrilateral are supplementary.

(iii) Construct △ DEF such that DE = 7.9 cm, ∠ DFE = 80°, seg FK is median and FK = 4.5 cm.

(iv) Show that :

$$\sqrt{\frac{1 + \cos A}{1 - \cos A}} = \text{cosec } A + \cot A.$$

(v) A toy is a combination of a cylinder, hemisphere and a cone, each with radius 10 cm. Height of the conical part is 10 cm and total height of toy is 60 cm. Find the total surface area of the toy.

(Given $\pi = 3.14$ and $\sqrt{2} = 1.41$)

(vi) Find the ratio in which the point B = (4, k) divides the join of Q = (-1, 2) and R = (19, 22) internally. Also find k.