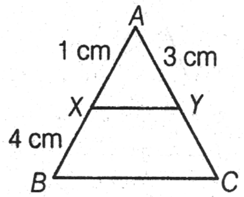
# UNIT TEST - 3

**Class X** **MATHEMATICS** **Time : 1½ hrs.**

**SET A** **Mark : 40**

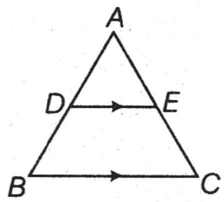
**SECTION - A (OBJECTIVE TYPE)** **8 × 1 = 8**

1. In the figure, XY || BC. Find the length of YC.




   a) 14 cm  b) 12 cm
   c) 17 cm  d) 8 cm

2. In $\Delta ABC$, DE || BC, so that AD = (7x – 4) cm, AE = (5x – 2) cm, DB = (3x + 4) cm and EC = 3x cm. Then, find the value of x.




   a) 2 m  b) 4 cm
   c) 12 cm  d) 10 cm

3. Sin A = $\frac{12}{13}$ then cos A is ...........

   a) $\frac{13}{12}$  b) $\frac{12}{5}$  c) $\frac{5}{13}$  d) $\frac{20}{7}$

4. If tan A = $\frac{a}{b}$, then the value of sec $\theta$ is ...............

   a) $\frac{\sqrt{a^2 + b^2}}{b}$  b) $\sqrt{a^2 + b^2}$  c) $\frac{b}{a^2}$  d) $\frac{a^2}{a^2 + b^2}$

5. A point P is 13 cm from the centre of the circle. Radius of the circle is 5 cm. Then the length of the tangent drawn from P to the circle is

   a) 10  b) 11  c) 12  d) 13

6. A tangent PQ at a point P of a circle of radius 15 cm meets a line through the centre O at a point Q so that OQ = 25 cm. Length of PQ is

   a) 5  b) 25  c) 16  d) 20

7. The perimeters of two similar $\Delta ABC$ and $\Delta PQR$ are respectively 18 cm and 12 cm. If PQ = 5 cm then AB is .................

   a) 7.5 cm  b) 18 cm  c) 12.3 cm  d) 2.5 cm

8. If $2\sin\theta - 1 = 0$ prove that $3\cos\theta - 4\cos^3\theta = 0$

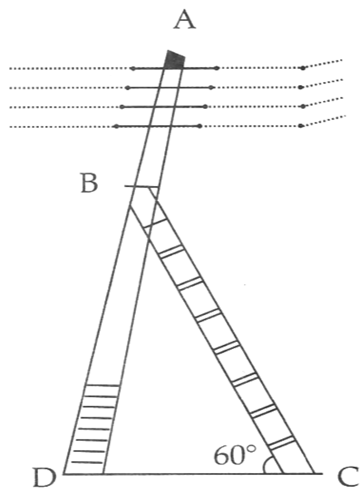
**OR**

If $4\cos^2\theta = 3$ then find the value of $\theta$ in 1st quadrant.

**SECTION - B - (COMPETENCY BASED QUESTIONS) (16 MARKS)**

9. **Read the following and answer the questions.**

An electrician has to repaired and electric fault on the pole of height 5 cm. She needs to reach a point 1.3 m below the top of the pole to undertake the repair work.




i) What is the length of BD?

a) 1.3 m

b) 5 m

c) 3.7 m

d) None of these **1**

ii) What should be the length of Ladder, when inclined at an angle of $60^0$ to the horizontal? **2**

iii) How far from the foot of pole should she place the foot of the ladder? **2**

iv) If the horizontal angle is changed to $30^0$, then what should be the length of the ladder? **2**

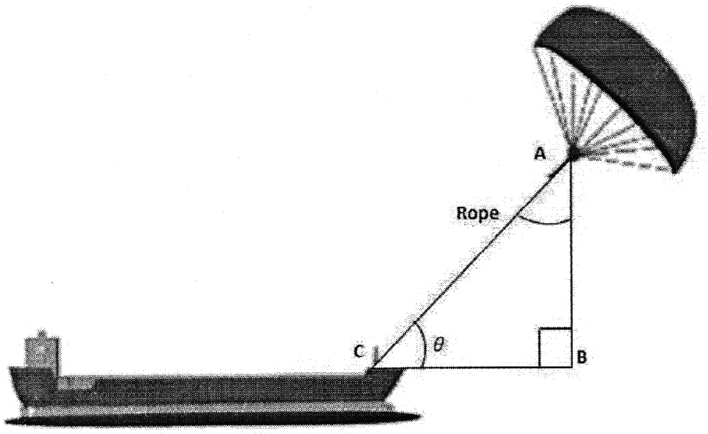
v) What is the value of $\angle B$? **1**

a) $60^0$ b) $90^0$ c) $30^0$ d) $180^0$

10. **Read the following and answer the questions.** **5**

'Skysails' is that genre of engineering science that uses extensive utilization of wind energy to move a vessel in the sea water. The 'Skysails' technology allows the towing kite to gain a height of anything between 100 metres - 300 metres. The sailing kite is made in such a way that it can be raised to its proper elevation and then brought back with the help of a 'telescopic mast' that enables the kite to be raised properly and effectively.

Based on the following figure related to sky sailing, answer the questions:



i) In the given figure, if $\sqrt{3}\ \tan 2\theta - 3 = 0$, where $\theta$ is acute angle, then find the vale of $\theta$.

a) $45^0$ b) $30^0$ c) $60^0$ d) None of these

ii) What should be the length of the rope of the kite sail in order to pull the ship at the angle (calculated above) and be at a vertical height of 300 m?

a) 300 m b) 400 m c) 500 m d) 600 m

iii) What should be the distance BC in order to pull the ship at the angle and be at a vertical height of 300 m?

a) $300\sqrt{3}\,m$ b) $400\sqrt{3}\,m$ c) $500\sqrt{3}\,m$ d) $600\sqrt{3}\,m$

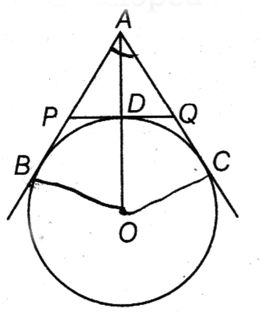
iv) If BC = 100 m, $\theta = 60^0$, then AB is

a) $100\sqrt{3}\,m$ b) $200\sqrt{3}\,m$ c) $500\sqrt{3}\,m$ d) $300\sqrt{3}\,m$

v) If the length of the rope, AC = 200 m and $\theta = 30^0$, then the vertical height, AB is

a) 300 m b) 400 m c) 100 m d) 200 m

11. For a Science Exhibition, Rahul presented a diagrammatic representation of rain water harvesting as a project. AB and AC, the pipes of 12 m long are bringing water from the terrace of a building (as shown in the figure). The triangular space is developed as a garden.



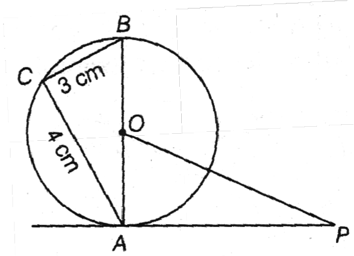

i) What is the perimeter of the triangular garden? **2**

ii) If the radius of circle is 5 cm, then find the length of OA. **3**

## SECTION - C - SHORT AND LONG ANSWER QUESTIONS

**Short Answer Type I Questions. (Answer any 4)** **4 × 2 = 8**

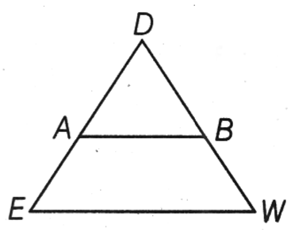
12. PA is a tangent to the circle with centre O. If BC = 3 cm, AC = 4 cm and $\Delta ACB \sim \Delta PAO$, then find OA and $\dfrac{OP}{AP}$.



13. If tan A = $\sqrt{2}-1$ prove that $\frac{\tan A}{1+\tan^2 A} = \frac{\sqrt{2}}{4}$

14. If $\tan(3x + 30^0) = 1$, find the value of x.

15. In $\Delta DEW$, AB || EW. If AD = 4 cm, DE = 12 cm and DW = 24 cm, find the value of DB.




16. Two tangents PQ and PR are drawn from an external point to a circle with centre O. Prove that QORP is a cyclic quadrilateral.

**Short Answer Type II Questions. (Answer any one)** **1 × 3 = 3**

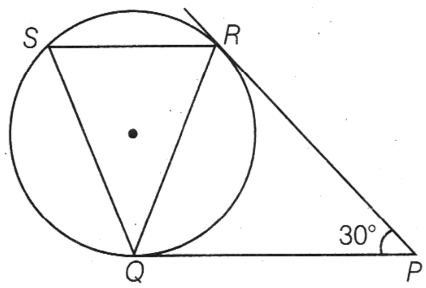
17. Prove that the tangents drawn at the end of a diameter of a circle are parallel.

18. PQRS is a trapezium with PQ || SR. Diagonals PR and SQ intersect at M and $\Delta PMS \sim \Delta QMR$ prove that PS = QR.

**Long Answer Questions. (Answer any one)** **1 × 5 = 5**

19. A girl of height 90 cm is walking away from the base of a lamp-post at a speed of 1.2 m/s. If the lamp is 3.6 m above the ground, then find the length of her shadow after 4 seconds.

20. In figure, tangents PQ and PR are drawn to a circle such that $\angle RPQ = 30^0$. A chord RS is drawn parallel to the tangent PQ. Find the $\angle RQS$.



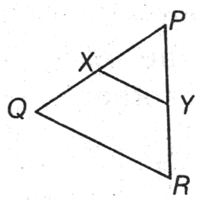
# UNIT TEST - 3

**Class X** **MATHEMATICS** **Time : 1½ hrs.**

**SET B** **Mark : 40**

**SECTION - A (OBJECTIVE TYPE)** **8 × 1 = 8**

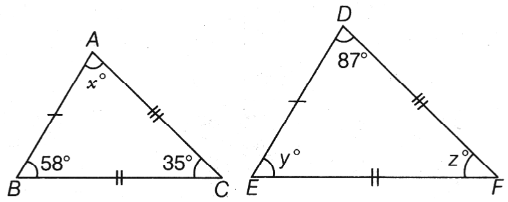
1. In the given figure, XY || QR, PQ/XQ = 7/3 and PR = 6.3 cm. Find the value of YR.




a) 4 cm b) 2.7 cm

c) 4.3 cm d) 7.1 cm

2. Find the value of each of the pronumerals in the given pair of triangles.




3. If $\cos A = \frac{4}{5}$, then the value of tan A is

a) $\frac{3}{5}$ b) $\frac{3}{4}$ c) $\frac{4}{3}$ d) $\frac{5}{3}$

4. If $\sin A = \frac{12}{13}$ then tan A is .............

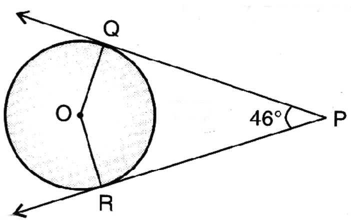
a) $\frac{5}{13}$ b) $\frac{15}{7}$ c) $\frac{12}{5}$ d) $\frac{27}{3}$

5. What is the length of the tangent drawn from a point, whose distance from the centre of a circle is 20 cm and radius of the circle is 16 cm.

a) 12 b) 144 c) 169 d) 25

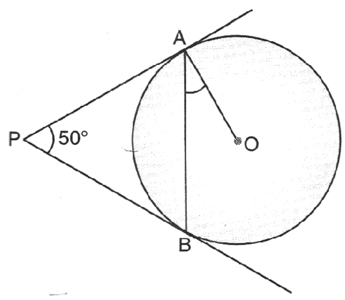
6. If PQ and PR are two tangents to a circle with centre O.

If $\angle QPR = 46^0$, find $\angle QOR$.




**OR**

In figure PA and PB are tangents to the circle with centre O such that $\angle APB = 50^0$. Write the measure of $\angle OAB$.



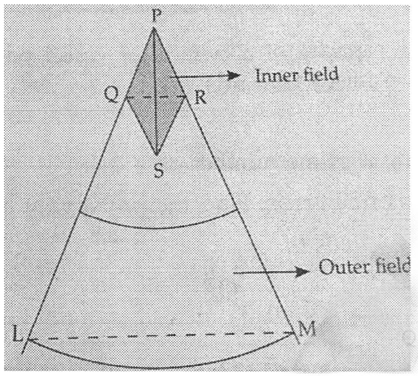
7. At which point a tangent is perpendicular to the radius?

8. If $\sin\theta = \frac{1}{2}$, then prove that $3\cos\theta - 4\cos^3\theta = 0$

## SECTION - B - (COMPETENCY BASED QUESTIONS) (16 MARKS)

9. **Read the following and answer the questions.** **5 × 1 = 5**

A baseball coach is preparing a field for a game between two teams at the weekend. The field has two fences PL and PM. The field is in the shape of a triangle bounded by a semicircle. For the accuracy of the game, the dimensions of the field should be such that $\frac{PQ}{PL} = \frac{PR}{PM}$. Based on the situation, answer the following questions :




i) The relation between the line segments QR and LM is

a) QR || LM  b) QR = LM

c) QR = $\frac{1}{2}$ LM  d) QR = $\frac{1}{3}$ LM

ii) The theorem applied in part (i) is

a) Basic proportionality Theorem  b) Pythagoras theorem

c) Converse of Basic proportionality theorem  d) Mid-point theorem

iii) Which of the following relation is true for $\Delta PQR$ and $\Delta PLM$?

a) $ar(\Delta PQR) = ar(\Delta PLM)$  b) $ar(\Delta PQR) = \frac{1}{2} ar(\Delta PLM)$

c) $\Delta PQR \sim \Delta PLM$  d) $\Delta PQR \cong \Delta PLM$

iv) If PQ = 3 cm, QR = 4 cm and LM = 6 cm, then length of PL is

a) 2 cm  b) 9 cm  c) 2.25 cm  d) 4.5 cm

v) If $\angle P = 50^0$ and $\angle PLM = 60^0$, then the measure of $\angle PRQ$ is

a) $60^0$  b) $70^0$  c) $50^0$  d) $110^0$

10. A street light bulb is fixed on a pole 6 m above the level of the street. If a woman of height 1.5 m casts a shadow of 3 m.

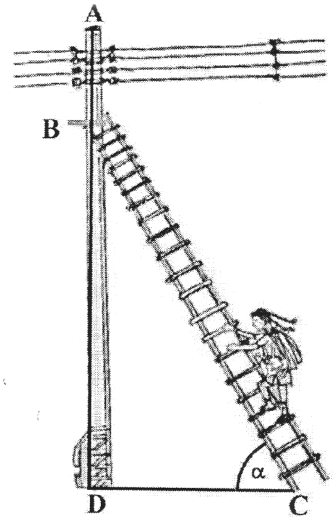
i) Which criteria for similarity of triangles is applicable here?

a) SSS  b) AAA  c) SAS  d) ASS **1**

ii) Find how far she is away from the base of the pole. **3**

11. **Read the following and answer the questions.** **5 × 1 = 5**

Raj is an electrician in a village. One day power was not there in entire village and villagers called Raj to repair the fault. After thorough inspection he found an electric fault in one of the electric pole of height 5 m and he has to repair it. He needs to reach a point 1.3 m below the top of the pole to undertake the repair work.




Based on the above situation, answer the following questions.

i) Whent the ladder is inclined at an angle of $\alpha$ such that $\sqrt{3}\tan\alpha + 2 = 5$ to the horizontal, then find the angle $\alpha$ ?

a) $45^0$ b) $30^0$ c) $60^0$ d) None of these

ii) How far from the foot of the pole should he place the foot of the ladder? $\left(Use\sqrt{3} = 1.73\right)$

a) 2.89 m b) 2.14 m c) 3 m d) None of these

iii) In the above situation, find the value of $\sin\alpha\cos\frac{\alpha}{2} - \cos\alpha\sin\frac{\alpha}{2}$

a) 0 b) 1 c) $\frac{1}{2}$ d) None of these

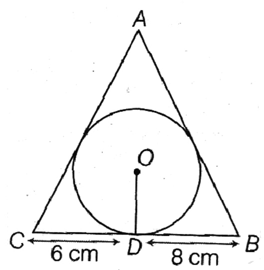
iv) In the above situation if BD = 3 cm and BC = 6 cm. Find $\alpha$

a) $45^0$ b) $30^0$ c) $60^0$ d) None of these

v) Given $15\cot\alpha = 8,$ find $\sin\alpha$

a) $\frac{17}{15}$ b) $\frac{16}{15}$ c) $\frac{17}{8}$ d) $\frac{15}{17}$

12. For an inaugration of the eco friendly week in a DAV Public School, badges were given to volunteers. Meena made these badges in the shape of a triangle with a circle of radius 4 cm inscribed in it.
A message "supporting tree plantation" was written in the circle.
Suppose, BD = 8 cm, CD = 6 cm as shown in the figure.



i) Area of $\Delta OCB$ is **1**

a) 28 $cm^2$ b) 15 $cm^2$ c) 18 $cm^2$ d) 25 $cm^2$

ii) Length of AE is **1**

a) 1 cm b) 7 cm c) 8 cm d) 2 cm

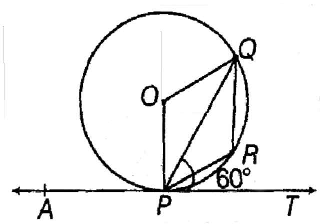
iii) Find the length of AB **1**

iv) Find the length of AC **1**

## SECTION - C - SHORT AND LONG ANSWER QUESTIONS

**Short Answer Type I Questions. (Answer any four)** **4 × 2 = 8**

13. In the adjoining figure, PQ is a chord of a circle with centre O and PT is a tangent at P such that $\angle QPT = 60^0$, then find $\angle PRQ$.




14. If tan A = $\frac{4}{3}$, find the other trignometric ratios of $\angle A$.

15. An equilateral triangle is inscribed in a circle of radius 6 cm. Find its side.

16. If $\angle A = \angle B = 45^0$, verify that sin(A + B) = sin A cos B + cos A sin B.

17. Out of two concentric circles the radius of the outer circle is 5 cm and the chord AC of length 8 cm is a tangent to the inner circle. Find the radius of the inner circle.

**Short Answer Type II Questions. (Answer any one)** **1 × 3 = 3**

18. Two tangents TP and TQ are drawn to a circle with centre O, from an external point T. Prove that $\angle PTQ = 2\angle OPQ$.

19. In a $\Delta ABC$, P and Q are points in AB and AC respectively and PQ || BC. Prove that the medium bisects PQ.

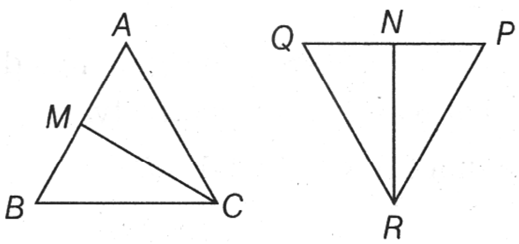
**Long Answer Questions. (Answer any one)** **1 × 5 = 5**

20. In the following figure, CM and RN are respectively the medians of $\Delta ABC$ and $\Delta PQR$. If $\Delta ABC \sim \Delta PQR$ prove that

i) $\Delta AMC \sim \Delta PNR$

ii) $\frac{CM}{RN} = \frac{AB}{PQ}$

iii) $\Delta CMB \sim \Delta RNQ$




21. Prove that the opposite sides of a quadrilateral circumscribing a circle subtend supplimentary angles at the centre of the circle.