PRACTICE PAPER

ICSE CLASS 10 – MATHEMATICS

Chapter 21 : Trigonometrical Identities

(Trigonometry : Identities and Complementary Angles)

Maximum Marks: 40 Time allowed: One and a half hours

1. *Answers to this Paper must be written on the paper provided separately.*
2. *You will not be allowed to write during the first 10 minutes. This time is to be spent in reading the question paper.*
3. ***The time given at the head of this Paper is the time allowed for writing the answers.***
4. *Attempt **all** questions from **Section A** and **any two** questions from **Section B**.*
5. ***All working, including rough work, must be clearly shown, and must be done on the same sheet as the rest of the answer.***
6. ***Omission of essential working will result in loss of marks.***
7. *The intended marks for questions or parts of questions are given in brackets [ ].*
8. *Figures given in the questions are rough sketches and are not drawn to scale. Mathematical tables are not required.*

Question 1

Choose the correct answers to the questions from the given options. [8]

(Do not copy the question, write the correct answers only.)

(i) If $\tan\theta = 5/12$ and θ is acute, then $\sec\theta$ is equal to:

(a) 13/5
(b) 12/13
(c) 13/12
(d) 5/13

(ii) The expression $(1 - \sin^2\theta)\sec^2\theta$ is equal to:

(a) 1
(b) $\cos^2\theta$
(c) $\sec^2\theta$
(d) $\tan^2\theta$

(iii) $\text{cosec}\,(90° - \theta)$ is equal to:

(a) $\cos\theta$
(b) $\cot\theta$
(c) $\text{cosec}\,\theta$
(d) $\sec\theta$

(iv) The value of $\sin 25° \div \cos 65°$ is:

(a) 0
(b) 1
(c) 25/65
(d) 2

(v) The value of $1/(1 + \tan^2\theta) + 1/(1 + \cot^2\theta)$ is:

(a) 0
(b) 2
(c) $\sin\theta \cos\theta$
(d) 1

(vi) If $2\cos^2\theta - 1 = 0$ and θ is an acute angle, then θ is equal to:

(a) 30°
(b) 45°
(c) 60°
(d) 90°

(vii) **Assertion (A):** $\sin^2\theta + \cos^2\theta = 1$ for every acute angle θ.

Reason (R): In a right-angled triangle, $(\text{perpendicular})^2 + (\text{base})^2 = (\text{hypotenuse})^2$.

(a) (A) is true and (R) is false.
(b) (A) is false and (R) is true.
(c) Both (A) and (R) are true, and (R) is the correct explanation for (A).
(d) Both (A) and (R) are true, but (R) is not the correct explanation for (A).

(viii) **Assertion (A):** There is an acute angle θ for which $\sin\theta = 5/4$.

Reason (R): In a right-angled triangle, the hypotenuse is the longest side.

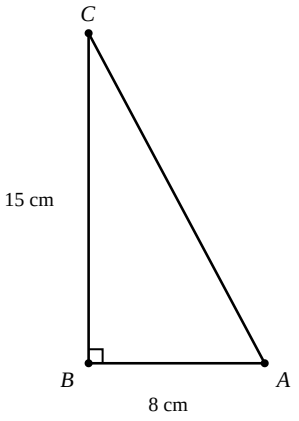
(a) (A) is true and (R) is false.
(b) (A) is false and (R) is true.
(c) Both (A) and (R) are true, and (R) is the correct explanation for (A).
(d) Both (A) and (R) are true, but (R) is not the correct explanation for (A).

Question 2

(i) Prove the identity: $\tan A / (\sec A + 1) + (\sec A + 1) / \tan A = 2 \operatorname{cosec} A$. [4]

(ii) Evaluate without using tables: $(\sin 18° / \cos 72°) + (\tan 23° / \cot 67°) - 2\cos 60° \tan 45°$. [4]

(iii) In the figure, ABC is a right-angled triangle, right-angled at B, with AB = 8 cm and BC = 15 cm. Find AC and hence the value of $(\operatorname{cosec} A - \cot A) \div (\operatorname{cosec} A + \cot A)$. [4]

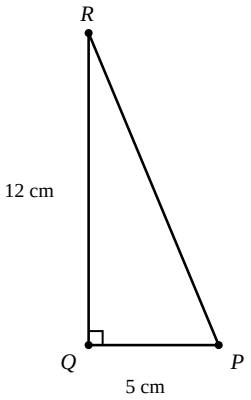


SECTION B (20 Marks)

*(Attempt **any two** questions from this Section.)*

Question 3

In the figure, PQR is a triangle right-angled at Q, with PQ = 5 cm and QR = 12 cm.



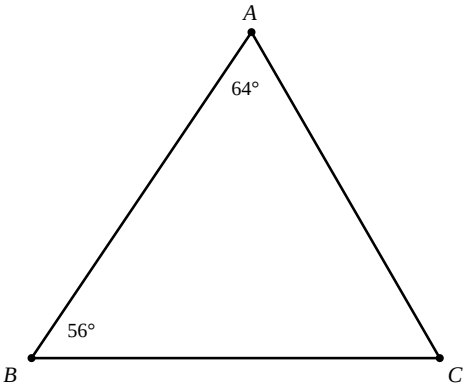
(i) Find PR and the values of sin P, cos P and tan P. [3]

(ii) Verify that $\sin^2 P + \cos^2 P = 1$ and $1 + \tan^2 P = \sec^2 P$. [3]

(iii) Prove that $(\sec P - \tan P) \div (\sec P + \tan P) = (1 - \sin P) \div (1 + \sin P)$ and hence find its value. [4]

Question 4

In the figure, ABC is a triangle in which $\angle A = 64°$ and $\angle B = 56°$.



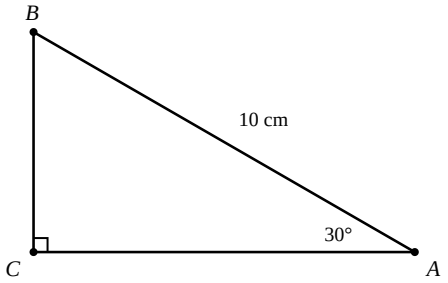
(i) Prove that, for any triangle ABC, $\sin \frac{1}{2}(A + B) = \cos \frac{1}{2}C$. [3]

(ii) Prove that, for any triangle ABC, $\tan \frac{1}{2}(B + C) = \cot \frac{1}{2}A$. [3]

(iii) For the triangle in the figure, find $\angle C$ and the value of $\sin \frac{1}{2}(A + B) \div \cos \frac{1}{2}C$. [4]

Question 5

In the figure, ΔABC is right-angled at C. ∠A = 30° and AB = 10 cm.



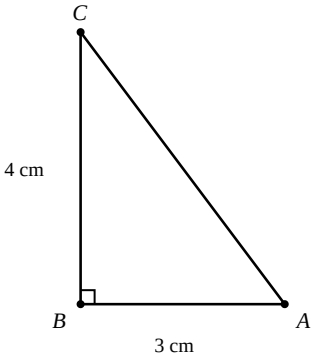
(i) Find the lengths BC and AC. [3]

(ii) Write down tan A, cos B and cot B. What do you observe about tan A and cot B? [3]

(iii) Find sin B from the triangle and hence verify that sin 2A = 2 sin A cos A for A = 30°. [4]

Question 6

In the figure, ABC is a triangle right-angled at B, with AB = 3 cm and BC = 4 cm. Let m = tan A + sin A and n = tan A − sin A.



(i) Find AC, sin A and tan A. [3]

(ii) Find the values of m and n. [3]

(iii) Prove that, for any acute angle A, $m^2 - n^2 = 4\sqrt{(mn)}$, and verify it for the values found in (ii). [4]

— End of Question Paper —