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## Exercise 10.1 (Solutions)

Mathematics 9th (Science) Punjab Textbook Board

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براءُ مهربانى نويُس كانى اور استعمال كرخ وقت اس لائيسنس كا خيال ركهي-
Q. 1 In the given figure, $\overline{A B} \cong \overline{C B}, \angle 1 \cong \angle 2$,

Prove that $\triangle A B D \cong \triangle C B E$.
Solution: Given: $\overline{A B} \cong \overline{C B}$ and $\angle 1 \cong \angle 2$
To prove: $\triangle A B D \cong \triangle C B E$.


Proof:

|  | Statement |
| :---: | :--- |
| In | Reasons |
|  | $\overline{A B} \cong \overline{C B}$ |
|  |  |
|  | $\angle B A D \cong \angle B C E$ |
|  | Given |
|  | Given $\angle 1 \cong \angle 2$ |
|  | $\triangle A B D \cong \triangle C B E$ |
|  | Common |
|  |  |

Q. 2 From the point on the bisector of an angle of an angle, perpendiculars are drawn to the arm of the angle. Prove that these perpendiculars are equal in measure


Solution: Given: $A D$ bisects of an angle $\angle B A C$ from point $E$, draw $\overline{E C} \perp \overline{A M}$ and $\overline{E B} \perp \overline{A L}$.
To prove: $\overline{E B} \cong \overline{E C}$
Proof:

| Statement | Reasons |  |
| :--- | :---: | :--- |
| In | $\Delta A E B \leftrightarrow \triangle A E C$ |  |
|  | $\overline{A E} \cong \overline{A E}$ | Common |
|  | $m \angle A B E=m \angle A C E$ | Each right angle is given |
|  | $m \angle B A E=m \angle C A E$ | Given $\overline{A D}$ is bisector of angle $A$ |
| $\therefore$ | $\Delta A B E=\Delta A C E$ | S.A.A postulate |
| So | $\overline{E B} \cong \overline{E C}$ | Corresponding sides of congruent |
|  |  | triangles. |

Q. 3 In triangle $A B C$, the bisectors of $\angle B$ and $\angle C$ meet in a point $I$. Prove that $I$ is equidistant from the three sides of $\triangle A B C$.
Solution: Given:

$$
\text { In } \triangle A B C, \overline{I F} \perp \overline{A B}, \overline{I E} \perp \overline{A C}, \overline{I D} \perp \overline{B C} \text {. }
$$

To prove:

$$
\overline{I D} \cong \overline{I E} \cong \overline{I F} .
$$



D

## Proof:

| Statement | Reasons |
| :--- | :--- |
| In $\Delta I D B \leftrightarrow \Delta I F B$ |  |
| $\overline{B I} \cong \overline{B I}$ | Common |
| $\angle I B D \cong \angle I B F$ | Given $B I$ is bisector of $\angle B$ |
| $\angle I D B \cong \angle I F B$ | Given each angle is right angle |
| $\Delta I D B \cong \Delta I F B$ | S.A.S Postulates |
| $\therefore \overline{I D} \cong \overline{I F} \quad \ldots . .(i)$ |  |
| Similarly, |  |
| $\Delta I F A \cong \Delta I E A$ | Corresponding sides of $\cong \Delta^{\prime} s$ |
| So $\quad \therefore \quad \overline{I F} \cong \overline{I E} \quad \ldots . .(i i)$ |  |
| From $(i) \quad a n d \quad(i i)$ |  |
| $\overline{I D} \cong \overline{I E} \cong \overline{I F}$ |  |
| $\therefore I$ is equidistant from the three |  |
| sides of $\Delta A B C$ |  |

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