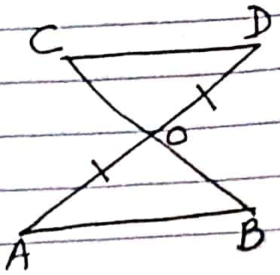
IX Test-10 TRIANGLES

1) Mr. Rohit Verma, Class-IX maths teacher, drew a figure on the white board in the class and provided the following information to the students.



* AB || CD

* O is the mid-point of AD

Then asked the following questions to students

* (i) $\triangle AOB \cong \triangle DOC$ by which congruent condition?

(a) ASA (b) SAS (c) SSS (d) RHS

* (ii) which of the following is correct?

(a) $\angle A = \angle B$ (b) $\angle A = \angle C$ (c) $\angle A = \angle D$ (d) $\angle AOB = \angle ABO$

* (iii) $\angle AOB = \angle DOC$ holds because:

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(a) corresponding angles are equal

(b) alternate interior angles are equal.

(c) alternate exterior angles are equal

(d) vertically opposite angles are equal.

* (iv) The correct statement is:

(a) $AO = DC$ (ii) $OB = OD$ (iii) $AB = OD$ (iv) $OB = OC$

* (v) which of the following is not a congruent criterion?

(a) ASA (b) SAS (c) AAA (d) $OB = OC$

2)

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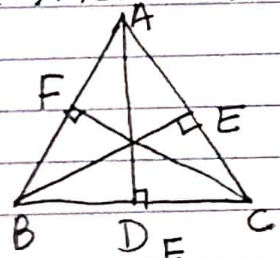

The altitudes AD, BE and CF of $\triangle ABC$ are equal. Prove that $\triangle ABC$ is an equilateral $\triangle$.

3)

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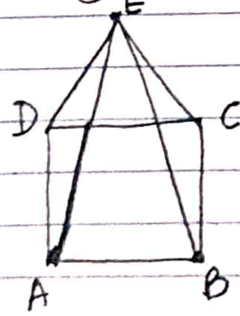

ABCD is a square and CDE is an equilateral $\triangle$. Prove that

(i) $AE = BE$

(ii) $\angle DAE = 15°$

4)

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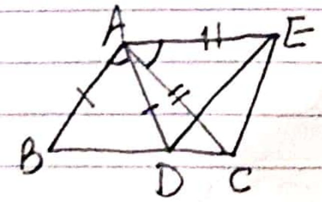
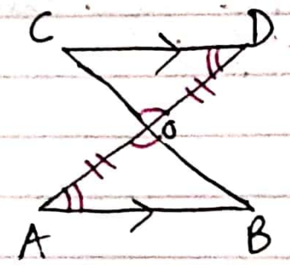


$AC = AE$, $AB = AD$ and $\angle BAD = \angle EAC$.

Show that $BC = DE$.

IX Test - 10 : TRIANGLES - answers

1)



(i) In ΔAOB and ΔDOC, $\angle AOB = \angle DOC$ (V.O.A)
$OA = OD$ (given)
$\angle OAB = \angle ODC$ (alternate interior angles, $AB \parallel CD$ and DA is the transversal)
(a) $\therefore \Delta AOB \cong \Delta DOC$ (ASA Congruency)

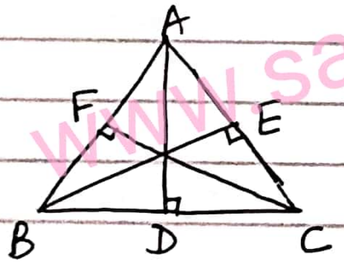
(ii) $\angle A = \angle D$ (alt. int. $\angle$s) (c)

(iii) Vertically opposite angles (d)

(iv) $OB = OC$ (by CPCT) (iv)

(v) AAA (c)

2)



Given: in ΔABC, $AD \perp BC$, $BE \perp AC$, $CF \perp AB$; $AD = BE = CF$

To prove: ΔABC is an equilateral Δ.

Proof:- In ΔADC and ΔBEC, $\angle ADC = \angle BEC$ (each $90°$)
$\angle ACD = \angle BCE$ (common angle)
$AD = BE$ (given)
$\therefore \Delta ADC \cong \Delta BEC$ (AAS congruency)

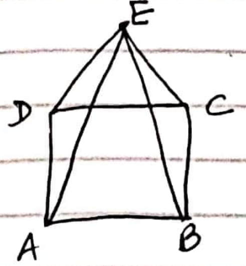
Thus $AC = BC$ (by CPCT) $\longrightarrow$ (1)

In ΔADB and ΔCFB, $\angle ADB = \angle CFB$ (each $90°$)
$\angle ABD = \angle CBF$ (common angle)
$AD = CF$ (given)
$\therefore \Delta ADB \cong \Delta CFB$ (AAS congruency)

Thus $AB = BC$ (by CPCT) $\rightarrow$ (2)

From (1) and (2), $AB = BC = AC$

$\Rightarrow \triangle ABC$ is an equilateral $\triangle$ with all sides equal.
Hence Proved.

3) 

Given: $ABCD$ is a square
$\triangle CDE$ is an equilateral $\triangle$.

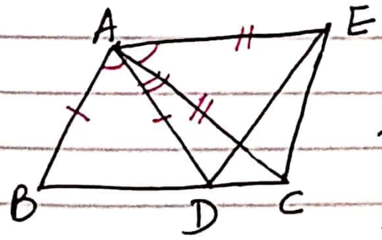
To prove: (i) $AE = BE$
(ii) $\angle DAE = 15^\circ$

Proof :- In equilateral, $\triangle CDE$, $\angle EDC = 60^\circ$
In square $ABCD$, $\angle ADC = 90^\circ$
$\therefore \angle EDA = 60^\circ + 90^\circ = 150^\circ$
Similarly, $\angle ECB = 150^\circ$

(i) In $\triangle EDA$ and $\triangle ECB$, $ED = EC$ (sides of equilateral $\triangle$)
$\angle EDA = \angle ECB$ (each 150°)
$DA = BC$ (sides of a square)
$\therefore \triangle EDA \cong \triangle ECB$ (SAS congruency)
Thus, $AE = BE$ (by CPCT)

(ii) In $\triangle EDA$, $ED = DA$
$\Rightarrow \angle DEA = \angle DAE$ [angles opposite to equal sides]
Using angle sum property, $\angle DAE = \dfrac{180^\circ - 150^\circ}{2} = \dfrac{30^\circ}{2} = 15^\circ$

Hence Proved.

4) 

Given: $AC = AE$, $AB = AD$,
$\angle BAD = \angle EAC$

To prove: $BC = DE$

Proof :- $\angle BAD = \angle EAC$ (given)
$\Rightarrow \angle BAD + \angle DAC = \angle EAC + \angle DAC$
$\Rightarrow \angle BAC = \angle DAE \longrightarrow (1)$

In $\triangle BAC$ and $\triangle DAE$, $AB = AD$ (given)
$AC = AE$ (given)
$\angle BAC = \angle DAE$
$\therefore \triangle BAC \cong \triangle DAE$ (SAS Congruency)

Thus $BC = DE$ (by CPCT)
Hence Proved.