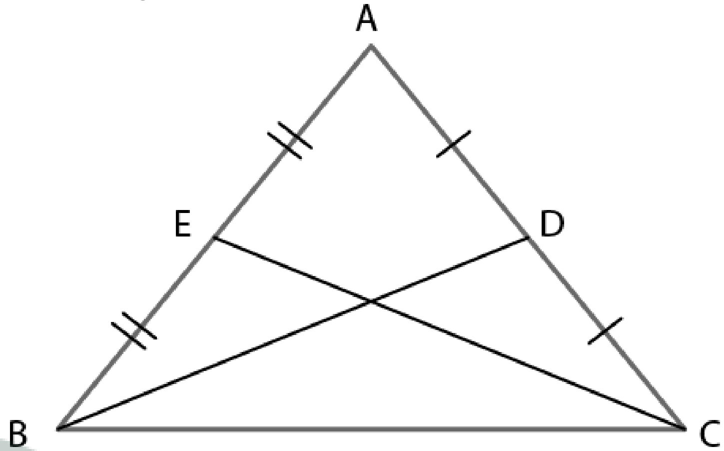
EXERCISE 7.3

ABC is an isosceles triangle with AB = AC and BD and CE are its two medians. Show that BD = CE.

Solution:

According to the question,

ΔABC is an isosceles triangle and AB = AC, BD and CE are two medians



From ΔABD and ΔACE,

AB = AC (given)

2 AE = 2 AD (as D and E are mid points)

So, AE = AD

∠A = ∠A (common)

Hence, ΔABD ≅ ΔACE (using SAS)

⇒ BD = CE (by CPCT)

Hence proved.

1. In Fig.7.4, D and E are points on side BC of a Δ ABC such that BD = CE and AD = AE. Show that Δ ABD ≅ Δ ACE.

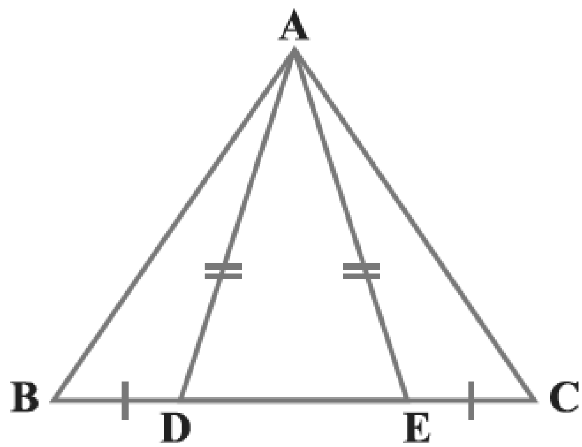


Fig. 7.4

Solution:

According to the question,

In ΔABC,
BD = CE and AD = AE.
In ΔADE,
AD = AE
Since opposite angles to equal sides are equal,
We have,
$\angle ADE = \angle AED$ … (1)
Now, $\angle ADE + \angle ADB = 180°$ (linear pair)
$\angle ADB = 180° - \angle ADE$ ... (2)
Also, $\angle AED + \angle AEC = 180°$ (linear pair)
$\angle AEC = 180° - \angle AED$
Since, $\angle ADE = \angle AED$
$\angle AEC = 180° - \angle ADE$ … (3)
From equation (2) and (3)
$\angle ADB = \angle AEC$ ... (4)
Now, In ΔADB and ΔAEC,
AD = AE (given)
BD = EC (given)
$\angle ADB = \angle AEC$ (from (4)
Hence, $\Delta ABD \cong \Delta ACE$ (by SAS)

2. CDE is an equilateral triangle formed on a side CD of a square ABCD (Fig.7.5). Show that Δ ADE ≅ Δ BCE.

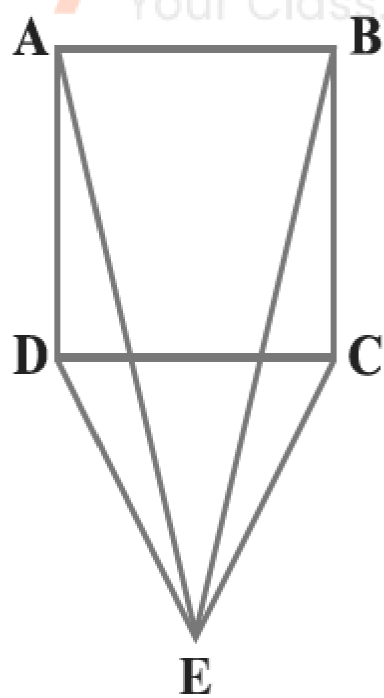


Fig. 7.5

Solution:

According to the question,
CDE is an equilateral triangle formed on a side CD of a square ABCD.
In ΔADE and ΔBCE,
DE = CE (sides of equilateral triangle)
Now,
∠ADC = ∠BCD = 90°
And, ∠EDC = ∠ECD = 60°
Hence, ∠ADE = ∠ADC + ∠CDE = 90° + 60° = 150°
And ∠BCE = ∠BCD + ∠ECD = 90° + 60° = 150°
⇒ ∠ADE = ∠BCE
AD = BC (sides of square)
Hence, ΔADE ≅ΔBCE (by SAS)

3. In Fig.7.6, BA ⊥ AC, DE ⊥ DF such that BA = DE and BF = EC. Show that Δ ABC ≅ Δ DEF.

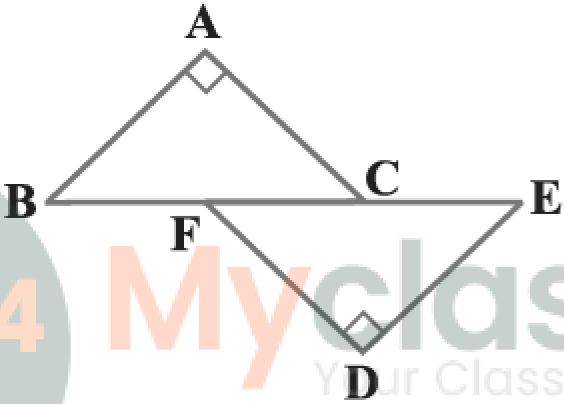


Fig. 7.6

Solution:

According to the question,
BA ⊥ AC, DE ⊥ DF such that BA = DE and BF = EC.
In ΔABC and ΔDEF
BA = DE (given)
BF = EC (given)
∠A = ∠D (both 90°)
BC = BF + FC
EF = EC + FC = BF + FC (∵ EC = BF)
⇒ EF = BC
Hence, ΔABC ≅ ΔDEF (by RHS)

4. Q is a point on the side SR of a Δ PSR such that PQ = PR. Prove that PS > PQ.
Solution:

Given: in ΔPSR, Q is a point on the side SR such that PQ = PR.
In ΔPRQ,
PR = PQ (given)
⇒ ∠PRQ = ∠PQR (opposite angles to equal sides are equal)
But ∠PQR > ∠PSR (exterior angle of a triangle is greater than each of opposite interior angle)

⇒ ∠PRQ > ∠PSR
⇒ PS > PR (opposite sides to greater angle is greater)
⇒ PS > PQ (as PR = PQ)