Exercise 15(B)

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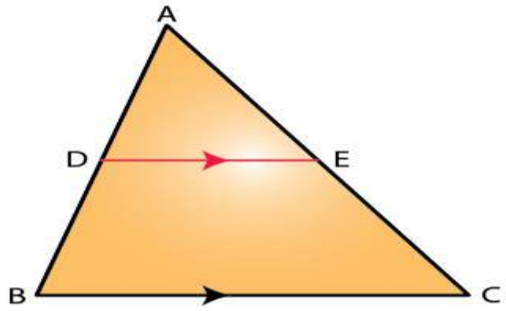
1. In the following figure, point D divides AB in the ratio 3: 5. Find:
(i) AE/EC (ii) AD/AB (iii) AE/AC
Also if,
(iv) DE = 2.4 cm, find the length of BC.
(v) BC = 4.8 cm, find the length of DE.



Solution:

(i) Given, AD/DB = 3/5
And DE || BC.
So, by Basic Proportionality theorem, we have
AD/DB = AE/EC
AE/EC = 3/5

(ii) Given, AD/DB = 3/5
So, DB/AD = 5/3
Adding 1 both sides, we get
DB/AD + 1 = 5/3 + 1
(DB + AD)/ AD = (5 + 3)/ 3
AB/AD = 8/3
Therefore,
AD/AB = 3/8

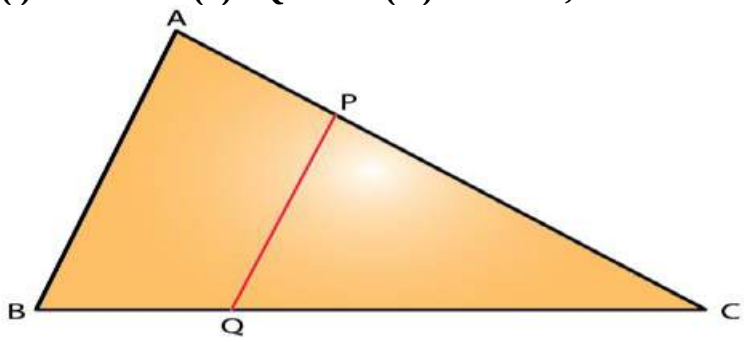
(iii) In ΔABC, as DE || BC
By BPT, we have
AD/DB = AE/ EC
So, AD/AB = AE/AC
From above, we have AD/AB = 3/8
Therefore,
AE/AC = 3/8

(iv) In ΔADE and ΔABC,
∠ADE = ∠ABC [As DE || BC, corresponding angles are equal.]
∠A = ∠A [Common angle]
Hence, ΔADE ~ ΔABC by AA criterion for similarity
So, we have
AD/AB = DE/BC

3/8 = 2.4/BC
BC = 6.4 cm

(v) Since, ΔADE ~ ΔABC by AA criterion for similarity
So, we have
AD/AB = DE/BC
3/8 = DE/4.8
DE = 1.8 cm

2. In the given figure, PQ ∥ AB; CQ = 4.8 cm QB = 3.6 cm and AB = 6.3 cm. Find:
(i) CP/PA (ii) PQ (iii) If AP = x, then the value of AC in terms of x.



Solution:

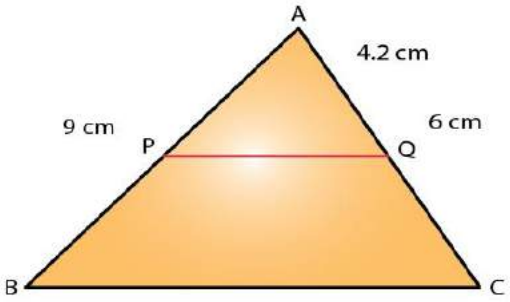
(i) In ΔCPQ and ΔCAB,
∠PCQ = ∠APQ [As PQ || AB, corresponding angles are equal.]
∠C = ∠C [Common angle]
Hence, ΔCPQ ~ ΔCAB by AA criterion for similarity
So, we have
CP/CA = CQ/CB
CP/CA = 4.8/ 8.4 = 4/7
Thus, CP/PA = 4/3

(ii) As, ΔCPQ ~ ΔCAB by AA criterion for similarity
We have,
PQ/AB = CQ/CB
PQ/6.3 = 4.8/8.4
PQ = 3.6 cm

(iii) As, ΔCPQ ~ ΔCAB by AA criterion for similarity
We have,
CP/AC = CQ/CB
CP/AC = 4.8/8.4 = 4/7
So, if AC is 7 parts and CP is 4 parts, then PA is 3 parts.
Hence, AC = 7/3 x PA = (7/3)x

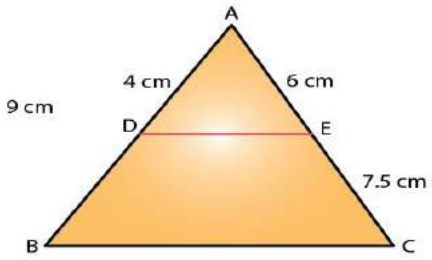
3. A line PQ is drawn parallel to the side BC of Δ ABC which cuts side AB at P and side AC at Q. If AB = 9.0 cm, CA = 6.0 cm and AQ = 4.2 cm, find the length of AP.

Solution:



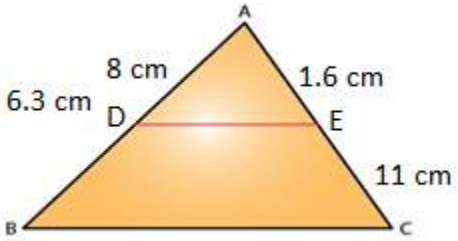
In Δ APQ and Δ ABC,
∠APQ = ∠ABC [As PQ || BC, corresponding angles are equal.]
∠PAQ = ∠BAC [Common angle]
Hence, ΔAPQ ~ ΔABC by AA criterion for similarity
So, we have
AP/AB = AQ/AC
AP/9 = 4.2/6
Thus,
AP = 6.3 cm

4. In Δ ABC, D and E are the points on sides AB and AC respectively. Find whether DE ∥ BC, if
(i) AB = 9cm, AD = 4cm, AE = 6cm and EC = 7.5cm.
(ii) AB = 6.3 cm, EC = 11.0 cm, AD =0.8 cm and EA = 1.6 cm.
Solution:



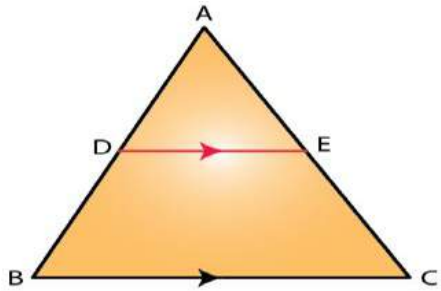
(i) In Δ ADE and Δ ABC,
AE/EC = 6/7.5 = 4/5
AD/BD = 4/5 [BD = AB – AD = 9 – 4 = 5 cm]
So, AE/EC = AD/BD
Therefore, DE || BC by the converse of BPT.

(ii) In Δ ADE and Δ ABC,

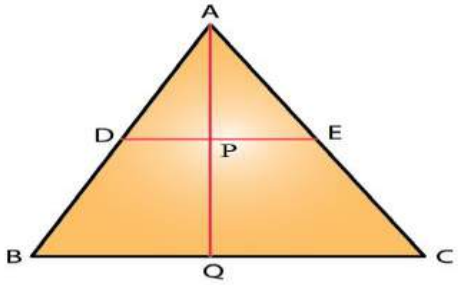


AE/EC = 1.6/11 = 0.8/5.5
AD/BD = 0.8/5.5 [BD = AB – AD = 6.3 – 0.8 = 5.5 cm]
So, AE/EC = AD/BD
Therefore, DE || BC by the converse of BPT.

5. In the given figure, Δ ABC ~ Δ ADE. If AE: EC = 4: 7 and DE = 6.6 cm, find BC. If 'x' be the length of the perpendicular from A to DE, find the length of perpendicular from A to BC in terms of 'x'.



Solution:



Given,
Δ ABC ~ Δ ADE
So, we have
AE/AC = DE/BC
4/11 = 6.6/BC
BC = (11 x 6.6)/ 4 = 18.15 cm
And, also
As Δ ABC ~ Δ ADE, we have
∠ABC = ∠ADE and ∠ACB = ∠AED
So, DE || BC
And, AB/AD = AC/AE = 11/4 [Since, AE/EC = 4/7]
In Δ ADP and Δ ABQ,
∠ADP = ∠ABQ [As DP || BQ, corresponding angles are equal.]
∠APD = ∠AQB [As DP || BQ, corresponding angles are equal.]
Hence, ΔADP ~ ΔABQ by AA criterion for similarity
AD/AB = AP/AQ
4/11 = x/AQ
Thus,
AQ = (11/4)x