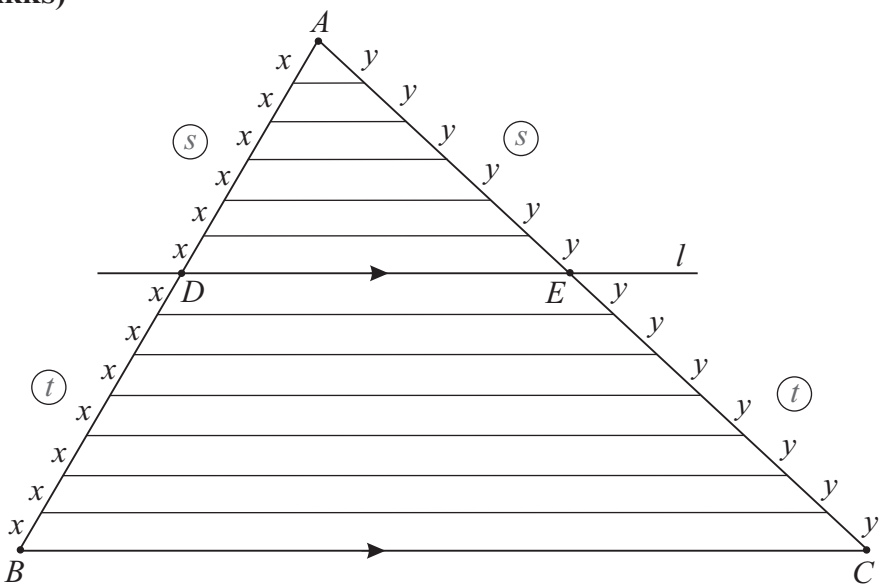
LC 2018: Paper 2

Question 6 (25 marks)

Question 6 (a)



Given: ΔABC with a line DE parallel to $[BC]$ dividing $[AB]$ in the ratio $s{:}t$.

To prove: In ΔABC, if a line DE is parallel to BC and cuts $[AB]$ in the ratio $s{:}t$, then it also cuts $[AC]$ in the same ratio.

Construction: Divide $[AB]$ into $(s + t)$ segments of equal length x by drawing equally spaced parallel lines starting at A and ending at B.

Proof:

By the transversal theorem, the segments on $[AC]$ have equal length y.

$$\therefore \frac{|AD|}{|DB|} = \frac{sx}{tx} = \frac{s}{t} \Rightarrow \frac{|AE|}{|EC|} = \frac{sy}{ty} = \frac{s}{t}$$

Therefore, DE divides $[AC]$ in the same ratio.

Marking Scheme Notes

Question 6 (a) [Scale 15D (0, 4, 7, 11, 15)]

4: • Relevant diagram drawn

7: • Construction clearly indicated

11: • Proof missing 1 relevant step

Question 6 (b)

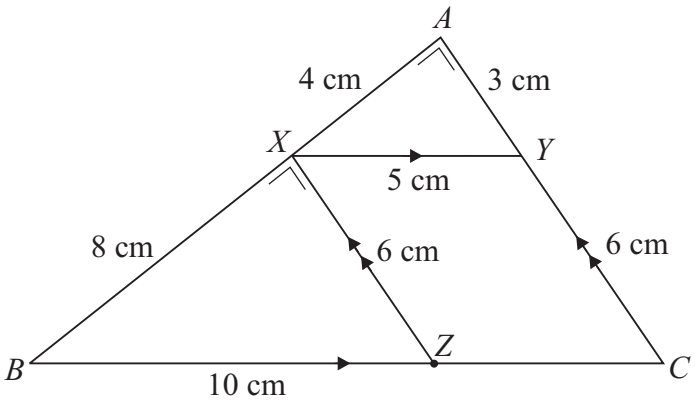
$|XY| = \sqrt{4^2 + 3^2} = 5$ cm [Pythagoras]

$|BX| = 8$ cm $[|AX| : |XB| = 1:2]$

$|YC| = 6$ cm [Ratio theorem]

$|XZ| = |YC| = 6$ cm [$ZCYX$ is a parallelogram]

$|BZ| = \sqrt{8^2 + 6^2} = 10$ cm [Pythagoras]



Marking Scheme Notes

Question 6 (b) [Scale 10C (0, 3, 7, 10)]

3: • $|XY|$ or $|BX|$ or $|CY|$ found
• Pythagoras with some substitution

7: • $|ZC|$ or $|BC|$ found
• Ratios formulated with $|BZ|$ the sole unknown