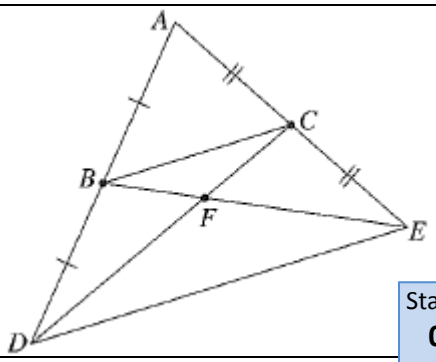
11 **9a** The diagram shows ΔADE, where B is the midpoint of AD and C is the midpoint of AE. The intervals BE and CD meet at F.

(i) Explain why ΔABC is similar to ΔADE. **1**

(ii) Hence, or otherwise, prove that the ratio $BF:FE = 1:2$. **2**



State Mean:
0.67/1
0.43/2

(i) $\angle A$ is common

$$\frac{AB}{AD} = \frac{AC}{AE} \text{ (given)}$$

$\therefore$ ΔABC and ΔADE are similar because 2 sides in proportion and included angle equal.

(ii) $\angle ABC = \angle ADE$ (matching $\angle$s of similar Δs equal)

$\therefore$ BC || DE (corr $\angle$s equal)

$\therefore$ $\angle CBF = \angle DEF$ (alt $\angle$s equal, BC || DE)

$\angle BCF = \angle EDF$(alt $\angle$s equal, BC || DE)

$\therefore$ ΔBCF and ΔEDF are similar (2 $\angle$s equal)

But $\frac{BC}{DE} = \frac{1}{2}$ (from similar Δs in (i))

$\therefore$ $\frac{BF}{FE} = \frac{1}{2}$ or, $BF:FE = 1:2$

(matching sides of sim Δs in proportion)

* These solutions have been provided by *projectmaths* and are not supplied or endorsed by the Board of Studies

Board of Studies: Notes from the Marking Centre

(i) Most commonly candidates tried to prove similarity by using corresponding sides in the same ratio with an included angle equal. However, many were unable to present a logical argument with correct terminology. A significant number of candidates were unsure how to write the ratios correctly and regularly confused the letters given in the diagram, for example writing $2AD = AB$ and $2AE = AC$. Many candidates assumed parallel lines (even though this was not given in the data).

(ii) Candidates who attempted this part often recognised that corresponding sides in similar triangles are in the same ratio, but they did not first prove that ΔBCF is similar to ΔEDF. Much more care is needed in naming the correct corresponding angles of triangles, in providing correct reasoning in proofs and in not making assumptions, such as that BC was parallel to DE.

Source: http://www.boardofstudies.nsw.edu.au/hsc_exams/