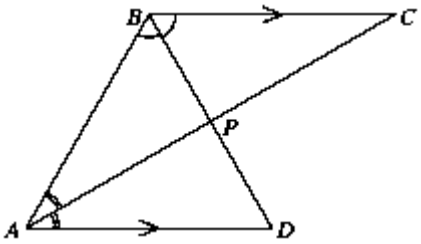
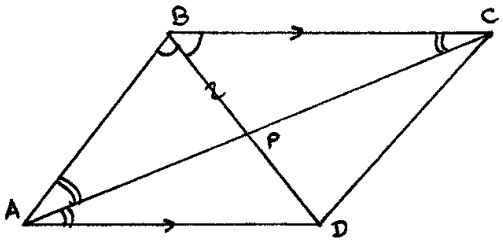
06	**6a**	In the diagram, AD is parallel to BC, AC bisects $\angle BAD$ and BD bisects $\angle ABC$. The lines AC and BD intersect at P. Copy or trace the diagram into your writing booklet. (i) Prove that $\angle BAC = \angle BCA$. (ii) Prove that $\Delta ABP \equiv \Delta CBP$. (iii) Prove that $ABCD$ is a rhombus.	**1** **2** **3**



i. $\angle BAC = \angle DAC$ (given)
$\angle DAC = \angle BCA$ (alt $\angle$s, AD || BC)
$\therefore \angle BAC = \angle BCA$



ii. $\angle BAC = \angle BCA$ (from i)
$\angle ABP = \angle CBP$ (given)
BP is common
$\therefore \Delta ABP \equiv \Delta CBP$ (AAS test)

iii. Let $\angle ABP = \angle CBP = x^\circ$, and
let $\angle BAP = \angle BCP = y^\circ$
In ΔABC, $x + y + y + x = 180$ ($\angle$ sum of Δ)
$\therefore 2x + 2y = 180$
$x + y = 90$
In ΔABP, $x + y + \angle APB = 180^\circ$
$\therefore \angle APB = 90^\circ$
This means diagonals are perpendicular,
$\therefore ABCD$ is a rhombus

* 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) The majority of candidates presented a solution involving $\angle BCA = \angle CAD$ (alternate angles as BC is parallel to AD). However, candidates who did not provide the link $\angle BAC = \angle CAD$ were not awarded any marks.

(ii) Candidates presented a congruence proof that involved three matching equality statements. The better responses gave appropriate reasons for these statements and the correct congruence test. Candidates who provided insufficient justification were awarded one mark.

(iii) Candidates providing better responses to this question presented a correct argument with appropriate reasons to justify their statements. However, many candidates attempted to answer the question by stating the properties of a rhombus only. When presenting a proof candidates need a logical argument with justification.

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