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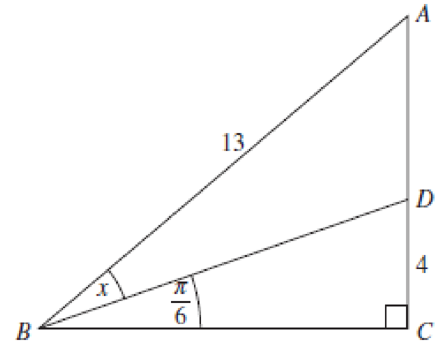
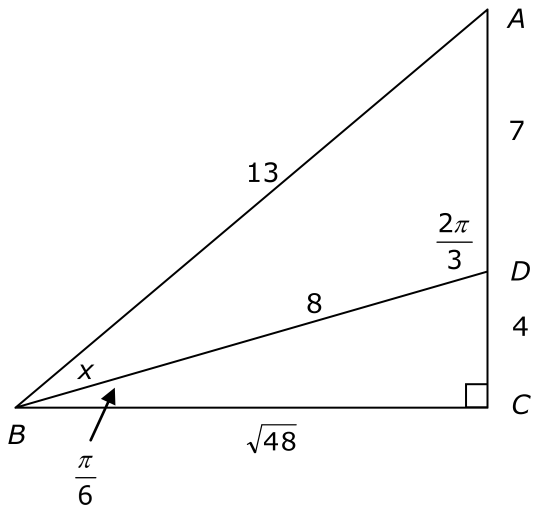
13	**14 c**	The right-angled triangle ABC has hypotenuse $AB = 13$. The point D is on AC such that $DC = 4$, $\angle DBC = \frac{\pi}{6}$ and $\angle DBC = x$. Using the sine rule, or otherwise, find the exact value of $\sin x$.	**3**



Not to scale

State Mean: **1.08/3**



$$\frac{4}{BD} = \sin\frac{\pi}{6}$$

$$\frac{4}{BD} = \frac{1}{2}$$

$$\therefore BD = 8$$

By Pythagoras,

$$BC^2 = 8^2 - 4^2$$

$$= 64 - 16$$

$$= 48$$

$$BC = \sqrt{48}$$

By Pythagoras,

$$AC^2 = 13^2 - (\sqrt{48})^2$$

$$= 121$$

$$AC = 11$$

$$\therefore AD = 7$$

Also, $\angle ADB = \frac{\pi}{6} + \frac{\pi}{2}$

$$= \frac{2\pi}{3}$$

$$\therefore \frac{\sin x}{7} = \frac{\sin\frac{2\pi}{3}}{13}$$

$$\sin x = \frac{7\sin\frac{2\pi}{3}}{13}$$

$$= \frac{7 \times \frac{\sqrt{3}}{2}}{13}$$

$$= \frac{7\sqrt{3}}{26}$$

* 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

Candidates used a range of successful strategies to find the exact value of $\sin x$. Some recognised that they were required to use the sine rule and Pythagoras' theorem and they used the appropriate notation correctly.

Common problems were:

- phrasing their 'exact' answer in terms of inverse trig functions
- using Pythagoras' theorem on non-right triangles.

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