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**2016 13** Consider the parabola  $x^2 - 4x = 12y + 8$ .

- b** (i) By completing the square, or otherwise, find the focal length of the parabola. **2**  
 (ii) Find the coordinates of the focus. **1**

(i)  $x^2 - 4x = 12y + 8$

$$x^2 - 4x + 4 = 12y + 8 + 4$$

$$(x - 2)^2 = 12y + 12$$

$$(x - 2)^2 = 12(y + 1),$$

which is of the form  $(x - h)^2 = 4a(y - k)$ .

$$\therefore a = 3$$

$\therefore$  the focal length is 3 units.

State Mean:

**1.42**

(ii) The parabola is concave up with vertex  $(2, -1)$  and focal length 3.

$\therefore$  focus  $(2, 2)$

State Mean:

**0.56**

\* These solutions have been provided by [projectmaths](#) and are not supplied or endorsed by BOSTES.

### BOSTES: Notes from the Marking Centre

This information is released by BOSTES in late Term 1 2017.