



20 24 MA The circle $x^2 - 6x + y^2 + 4y - 3 = 0$ is reflected in the x -axis.

3

Sketch the reflected circle, showing the coordinates of the centre and the radius.

$$x^2 - 6x + y^2 + 4y - 3 = 0$$

$$x^2 - 6x + y^2 + 4y = 3$$

$$x^2 - 6x + 9 + y^2 + 4y + 4 = 3 + 9 + 4 \quad \checkmark$$

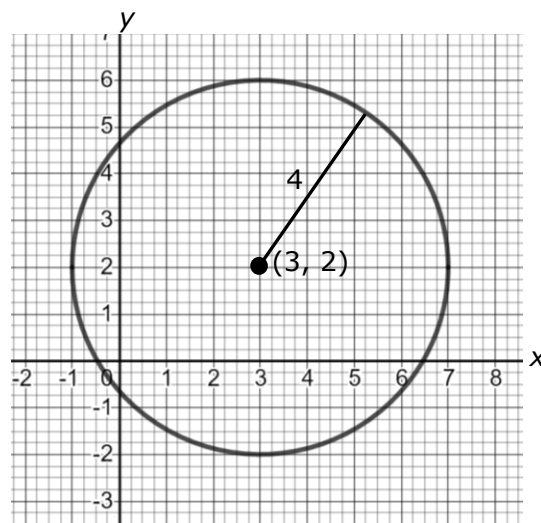
$$(x - 3)^2 + (y + 2)^2 = 16$$

Circle centre $(3, -2)$, radius 4 units. \checkmark

Reflecting about x -axis means new circle has centre at $(3, 2)$ and radius 4 units. \checkmark

State Mean:

1.45/3



HSC Marking Feedback

Students should:

- transform the equation by completing the square on both x and y terms
- reflect in the x -axis by algebraically replacing y with $(-y)$, or graphically after sketching the original circle
- sketch a reflected circle showing the centre and radius.

In better responses, students were able to:

- show all necessary working to complete the square
- state the coordinates of the centre and radius of the original circle
- substitute y in the original equation with $(-y)$, ensuring that $y^2 > 0$
- state the coordinates of the centre and radius of the reflected circle
- sketch the original circle and then the reflected circle clearly showing the centre and radius
- use appropriate scale to show suitable x - and y -intercepts
- find the horizontal width and vertical height of the circle (N-E-W-S).

Areas for students to improve include:

- reflecting in the x -axis, either graphically or by replacing y in the original equation with $(-y)$
- answering the question by including a sketch
- completing the square and drawing circles when the centre is not at the origin
- recognising that the radius is the square root of the right-hand side of the equation
- checking working if the equation involves a negative radius
- sketching circles by showing the centre and radius.

* These solutions have been provided by [projectmaths](http://projectmaths.com.au) and are not supplied or endorsed by NESA.

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