

CYLINDRICAL COORDINATE CONVERSIONS - ANSWERS

Convert from cylindrical, (r, θ, z) , to rectangular, (x, y, z) , coordinates.

1. $(2, \pi/2, 3)_{\text{cylindrical}} \rightarrow (0, 2, 3)_{\text{rectangular}}$

2. $(2, \pi/4, 1)_{\text{cylindrical}} \rightarrow (\sqrt{2}, \sqrt{2}, 1)_{\text{rectangular}}$

3. $(3, \pi/6, 2)_{\text{cylindrical}} \rightarrow \left(\frac{3\sqrt{3}}{2}, \frac{3}{2}, 2\right)_{\text{rectangular}}$

4. $(2, 7\pi/4, 8)_{\text{cylindrical}} \rightarrow (\sqrt{2}, -\sqrt{2}, 8)_{\text{rectangular}}$

5. $(2, 4\pi/3, 3)_{\text{cylindrical}} \rightarrow (-1, -\sqrt{3}, 3)_{\text{rectangular}}$

6. $(1, 5\pi/6, -3)_{\text{cylindrical}} \rightarrow \left(\frac{-\sqrt{3}}{2}, \frac{1}{2}, -3\right)_{\text{rectangular}}$

Convert from rectangular, (x, y, z) , to cylindrical, (r, θ, z) , coordinates.

7. $(2, 2, 2)_{\text{rectangular}} \rightarrow \left(2\sqrt{2}, \frac{\pi}{4}, 2\right)_{\text{cylindrical}}$

8. $(-1, 0, 2)_{\text{rectangular}} \rightarrow (1, \pi, 2)_{\text{cylindrical}}$

9. $(0, 1, -5)_{\text{rectangular}} \rightarrow \left(1, \frac{\pi}{2}, -5\right)_{\text{cylindrical}}$

10. $(-2, 2, 3)_{\text{rectangular}} \rightarrow \left(2\sqrt{2}, \frac{3\pi}{4}, 3\right)_{\text{cylindrical}}$

11. $(1, \sqrt{3}, 4)_{\text{rectangular}} \rightarrow \left(2, \frac{\pi}{3}, 4\right)_{\text{cylindrical}}$

12. $(0, -1, -2)_{\text{rectangular}} \rightarrow \left(1, \frac{3\pi}{2}, -2\right)_{\text{cylindrical}}$

Write the given equation in cylindrical coordinates.

13. $x^2 + y^2 + z^2 = 25$

$$r^2 + z^2 = 25$$

14. $x^2 + y^2 = 2y$

$$r^2 = 2r \sin \theta \Rightarrow r^2 - 2r \sin \theta = 0 \Rightarrow r(r - 2 \sin \theta) = 0$$

15. $x^2 + y^2 + 9z^2 = 36$

$$r^2 + 9z^2 = 36$$

16. $x = 1$ (write as a function of r)

$$r \cos \theta = 1 \Rightarrow r = \sec \theta$$