

Ch12-6

單選題

■ Identify the trace of the surface $x = 2y^2 + 3z^2$ in the plane $x = 1$.

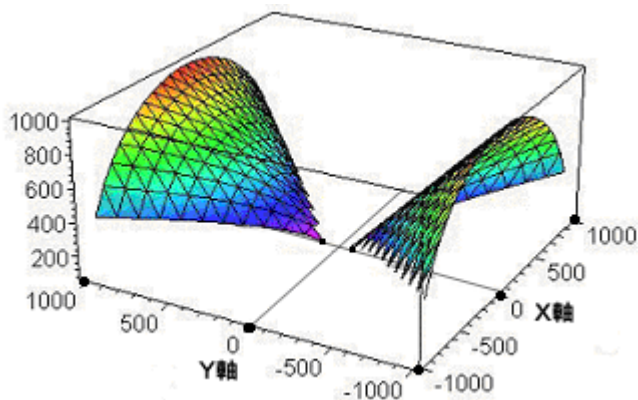
(1) Ellipse but not circle (2) Parabola
(3) Hyperbola (4) Circle
(5) Two Parallel straight lines (6) Two intersecting straight lines
(7) Point (8) Straight Line

Ans : 1

Sol : :

The trace of the surface: $2y^2 + 3z^2 = 1 \Rightarrow$ Ellipse but not circle.

■ Given the following graph:



Which equation in the following matches its graph as above?

A) $9x^2 + 4y^2 + z^2 = 1$ B) $y = x^2 - z^2$ C) $x^2 - y^2 + z^2 = 1$ D)

$-x^2 + y^2 - z^2 = 1$

Ans : D

Sol:

Idea: Fix z-axis

$z=0 \Rightarrow$ ①圖形在 y 軸交兩點

② 對稱 y 軸雙曲線

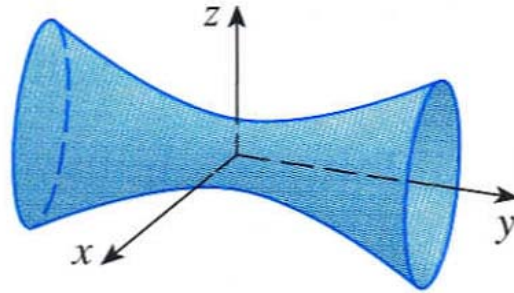
For (A): $9x^2 + 4y^2 = 1 \Rightarrow$ 橢圓 (ellipse). False!

For (B): $y = x^2 \Rightarrow$ 拋物線(parabolic). False!

For (C): $x^2 - y^2 = 1 \Rightarrow$ 對稱 x 軸雙曲線(Hyperbolic). False!

For (D): $-x^2 + y^2 = 1 \Rightarrow$ 對稱 y 軸雙曲線(Hyperbolic). True!

■ The graph



is the equation of

(A) $x^2 + 4y^2 + 9z^2 = 1$, (B) $x^2 - y^2 + z^2 = 1$,

(C) $-x^2 + y^2 - z^2 = 1$, (D) $y^2 = x^2 + 2z^2$.

Ans : B

Sol:

The graph give us two sense: ① Circle or ellipse.(When fix $y=0$)

② Hyperbolic. (When fix $x=0$)

Fix $y=0 \Rightarrow$

For (A), $x^2 + 9z^2 = 1 \Rightarrow$ Ellipse.

For (B), $x^2 + z^2 = 1 \Rightarrow$ Circle.

For (C), $-x^2 - z^2 = 1 \Rightarrow x^2 + z^2 = -1 \Rightarrow \emptyset$ (False!)

For (D), $x^2 + 2z^2 = 0 \Rightarrow$ one point $(0,0,0)$. (False!)

Fix $x=0 \Rightarrow$

For (A), $4y^2 + 9z^2 = 1 \Rightarrow$ Ellipse. (False!)

For (B), $-y^2 + z^2 = 1 \Rightarrow$ Hyperbolic.

Therefore , the answer is (B).