1. A vector *A* which has magnitude 8.0 is added to a vector *B* which lies on *x*-axis. The sum of these two vectors lies on *y*-axis and has a magnitude twice of the magnitude of vector *B*. The magnitude of vector *B* is:

a) 8 ;

b) 1.41*8 ;

c) 8/(5)^1/2 ;

d) 8*(5)^1/2 .

Solution.

As vector *B* which lies on *x*-axis, then $\vec{B}(b;0)$. The magnitude of vector *B* is $\left|\vec{B}\right| = \sqrt{b^2 + 0^2} = |b|$.

Assume that $\vec{A}(a_1; a_2)$.

The sum of these two vectors is $\vec{C} = \vec{A} + \vec{B} = (a_1;\ a_2) + (b;\ 0) = (a_1 + b;\ a_2)$. This vector lies on *y*-axis, so $a_1 + b = 0$, $a_1 = -b$.

The magnitude of vector $\vec{A}$ is $\left|\vec{A}\right| = \sqrt{a_1{}^2 + a_2{}^2} = \left|(-b)^2 + a_2{}^2\right| = \sqrt{b^2 + a_2{}^2}$. According to the condition of the problem, $\left|\vec{A}\right| = 8.0$.

The magnitude of vector $\vec{C}$ is $\left|\vec{C}\right| = \sqrt{0^2 + a_2{}^2} = |a_2|$. According to the condition of the problem, $\left|\vec{C}\right| = 2 \cdot \left|\vec{B}\right|$, so $|a_2| = 2 \cdot |b|$.

Summarizing, $\left|\vec{A}\right| = \sqrt{b^2 + (2|b|)^2} = 8.0$, $|b| = \dfrac{8.0}{\sqrt{1+2^2}} = \dfrac{8.0}{\sqrt{5}}$.

Thus, the magnitude of vector $\vec{B}$ is $\left|\vec{B}\right| = |b| = \dfrac{8.0}{\sqrt{5}}$.

Answer: *C*.