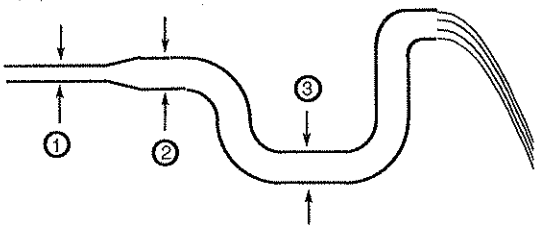
The side view of a pipe is shown. The pipe diameter increases and then remains constant. P_i is the pressure, and v_i is the speed of a non-viscous incompressible fluid, at locations i = 1,2,3.



Choices: **Greater than, Less than, Equal to.**

A. v_2 is .... v_1.
B. P_2 is .... P_1.
C. P_3 is .... P_2.
D. v_3 is .... v_2.

Tries 0/99

Answer for Part: 0	• Less than • Greater than • Greater than • Equal to

Water is flowing in a straight horizontal pipe of variable cross section. Where the cross-sectional area of the pipe is $2.50 \cdot 10^{-2}$ m^2, the pressure is $10.90 \cdot 10^5$ Pa and the velocity is 0.460 m/s. In a constricted region where the area is $15.50 \cdot 10^{-4}$ m^2, what is the velocity?

Tries 0/99

What is the pressure (in Pa)? (Assume an ideal fluid)

Tries 0/99

Answer for Part: 11	• 7.42 [7.34516129032258 7.49354838709678] Sig 0 - 15 • Unit: m/s
Answer for Part: 13	• 1.06E+06 [1051956.56301977 1073208.21075755] Sig 0 - 15

G) known: $A_1 = 2.5\times10^{-2}\,m^2$, $A_2 = 15.5\times10^{-4}\,m^2$, $P_1 = 10.9\times10^5\,Pa$, $v_1 = 0.46\,m/s$ | unknown: $P_2 = ?$, $v_2 = ?$

Estimate

$v_2 = 0.46 \cdot \frac{2.5\times10^{-2}}{15.5\times10^{-4}} \approx \frac{250}{30} = 8\,m/s$

6) $v_2 > v_1$, $P_2 < P_1$

Bernoulli + continuity

$A_1 v_1 = A_2 v_2$

$P_1 + \frac{1}{2}\rho v_1^2 = P_2 + \frac{1}{2}\rho v_2^2$

H) $v_2 = \frac{A_1 v_1}{A_2} = 0.46\,m/s \cdot \frac{2.5\times10^{-2}\,m^2}{15.5\times10^{-4}\,m^2} = 7.42\,m/s$

$P_2 = P_1 + \frac{1}{2}\rho(v_1^2 - v_2^2)$

$= 10.9\times10^5\,Pa + \frac{1}{2}\,1000\,\frac{kg}{m^3} \times \left(0.46^2\,\frac{m^2}{s^2} - 7.42^2\,\frac{m^2}{s^2}\right)$

$= 1.06\times10^6\,Pa = 1060\,kPa$