

### Question:

Water enters your home plumbing at ground level. Where will you get the strongest spray from a shower?

1. In the ground floor shower.
2. In the basement shower.
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- Fluids accelerate toward lowest pressures.

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  - Push inward on the water.
  - The water pushes outward on you.
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  - Water pressure rises as you squeeze it.

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$$\text{Work} = \text{Pressure} \cdot \text{Volume}$$

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- PPE needs steady state flow (SSF).

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- Energy is PPE + KE (Kinetic Energy).
- Bernoulli's equation (no gravity):

$$\text{PPE} + \text{KE} = \text{Constant}$$

$$\text{PPE/Volume} + \text{KE/Volume} = \text{Constant/Volume}$$

(along a streamline)

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  - Pressure decreases with altitude.
  - Pressure increases with depth.

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- Weight also causes fluids to accelerate.
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- Weight creates stable pressure gradients
- Fluids have gravitational potential energy (GPE)

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- Bernoulli's equation:

$$\begin{aligned} PPE + KE + GPE &= \text{Constant} \\ PPE/\text{Volume} + KE/\text{Volume} + GPE/\text{Volume} &= \text{Constant}/\text{Volume} \\ &(\text{along a streamline}) \end{aligned}$$

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Water enters your home plumbing at ground level. Where will you get the most intense shower spray?

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