2019-Ph-H1-Q5

Section: Our Dynamic Universe
Topic: Forces, Energy and Power

Summary:
Four masses (10 kg, 40 kg, 30 kg, 20 kg) are linked on a horizontal, frictionless surface by strings P, Q, and R. A constant horizontal force pulls the system. We are asked which string experiences the greatest and least tension.

Solution:

- **Key idea:** The string nearest the pulling force must transmit the force required to accelerate *all* masses behind it.
- String **P** pulls the entire system (40 + 30 + 20 = 90 kg).
- String **Q** pulls 30 + 20 = 50 kg.
- String **R** pulls only 20 kg.

So:
Tension is greatest in P and least in R.

Answer: B. Greatest in P and least in R.

Guidance for Students:

- Tension in a series of connected objects is highest closest to the pulling force.
- Each string only needs to accelerate the masses behind it.

Revision Tips:

- **Draw free-body diagrams** for each mass.
- Start from the rear mass to determine tensions step by step.
- Remember: *same acceleration for all connected masses*.