

- b) middle part, B.
- c) lower part, C.
- d) ... makes no difference.



CONCEPTUAL Physics

NEXT-TIME QUESTION



If you drill a hole horizontally through the branch of a tree, you risk weakening the branch. For minimum weakening, drill the hole through the

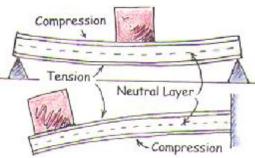
- a) upper part, A.
- b) middle part, B.
- c) lower part, C.
- d) ... makes no difference.

Answer: b, middle part, B

CONCEPTUAL Physics

The upper half of the horizontal branch is under tension while the lower half is under compression. The middle part is neither under tension nor compression—fibers of wood there experience no stretching or compressing. So drilling a hole through the middle will hardly affect the branch's strength. Drilling a hole in the upper part, however, weakens the branch because fibers there are stretched and may be pulled apart. And drilling a hole in the lower part may result in squeezed fibers crushing together.

Like the horizontal branch, tension and compression occur in the top and bottom parts of an I beam, popular in construction. Material can be scooped from the middle, where it's needed least, resulting in a beam that is lighter and nearly the same strength.



Can you see that the "flanges" of a horizontal I beam are either stretched or squeezed?

And that the middle region — the neutral layer — experiences neither?



