

MA-113 Pumping work exploratory activity

Very rough initial draft outline

V0.01: 2020-09-12

Determine work required to lift boxes from floor to shelf in scenarios 1-4 in terms of box dimensions, box density, and shelf height. (Neglect work required to overcome frictional forces such as air resistance and friction in the hoist.)

Variations / questions about independence of total work on stacking order

Replace boxes with stacks of right circular cylinders. Would the amount of work performed be any different if the cylinders were lifted to the height of the shelf and then simply dropped, say by the side of the shelf, rather than placed on the shelf?

Set up an expression using sigma notation for the work required to lift n stacked cylinders to the height of the shelf where the (common) cylinder thickness is $\Delta z = \frac{h}{n}$, and the i^{th} cylinder from the bottom has radius $f(i \Delta z)$, for some function f .

(MatLab computations?)

How can the limit of this expression as n goes to ∞ be computed? What might this limit model?

Block problems with pulleys

Pumping animation / pumping computations and conceptual questions