9. [16 points] Archaeologists are pulling artifacts from an excavation site. As a reminder, the gravitational constant g is 9.8 m/s^2.

    a. [8 points] The first artifact weighs 20 kg and lies at the bottom of the excavation site. The archaeologists are 50m above the bottom and want to use a rope to pull the artifact up to a ledge 20m from the bottom of the excavation site. If the rope has mass 2 kg per meter, how much work is done pulling the first artifact from the bottom of the excavation site to the ledge? Be sure to include units and show all your work, including calculation of any integrals.

The second artifact weighs 100 lbs when the archaeologists begin lifting it 165 feet up out of the excavation site. This artifact is crumbling, and it loses weight at a constant rate of 0.2 lbs per foot it is lifted. The cable used to lift this second artifact weighs 0.5 lbs per foot.

    b. [3 points] Write a formula for $w(y)$, the weight of the second artifact in lbs, when it has been lifted y feet out of the excavation site.

    c. [5 points] Write an expression involving one or more integrals for the work done pulling the second artifact out of the excavation site. Do not evaluate your integral(s).