

Applied Geomorphology Discharge Problem

For the following problems refer to the Figure 1 diagram.

Constants

1.0 foot³ of stream water = 7.85 Gallons

Density of Stream Water = 1.05

1.0 Gallon of Stream Water = 8.753 Pounds

Problem 1: Imagine that you are a geologist, and that you must calculate the discharge rate and the amount sediment being transported by a stream. A floating object was dropped into the middle of the stream channel and timed as it traveled a known distance of 300 feet. The result was 41 seconds of travel time. What is the velocity of the stream in feet per second (show calculation steps)?

Velocity (feet/second) = _____

Problem 2: Given the profile constructed in Figure 1, which was based on depth soundings made across the stream channel, calculate the discharge of the stream. You should count the rectangles in Figure 1 to determine the cross sectional area of the stream. Assume that each rectangle is 15 feet wide and 10 feet high. Calculate the following (show calculation steps):

a) Total cross-sectional area in feet² = _____

b) Discharge in feet³/second = _____

c) Discharge in gallons/minute = _____

d) Discharge converted to: (pounds of water)/minute = _____

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Problem 3: The density of the water in the stream was measured as 1.05. We also know that the above discharge calculation includes both stream water and suspended load. If we assume that the deviation of the density value from that of pure water (1.0) is due entirely to the sediment suspended in the water, how much suspended sediment is being transported by the stream in units of pounds/minute (show calculation steps)?

Suspended Sediment (Pounds/minute) = _____

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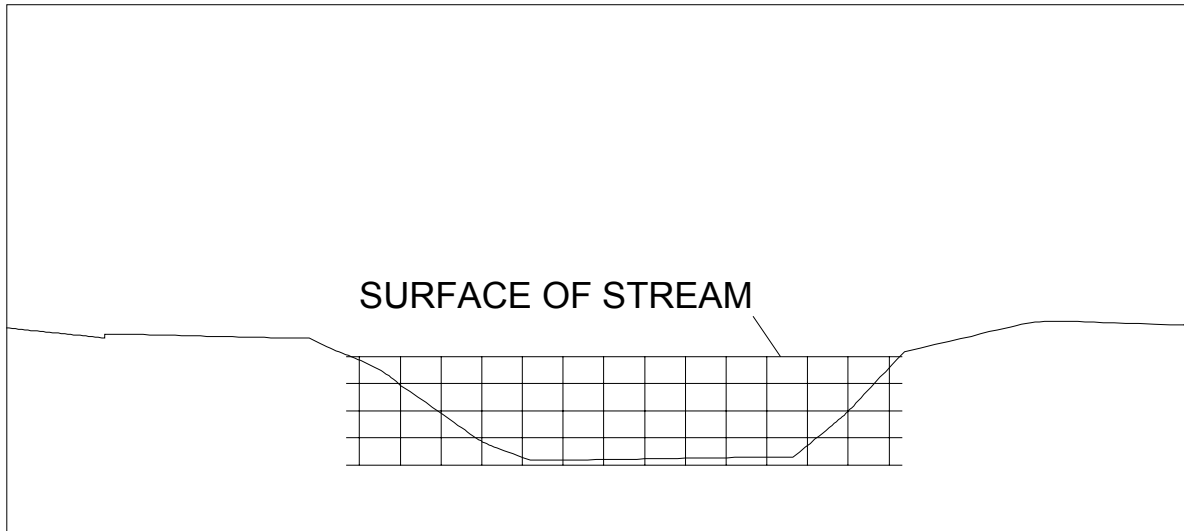


Figure 1. Diagram of stream profile.