

You MAY use your calculators.

The tide removes sand from Sandy Point Beach at a rate modeled by the function R , given by

$$R(t) = 2 + 5 \sin\left(\frac{4\pi t}{25}\right).$$

A pumping station adds sand to the beach at a rate modeled by the function S , given by

$$S(t) = \frac{15t}{1 + 3t}.$$

Both $R(t)$ and $S(t)$ have units of cubic yards per hour and t is measured in hours for $0 \leq t \leq 6$. At time $t = 0$, the beach contains 2500 cubic yards of sand.

- (a) How much sand will the tide remove from the beach during this 6-hour period? Indicate units of measure.

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- (b) Write an expression for $Y(t)$, the total number of cubic yards of sand on the beach at time t .

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- (c) Find the rate at which the total amount of sand on the beach is changing at time $t = 4$.

(d) For $0 \leq t \leq 6$, at what time t is the amount of sand on the beach a minimum? What is the minimum value? Justify your answers.