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STUDENT VERSION
SPREAD OF OIL SLICK

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Abstract: We describe a modeling activity for students in which modeling with difference and differential equations is appropriate. We have used this model in our coursework for years and have found that it enlightens students as to the model building process and parameter estimation for a linear, first-order, non-homogeneous, ordinary differential equation. The activity also provides a lesson in "knowing what to do when you do not know what to do."[**?**]

SCENARIO DESCRIPTION

An oil slick spreads at sea. From time to time, but irregularly, a helicopter is dispatched to photograph the oil slick. On each trip, the helicopter arrives over the slick, the pilot takes a picture, waits 10 minutes, takes another, and heads home. On each of seven trips the size (in area) of the slick is measured from both photographs.

Size of Slick (square miles)	
Initial Observation	10 min. later
1.047	1.139
2.005	2.087
3.348	3.413
5.719	5.765
7.273	7.304
8.410	8.426
9.117	9.127

Table 1. Data on spread of an oil slick.

(a) Build a model for the size of the oil slick at time t.

(b) Predict the future size of the oil slick, say at $t = 10$ min, $t = 20$ min, $t = 120$ min.

(c) Plot your model of the size of the oil slick as a function of time.

(d) Find the time at which the oil slick is 8 square miles.

(e) Determine the time of each of the observations for the first, third, fifth, and seventh initial observations.