RATIONAL FUNCTIONS — Word problems

10) In the following formula, S(x) is the minimum number of hours of studying required to attain a test score of x:

$$S(x) = \frac{0.32x}{100.5 - x}.$$

a) How many hours of study are needed to score 85?
b) What score can you get if you study 8 hours?
c) How many hours of study are needed to score 100?

11) The average cost per unit C(x) to produce x units of plywood is given by $C(x) = \frac{300}{x + 10}$,

a) What is the cost per unit when 590 units are produced?
b) If the cost per unit is $1.50, how many units have been produced?

Solve the problem.

12) A rare species of insect was discovered in the rain forest of Costa Rica. Environmentalists transplant the insect into a protected area. The population of the insect t months after being transplanted is

$$P(t) = \frac{45(1 + 0.6t)}{(3 + 0.02t)}.$$

(a) What was the population when $t = 0$?
(b) What will the population be after 10 years?
(c) When will there be 549 insects?

13) The concentration C (in mg/dl), of a certain antibiotic in a patient's bloodstream is given by

$\frac{50\,t}{t^2 + 25}$ where t is the time (in hours) after taking the antibiotic.

(a) What is the concentration 4 hours after taking the antibiotic?
(b) In order for the antibiotic to be effective, 4 or more mg/dl must be present in the bloodstream. When do you have to take the antibiotic again? Solve using algebra, and solve graphically.

Key

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10) 1.75 hr, b) 96.6%, c) 64 hours
11) a) $0.50; (b) 190 units
12) (a) $P(0) = 15$ insects ; (b) $P(120) \approx 608$ insects ; (c) 100 months later
13) (a) 4.9 mg/dl; (b) *10 hours*