

Solve.

- 1) Chuck and Dana agree to meet in Chicago for the weekend. Chuck travels 104 miles in the same time that Dana travels 96 miles. If Chuck's rate of travel is 4 mph more than Dana's, at what speed does Chuck travel?
A) 52 mph B) 57 mph C) 48 mph D) 47 mph
- 2) A loaded moving truck is traveling 20 mph faster than a freight train. In the time it takes the train to travel 160 miles, the truck travels 240 miles. Find the speed of the truck.
A) 12 mph B) 60 mph C) 20 mph D) 120 mph
- 3) The speed of a stream is 6 mph. If a boat travels 94 miles downstream in the same time that it takes to travel 47 miles upstream, what is the speed of the boat in still water?
A) 20 mph B) 21 mph C) 12 mph D) 18 mph
- 4) A boat goes 450 miles downstream in the same time it can go 360 miles upstream. The speed of the current is 8 miles per hour. Find the speed of the boat in still water.
A) 72 mph B) 80 mph C) 64 mph D) 81 mph
- 5) A plane flies 450 miles with the wind and 300 miles against the wind in the same length of time. If the speed of the wind is 29 mph, what is the speed of the plane in still air?
A) 145 mph B) 170 mph C) 135 mph D) 150 mph
- 6) A number minus 12 times its reciprocal is 1. Find the number(s).
A) 4 or 3 B) 4 or -3 C) -4 or 3 D) 4
- 7) The sum of a number and 3 times its reciprocal is -4. Find the number(s).
A) -4 or 1 B) -1 C) -1 or -3 D) 1 or 3
- 8) The sum of a number and its reciprocal is -2. Find the number.
A) 1 or -1 B) 1 C) -1 D) 2

Solve. Round to two decimal places unless otherwise noted.

- 9) Suppose the cost per ton, $C(x)$, to build an oil platform of x thousand tons is approximated by $C(x) = \frac{312,500}{x + 625}$.
- a) What is the cost per ton for 30 thousand tons?
b) How many thousand tons was the platform if the cost per ton was \$483?

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

$$\frac{50t}{t^2 + 25}$$
 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.

14) 9) a) \$477.10, b) 22 thousand tons

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