

When using the simple interest formula, $I = Prt$, the value of any one of the variables can be unknown. As long as you know the values of three of the variables, you can calculate the value of the fourth variable.



Simple Interest: Related Formulas

Find interest.

$$I = Prt$$

Find principal.

$$P = \frac{I}{rt}$$

Find rate.

$$r = \frac{I}{Pt}$$

Find time.

$$t = \frac{I}{Pr}$$

Math.andYOU.com

You can access a simple interest calculator at *Math.andYou.com*.

EXAMPLE 6 Finding the Annual Percentage Rate

Using an ATM, you take a cash advance of \$500. The service charge is \$3.50. After 45 days, you repay the advance. When you get your credit card statement, you notice that the interest for the “loan” is \$17.26. (a) For the interest alone, what is the annual percentage rate? (b) When you add the service charge to the interest, what is the annual percentage rate?

SOLUTION

- a. Because you are finding the rate, use the third formula in the table above.

$$\begin{aligned} r &= \frac{I}{Pt} \\ &= \frac{17.26}{500 \left(\frac{45}{365} \right)} && I = \$17.26, \quad P = \$500, \quad t = \frac{45}{365} \\ &\approx 0.28 \end{aligned}$$

The annual percentage rate is about 28%.



- b. Add the service charge to the stated interest to get $I = \$20.76$.

$$\begin{aligned} r &= \frac{I}{Pt} \\ &= \frac{20.76}{500 \left(\frac{45}{365} \right)} && I = \$20.76, \quad P = \$500, \quad t = \frac{45}{365} \\ &\approx 0.337 \end{aligned}$$

The annual percentage rate is about 33.7%.

Study Tip

APR is also called *nominal* APR. The APR found in Example 6(b) is called the *effective* APR, which includes other charges incurred from the loan.

✓ Checkpoint

Help at **Math.andYOU.com**

You borrow \$100 from a friend. You repay the loan in 3 weeks and agree to pay \$10 for interest. What is the annual percentage rate for this loan?