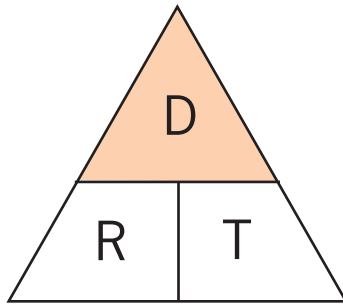


# Rate, Distance, Time

Your teenage daughter sprinted the 50-yard dash. How many yards per second did she run? Your plane flew from Chicago to Dallas — but how fast? On a drive from the city to the country, you took the interstate and later a dirt road. What's the average number of miles per hour you ended up driving?

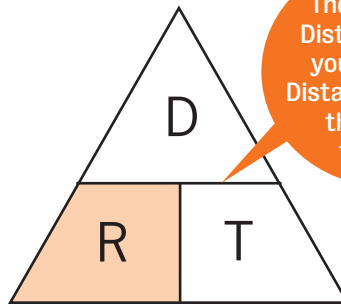
To answer these questions you have to consider RATE — the speed, for example, at which your daughter ran her race; TIME — how long it took your plane to reach its destination; and DISTANCE — the total mileage you drove on your road trip.

Problems about rate, distance, and time are solved by using three simple formulas. (Formulas are rules that are always true.) To remember the formulas, write the letters D (for Distance), R (for Rate), and T (for Time) in a triangle this way:



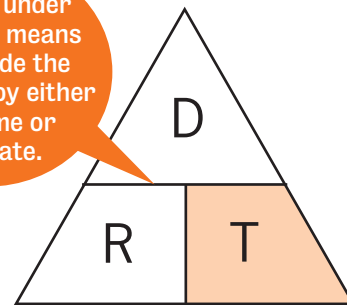
$$\text{Distance} = \text{Rate} \times \text{Time},$$

$$\text{or } D = RT$$



$$\text{Rate} = \text{Distance}/\text{Time},$$

$$\text{or } R = D/T$$



$$\text{Time} = \text{Distance}/\text{Rate},$$

$$\text{or } T = D/R$$

The line under Distance means you divide the Distance by either the Time or the Rate.

When two letters are written next to one another—RT—you multiply them. Here you multiply the Rate by the Time.

Follow three steps to answer rate, distance, and time problems:

**Step 1:** Write the formula you need by looking for the key words in each question.

**Step 2:** Substitute the numbers in the problem for the letters they stand for in the formula.

**Step 3:** Do the arithmetic (either multiply or divide, depending on the formula).

**Example:** Kai drove 450 miles at 60 miles an hour. How much time did his trip take?

**Step 1:** The problem asks how long Kai's trip took, or the amount of time. So write the formula for time:  $\text{Time} = \text{Distance}/\text{Rate}$  or  $T = D/R$ .

**Step 2:** The problem tells you the *distance* driven, 450 miles, and the *rate*, 60 miles an hour. Substitute these numbers for the letters in the formula:  $T = 450/60$ .

**Step 3:** The formula for Time requires division. Divide 450 by 60 to get:  $7\frac{1}{2}$  hours, or  $T = 7\frac{1}{2}$  hours (7 hours and 30 minutes).

## Key Words

speed = rate

how long = time

how fast = rate

how far = distance

per (as in miles per hour) = rate

**Example:** Trang hiked 1.5 miles per hour for 10 hours. How far did she hike?

**Step 1-Formula:** The problem asks how far:  $\text{Distance} = \text{Rate} \times \text{Time}$  or  $D = RT$

**Step 2-Substitution:** Rate, or miles per hour, is given, as is the time:  $D = 1.5 \times 10$ .

**Step 3-Arithmetic:** In the formula for Distance, you multiply, and the answer is 15 miles.

**NOW YOU TRY IT**

1. During an anti-war march, Amallia covered  $2\frac{1}{2}$  miles for every hour she walked. She walked for 4 hours. At the end of the peace march, what **distance** had she walked?

Formula: \_\_\_\_\_ or \_\_\_\_\_

Substitution: \_\_\_\_\_

Arithmetic: \_\_\_\_\_ miles



2. An airplane flies 2,004 miles in 4 hours. What is the **speed** at which the plane flies?

Formula: \_\_\_\_\_ or \_\_\_\_\_

Substitution: \_\_\_\_\_

Arithmetic: \_\_\_\_\_ miles per hour

3. Malik jogs 7.5 miles at the rate of 5 miles an hour. **How long** does his morning jog take?

Formula: \_\_\_\_\_ or \_\_\_\_\_

Substitution: \_\_\_\_\_

Arithmetic: \_\_\_\_\_ hours

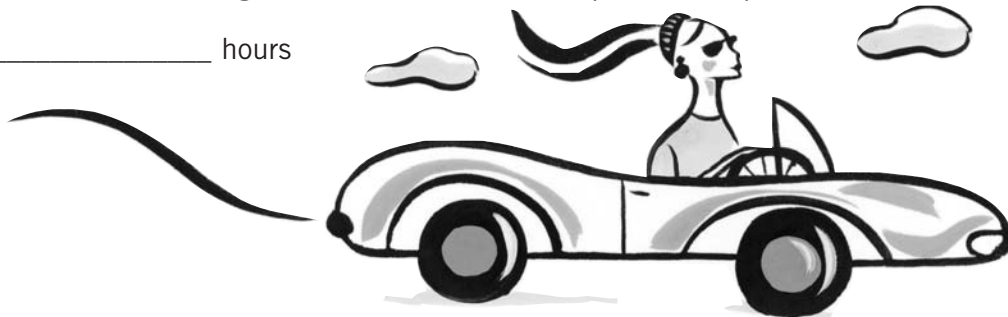


**YOU'RE ON YOUR OWN**

Keep following Step 1, Step 2, and Step 3:

1. Joanna drove at a steady speed of 65 miles per hour on the interstate. The distance she drove was 1,690 miles. How long did it take Joanna to complete her trip?

Answer: \_\_\_\_\_ hours



2. Dezray rides her bike at the rate of 4.2 miles an hour. If she bicycles for 3.7 hours, how far has she traveled?

Answer: \_\_\_\_\_ miles

3. A train travels 864 miles in 8 hours. How fast is the train traveling?

Answer: \_\_\_\_\_ miles per hour

**NOW YOU TRY IT:** 1. Distance = Rate x Time or  $D = RT$ ;  $D = 2\frac{1}{2} \times 4$ ; multiply; 10 miles  
 2. Rate = Distance/Time or  $R = D/T$ ;  $R = \frac{2004}{4}$ ; divide; 501 miles per hour  
 3. Time = Distance/Rate or  $T = D/R$ ;  $T = \frac{5}{7.5}$ ; divide; 1.5 hours or  $1\frac{1}{2}$  hours  
**YOU'RE ON YOUR OWN:** 1. Formula: Time = Distance/Rate or  $T = D/R$ ; Substitution:  $T = \frac{1690}{65}$ ; Arithmetic: divide; Answer: 26 hours  
 2. Formula: Distance = Rate x Time or  $D = RT$ ; Substitution:  $D = 4.2 \times 3.7$ ; Arithmetic: multiply; Answer: 15.54 miles  
 3. Formula: Rate = Distance/Time or  $R = D/T$ ; Substitution:  $R = \frac{864}{8}$ ; Arithmetic: divide; Answer: 108 miles per hour