DISTANCE, RATE, AND TIME

7.1.1

Distance \((d)\) equals the product of the rate of speed \((r)\) and the time \((t)\). This relationship is shown below in three forms:

\[
d = r \cdot t \quad r = \frac{d}{t} \quad t = \frac{d}{r}
\]

It is important that the units of measure are consistent.

Example 1

Find the rate of speed of a passenger car if the distance traveled is 572 miles and the time elapsed is 11 hours.

\[
572 \text{ miles} = r \cdot 11 \text{ hours} \quad \Rightarrow \quad \frac{572 \text{ miles}}{11 \text{ hours}} = r \quad \Rightarrow \quad 52 \text{ miles/hour} = \text{rate}
\]

Example 2

Find the distance traveled by a train at 135 miles per hour for 40 minutes.

The units of time are not the same so we need to change 40 minutes into hours. \(\frac{40}{60} = \frac{2}{3} \text{ hour}\).

\[
d = (135 \text{ miles/hour})(\frac{2}{3} \text{ hour}) \quad \Rightarrow \quad d = 90 \text{ miles}
\]

Example 3

The Central Middle School hamster race is fast approaching. Fred said that his hamster traveled 60 feet in 90 seconds and Wilma said she timed for one minute and her hamster traveled 12 yards. Which hamster has the fastest rate?

rate = \(\frac{\text{distance}}{\text{time}}\) but all the measurements need to be in the same units. In this example, we use feet and minutes.

Fred’s hamster: \(\text{rate} = \frac{60 \text{ feet}}{1.5 \text{ minutes}} \quad \Rightarrow \quad \text{rate} = 40 \text{ feet/minute}\)

Wilma’s hamster: \(\text{rate} = \frac{36 \text{ feet}}{1 \text{ minute}} \quad \Rightarrow \quad \text{rate} = 36 \text{ feet/minute}\)

Fred’s hamster is faster.
Problems

Solve the following problems.

1. Find the time if the distance is 157.5 miles and the speed is 63 mph.
2. Find the distance if the speed is 67 mph and the time is 3.5 hours.
3. Find the rate if the distance is 247 miles and the time is 3.8 hours.
4. Find the distance if the speed is 60 mph and the time is 1 hour and 45 minutes.
5. Find the rate in mph if the distance is 3.5 miles and the time is 20 minutes.
6. Find the time in minutes if the distance is 2 miles and the rate is 30 mph.
7. Which rate is faster? A: 60 feet in 90 seconds or B: 60 inches in 5 seconds
8. Which distance is longer? A: 4 feet/second for a minute or B: 3 inches/min for an hour
9. Which time is shorter? A: 4 miles at 60 mph or B: 6 miles at 80 mph

Answers

1. 2.5 hr  2. 234.5 mi  3. 65 mph  4. 105 miles  5. 10.5 mph