Name _____ Class_____Date_____

Skills Worksheet

Chapter 11 Math Skills

Velocity

After you study each sample problem and solution, work out the practice problems on a separate sheet of paper. Write your answers in the spaces provided.

PROBLEM

Polar bears are extremely good swimmers and can travel as long as 10 hours without resting. If a polar bear is swimming at an average speed of 2.6 m/s, how far will it have traveled after 10.0 hours?

SOLUTION

Step 1: List the given and the unknown values.

Given: speed, v = 2.6 m/s

time, t = 10.0 h × 3,600 s/h = 3.6 ×10^4 s

Unknown: distance, d = ? m

Step 2: Rearrange the speed equation to solve for distance.

$$speed = \frac{distance}{time}$$

$$v = \frac{d}{t}$$

$$d = vt$$

Step 3: Insert the known values into the equation, and solve.

$$d = \frac{2.6\ \text{m}}{\text{s}} \times (3.6 \times 10^4\ \text{s})$$

$$d = 9.4 \times 10^4\ \text{m} = 94\ \text{km}$$

PRACTICE

1. Suppose the polar bear was running on land instead of swimming. If the polar bear runs at a speed of about 8.3 m/s, how far will it travel in 10.0 hours?

2. Like the polar bear, the walrus is a strong swimmer, although it does not have the same endurance. For short periods of time, a walrus can swim at an average speed of 9.7 m/s. How far would a walrus swim at this speed in 3.4 minutes?

3. The maximum posted speed limit on the U.S. Interstate Highway System is found in rural areas of several western states. This maximum speed is 75 mi/h, or 121 km/h. What is the distance, in kilometers, that a car a travels if it moves continuously at this speed for 3 hours and 20 minutes?

4. For normal situations, the minimum speed limit throughout the U.S. Interstate Highway System is 45 mi/h, or 72 km/h. How far, in kilometers, will a car travel if it moves continuously at this speed for 3 hours and 20 minutes?

Math Skills *continued*

PROBLEM

A baseball is pitched at a speed of 35.0 m/s. How long does it take the ball to travel 18.4 m from the pitcher's mound to home plate?

SOLUTION

Step 1: List the given and the unknown values.

Given: speed, $v = 35.0$ m/s

distance, $d = 18.4$ m

Unknown: time, $t = ?$ s

Step 2: Rearrange the speed equation to solve for time.

$$speed = \frac{distance}{time} \qquad v = \frac{d}{t}$$

$$tv = d \qquad \frac{t\cancel{v}}{\cancel{v}} = \frac{d}{v}$$

Step 3: Insert the known values into the equation, and solve.

$$t = \frac{18.4\ \text{m}}{35.0\ \text{m/s}}$$

$$t = 0.526\ \text{s}$$

PRACTICE

5. Various types of tree sloths share the honor of being the slowest-moving mammals. An average tree sloth moves at a speed of 0.743 m/s. How long does it take a sloth moving at this speed to travel 22.30 m?

6. The longest stretch of straight railroad tracks lies across the desolate Nullarbor Plain, between the Australian cities of Adelaide and Perth. The tracks extend a distance of 478 km without a curve. How long would it take a train, moving at a constant speed of 97 km/h, to travel this length of track?

Math Skills *continued*

7. The Concorde is the fastest supersonic passenger jet. How long would the Concorde take to travel 6,265 km between New York City and London, assuming that the jet travels at its maximum speed of 2.150×10^3 km/h during the entire trip?

8. The longest distance in a track-and-field event is the 10 km run. The record holder for the women's 10 km run is Wang Junxia of China. Assuming that she ran 10.00 km at an average speed of 5.644 m/s, what was her time?

PROBLEM

Florence Griffith-Joyner set the women's world record for running the 200.0 m race in 1988. At the 1988 Summer Olympics in Seoul, South Korea, she completed the distance in 21.34 s. What was Griffith-Joyner's average speed?

SOLUTION

Step 1: List the given and the unknown values.

Given: distance, $d = 200.0$ m

time, $t = 21.34$ s

Unknown: speed, $v = ?$ m/s

Step 2: Write out the equation for speed.

$$speed = \frac{distance}{time} \qquad v = \frac{d}{t}$$

Step 3: Insert the known values into the speed equation, and solve.

$$v = \frac{d}{t} = \frac{200.0 \text{ m}}{21.34 \text{ s}}$$

$$v = 9.372 \text{ m/s}$$

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PRACTICE

9. The cheetah, the fastest of land animals, can run 274 m in 8.65 s at its top speed. What is the cheetah's top speed?

10. In 1985, Matt Biondi set a record for the men's 100 m freestyle event in swimming. He took 49.17 s to swim the 50.0-m length of the pool and swim back. Assume that half of Biondi's record time was spent traveling the length of the pool. What was his speed?

11. The fastest crossing of the Atlantic Ocean by an ocean liner was made on July 7, 1952. The ship, the SS *United States*, traveled 4,727 km east by northeast in 3 days, 10 hours, and 40 minutes. Assume that the ship had traveled the same speed, but directly east. What would the velocity of the SS *United States* be in kilometers per hour?