Problem Solving
Quiz Chapter 8

Name Key

A machine puts golf balls into boxes and then loads the boxes into cases. The machine is normally able to load 25 cases of golf balls per hour. There are 20 boxes in one case. There are 12 balls in one box. Today, the machine is running a little faster than usual so that it takes 0.2 seconds less time to load one golf ball into a box than it normally does. What is the machine's new rate in cases of golf balls per hour?

10 points

5 points for detailed solution (all steps to change units), 3 points for a summary of your approach, 2 points for final answer *please circle* (Machine's new rate in cases of golf balls per hour).

Facts - past performance

$\frac{25 \text{ cases}}{1 \text{ hr}}$ $\frac{1 \text{ hr}}{25 \text{ cases}}$

$\frac{20 \text{ boxes}}{1 \text{ case}}$ $\frac{1 \text{ case}}{20 \text{ boxes}}$

$\frac{12 \text{ balls}}{1 \text{ box}}$ $\frac{1 \text{ box}}{12 \text{ balls}}$

Facts - today's performance

Today it takes the machine 0.2 fewer seconds to load one golf ball into a box.

① convert cases/hr to seconds/ball

$$\frac{1 \text{ hr}}{25 \text{ cases}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{1 \text{ case}}{20 \text{ boxes}} \cdot \frac{1 \text{ box}}{12 \text{ balls}} = \frac{3600 \text{ sec}}{6000 \text{ ball}}$$

$$= 0.6 \text{ sec/ball}$$

② Subtract 0.2 seconds from ① to get the new rate in sec/ball $0.6 - 0.2 = 0.4 \text{ sec/ball}$

③ convert new rate 0.4 sec/ball to cases per hour

$$\frac{1 \text{ ball}}{0.4 \text{ sec}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{1 \text{ box}}{12 \text{ balls}} \cdot \frac{1 \text{ case}}{20 \text{ boxes}} = \frac{3600 \text{ cases}}{96 \text{ hour}}$$

$$= 37.5 \text{ cases/hr}$$

Problem Solving
Quiz Chapter 8

Name Key

A machine puts tennis balls into tennis ball cans. The machine is normally able to do 500 cases of tennis balls per hour. There are 24 cans in one case. There are 3 balls in one can. Today, the machine is running a little slower than usual so that it takes 0.1 seconds longer to load one tennis ball into a can than it normally does. What is the machine's new rate in cases of tennis balls per hour?

10 points

5 points for detailed solution (all steps to change units), 3 points for a summary of your approach, 2 points for final answer *please circle* (Machine's new rate in cases of tennis balls per hour).

Facts-past performance

$\frac{500 \text{ cases}}{1 \text{ hr}}$ $\frac{1 \text{ hr}}{500 \text{ cases}}$

$\frac{24 \text{ cans}}{1 \text{ case}}$ $\frac{1 \text{ case}}{24 \text{ cans}}$

$\frac{3 \text{ balls}}{1 \text{ can}}$ $\frac{1 \text{ can}}{3 \text{ balls}}$

Facts - today's performance

Today it takes the machine 0.1 more second to load one ball into a can.

① Convert cases/hr to seconds/ball

$\frac{1 \text{ hr}}{500 \text{ cases}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{1 \text{ case}}{24 \text{ cans}} \cdot \frac{1 \text{ can}}{3 \text{ balls}} = \frac{3600 \text{ sec}}{36000 \text{ balls}} = 0.1 \text{ sec/ball}$

② Add 0.1 sec to ① to get the new rate in sec/ball → 0.2 sec/ball

③ Convert new rate 0.2 sec/ball to cases per hour.

$\frac{1 \text{ ball}}{0.2 \text{ sec}} \cdot \frac{1 \text{ can}}{3 \text{ balls}} \cdot \frac{1 \text{ case}}{24 \text{ cans}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} = \frac{3600 \text{ cases}}{14.4 \text{ hr}}$

$= 250 \text{ cases/hr}$