

Practice Midterm Two

b) $\frac{850 \text{ yds}}{3.8 \text{ min}}$ want $\frac{\text{mi}}{\text{hr}}$

unit analysis

write the given measurement as a fraction
write some "empty" rates without numbers
fill in the numbers for the rates
multiply
simplify the fraction answer

$$\frac{850 \text{ yds}}{3.8 \text{ min}} \cdot \frac{3 \cancel{\text{ft}}}{1 \text{ yds}} \cdot \frac{1 \text{ mi}}{5,280 \cancel{\text{ft}}} \cdot \frac{60 \text{ min}}{1 \text{ hr}}$$

$$= \frac{850 \cdot 3 \cdot 1 \cdot 60 \text{ mi}}{3.8 \cdot 1 \cdot 5,280 \cdot 1 \text{ hr}}$$

$$= \frac{153,000 \text{ mi}}{20,064 \text{ hr}}$$

top \div bottom

$$\approx \boxed{7.6 \frac{\text{mi}}{\text{hr}}}$$

Unit Analysis

Remember that one-step conversions were not a nice way to do many measurement unit conversion problems. We needed a new technique.

Our new technique is a five-step process called Unit Analysis (nicknamed "Canceling Words"). It is a simple and powerful tool. Here are the steps without context, but only for later reference. To first meet the new technique it is best to see it in action in an example.

Definition

Unit Analysis uses five steps to convert measurement units.

1. write the given measurement as a fraction
2. write some "empty" rates without numbers
3. fill in the numbers for the rates
4. multiply
5. simplify the fraction answer

Here is a simple example of Unit Analysis.

Example 1

How many inches is 3.7 feet?

Our first step is to write the given measurement as a fraction. If it is not already a fraction we put the value over 1.

$$\frac{3.7 \text{ feet}}{1}$$

7)

k h d u d c m . . micro

3 right

103.947 mg

= 103,947 mcg

Test Error!

Midterm Two, Part 2 #1

$$\$5,402 \cdot 0.29 \cdot (136 \div 365) = \boxed{\$583.71}$$

Joyce pays \$1,402 for 36 days

$$\text{Interest} = \$1,442.66 - \$1,402 = \$40.66$$

$$\text{So } \$40.66 = \$1,402 \cdot r \cdot 36 \div 365$$

$$\$40.66 = r \cdot \$1,402 \cdot 36 \div 365$$

$$\$40.66 = r \cdot 138.28$$

$$\div 138.28$$

$$\div 138.28$$

$$.29 \approx r$$

$$\boxed{29\%} = r$$

4) Part A

$$\text{Total Amount} = \text{Principal} \cdot \left(1 + \frac{\text{rate per payout}}{\# \text{ of payouts}} \right)$$

$$\text{Principal} = \$11,000$$

$$\text{Rate per payout} = 2\% \div 12 = 0.001\bar{6} \text{ per month}$$

$$\# \text{ of payouts} = 28 \text{ yrs} \cdot 12 = 336 \text{ months}$$

$$= \$11,000 \cdot 1.001\bar{6}^{336}$$

$$\approx \$19,248.42$$

Part B

$$\text{Total Amount} = \text{Principal} \cdot \left(1 + \frac{\text{rate per payout}}{\# \text{ of payouts}} \right)$$

$$\text{Principal} = \$19,248.42$$

$$\text{Rate per payout} = 5\% \div 52 = 0.000961538$$

$$\# \text{ of payouts} = 36 \text{ yrs} \cdot 52 = 1,872 \text{ weeks}$$

$$= \$19,248.42 \cdot 1.000961538^{1872}$$

$$\approx \boxed{\$116,345.49}$$

5)

30 yrs }
8% } \$ 7.34 per thousand

$$\$626 \div \$7.34 \approx 85.286$$

so

\$85,286

$$6) \frac{\$626}{1 \text{ month}} \cdot \frac{12 \text{ months}}{1 \text{ yr}} \cdot \frac{30 \text{ yrs}}{1} = \boxed{\$225,360}$$

$$7) \$225,360 - \$85,286 = \boxed{\$140,074 \text{ interest}}$$

8] Part A - Sum of Annuity Due

$$\begin{aligned} \text{Total Amount} &= \left(\text{Principal} \cdot (1 + \text{rate})^{\text{years} + 1} - \text{Principal} \cdot (1 + \text{rate}) \right) \div \text{rate} \\ &= \left(\$2,260 \cdot 1.09^{20} - \$2,260 \cdot 1.09 \right) \div 0.09 \\ &\approx \$113,361.87 \end{aligned}$$

Part B - Compound Interest

$$\begin{aligned} \text{Total Amount} &= \text{Principal} \cdot \left(1 + \frac{\text{rate}}{\text{per payout}} \right)^{\# \text{ of payouts}} \\ &= \$113,361.87 \cdot 1.09^{31} \\ &\approx \boxed{\$1,639,413.24} \end{aligned}$$

12)

36% off → 64% remaining
 $100 - 36$

17% off → 83% remaining
 $100 - 17$

then

$$\$31 \cdot 0.64 \cdot 0.83 = \boxed{\$16.47}$$