Two-Step Conversions Name _____

Please solve every problem below using *two* conversion factors. As before, please write out your answer showing that your properly understand the conversion factor method.

Dividing by two numbers with a calculator:
To do

$$\frac{54}{32 \cdot 45}$$

You can type one of these two things into your calculator:

54 / 32 / 45 or 54 / (32 x 45)

But, do NOT do:

~~54 / 32 x 45~~

which will give the wrong answer!

1. Convert 30 seconds to hours.

Remember, for full credit you must:
- write each value including units,
- represent conversion factors as fraction of two values with units
- cross out canceled units

2. Convert 250 seconds to hours.

3. Convert 50 minutes to days.

4. Convert 1400 feet to kilometers using these conversion factors.
1 mile = 5280 feet
1 mile = 1.61 kilometers

5. Convert 1400 feet to kilometers using these conversion factors:
1 meter = 3.28 feet
1 kilometer = 1000 meters

Remember, for full credit you must:
- write each value including units,
- represent conversion factors as fraction of two values with units
- cross out canceled units

6. How many minutes are there in 5 days?

7. How many inches are there in 20 miles?

8. How many meters are there in 1 mile? Figure it out using these conversion factors:
1 mile = 1.61 kilometers
1 kilometer = 1000 meters

9. How many meters are there in 1 mile? Figure it out using these conversion factors:
1 mile = 5280 feet
1 meter = 3.28 feet

10. Convert 500 slugs to metric tons.

Answers:

1.

$$30 \text{ seconds} = \frac{30 \text{ seconds}}{1}\left(\frac{1 \text{ minute}}{60 \text{ seconds}}\right)\left(\frac{1 \text{ hour}}{60 \text{ minutes}}\right) = \frac{30 \text{ hours}}{60 \cdot 60} = 0.0083 \text{ hours}$$

2.

$$250 \text{ seconds} = \frac{250 \text{ seconds}}{1}\left(\frac{1 \text{ minute}}{60 \text{ seconds}}\right)\left(\frac{1 \text{ hour}}{60 \text{ minutes}}\right) = \frac{250 \text{ hours}}{60 \cdot 60} = 0.069 \text{ hours}$$

3.

$$50 \text{ minutes} = \frac{50 \text{ minutes}}{1}\left(\frac{1 \text{ hour}}{60 \text{ minutes}}\right)\left(\frac{1 \text{ day}}{24 \text{ hours}}\right) = \frac{50 \text{ days}}{60 \cdot 24} = 0.035 \text{ days}$$

4.

$$1400 \text{ feet} = \frac{1400 \text{ feet}}{1}\left(\frac{1 \text{ mile}}{5280 \text{ feet}}\right)\left(\frac{1.61 \text{ kilometers}}{1 \text{ mile}}\right) = \frac{1400 \cdot 1.61 \text{ km}}{5280} = 0.43 \text{ kilometers}$$

5.

$$1400 \text{ feet} = \frac{1400 \text{ feet}}{1}\left(\frac{1 \text{ meter}}{3.28 \text{ feet}}\right)\left(\frac{1 \text{ kilometer}}{1000 \text{ meters}}\right) = \frac{1400 \text{ km}}{3.28 \cdot 1000} = 0.43 \text{ kilometers}$$

6.

$$5 \text{ days} = \frac{5 \text{ days}}{1}\left(\frac{24 \text{ hours}}{1 \text{ days}}\right)\left(\frac{60 \text{ minutes}}{1 \text{ hour}}\right) = \frac{5 \cdot 24 \cdot 60 \text{ minutes}}{1} = 7{,}200 \text{ minutes}$$

7.

$$20 \text{ miles} = \frac{20 \text{ miles}}{1}\left(\frac{5280 \text{ feet}}{1 \text{ mile}}\right)\left(\frac{12 \text{ inches}}{1 \text{ foot}}\right) = \frac{20 \cdot 5280 \cdot 12 \text{ inches}}{1} = 1.3 \cdot 10^6 \text{ inches}$$

8.

$$1 \text{ mile} = \frac{1 \text{ mile}}{1}\left(\frac{1.61 \text{ kilometers}}{1 \text{ mile}}\right)\left(\frac{1000 \text{ meters}}{1 \text{ kilometer}}\right) = \frac{1.61 \cdot 1000 \text{ meters}}{1} = 1610 \text{ meters}$$

9.

$$1 \text{ mile} = \frac{1 \text{ mile}}{1}\left(\frac{5280 \text{ feet}}{1 \text{ mile}}\right)\left(\frac{1 \text{ meter}}{3.28 \text{ feet}}\right) = \frac{5280 \text{ meters}}{3.28} = 1610 \text{ meters}$$

10.

$$500 \text{ slugs} = \frac{500 \text{ slugs}}{1}\left(\frac{14.6 \text{ kg}}{1 \text{ slug}}\right)\left(\frac{1 \text{ metric ton}}{1000 \text{ kg}}\right) = \frac{500 \cdot 14.6 \text{ metric tons}}{1000} = 7.3 \text{ metric tons}$$