

# University Physics with modern Physics

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Attempting to avoid death by studying too much!

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1.

2.

1

1

1

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1

1

1

2

2

2

2

2

2

he probably meant something like a yard<sup>2</sup> with some standard depth, say an inch

5.

my height is 170.18 cm and weight is 75 kilograms.

6.

The idea of the kilogram and its value is not changing, only objects we use to keep track of it. At that rate it would take 1,000,000 years to change one of them by a gram, but for accurate purposes this could perhaps still be an issue. ultimately it's not a huge concern.

### I. UNITS, PHYSICAL QUANTITIES, AND VECTORS

#### A. Discussion Questions

1.

It only takes one inconsistent result to disprove a theory. Of course having multiple adds certainty, but ultimately one is enough if one can be reasonably sure the results it correct. Proving a theory is impossible, one can only increase our confidence by many experiments that are consistent.

2.

you could convert to the same units and get 0.12 and call that a difficulty rating after normalizing it to some upper difficulty value.

3.

This is not possible because a function such as tangent cannot take units in as an argument, we could take the tangent of 5 and interpret this as giving units of meters out.

7.

one could use rotation of the earth about the sun, this would be kinda poor though. we could use basically whatever we wanted really.

8.

I could fold the paper repeatedly, and well, then measure the new total thickness and just assume even thickness per layer!

9.

the natural number  $e$ , and  $\tau$ , then any ratio really

10.

standard units of volume are meters cubed. That answer would have the wrong units!

11.

name	Accurate	Precise
Joe	yes	no
Moe	no	yes
Flo	yes	yes

b)

$$1km \left(\frac{1000m}{1km}\right) \left(\frac{100cm}{1m}\right) \left(\frac{1in}{2.54cm}\right) \left(\frac{1ft}{12in}\right) = 3,281ft \tag{1}$$

2.

First is  $500m$  then is  $0m$  since she has returned to her initial position.

$$0.473L \left(\frac{1000cm^3}{1L}\right) \left(\frac{1in}{2.54cm}\right)^3 = \tag{2}$$

13.

**B. Exercises**

1.

a) There are 5280 feet in a mile so

$$1\text{mile} \frac{5280\text{feet}}{1\text{mile}} \frac{12\text{inches}}{1\text{foot}} \frac{2.54\text{cm}}{1\text{inch}} \frac{1\text{m}}{100\text{cm}} \frac{1\text{km}}{1000\text{m}} = 1.609\text{km}$$