

## Mileage

A car (averaging 17.5 miles per gallon) is traveling 50 miles per hour. How many gallons of gas will be used on a trip that lasts 0.75 hours?

$$17.5 \text{ mi} = \text{gal} \quad 50 \text{ mi} = \text{hr}$$

$$0.75 \text{ hr} \times \frac{50 \text{ mi}}{\text{hr}} \times \frac{\text{gal}}{17.5 \text{ mi}} = 2.1 \text{ gal}$$

If gas is \$3.46 per gallon, how much will the trip cost?

$$\$3.46 = \text{gal}$$

$$2.1 \text{ gal} \times \frac{\$3.46}{\text{gal}} = \$7.40$$

For a 200 mile trip in a car which averages 15 miles per gallon, if gas costs \$3.46 per gallon, what's the cost of the trip?

$$15 \text{ mi} = \text{gal} \quad \$3.46 = \text{gal}$$

$$200 \text{ mi} \times \frac{\cancel{\text{gal}}}{15 \cancel{\text{mi}}} \times \frac{\$3.46}{\cancel{\text{gal}}} = \boxed{\$46}$$

## Accuracy and Precision

- two related concepts that you must understand when working with measured numbers!

### Accuracy

- how close a measured number is to the CORRECT (or "true") value of what you are measuring
- "Is it right?"
- checked by comparing measurements against a STANDARD (a substance or object with known properties)

### Precision

- how close a SET of measured numbers are to EACH OTHER
- "Can I reproduce this?"
- checked by repeated measurements

## More on precision

Every measurement contains some amount of ERROR, or some amount of deviation from the true value of what is being measured.

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RANDOM ERROR is the variability in a measurement that cannot be traced back to a single cause. Random errors cause measurements to fluctuate around the true value, but can be averaged out given enough measurements.

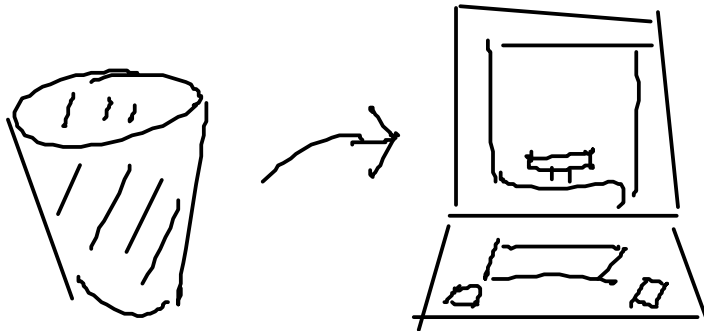
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When reporting measurements, we want to indicate how much random error we think is present. How?

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An experiment:

Measure the mass of the RUBBER STOPPER using the BALANCE.



Record the mass on the note card. Include ALL digits given by the balance. Then, give the card to your instructor.