Measurement (Part 1)

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Objectives

- Adding/Subtracting with Measurements
- Multiplying/Dividing with Measurements
- Converting Decimals to Fractional Inches

Discussion

- What are the different ways we can measure things? What are the most common units used?

Measurement Definitions

- Measurement: a value composed of a standard unit and how many of the unit
- Examples:

  3 in. = 3 of 1 in. = 3 × 1 in.

  ¼ lb. = one quarter of one pound = ¼ × 1 lb.

Adding/Subtracting Measurements

- Be sure you are combining like units. Ex: You can not add 2 ft to 3 in.
- Example: 3.2 cm + 5.298 cm + 0.18 cm
- Example: 5½ ft + 2¾ ft – 2.65 ft + 24 in

Adding/Subtracting Measurements

- Example: 6'9" + 2'6"
- Example: 4'2" – 1'7"

Adding/Subtracting Measurements

- Example: $1'9\frac{3}{8}" + 4\frac{9}{16}"$
- Example: $8'4\frac{1}{8}" - 3'8\frac{3}{4}"$

Try Yourself

- 1) 3 ft – 9 in
- 2) $10'8¾" + 2'6\frac{1}{8}"$
- 3) $5'7\frac{1}{2}" - 2'8\frac{5}{8}"$

Multiplying/Dividing Measurements

- The operation of the problem needs to be done to the unit as well as the numbers attached to the units.
- Example: 2 ft × 3 ft

Multiplying/Dividing Measurements

- Example: 4 in × 8 in × 3 in

Linear Measurement

- For length measurements, there are three types based on the dimensions in the context of the situation. Inches is used below, but this can be applied to any length units.

Linear Length	Area	Volume
One Dimensional	Two Dimensional	Three Dimensional
		
in	in^2 or sq in	in^3 or cu in

Multiplying/Dividing Measurements

- Example: 130 mi ÷ 2 hr
- Example: 15 sq ft ÷ 3 ft
- Example: 75 lb ÷ 6.55 sq in.

Try Yourself

- 1) 7 mph × 4 hr
- 2) 200 mi ÷ 55 mph

Converting Decimals to Fractional Inches

- There is an efficient way to determine what fractional 16^{th}, 32^{nd}, or 64^{th} a decimal is closest to, especially when you cannot look at the decimal and know right away:
  - 1. Multiply the numerator by the desired denominator and round to the nearest whole number.
  - 2. Put the rounded number over the desired denominator.
  - 3. If possible, reduce.

Converting Decimals to Fractional Inches

- Examples: What are the following decimals to the nearest 16ths?
  - 0.51
  - 0.287
  - 4.879
  - 9.683

Try Yourself

- Examples: What are the following decimals to the nearest 32nds?
  1) 0.287
  2) 3.065
  3) 0.738

Converting Decimals to Fractional Inches - Error

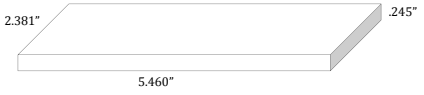
- By using a fractional measurement, we are creating a certain amount of error by not using the exact decimal dimension, the difference between the decimal given and fraction determined.
- Example: Express 0.76" in fraction form to the nearest 16^{th} of an inch. Find the error to the nearest ten-thousandth.
- If the tolerance on this job was ±0.05" would we be okay using the nearest 16^{th}? What about ±0.005"? If not, what we need to do to have our fractional measurement more accurate?

Converting Decimals to Fractional Inches - Error

- Example: What is 3.268 in equivalent to in fraction form to the nearest 32^{nd} of an inch? Find the error to the nearest ten-thousandth.

Try Yourself

- Example: Express each of the dimensions in fraction form to the nearest 16^{th} of an inch. Find the error to the nearest thousandth for each side.



Blueprint Measurement	Nearest 16^{th} of an inch	Error
2.381"		
5.460"		
0.245"		