

Problem 6

You can easily convert common units and measures electronically, but you still should be able to use a conversion table, such as those in Appendix D. Table 1-6 is part of a conversion table for a system of volume measures once common in Spain; a volume of 1 fanega is equivalent to 55.501 dm³ (cubic decimeters). To complete the table, what numbers (to three significant figures) should be entered in (a) the cahiz column, (b) the fanega column, (c) the cuartilla column, and (d) the almude column, starting with the top blank? Express 7.00 almudes in (e) medios, (f) cahizes, and (g) cubic centimeters (cm³).

Table 1-6 Problem 6

	cahiz	fanega	cuartilla	almude	medio
1 cahiz =	1	12	48	144	288
1 fanega =		1	4	12	24
1 cuartilla =			1	3	6
1 almude =				1	2
1 medio =					1

Solution

Row 2

Convert from fanegas to cahizes, using the information in row 1.

$$1 \text{ fanega} = 1 \cancel{\text{ fanega}} \times \frac{1 \text{ cahiz}}{12 \cancel{\text{ fanega}}} \approx 0.0833 \text{ cahiz}$$

Row 3

Convert from cuartillas to fanegas, using the information in row 2.

$$1 \text{ cuartilla} = 1 \cancel{\text{ cuartilla}} \times \frac{1 \text{ fanega}}{4 \cancel{\text{ cuartilla}}} = 0.250 \text{ fanega}$$

Convert from cuartillas to cahizes, using the information in rows 1 and 2.

$$1 \text{ cuartilla} = 1 \cancel{\text{ cuartilla}} \times \frac{1 \cancel{\text{ fanega}}}{4 \cancel{\text{ cuartilla}}} \times \frac{1 \text{ cahiz}}{12 \cancel{\text{ fanega}}} \approx 0.0208 \text{ cahiz}$$

Row 4

Convert from almudes to cuartillas, using the information in row 3.

$$1 \text{ almude} = 1 \cancel{\text{ almude}} \times \frac{1 \text{ cuartilla}}{3 \cancel{\text{ almudes}}} \approx 0.333 \text{ cuartilla}$$

Convert from almudes to fanegas, using the information in row 2.

$$1 \text{ almude} = 1 \cancel{\text{ almude}} \times \frac{1 \cancel{\text{ cuartilla}}}{3 \cancel{\text{ almudes}}} \times \frac{1 \text{ fanega}}{4 \cancel{\text{ cuartilla}}} \approx 0.0833 \text{ fanega}$$

Convert from almudes to cahizes, using the information in row 1.

$$1 \text{ almude} = 1 \cancel{\text{ almude}} \times \frac{1 \cancel{\text{ cuartilla}}}{3 \cancel{\text{ almudes}}} \times \frac{1 \cancel{\text{ fanega}}}{4 \cancel{\text{ cuartilla}}} \times \frac{1 \text{ cahiz}}{12 \cancel{\text{ fanega}}} \approx 0.00694 \text{ fanega}$$

Row 5

Convert from medios to almudes, using the information in row 4.

$$1 \text{ medio} = 1 \cancel{\text{medio}} \times \frac{1 \cancel{\text{almude}}}{2 \cancel{\text{medios}}} = 0.500 \text{ almudes}$$

Convert from medios to cuartillas, using the information in row 3.

$$1 \text{ medio} = 1 \cancel{\text{medio}} \times \frac{1 \cancel{\text{almudes}}}{2 \cancel{\text{medios}}} \times \frac{1 \cancel{\text{cuartilla}}}{3 \cancel{\text{almudes}}} \approx 0.167 \text{ cuartilla}$$

Convert from medios to fanegas, using the information in row 2.

$$1 \text{ medio} = 1 \cancel{\text{medio}} \times \frac{1 \cancel{\text{almudes}}}{2 \cancel{\text{medios}}} \times \frac{1 \cancel{\text{cuartilla}}}{3 \cancel{\text{almudes}}} \times \frac{1 \cancel{\text{fanega}}}{4 \cancel{\text{cuartilla}}} \approx 0.0417 \text{ fanega}$$

Convert from medios to cahizes, using the information in row 1.

$$1 \text{ medio} = 1 \cancel{\text{medio}} \times \frac{1 \cancel{\text{almudes}}}{2 \cancel{\text{medios}}} \times \frac{1 \cancel{\text{cuartilla}}}{3 \cancel{\text{almudes}}} \times \frac{1 \cancel{\text{fanega}}}{4 \cancel{\text{cuartilla}}} \times \frac{1 \cancel{\text{cahiz}}}{12 \cancel{\text{fanega}}} \approx 0.00347 \text{ cahiz}$$

All these results are shown below in the table.

	cahiz	fanega	cuartilla	almude	medio
1 cahiz =	1	12	48	144	288
1 fanega =	0.0833	1	4	12	24
1 cuartilla =	0.0208	0.250	1	3	6
1 almude =	0.00694	0.0833	0.333	1	2
1 medio =	0.00347	0.0417	0.167	0.500	1

Convert 7.00 almudes to medios.

$$7.00 \cancel{\text{almudes}} \times \frac{2 \cancel{\text{medios}}}{1 \cancel{\text{almude}}} = 14.0 \text{ medios}$$

Convert 7.00 almudes to cahizes.

$$7.00 \cancel{\text{almudes}} \times \frac{1 \cancel{\text{cuartilla}}}{3 \cancel{\text{almude}}} \times \frac{1 \cancel{\text{fanega}}}{4 \cancel{\text{cuartilla}}} \times \frac{1 \cancel{\text{cahiz}}}{12 \cancel{\text{fanegas}}} \approx 0.0486 \text{ cahiz}$$

Convert 7.00 almudes to cubic centimeters.

$$7.00 \cancel{\text{almudes}} \times \frac{1 \cancel{\text{cuartilla}}}{3 \cancel{\text{almude}}} \times \frac{1 \cancel{\text{fanega}}}{4 \cancel{\text{cuartilla}}} \times \frac{55.501 \cancel{\text{dm}^3}}{1 \cancel{\text{fanegas}}} \times \left(\frac{10 \text{ cm}}{1 \text{ dm}} \right)^3 \approx 3.24 \times 10^4 \text{ cm}^3$$