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 1118 - section 1
 Desk # 7
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Properly label heading with your name, partner's name, course/section #, desk #, and date

The Value of π

Purpose Find the experimental value of π .

Describe the purpose of the lab; this purpose will be answered in the conclusions

Apparatus 30-cm ruler, a circular box #7, a rectangular box #7, and marbles of the same size, see picture below.

List all apparatus used along with the identifying numbers



Data

Table 1: Dimension of the boxes (cm)

Record data with units and uncertainties in tables with descriptive titles

Readings	1	2	3	Average	Uncertainty
Length of the rectangular box: l	21.2	21.2	21.3	21.333	± 0.1
Width of the rectangular box: w	11.0	11.1	11.1	11.067	± 0.1
Diameter of the round box: d	12.40	12.40	12.40	12.40	± 0.05

Table 2: Numbers of the marbles to fill the bottom

Readings	1	2	Uncertainty
Rectangular box	149	149	0
Round box	76	76	0

Calculations

The areas can be calculated from the dimensions:

$$A_{\text{rect}} = lw = 21.33 \times 11.067 = 236.09 \text{ cm}^2$$

$$A_{\text{round}} = \pi r^2 = \frac{1}{4} \pi d^2 = \frac{1}{4} 12.40^2 \pi = 38.44\pi \text{ cm}^2$$

And also by ratios of the marbles:

$$\frac{A_{\text{rect}}}{A_{\text{round}}} = \frac{236.09 \text{ cm}^2}{38.44\pi \text{ cm}^2} = \frac{149 \text{ marbles}}{76 \text{ marbles}}$$

Solving for π we get:

$$\pi = \frac{76 \times 236.09}{149 \times 38.44} = 3.1327$$

Comparing to the reference value of π to 5 non-zero digits:

$$\% \text{ discrepancy} = \frac{|3.1327 - 3.1416|}{3.1416} \times 100\% = 0.283\% \approx 0.3\%$$

Conclusion

We found the value of π to be 3.13, which is 0.3% lower than the reference value 3.14159265

Convert units before calculations. (Not needed here because the units cancel out in the ratio.)

Write the formula, then substitute in the numbers. Keep track of sig figs in results with underlines.

State the result with the correct number of sig figs and compare with the reference value.