Experiment 19

TRADITIONAL 

Measuring a Book? Precisely!

Problem

How does the precision of an instrument affect measurements and calculations?

Introduction

Measurement is an important part of science, and an understanding of uncertainty is an important part of measurement.

In this activity you will compare measurements of your textbook with four different rulers, each with a different precision.

Prelaboratory Assignment

✓ **Read the entire experiment** before you begin.

Materials

4 special rulers
Chemistry textbook

Procedure

1. Measure the length and width of your chemistry textbook with each of the four special rulers. Record these values.
2. Convert all measurements to centimeters (if necessary). Record these values.
3. Using your measurements, calculate the perimeter (in cm) and area (in cm^2) of the cover of your chemistry textbook. Record these values.

Cleaning Up

Leave the rulers on the lab bench.

Analysis and Conclusions

Complete the **Analysis and Conclusions** section for this experiment either on your Report Sheet or in your laboratory notebook, as directed by your teacher.

1. Which ruler gives you the most precise measure of the perimeter and area of the cover of your chemistry textbook? Why?
2. Which ruler gives you the least precise measure of the perimeter and area of the cover of your chemistry textbook? Why?
3. Justify the number of significant figures in each of your measurements.
4. Justify the number of significant figures in each of your calculations.

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5. Compare your measurements with other groups. For which ruler was there the most difference among groups? The least difference? Explain.

6. Compare your calculations with other groups. For which ruler was there the most difference among groups? The least difference? Explain.

Something Extra

For each ruler, what is the largest length that you can measure that you would report as a measurement of zero? Explain.

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Name _____

Section _____ Date _____

Report for Experiment 19

Measuring a Book? Precisely!

Analysis and Conclusions

1. Which ruler gives you the most precise measure of the perimeter and area of the cover of your chemistry textbook? Why?

2. Which ruler gives you the least precise measure of the perimeter and area of the cover of your chemistry textbook? Why?

3. Justify the number of significant figures in each of your measurements.

4. Justify the number of significant figures in each of your calculations.

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5. Compare your measurements with other groups. For which ruler was there the most difference among groups? The least difference? Explain.

6. Compare your calculations with other groups. For which ruler was there the most difference among groups? The least difference? Explain.

Summary Table

Record your measurements and calculations in the table below. Be sure to include appropriate units!

Ruler #	length	width	length	width	perimeter	area
1						
2						
3						
4						

Something Extra

For each ruler, what is the largest length that you can measure that you would report as a measurement of zero? Explain.

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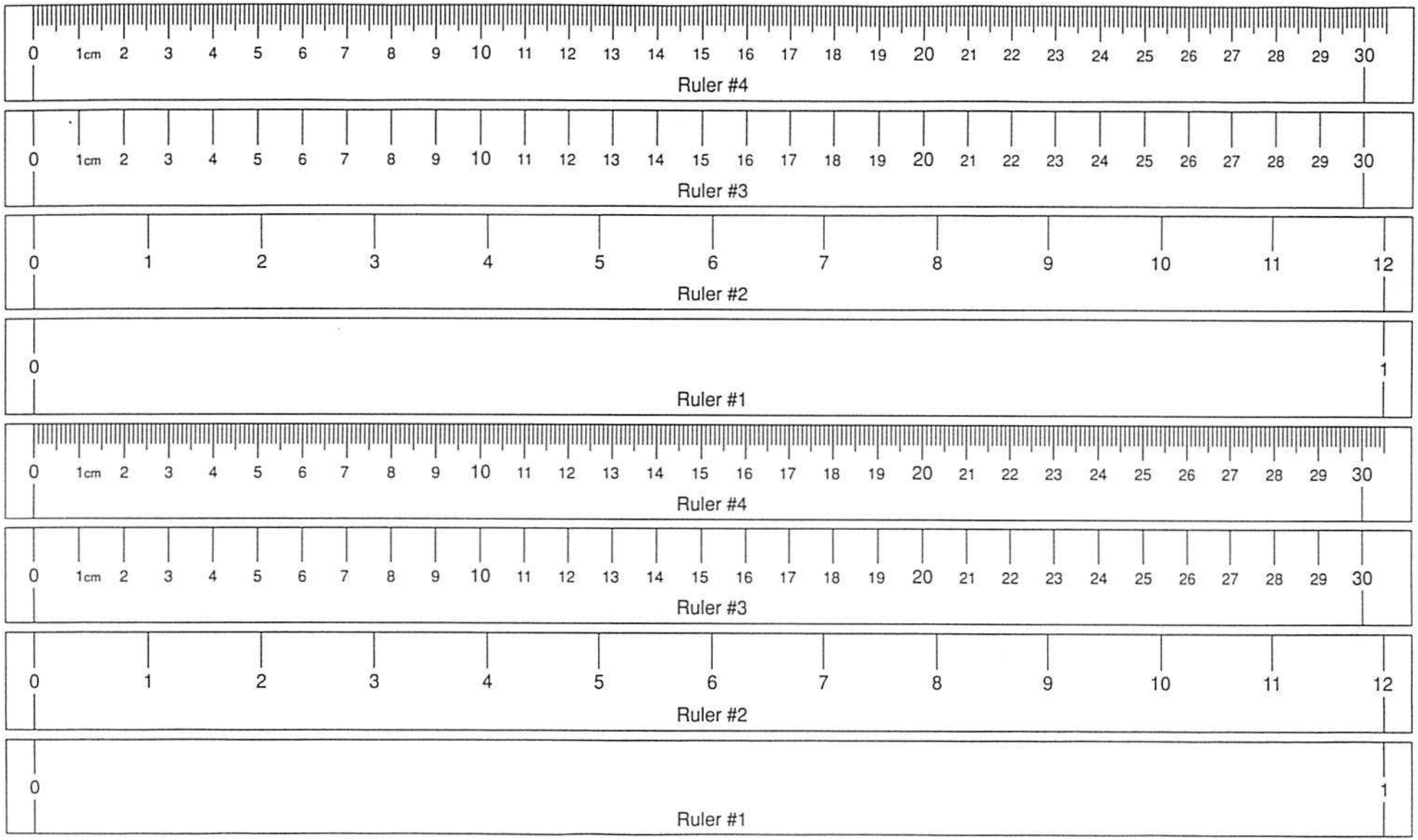
0 1cm 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Ruler #4
0 1cm 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Ruler #3
0 1 2 3 4 5 6 7 8 9 10 11 12
Ruler #2
0 1
Ruler #1
0 1cm 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Ruler #4
0 1cm 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Ruler #3
0 1 2 3 4 5 6 7 8 9 10 11 12
Ruler #2
0 1
Ruler #1