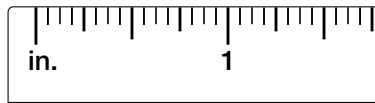


Precision and Measurement

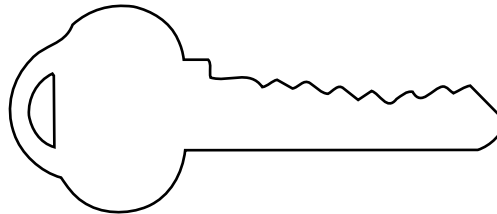
The **precision** or *exactness* of a measurement depends on the unit of measure. The **precision unit** is the smallest unit on a measuring tool. **Significant digits** include all of the digits of a measurement that you know for sure, plus one estimated digit.

EXAMPLE 1 Identify the precision unit of the measuring tool.

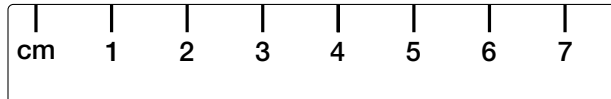


The smallest unit is a sixteenth of an inch. So, the precision unit is $\frac{1}{16}$ inch.

EXAMPLE 2 State the measurement of the key using significant digits.

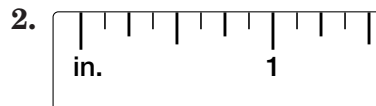
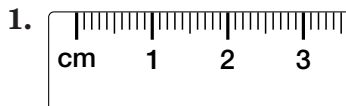


The precision unit is 1 centimeter. You know for certain that the length is between 6 and 7 centimeters. One estimate is 6.6 centimeters.

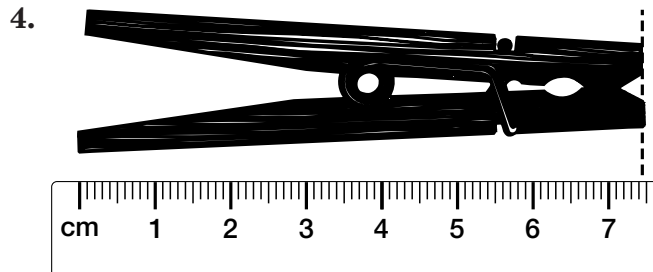
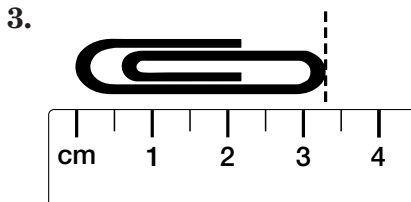


EXERCISES

Identify the precision unit of each measuring tool.

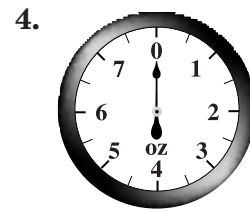
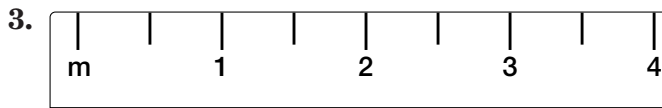
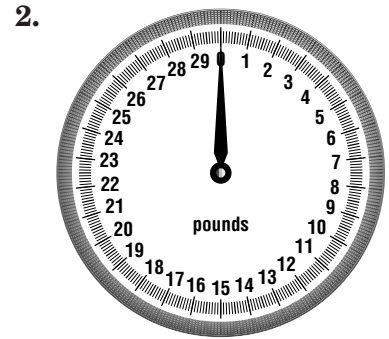
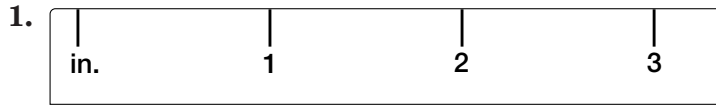


State the measure using significant digits.

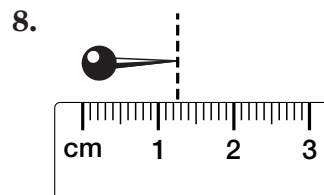
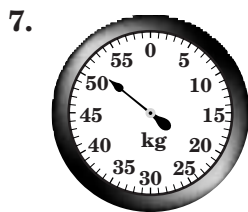
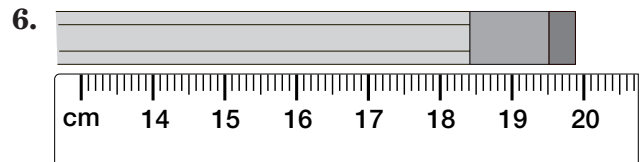
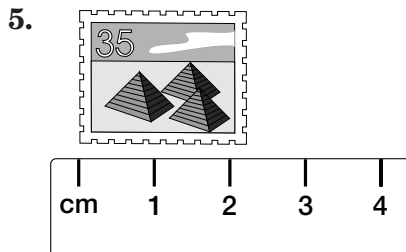


Precision and Measurement

Identify the precision unit of each measuring tool.



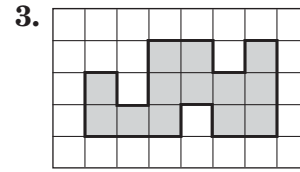
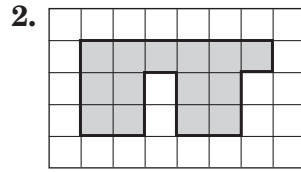
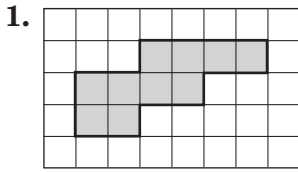
State the measure using significant digits.



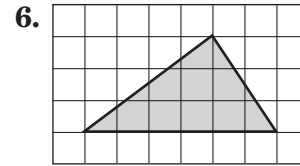
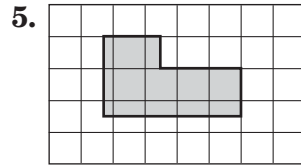
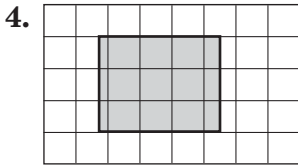
Perimeter

Perimeter is the sum of the lengths of the sides of a polygon.

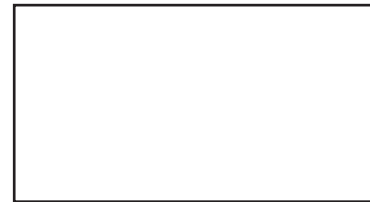
Find the perimeter of each figure.



Estimate the perimeter of each figure.

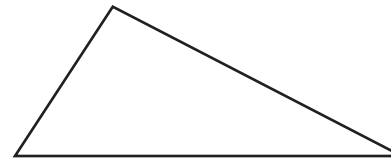


For Exercises 7–10, use the rectangle at the right.



7. Measure the length and width of the rectangle to the nearest centimeter. Find the perimeter of the rectangle using these measurements.
8. Measure the length and width of the rectangle to the nearest half centimeter. Find the perimeter of the rectangle using these measurements.
9. Measure the length and width of the rectangle to the nearest tenth centimeter. Find the perimeter of the rectangle using these measurements.
10. Which perimeter is most precise?

For Exercises 11–14, use the triangle at the right.



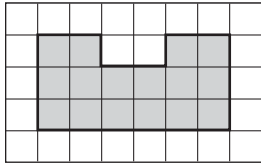
11. Measure each side of the triangle to the nearest centimeter. Find the perimeter of the triangle using these measurements.
12. Measure each side of the triangle to the nearest half centimeter. Find the perimeter of the triangle using these measurements.
13. Measure each side of the triangle to the nearest tenth centimeter. Find the perimeter of the triangle using these measurements.
14. Which perimeter is most precise?
15. The sides of a pentagon are measured to the nearest centimeter. Using these measurements, the perimeter is found to be 25 centimeters. If more precise measurements are made, between what two numbers will the perimeter fall?
16. The city must maintain the highway that goes around the city. Would the city need to determine the amount of highway they need to maintain to the nearest inch? Explain.

Area

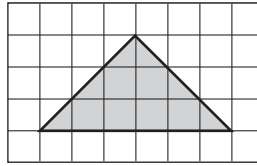
The area of a figure is the number of square units needed to cover its surface.

Find the area of each figure.

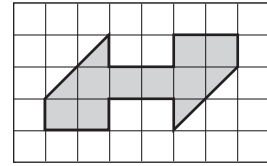
1.



2.

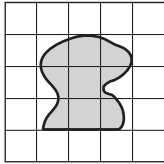


3.

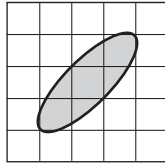


Estimate the area of each figure.

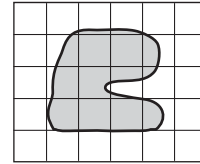
4.



5.



6.



For Exercises 7–10, use the rectangle at the right.

7. Measure the length and width of the rectangle to the nearest centimeter. Find the area of the rectangle using these measurements.
8. Measure the length and width of the rectangle to the nearest half centimeter. Find the area of the rectangle using these measurements.
9. Measure the length and width of the rectangle to the nearest tenth centimeter. Find the area of the rectangle using these measurements.
10. Which area is the most precise?



For Exercises 11–14, use the square at the right.

11. Measure the side of the square to the nearest centimeter. Find the area of the square using this measurement.
12. Measure the side of the square to the nearest half centimeter. Find the area of the square using this measurement.
13. Measure the side of the square to the nearest tenth centimeter. Find the area of the square using this measurement.
14. Which area is the most precise?
15. To the nearest centimeter, the length and width of a rectangle are 15 centimeters and 21 centimeters. If more precise measurements are made, between what two numbers will the area fall?
16. A can of paint can be used to cover about 400 square feet. Should you measure the length and width of the walls of a room to the nearest foot or inch to determine how many cans of paint to buy?

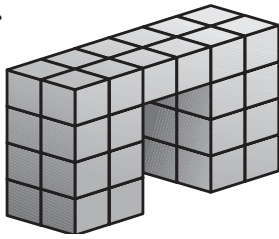


Volume

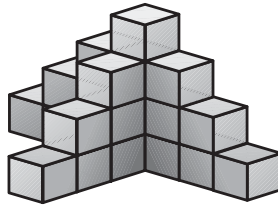
Volume is the measure of the amount of space enclosed by a three-dimensional figure.

Find the volume of each figure.

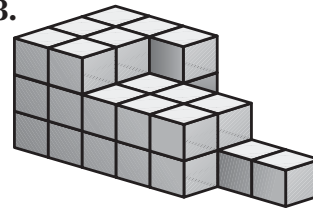
1.



2.



3.



The volume of a rectangular prism can be found by multiplying the length, the width, and the height.

For Exercises 4–7, use a box in the shape of a rectangular prism.

4. Measure the length, width, and height of the prism to the nearest centimeter. Find the volume of the prism using these measurements.
5. Measure the length, width, and height of the prism to the nearest half centimeter. Find the volume of the prism using these measurements.
6. Measure the length, width, and height of the prism to the nearest tenth centimeter. Find the volume of the prism using these measurements.
7. Which volume is the most precise?
8. Repeat Exercises 4–7 using another box in the shape of a rectangular prism.
9. To the nearest centimeter, the dimensions of a rectangular prism are 8 centimeters, 10 centimeters, and 15 centimeters. If more precise measurements are made, between what two numbers will the area fall?
10. An air conditioner will cool a house up to 15,000 cubic feet. Should you measure the dimensions of the house to the nearest foot or inch to determine whether or not the air conditioner will cool a given building?
11. A manufacturer of cereal wants to purchase boxes that will hold at least 180 cubic inches of cereal. Should the manufacturer measure potential boxes to the nearest foot or inch?
12. Each side of a cube is 11 inches long. Find the volume of the cube in cubic inches. If the side had been measured to the nearest foot, find the volume of the cube in cubic inches.