

Activity

What Is Science?

Scientific Notation

Add the following and round off your answer.

$$\begin{array}{r} 1. \quad 3.75 \\ \quad 43.844 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad 134.456 \\ \quad 67.9 \\ \quad 63.35 \\ \hline 372.655 \end{array}$$

Subtract the following.

$$\begin{array}{r} 3. \quad 8.055 \\ \quad -0.1748 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 876.544 \\ \quad - 21.10 \\ \hline \end{array}$$

It is sometimes useful to express very large or very small numbers as powers of ten, or in scientific notation. For example, 93,000,000 can be expressed as 9.3×10^7 (10^7 actually means $10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$, or 10,000,000). The decimal 0.00053 can be expressed as 5.3×10^{-4} (10^{-4} actually means $\frac{1}{10} \times \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10}$, or 0.0001).

Put the following into scientific notation.

$$5. \quad 376,000$$

$$6. \quad 186,000,000$$

$$7. \quad 0.00000000810$$

$$8. \quad 0.0042$$

In order to add or subtract, the numbers must be written to the same power of ten. For example,

$$\begin{array}{r} 4.3 \times 10^5 \quad 4.3 \times 10^5 \\ +0.4 \times 10^6 = 4.0 \times 10^5 \\ \hline 8.3 \times 10^5 \end{array}$$

In multiplication, the powers of ten are added together:

$$(4.30 \times 10^5)(0.40 \times 10^6) = 1.72 \times 10^{11}$$

In division, the powers of ten are subtracted:

$$\frac{4.8 \times 10^5}{2.4 \times 10^3} = 2.0 \times 10^2$$

Add the following.

$$\begin{array}{r} 9. \quad 0.23 \times 10^6 \\ \quad +4.32 \times 10^6 \end{array}$$

$$\begin{array}{r} 10. \quad 7.57 \times 10^4 \\ \quad +6.85 \times 10^6 \end{array}$$

Subtract the following.

$$\begin{array}{r} 11. \quad 5.4 \times 10^5 \\ \quad -3.40 \times 10^6 \end{array}$$

$$\begin{array}{r} 12. \quad 6.015 \times 10^4 \\ \quad -4.502 \times 10^4 \end{array}$$

Multiply the following.

13. $(4.50 \times 10^4)(1.23 \times 10^3)$

14. $(3.6 \times 10^5)(1.3 \times 10^{-3})$

Divide the following.

15. $\frac{4.5 \times 10^4}{1.23 \times 10^3}$

16. $\frac{4.01 \times 10^7}{1.5 \times 10^3}$

Activity

Measurement and the Sciences

Practicing Measurement Skills

Pick up a metric ruler and look carefully at the scale. You will see lots of little lines and every so often a much longer line marked with a number. The longer lines are centimeter (cm) marks, and the shorter lines are one-tenth of a centimeter (0.1), or millimeter (mm) lines.

1. Using your metric ruler, draw a line that is 3 cm long.
2. Draw a line that is 7 cm long.
3. a. Draw a line that is 1 cm long.

b. Now draw a line that is 10 mm long.
4. How many millimeters are there in 1 cm? _____
5. What part of a centimeter is 1 mm? _____

The metric ruler can measure distance easily in millimeters or centimeters. If you want to measure in millimeters, just multiply the numbers on the scale by 10. For example, the line marked 7 now becomes 70.

6. a. Measure the length of the following line in millimeters.

Length = _____ mm

- b. Measure the length of the following line in millimeters.

Length = _____ mm

To measure distances between two numbers on the number scale, count the millimeter, or smaller, lines between the numbers as tenths of a centimeter (0.1). For example, look at Figure 1. The arrow is pointing to a millimeter line between 5 and 6 cm. You will notice that this millimeter line is the third line beyond the 5 cm. If each millimeter line is 0.1 cm, then 3 mm lines is 0.3 cm. Now, add 5 cm to the 0.3 cm. The answer is 5.3 cm.

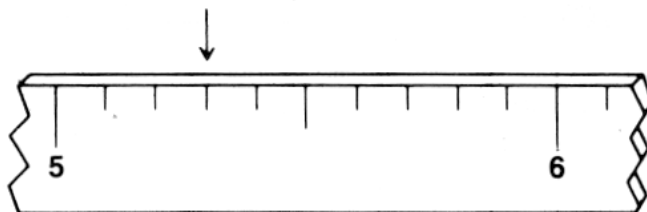


Figure 1

7. a. Measure the length of the following line in centimeters.

Length = _____ cm

- b. Measure the length of the following line in centimeters.

Length = _____ cm

8. You have just seen how easy it is to measure distance in centimeters or millimeters. Measure the length and width of Figure 2 in centimeters and millimeters.

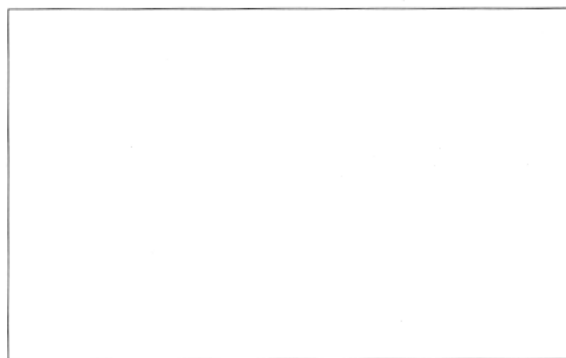


Figure 2

Length = _____ cm = _____ mm

Width = _____ cm = _____ mm

EARTH SCIENCE

SigFigs

10 Points

Overall Score:

Overall Grade:

Name _____

Group _____

Date _____

PART A Significant Figures

Write the number of significant figures shown for each number.

- | | | | | | |
|----------|---|-----------|---------------------------------------|-----------|-------------------------------------|
| 1. _____ | 0.00526 | 7. _____ | 8.000×10^2 | 13. _____ | 0.1698 |
| 2. _____ | 1.59×10^8 | 8. _____ | 1×10^9 | 14. _____ | 700.0 |
| 3. _____ | 165,000 | 9. _____ | 25 | 15. _____ | 6.00009 |
| 4. _____ | 89,456,904 | 10. _____ | 409 | 16. _____ | 556.0 |
| 5. _____ | 0.5 | 11. _____ | 10 | 17. _____ | 0.0000001 |
| 6. _____ | 9.50×10^{-5} | 12. _____ | 0.0001 | 18. _____ | 123×10^7 |

PART B SigFig Computations

Do the math and then write your answer with the correct amount of significant figures. You don't need to show your work.

- | | | | |
|-----------|---|-----------|---|
| 19. _____ | $7.936 + 1.20$ | 29. _____ | $(1 + 3.0) \div (4.2 - 9.565)$ |
| 20. _____ | $89 + 1.236$ | 30. _____ | $[(9 + 0.9) \div (69 \times 8.6)] \times 4$ |
| 21. _____ | $963.3 - 1$ | 31. _____ | $(675.4 \div 23) \div (89 \times 3.2)$ |
| 22. _____ | $0.74545 - 0.498$ | 32. _____ | $(344 + 102) \div (66.4 \times 2.6)$ |
| 23. _____ | 1.4×5.30 | 33. _____ | $0.336 + 98.1 - 89.0 + 0.05$ |
| 24. _____ | $(9.2 + 0.0059) \div (69 \times 8.6)$ | 34. _____ | $3.14 \times 0.00005694465$ |
| 25. _____ | $26.87 - 100$ | 35. _____ | $(2.6 \times 89.5656 \div 65.8) + 1$ |
| 26. _____ | 123×100 | 36. _____ | $4.54564356542794 - 0.1$ |
| 27. _____ | $45.0 \div 6.54$ | 37. _____ | $0.000056564 + 0.143$ |
| 28. _____ | $(5.32 - 0.85) \times (69.01 + 8)$ | 38. _____ | 4.0×6.0 |

THE CRAZY FIFI CONVERSION MACHINE

Crazy Fifi (CF) is an inventor. She has designed and constructed a machine that can do amazing things. The machine has only 1 dial on it but the dial has seven settings:

Setting 1: CF's machine changes elephants into monkeys.

Setting 2: CF's machine changes beans into rocks.

Setting 3: CF's machine changes mud into iPads.

Setting 4: CF's machine changes lipstick into mud.

Setting 5: CF's machine changes monkeys into iPads.

Setting 6: CF's machine changes money into beans.

Setting 7: CF's machine changes elephants into rocks.

If CF stands on her head, the input and output of the machine work in reverse. While CF is on her head, the machine behaves as follows:

Reverse Setting 1: CF's machine changes monkeys into elephants.

Reverse Setting 2: CF's machine changes rocks into beans.

Reverse Setting 3: CF's machine changes iPads into mud.

Reverse Setting 4: CF's machine changes mud into lipstick.

Reverse Setting 5: CF's machine changes iPads into monkeys.

Reverse Setting 6: CF's machine changes beans into money.

Reverse Setting 7: CF's machine changes rocks into elephants.

Use CF's machine to solve the problems below. Write your answers on a separate piece of paper. Be sure to specify when CF needs to stand on her head!

1. CF wants to make a rock turn into an elephant because she always wanted a pet elephant. How can she do this with her machine? List all of the steps and settings that she must use.
2. CF ate a giant mud pie and now has mud all over her lips. She wants to change the mud into lipstick. How can she do this? ? List all of the steps and settings that she must use.
3. CF has a pet elephant but she wants an iPad and has no money. What is the easiest way that she can get an iPad using her machine? List all of the steps and settings that she must use.
4. CF is hungry but she only has lipstick in her purse. CF needs to convert the lipstick into beans. How can she do this with her machine? List all of the steps and settings that she must use.
5. CF doesn't like her iPad anymore and wants to buy a package of diapers to wear on her head to make herself laugh. How can she change her iPad into money so that she can buy the diapers? List all of the steps and settings that she must use.
6. CF decides against buying the diapers and instead wants to buy a monkey. She takes her money to the zoo but they won't sell her a monkey. How can she make a monkey with her machine? List all of the steps and settings that she must use.
7. Draw a picture of what you think Crazy Fifi and her machine look like.

Name: _____ Date: _____

Measurement Conversions [Metric to Metric]

1. 3.68 kg = _____ g

2. 568 cm = _____ m

3. 8700 ml = _____ l

4. 25 mg = _____ g

5. 0.101 cm = _____ mm

6. 250 ml = _____ l

7. 600 g = _____ kg

8. 8900 mm = _____ m

9. 0.000004 m = _____ mm

10. 0.250 kg = _____ mg

Name: _____ Date: _____

Measurement Conversions [Metric to English]

1. 74 cm = _____ in.
2. 25 ml = _____ tsp.
3. 50 kg = _____ lbs.
4. 160 km = _____ mi.
5. 3.6 l = _____ gal.
6. 500 g = _____ oz.
7. 100 m = _____ yds.
8. 300 ml = _____ cups.
9. 600 g = _____ lbs.
10. 523 mm = _____ in.