Unit 0: Scientific Method & Lab Skills Test Review

Key

Scientific Method In Action

The Strange Case of BeriBeri

In 1887 a strange nerve disease attacked the people in the Dutch East Indies. The disease was beriberi. Symptoms of the disease included weakness and loss of appetite, victims often died of heart failure. Scientists thought the disease might be caused by bacteria. They injected chickens with bacteria from the blood of patients with beriberi. The injected chickens became sick. However, so did a group of chickens that were not injected with bacteria.

One of the scientists, Dr. Eijkman, noticed something. Before the experiment, all the chickens had eaten whole-grain rice, but during the experiment, the chickens were fed polished rice. Dr. Eijkman researched this interesting case and found that polished rice lacked thiamine, a vitamin necessary for good health.

1. State the Problem A nerve disease, called beriberi was affecting people in the Dutch East Indies.
2. What was the hypothesis? The disease is caused by beriberi.
3. How was the hypothesis tested? Chickens were injected with diseased blood while another group was not to see if it was the bacteria.
4. Should the hypothesis be supported or rejected based on the experiment? Rejected because both the experimental group & control group became ill.
5. What is the independent variable? - the bacteria.
6. What is the dependent variable? - Illness in the chickens
7. What is the control group? The group of chickens who were not injected

Significant Figures Worksheet

How many significant figures are in each of the following numbers?

1) 5.40 3
2) 210 2
3) 801.5 4
4) 1,000 1
5) 101.0100 7
6) 1.2×10^3 2
7) 0.00120 3
8) 0.0102 3
9) 9.010×10^{-6} 4
10) 2,370.0 5

11) Why are significant figures important when taking data in the laboratory?
Significant figures indicate the precision of the measured data.

12) Why are significant figures NOT important when solving problems in your math class?
math classes do not deal with measured values.

13) Using two different instruments, I measured the length of my foot to be 27 centimeters and 27.00 centimeters. Explain the difference between these two measurements.
The 2nd measurement (27.00) is much more precise.

Significant Figure Calculations

Solve the following mathematical problems such that the answers have the correct number of significant figures:

14) 334.540 grams + 198.9916 grams = _____
533.5316 grams = 533.532 grams

15) 34 grams / 10.1 mL = _____
33.663366 34 grams/mL = 34 grams/mL

16) 2.61×10^6 joules / 0.0034 seconds = _____
767647058.5 joules/second = 760000000 joules/second

17) 0.0610 m – 0.18 m = _____
-0.119 m = -.12 m

18) 349.0 cm + 1.10 cm + 100. cm = _____
450.1 cm = 450 cm

19) 252 meters / 910 seconds = _____
.276923077 meters/second = .28 meters/second

20) 248.01010 kilograms + 84.097 kilograms = _____
332.1071 kg = 332.107 kg

21) 44 m/s x 20 s = _____

880 m = 900m

Algebra – Solving Problems

Solve the following problems and write your answer in the correct significant figures.

22) $4.00x + 124.00 = 204.00$

$-124.00 \quad -124.00$

$4.00x = 80.00$

$\frac{4.00x}{4.00} = \frac{80.00}{4.00}$

$x = 20.0$

23) $V_A T_A = V_B T_B$ $\quad V_A\ 0.761$ $\quad T_A = 20.0$ $\quad T_B = 33.5$

$\frac{(0.761)(20.0)}{33.5} = \frac{V_B(33.5)}{33.5}$

$V_B = .454328358 = .454$

24) $F = 1.8(C) + 32$ $\quad F = -459.4$

$-459.4 = 1.8(C) + 32$

$-32 \quad -32$

$-491.4 = 1.8(C)$

$\frac{-491.4}{1.8} = \frac{1.8(C)}{1.8}$

$-273 = C$

-270

Scientific Notation

Write the following numbers into scientific notation:

25) 3,400 3.4×10^3

26) 0.000023 2.3×10^{-5}

27) 101,000 1.01×10^5

28) 0.010 1.0×10^{-2}

29) 1,000,000 1×10^6

30) 0.00671 6.71×10^{-3}

Write the following numbers into regular notation:

31) 2.30×10^4 23000

32) 1.76×10^{-3} 0.00176

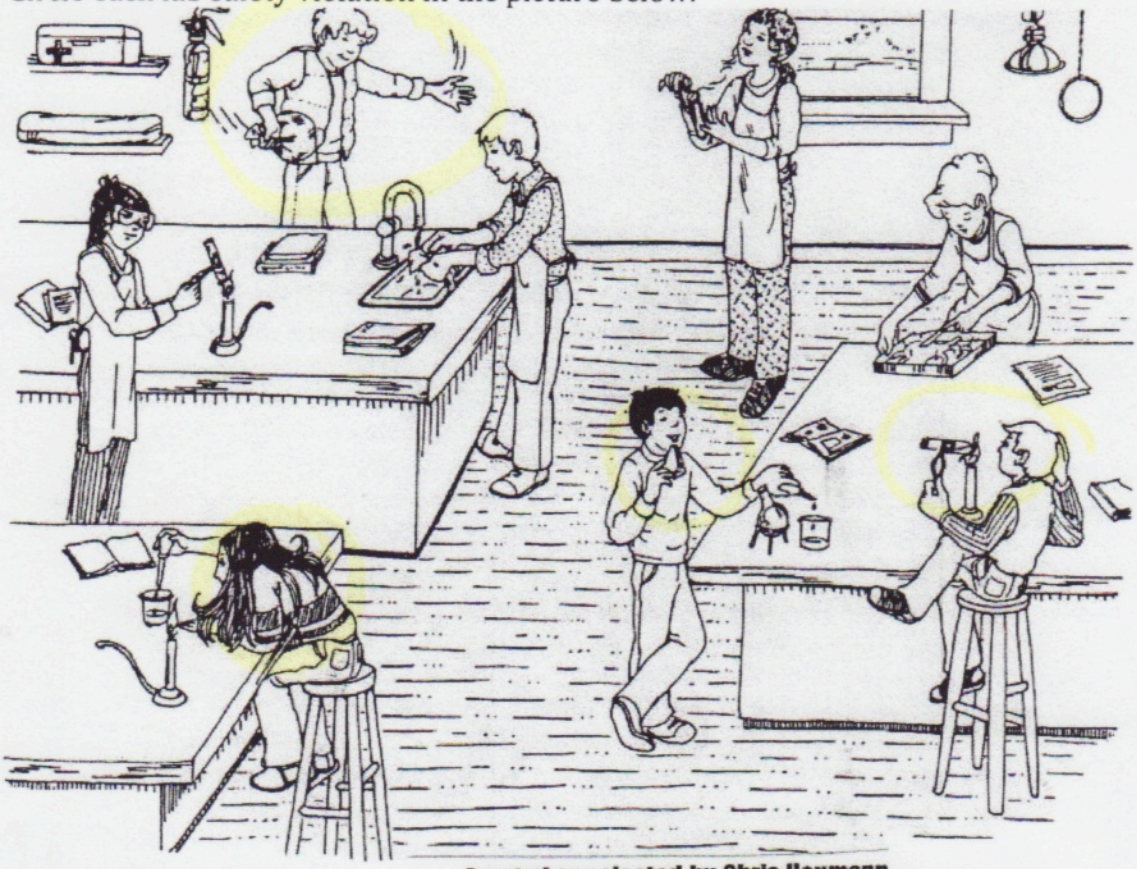
33) 1.901×10^{-7} 0.0000001901

34) 9.11×10^1 91.1

35) 7.4×10^5 740000

Lab Safety

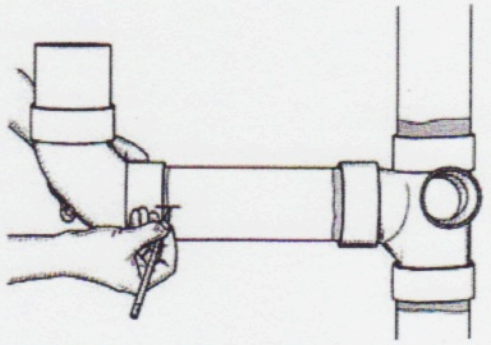
Circle each lab safety violation in the picture below.



Created or selected by Chris Heumann

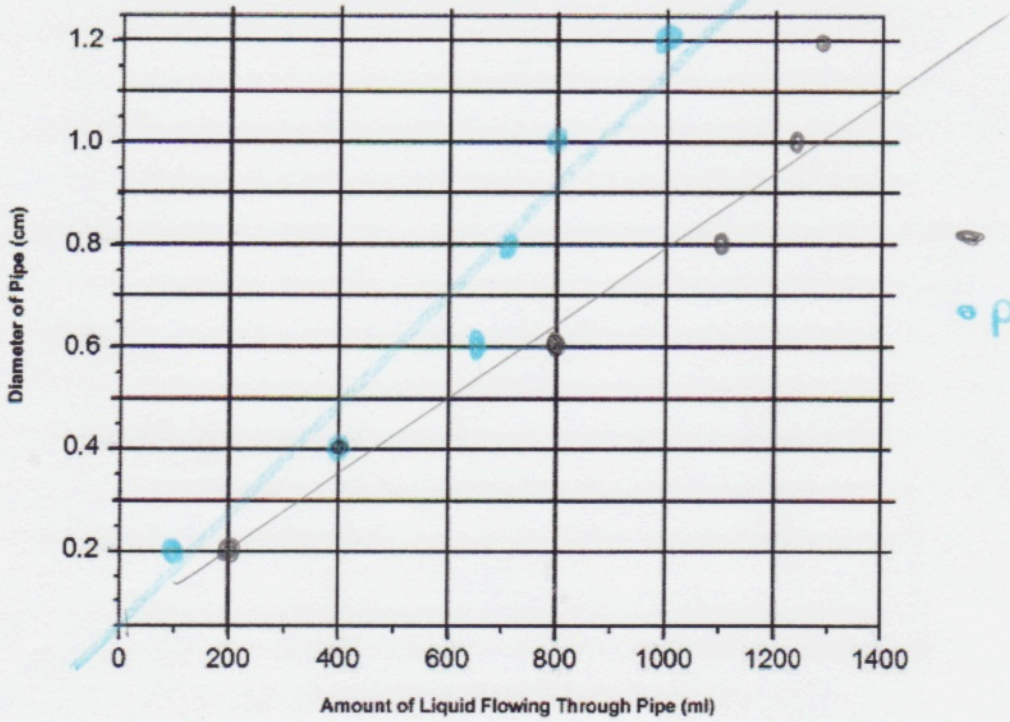
Name:_____

FLOW RATES : The following data sets show the flow of a liquid through a pipe. There are two tests shown, each testing the rate of flow of different liquids: pooponol and peepinol, as they flow though pipes of different diameters.



Data Set 1: Pooponol			Data Set 2: Peepinol	
Diameter of Pipe	Flow		Diameter of Pipe	Flow
.2	100		.2	200
.4	400		.4	400
.6	650		.6	800
.8	700		.8	1100
1.0	800		1.0	1250
1.2	1000		1.2	1275

Graphing: Use two different lines, of different colors to graph the data. Make one line for Peepinol and another line for Poopinol.



Analysis

1. At what diameter do both liquids have the same flow rate? at 0.4cm
2. Which liquid generally moves faster in the pipe (no matter what diameter)? peepinol

Extra: Peepinol has a higher VISCOSITY than poopinol. What does VISCOSITY mean?

thickness of the liquid.

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