This is BCE#2.

I recommend you print out this page and bring it to class. Click here to show a set of five BCE2 student responses randomly selected from all of the student responses thus far in a new window.

john , here are your responses to the PLE and the Expert's response.

1. Indicate the number of significant figures in each of the following measurements,

a) 50.50 mLs 84% 4 10% 3

4.82

4 sig figs...rules say a zero is significant when it is between two nonzero digits; rules say a zero is significant when a nonzero digit is to its left AND a decimal point is present.

b) 0.000300 gms 82% 3 7% 4 3% 6

3

3 sig figs...rules says a zero is NOT significant if there is no nonzero digit to its left. 0.000300 gms the numbers in black are not significant.

2. Round each of the following numbers to the indicated number of sig figs.

a) 115.4523 km (4 sig figs) 8 8.5%

115.5

115.5 Since the digit to be dropped is 5 we round the last digit retained up.

b) 2.50999 grams (2 sig figs) 95%

2.5

2.5 The digit to be dropped is less than 5 so we simply drop everything beyond the last digit retained.

c) 617,050 tons (2 sig figs) 74%

6.2e5

6.2 x 10^5 or 620,000. In cases like this it is easier to keep track of sig figs when using

scientific notation.

3. Complete the following calculations and report the answer to the correct number of significant figures,

a) 83.406 g + 18.14 g

101.55 47%

101.55 g 10% 101.546g
25% 101.5 } wrong sig fig rule
3% 101.6 }

For addition and subtraction operations the answer must be reported to the number of digits to the right of the decimal that is equal to the measurement with the least number of digits to the right of the decimal. 83.406 g has 3 digits to the right of the decimal, and 18.14 g has 2 digits to the right of the decimal, therefore the answer must have 2 digits to the right of the decimal. The sum is 101.546 g, the first digit to be dropped is a '6' so the last digit retained must be rounded up by one.

11.5% 6
53% 5
30% 4

Indicate how many significant figures are in your answer in Q3a 5

5 significant digits in the answer to Q3a. Since the operation is addition the answer can only have two digits to the right of the decimal. Those two digits and the three digits preceeding the decimal mean a total of 5 significant digits.

b) 1/0.0350 - 1/0.091 = 18 (Note: Assume the numerator (1) is an exact number in each case.) 27%

The quotient 1/0.0350 is 28.571 and 1/0.091 is 10.989. The number 0.0350 has 3 sig figs (remember the 1 is an exact number) so the quotient, 28.571 has 3 sig figs. 0.091 has two sig figs. so the quotient, 10.989 has 2 sig figs. So when we subtract our answer must be reported to the correct number of digits to the right of the decimal. Since 10.989 can only be reported to two sig figs, then our answer will not have any places to the right of the decimal. 28.571 - 10.989 = 17.582. The answer is 18.

Indicate how many significant figures are in your answer in Q3b 2

2 significant digits in the answer to Q3b. Since the last operation is subtraction the answer can only have zero digits to the right of the decimal. Only two significant digits preceed the decimal means a total of 2 significant digits.

c) $4.56 \times 10^4 + 2.5823 \times 10^2 = 4.59e4$ 40%

Convert one of the numbers so it has the same exponent as the other....$4.56 \times 10^4 + 0.025823 \times 10^4$ Adding, our result is limited by the 2 digits to the right of the

decimal, because one measurement has 2 digits to the right of the decmal and the other measurement has 6 digits to the right of the decimal. So the result is 4.585823 x 10^4. The answer can have no more digits to the right of the decimal than the measurement with the least number. In the two measurement 2 digits to the right of the decimal means the result can only have two digits, and the answer is 4.59 x 10^4.

Indicate how many significant figures are in your answer in Q3c 3

3 significant digits in the answer to Q3c. Since the operation is addition the answer can only have two digits to the right of the decimal. Those two digits and the one digit preceeding the decimal mean a total of 3 significant digits.

4) Fun with conversions....watch your significant figures! (There is a table of useful conversion on the inside back cover of your textbook.)

a) How many mLs in 2.50 gallons? 9460 mL

79% math correct
57% C ± 1 sig. fig

9.46 x 10^3 mLs

2.50 gal (4 qt/1 gal) (1 L/1.0567 qt) (1000 mL/1 L) = 9.46 x 10^3 mLs (NOTE: All coversions are exact numbers, therefore at no time will a conversion change the number of significant figures in the answer. Since 2.50 gal has 3 sig figs our answer must also have 3 sig figs).

Indicate how many significant figures are in your answer in Q4a 3

3 significant digits in the answer to Q4a. since all of the operations are multiplication and division, and every conversion is an exact number, the result can have no more or less significant digits than the initial measurement.

b) How many degrees Celsius is 103 degrees Fahrenheit? 39.4 ˚C

84% math
68% C ± 1 sig. fig

39 ˚C

˚C = 5/9(˚F - 32)

˚C = 5/9(103 - 32) = 5/9(71) = 39.44 ˚C

Indicate how many significant figures are in your answer in Q4b 3

2 significant digits. Note: 103 ˚F has no digits to the right of the decimal, so 103 - 32 has no digits to the right of the decimal. So when we take 5/9 (71) the answer has only 2 sig figs. Remember the 5/9 is an exact number and does not change the number of sig figs in the answer.

c) Molybdenum has a density of 10.22 g cm^{-3}. What is the density of molybdenum in pounds $foot^{-3}$? (Check out the discussion on pages 27 - 29 in your textbook.)

643.1 pounds $foot^{-3}$ 46% correct math
40% C ±1 sig fig

638.0 pounds $foot^{-3}$

10.22 g cm^{-3} (1 pound/454 g) (2.54 cm/1 inch)(2.54 cm/1 inch)(2.54 cm/1 inch) (12 inches/1 foot)^3 = 638.0 pounds $foot^{-3}$

Indicate how many significant figures are in your answer in Q4c 4

4 significant digits in the answer to Q4c. since all of the operations are multiplication and division, and every conversion is an exact number, the result can have no more or less significant digits than the initial measurement.

5. Is there anything about the questions that you feel you do not understand? List your concerns/questions.

nothing

6. If there is one question you would like to have answered in lecture, what would that question be?

nothing

This BCE focused on four areas: significant figures, rounding to the correct number of sgnificant figures, reporting the result of a mathematical operation to the correct number of significant digits and performing conversions and reporting the result of the conversion to the correct number of significant digits.

Here is how well the Expert thinks you have done:

Identifying the correct number of significant figures: You have identified the correct number of significant figures in Question 1b but not in Questions 1a. Be sure to look at the Experts Response.

Significant figures: Rounding to the correct number of sgnificant figures: You have correctly rounded the number in Question 2a,you have correctly rounded the number in Question 2b,and you have correctly rounded the number in Question 2c.

Reporting the result of a mathematical operation to the correct number of significant digits: You have the correct value for the sum of the two numbers in Question 3a and you have the correct number of significant figures in Question 3a.

You have the correct value for the difference of the two numbers in Question 3b and you have the correct number of significant figures in Question 3b. You have the correct value for the sum of the two numbers in Question 3c and you have the correct number of significant figures in Question 3c.

Performing conversions and reporting the result of the conversion to the correct number of significant digits: You have the correct value for the volume of the sample in Question 4a and you have the correct number of significant figures in Question 4a. You have the correct value for the temperature in degrees Celsius in Question 4b and you do not have the correct number of significant figures in Question 4b. You have the correct value for the density of molybdenum in Question 4c, and you have the correct number of significant figures in Question 4c. Be sure to check the Expert's Response on each part that you rounded incorrectly to see the rounding rule you are having difficulty with.