1) Which measurement contains a total of three significant figures?

A) 0.0100 g B) 0.01000 g C) 0.01 g D) 0.010 g

2) Which measurement contains a total of three significant figures?

A) 0.125 g B) 1,205 g C) 0.012 g D) 12,050 g

3) Which measurement has the *greatest* number of significant figures?

A) 60.6 mg B) 60,600 mg C) 606 mg D) 6.060 mg

4) Expressed to the correct number of significant figures, what is the correct sum of (3.04 g + 4.134 g + 6.1 g)?

A) 13.27 g B) 13.3 g C) 13.274 g D) 13 g

5) What is the sum of 6.6412 g + 12.85 g + 0.046 g + 3.48 g, expressed to the correct number of significant figures?

A) 23 g B) 23.0 g C) 23.017 g D) 23.02 g

6) Which quantity expresses the sum of the values below to the proper degree of precision?

2.1 g
33.566 g
12.22 g
+_____

A) 47.886 g B) 48.0 g C) 47.9 g D) 47.89 g

7) In the laboratory a student determined the atomic mass of an element to be 28.02. The accepted value is 28.086. What is the difference between the student's observed value and the accepted value, expressed to the correct number of significant figures?

A) 0.10 B) 0.07 C) 0.066 D) 0.1

8) Given: (52.6 cm)(1.214 cm)

What is the product expressed to the correct number of significant figures?

A) 63.8564 cm^2 B) 64 cm^2 C) 63.9 cm^2 D) 63.86 cm^2

9) A student determined the melting point of a substance to be 55.2°C. If the accepted value is 50.1°C, what is the percent error in the student's determination?

A) 5.10 B) 9.24 C) 10.2 D) 12.0

10) In determining the volume of a mole of gas at STP in the laboratory, a student's experimental value was 3.36 liters *greater* than the accepted value (22.4 L). The percent error contained in the student's value is *closest* to

A) 19.0 B) 25.8 C) 15.0 D) 3.36

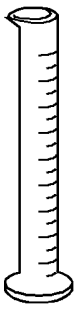
11) In a laboratory exercise to determine the volume of a mole of a gas at STP, a student determines the volume to be 2.25 liters *greater* than the accepted value of 22.4 liters. What is the percent error in the student's value?

A) 20.2% B) 24.7% C) 2.25% D) 10.0%

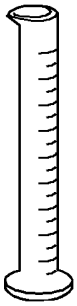
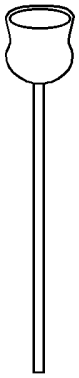
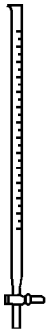
12) In an experiment, a student found that the percent of oxygen in a sample of $KClO_3$ was 42.3%. If the accepted value is 39.3%, what is the experimental percent error?

A) $\frac{3.0}{42.3} \times 100\%$ B) $\frac{42.3}{39.3} \times 100\%$ C) $\frac{39.3}{42.3} \times 100\%$ D) $\frac{3.0}{39.3} \times 100\%$

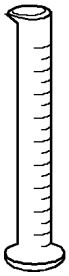
13) Which diagram below represents a pipette?

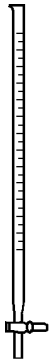
A)  B)  C)  D) 

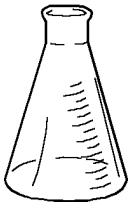
14) Which diagram represents a graduated cylinder?

A)  B)  C)  D) 

15) Which piece of glassware is used for accurately measuring volumes of an acid and a base during a titration?

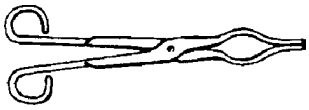
A) 

B) 

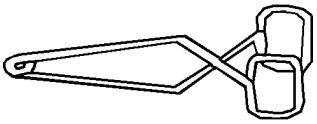
C) 

D) 

16) Which piece of laboratory equipment should be used to transport a hot crucible?

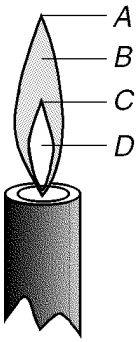
A) 

B) 

C) 

D) 

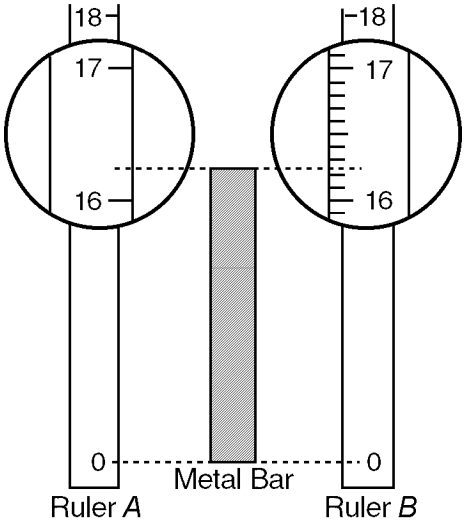
17) The diagram below shows the upper part of a laboratory burner.



What letter represents the hottest part of the burner flame?

A) *A* B) *B* C) *C* D) *D*

18) The diagram below represents a metal bar and two centimeter rulers, *A* and *B*. Portions of the rulers have been enlarged to show detail.



What is the *greatest* degree of precision to which the metal bar can be measured by ruler *A* and by ruler *B*?

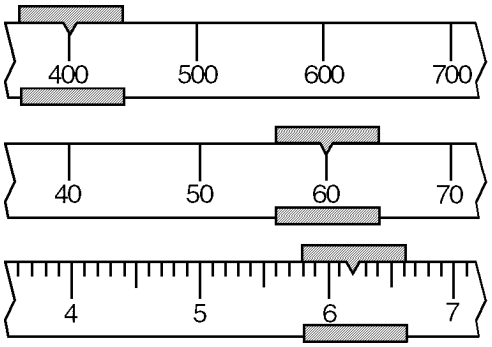
A) to the nearest tenth by both rulers

B) to the nearest tenth by ruler *A* and to the nearest hundredth by ruler *B*

C) to the nearest hundredth by ruler *A* and to the nearest tenth by ruler *B*

D) to the nearest hundredth by both rulers

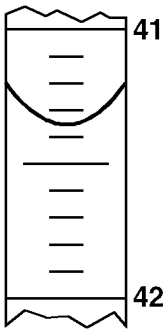
19) The diagram below represents a portion of a triple beam balance.



If the beams are in balance, with the riders in the position shown, what is the total mass in grams of the object being massed?

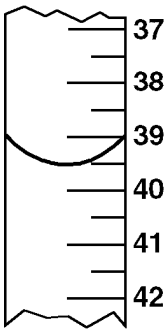
A) 466.20 B) 466.62 C) 460.20 D) 460.62

20) Which one of the following is the correct reading of the meniscus as shown in the portion of the buret below?



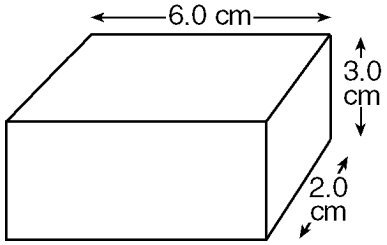
A) 42.65 mL B) 42.60 mL C) 41.35 mL D) 41.30 mL

21) The diagram below represents a portion of a buret. What is the reading of the meniscus?



A) 39.2 mL B) 40.5 mL C) 39.5 mL D) 40.9 mL

22) The solid object shown below has a mass of 162.2 grams.



What is the density of the object to the correct number of significant figures?

A) 0.2219 g/cm^3 B) 4.5 g/cm^3 C) 0.22 g/cm^3 D) 4.506 g/cm^3

23) The mass of a solid is 3.60 grams and its volume is 1.8 cubic centimeters. What is the density of the solid, expressed to the correct number of significant figures?

A) 2.0 g/cm^3 B) 2 g/cm^3 C) 0.5 g/cm^3 D) 0.50 g/cm^3

24) A student collected the data shown below to determine experimentally the density of distilled water.

Mass of graduated cylinder + distilled H_2O sample..... 163 g
Mass of empty graduated cylinder..... 141 g
Mass of distilled H_2O sample..... **?** g
Volume of distilled H_2O sample..... 25.3 mL

Based on the experimental data collected, what is the density of the distilled water?

A) 0.253 g/mL B) 1.0 g/mL C) 1.15 g/mL D) 0.87 g/mL

25) A student investigated the physical and chemical properties of a sample of an unknown gas and then identified the gas. Which one of the following statements represents a conclusion rather than an experimental observation?

A) When the gas is bubbled into limewater, the liquid becomes cloudy.

B) The gas is colorless.

C) When placed in the gas, a flaming splint stops burning.

D) The gas is carbon dioxide.

26) The process of filtration is performed in the laboratory to

A) separate dissolved particles from the solvent

B) remove water from solutions

C) form precipitates

D) separate insoluble substances in an aqueous mixture

27) As a result of dissolving a salt in water, a student found that the temperature of the water increased. From this observation alone, the student should conclude that the dissolving of the salt

A) produced an acid solution C) produced a basic solution

B) was endothermic D) was exothermic

28) The following procedures are carried out during a laboratory activity to determine the mass in grams of $CuSO_4$ in a sample of $CuSO_4 \cdot 5H_2O$.

STEP 1: Determine the mass in grams of the crucible and $CuSO_4 \cdot 5H_2O$.
STEP 2: Determine the mass in grams of the crucible and $CuSO_4$.
STEP 3: Determine the mass in grams of $CuSO_4 \cdot 5H_2O$.
STEP 4: Determine the mass in grams of the empty crucible.
STEP 5: Determine the mass in grams of $CuSO_4$.

What sequence of steps would produce the desired result using only three weighings?

A) 2,4,1,5,3 B) 4,1,3,2,5 C) 1,3,4,2,5 D) 3,4,1,2,5

29) What procedure represents the *safest* technique to use for diluting a concentrated acid?

A) Add the water slowly to the acid with steady stirring.

B) Add the acid slowly to the water with steady stirring.

C) Add the water to the acid quickly.

D) Add the acid to the water quickly.

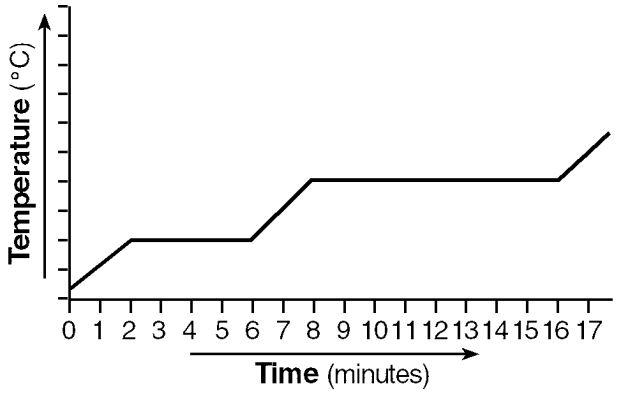
30) The table below shows the data collected by a student as heat was applied at a constant rate to a solid below its freezing point.

Time (min)	Temperature (°C)	Time (min)	Temperature (°C)
0	20	18	44
2	24	20	47
4	28	22	51
6	32	24	54
8	32	26	54
10	32	28	54
12	35	30	54
14	38	32	58
16	41	34	62

What is the boiling point of this substance?

A) 54°C B) 100°C C) 62°C D) 32°C

31) The graph below was constructed by a student to show the relationship between temperature and time as heat was uniformly added to a solid below its melting point.



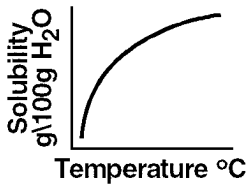
What is the total length of time that the solid phase was in equilibrium with the liquid phase?

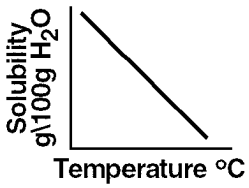
A) 10 min B) 8 min C) 4 min D) 6 min

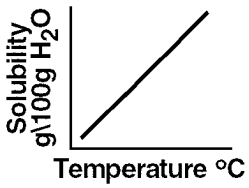
32) The following data were recorded while determining the solubility of a certain salt.

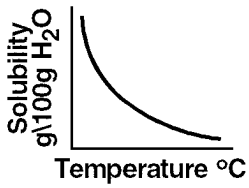
Temperature (°C)	10	20	30	40	50
Grams Solute/100. g H_2O	30	33	36	39	42

Which graph *best* represents the solubility of this salt?

A) 

B) 

C) 

D) 

33) A student calculated the percent by mass of water in a sample of $BaCl_2 \cdot 2H_2O$ to be 16.4%, but the accepted value is 14.8%. What was the student's percent error? [*Write the correct formula.*] [*Show all work.*]

34) A student determining the percent by mass of water in a sample of hydrated salt obtained the following data:

Mass of hydrate = 6.25 g
Mass of sample after 1st heating = 5.12 g
Mass of sample after 2nd heating = 5.12 g

(a) Determine the percent by mass of water in the sample. [*Show all work.*]

(b) The actual value for the percent of water in the hydrate is 17.5%. Determine the percent error in the student's investigation. [*Write the correct formula.*] [*Show all work.*]

(c) Explain why the sample was heated a second time.

35) A student determines the mass of a sample of copper to be 32.16 grams and the volume to be 3.50 mL.

(a) Calculate the density of the sample of copper. [*Write the correct formula.*] [*Show all work.*] [*Round answer to the correct decimal place and include an appropriate unit.*]

(b) The accepted value for the density of copper is 8.96 g/mL. Calculate the percent error in the student's determination. [*Write the correct formula.*] [*Show all work.*]