

**Jerusalem Science Contest 5783**  
**Environmental Sustainability and Energy**  
**Test 1 Answer Key**  
**Form – A**

Note: It has come to our attention that there were a number of errors on the first exam. After all the proofreading and typesetting, it seems that our testing software made an update causing a number of formatting errors. We apologize tremendously for this. Please be assured that we analyzed the issue, and that no student was penalized any points for a question that had errors.

No points were taken off for the following questions due to formatting errors: Form A: 11, 13, 14. Form B: 10, 14, 16, 17. Form C: 1, 7, 19, 20.

- 1) When God gave the Torah to the Jewish people at Sinai, he gave:
  - a) Only the narrative parts
  - b) Only the instructive parts
  - c) *The Written Law and the Oral Law***
  - d) The Chumash and the Nevi'im
  
- 2) What Mitzvah is taught by the verse, "בדרכיו והלכת" – "you shall walk in His ways"?
  - a) I must fulfill all of His commandments
  - b) *I must strive to emulate His attributes and deeds of kindness, mercifulness, and righteousness.***
  - c) I must go up to Jerusalem (when the Beit ha'Mikdash is standing) on each of the "shalosh regalim" – the three pilgrimage festivals.
  - d) I must give a reward to those who do good to me, and give a punishment to those who wrong me.
  
- 3) Where is the first place in the Torah where we find the concept of a sustainable world?
  - a) *The description of God's creation of reproductive plant life.***
  - b) The description of God's creation of reproductive animal life.
  - c) The description of God's creation of the water cycle (water evaporation, cloud formation, and precipitation).
  - d) God's command to Adam to master the world.
  
- 4) What potential pitfalls, if any, might there be if mankind is given mastery over the world (and is permitted to do with the world and its resources as he pleases)?
  - a) There are no potential pitfalls.
  - b) He will think that he, and not God, is the master of the world.
  - c) He will use his mastery over the world for selfish purposes and neglect his spiritual mission.
  - d) *Both b and c.***

- 5) What would be the best logical refutation of the argument that since Hashem made a sustainable world, we, too, must emulate Him and maintain a sustainable world?
- a) **Perhaps the mandate to emulate God is in His attributes of bestowing good on people, which we must certainly emulate, but not in His attribute of doing good to inanimate objects.**
  - b) We find nowhere in the Torah any aspect of sustainable practice ascribed to God, and thus it is not something we are expected to emulate.
  - c) Some of God's actions are way beyond our ability, and so we are not expected to emulate them.
  - d) Perhaps God did not create a sustainable world. Perhaps after a few thousand years, the natural world will simply no longer be able to regenerate (even without man's destructive intervention).
- 6) A scientist conducts an experiment to test her hypothesis regarding a specific question/problem. The results of the experiment suggest that her hypothesis was correct. What should be her next step?
- a) Report her results as a scientific theory
  - b) Report her results as a scientific law
  - c) **Repeat the experiment to confirm accuracy and precision**
  - d) Celebrate her success
- 7) A series of measurements is precise if:
- a) **All the measurements are approximately the same**
  - b) All the measurements are the same as the correct value
  - c) The average of all the measurements is the same as the correct value
  - d) The measurements are performed on a Friday
- 8) The distance between Green Oaks, IL and Urbana, IL is 177 miles. If I brag to you that I can make this trip in 2.21 hours by driving at a speed of 80, then what is wrong with this statement?
- a) I was speeding
  - b) **I did not include units for speed**
  - c) The speed limit on the highway is only 70
  - d) There is no way that my truck can do 80
- 9) If you have 0.03840 liters (L) of water, how many significant figures are there in this number?
- a) 3
  - b) **4**
  - c) 6
  - d) 5

10) Which of the following numbers contains 5 significant figures?

- a) 10,000
- b) 0.0074
- c) 8.0047**
- d) 0.9044

11) There are  $1 \times 10^9$  nanometers (nm) in one meter (m). In other words,  $1\text{ m} = 1 \times 10^9\text{ nm}$ . This is a definition. If green light has a wavelength of 554 nm, then what is the wavelength of green light in meters? Convert 554 nm into m!

- a)  $5.54 \times 10^9\text{ m}$
- b)  $5.54 \times 10^7\text{ m}$
- c)  $5.54 \times 10^{-9}\text{ m}$
- d)  $5.54 \times 10^{-7}\text{ m}$**

12) By definition, 1 gram (g) is equal to exactly 1000 milligram (mg). Mathematically, we can say that  $1\text{ g} = 1000\text{ mg}$ . Another way of saying this is that there is 1g *PER* 1000mg or there are 1000mg *PER* 1g. So... we can turn this relationship into a *conversion factor*. When used as a conversion factor, the number of significant figures is which?

$$\frac{1000\text{ mg}}{1\text{ g}} \quad \text{OR} \quad \frac{1\text{ g}}{1000\text{ mg}}$$

- a) Unlimited**
- b) 1
- c) 3
- d) Who cares?

13) With the correct amount of significant figures, how do we express 14,000m in scientific notation?

- a)  $1.4 \times 10^4\text{ m}$**
- b)  $14.000 \times 10^3\text{ m}$
- c)  $1.4000 \times 10^4\text{ m}$
- d)  $14 \times 10^3\text{ m}$

14) With the correct amount of significant figures, how do we express 0.03480L in scientific notation?

- a)  $3.48 \times 10^{-2}\text{ L}$
- b)  $3.48 \times 10^2\text{ L}$
- c)  $3.480 \times 10^{-2}\text{ L}$**
- d)  $3.480 \times 10^2\text{ L}$

- 15) With the correct number of significant figures, how do we express  $4.7400 \times 10^{-3}$  as a “regular number” with a decimal?
- a) 0.00047400
  - b) 0.00474
  - c) 0.000474
  - d) 0.0047400**
- 16) With the correct number of significant figures, how do we express  $6.970100 \times 10^4$  as a “regular number” with a decimal?
- a) 69,701.00**
  - b) 69,701
  - c) 6,970.100
  - d) 697,010.0
- 17) A student measured the temperature of boiling isopropanol three times, using the same thermometer. The boiling point of isopropanol is known to be  $82.5\text{ }^{\circ}\text{C}$ . The results of her experiment are shown below.

#### **Trial Boiling Point**

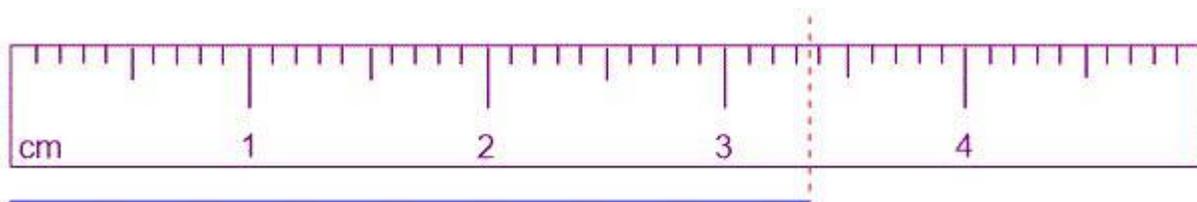
1.  $64.0\text{ }^{\circ}\text{C}$
2.  $63.8\text{ }^{\circ}\text{C}$
3.  $64.3\text{ }^{\circ}\text{C}$

#### **Average $64.0\text{ }^{\circ}\text{C}$**

Her experiment is best described as:

- a) Accurate but not precise
- b) Precise but not accurate**
- c) Both accurate and precise
- d) Neither accurate nor precise

- 18) The length of a straight line is measured by using a 5 cm ruler as shown below. To the correct number of significant figures, what is the length in centimeters of this line?

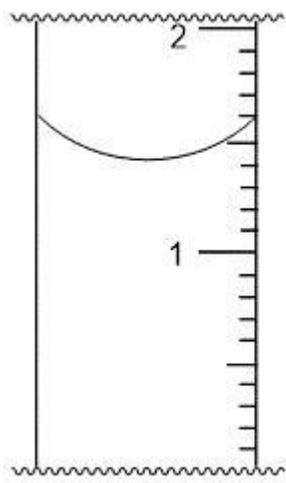


- a) 3.3 cm
- b) 3.36 cm**
- c) 3.4 cm
- d) 3.30 cm

19) By definition, there are *EXACTLY*  $1 \times 10^9$  nanometers (nm) in one meter (m). If a beam of blue light has a wavelength of 445 nm, then what is the wavelength in meters?

- a)  $4.45 \times 10^{-7} \text{ m}$
- b)  $4.45 \times 10^{-9} \text{ m}$
- c)  $4.45 \times 10^9 \text{ m}$
- d)  $4.45 \times 10^{11} \text{ m}$

20) To the correct number of significant figures, what is the volume of water in the shown partial graduated cylinder?



- a)  $1.41 \text{ mL}$
- b)  $1.4 \text{ mL}$
- c)  $1.59 \text{ mL}$
- d)  $1.6 \text{ mL}$