



Jerusalem Science Contest 5785
Nanotechnology
Test 1
Form – A answer key

1) **What is nanotechnology?**

- a) Study of large objects
- b) Technology for space exploration
- c) *Manipulation of matter on an atomic or molecular scale***
- d) Study of ecosystems

2) **What is the typical size range of nanomaterials?**

- a) *1 to 100 nanometers***
- b) 1 to 10 millimeters
- c) 1 to 100 micrometers
- d) 1 to 10 centimeters

3) **Which of the following is a common application of nanotechnology in medicine?**

- a) Wind energy generation
- b) *Targeted drug delivery systems***
- c) Food preservation
- d) Building construction

4) **What is a carbon nanotube (CNT)?**

- a) A tube made of silicon
- b) *A cylindrical nanostructure made of carbon atoms***
- c) A tube made of glass
- d) A biological cell structure

5) **Which property may be enhanced in materials due to nanotechnology?**

- a) Strength
- b) Electrical conductivity
- c) Durability
- d) *All of the above***

6) **What is a typical application of a quantum dot in nanotechnology?**

- a) To act as a catalyst in chemical reactions
- b) To serve as a fluorescent marker in biological imaging**
- c) To construct nanorobots
- d) To power electronic devices

7) **Which of the following materials is commonly used in nanotechnology for its excellent electrical conductivity?**

- a) Copper
- b) Silicon
- c) Barium
- d) Graphene**

8) **What is a primary application of nanosensors in robotics?**

- a) Enhancing the taste of food
- b) Detecting and monitoring glucose levels
- c) Improving tactile sensing and feedback**
- d) Measuring atmospheric pressure

9) **How does the surface area to volume ratio change as particle size decreases to the nanoscale?**

- a) It decreases
- b) It remains the same
- c) It increases**
- d) It fluctuates randomly

10) **Which of the following is a potential environmental concern related to nanotechnology?**

- a) Increase in soil fertility
- b) Uncontrolled release of nanoparticles into the environment**
- c) Enhanced plant growth
- d) Reduced need for fertilizers

11) **What is the primary method used to observe nanoparticles?**

- a) Light microscope
- b) Electron microscope**
- c) Ultrasonic sensor
- d) X-ray diffraction

12) **Which industry benefits from the use of nanocoatings to improve stain resistance?**

- a) Agriculture industry
- b) Food industry
- c) Textile industry**
- d) Education industry

13) What is a major challenge in the field of nanotechnology?

- a) Lack of raw materials
- b) Difficulty in controlling nanoparticles**
- c) Excessive energy consumption
- d) High production costs

14) Which term describes the process of designing materials at the molecular level?

- a) Biotechnology
- b) Nanoengineering**
- c) Microfabrication
- d) Quantum computing

15) What is the main focus of nanomedicine?

- a) Developing new surgical techniques
- b) Creating miniaturized diagnostic tools**
- c) Producing large-scale medical equipment
- d) Studying traditional herbal medicine

16) Which of the following sources is one place where the word “nano” appears in a Torah source with the same root meaning as in the English word nanotechnology?

- a) Shoftim 20:32: וַיֹּאמְרוּ בְנֵי בְנֵימִן נִגְפִים הֵם לְפָנֵינוּ כְּבָרָאשְׁנָה וּבְנֵי יִשְׂרָאֵל אָמְרוּ נְנוּסָה וַיִּתְקַנְהוּ מִן־הָעִיר אֶל־הַמְּסָלוֹת. (“And the people of Benjamin said, ‘They are beaten before us, as at first,’ but [in actuality] the people of Israel had said, ‘Nanusah, and draw them away from the city to the highways.’”)
- b) Yeshayah 30:16: וַתֹּאמְרוּ לֹא כִי עַל סוּסִים נְנוּסִים עַל כֵּן תִּנּוּסוּן וְעַל קַל נִרְכָּב עַל כֵּן יִקְלוּ רַדְפֵיכֶם. (“And you said, ‘No, but on horses Nanus.’...”)
- c) . Mishnah, Shabbos 16:5: וְנָס אֹמֵר פּוֹרְסִין עוֹר שֶׁל גְּדִי עַל גְּבֵי שִׂידָה תִּיבָה וּמַגְדֵּל שְׂאֵחַז. בַּהֲן אֶת הָאוֹר. (Rebbi Shimon ben Nanas says, “We may spread [on Shabbos] a [moist] animal hide over a box, chest, or closet that caught fire.”)
- d) Mishnah, Bechoros 7:6: הַכּוּשִׁי וְהַגִּיחֹר וְהַלְבָקָן וְהַקֶּפֶחַ וְהַנֶּנֶס וְהַחֶרֶשׁ וְהַשׁוֹטָה וְהַשְּׂכּוֹר וְבַעֲלֵי. (The kushi, the gichor, the lavkan, the kipe’ach, the nanas, the cheresh, the shoteh, the intoxicated, and those with leprous afflictions are disqualified [from performing the Temple service]....)**

17) Choose the most accurate statement according to traditional Jewish belief:

- a) . G-d created the world, and then He created the Torah as an “accessory” to help us live in the world.
- b) G-d created the Torah, and then He looked into the Torah and created the world.**
- c) G-d created the world and the Torah at the same time.
- d) The Torah is the revealed word of G-d but is unrelated to the physical world.

- 18) **According to the Rambam, what is the ideal way to fulfill the Mitzvah to love Hashem?**
- a) Spend many hours deep in meditation and prayer.
 - b) Study nothing but Torah.
 - c) Study nothing but formal science and natural science.
 - d) *Study both Torah and science.***
- 19) **What is the classical Jewish perspective on the impact of modern discoveries in nanoscience and nanotechnology on the notion of an omniscient Creator?**
- a) *Scientific discoveries continue to support, at more intricate and significant levels, the presence of a Divine wisdom.***
 - b) Scientific discoveries have eliminated the idea that there is Divine wisdom underlying the building blocks of the world.
 - c) *There remains the possibility for a person to choose either (a) or (b), so that free will is not obstructed.***
 - d) Any of the above answers is correct.
- 20) **What is a common but misleading phrase that appears in scientific literature that a Jewish student of science should be wary of?**
- a) "The data proves..."
 - b) "We do not yet know..."
 - c) *"Nature has created..."***
 - d) "Research is ongoing..."