



Jerusalem Science Contest 5785

Nanotechnology

Test 4

Form – A

Answer Key

- 1) **Which of the following fields has seen significant advancements due to nanotechnology?**
 - a) Cosmetics
 - b) Medicine
 - c) Electronics
 - d) All of the above**

- 2) **Nanotechnology has enabled the development of which of the following in the medical field?**
 - a) Targeted drug delivery systems**
 - b) Traditional antibiotics
 - c) Large-scale surgical equipment
 - d) Basic X-ray machines

- 3) **In electronics, nanotechnology is primarily used to:**
 - a) Enhance the strength of materials
 - b) Develop smaller and more efficient transistors**
 - c) Improve food packaging
 - d) Create new alloys

- 4) **Which of the following is a nanotechnology application in energy?**
 - a) Solar panels with increased efficiency**
 - b) Coal-fired power plants
 - c) Wind turbines
 - d) Hydroelectric dams

- 5) **Nanoparticles (Exosomes) are used in cosmetics because they:**
 - a) Absorb ultraviolet (UV) light more effectively
 - b) Are cheaper than traditional ingredients
 - c) Are natural delivery nanoparticles**
 - d) Reflect visible light

6) **How does nanotechnology contribute to water purification?**

- a) By breaking down large particles
- b) *Through nanomembranes that filter contaminants***
- c) By adding more chemicals to water
- d) Through heating water to boiling

7) **Which of the following is an application of nanotechnology in the textile industry?**

- a) *Stain-resistant fabrics***
- b) Cotton farming
- c) Traditional dyeing methods
- d) Large-scale textile production

8) **Nanotechnology has enabled the creation of what type of materials that are stronger and lighter?**

- a) *Nanocomposites***
- b) Concrete
- c) Iron alloys
- d) Wood

9) **In the food industry, nanotechnology is used to:**

- a) Enhance the flavor of foods
- b) *Improve food packaging for longer shelf life***
- c) Increase food production rates
- d) Reduce the cost of food

10) **Which of the following is an example of biomimicry in nanotechnology?**

- a) *Developing water-repellent surfaces inspired by lotus leaves***
- b) Creating larger computer processors
- c) Building traditional concrete structures
- d) Designing heavier materials for construction

11) **In the aerospace industry, nanotechnology is used to:**

- a) *Increase fuel efficiency through lightweight materials***
- b) Increase the size of vehicles
- c) Create less efficient engines
- d) Reduce vehicle durability

12) **How would you describe exosomes?**

- a) Nanoparticles used to enhance biofuel efficiency
- b) *Vesicles used for cell-to-cell communication***
- c) Artificial drug delivery systems
- d) Emulsifiers

- 13) **Nanotechnology in fuel cells can be used to:**
- a) ***Develop more efficient electrodes***
 - b) Eliminate the use of electricity
 - c) Reduce the cost of fuel
 - d) Decrease the weight of electrolyte
- 14) **Which of the following is a nanotechnology technique applied to tissue engineering?**
- a) Enhancing natural products in food
 - b) Creating structural colors
 - c) Imaging techniques
 - d) ***Electrospinning***
- 15) **Nanotechnology inspired by the structure of gecko feet has led to the development of:**
- a) Improved battery storage capacity
 - b) New types of magnetic materials
 - c) ***Adhesive materials that can stick to surfaces without glue***
 - d) Water purification membranes
- 16) **What issue(s) are relevant when ascertaining whether the “nano-Tanach” has the halachic status of a holy item which must be treated with respect?**
- a) Does a holy text so small that it is not visible to the eye without the means of magnification have the status of writing?
 - b) Does a holy text that was not written by a person but by a machine have the status of writing?
 - c) Does a holy text that was engraved into a surface have the status of writing?
 - d) ***Both (a) and (b).***
- 17) **From the Gemara and Tosfos in Menachos (29a-30a) we learn that in order to be a valid form of writing for halachic purposes, a letter must be of a minimum size. What is that minimum size?**
- a) It must be able to be written with ink.
 - b) ***It must be discernible to the eyes of a young child of average intelligence.***
 - c) It must be large enough that it can be seen through any instrumentation that man will invent.
 - d) It must be large enough to see when held at arm's length.

- 18) **When the Central Bank of Israel issued a banknote in 1958 with an image of a holy text and Hashem's name that was readable only through magnification, which of the following was not a halachic issue?**
- a) ***Because of the holy text and Hashem's name on the banknote, it was questionable whether it was permissible to use the banknote for ordinary (non-holy) purchases.***
 - b) Because of the holy text and Hashem's name, it was questionable whether the banknote could be brought into a bathroom.
 - c) Because of the holy text and Hashem's name, it was questionable whether the banknote could be destroyed upon cessation from circulation.
 - d) The bank directors were remiss in their responsibilities by neglecting to ask the rabbinical authorities about printing such an image on a banknote.
- 19) **In practice, which of the following rulings is the accepted Halachah?**
- a) The nano-Tanach may be brought into a bathroom only when covered.
 - b) The nano-Tanach may not be discarded into the garbage.
 - c) ***One may get dressed/undressed in front of an uncovered nano-Tanach.***
 - d) All of the above.
- 20) **In practice, which of the following rulings is the accepted Halachah?**
- a) Because of the tremendous monetary value of the nano-Tanach, it is always muktzeh "machmat chisaron kis."
 - b) The nano-Tanach is never muktzeh since it is a book whose content is certainly permitted to be read on Shabbat.
 - c) Because the nano-Tanach is nothing more than a piece of silicon crystal with no ordinary, permitted use on Shabbat, it is always muktzeh "machmat gufo."
 - d) ***If the nano-Tanach was made into a piece of jewelry, then it is not muktzeh.***