

1. In electromagnetic induction a spinning magnet (fluctuating magnetic field) induces _____ into conductive coils, which surround the magnet. S 9,10
2. The electromagnetic induction principle developed by Michael Faraday in 1831 is important to us because it helped trigger the _____ industry. S 9,10
3. James Clerk Maxwell explained Clausius' entropy as _____. S 6
4. Which of the following is one of the eight great technologies according to Burke: C10 6
5. Throughout history we have witnessed periods of lasting increases in the rate technological development. All these periodic increases are due to improved _____. C10 14
6. Power = volts x _____ C10 24
7. If the power running through a power line is 20,000 watts and the voltage is 1000 volts then what is the current in the line? C10 24
8. Identify at least 3 modern technologies dependant on glass C10 45
9. AC electricity was chosen as the preferred form of electrical power from the power plant because its _____ can easily and efficiently be changed using a _____ C10 23, 26-27
10. AC power of 100 volts and 1 ampere enters a transformer with 5 coils and exits the transformer with 25 coils. What is the exiting voltage and current? C10 26-28
11. AC can be converted into DC by passing the AC through a _____ and "smoothed" by using a _____. C10 33
. C10 33
12. Embryonic stem cells may differentiate into functional cells like : S 30
13. Sir Isaac Newton told us about gravity and gave us a simple elegant

equation to calculate it. The force of gravity is directly proportional to _____ of two objects and inversely proportional to the _____. S 1

14.



Daniel Bernoulli told us about the physics of fluids and described it mathematically telling us that $[\text{density} \times \text{velocity}^2/2] + \text{pressure} = \text{constant}$ which means fluid velocity is inversely related to its pressure. How does this principle explain the lifting movement of paper if you blow over it? S 5-6

15. Sulfur and Nitrogen oxides from coal burning combine with water in the atmosphere to form _____. C10 44

16. What topics did we discuss in biotechnology and what is the 2007 discovery providing an inexpensive, easy to use method for editing living system's DNA. S 27-32

17. Albert Einstein won a Nobel Prize in 1922 for telling us about the photoelectric effect. Which one of Burkes major technologies owes its origin to the photoelectric effect? S 12,31 & C9 21-22

18. Einstein also told us $E=mc^2$ which tells us that the _____ and _____ of an object is directly proportional and possibly interchangeable. S 13

19. Antimatter was first observed in 1955. Since then extremely small amounts have been made. When antimatter contacts matter the matter changes into _____. S 13

20. If we could convert 2 grams of matter into energy it would be equivalent to about _____ Hiroshima size atomic bombs. S 13

21. The simple act of observing or measuring a quantum particle like an atom destroys its _____. This is the basis of emerging quantum cryptography technology. S 32

22. Intel co-founder, Gordon Moore claimed that the number of _____ on a

chip could _____ every 24 months. This has since become known as Moore's Law. Is there a limit to Moore's law? C10 37

23. The N side or cathode of a solid state Si (group 4) diode could be doped with a group _____ element. C10 36

24. Electrical power loss in the transmission cable is equal to resistance x current². This electrical power is sent at very high voltage to _____. (Hint: remember power = current x volts) C10 25

25. Which of the following is **not** an option suggested by Burke to cope with the rapid technological changes we face? C10 15-19

26. In a diode electrons flow in one direction, from the _____ to the _____. C10 30-31

27. Was there inventors or scientists discussed in class which worked alone without any outside influences? C10 14

28. In a special type of solid-state diode the N side is higher energy than the P side and under forward bias current flow electrons combine with holes at the junction interface to produce _____. C10 36-38

29. The _____ is a solid-state replacement for a triode vacuum tube. These are NPN or PNP and require _____ volts across the base to allow electron flow. C10 32 & 36

30. What are the triggers for technological change according to Burke: C10 7-13

31. Graphite, diamonds, and buckminsterfullerene are all allotropes of _____ S 22-25

32. In the garden hose analogy to electricity the _____ is analogous to resistance (ohms) and the _____ is analogous to volts. C10 24

33. Nuclear fission is the _____ of an element while nuclear fusion is the _____ of small elements to make a large element. C2 21

34. The branch of technology, which deals with dimensions and tolerances of 10^{-9} meters, especially the manipulation of individual atoms or molecules is called _____. [S 26](#)
35. What are Luddites? [S 16-17 & Readings](#)
36. Early 20th century, American scientist, inventor and educator responsible for increasing the farmers' productivity and wealth. [S 18-19](#)
37. Burke believes that ordinary people are often prevented from sharing in scientific and technological discussions because they: [C10 & video](#)
38. Inventors are generally: [C10 4 and video and lecture notes](#)
39. The development of a near perfect vacuum allowed the development of: [C9 20, 26-31, C8 22, C10 30-31](#)
40. The uncertainty principle and entanglement theory are topics in _____. [S32, Readings Quantum Physics and Quantum Theory](#)
41. Light amplification by stimulated emission radiation results in concentrated _____. [C10 39](#)
42. How are communications and technological development related? [C10 14](#)
43. Why is technology changing faster now than 200 years ago? [C10 14](#)
44. Why is it difficult to predict future technological developments? [C10 7-14](#)
45. Give a unit of electrical power equivalent to J/s. [C10 24 and lecture notes](#)
46. What is the difference between fusion and fission? [C2 21](#)
47. In the simplest terms what were the motivations of A. Einstein, I. Newton, D. Bernoulli and R. Clausius which led to their discoveries? [C1 16](#)
48. What is the name of the precise gene editing system adapted from bacteria's virus defense mechanism. [S 32](#)
49. How does a light emitting diode, LED, work? [C10 38](#)
50. In fluid flow, how are pressure and velocity related? [S 3-5](#)