2008 Qual Exam Questions

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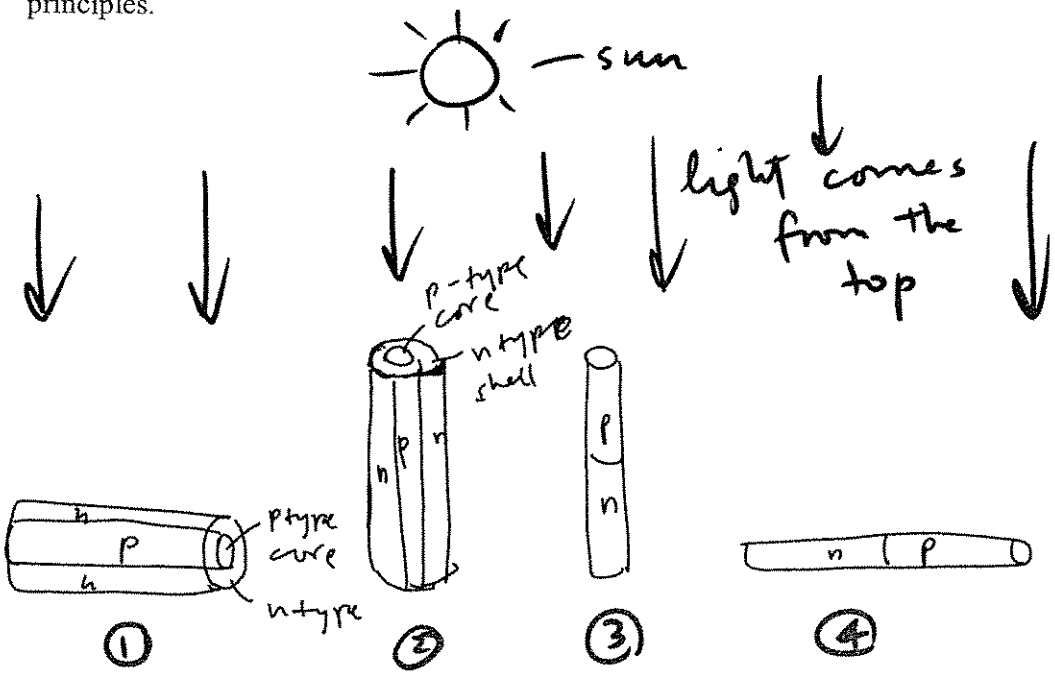
1. Tell me how a semiconductor solar cell works.
2. Show the I-V characteristics.
3. Show the band diagram of a silicon pn-junction solar cell with and without light illumination. Show where the Fermi levels are and where the conduction band and valence band is. Explain how you would determine the Fermi level.
4. Consider a semiconductor pn-junction nanowire of diameter 30 nm and about 1 um long. Which one of the following four device configurations will give you the best solar cell? Light is coming from the top. Explain your answers using device physics principles.



5. If you are allowed to change the device configuration, how would you change it to improve this solar cell?