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## *The Magic of Ceramics -- Study Guide, Chapter 5*

1. What is a compressive stress?
2. What is a tensile stress?
3. Explain why ceramics are strong in compression and weaker in bending or tension.
4. What is silicon nitride?
5. What are some uses for gas turbine engines?
6. Why is silicon nitride tougher than most other ceramics?
7. What is an advantage of silicon nitride cutting tools?
8. What is the key function or purpose of a bearing?
9. What improvements do silicon nitride bearings provide compared to metals?
10. What is zirconia?
11. Explain the meaning of the term “toughness”.
12. How is toughness increased in a ceramic?
13. What are some uses (products) of transformation-toughened zirconia?
14. What are the purposes or functions of the **fibers** in a composite such as fiberglass?

15. What are the purposes or functions of the **matrix** in a composite such as fiberglass?
16. What are some applications of fiberglass?
17. When were composites with carbon fibers reinforcing epoxy developed?
18. What are some important applications?
19. Polymer matrix composites only have low temperature capability. What materials are used to make composites with high temperature capability?
20. What temperatures can some ceramics withstand? Give a couple examples.
21. Explain the meaning of the term “thermal expansion”.
22. Explain why Hale believed glass would be a better material for the mirrors of very large telescopes.
23. How long did it take to build the 200-inch Palomar telescope?
24. Why did it take so long?
25. Launching a large telescope into orbit was a difficult challenge. What were a couple of the key innovations that made the Hubble Telescope possible?