

Applied Physical Science - West Point Bridge Project Quiz - Structural Testing

Name: _____

Section 1 - Definitions (2 pts each)

Define each of the following terms:

1. Structural Member

2. Load

3. Tension

4. Compression

5. Yield

6. Rupture

7. Brittle

8. Ductile

9. Buckling

10. Failure

Section 2 - Short Answer - Answer each in complete sentences. (4 pts each)

11. What is meant by the "cross section" of a structural member?
12. In our bridges, we used two different types of structural members. What were they, and what types of load were they designed to carry?
13. Is cardboard (manila file folder material) ductile or brittle? How do you know?
14. What does it mean for a structural member to "fail?" (Hint: Can failure mean different things?)
15. What is the difference between "yield strength" and "ultimate strength?"
16. What is the difference between "elastic deformation" and "plastic deformation?"
17. Does the tensile strength of a structural member depend on the member's length? How do you know this?
18. Does the compressive strength of a structural member depend on its length? How do you know this?
19. Give two examples of everyday materials that are considered ductile.
20. Give two examples of everyday materials that are considered brittle.

Section 3 - Challenging Questions (10 pts each)

21. In the lab you performed tensile testing on 9 bars, ranging from 4mm in width to 9mm in width. You made a load-deformation graph to represent your testing data. Print out this graph, and submit it as your response to this question. Make sure the graph is appropriately titled and labeled.
22. In the lab you performed compression testing on 9 beams (tubes), with a 6mm x 10mm cross section, ranging from 5cm in length to 16cm in length. You made a graph showing the relationship between compressive strength and member length. Print out this graph, and submit it as your response to this question. Make sure the graph is appropriately titled and labeled.
23. Explain/show how the graphs you made for questions 21 and 21 could be used in the design of a new model bridge.
24. Explain/show how the testing machine works. Discuss how/why the amount of force input at one end of the machine was doubled at the location of the structural member.