

Name: Answer Key

Date: _____

Class: _____

SCIENCE 7

Structures & Forces

PRACTICE EXAM

PART A - MULTIPLE CHOICE

Circle the letter of the best answer. One mark each.

1. All of the following is considered a structure except
 - a. eagle's wings
 - b. leaves of trees
 - c. air
 - d. scuba fins

2. Structures not constructed or made by people are classified according to their origin as
 - a. frame
 - b. shell
 - c. natural
 - d. manufactured

3. This type of structure is usually formed from a solid piece and has little to no space inside. This type of structure is called _____ structure.
 - a. mass
 - b. shell
 - c. manufactured
 - d. frame

4. A bridge would be classified as a _____ structure.
 - a. frame
 - b. shell
 - c. mass
 - d. natural

5. Domes and cups can be classified according to their design as _____ structures.
- a. mass
 - b. shell
 - c. natural
 - d. frame
6. All of the following can be classified under the same type of structure according to their design except
- a. hockey puck
 - b. canoes
 - c. cement parking barrier
 - d. tree trunk
7. All of the following are characteristics of a frame structure except
- a. more massive than other forms of structures
 - b. large volume of empty space
 - c. made up of fastened parts
8. _____ is the use or purpose of a structure.
- a. Design
 - b. Function
 - c. Shape
 - d. Materials

9. The limit within which a structure's safety performance is considered acceptable is called

- a. aesthetics
- b. materials
- c. function
- d. margin of safety

10. Which of the following contains a mobile joint?

- a. metal nails holding two boards together
- b. a beam resting on a column supporting the floor
- c. the hinges on a door
- d. bricks cemented together with mortar

11. A large lamp on a chain, suspended from the ceiling of a house, began to fall when the chain snapped. Which property of the chain failed?

- a. the shear strength
- b. the compressive strength
- c. the tensile strength
- d. the torsion strength

12. Metal fatigue is when

- a. a structure collapses
- b. using bolts as fasteners
- c. a metal is weakened due to stress
- d. two or more metals mixed

13. Often the first part of a structure to break under stress is

- a. a joint
- b. a column
- c. a beam
- d. an arch

14. A squeezing force is

- a. tension
- b. compression
- c. torsion
- d. shear

15. A stretching force is

- a. tension
- b. compression
- c. torsion
- d. shear

16. In comparing a bird to a hang-glider, the bird is a

- a. completely different design
- b. manufactured structure
- c. frame structure
- d. natural structure

17. Which shape is the most rigid?

- a. a square
- b. a circle
- c. a rectangle
- d. a triangle

18. An example of a rigid joint is a

- a. chair leg
- b. knee
- c. hinge
- d. clam shell

19. An egg is like

- a. a triangle
- b. a frame structure
- c. a brace
- d. a shell structure

20. The most important stone in an arch is the

- a. cornerstone
- b. keystone
- c. centerpiece
- d. bottom stone

21. Which type of material failure occurs when you twist the lid of a tin can back and forth?

- a. Torsion
- b. Compression
- c. Shear
- d. Tension

22. Which of the following can be considered dead load?

- a. A chair with someone sitting in it
- b. Snow
- c. Empty desk
- d. Wind

23. Which of the following statements is true?

- a. Balance can be used to measure weight.
- b. Mass is measured in newtons.
- c. Mass is measured with a balance
- d. Gravity does not affect weight.

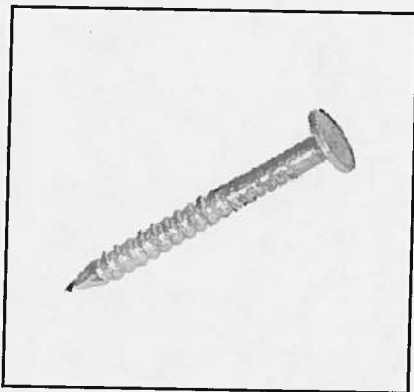
24. Concrete has great compressive strength but poor tensile strength. Steel has great tensile strength but poor compressive strength. By combining the two materials together, manufacturers produce a building material that is both strong enough and flexible enough to use in large projects. Which of the following terms appropriately describes this reinforced concrete?

- a. compound material
- b. combined material
- c. composite material
- d. mixed material

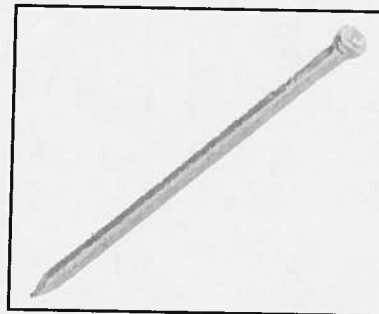
25. You are hired by a contractor to help frame a house. On your first day, you want to impress everyone with your understanding of design. You tell the contractor that frames that are weak in the middle can be stabilized by _____.

- a. bracing the middle of the beam
- b. supporting the load by an arch
- c. adding a cantilever
- d. A, B, and C

Ring Nail



Finishing Nail



26.. Friction occurs when the surfaces of two or more things come into contact with each other. Why would a ringed nail provide more friction than a finishing nail of the same size?

- a. The finishing nail is made from a lighter material.
- b. The ring nail penetrates the wood more deeply than the finishing nail.
- c. The ring nail has more surface area in contact with the wood.
- d. The ring and finishing nails will provide the same amount of friction.

27. Why is it important that foundation walls extend into the soil layers that never freeze?

- a. The freezing will not let the concrete harden.
- b. The freezing and thawing will cause the soil to contract / expand and fall away.
- c. The foundation must always be kept warm to maintain its strength.
- d. The metal reinforcement in the foundation will break if frozen.

28. Why do frame structures have multiple vertical supports in the walls?

- a. to make construction easier
- b. to better distribute the load
- c. to add weight to the structure
- d. to prevent shearing of the wall

29. How is the load distributed in the arch shown here?



- a. down and out to the sides
- b. up and into the middle
- c. down and into the middle
- d. up and out to the sides

30. This diagram shows a bridge that is based on what type of structure?



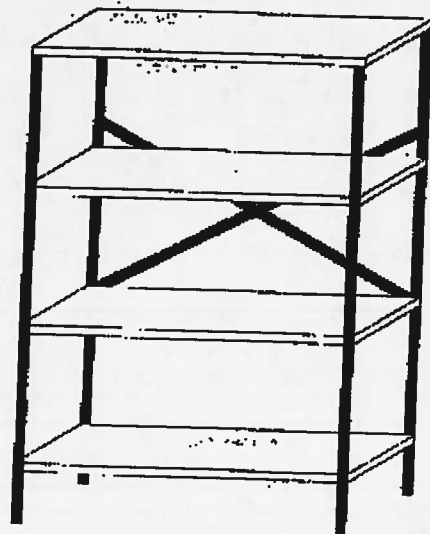
- a. a column
- b. a cantilever
- c. an arch
- d. a buttress

Use the following information to answer the next question

Mary is helping her mother assemble a set of kitchen shelves that consists of four posts, four shelves, and two metal straps that cross over each other on the back. Her mother understands the purpose of the posts and shelves, but is not sure why the straps are needed.

31. The straps are needed because they

- a. help hold up the second and third shelves
- b. hold up the shelves
- c. add more weight to the back so the shelves don't fall forward
- d. make the structure more rigid



32. What is the name used to describe a push or pull on a structure?

- a. load
- b. force
- c. weight
- d. mass

33. Bending involves two types of stresses these are

- a. tension and compression
- b. torsion and tension
- c. torsion and shear
- d. shear and compression

34. A Ferris wheel is an example of a

- a. natural, frame structure
- b. manufactured, shell structure
- c. natural, mass structure
- d. manufactured, frame structure

35. Which of the following would *not* be an aesthetic consideration for the tennis racquet?

- a. color
- b. logo design
- c. string tension

36. One instrument that can be used to measure weight is a(n)

- a. electronic balance
- b. spring scale
- c. equal arm balance
- d. triple beam balance

37. Which internal force would be involved in stabilizing a telecommunications tower that is held in place by guide wires (diagonal cables)?

- a. tension
- b. compression
- c. torsion
- d. shear