**CHAPTER 9 REVIEW:**

**Product Development**

(TEXT PAGES 208-229)

**Matching**

Directions: Match each item in the left-hand column with the correct description from the right-hand column. Write the letter of the correct description in the space provided. Note: Some descriptions will not be used. No description will be used more than once.

| 1. standardization | A. The amount a part can vary from specified design size and still be used |
| 2. concurrent engineering | B. Reducing the number of different size parts in a product |
| 3. prototype | C. Three-dimensional non-working model of a proposed product |
| 4. mock-up | D. A basic unit |
| 5. tolerance | E. Parts are made exactly like one another so that any of them will fit the product |
| 6. interchangeable parts | F. Setting a uniform or common size for certain parts |
| | G. A drawing that gives all the information needed to make a part |
| | H. A full-size working model |
| | I. Engineering approach in which all phases of a product's life cycle are considered |

**True-False**

Directions: On the line beside each statement, write True if the statement is correct or False if the statement is incorrect.

1. Research done to solve a problem is called basic research.
2. A product's life cycle may last anywhere from a few months to several years.
3. During the growth stage of a product's life cycle, the price usually goes up.
4. Only about one of sixty new product ideas is good enough to be developed into a new product.
5. Building prototypes helps plan the manufacturing processes that will be used to produce the product.
6. Engineering involves predicting the future behavior of materials and systems.
7. Structural elements are the working parts of the product.
Multiple Choice

Directions: In the space at the left, write the letter of the choice that BEST completes the statement or answers the question.

14. It is the __ who decides from what materials a product will be made.
A. manufacturing manager
B. product designer
C. research and development department
D. product engineer

15. A __ is a kind of diagram that shows the position of parts in a system.
A. rendering
B. mock-up
C. schematic drawing
D. detail drawing

16. Which of the following is not an example of functional design considerations?
A. fasteners, like rivets and screws
B. interchangeability of parts
C. materials to be used
D. engine type and size

17. When a new design idea is presented to management, the managers consider . . .
A. how easy or difficult manufacturing will be.
B. manufacturing costs.
C. how well the product will sell.
D. all of these.

18. The process of finding the most functional, yet lowest cost, material for every part of a product is called . . .
A. research and development.
B. value analysis.
C. functional analysis.
D. product engineering.

19. Most ideas for new products come from . . .
A. individuals who sell them to manufacturers.
B. product designers.
C. product engineers.
D. R & D departments.

20. Which of the following cannot be done using a computer?
A. analyze a product's design before any parts are made
B. make a working drawing
C. make a mock-up
D. perform a value analysis

21. Analyzing a prototype to see if it works as predicted is called . . .
A. structural analysis.
B. functional analysis.
C. value analysis.
D. failure analysis.

22. Which of the following is not included on a detail drawing?
A. dimensions
B. location of holes
C. parts list
D. tolerances

23. A product that can be varied by adding certain basic units, such as a car body that can be equipped with a 4-, 6-, or 8-cylinder engine, is an example of . . .
A. interchangeability of parts.
B. modular design.
C. design for assembly.
D. standardization.

24. A(n) __ drawing shows parts in their proper places and how they fit together.
A. detail
B. schematic
C. thumbnail
D. assembly

25. Using clips instead of nuts and bolts to hold parts together is an example of . . .
A. simplification.
B. modular design.
C. design for assembly.
D. functional design.