



**Introduction to Engineering  
Design  
Final Examination**

**Part A**

**Spring 2009  
PRACTICE EXAM**

**Student Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Class Period:** \_\_\_\_\_

Total Points: \_\_\_\_\_/40

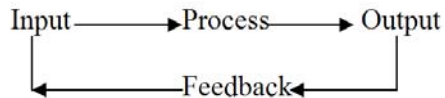
Converted Score: \_\_\_\_\_/50

## Part A - Multiple Choice

**Directions:** This is a **CLOSED-BOOK/CLOSED-NOTES** exam. Select the letter of the response which best completes the item or answers the question.

- Who is responsible for designing most products used in today's society?
  - Technicians
  - Engineers
  - Carpenters
  - Presidents of corporations
- \_\_\_\_\_ is a step in the design process that involves reassessing the design specifications, implementing modifications, and updating drawings.
  - Conceptualization
  - Optimization
  - Development and implementation
  - Design Analysis

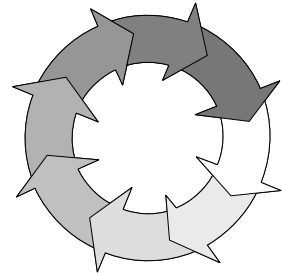
- Which of the following is represented by the diagram to the right?



- Constraint boundaries
  - Open Loop System
  - Closed Loop System
  - Serendipity cycle
- What engineering method uses a logical sequence of steps that begins with a specific problem, or perceived need, and results in a solution?
    - Data collection
    - Innovation
    - Brainstorming
    - Design process

- What principle of design involves a gradual change from one feature of the design to another?

- Subordination
- Transition
- Repetition
- Proportion



- What principle of design is being considered when sketching a bicycle tire in relationship to the size of its frame?

- Proportion
- Repetition
- Unity
- Subordination

- A(n)\_\_\_\_\_ is a list of the topics covered in someone's written work.

- appendix
- table of contents
- biography
- glossary

8. An organized collection of your best work during a class or major project is called a(n)\_\_\_\_\_.

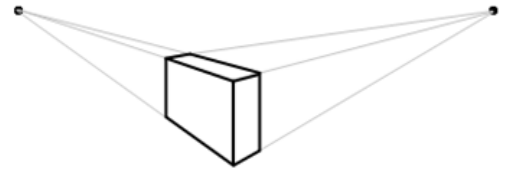
- A. design diary.
- B. engineering notebook.
- C. portfolio.
- D. experience log.

9. What type of line is used in an orthographic sketch to project the size of an object from one view to another?

- A. Section Line
- B. Object Line
- C. Construction Line
- D. Extension Line

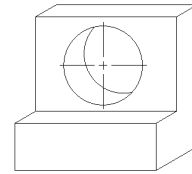
10. Identify the sketch type shown to the right.

- A. Cavalier Oblique
- B. Isometric
- C. Two point perspective
- D. Cabinet Oblique



11. What 3-dimensional sketch is drawn true size in its height and width but foreshortened in its depth, as illustrated to the right?

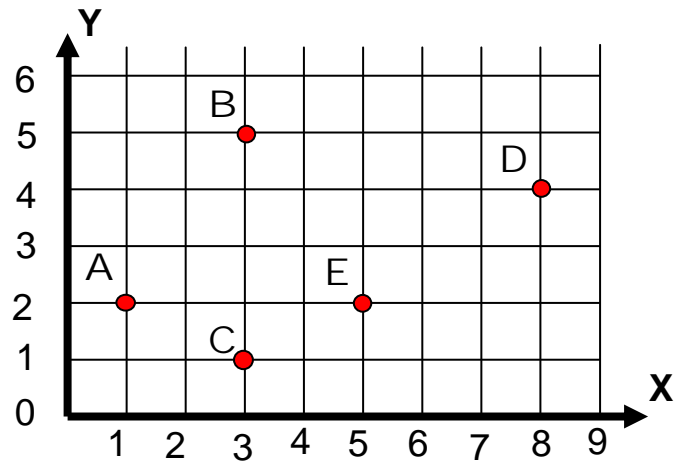
- A. Cavalier Oblique
- B. Isometric
- C. Two-point perspective
- D. Cabinet Oblique



12. A line touching an arc or circle at only one point perpendicular to the arc's radius is said to be \_\_\_\_\_.

- A. tangent.
- B. coincident.
- C. parallel.
- D. concentric.

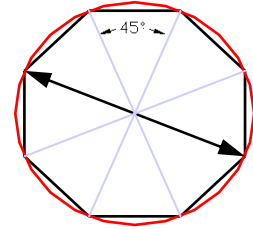
13. What are the relative coordinates of **POINT D** if moving from Point B?



- A. (8, 4)
- B. (5, -1)
- C. (1, -5)
- D. (4, 8)

14. What type of polygon does the adjacent picture represent?

- A. Acute
- B. Circumscribed
- C. Obtuse
- D. Inscribed



15.  $a^2+b^2=c^2$  is an example of \_\_\_\_\_.

- A. computer modeling.
- B. graphical modeling.
- C. mathematical modeling.
- D. conceptual modeling.

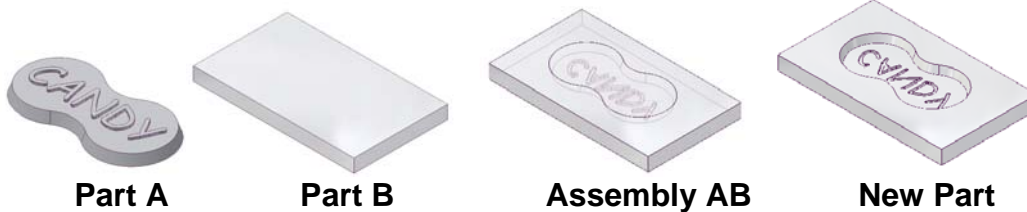
16. \_\_\_\_\_ are created by blending two or more unconsumed, closed profile sketches located on work planes or planar faces.

- A. Swept features
- B. Lofted features
- C. Coiled features
- D. Revolved features

17. \_\_\_\_\_ is a type of modeling that helps to define the scope and limitations of the design problem before significant time is invested in the development of a prototype.

- A. Conceptual modeling
- B. Physical modeling
- C. Mathematical modeling
- D. Graphical modeling

18.



The process for making the candy mold shown above illustrates how to create a(n) \_\_\_\_\_ using 3D solid modeling software.

- A. adaptive part
- B. lofted part
- C. grounded part
- D. derived part

19. In computer modeling, the process of drawing lines, circles, arcs, and rectangles to create the basic profile that defines the approximate size and shape of features in a part is referred to as \_\_\_\_\_.

- A. dimensioning.
- B. profiling.
- C. sketching.
- D. extruding.

20. Placed features such as \_\_\_\_\_ and \_\_\_\_\_ are edge treatments applied to a 3D solid model.

- A. emboss, engrave
- B. fillet, chamfer
- C. rib, web
- D. draft face, thicken

21. A \_\_\_\_\_ is a full-size, physical model that is functional and can be tested.

- A. concept model
- B. scale model
- C. mock up
- D. prototype

22. Work planes that are created parallel to an existing surface and a specified distance away from that surface are referred to as:

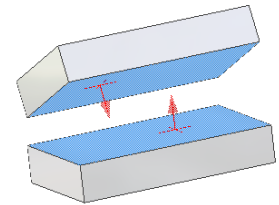
- A. offset work planes.
- B. angled work planes.
- C. oblique work planes.
- D. auxiliary work planes.

23. When a group of parts is preassembled and brought into a larger group of parts as a single unit, they are referred to as \_\_\_\_\_.

- A. Exponential Components.
- B. Sub Assemblies.
- C. Mathematical Modes.
- D. Subsystems.

24. If a **single** mate constraint is applied between two opposing surfaces in an assembly, how many degrees of freedom will remain between the two parts?

- A. 1
- B. 2
- C. 3
- D. 4



25. The simulated movement of assembled parts through a variety of specified steps is accomplished using which of the following:

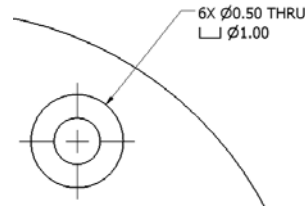
- A. Degrees of Freedom
- B. Unconstrained Move
- C. Drive Constraints
- D. Rotate Component

26. What is the maximum number of bike frames you could ship in one box, at one time, if the postal service has a twenty pound weight limit per package? The bike frame has the following mass properties:  
mass = 5.67lbs; volume = 58.35 in<sup>3</sup>; and area = 121.87 in<sup>2</sup>.

- A. One
- B. Three
- C. Five
- D. Seven

27. What is the permissible amount a dimension can vary during the manufacture of a part and have the part still be useable?
- A.** Tolerance range
  - B.** Dual dimension
  - C.** Fluctuation
  - D.** Acceptability
28. Which of the following terms describes the minimum clearance space (or maximum interference) intended between two mating parts?
- A.** Tolerance
  - B.** Offset
  - C.** Micro measurement
  - D.** Allowance
29. One purpose of hatch marks or section lines in an orthographic drawing is to show\_\_\_\_\_.
- A.** material.
  - B.** texture.
  - C.** dimensions.
  - D.** finish.
30. A cutting plane is needed to create which of the following views in an orthographic drawing?
- A.** Auxiliary View
  - B.** Isometric View
  - C.** Detail View
  - D.** Section View
31. When creating an assembly in 3D modeling software that includes a base plate, cover, nut, and bolt, which component would typically be placed first?
- A.** Base Plate
  - B.** Cover
  - C.** Nut
  - D.** Bolt
32. Which drawing view would be the most appropriate to use if an important feature of a part was too small and complex relative to the total part size?
- A.** Section View
  - B.** Auxiliary View
  - C.** Detail View
  - D.** Isometric View
33. Which drawing view would be necessary when the interior parts of an object are complex and not clearly visible from any view?
- A.** Auxiliary View
  - B.** Detail View
  - C.** Isometric View
  - D.** Section View
34. Which of the following views would be needed to show the actual shape and size of an inclined surface?
- A.** Auxiliary View
  - B.** Isometric View
  - C.** Section View
  - D.** Orthographic View

35. What information is missing from the following annotation of the counterbored hole?



- A.** Hole depth
- B.** Hole diameter
- C.** Counterbore depth
- D.** Counterbore diameter
36. What guideline should be followed for creating slides using a presentation software, such as PowerPoint®, to communicate your design idea to an audience?
- A.** Create slides with contrasting colors
- B.** Use Times New Roman, 12 point font
- C.** Use varied slide transitions and many sound effects
- D.** Match the text color with the slide background
37. What type of inexpensive, physical model could be used in a classroom presentation?
- A.** Inventor part
- B.** Rapid prototype
- C.** Wire-frame
- D.** Mock-up
38. \_\_\_\_\_ is a department within a company that develops new products or redesigns existing products.
- A.** Concurrent Engineering
- B.** Rapid Prototyping
- C.** Research and Development
- D.** Human Resources
39. The production process known as \_\_\_\_\_ is when products/materials arrive at the manufacturing facility and are used right away without the need for long warehousing time.
- A.** **CE** Concurrent Engineering
- B.** **JIT** Just in Time
- C.** **TQM** Total Quality Management
- D.** **RE** Reverse Engineering
40. What data collection process is used to determine how much money is needed to design, manufacture, package and distribute a product?
- A.** Cost analysis
- B.** Monetary allocation
- C.** Research and development
- D.** Financial spreadsheet