

National Exams December 2015

04-BS-15, Engineering Graphics & Design Process Three-hour duration

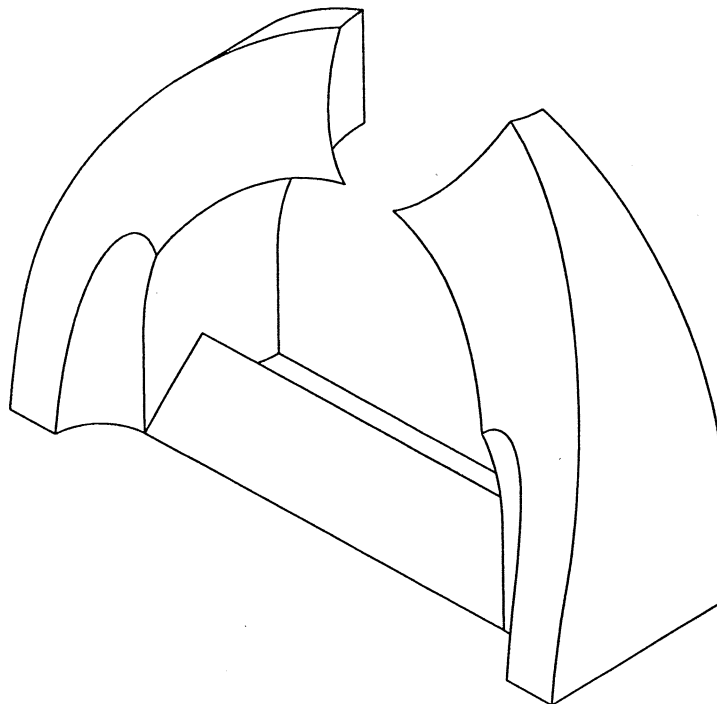
Notes

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. This is a closed book examination. Candidates may use one of two calculators, the Casio or Sharp approved models.
3. Aids allowed:
 1. Straight edge
 2. Engineering squares or rolling ruler
 3. Pencil and eraser
 4. Engineering scale
 5. Protractor
 6. Compass
4. Ten (10) questions constitute a complete exam paper. Clearly label the answers in the answer book.
5. All questions are of equal value.
6. Failure to follow the above directions will result in grade penalties.
7. All questions have a grading rubric attached. The rubric (with headings criterion and grade) is a guideline that will be used to assign marks and penalties.
8. All sketches must be made freehand and must be easy to read and neat.

Examination Questions

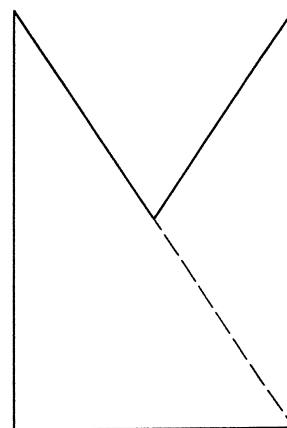
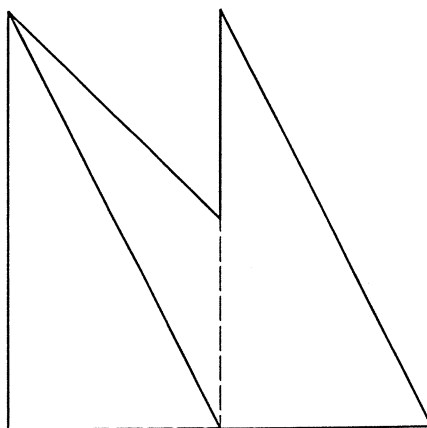
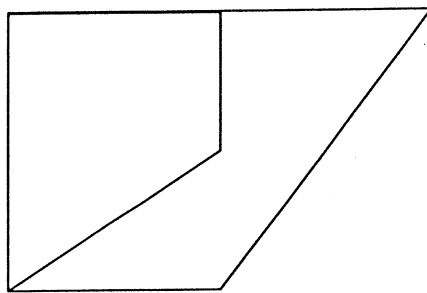
1. Shown below is an isometric pictorial of a single component. Sketch or draw an orthographic projection of the component. Select and position principal views as necessary. Use common Canadian (CSA/ANSI) conventions and practices. Do not dimension. All holes are through.

| Criterion | Grade |
|----------------------------|--|
| Selection of Views | 3: Minimum necessary views 2/1: More views present than necessary 0: Missing views |
| Adherence to conventions | 3: Flawless 2: Minor omissions 1/0: Incorrect application of conventions |
| Correctness of projections | 4: Flawless 3: Minor errors 2: One or more significant omissions 1/0: Part cannot be manufactured |



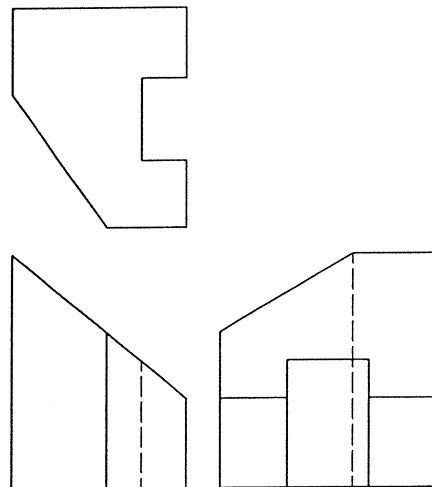
2. Sketch an isometric pictorial of the following orthographic projection. Sketch. Do not draw. Do not use a straight edge.

| Criterion | Grade |
|---------------------------|--|
| Isometric pictorial | 4: Correct angles of horizontal lines 3: Near correct angles of horizontal lines 0: Not an isometric pictorial |
| Correctness of projection | 4: Flawless 3: Minor errors 2: One or more significant omissions 1/0: Part could not be manufactured |
| Penalties | -10: Use of a straight edge |



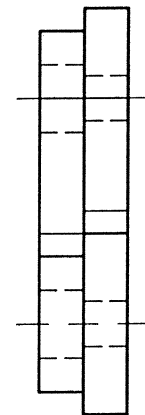
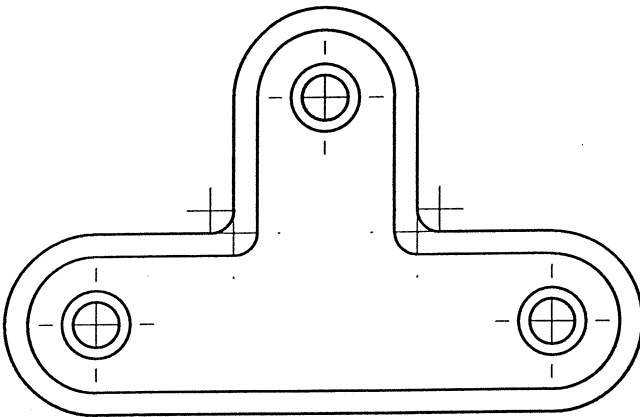
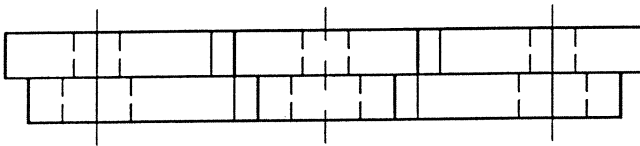
3. Draw the oblique face(s) of the below component in true shape. Show all work. Clearly label the auxiliary view. Complete the answer in the space provided below.

| Criterion | Grade |
|----------------------------|--|
| Selection of views | 2: Correct auxiliary view(s) |
| Adherence to conventions | 3: Flawless 2: Minor omissions 1/0: Incorrect application of conventions |
| Correctness of projections | 4: Flawless 3: Minor flaws 0: True shape not obtained |



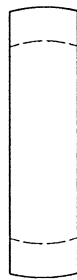
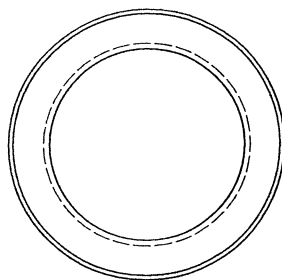
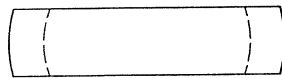
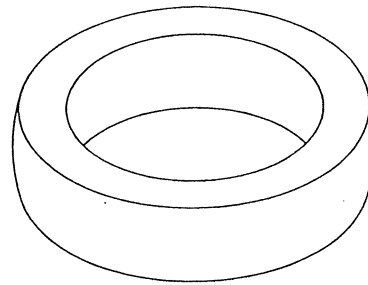
4. Fully dimension the follow orthographic projection using Canadian conventions (CSA/ANSI) in inches. The component is drawn in half scale. Complete the answer on the drawing provided.

| Criterion | Grade |
|--------------------------|---|
| Drawing | 10: dimensioned figure |
| Dimensioning | -1 per unnecessary dimensions -1 per missing dimension |
| Adherence to conventions | -1 per error |



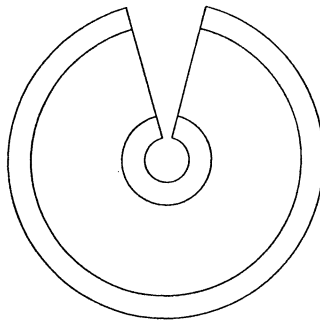
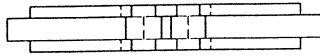
5. Sketch the steps that could be used to construct the following object using only primitives (i.e., cubes, with rectilinear prisms, spheres, cones, tori, and cylinders) and Boolean operations (i.e., union, difference, and intersection). The shown orthographic and isometric projections are of the same object.

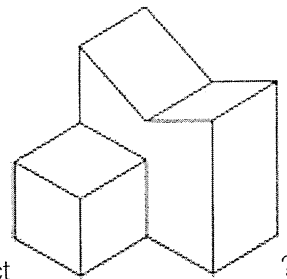
| Criterion | Grade |
|---------------------|---|
| Overall correctness | 10: flawless description of steps to reproduce object 8: minor errors 4: object could not be reproduced |



6. Sketch an appropriate section view for the following component.

| Criterion | Grade |
|----------------------------|---|
| Selection of section view | 3: Correct 2/1: Wrong type of section view 0: Inappropriate |
| Adherence to conventions | 3: Flawless 2: Minor omissions 1/0: Incorrect application of conventions |
| Correctness of projections | 4: Flawless 3: Minor flaw 2: One or more significant omissions 1/0: Part could not be manufactured |



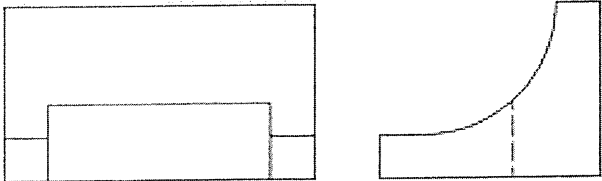


7. Which of the following is a third angle projection of the object

- A.
- B.
- C.
- D.

E. None of the above are third angle projections.

8. Which of the following top views belongs to the given front and side view?



- A.
- B.
- C.
- D.

9. For the design of a simple part such as the door latch pictured on this page, list the stages of the design process from the initial problem statement to the final drawings. Explain each step using the door latch. State your assumptions.



| Criterion | Grade |
|--------------|-------|
| Stages | 5 |
| Explanations | 5 |

10. For three of the five following terms write a paragraph explaining the term and providing an example.

- A. Requirement
- B. Specification
- C. Functional analysis
- D. Constraint
- E. Objective

| Criterion | Grade |
|------------------|--|
| Correct English | -1/2 per error |
| Explanation (x3) | 3: Clear and concise 2: Minor flaws 1: Difficult to understand |
| Example (x3) | 1: Clear and concise |