

National Exams May 2011

04-BS-15, Engineering Graphics & Design Process

3 hours duration

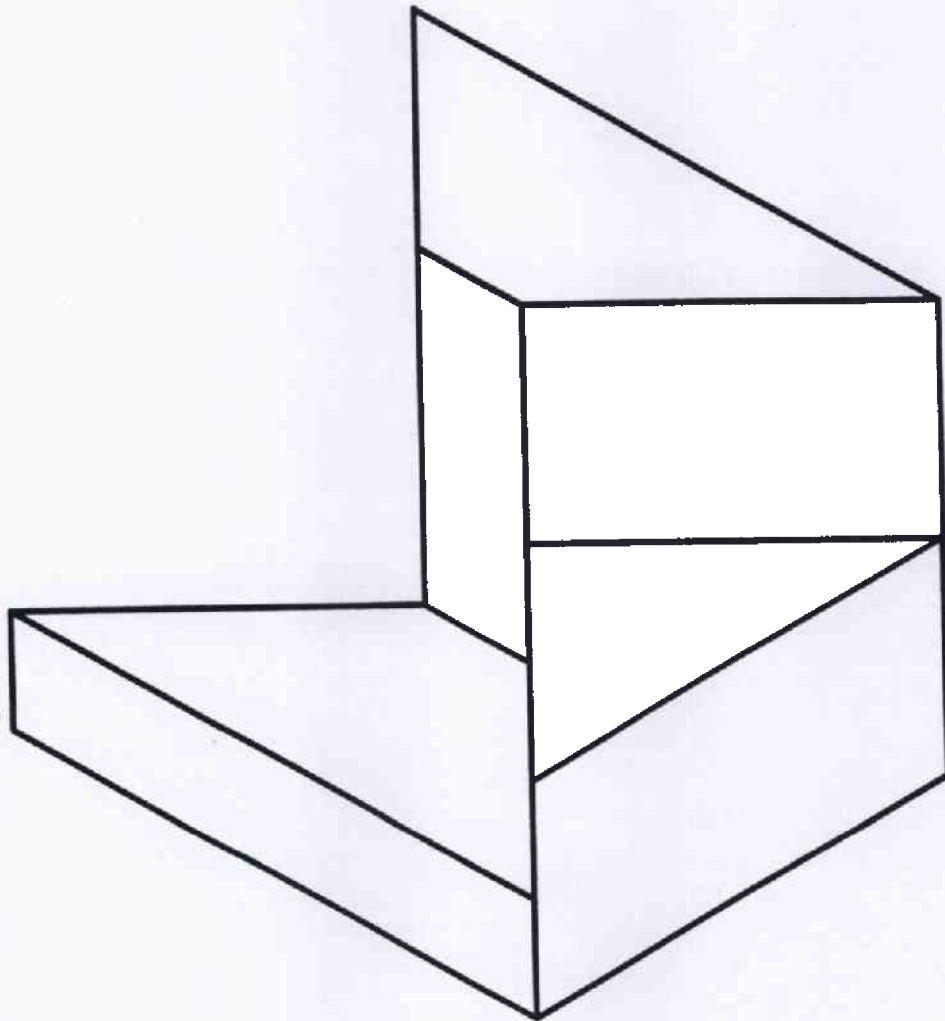
NOTES

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:
 - a. Straight edge
 - b. Engineering squares or rolling ruler
 - c. Pencil and eraser
 - d. Engineering scale
 - e. Protractor
 - f. 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 the headings *criterion* and *grade*) is a guideline that will be used to assign marks and penalties.
8. All sketches must be made freehand (without use of any aids) and must be easy to read and neat. Drawings should be made with a straight edge and any other allowed aid.

EXAMINATION QUESTIONS

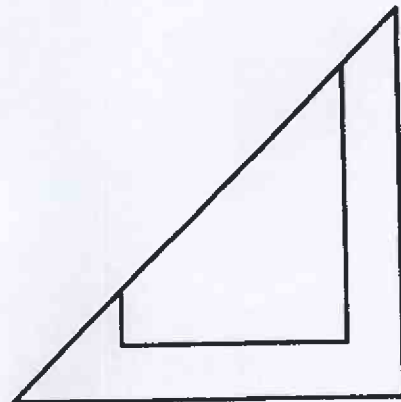
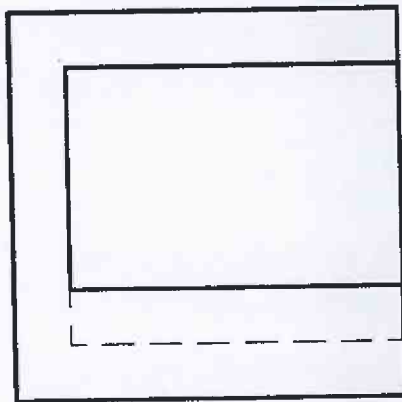
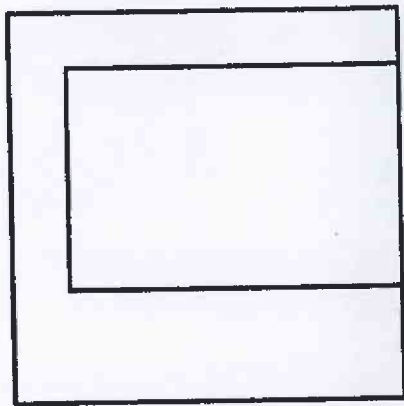
1. Shown below is an isometric pictorial of an artifact. Sketch or draw an orthographic projection of the artifact. Select and position principal, section, and auxiliary views as necessary. Use common Canadian (CSA/ANSI) conventions and practices. Do not dimension.

| 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 could not be manufactured |



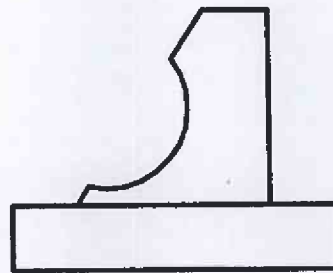
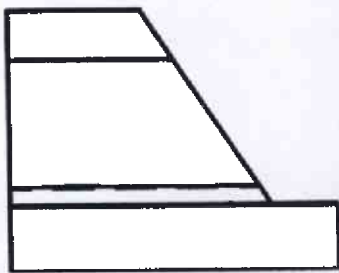
2. Sketch an isometric pictorial of the following orthographic projection. Sketch; do not draw. Do not use a straight edge.

| 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 straight edge |



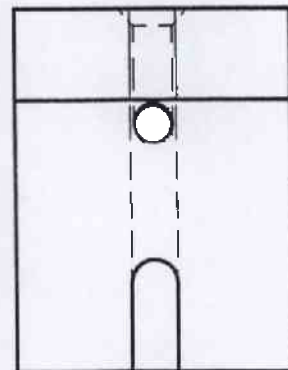
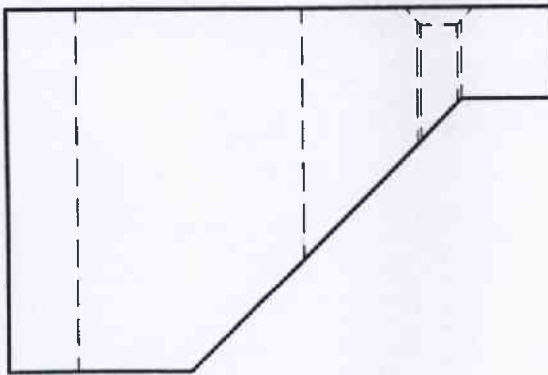
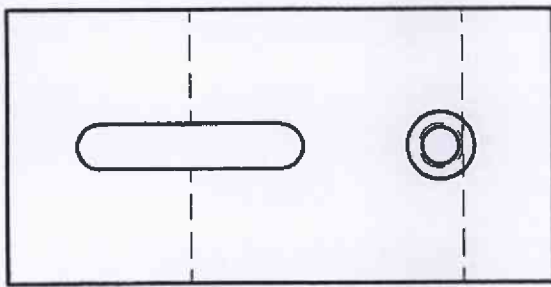
3. Draw the appropriate auxiliary views. Show all work. Clearly label the auxiliary views. Complete the answer in the space provided below.

| Criterion | Grade |
|----------------------------|--|
| Selection of views | 2: Two correct auxiliary views 1: One correct auxiliary view |
| 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 |



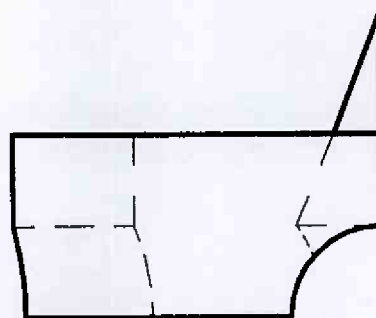
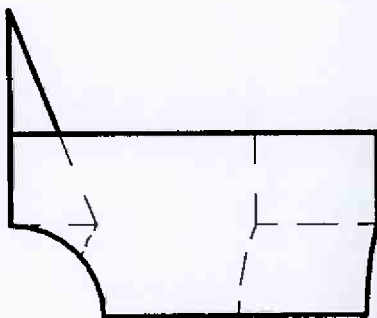
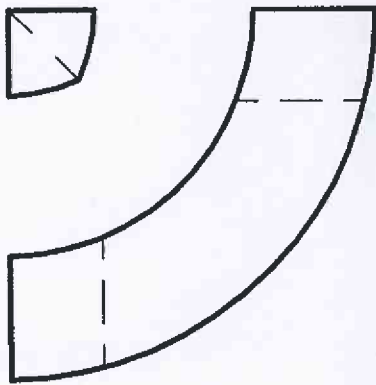
4. Dimension the following orthogonal projection using Canadian conventions (CSA/ANSI) in millimetres. The artifact is drawn in half scale. Complete the answer on the drawing provided.

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



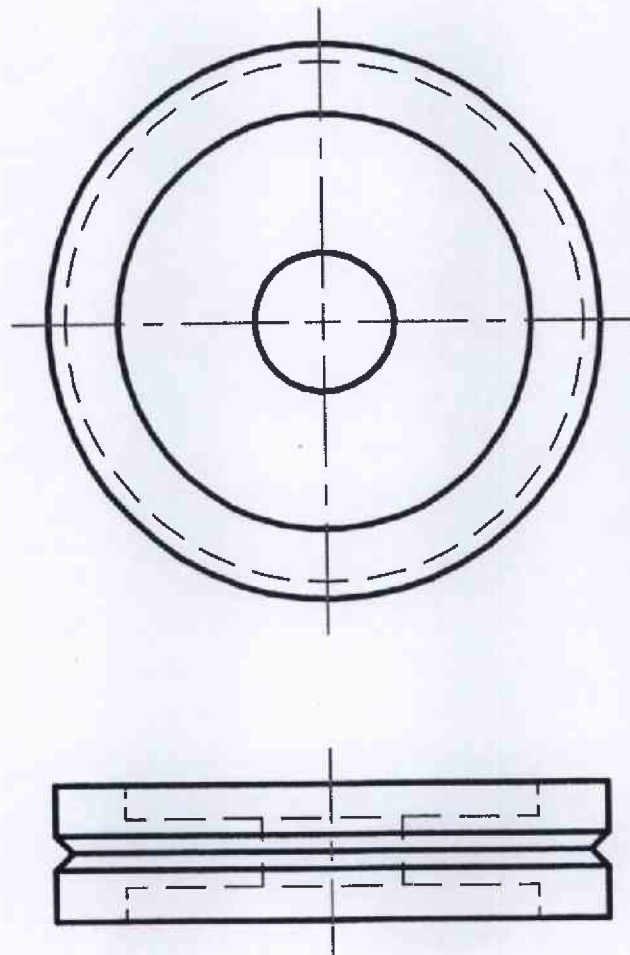
5. Sketch the steps that could be used to construct the following object using primitives (i.e., block, sphere, cylinder, cone, cylinder, prism, torus) using only Boolean operations (union, intersect, subtract).

| 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 artifact.

| 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 errors 2: One or more significant omissions 1/0: Part could not be manufactured |



7. For two of the three following acronyms, expand the acronym and explain its significance.

| Criterion | Grade |
|-----------------|--|
| Correct English | -½ per error |
| Expansion (×2) | 2: clear and concise 1: minor flaws |
| Example (×2) | 2: clear and concise |

- a. PLM
- b. B-rep
- c. CSG

8. Explain the difference between the terms cavalier oblique, cabinet oblique, and general oblique. Sketch an example of each.

| Criterion | Grade |
|-----------------|--|
| Correct English | 1: well written -½ per error |
| Definition (×3) | 2: clear and concise 1: minor flaws |
| Example (×3) | 1: clear and concise |

9. For two of the three following terms related to dimensioning, write a paragraph explaining the term and sketch an example.

| Criterion | Grade |
|------------------|--|
| Correct English | -½ per error |
| Explanation (×2) | 2: clear and concise 1: minor flaws |
| Example (×2) | 2: clear and concise |

- a. Coordinate dimension
- b. Out-of-scale dimension
- c. Chain line

10. Sketch an example of each of the following terms.

| Criterion | Grade |
|---------------------|--|
| Identification (×2) | 1: Correctly labelled sketch |
| Sketch (×2) | 4: Simple and concise sketch following conventions 3: Minor errors 0: Not a section view |

- a. Removed section
- b. Revolved section