

# National Exams May 2014

## 04-BS-15, Engineering Graphics & Design Process 3 hours duration

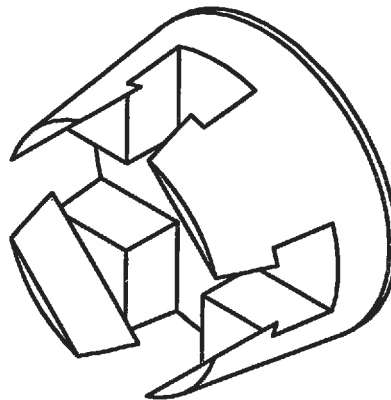
### NOTES

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 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

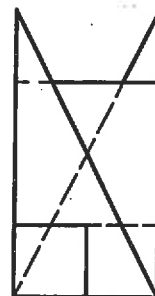
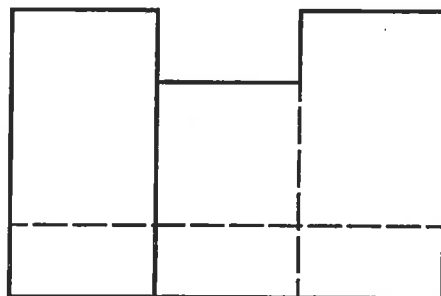
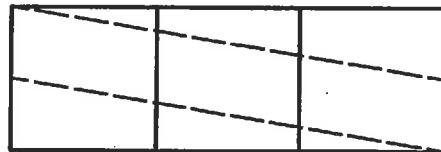
1. Shown below is an isometric pictorial of a single component. Sketch or draw an orthographic projection of the component. Select and position principal, section, and auxiliary views as necessary. Use common Canadian (CSA/ANSI) conventions and practises. Do not dimension. All holes are through.

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



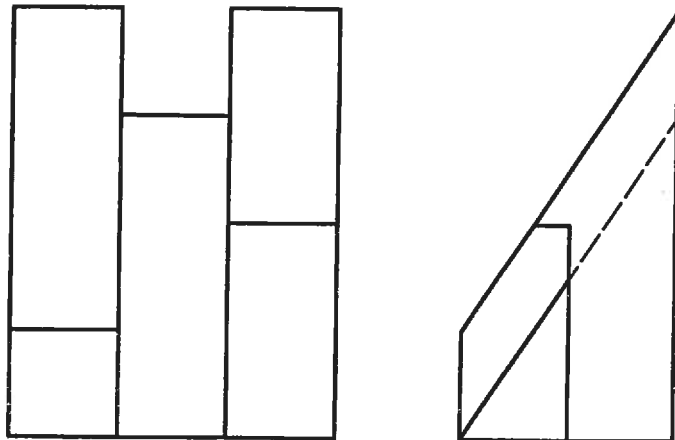
2. Sketch an isometric pictorial of the following orthographic projection. Sketch. Do not draw. Do not use a straight edge.

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



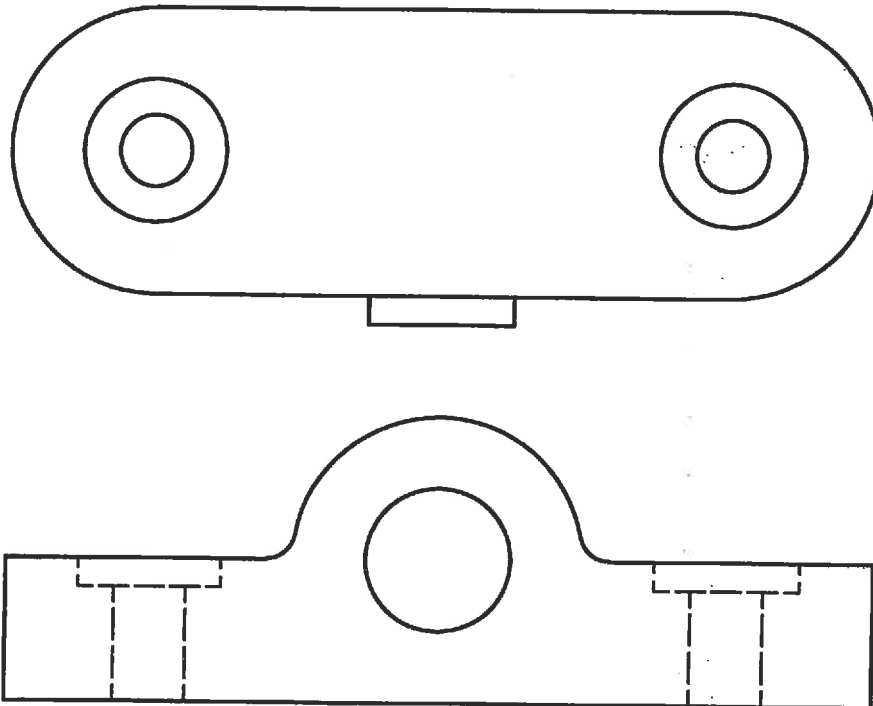
3. Draw the oblique face(s) of the below component in true shape. Show all work. Clearly label the auxiliary view. Complete the answer in the space provided below.

Criterion	Grade
Selection of views	2: Correct auxiliary view
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



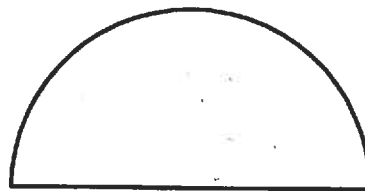
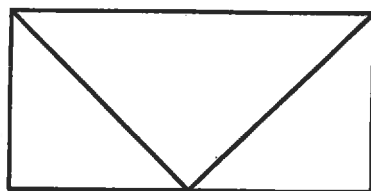
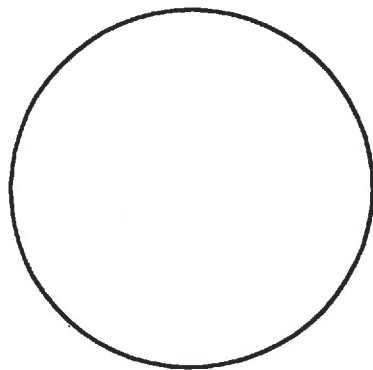
4. Dimension the following orthogonal projection using Canadian conventions (CSA/ANSI) in millimetres. Add centre lines and centre marks as needed. The component is drawn in full scale. Complete the answer on the drawing provided.

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



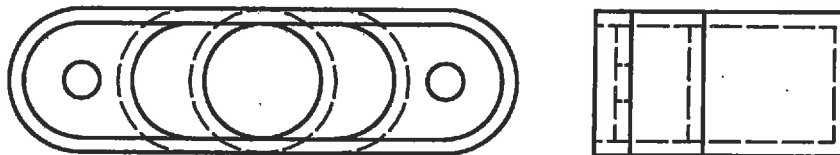
5. Sketch the steps that could be used to construct the following object using primitives (cubes, right rectilinear prisms, right triangular prisms, spheres, cones, tori, and cylinders) using only Boolean operations (union, difference, and intersection).

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

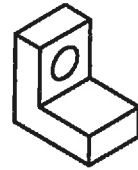


6. Sketch an appropriate section view for the following component.

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

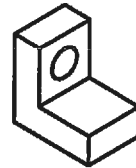


7. For the part shown on the right, sketch a first angle projection and a third angle projection. The part must appear differently in the two projections.



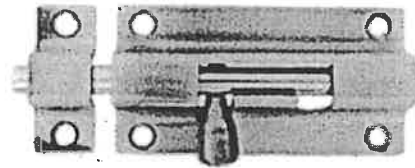
Criterion	Grade
Correct first angle projection	5
Correct third angle projection	5

8. Sketch the part shown on the right using orthographic views. Use size, location, and coordinate dimensions following CSA/ANSI conventions. Label one of each of these three types of dimensions.



Criterion	Grade
Correctly drawn and labelled size dimension	3
Correctly drawn and labelled location dimension	3
Correctly drawn and labelled coordinate dimension	3
Sketch is accurate and correct	1

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



Criterion	Grade
Stages	5
Explanations	5



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

- a. Requirement
- b. Functional analysis
- c. Objective

Criterion	Grade
Correct English	-½ per error
Explanation (x2)	3: clear and concise 2: minor flaws 1: difficult to understand
Example (x2)	2: clear and concise