

# National Exams May 2015

## 04-BS-15 – Engineering Graphics & Design Process

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Duration of Examination: 3 hours

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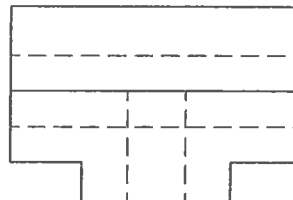
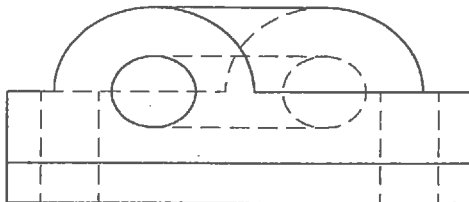
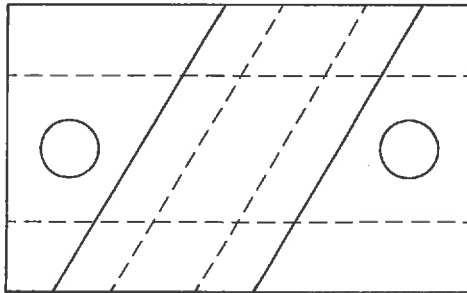
### Notes

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 not use a calculator.
  3. Aids permitted during this examination:
    - (a) Straight edge
    - (b) Engineering squares or rolling ruler
    - (c) Pencil and eraser
    - (d) Engineering scale
    - (e) Protractor
    - (f) Compass
  4. This exam paper consists of nine (9) questions on 9 pages. Check to ensure your exam paper is complete. Clearly label your answers in the answer booklet.
  5. **Regardless of rubric total, all questions are of equal value.**
  6. Each question has a grading rubric attached. The rubric is a guideline that will be used to assign marks and penalties.
  7. All sketches must be made freehand, must be neat, and must be easy to read.
  8. Failure to follow the above directions will result in grade penalties.
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Note all 9 questions must be answered.

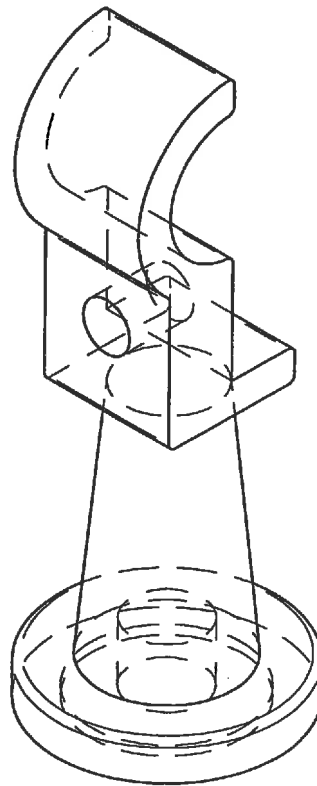
1. Sketch the isometric pictorial of the orthographic projection represented below. The orthographic is presented at a half of the part's actual size. State the scale according to your sketch.

ISOMETRIC PICTORIAL RUBRIC			
	WT	MARK	TOTAL MARK
PROJECTION	4	/3	/12
PROPORTIONS	2	/3	/6
PRESENTATION	1	/3	/3
PENALTIES	Use of straight edge		-21
FINAL MARK			21



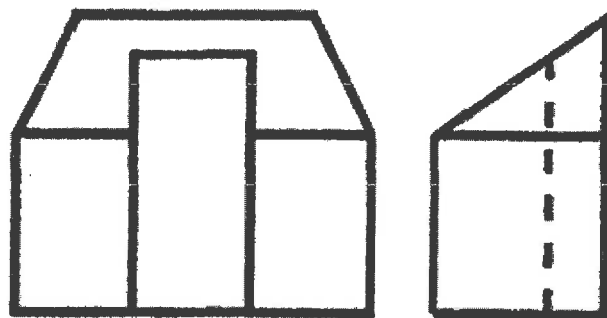
2. Sketch or draw the orthographic projection of the isometric pictorial design represented below. Pictorials are presented at double of the part's actual size. State the scale according to your sketch. Select and position the principal, section, and auxiliary views as necessary. Use common Canadian (CSA/ANSI) conventions and practises. Do not dimension. Your answer will be graded using the multiview rubric.

MULTIVIEW RUBRIC			
	WT	MARK	TOTAL MARK
VIEW SELECTION	4	/3	/12
PROJECTION	4	/3	/12
PROPORTIONS	2	/3	/6
CENTRE LINES & MARKS	1	/3	/3
PRESENTATION	1	/3	/3
FINAL MARK			36



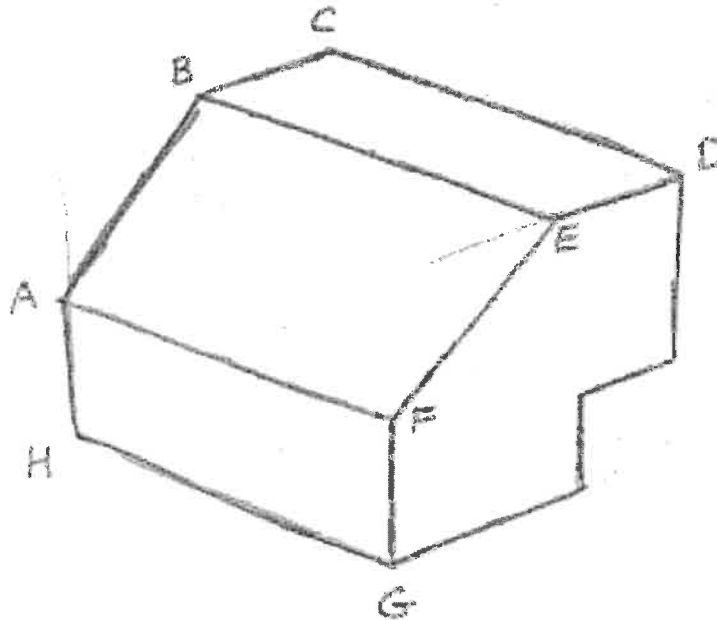
3. Two views of an object are shown below using standard CSA/ANSI convention. Correctly identify, label, and sketch the missing view. Complete the answer on the drawing provided.

CRITERION	MARK
CORRECT MISSING VIEW	4
ACCURATE SKETCH OF MISSING VIEW	4
CORRECT IDENTIFICATION & LABELLING OF MISSING VIEW	2



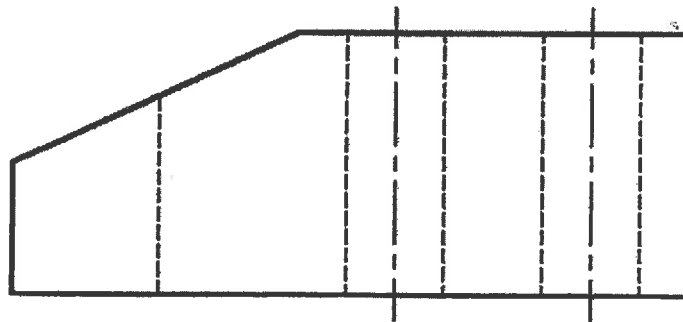
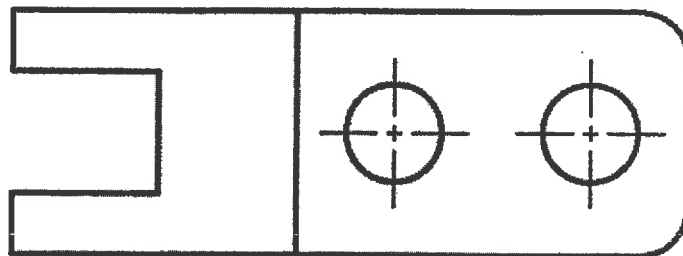
4. Given the isometric pictorial with several labelled vertices, re-sketch this part rotated 90 degrees clockwise about line BC (relative to an observer looking at plane AFGH).

ISOMETRIC PICTORIAL & ROTATION RUBRIC			
	WT	MARK	TOTAL MARK
PROJECTION	4	/3	/12
PROPORTIONS	2	/3	/6
PRESENTATION	1	/3	/3
CLEAR & CORRECT ROTATION	2	/3	/6
PENALTIES	Use of straight edge		-21
FINAL MARK			27



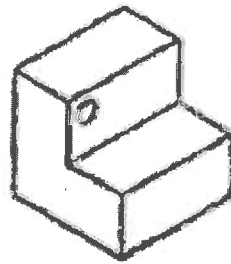
5. Dimension the following orthogonal projection using Canadian conventions (CSA/ANSI) in millimetres. The part is drawn at full scale. Complete the answer on the drawing provided.

CRITERION	MARK
CORRECT DRAWING DIMENSIONS	10
PENALTY	-1 PER UNECESSARY DIMENSION
PENALTY	-1 PER MISSING DIMENSION
PENALTY	-1 PER CONVENTION ERROR



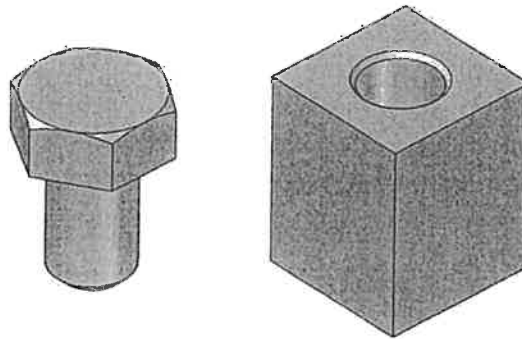
6. For the part shown below, clearly sketch a first angle projection and a third angle projection. The projection type must be labelled, the selection of view(s) in your sketches must clearly illustrate the difference between the two projection types, and the part must appear different in each projection.

CRITERION	MARK
CORRECT FIRST ANGLE PROJN	5
CORRECT THIRD ANGLE PROJN	5



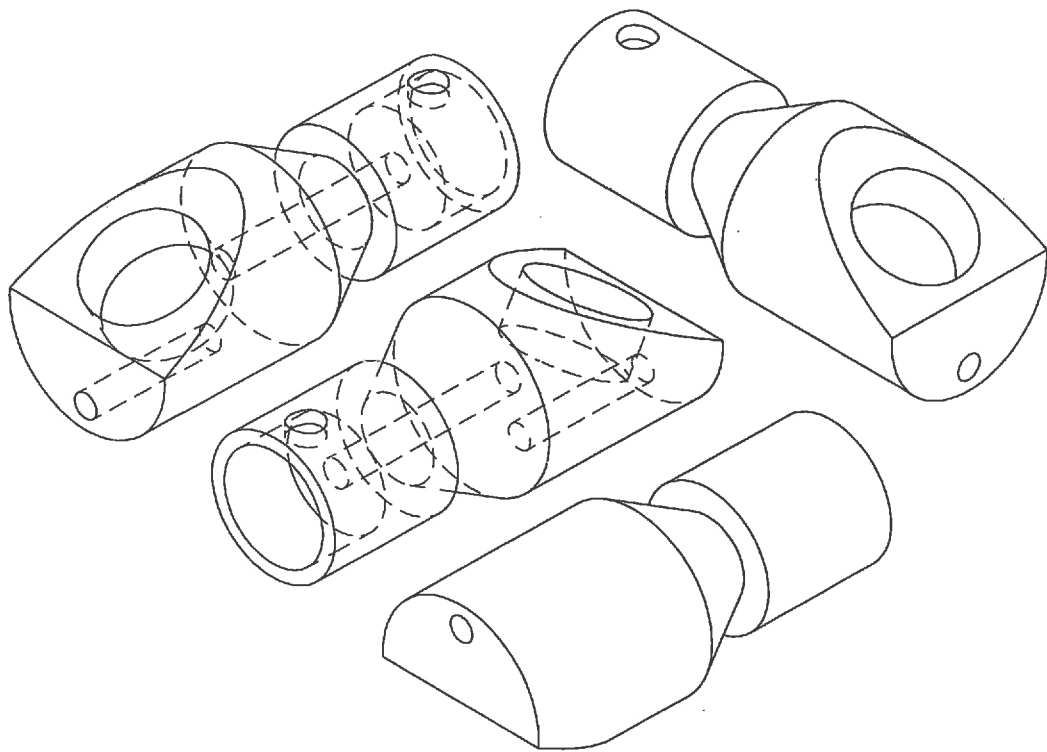
7. For the parts shown below, Clearly describe the process of assembling them to be fully constrained. Present an answer that includes a tabular format showing total degrees of freedom, and the the degree(s) of freedom contained as each relationship is applied

CRITERION	MARK
TOTAL DOF	3
CORRECT/FULLY CONSTRAINED	9



8. Given the following isometric pictorials of a part, sketch an appropriate orthographic projection section view.

SECTION VIEW RUBRIC			
	WT	MARK	TOTAL MARK
VIEW SELECTION	4	/3	/12
PROJECTION	4	/3	/12
PROPORTIONS	2	/3	/6
CENTRE LINES & MARKS	1	/3	/3
PRESENTATION	1	/3	/3
FINAL MARK			36





9. A simple assembly of a hinge is shown. The exploded view is shown below from both sides. List the stages of the design process from the initial problem statement to final drawings. Explain each step with reference to the given hinge.

CRITERION	MARK
STAGES	5
EXPLANATIONS	5

