



Coimisiún na Scrúduithe Stáit State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2016

ENGINEERING – MATERIALS AND TECHNOLOGY

(Ordinary level – 200 marks)

THURSDAY, 9 JUNE

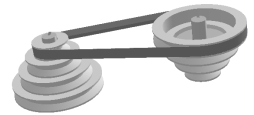
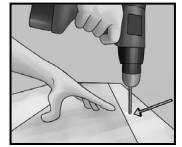
MORNING, 9:30 – 12:00

Answer **Question 1**, **Section A** and **Section B**, and **three** other questions.

SECTION A – 30 marks

Give **brief** answers to **any six** of the following:

- (a) List **two** safety precautions to be observed when drilling light gauge aluminium.
- (b) Name the alloy which is produced from lead and tin.
- (c) State a material which is a good electrical insulator.
- (d) Name the drive system shown and suggest **one** application for this system.
- (e) Outline **two** reasons why *planning* is essential in project work.
- (f) Describe **two** ways in which computer technology is used in the manufacturing process.
- (g) Name **one** type of thread form and suggest a suitable application for the thread form named.
- (h) State **two** reasons why *cutting fluids* are used when machining.



SECTION B – 35 marks

Answer **any three** of the following:

- (i) Describe the main operating features of **any one** of the following:



Worm and wheel mechanism



Tailstock



Vacuum forming machine.

- (j) Explain **any two** of the following:
 Drone, Hardware, Virus, High definition (HD).
- (k) Define the term *malleability* and name a material which is malleable.
- (l) Explain **any two** of the following:
 Tensile force, Countersink drill, Thermal conductor, Solar panel.
- (m) Name the machine component shown and explain its function.

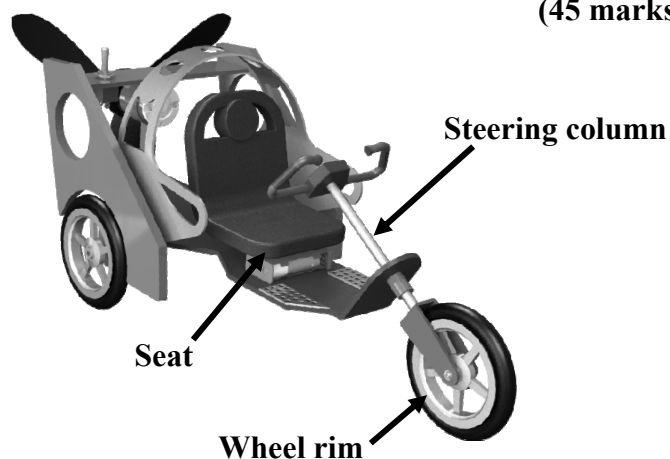


Question 2.

(45 marks)

- (a) (i) Name a suitable material for **each** of the parts labelled on the trike buggy shown opposite.

- (ii) State **one** reason for the selection of **each** material.



- (b) For **each** of the metals listed below, name a suitable furnace used in the production of the metal:

(i) Steel

(ii) Pig iron

(iii) Cast iron.

- (c) With the aid of a labelled diagram, describe the operation of **one** of the furnaces identified at 2(b) above.

- (d) Name **two** ferrous metals and **two** non-ferrous metals.

Question 3.

(45 marks)

- (a) (i) In relation to the properties of metals, explain the difference between hardening and annealing.

- (ii) Describe how to carry out **each** of the following heat treatment processes:

Hardening,

Annealing.

- (b) For **each** of the following, select the *main* heat treatment process required during its manufacture:



(i) Scriber



(ii) Copper dish



(iii) Screwdriver point.

- (c) State **two** safety precautions to be observed when using *coolants* during heat treatment.

- (d) Describe **any two** of the following material properties:

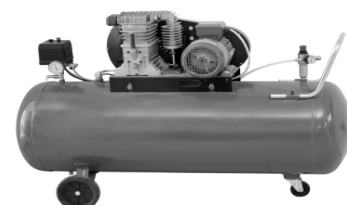
(i) Brittleness

(ii) Ductility

(iii) Toughness.

OR

- (d) State **two** applications for a compressor in industry.



Question 4.

(45 marks)

- (a)** Describe **each** of the following oxy-acetylene flames:

- (i)** Neutral flame
- (ii)** Oxidising flame
- (iii)** Carburising flame.



- (b)** **(i)** State the function of **any three** of the following in manual metal arc welding:

Electrode, Welding mask, Arc, Generator.

- (ii)** List **three** steps to be observed to ensure a high quality joint in manual metal arc welding.



- (c)** Answer **any three** of the following:

- (i)** Name the type of nut shown and suggest a suitable application for it.

- (ii)** Why is a passive flux required when soldering electrical circuits?

- (iii)** Outline **two** advantages for using spot welding to join metals.

- (iv)** What is the difference between a permanent joint and a temporary joint?



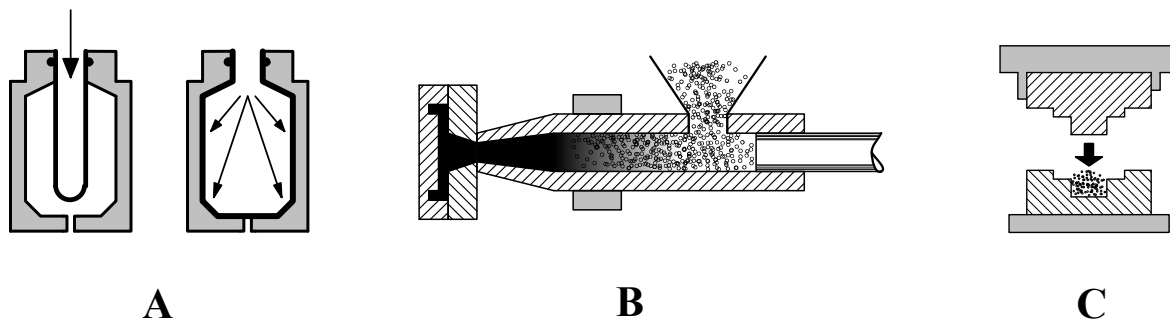
- (d)** State **two** safety precautions to be observed when using oxy-acetylene welding equipment.



Question 5.

(45 marks)

(a)



(i) Name the **three** plastic manufacturing processes shown at A, B and C above.

(ii) Describe with the aid of a diagram, **one** of the manufacturing processes named in 5(a)(i) and identify **one** component produced by this process.

(b) State **two** safety precautions to be observed when using heat to form plastics.

(c) Identify a suitable plastic for the manufacture of **each** of the components shown below:



(i) Plastic water bottle



(ii) Plug casing.

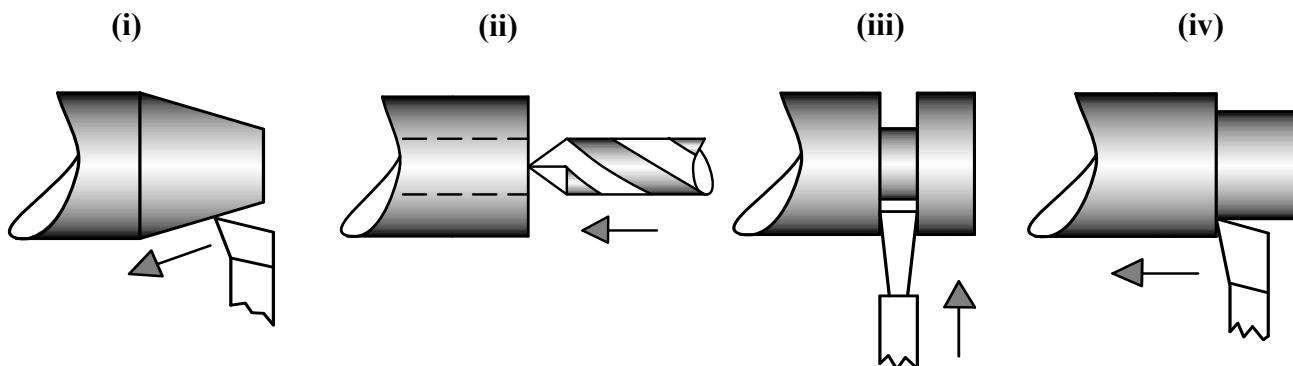
(d) (i) Which is more suitable for recycling, thermoplastic or thermosetting plastic?

(ii) Give **one** reason for your choice in 5(d)(i) above.

Question 6.

(45 marks)

- (a)** Name **any three** of the lathe operations shown.



- (b)** Describe **any three** of the following in relation to machining:

(i) Four jaw chuck **(ii)** Clearance angle **(iii)** Pilot hole **(iv)** Swarf.

- (c)** A machining tool for a centre lathe is shown.



- (i)** Name the process in which this machining tool is used.
(ii) Describe **two** things to be considered when setting up this machining tool.
(iii) State **one** safety precaution to be observed when using the machining tool shown.

OR

- (c)** State **three** advantages of operating a lathe by computer numerical control (CNC) rather than manual control.

Question 7.

(45 marks)

(a) Explain **any two** of the following terms in relation to limits and fits:

(i) Clearance fit

(ii) Upper limit

(iii) Transition fit.

(b) A steel shaft is machined to the dimensions shown.

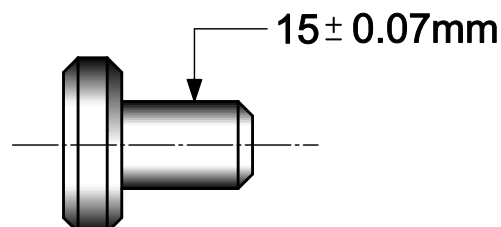
State the:

(i) Nominal diameter of the shaft;

(ii) Minimum diameter of the shaft;

(iii) Maximum diameter of the shaft;

(iv) The tolerance on the shaft.



(c) Name **any three** of the instruments shown and give **one** application for **each** instrument named.



(i)



(ii)



(iii)



(iv)

OR

(c) Name **each** of the electronic components shown below and outline the function of **each** component named.



(i)



(ii)



(iii)

Blank Page



Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2016

ENGINEERING - PRACTICAL
HIGHER and ORDINARY LEVELS

150 marks

3rd May - 13th MAY - MORNING: 10:00 to 1:00
AFTERNOON: 2:00 to 5:00

PLEASE READ CAREFULLY

INSTRUCTIONS

- (a) The Examination Number must be clearly stamped or engraved, by the **teacher**, on the test-piece in the position indicated on the drawing 2016. M74A(L₂). If the test-piece is not assembled, the Examination Number must be indicated on each separate part of the test-piece.
- (b) Candidates are not permitted to communicate with or assist one another.
- (c) Completed **mild steel** parts **only** must be sprayed with a clear rust preventive aerosol.

From the materials supplied, make the **Clamp** shown on the drawings to the shape and dimensions specified.

PART	MATERIAL	PROCESS
4	Aluminium	Mark out, drill and shape.
5	Aluminium	Mark out, drill, tap and shape.
6	Brass	Mark out, drill and shape.
8	Clear Polycarbonate	Mark out, drill and shape.

- Note:** (i) Parts 1, 2, 3 and 7 have been made prior to examination day. Part 5 has been part-prepared. Using the screws, nut and washer supplied assemble the Clamp, as detailed on the assembly drawing.
- (ii) **Accuracy, finish and function are important.**



Coimisiún na Scrúdaithe Stáit

SCRÚDÚ ARDTEISTIMÉIREACHTA, 2016

INNEALTÓIREACHT - PRAITICIÚIL
ARDLEIBHÉAL agus GNÁTHLEIBHÉAL

150 marc

3 BEALTAINE - 13 BEALTAINE - MAIDIN: 10:00 go dtí 1:00
TRÁTHNÓNA: 2:00 go dtí 5:00

LÉIGH NA TREORACHA SEO GO CÚRAMACH IAD LE DO THOIL

TREORACHA

- (a) Ba chóir don **mhúinteoir** Scrúduimhir an Iarrthóra a ghreanadh nó a scríobadh san ionad a thaispeántar ar an líníocht 2016. M74A(L₂). Mura bhfuil an triailphíosa curtha le chéile, ní mór an Scrúduimhir a thaispeáint ar gach páirt ar leith den triailphíosa.
- (b) Níl sé de chead ag iarrthóirí caidreamh a bheith acu lena chéile ná cúnamh a thabhairt dá chéile.
- (c) Ní mór sprae trédhearcadh aerosol chun meirg a chosc a chur ar na páirteanna déanta as **cruach bhog amháin** agus iad críochnaithe.

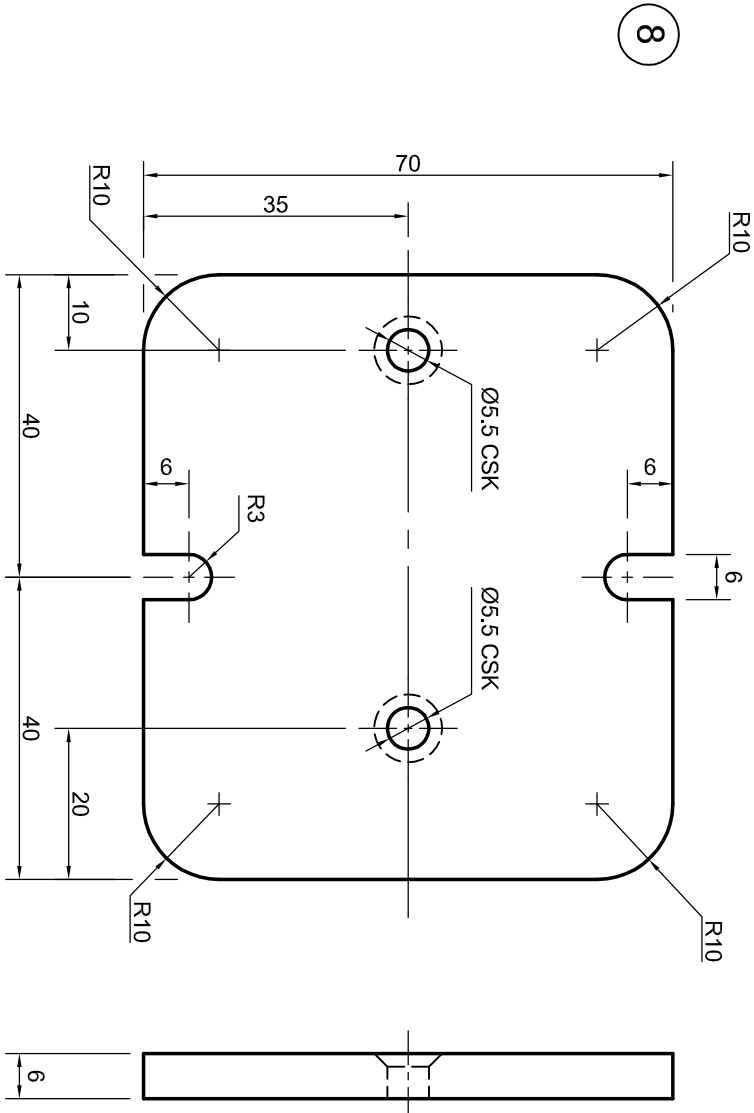
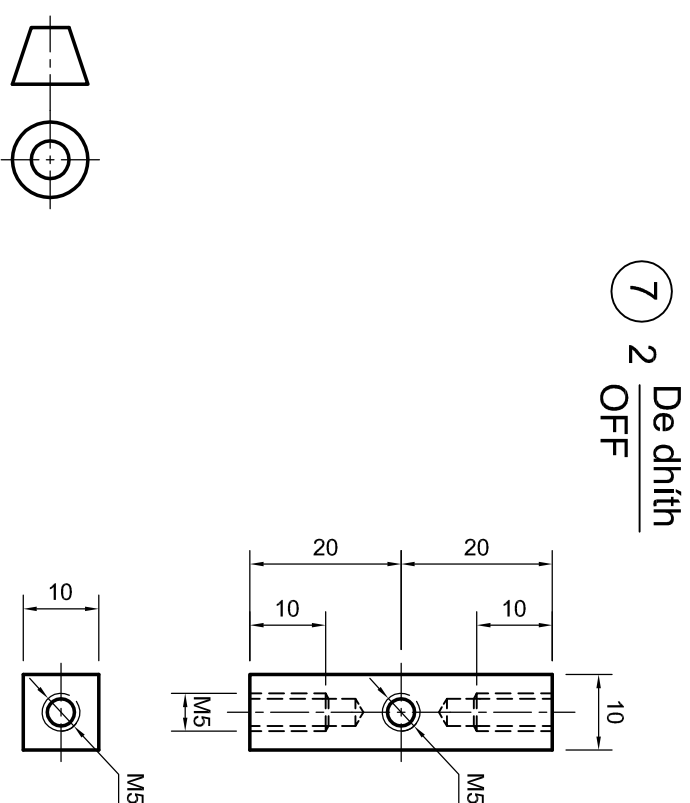
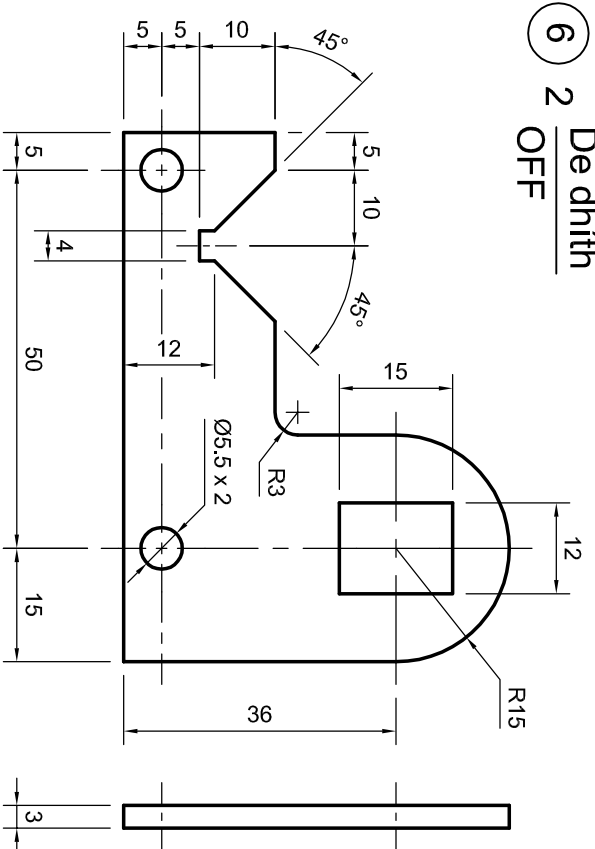
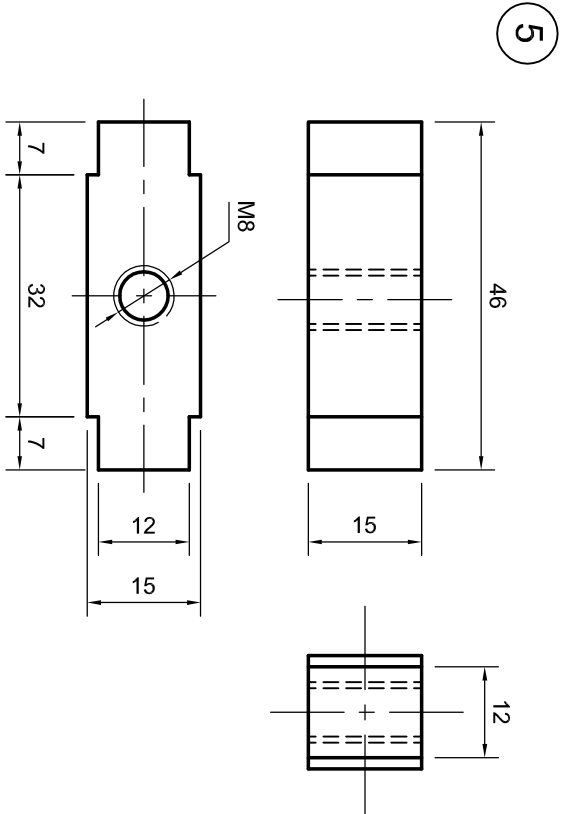
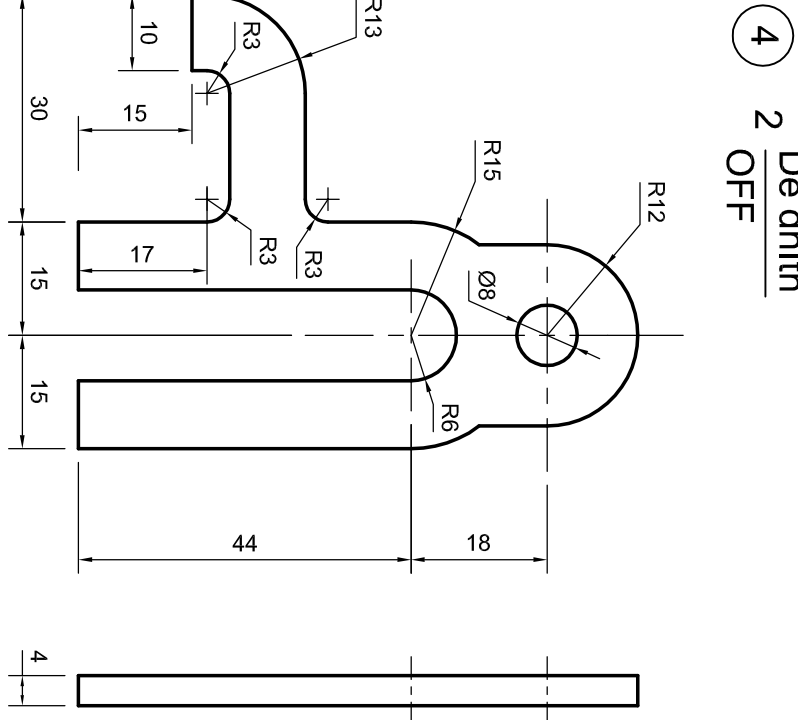
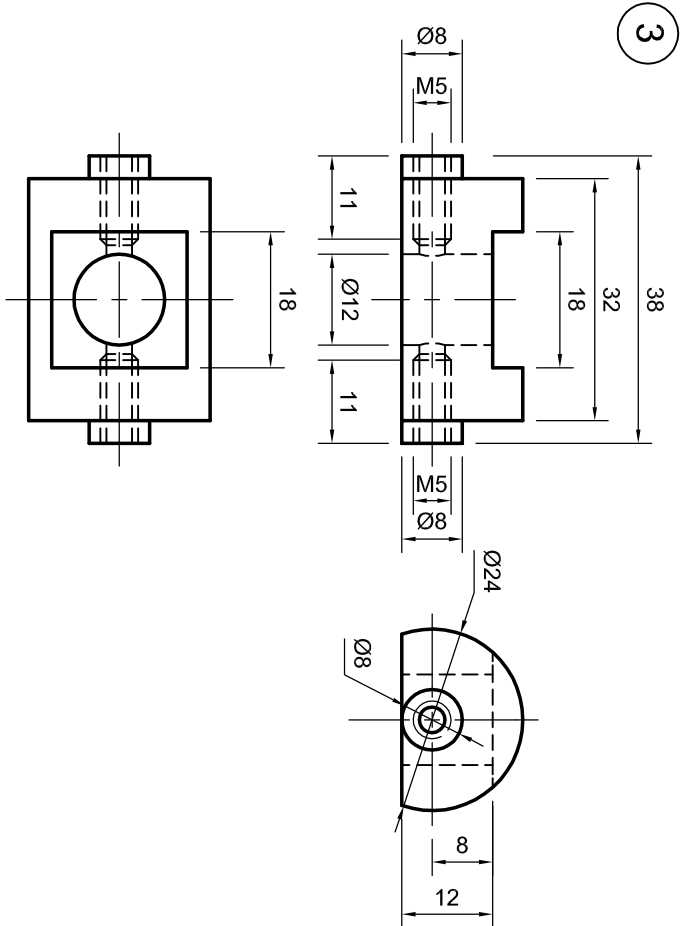
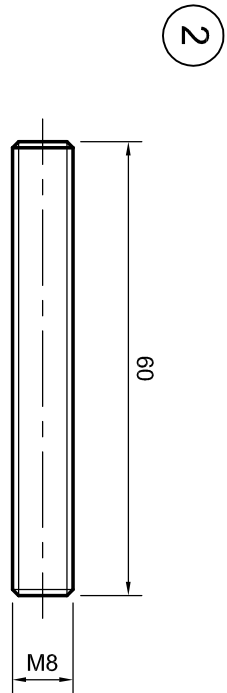
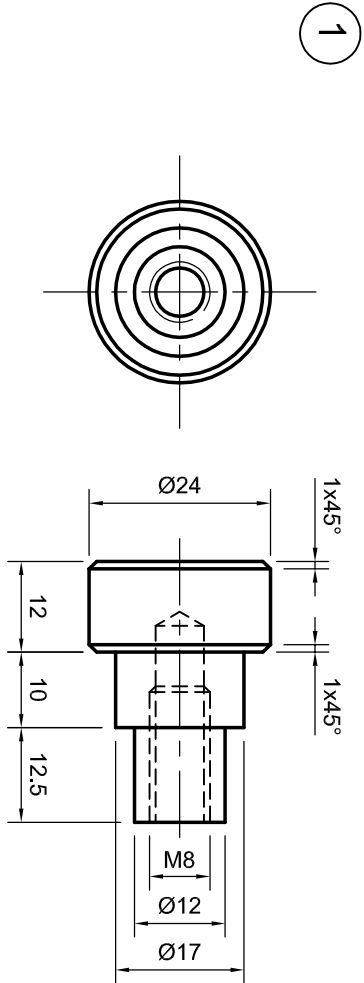
As na hábhair a sholáthraítear, an **Clampa** a thaispeántar sna líníochtaí a dhéanamh sa chruth agus de réir na dtoisí a shonraítear.

PÁIRT	ÁBHAR	PRÓISEAS
4	Alúmanam	A mharcáil amach, a dhruileáil agus a dheilbhiú.
5	Alúmanam	A mharcáil amach, a dhruileáil, a tapa agus a dheilbhiú.
6	Prás	A mharcáil amach, a dhruileáil agus a dheilbhiú.
8	Polacharbónáit thrédhearcach	A mharcáil amach, a dhruileáil agus a dheilbhiú.

Nóta: (i) Rinneadh páirteanna 1, 2, 3 agus 7 roimh lá an scrúdaithe. Tá páirt 5 páirtdeanta. Ag baint úsáide as na scríúnná, an cnó agus an leicneán a sholáthraítear, cóimeáil an Clampa faoi mar atá sa líníocht cóimeála.

(ii) Tá tábhacht ag baint le cruinneas, le bailchríoch agus le hoibriú.

THALL
OVER

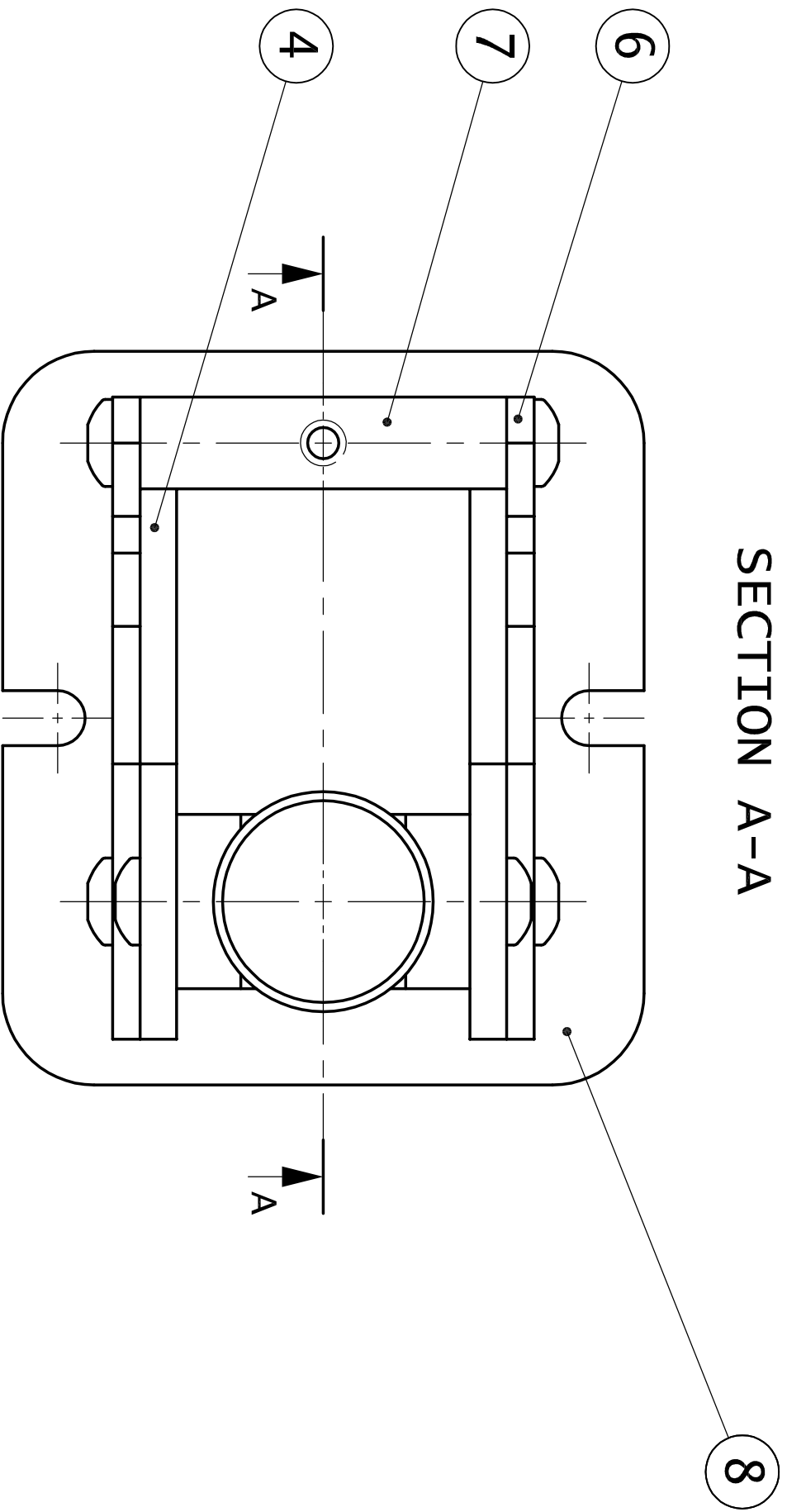
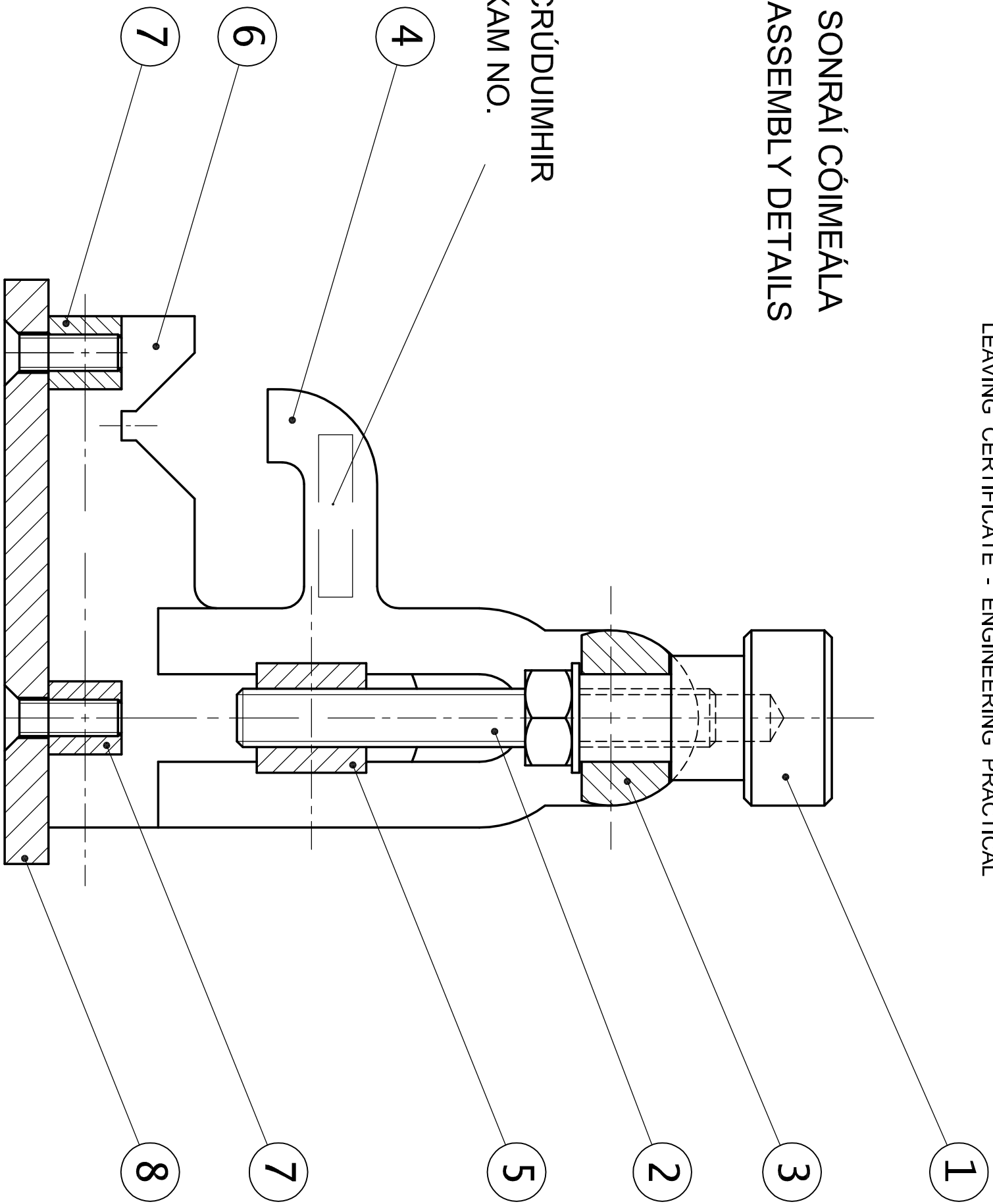


Nóta: Tabhair ar ais an scrúdpháipéar seo don Fheitheoir ag deireadh an scrúdaithe.
Note: Hand up this examination paper to the Superintendent at the end of the examination.

SCRÚDÚ ARDTEISTIMÉIREACHTA - INNEALTÓIREACHT PRAITICIÚIL
LEAVING CERTIFICATE - ENGINEERING PRACTICAL

SONRAÍ CÒIMEÁLA
ASSEMBLY DETAILS

SCRÚDUIMHIR
EXAM NO.



Nóta: Tabhair ar ais an scrúpháipéar seo don Fheithéor ag deireadh an scrúdaithe.
Note: Hand up this examination paper to the Superintendent at the end of the examination.