



Coimisiún na Scrúduithe Stáit State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2017

ENGINEERING – MATERIALS AND TECHNOLOGY

(Ordinary level – 200 marks)



THURSDAY, 8th JUNE

MORNING, 9:30 – 12:00

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

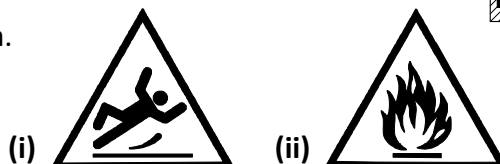
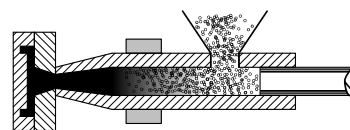
Question 1.

(65 marks)

SECTION A – 30 marks

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

- (a) List **any two** applications of drone technology.
- (b) Explain the term *non-ferrous* metal.
- (c) The sun is a renewable energy source. Identify **one** non-renewable energy source.
- (d) Name the machine tool shown and state **one** application for its use.
- (e) Explain the term *clearance fit* in relation to a shaft and a hole.
- (f) Name **two** computer output devices.
- (g) Give **one** application for the *injection moulding* process.
- (h) Identify **each** of the safety symbols shown.



SECTION B – 35 marks

Answer **any three** of the following:

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



Hydraulic lifting platform



Ratchet and pawl mechanism



Scroll saw.

- (j) Explain **any two** of the following:

Bluetooth, 3-D printer, Cloud technology, GPS.

- (k) Define the term *compressive strength* in relation to the properties of materials **and** give **one** application where a material needs to be strong in compression.

- (l) Explain **any two** of the following:

Carbon footprint, Self-locking nut, Pop riveting, Light emitting diode (LED).

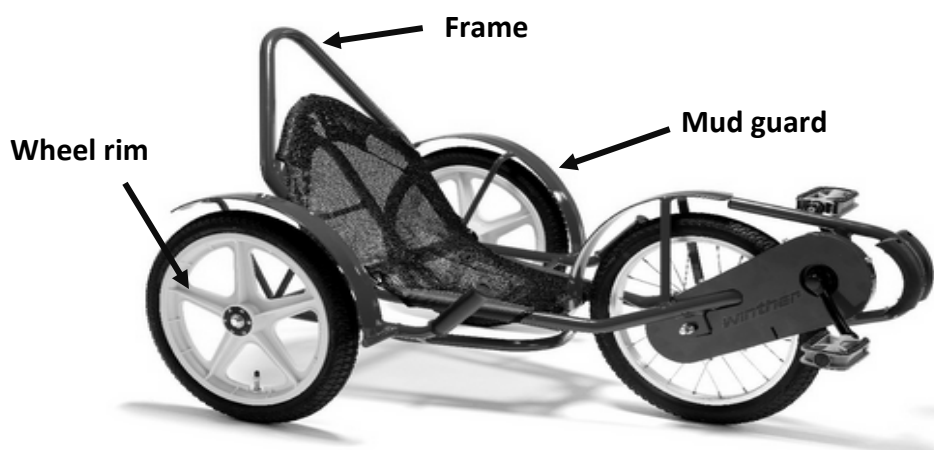
- (m) Name the mechanism shown and suggest **one** suitable application for it.



Question 2.

(45 marks)

- (a) (i) Name the metals produced from **each** of the furnaces listed below:
- Blast furnace
 - Cupola furnace
 - Electric arc furnace.
- (ii) With the aid of a suitable diagram, describe the operation of **one** of the furnaces listed at **Q2(a)(i)** above.
- (b) (i) Name a suitable material for **each** of the **three** parts labelled on the go-cart shown below.
- (ii) State **one** reason for the selection of **each** material.



- (c) Name the *metal alloys* produced from **any two** of the following combinations:
- (i) Copper and zinc;
- (ii) Lead and tin;
- (iii) Copper and tin.

Question 3.

(45 marks)

- (a) Describe how to carry out **each** of the following heat treatment processes:
- (i) Case hardening;
 - (ii) Annealing.
- (b) (i) Describe **how** the *point* of the centre punch shown is hardened and tempered.



- (ii) Explain **why** it is necessary to *temper* the point of the centre punch shown.
- (c) Identify **any two** items of protective clothing that should be worn when using *water* as a coolant during heat treatment.
- (d) Explain **any two** of the following terms:
- (i) Malleability,
 - (ii) Tensile strength,
 - (iii) Work hardening.

OR

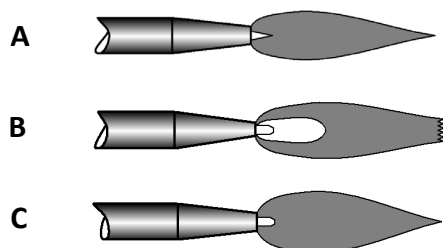
- (d) (i) State **one** advantage for the use of robotics in manufacturing.
- (ii) State **one** disadvantage for the use of robotics in manufacturing.



Question 4.

(45 marks)

- (a) (i) Name **each** of the oxy-acetylene flames shown at **A**, **B** and **C**.



- (ii) State the proportions of oxygen and acetylene required for **each** of the flames shown at **A**, **B** and **C** above.

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

- (i) Electric soldering iron, (ii) A sweated joint, (iii) Flux, (iv) Oxides.



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

- (i) Describe the joining process which uses the welding machine shown.

- (ii) Explain the term *tapping size hole*.

- (iii) Describe the function of a *flashback arrestor* when using oxy-acetylene equipment.

- (iv) State **two** safety precautions to be observed when using adhesives to join materials.



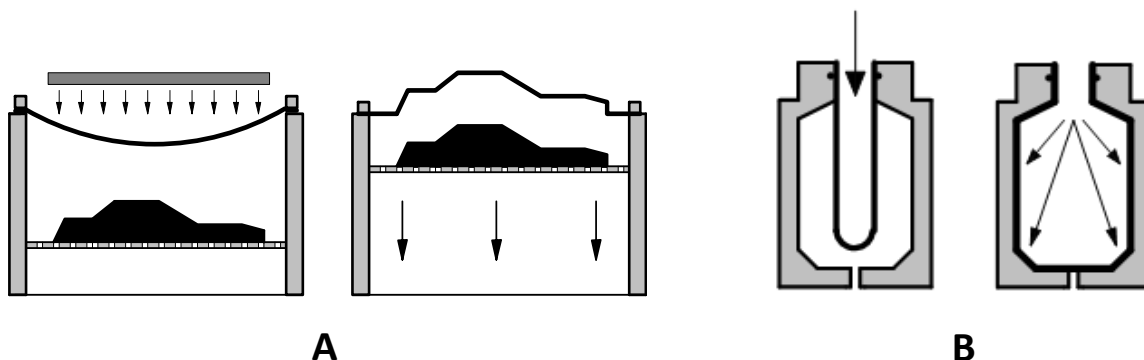
- (d) State **two** reasons why it is important to wear goggles with a dark lens when gas welding.



Question 5.

(45 marks)

- (a) Two plastic manufacturing processes are shown at **A** and **B**.



- (i) Name the plastic manufacturing process shown at **A** and the plastic manufacturing process shown at **B**.
- (ii) Outline the **main** differences between process **A** and process **B**.
- (iii) For **each** process, identify a suitable component produced.

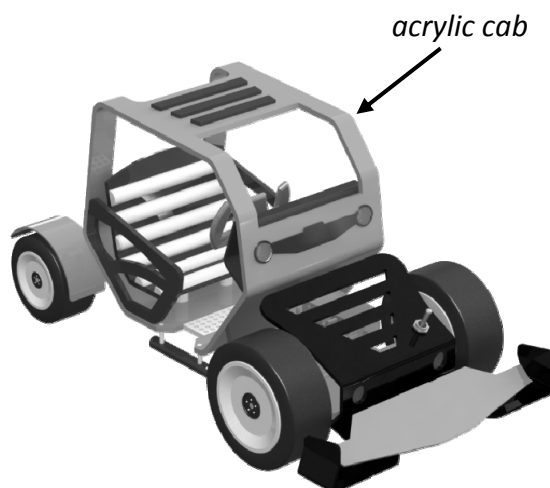
- (b) Describe **any three** of the following terms associated with plastics:

- (i) Thermoplastic;
- (ii) Elastic memory;
- (iii) Thermosetting plastic;
- (iv) Plastic dip coating tank.

- (c) Identify a suitable application for **any two** of the following plastics:

- (i) Polyethylene,
- (ii) Polystyrene,
- (iii) PVC.

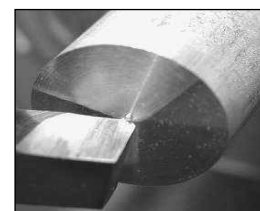
- (d) The cab of the car shown is made from acrylic. Describe a process which can be used to form the bends on the acrylic cab shown.



Question 6.

(45 marks)

- (a) (i) Give **one** reason for using cutting fluids when machining.
- (ii) Give **one** reason for changing the speed of the chuck when machining on a centre lathe.
- (iii) Give **one** reason why a lathe cutting tool must be positioned *on centre* before machining.



- (b) Identify **any three** of the lathe parts shown.



(i)



(ii)



(iii)



(iv)

- (c) A chuck for use in a centre lathe is shown.

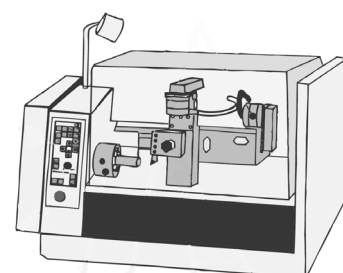
- (i) Name this chuck.
- (ii) Name **two** other methods for holding work on a centre lathe.
- (iii) State **one** safety precaution to be observed when using this type of chuck.



OR

- (c) A CNC lathe used for CAD/CAM technology is shown.

- (i) What do the letters CAD/CAM stand for?
- (ii) Describe **two** advantages of using CAD/CAM technology in industry.
- (iii) State **one** safety precaution to be observed when operating a CNC lathe.



Question 7.

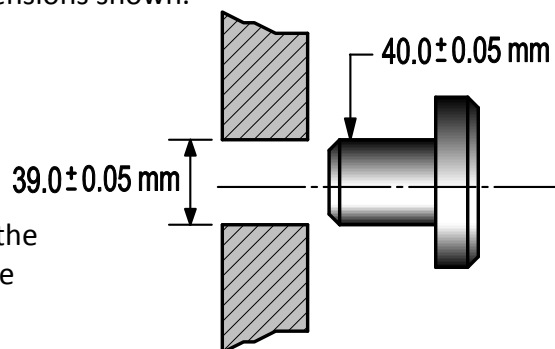
(45 marks)

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

- (i) Interference fit, (ii) Tolerance, (iii) Lower limit.

(b) A hole and shaft assembly is manufactured to the dimensions shown.

- State the:
- (i) Nominal diameter of the shaft;
 - (ii) Smallest diameter of the shaft;
 - (iii) Largest diameter of the hole;
 - (iv) The type of fit which will result from the assembly of the smallest shaft and the largest hole.



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



(i)



(ii)



(iii)

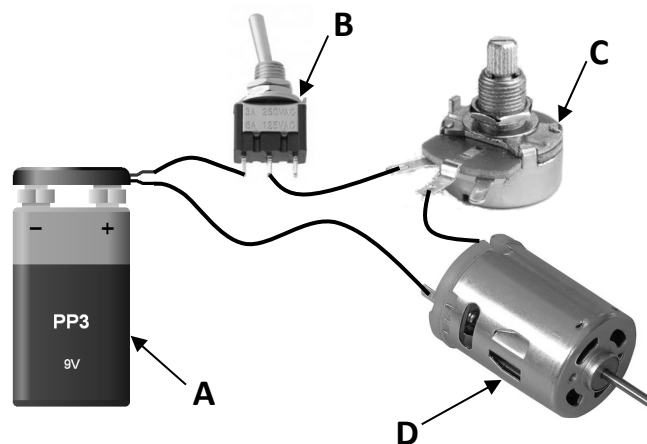


(iv)

OR

(c) (i) Name **any three** of the electronic components labelled A, B, C or D.

(ii) State the function of **each** of the electronic components named.





Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2017

ENGINEERING - PRACTICAL
HIGHER and ORDINARY LEVELS

150 marks

2nd May - 12th 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 2017. 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
1	Clear Polycarbonate	Mark out, drill, tap and shape.
2	Brass	Mark out, drill and shape.
5	Aluminium	Mark out, drill and shape.
9	Aluminium	Mark out and drill.
10	Clear Polycarbonate	Mark out, drill, tap and shape.

Note: (i) Parts 3, 4, 6, 7, 8, 11 and 12 have been made prior to examination day. Part 9 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 Scrúduithe Stáit

SCRÚDÚ NA hARDTEISTIMÉIREACHTA, 2017

INNEALTÓIREACHT - PRAITICIÚIL
ARDLEIBHÉAL agus GNÁTHLEIBHÉAL

150 marc

2 BEALTAINÉ - 12 BEALTAINÉ

MAIDIN:

10:00 go dtí 1:00

TRÁTHNÓNA:

2:00 go dtí 5:00

LÉIGH NA TREORACHA SEO GO CÚRAMACH LE DO THOIL

TREORACHA

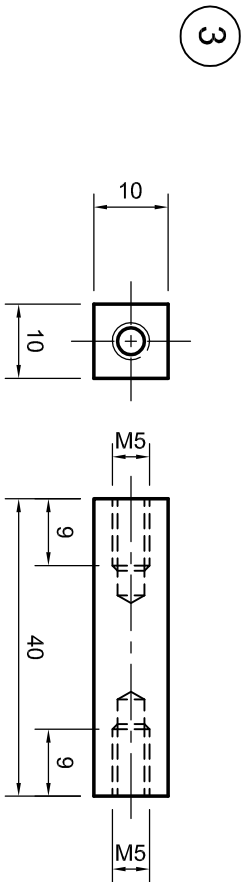
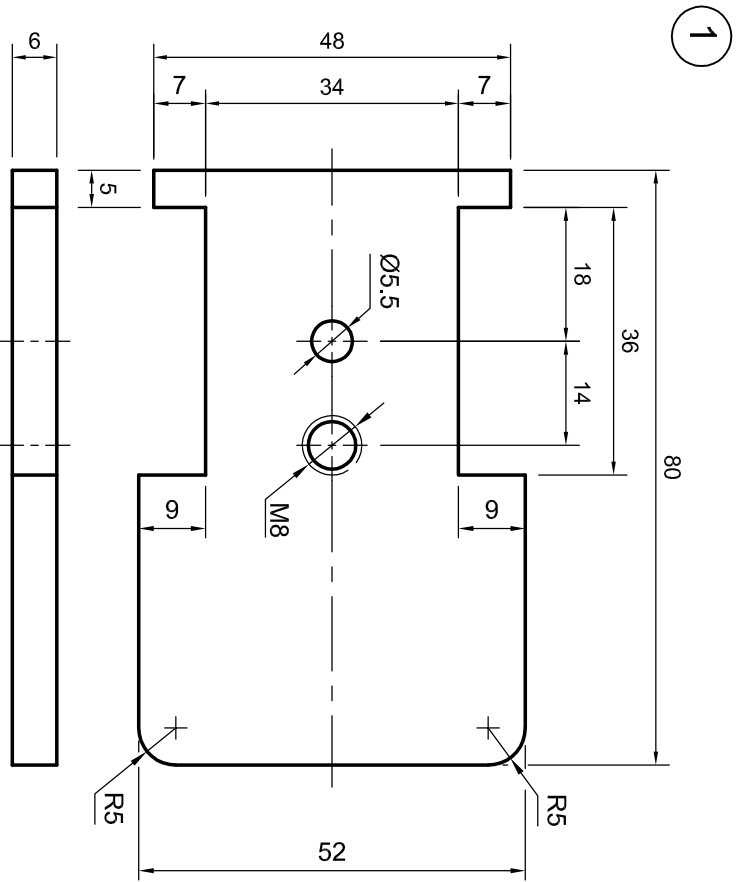
- (a) Ba chóir don **mhúinteoir** Scrúduimhir an iarrthóra a stampáil nó a ghreanadh ar an triailphíosa san ionad a thaispeántar ar an líníocht 2017. M74A(L₂). Mura bhfuil an triailphíosa curtha le chéile, ní mór an Scrúduimhir a thaispeáint ar gach páirt ar leith den triailphíosa.
- (b) Níl cead ag iarrthóirí a bheith i gcumarsáid le chéile ná cúnamh a thabhairt dá chéile.
- (c) Ní mór sprae trédhearcach aerasóil a chur ar na páirteanna críochnaithe a dhéantar as **cruach bhog** (agus orthu sin **amháin**) chun meirg a chosc.

As na hábhair a sholáthraítear, déan an **Clampa** a thaispeántar sna líníochtaí sa chruth agus sna toisí a shonraítear.

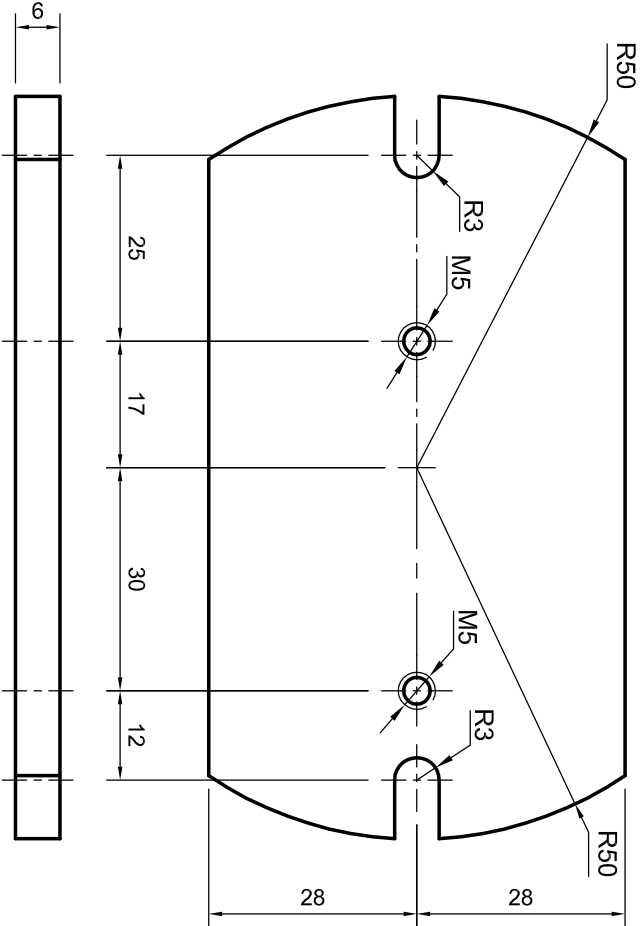
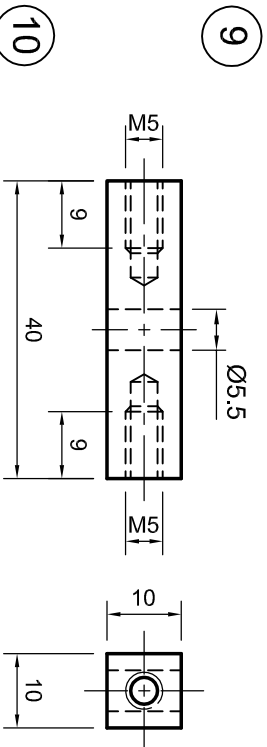
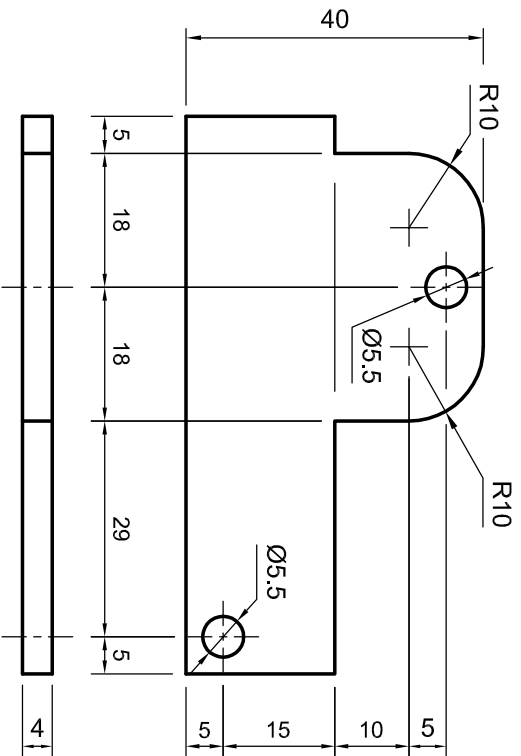
PÁIRT	ÁBHAR	PRÓISEAS
1	Polacarbónáit thrédhearcach	A mharcáil amach, a dhruileáil, a tapa agus a dheilbhiú.
2	Prás	A mharcáil amach, a dhruileáil agus a dheilbhiú.
5	Alúmanam	A mharcáil amach, a dhruileáil agus a dheilbhiú.
9	Alúmanam	A mharcáil amach agus a dhruileáil.
10	Polacarbónáit thrédhearcach	A mharcáil amach, a dhruileáil, a tapa agus a dheilbhiú.

Nóta: (i) Rinneadh na páirteanna 3, 4, 6, 7, 8, 11 agus 12 roimh lá an scrúdaithe. Tá páirt 9 páirtdeanta. Agus tú ag baint úsáide as na scriúnná, an cnó agus an leicneán a sholáthraítear, cóimeáil an Clampa faoi mar atá sa líníocht chóimeála.

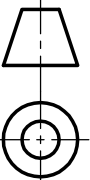
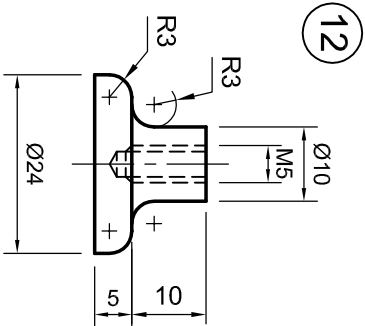
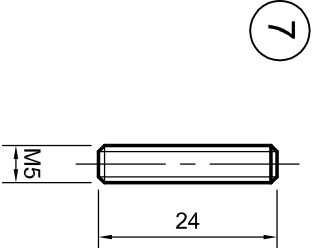
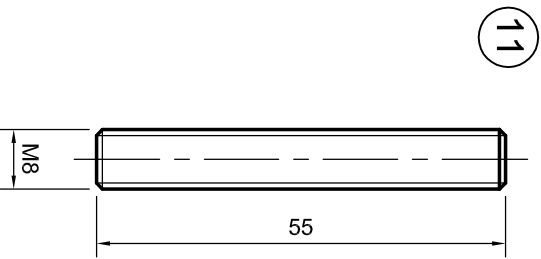
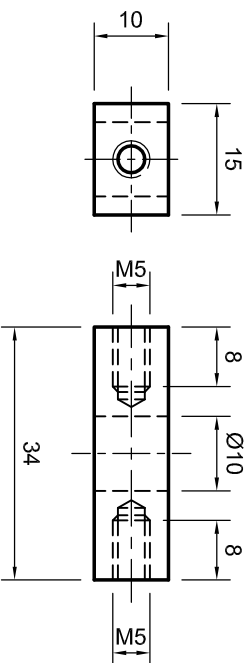
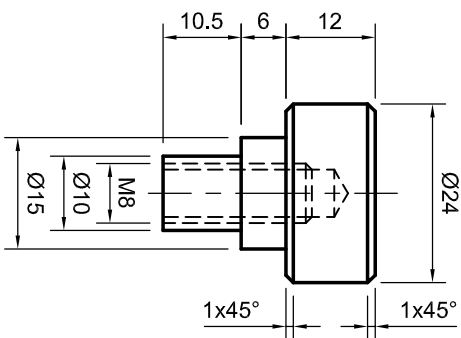
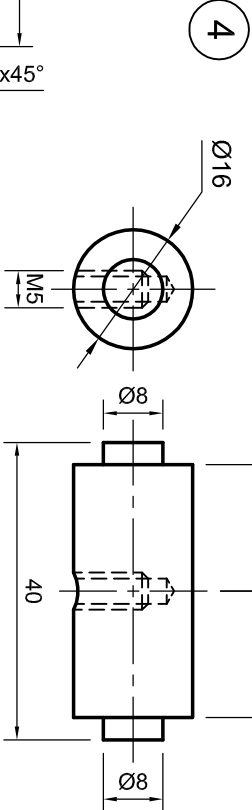
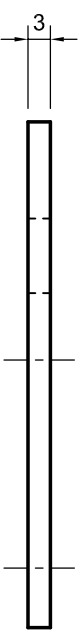
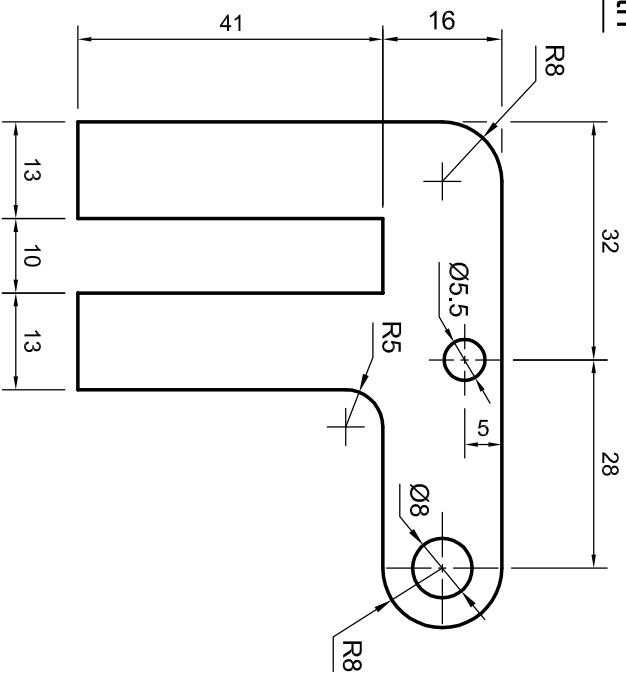
(ii) Tá tábhacht ag baint le cruinneas, le bailchríoch agus le hoibriú an triailphíosa.



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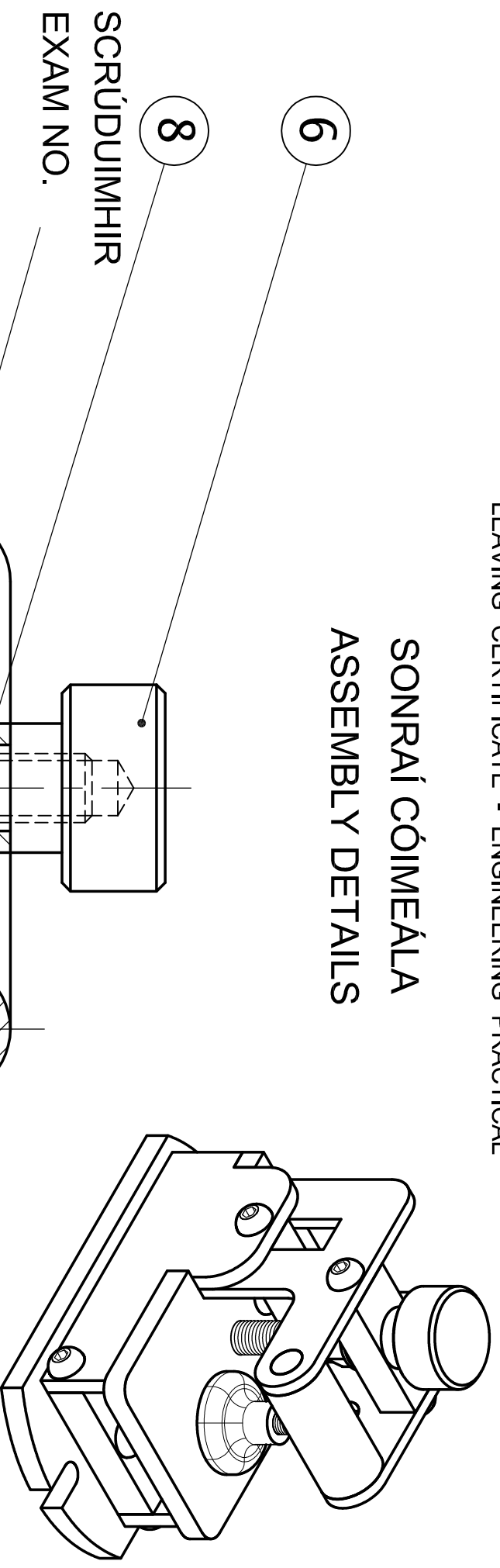


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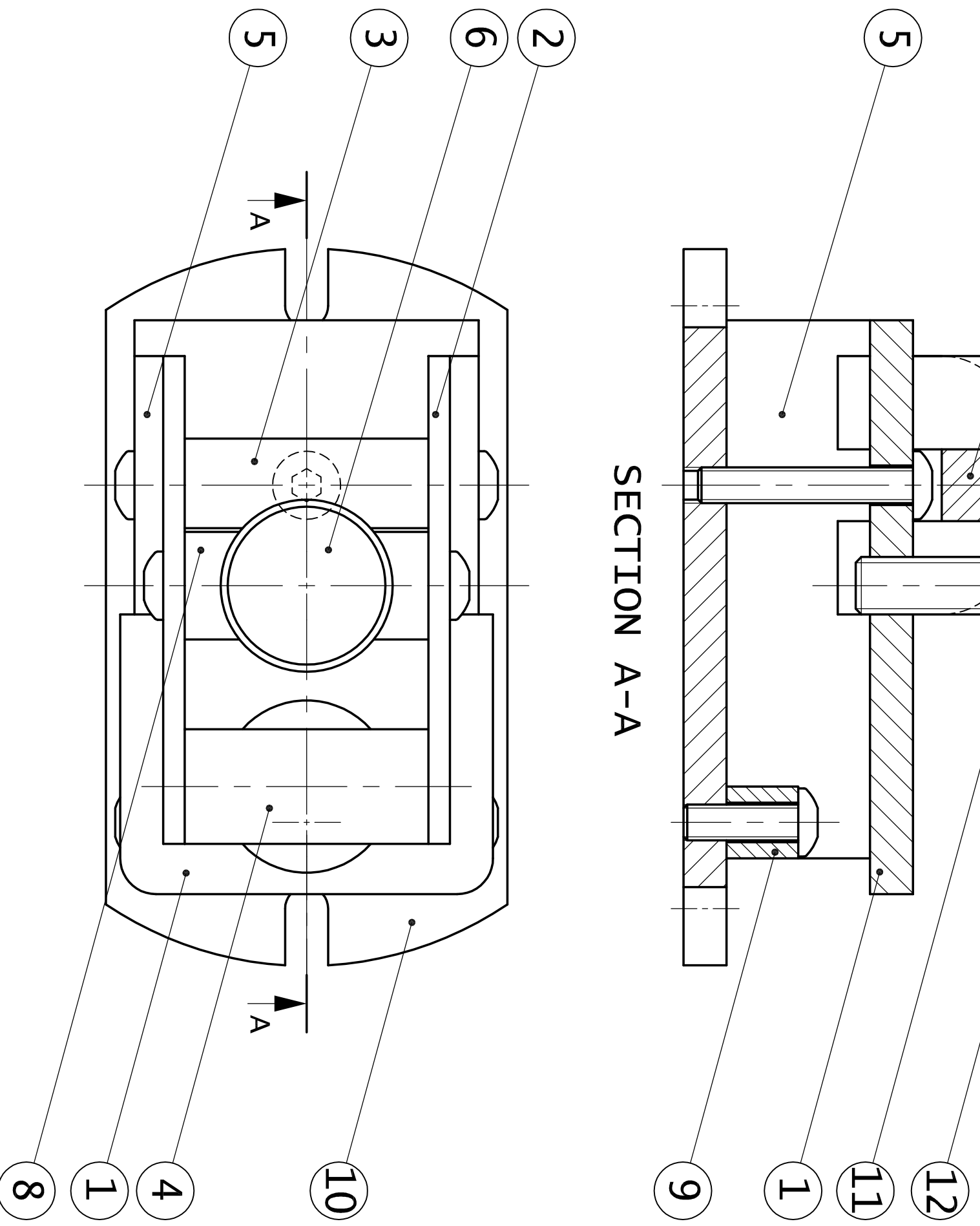


Nóta: Tabhair ar ais an scrúdpháipéar seo don Fheidheoir ag deireadh an scrúdaithe.
Note: Hand up this examination paper to the Superintendent at the end of the examination.

SONRAÍ CÓIMEÁLA ASSEMBLY DETAILS



SECTION A-A



Nóta: Tabhair ar ais an scrúdháipéar seo don Fheithneir ag deireadh an scrúdaithe.

Note: Hand up this examination paper to the Superintendent at the end of the examination.

