



Coimisiún na Scrúduithe Stáit State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2024

ENGINEERING – MATERIALS AND TECHNOLOGY

(Ordinary level – 200 marks)

THURSDAY, 6 JUNE

MORNING 9:30 – 12:00

Answer **any FOUR** questions.

All questions carry equal marks.

Question 1.

(50 marks)

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

(a) Identify mechanism **A** and give **one** application for it.



mechanism A

(b) Explain the term *electrical conductor*.

(c) State **one** benefit of making prototypes as part of the design process.

(d) Give **one** reason for using cutting fluids when machining.

(e) State **two** safety precautions that should be followed when using a metal shears.



metal shears

(f) Explain the term *alloy* and name **one** alloy.

(g) State **two** properties of aluminium.

(h) Name the type of chuck shown and give **one** suitable use for it.



chuck

(i) Explain the term *ferrous metal* and give **one** example of a ferrous metal.

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



(i) Wire stripper,



(ii) Knurling tool,



(iii) Scroll saw.

(k) Explain **any one** of the following:

(i) Drone technology,

(ii) Autonomous vehicle,

(iii) Solar energy.

(l) Define the term *brittleness* and name **one** material that is brittle.

(m) Explain **any one** of the following:

(i) Swarf,

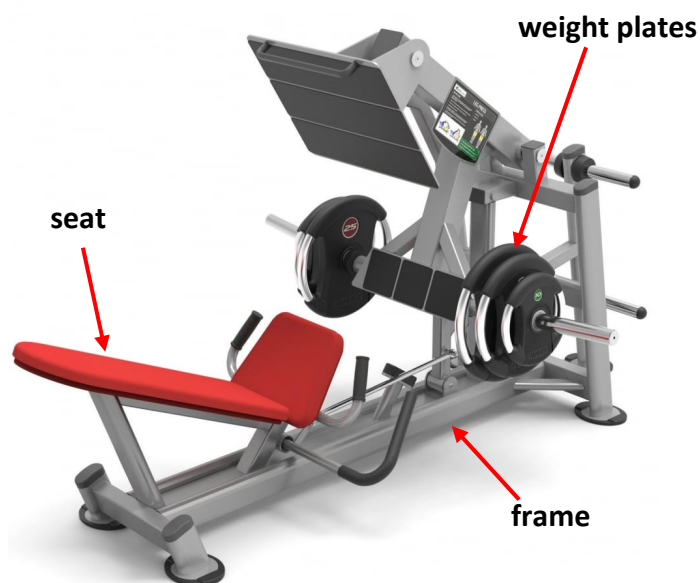
(ii) Taper tap,

(iii) Deburring.

Question 2.

(50 marks)

- (a) Name the metals produced from **each** of the furnaces listed below:
- (i) Blast furnace, (ii) Cupola furnace, (iii) Electric arc furnace.
- (b) Select **one** of the furnaces listed at Q2 (a) above and answer **each** of the following:
- (i) Draw a labelled diagram of the selected furnace;
- (ii) List the materials used in the charge;
- (iii) Describe how the charge is heated.
- (c) The leg press weight machine shown below is a common feature in most gyms.
- (i) Name **one** suitable material for **each** of the parts labelled on the leg press weight machine.
- (ii) State **one** reason for the selection of **each** material.



leg press weight machine

- (d) The coupling shown is assembled using a temporary joining process.
- (i) State **one** advantage of using a temporary joining process.
- (ii) Identify a temporary joining process which could be used in the assembly of the coupling shown.



coupling

Question 3.

(50 marks)

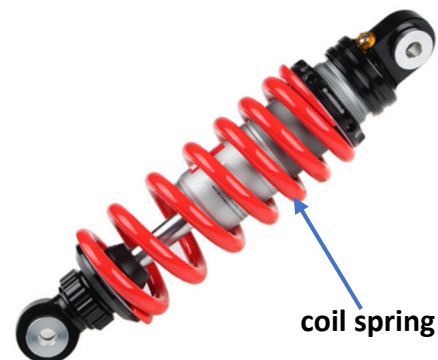
(a) In relation to the heat treatment of steel, explain **any two** of the following:

- (i)** Normalising, **(ii)** Quenching, **(iii)** Carbon content.

(b) The coil spring shown is annealed, hardened and tempered during the manufacturing process.

Describe **any two** of the following heat treatment processes:

- (i)** Annealing,
(ii) Hardening,
(iii) Tempering.



(c) State **two** safety precautions to be observed during the heat treatment of metals.

(d) Explain **any two** of the following metal properties:

- (i)** Elasticity, **(ii)** Melting point, **(iii)** Compressive strength.

OR

(d) State **one** advantage for **each** of the robotic processes shown below:



(i) Robotic lawn mowing,

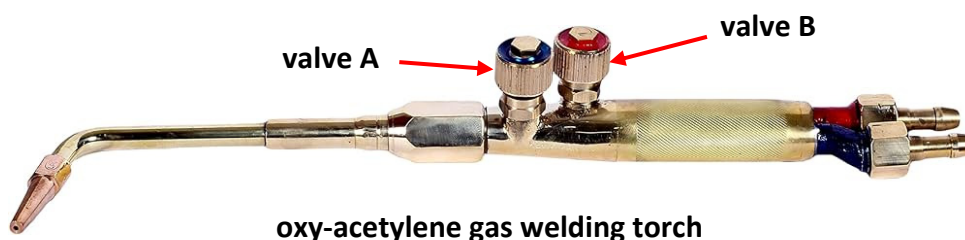
(ii) Robotic waste sorting,

(iii) Robotic welding.

Question 4.

(50 marks)

- (a) An oxy-acetylene gas welding torch is shown below.
- (i) Explain the function of valve **A** and the function of valve **B**.



- (ii) Name **two** flame types that can be produced in oxy-acetylene welding.
- (b) State the function of **any three** of the following in manual metal arc welding:



- (i) Earth clamp, (ii) Welding mask, (iii) Leather gloves, (iv) Welding magnet.

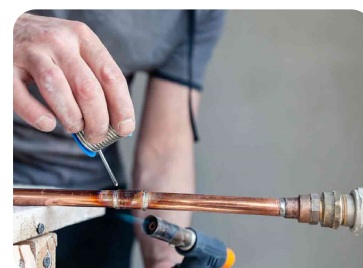
- (c) Answer **any three** of the following:

- (i) Explain the function of the plastic casing on the electrode holder shown.
- (ii) Explain why it is important to work in a well-ventilated area when using adhesives.
- (iii) State **one** reason why flux is required when soldering.
- (iv) Give **one** advantage of using a locknut when assembling project work.



electrode holder

- (d) State **two** safety precautions to be observed when soldering copper pipes and fittings.



Question 5.

(50 marks)

- (a)** The items shown below are produced by various plastic manufacturing processes.



Chair



Water bottle



Toy car

- (i)** Name a plastic manufacturing process used in the production of **each** of the items shown above.
- (ii)** Describe with the aid of a labelled diagram **any one** of the manufacturing processes, named by you, at **Q5 (a)(i)** above.
- (b)** Select **any two** of the plastic materials listed below **and** identify **one** suitable product which can be manufactured from **each** of the plastic materials selected.
- (i)** Polyvinyl Chloride (PVC),
- (ii)** Nylon,
- (iii)** Polystyrene (PS),
- (iv)** Acrylonitrile Butadiene Styrene (ABS).
- (c)** State **two** safety precautions to be observed when using a strip heater.
- (d)** In relation to plastic technology, describe **any two** of the following:



(i) Plastic dip coating,



(ii) Thermosetting plastics,

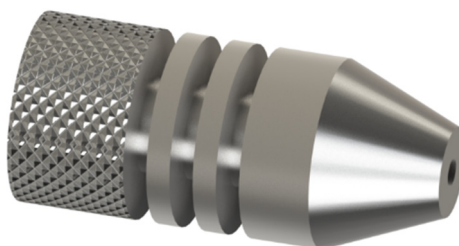


(iii) 3D Printing.

Question 6.

(50 marks)

- (a) The engineering component shown is to be manufactured on a centre lathe. Identify **three** lathe processes used to manufacture the engineering component.



engineering component

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

- (i) Rake angle,
- (ii) Chuck key,
- (iii) Depth of cut,
- (iv) Pilot hole.

- (c) A part for a centre lathe is shown opposite.

- (i) Name the centre lathe part shown.
- (ii) Identify **one** use for this centre lathe part.
- (iii) State **two** safety precautions to be observed when using a centre lathe.



OR

- (c) CNC Laser cutting is frequently used in schools and industry as part of the manufacturing process.

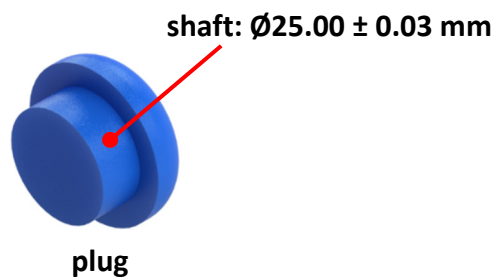
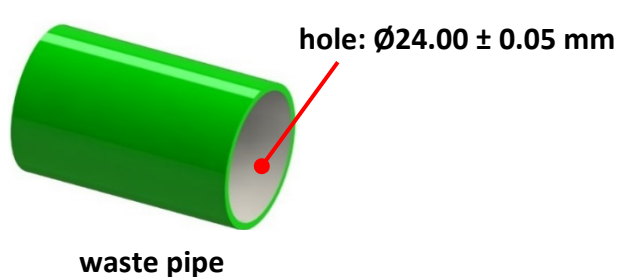
- (i) Explain the term CNC.
- (ii) List **two** advantages of using a CNC laser cutter in engineering manufacture.
- (iii) Identify **one** safety precaution to be observed when using a CNC laser cutter.



Question 7.

(50 marks)

- (a) (i) Name **any two** types of fit in a hole and shaft assembly.
- (ii) Describe **any one** of the fits named at Q7 (a)(i) above.
- (b) A waste pipe and plug are machined to the dimensions shown below.



- State the:
- (i) Nominal diameter of the **hole**;
 - (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 of **each** instrument named.



(i)



(ii)



(iii)

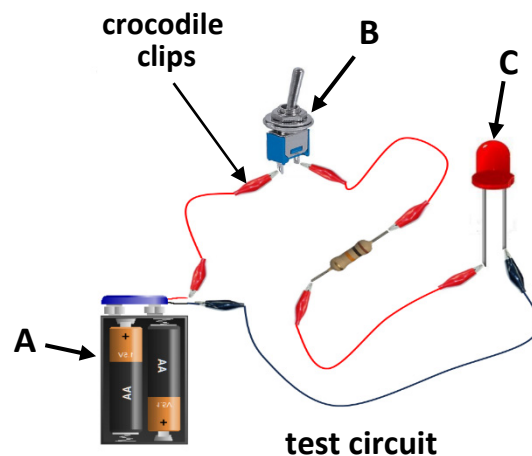


(iv)

OR

- (c) The test circuit shown uses crocodile clips for assembly.

- (i) Name the **three** electronic components labelled **A**, **B** and **C**.
- (ii) Draw the electronic symbol for **each** of the electronic components **A**, **B** and **C**.
- (iii) State **one** advantage of using crocodile clips when assembling test circuits.





Leaving Certificate Examination, 2024

Engineering - Practical
(150 marks)

Morning: 10:00 to 1:00 - Afternoon: 2:00 to 5:00

Please Read Carefully

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- (b) Candidates are not permitted to communicate with or assist one another.
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7	U-Aluminium	Mark out, drill and shape.
10	Clear Polycarbonate	Mark out, drill, tap and shape.

Note: (i) Parts 1, 4, 5, 6, 8 and 9 have been made prior to examination day.
Using the screws supplied assemble the mechanism, as detailed on the assembly drawing.
(ii) **Accuracy, finish and function are important.**



Scrúdú na hArdteistiméireachta, 2024

Innealtóireacht - Praiticiúil
(150 marc)

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Léigh na Treoracha seo go cúramach le do thoil

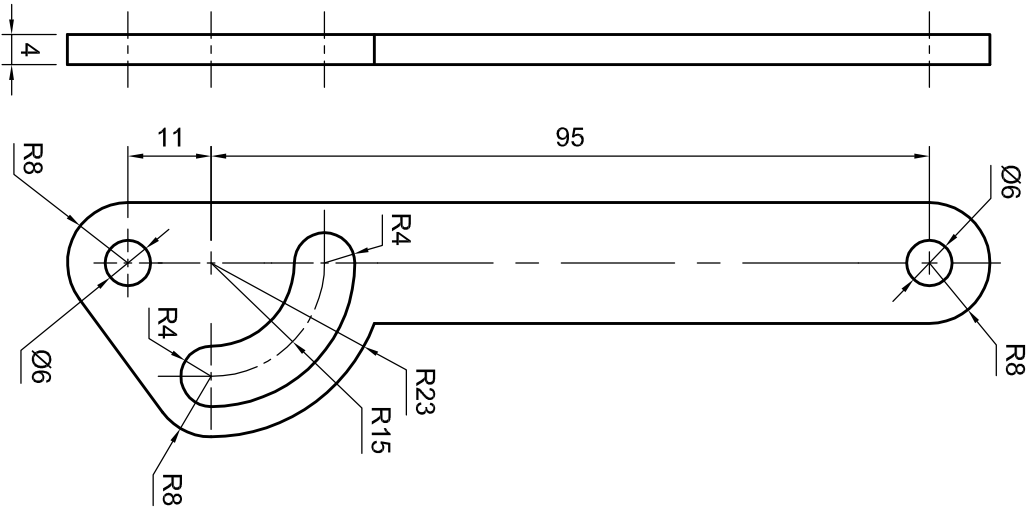
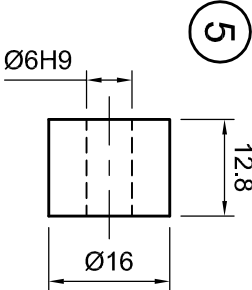
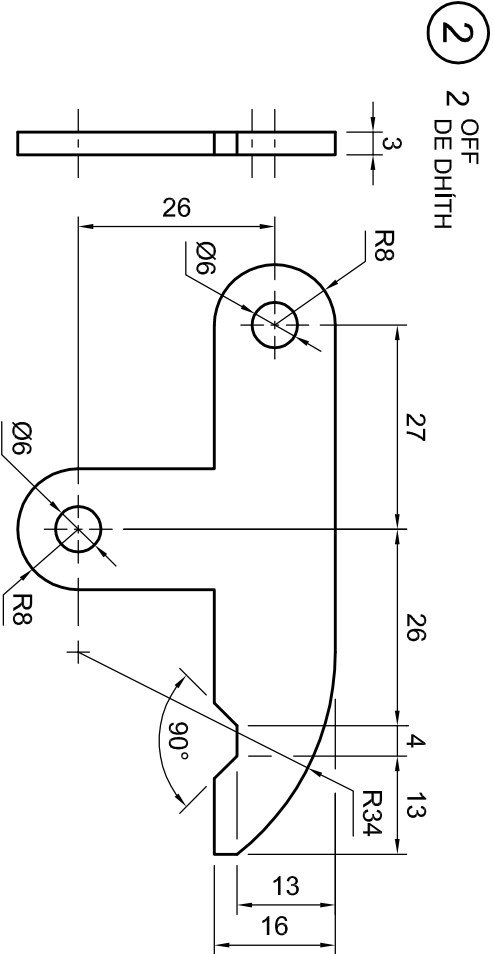
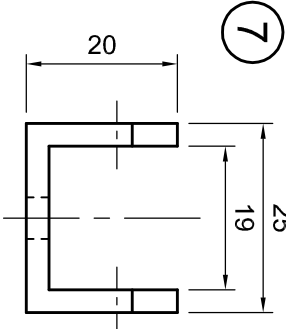
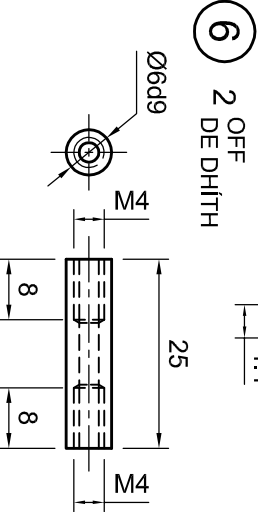
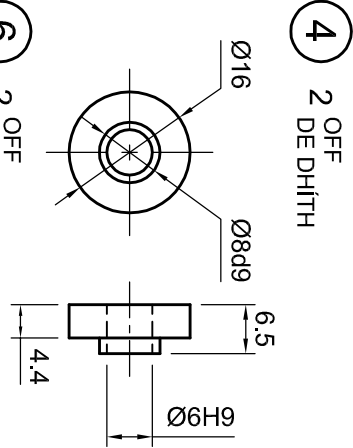
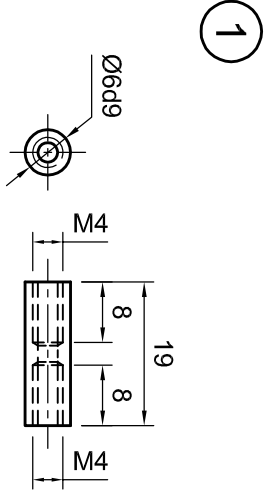
Treoracha

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

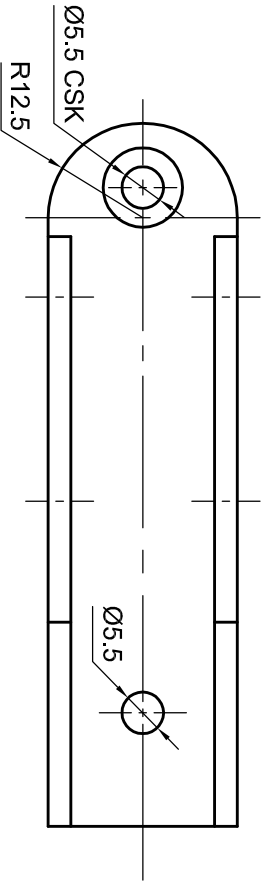
PÁIRT	ÁBHAR	PRÓISEAS
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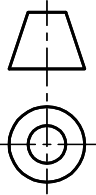
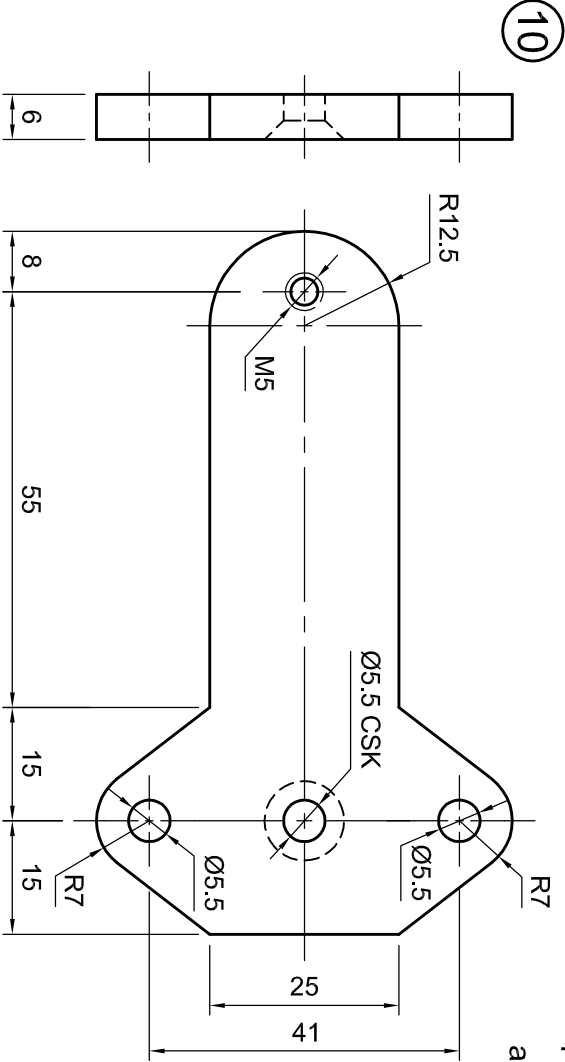
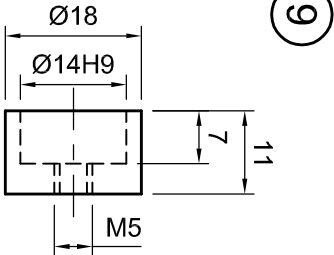
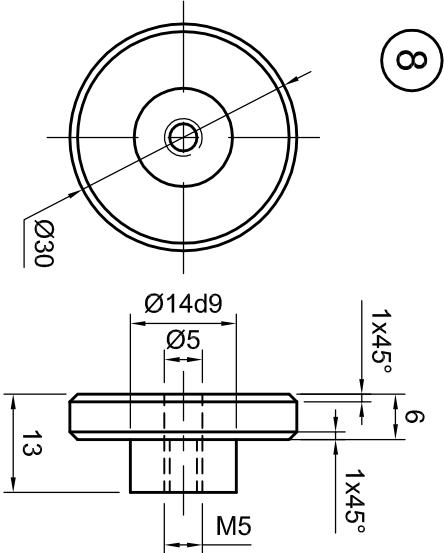
Scríobh do Scrúduitheir sa bhosca seo:

Write your Examination Number in this box:

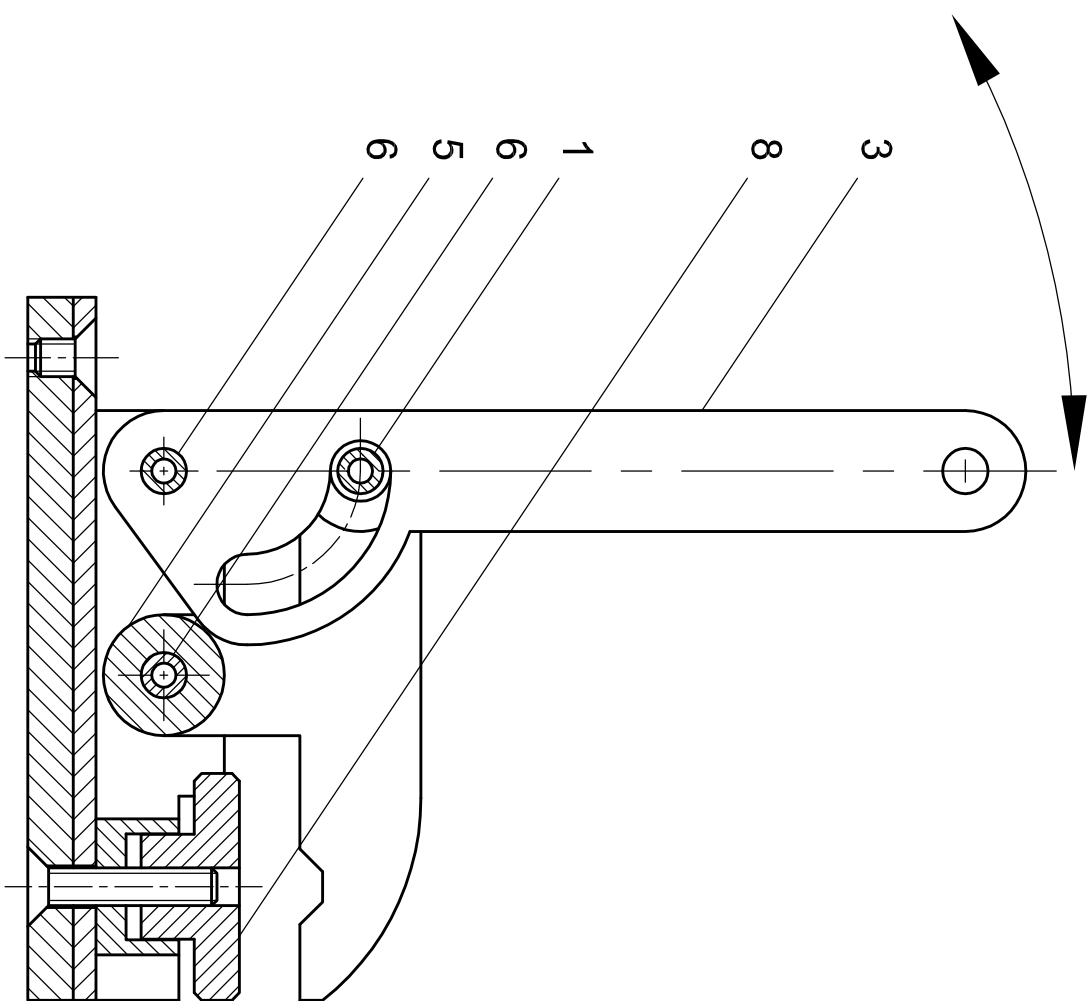
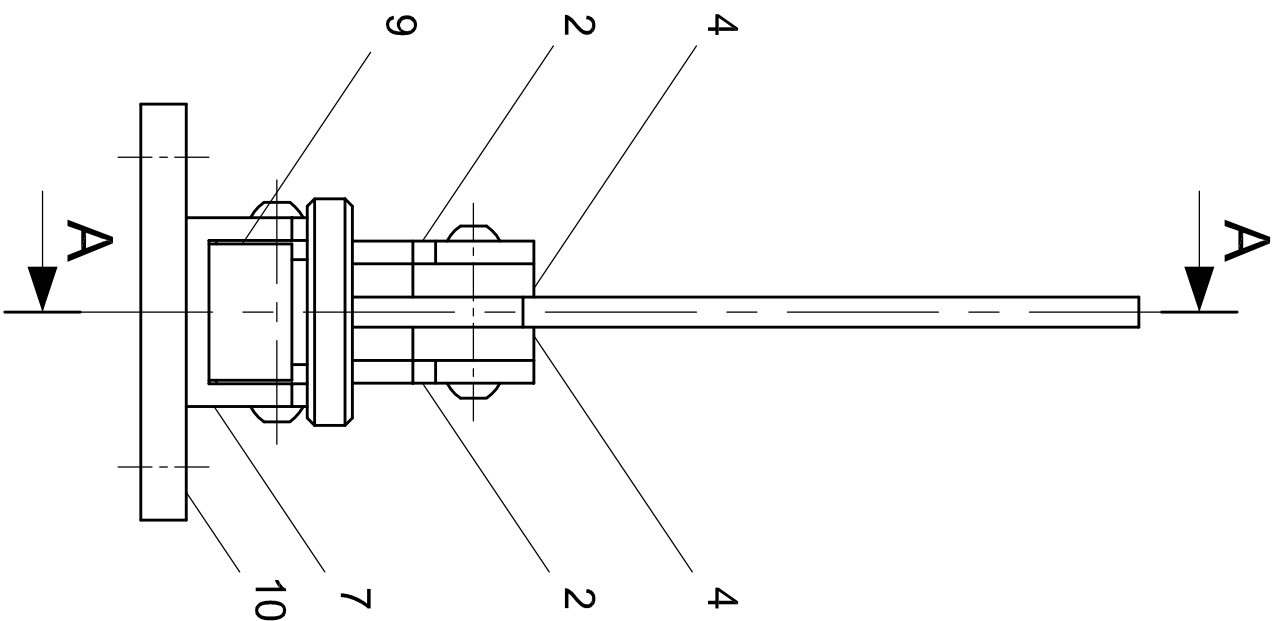


Cuir an scrúdpháipéar seo agus an triailphíosa isteach i gclúdach an iarrthóra atá curtha ar fáil, agus tabhair an clúdach don Fheidhneir ag deireadh an scrúdaithe.

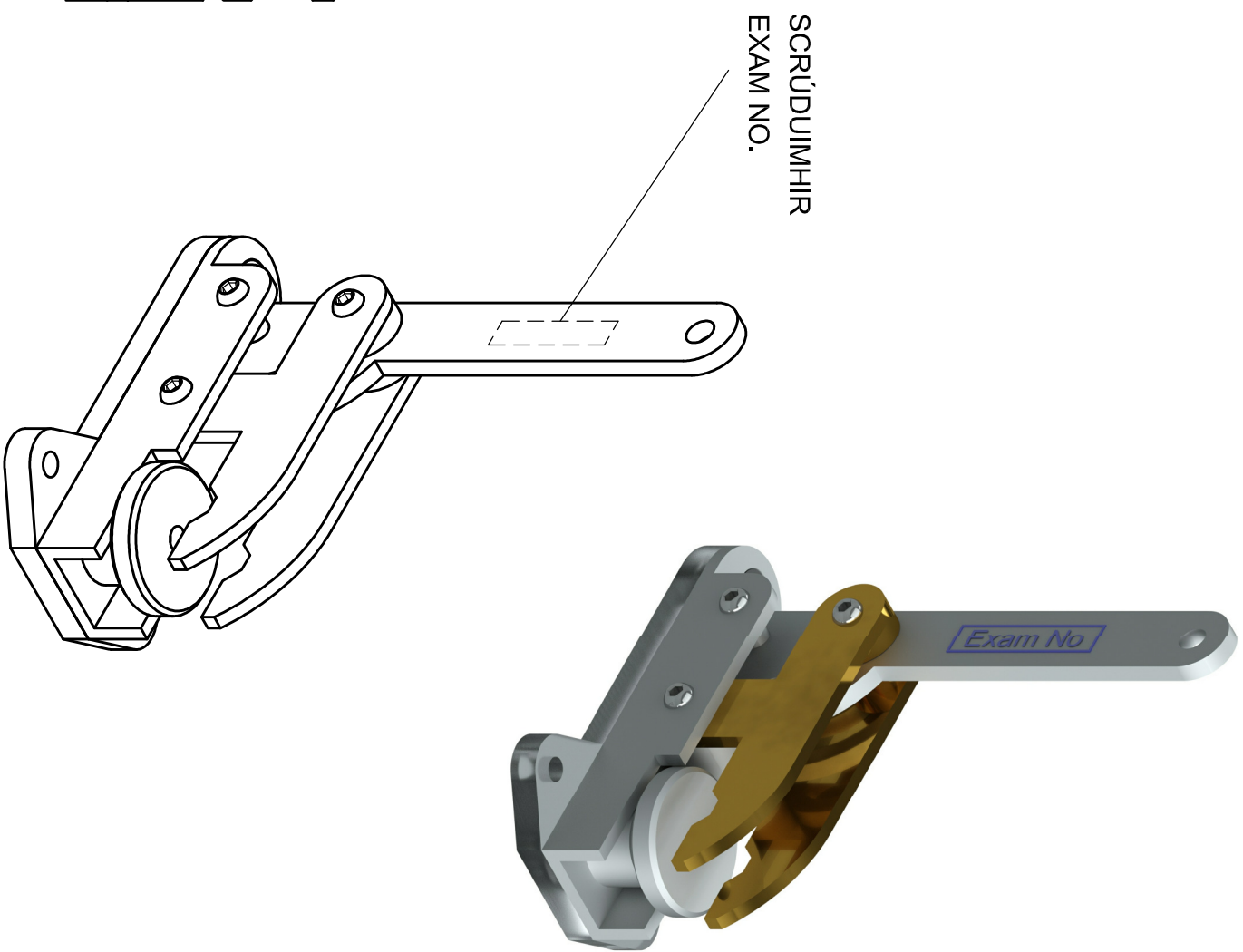
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THALL
OVER



SECTION A-A



SCRÚDUIMHIR
EXAM NO.

ASSEMBLY DETAILS
SONRAÍ CÓIMEÁLA

THALL
OVER



Leaving Certificate Examination, 2024

Engineering - Practical
(150 marks)

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Scrúdú na hArdteistiméireachta, 2024

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(150 marc)

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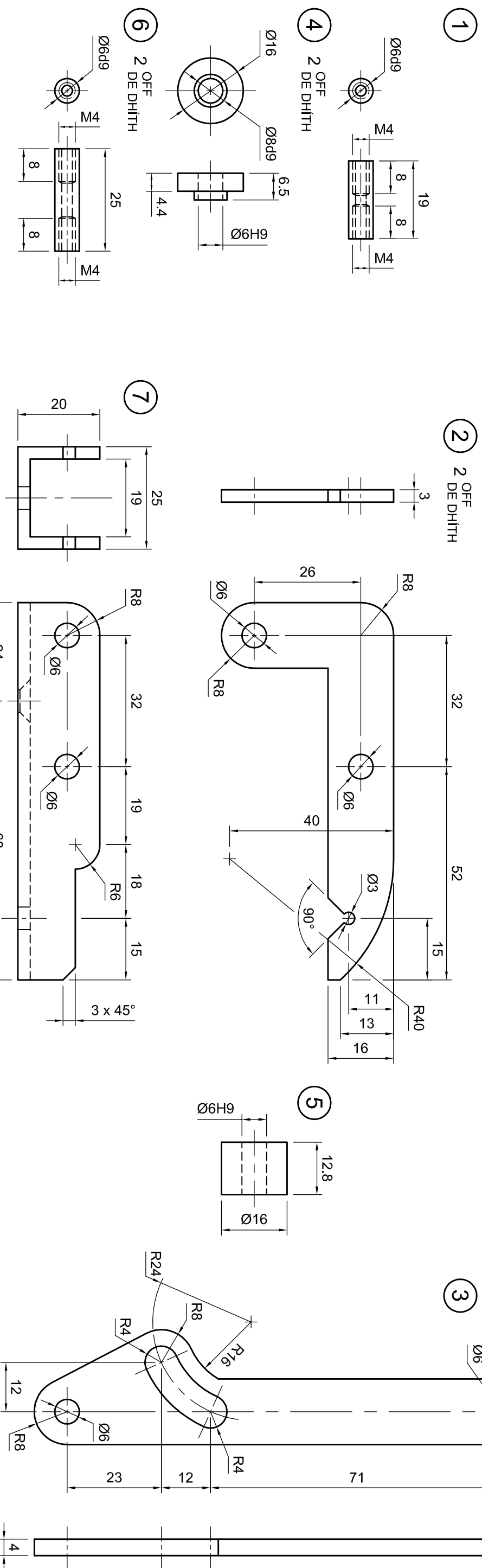
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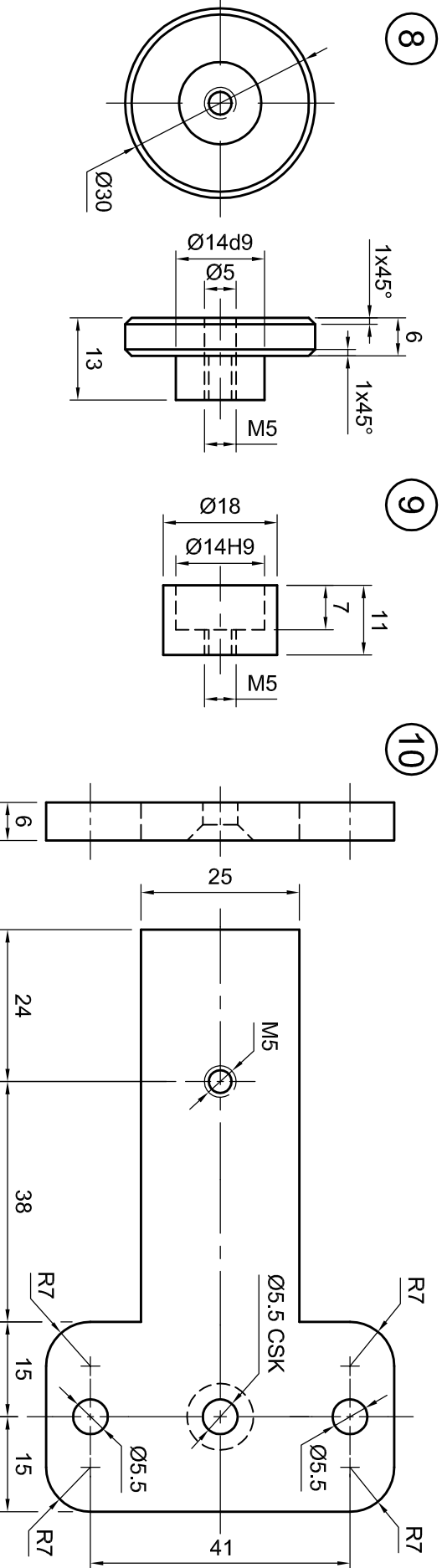
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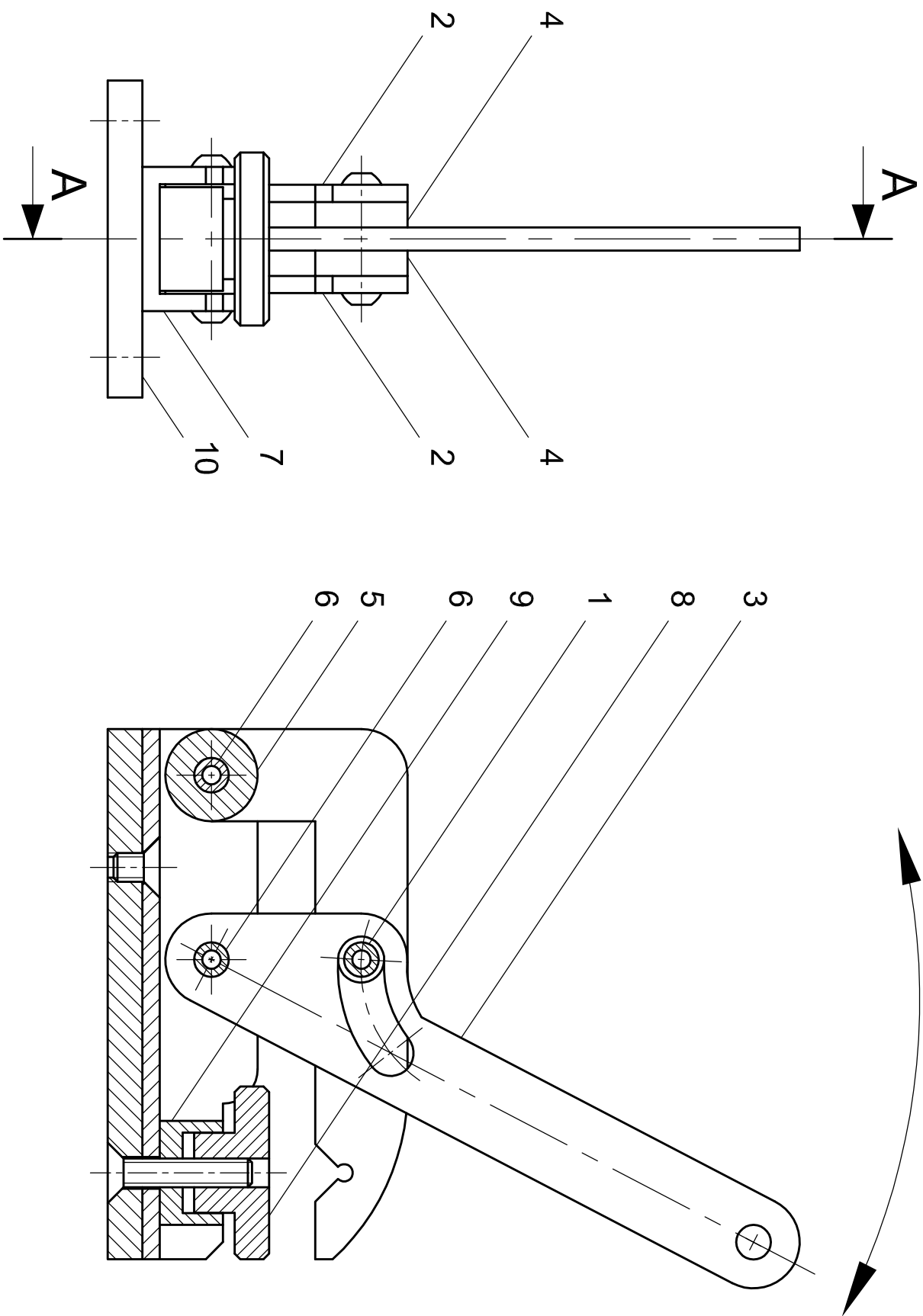
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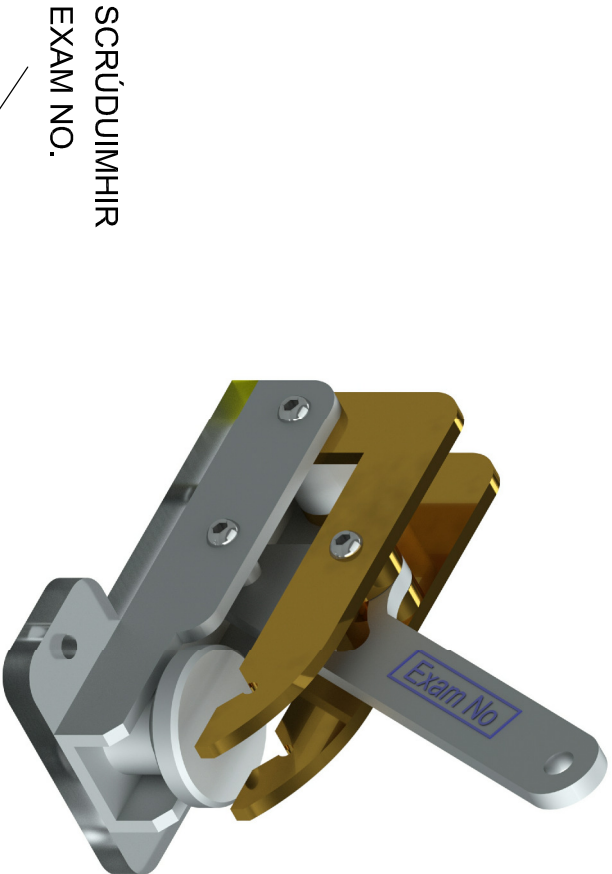
Scríobh do Scrúduitheoir sa bhosca seo:
Write your Examination Number in this box:



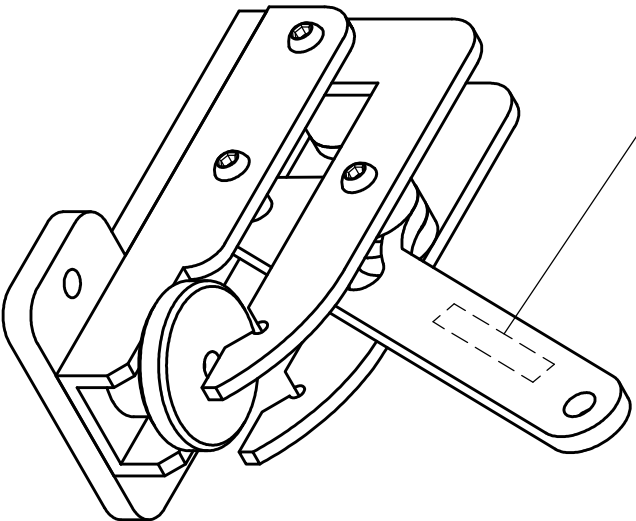
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SECTION A-A



SCRÚDUIMHIR
EXAM NO.



ASSEMBLY DETAILS
SONRAÍ CÒIMEÁLA

THALL
OVER



Leaving Certificate Examination, 2024

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(150 marks)

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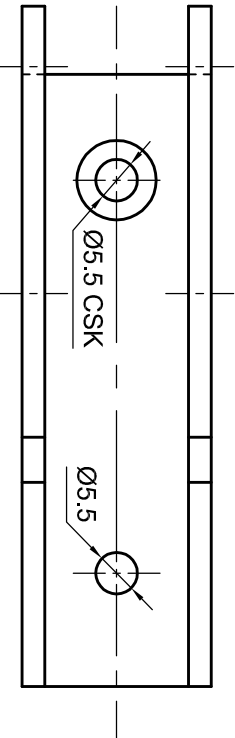
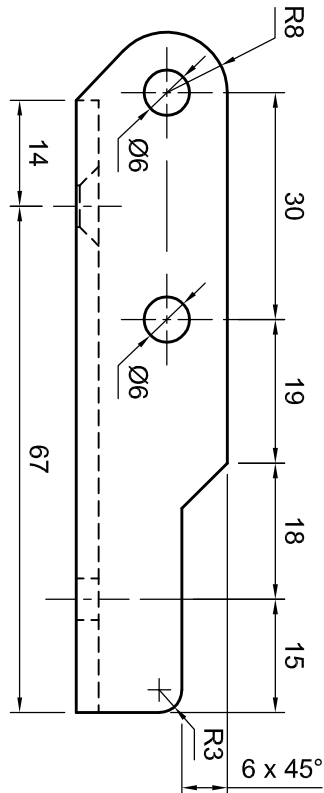
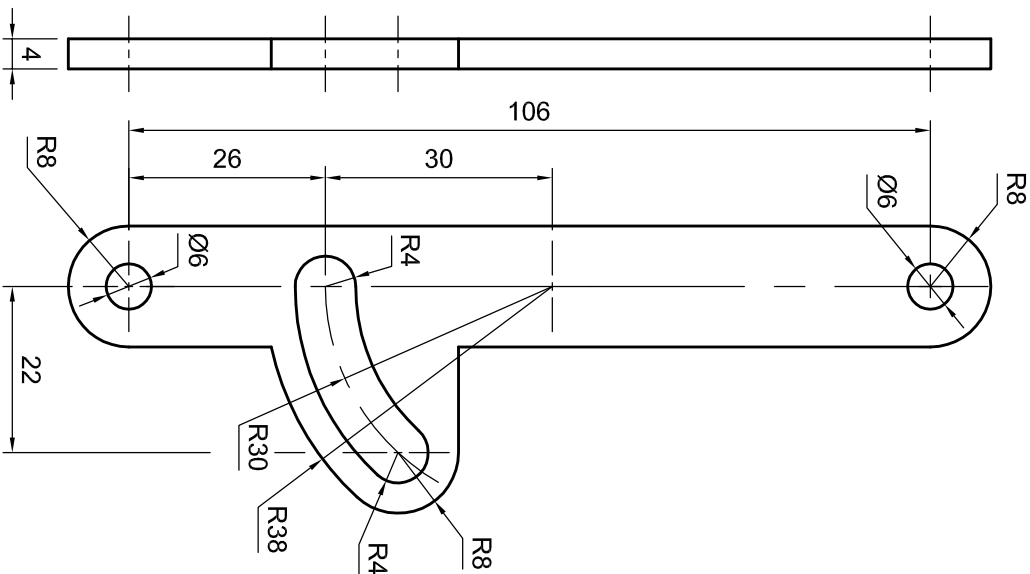
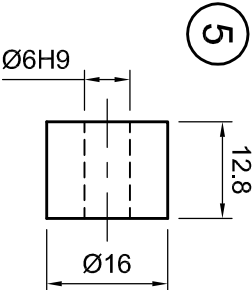
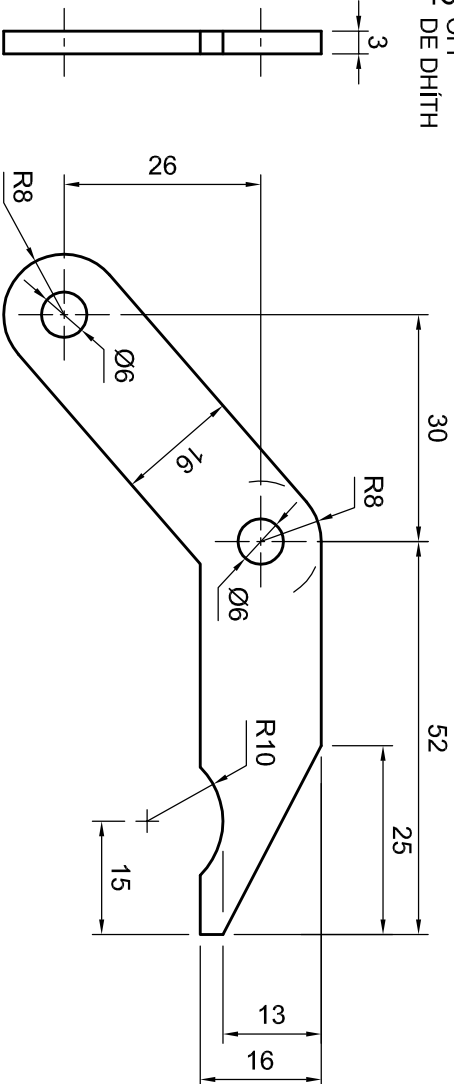
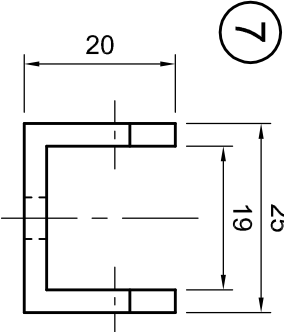
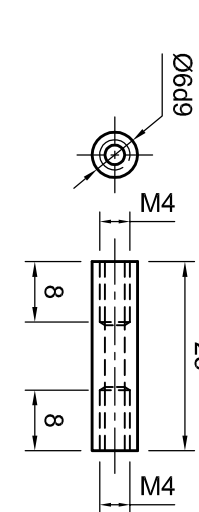
Treoracha

- (a) Ba chóir don **mhúinteoir** Scrúduimhir an iarrthóra a stampáil nó a ghreanadh ar an triailphíosa san ionad a thaispeántar ar an scrúdpháipéar - 2024. 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) Scríobh do Scrúduimhir sa bhosca atá ann di ar an scrúdpháipéar - 2024. M74A(L₁).
- (d) Cuir an scrúdpháipéar - 2024. M74A(L₁) agus an triailphíosa isteach i gclúdach an iarrthóra atá curtha ar fáil agus tabhair an clúdach don Fheitheoir ag deireadh an scrúdaithe.

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

PÁIRT	ÁBHAR	PRÓISEAS
2	Prás	A mharcáil amach, a dhruileáil agus a dheilbhiú.
3	Alúmanam	A mharcáil amach, a dhruileáil agus a dheilbhiú.
7	U-Alúmanam	A mharcáil amach, a dhruileáil agus a dheilbhiú.
10	Polacarbónáit thrédhearcach	A mharcáil amach, a dhruileáil, a tapa agus a dheilbhiú.

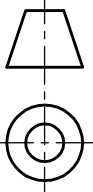
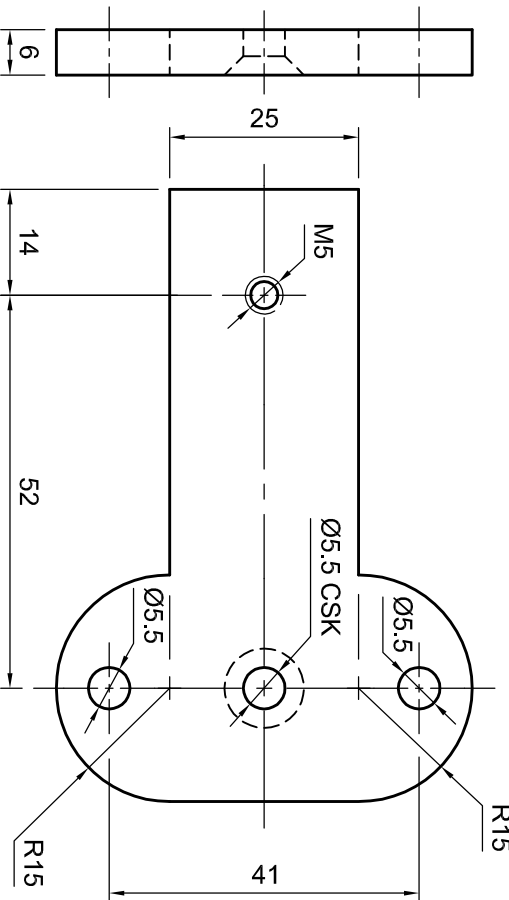
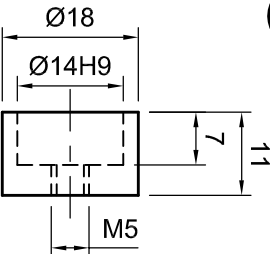
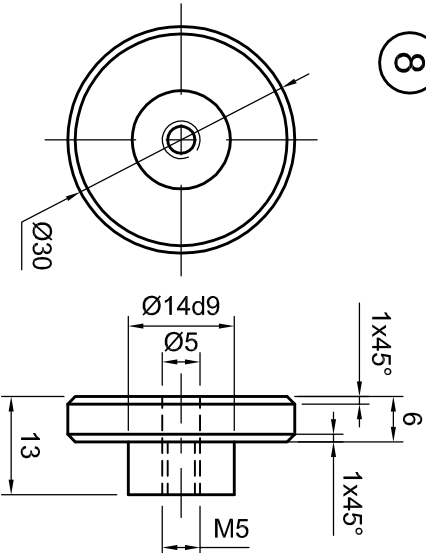
- Nóta:** (i) Rinneadh na páirteanna 1, 4, 5, 6, 8 agus 9 roimh lá an scrúdaithe.
Agus tú ag baint úsáide na scriúnna a sholáthraítear, cóimeáil an mheicníocht faoi mar atá sa líníocht chóimeála.
- (ii) Tá tábhacht ag baint le cruinneas, le bailchríoch agus le hoibriú an triailphíosa.



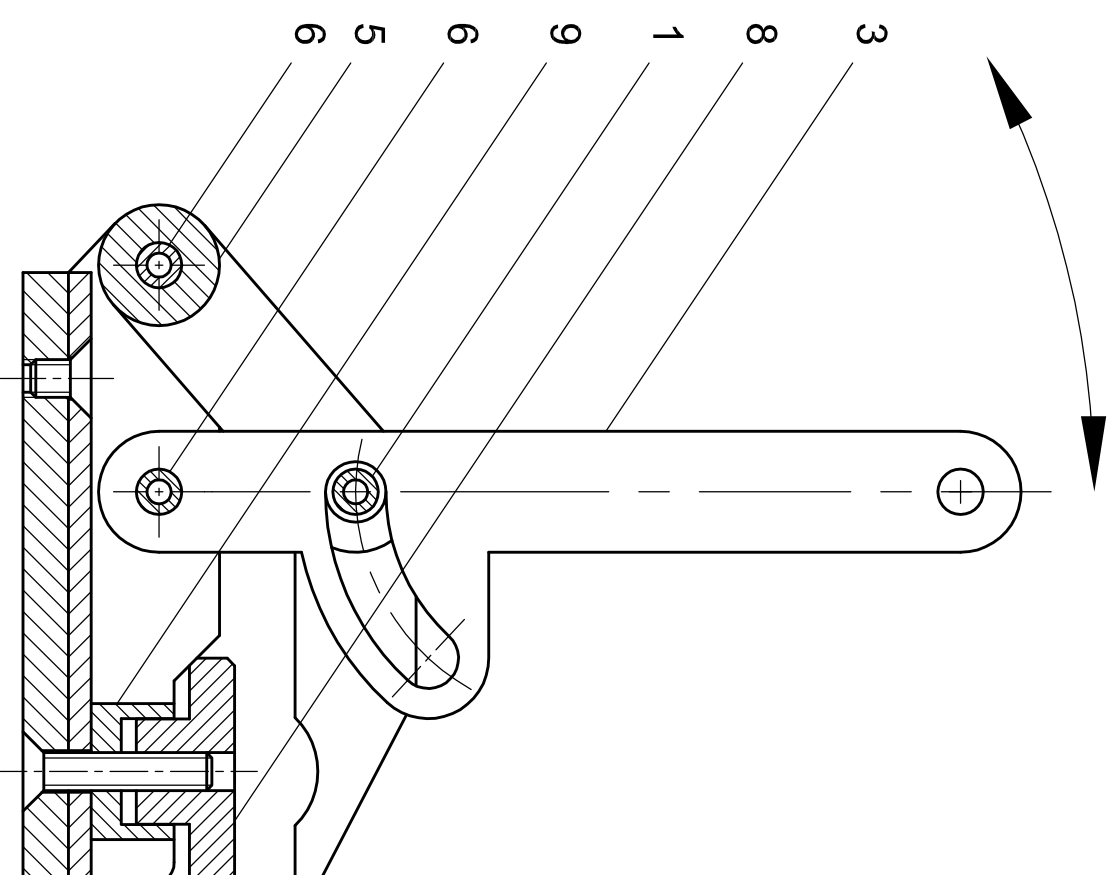
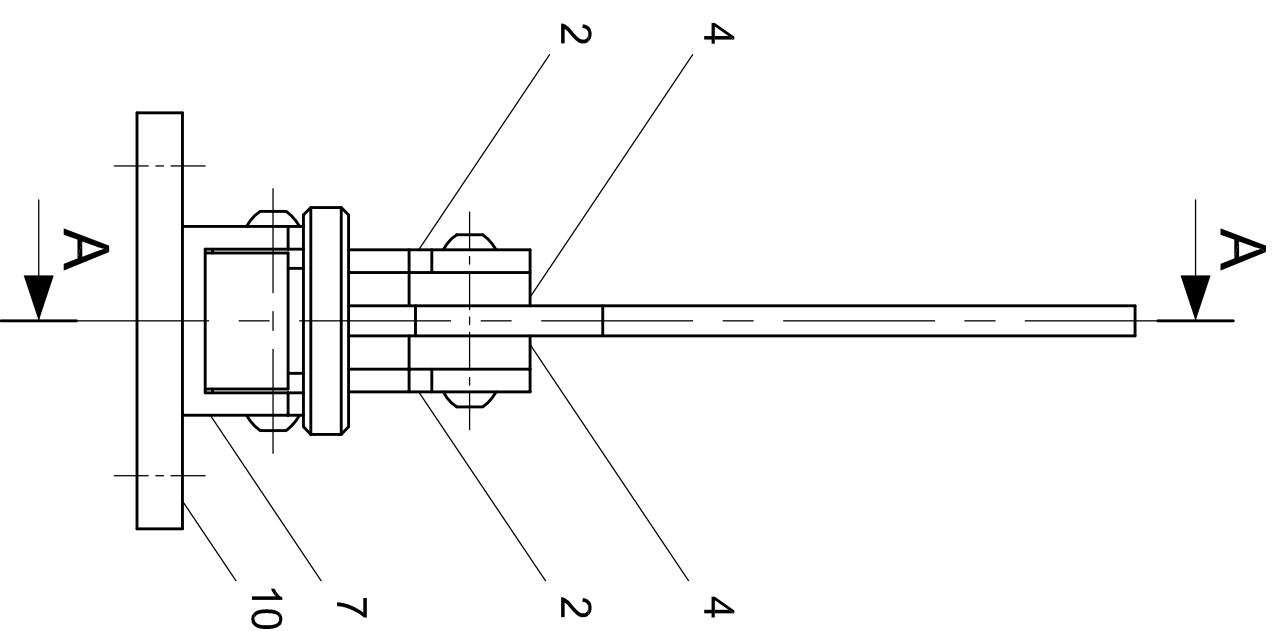
Cuir an scrúdpháipéar seo agus an triailphiosa isteach i gclúdach an iarrthóra atá curtha ar fáil, agus tabhair an clúdach don Fheidhneoir ag deireadh an scrúdaithe.

Put this examination paper and the test-piece into the candidate envelope supplied, and hand up the envelope to the Superintendent at the end of the examination.

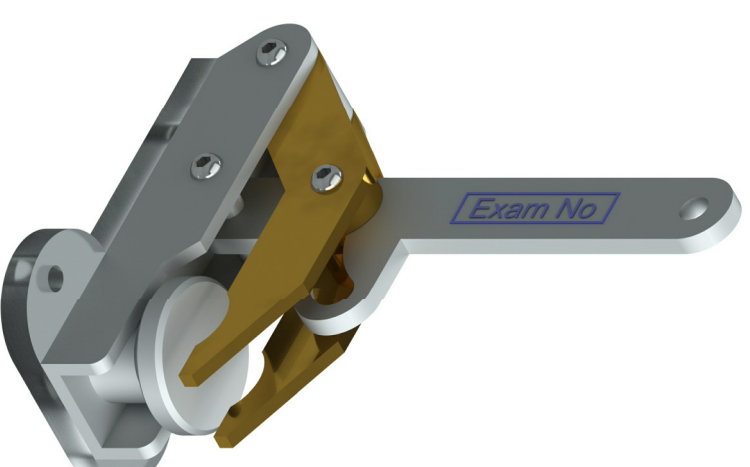
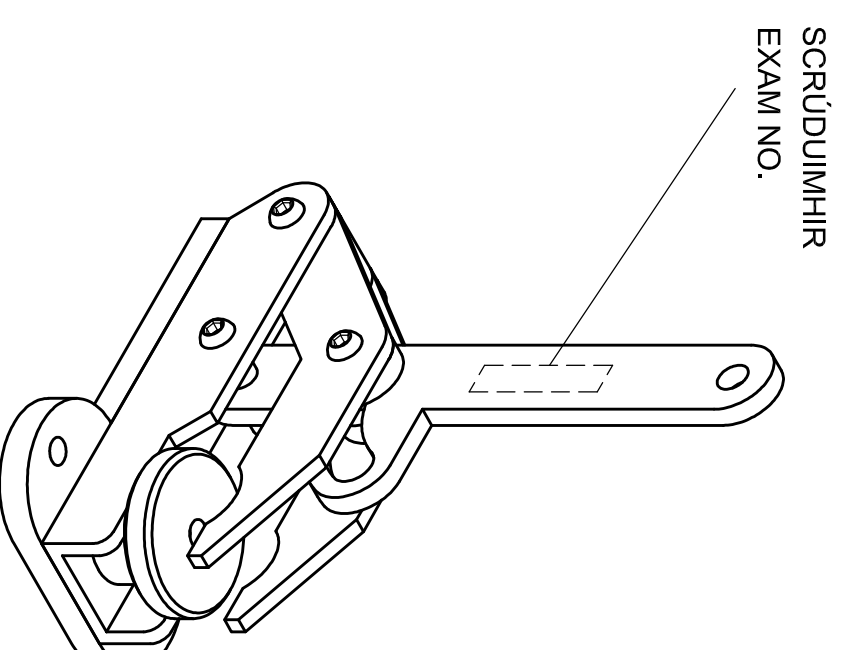
Scriobh do Scrúdumhir sa bhosca seo:
Write your Examination Number in this box:



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SECTION A-A



ASSEMBLY DETAILS SONRAÍ CÒIMEÁLA

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