



Coimisiún na Scrúduithe Stáit State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2025

ENGINEERING – MATERIALS AND TECHNOLOGY

(Ordinary level – 200 marks)

THURSDAY, 5 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) State **two** safety precautions to be observed when using a bandsaw.
- (b) Explain the term *permanent joint* **and** give **one** example of a *permanent joint* in engineering.
- (c) State **one** reason for testing electronic circuits before assembly.
- (d) Give **one** reason why it is important to work in a ventilated area when using adhesives.
- (e) State **two** advantages of using a 3D printer for manufacture in engineering.
- (f) Explain the term *non-ferrous* **and** name **one** *non-ferrous* metal.
- (g) Give **one** reason for producing a prototype when designing new products.
- (h) Define *malleability* in relation to the properties of materials **and** name **one** material which is malleable.
- (i) Give **one** reason why metal edges are deburred.
- (j) Explain **any one** of the following:
 - (i) Artificial intelligence (AI),
 - (ii) Renewable energy,
 - (iii) Virtual reality (VR).
- (k) Describe the main operating features of **any one** of the following:



bandsaw



3D printer



deburring



(i) Hot wire strip heater,



(ii) Soldering iron,



(iii) Pop rivet gun.

- (l) Describe **any one** of the following:

(i) Internal thread,

(ii) Blind hole,

(iii) Countersunk hole.

- (m) Name the type of nut shown **and** state **one** application for it.

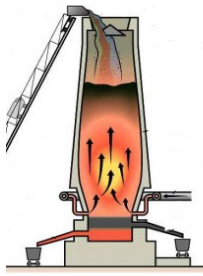


nut

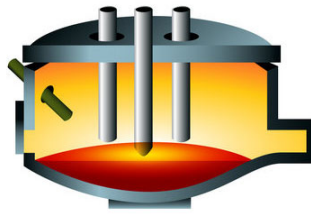
Question 2.

(50 marks)

- (a) Name **each** of the furnaces labelled **A**, **B** and **C** shown.



A



B



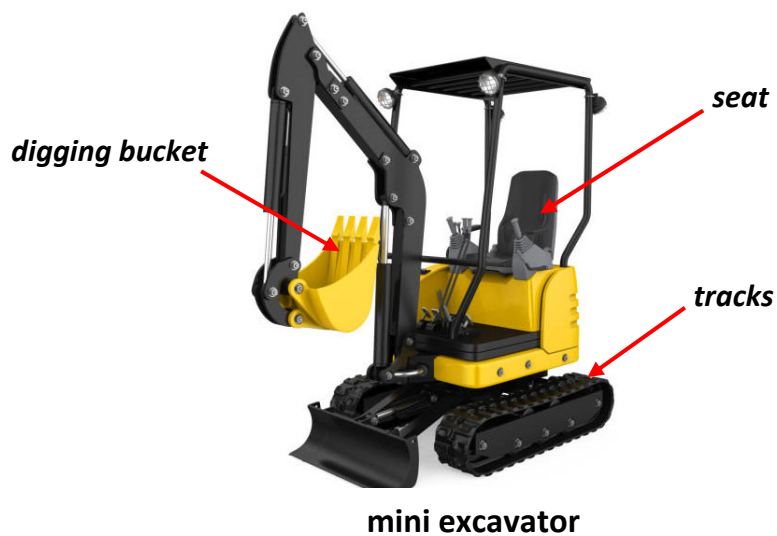
C

- (b) Select **one** of the furnaces labelled at **Q2(a)** above **and** answer **each** of the following:

- (i) List the materials used in the charge;
- (ii) Describe how the charge is heated;
- (iii) Name the metal produced.

- (c) You have been asked to manufacture a mini excavator as shown below.

- (i) Name a suitable material for **each** of the parts labelled on the mini excavator.
- (ii) State **one** reason for the selection of **each** material named.



mini excavator

- (d) Name **any two** of the mechanisms **A**, **B** and **C** shown below, **and** state **one** use for **each** mechanism named.



A



B



C

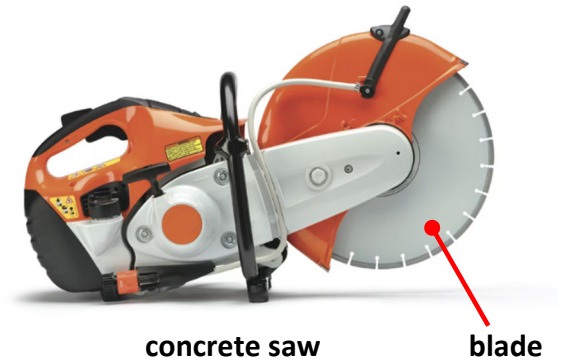
Question 3.

(50 marks)

(a) Explain the reason why **each** of the following heat treatment processes are carried out:

- (i)** Normalising,
- (ii)** Hardening.

(b) The blade of the concrete saw shown is annealed, tempered and quenched as part of the manufacturing process.



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

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

(c) State **two** items of personal protective equipment (PPE) that should be worn when working with hot metals.



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

- (i)** Toughness,
- (ii)** Melting point,
- (iii)** Brittleness.

OR

(d) Explain how robotic technology has changed **each** of the areas shown below:



(i) Parcel deliveries,



(ii) Medical procedures,

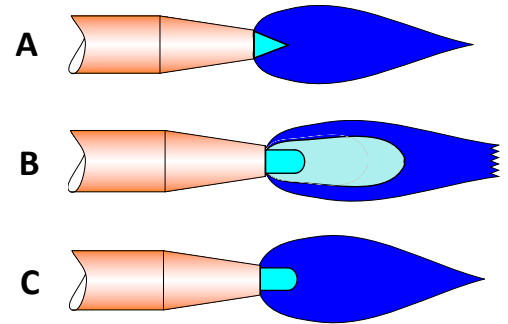


(iii) Mass production.

Question 4.

(50 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**.



- (b) Explain the function of **any three** of the following items used in manual metal arc welding:



(i) Welding curtain,



(ii) Chipping hammer,



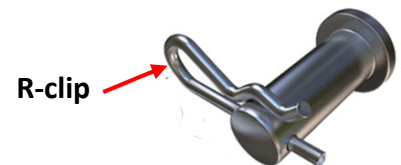
(iii) Electrode holder,



(iv) Welding shield.

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

- (i) Outline **one** benefit of using the *R-clip* shown.
- (ii) Suggest **one** method of joining sheet aluminium.
- (iii) Give **two** reasons why flux is required when soldering.
- (iv) Name tool **A** shown opposite **and** give **one** use for this tool.



R-clip

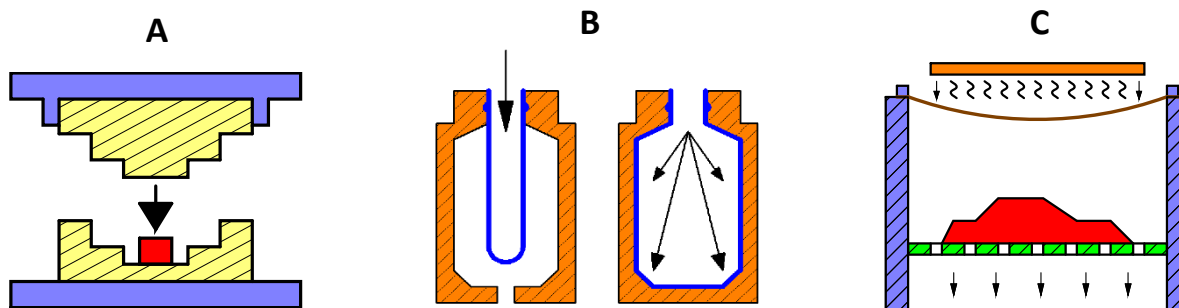


tool A

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



- (a) (i) Name **each** of the plastic manufacturing processes shown at **A**, **B** and **C**.



- (ii) Describe, with the aid of a labelled diagram, **any one** of the manufacturing processes named by you, at **Q5(a)(i)** above.

- (b) In relation to plastic technology, describe **any two** of the following:

- (i) Thermosetting plastic,
- (ii) Laminating,
- (iii) Thermoplastic,
- (iv) Elastic memory.

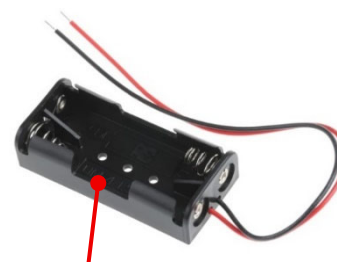
- (c) State **two** safety precautions to be observed when 3D printing plastic components.



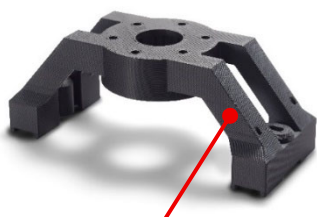
- (d) Select **any two** of the items shown below **and** name a suitable plastic material for **each** of the parts identified.



(i) Vehicle chassis,



(ii) Battery holder casing,



(iii) 3D printed model,

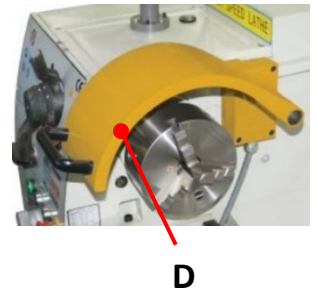
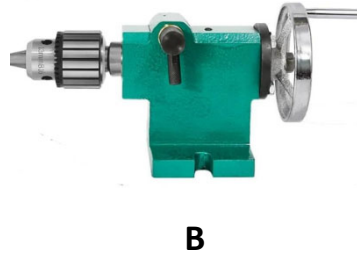
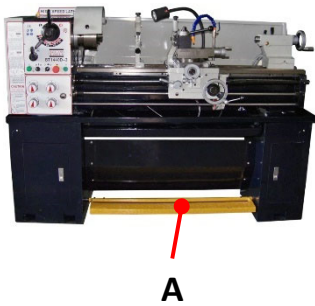


(iv) Gears.

Question 6.

(50 marks)

- (a) Identify **any three** of the centre lathe parts shown at **A, B, C** and **D**.



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

- (i) Cutting fluid,
- (ii) Clearance angle,
- (iii) Depth of cut,
- (iv) Swarf.

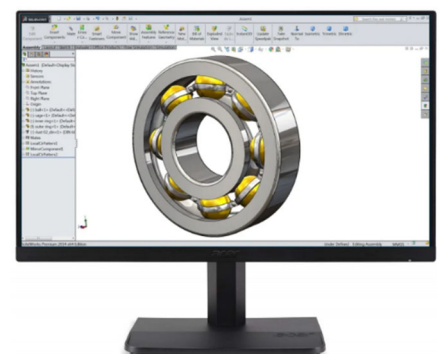
- (c) The stunt bike pegs shown opposite were manufactured on a centre lathe.

- (i) Name **any two** centre lathe processes used to manufacture the stunt bike pegs.
- (ii) Describe **any one** of the processes named by you, at **Q6(c)(i)** above.
- (iii) Specify **any two** items of personal protective equipment (PPE) that should be worn when operating a centre lathe.



OR

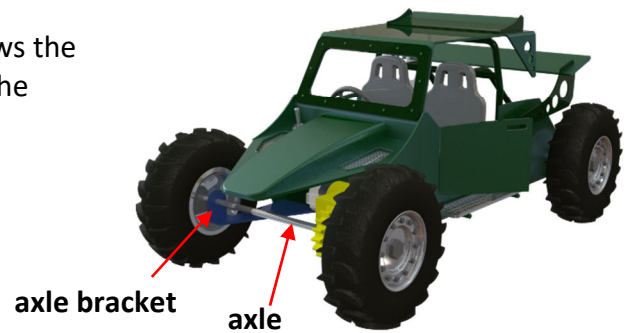
- (c) (i) Outline **one** advantage of using CAD in the design and manufacturing process.
- (ii) Name **one** CNC machine commonly used in the engineering workshop.
- (iii) Give **two** advantages of using CNC machines.



Question 7.

(50 Marks)

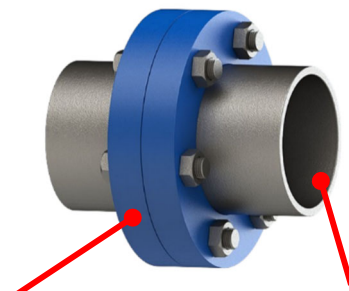
- (a) (i) Name the type of fit required, which allows the axle to rotate inside the axle bracket on the *Model Off-Road Sand Car* shown.
- (ii) Name **one** other type of fit **and** suggest a suitable application for it.



Model Off-Road Sand Car

- (b) The following pipe assembly is to be machined to the dimensions shown.

- State the:
- (i) Nominal diameter of the **flange**;
 - (ii) Smallest diameter of the **hole**;
 - (iii) Largest diameter of the **hole**;
 - (iv) Tolerance of the **hole**.



flange: $\text{Ø}50.00 \pm 0.50 \text{ mm}$

hole: $\text{Ø}20.00 \pm 0.50 \text{ mm}$

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



(i)



(ii)



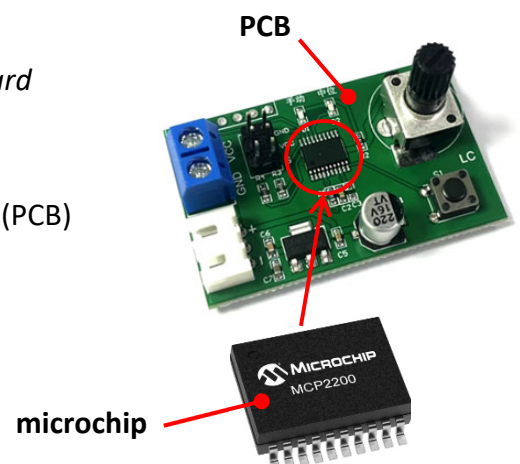
(iii)



(iv)

OR

- (c) (i) State **one** advantage of using a *Printed Circuit Board* (PCB) for the assembly of circuits.
- (ii) Give **two** examples where a Printed Circuit Board (PCB) may be used.
- (iii) Explain the term *microchip*.





Leaving Certificate Examination, 2025

Engineering - Practical
(150 marks)

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 examination paper - 2025. 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) Write your Examination Number in the box provided on the examination paper - 2025. M74A(L₁).
- (d) Put the examination paper - 2025. M74A(L₁) and the test-piece into the candidate envelope supplied and hand up the envelope to the Superintendent at the end of the examination.

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

PART	MATERIAL	PROCESS
2	Brass	Mark out, drill and shape.
7	Aluminium	Mark out, drill and shape.
9	Aluminium	Mark out, drill and shape.
10	Polycarbonate	Mark out, drill, tap and shape.
11	U-Aluminium	Mark out, drill and shape.

Note: (i) Parts 1, 3, 4, 5, 6, 8, 12 and 13 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, 2025

Innealtóireacht - Praiticiúil
(150 marc)

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 scrúdpháipéar - 2025. 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 - 2025. M74A(L₁).
- (d) Cuir an scrúdpháipéar - 2025. M74A(L₁) agus an triailphíosa isteach i gclúdach an iarrthóra atá curtha ar fáil agus tabhair an clúdach don Fheitheoir ag deireadh an scrúdaithe.

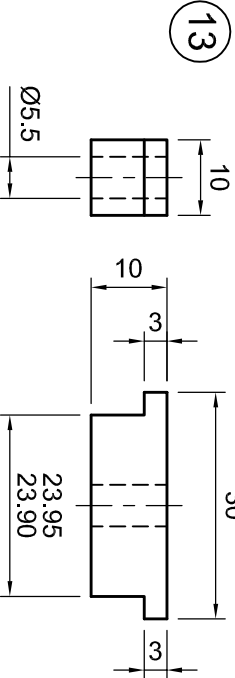
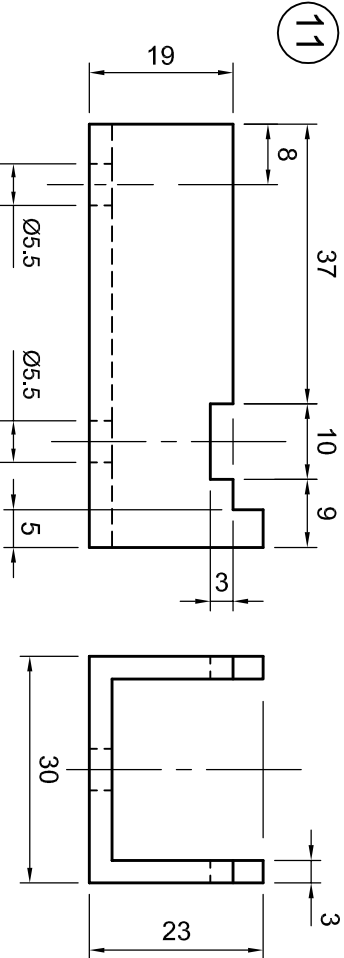
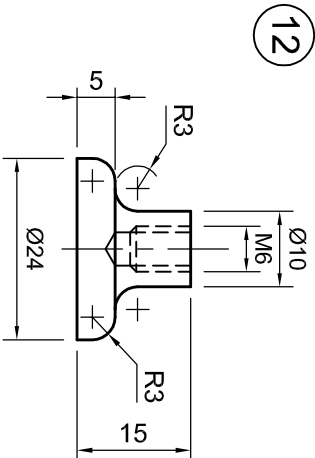
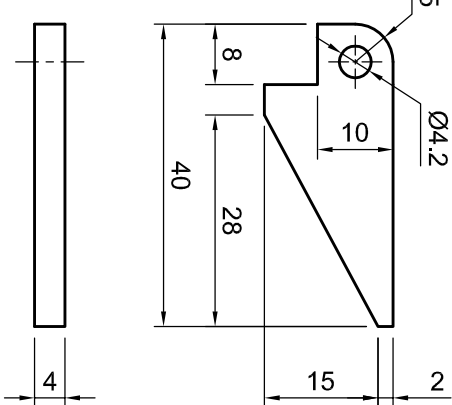
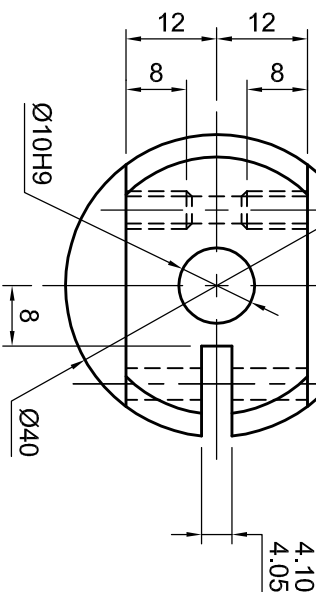
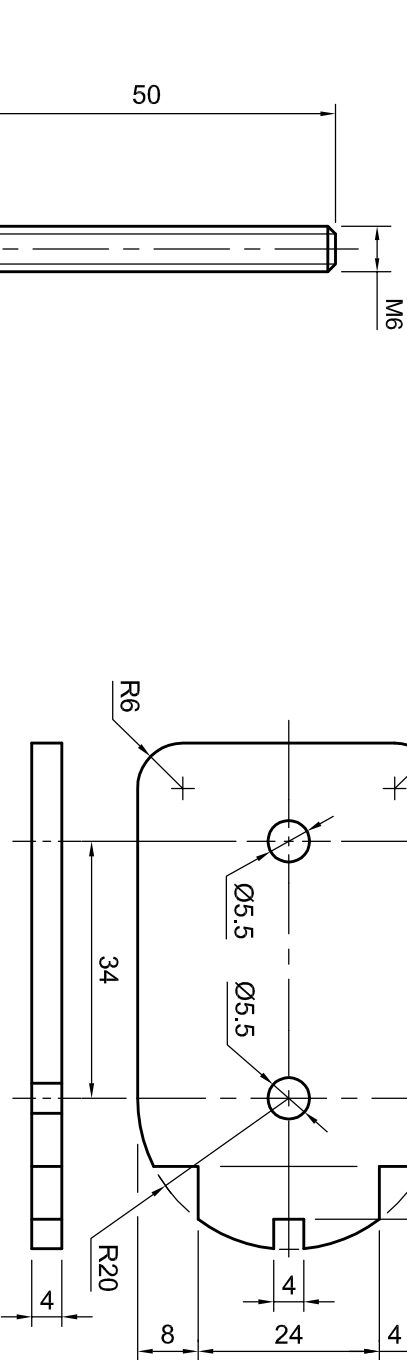
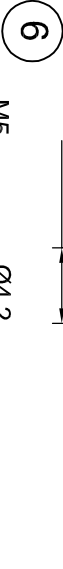
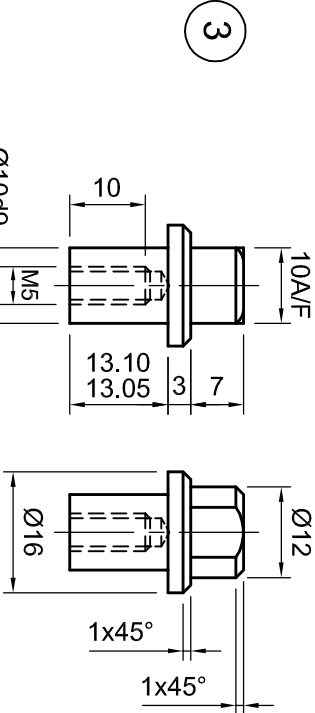
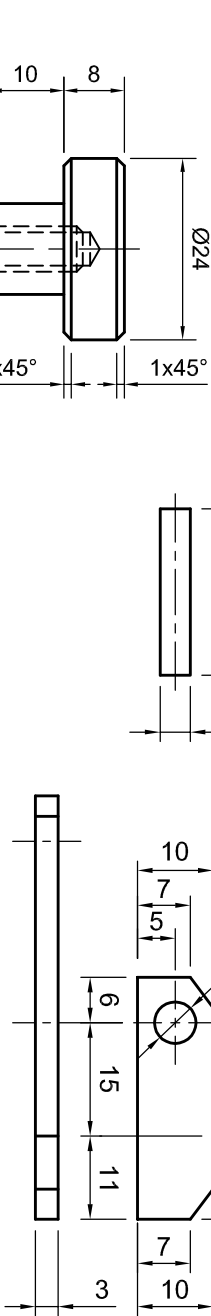
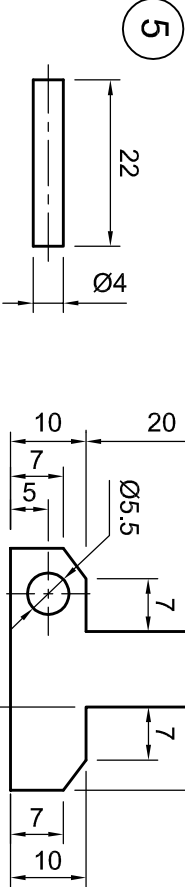
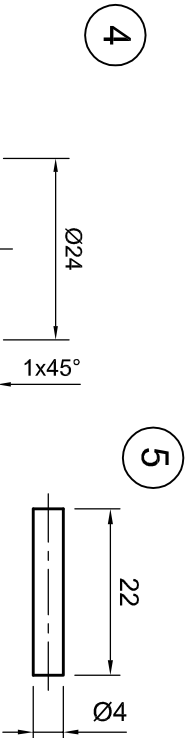
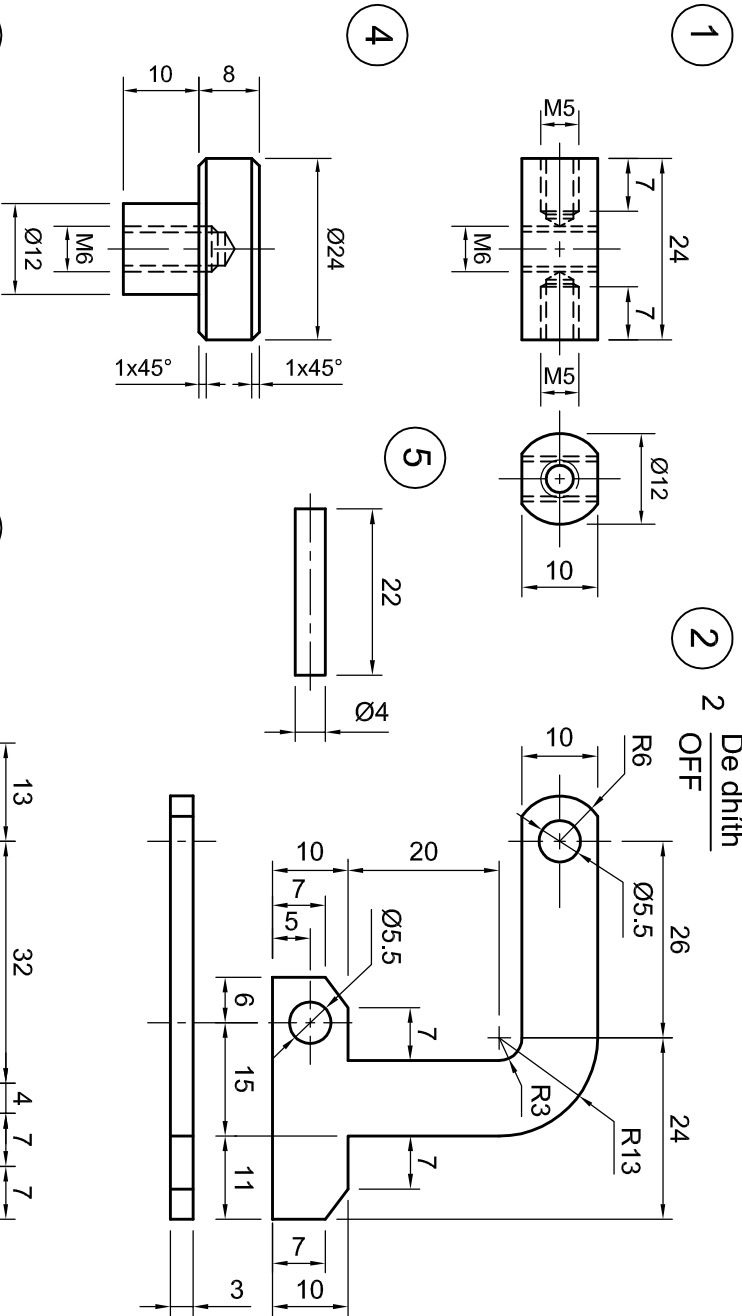
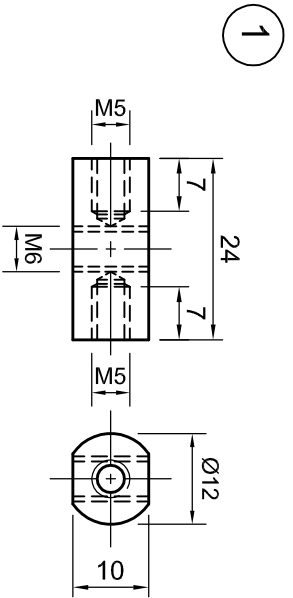
As na hábhair a sholáthraítear, déan an **Mheicníocht** a thaispeántar sna líníochtaí sa chruth agus sna toisí a shonraítear.

PÁIRT	ÁBHAR	PRÓISEAS
2	Prás	A mharcáil amach, a dhruileáil agus a dheilbhiú.
3	Alúmanam	A mharcáil amach, a dhruileáil agus a dheilbhiú.
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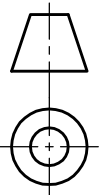
Nóta: (i) Rinneadh na páirteanna 1, 3, 4, 5, 6, 8, 12 agus 13 roimh lá an scrúdaithe. Agus tú ag baint úsáide as na scriúnná a sholáthraítear, cóimeáil an mheicníocht faoi mar atá sa líníocht chóimeála.

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

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

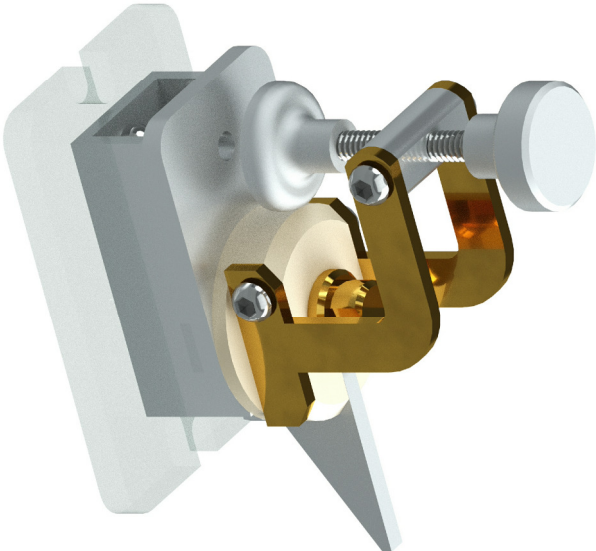
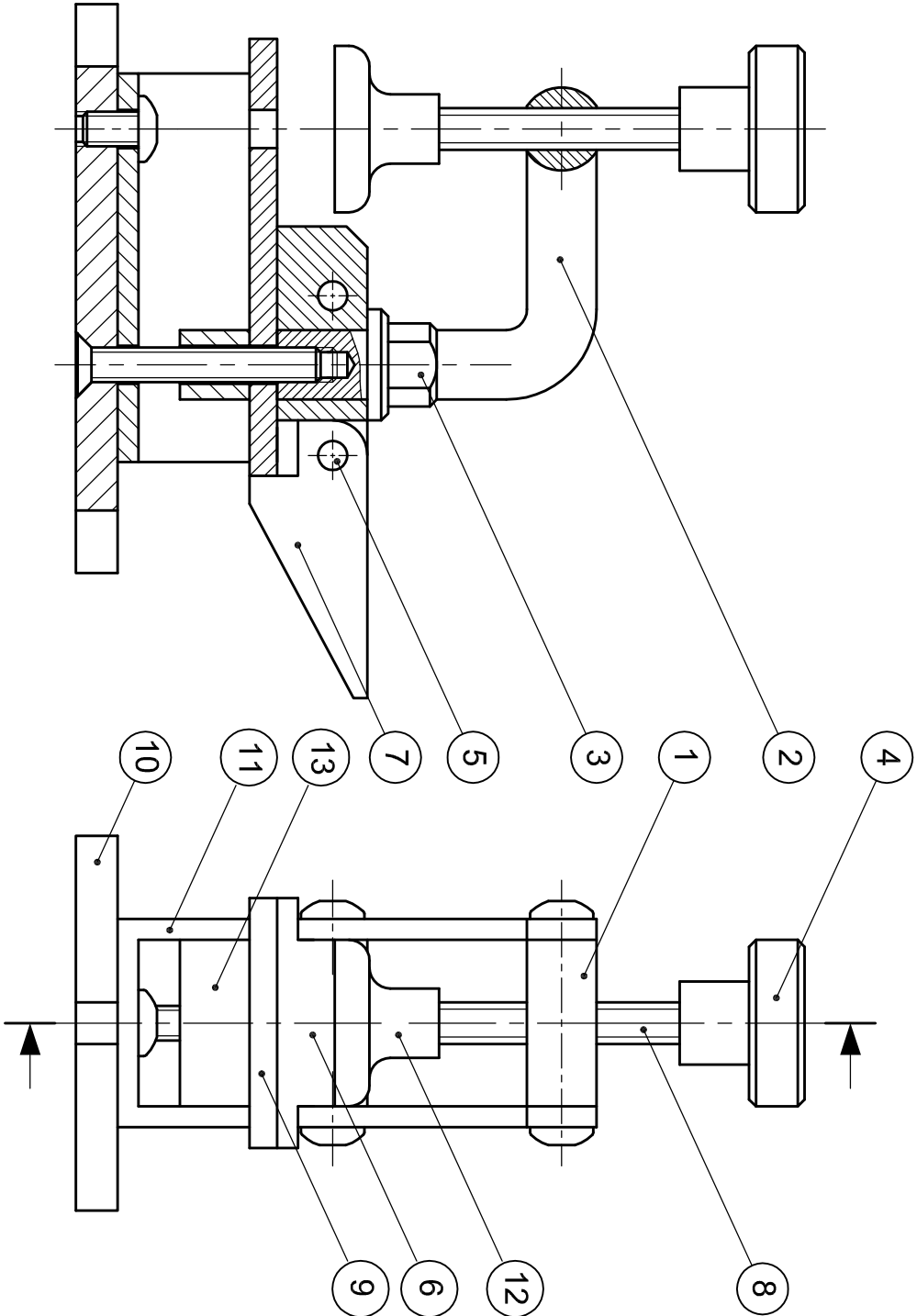


Cuir an scrúpháipéar seo agus an triailphíosa isteach i gclúdach an iarthóra atá curtha ar fáil, agus tabhair an clúdach don Fheithneoir ag deireadh an scrúdaithe. Put this examination paper and the test-piece into the candidate envelope supplied, and hand up the envelope to the Superintendent at the end of the examination.

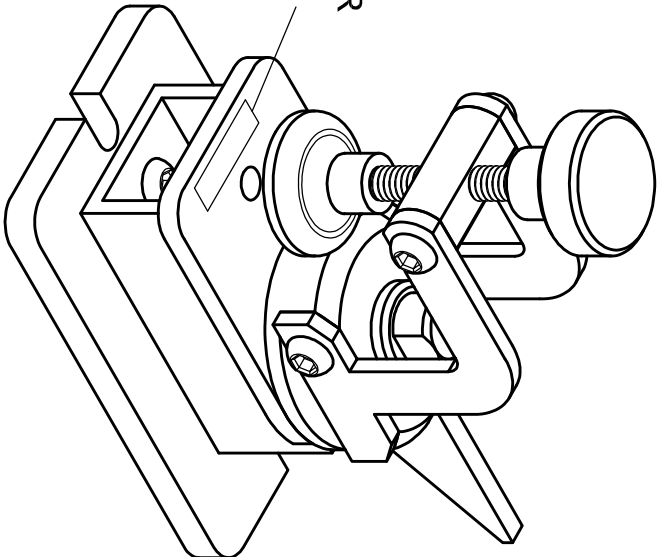


THALL
OVER

SCRÚDÚ ARDTEISTIMÉIREACHTA INNEALTÓIREACHT - PRAITICIÚIL
LEAVING CERTIFICATE ENGINEERING - PRACTICAL



SCRÚDUIMHIR
EXAM NO.



Cuir an scrúdpháipéar seo agus an triailphiosa isteach i gclúdach an iarthóra
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SONRAÍ CÓIMEÁLA
ASSEMBLY DETAILS



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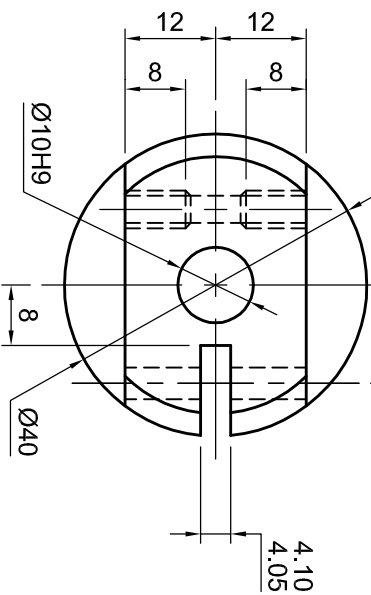
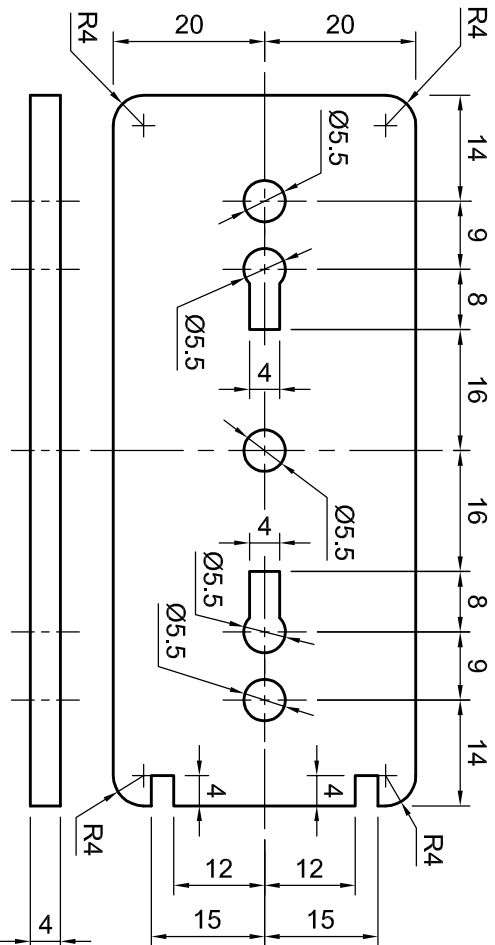
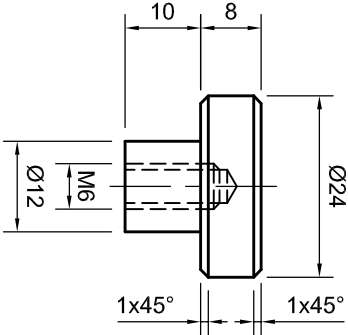
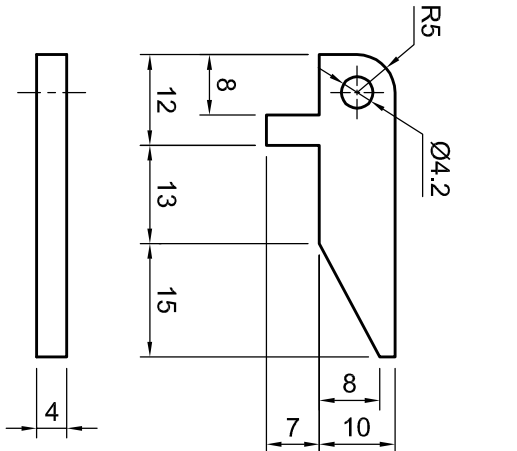
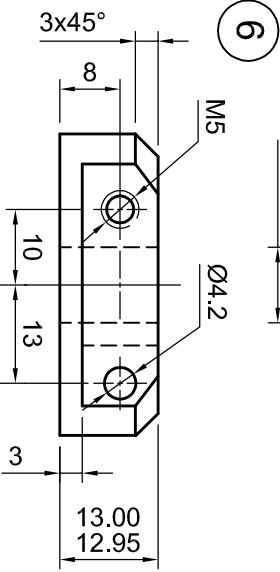
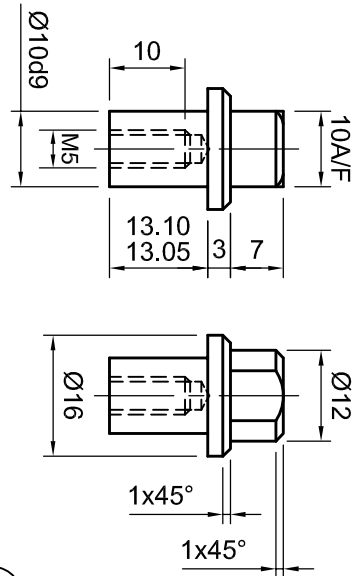
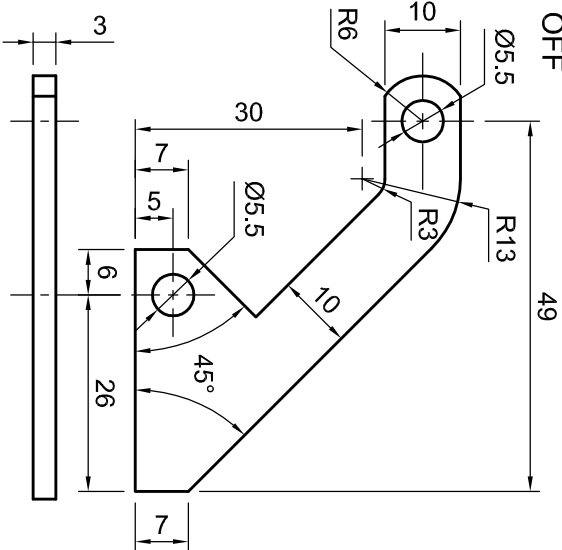
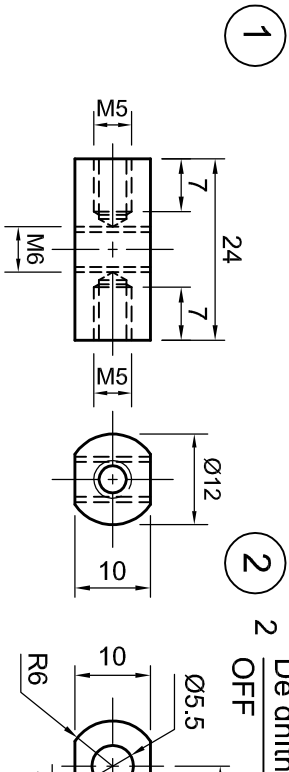
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11	U-Alúmanam	A mharcáil amach, a dhruileáil agus a dheilbhiú.

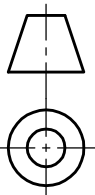
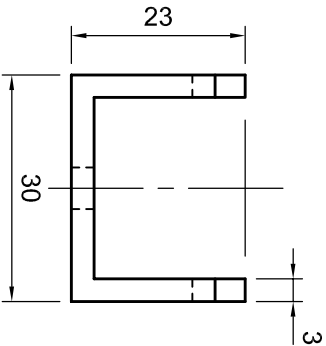
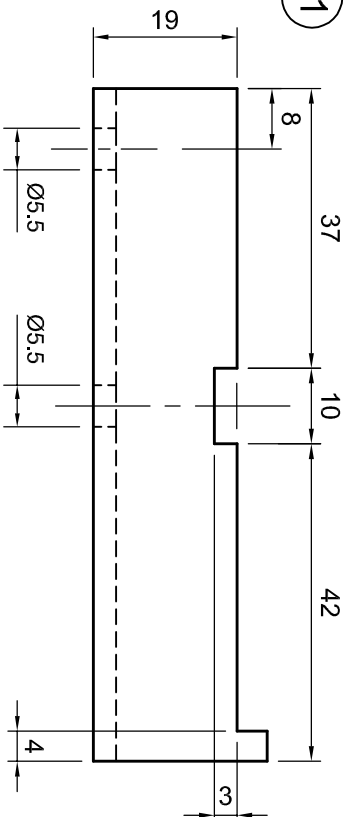
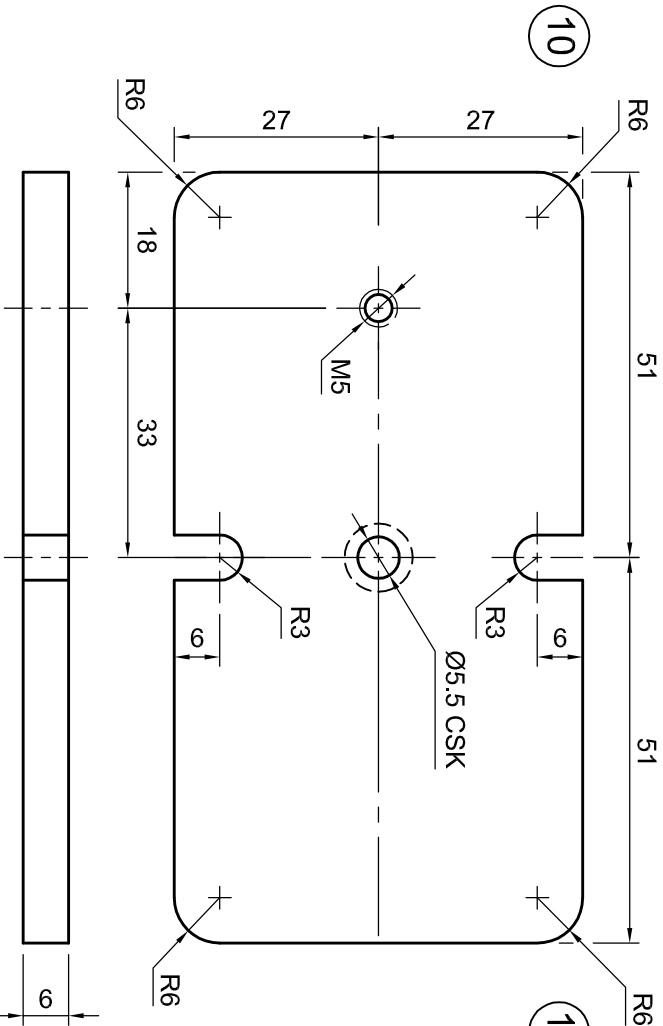
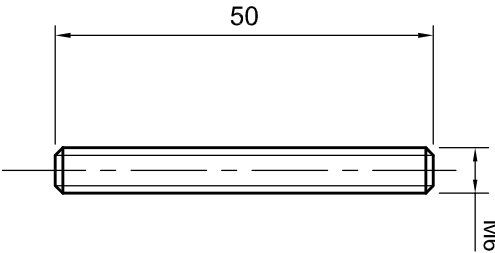
Nóta: (i) Rinneadh na páirteanna 1, 3, 4, 5, 6, 8, 12 agus 13 roimh lá an scrúdaithe. Agus tú ag baint úsáide as na scriúnná a sholáthraítear, cóimeáil an mheicníocht faoi mar atá sa líníocht chóimeála.

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

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

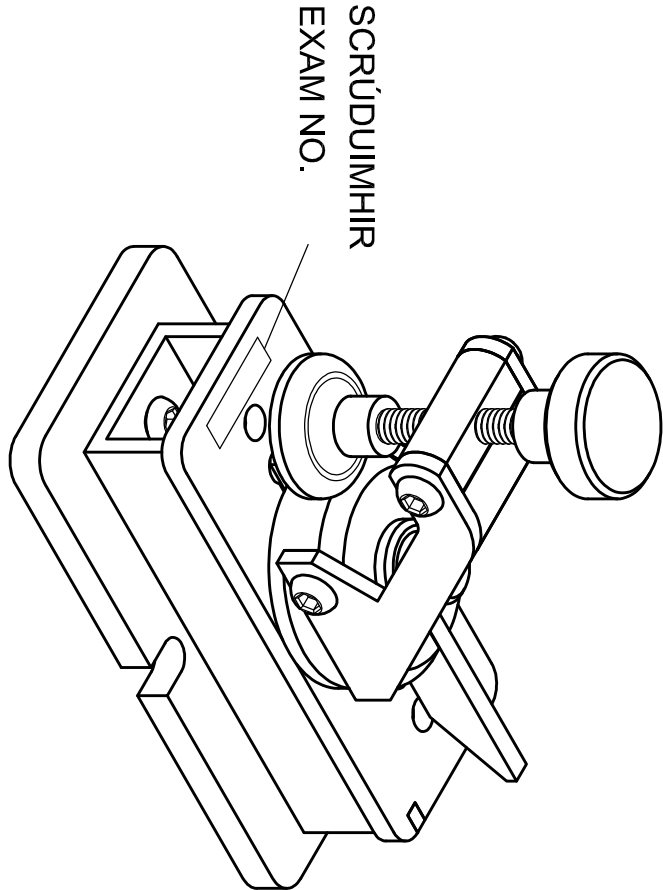
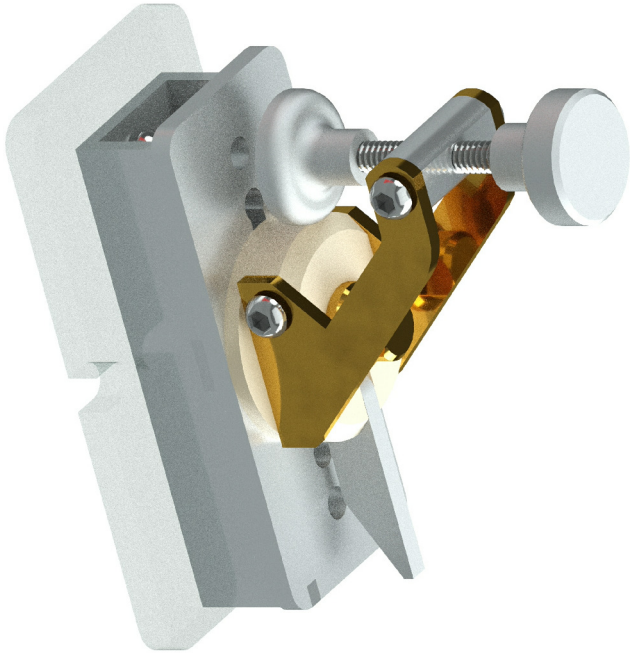
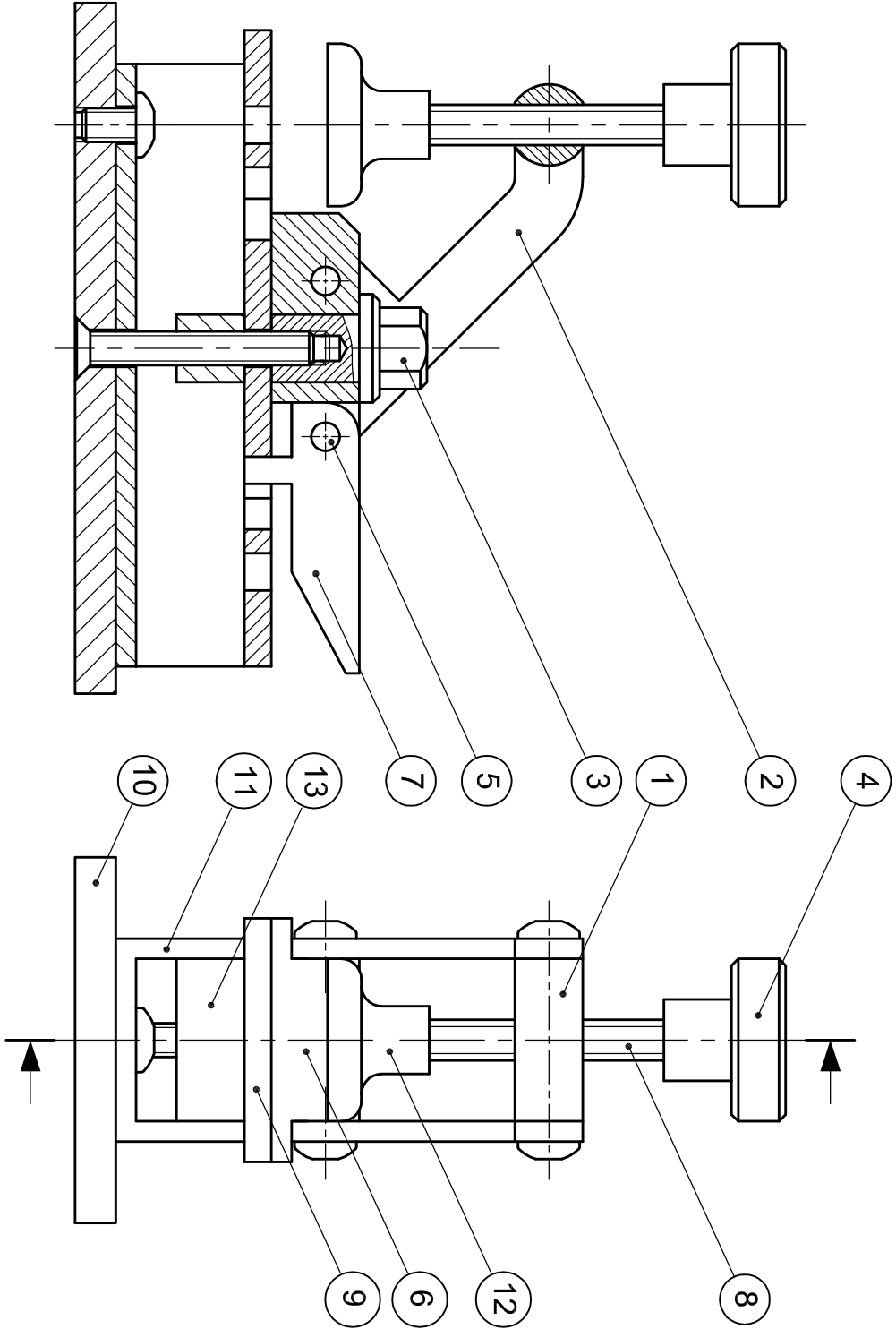


Cuir an scrúdpháipéar seo agus an triailphíosa isteach i gclúdach an iarthóra
atá curtha ar fáil, agus tabhair an clúdach don Fheithneoir ag deireadh an scrúdaithe.
Put this examination paper and the test-piece into the candidate envelope supplied,
and hand up the envelope to the Superintendent at the end of the examination.



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SCRÚDÚ ARDTEISTIMEIREACHTA INNEALTOIREACHT - PRAITICIÚIL
LEAVING CERTIFICATE ENGINEERING - PRACTICAL



Cuir an scrúpháipéar seo agus an triailphiosa isteach i gclúdach an iarrthóra atá curtha ar fáil, agus tabhair an clúdach don Fheidhteoir 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.



Leaving Certificate Examination, 2025

Engineering - Practical (150 marks)

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 examination paper - 2025. 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) Write your Examination Number in the box provided on the examination paper - 2025. M74A(L₁).
- (d) Put the examination paper - 2025. M74A(L₁) and the test-piece into the candidate envelope supplied and hand up the envelope to the Superintendent at the end of the examination.

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

PART	MATERIAL	PROCESS
2	Brass	Mark out, drill and shape.
7	Aluminium	Mark out, drill and shape.
9	Aluminium	Mark out, drill and shape.
10	Polycarbonate	Mark out, drill, tap and shape.
11	U-Aluminium	Mark out, drill and shape.

Note: (i) Parts 1, 3, 4, 5, 6, 8, 12 and 13 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, 2025

Innealtóireacht - Praiticiúil
(150 marc)

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 scrúdpháipéar - 2025. 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 - 2025. M74A(L₁).
- (d) Cuir an scrúdpháipéar - 2025. 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.

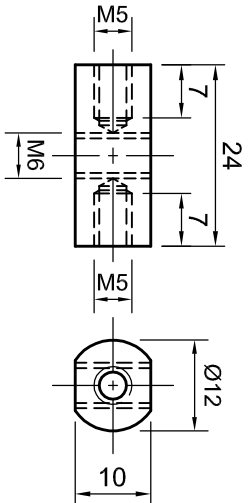
PÁIRT	ÁBHAR	PRÓISEAS
2	Prás	A mharcáil amach, a dhruileáil agus a dheilbhiú.
3	Alúmanam	A mharcáil amach, a dhruileáil agus a dheilbhiú.
7	Alúmanam	A mharcáil amach, a dhruileáil agus a dheilbhiú.
10	Polacarbónáit	A mharcáil amach, a dhruileáil, a tapa agus a dheilbhiú.
11	U-Alúmanam	A mharcáil amach,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

Nóta: (i) Rinneadh na páirteanna 1, 3, 4, 5, 6, 8, 12 agus 13 roimh lá an scrúdaithe. Agus tú ag baint úsáide as na scriúnná a sholáthraítear, cóimeáil an mheicníocht faoi mar atá sa líníocht chóimeála.

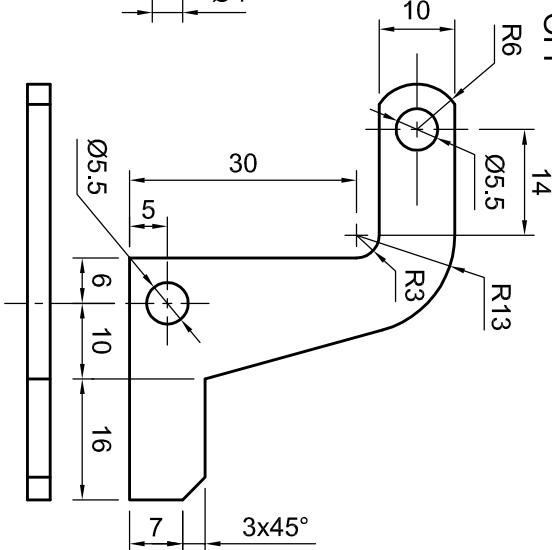
(ii) Tá tábhacht ag baint le cruinneas, le bailchríoch agus le hoibriú an triailphíosa.

Scriobh do Scrúdumhir sa bhosca seo:

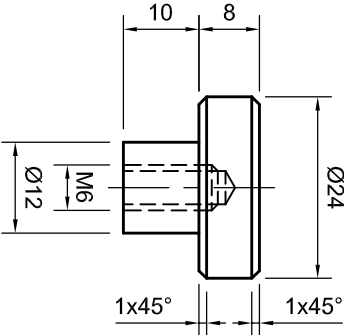
Write your Examination Number in this box:



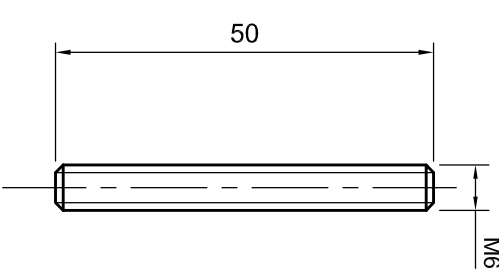
2 De dhíth 2 OFF



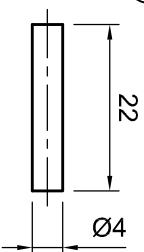
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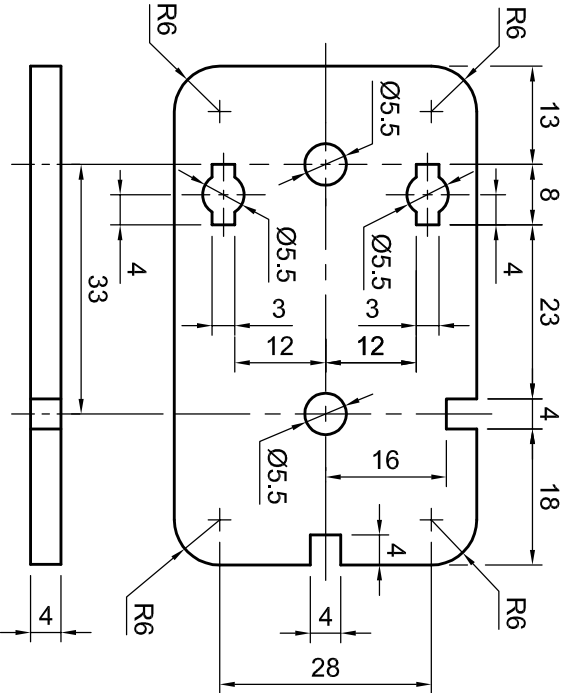
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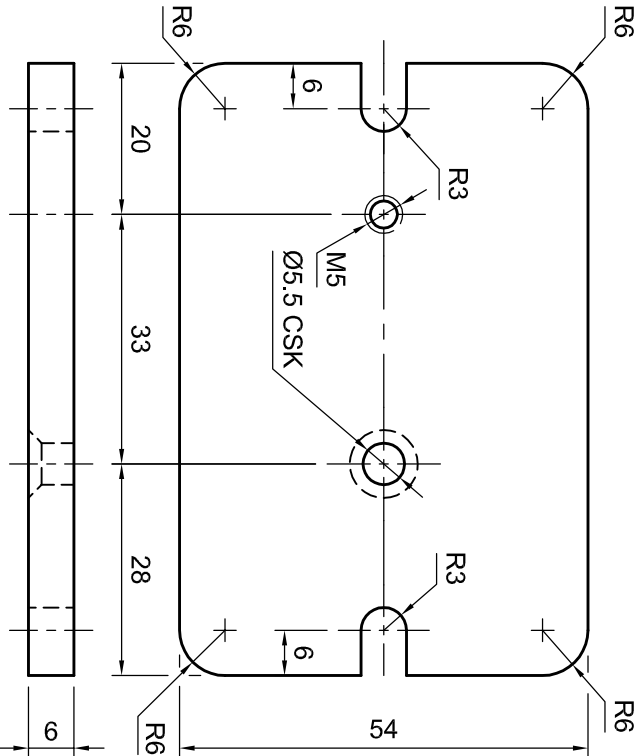
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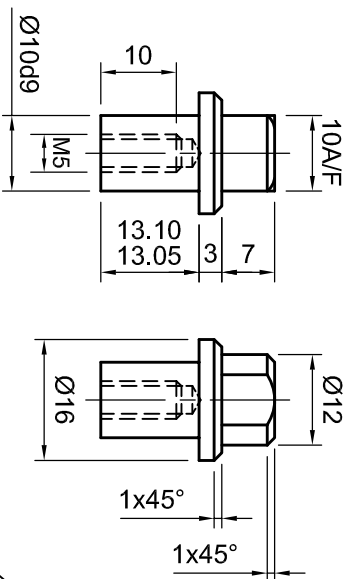
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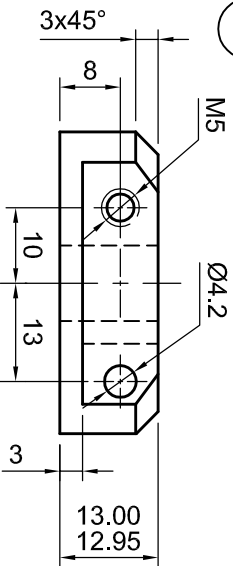
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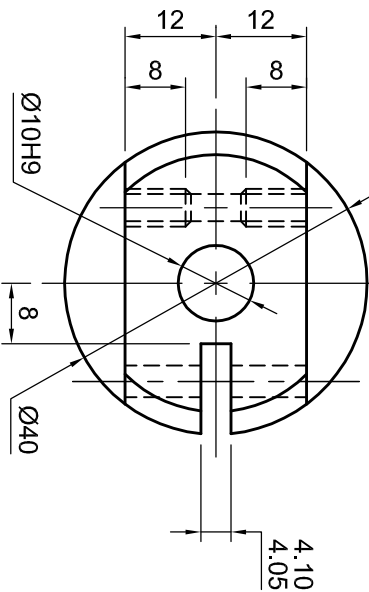
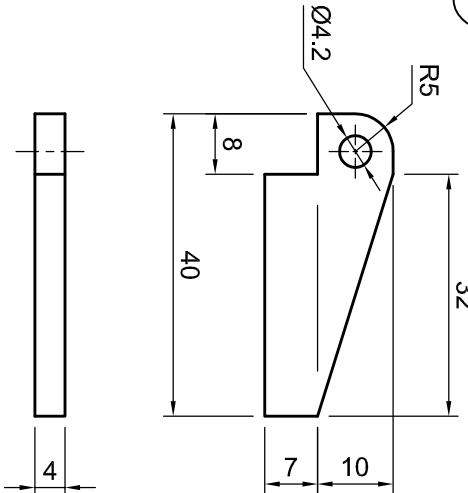
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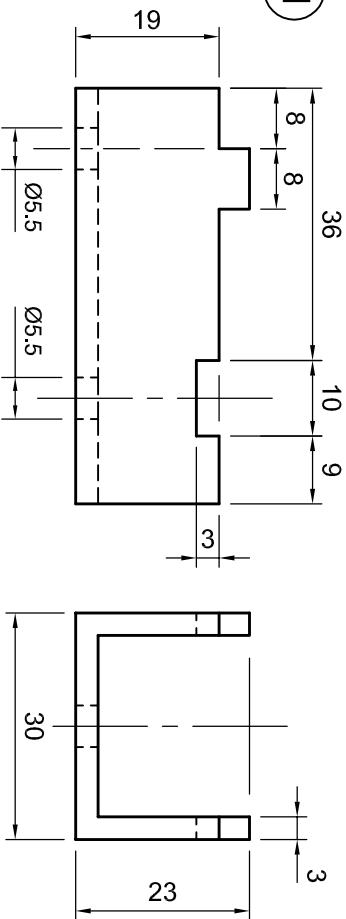
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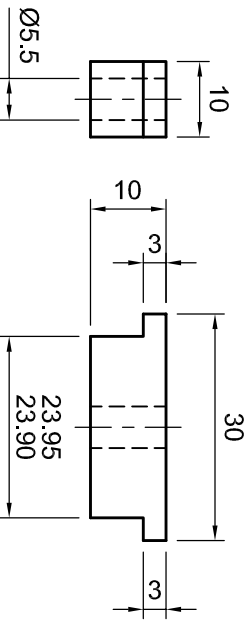
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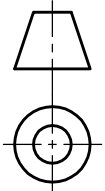
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13

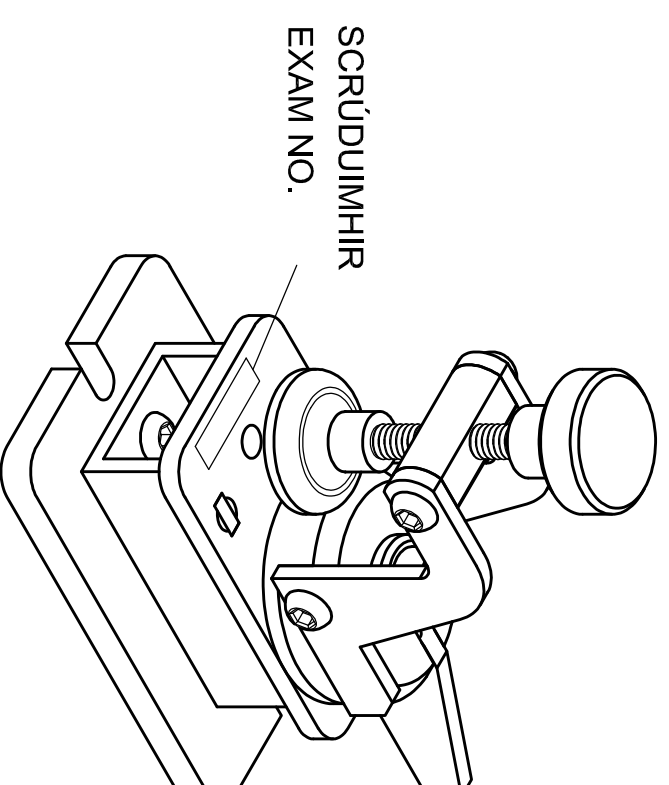
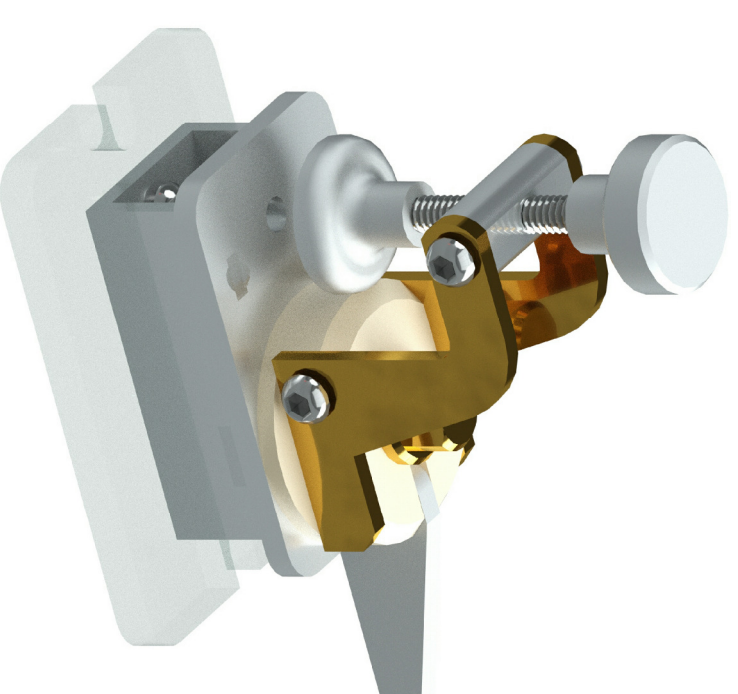
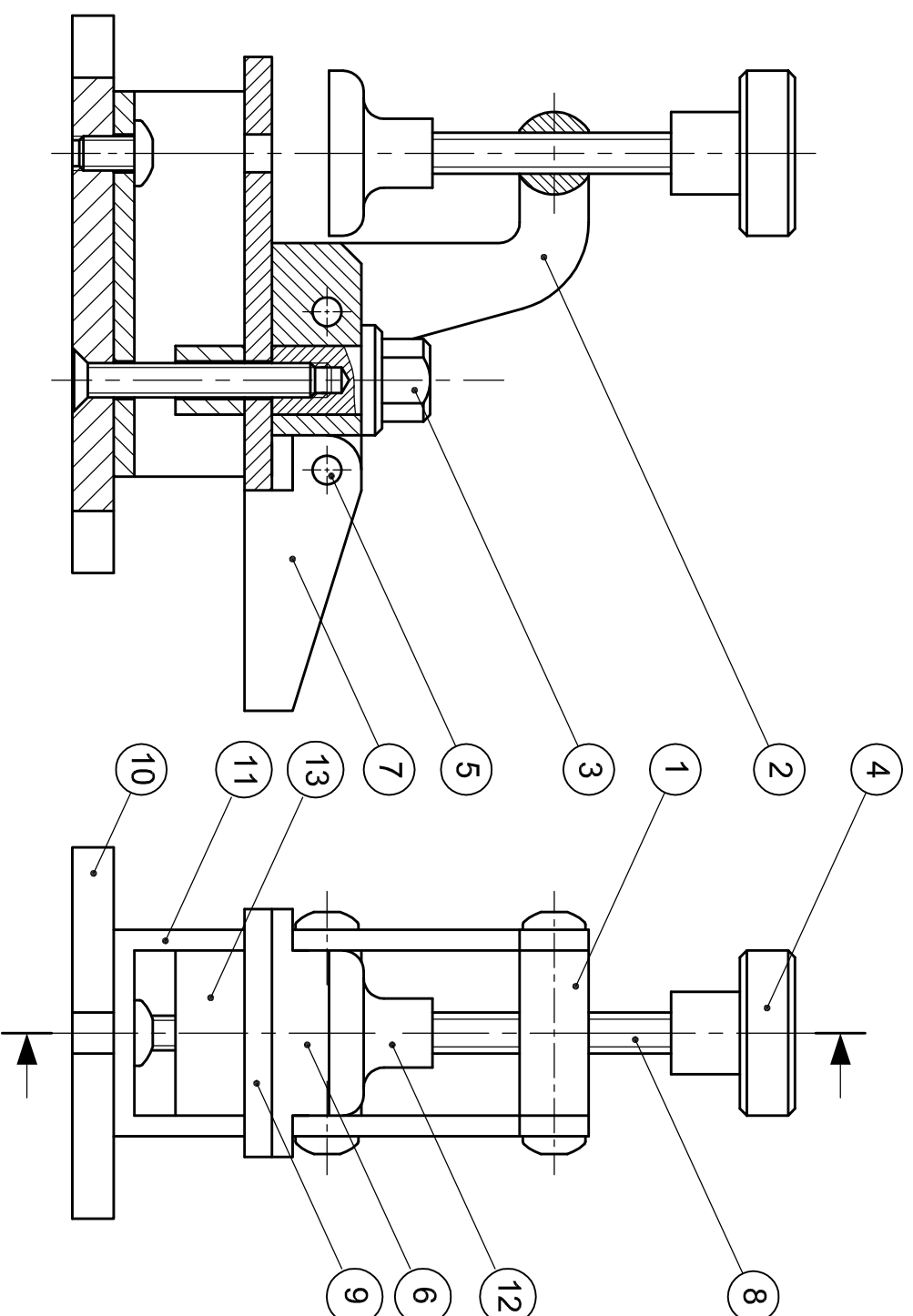


Cuir an scrúdpháipéar seo agus an triailphiosa isteach i gclúdach an iarthóra atá curtha ar fáil, agus tabhair an clúdach don Fheithneoir ag deireadh an scrúdaithe. Put this examination paper and the test-piece into the candidate envelope supplied, and hand up the envelope to the Superintendent at the end of the examination.



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SCRÚDÚ ARDTEISTIMÉIREACHTA INNEAL TÓIREACHT - PRAITICIÚIL
LEAVING CERTIFICATE ENGINEERING - PRACTICAL



SCRÚDUMHIR
EXAM NO.

Cuir an scrúdhpháipéar seo agus an triailphléosa isteach i gclúdach an iarthóra atá curtha ar fáil, agus tabhair an clúdach don Fheithneoir ag deireadh an scrúdaithe.

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SONRAÍ CÒIMEÁLA ASSEMBLY DETAILS