Coimisiún na Scrúduithe Stáit
State Examinations Commission

JUNIOR CERTIFICATE EXAMINATION, 2017

METALWORK
MATERIALS AND TECHNOLOGY

ORDINARY LEVEL - 100 Marks

Tuesday 20 June,   Afternoon 2:00 - 3:30

Centre Number ☞ [ ]

Examination Number ☞ [ ]

For Examiner	
Total Mark	
Question	**Mark**
1A	
1B	
2	
3	
4	
5	
6	
Total	
Grade	

1. Total of end of page totals	
2. Aggregate total marks for all disallowed question(s)	
3. Total mark awarded (1 minus 2)	
4. Bonus mark for answering through Irish (if applicable)	
5. Total mark awarded if Irish Bonus is applied (3+4)	
Note: The mark in row 3 (or row 5 if an Irish Bonus is awarded) must equal the mark in the Total Mark box on the script	

INSTRUCTIONS

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

2. Write your answers in the spaces provided or tick the appropriate box. ☑

3. Hand up this paper at the end of the examination.

MAKE SURE TO WRITE YOUR EXAMINATION NUMBER IN THE BOX PROVIDED ON THIS PAGE

| (a) | This instrument is a(n): | Odd-Leg Calipers | |
		Vernier Calipers	
		Outside Calipers	
		Inside Calipers	
(b)	A tap is used for:	Drilling	
		Reaming	
		Threading	
		Riveting	
(c)	This lathe part is called a:	Topslide	
		Chuck	
		Headstock	
		Tailstock Centre	
(d)	This holding device is a:	Machine Vice	
		Hand Vice	
		Vice Grips	
		G-Cramp	
(e)	Part 'X' is called the:	Shank	
		Body	
		Land	
		Flute	
(f)	This measuring tool is a:	Wire Gauge	
		Screw Pitch Gauge	
		Feeler Gauge	
		Radius Gauge	
(g)	This fastener is a:	Set Screw	
		Bolt and Nut	
		Washer	
		Lock Nut	
(h)	A file is cleaned using a:	Card File	
		Scriber	
		Punch	
		Soft Brush	
(i)	A micrometer can measure to an accuracy of:	10 mm	
		1 mm	
		0.1 mm	
		0.01 mm	
(j)	This measuring tool is a:	Centre Square	
		Protractor	
		Bevel	
		Combination Set	
(k)	This tool is a(n):	Open Spanner	
		Adjustable Spanner	
		Socket Wrench	
		Ring Spanner	
(l)	This tool is a(n):	Drift	
		Allen Key	
		Punch	
		Chisel	

(m)

(i) Give **three** reasons why the body of this drone should be made from a plastic material.

1.
2.
3.

(ii) Name **three** plastic materials.

1.
2.
3.

(n)
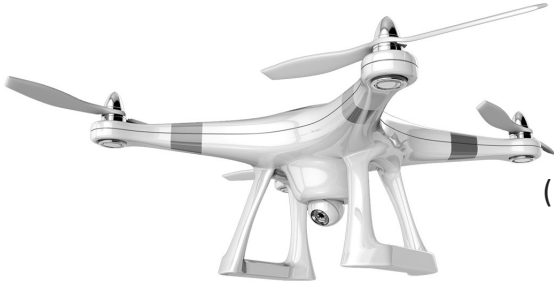
(i) List **two** components that are likely to be found on drones.

1.
2.

(ii) Give **two** uses for drone technology.

1.
2.

(o) (i) This device is a:

Flash Drive	
Memory Card	
Hard Disk	
Floppy Disk	

(ii) This symbol is used to represent:

Sound	
Wi-Fi	
Temperature	
Video	

(p) (i) Reports are normally produced using a:

DVD Player	
CAD Package	
Database	
Word Processor	

(ii) This symbol is used to represent a(n):

USB Connection	
VGA Connection	
HDMI Connection	
Audio Connection	

(q) (i) Which of the following is a renewable energy source:

Coal	
Petrol	
Natural Gas	
Wind	

(ii) Attic insulation can be made from:

Bakelite	
Nylon	
Fibreglass	
PVC	

Question 2.   **20 Marks**

(a)

(i) Copper is combined with tin to form:

Brass	
Bronze	
Aluminium	

(ii) Applying a zinc coating to steel is called:

Painting	
Dip Coating	
Galvanising	

(iii) Zinc is a(n):

Ferrous Metal	
Non-Ferrous Metal	
Alloy	

(iv) High speed steel is used to make:

Cutlery	
Cutting Tools	
Bicycle Frames	

(v) Steel is produced by combining iron with:

Carbon	
Zinc	
Lead	

(vi) Which one of these metals is an alloy?

Aluminium	
Brass	
Copper	

(vii) Which one of these metals is the hardest?

Gold	
Lead	
Cast Iron	

(viii) A material is said to be ductile when it can be easily:

Broken	
Stretched	
Fractured	

(b) Using the labels in the diagram describe how iron is produced in the Blast Furnace.

Iron Ore, Limestone and coke

Hot air

Molten Iron

Slag
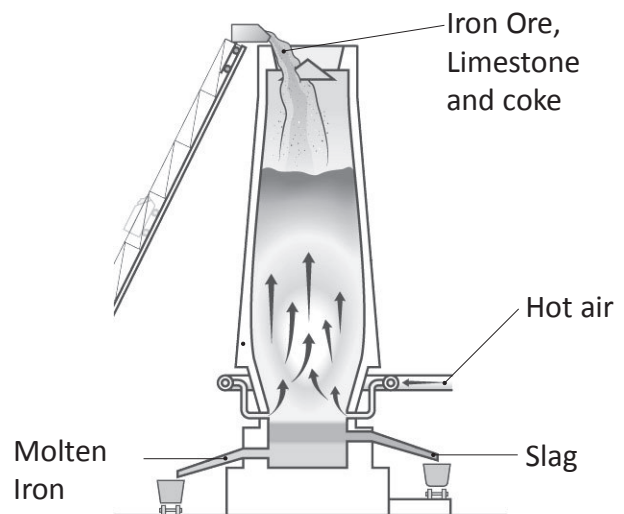
(c) Complete the chart by listing a tool for each task.

| Task	Tool
To draw an arc on a piece of metal.	*Dividers*
To flatten copper sheet without causing damage.	
To cut a 20 mm round mild steel bar.	
To mark out and check angles on a piece of metal.	
To find the diameter of a small drill.	
To cut a thin sheet of metal.	
To measure the depth of a hole.	

Question 3. 20 Marks

(a) (i) Match the number to the correct mechanism in the given table.

	2	3
1		
4	5	6
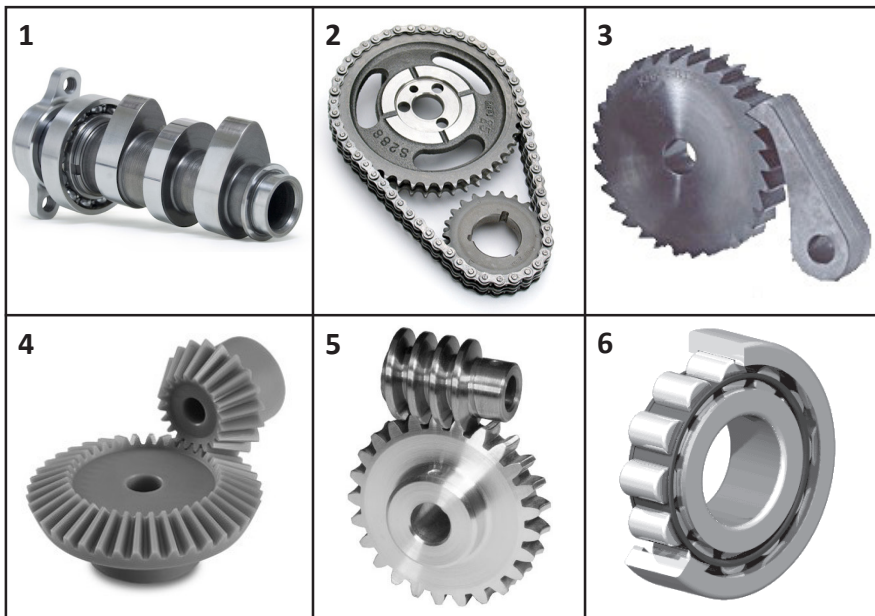
Mechanism	No.
Chain and Sprocket	
Roller Bearing	
Ratchet and Pawl	
Worm and Wormwheel	
Bevel Gears	
Camshaft	

(ii) Name a machine that uses a rack and pinion mechanism.

(b) (i) Use an arrow to indicate the direction of gear '**X**' in each of the following:

1	2	3
X	X	X
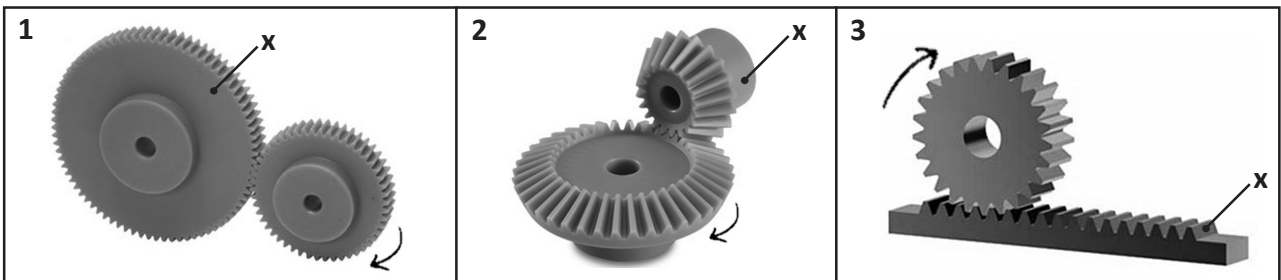
(ii) If gear '**A**' rotates at 10 RPM how fast will gear '**B**' rotate? (A = 60 Teeth, B = 30 Teeth.)
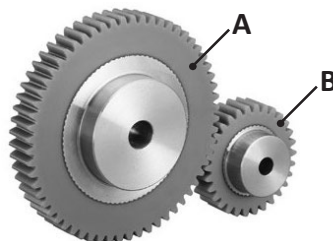
10 RPM	
20 RPM	
30 RPM	
60 RPM	

(iii) Is a gear train formed when two or more gears are in mesh? Yes ☐ No ☐

(c) Complete the table by naming devices that use the following mechanisms.

Mechanism	Device
Lead Screw	*Lathe*
Spur Gears	
Pulley	
Bevel Gears	
Spring	
Lever	
Clutch	

Question 4. 20 Marks

Details of a seat used in the manufacture of
a model jet buggy are shown.

Seat made from
coloured acrylic

R10
R10
25   35
12
20
20
Ø4.5 CSK
R10
BEND 60°
30
30
R10
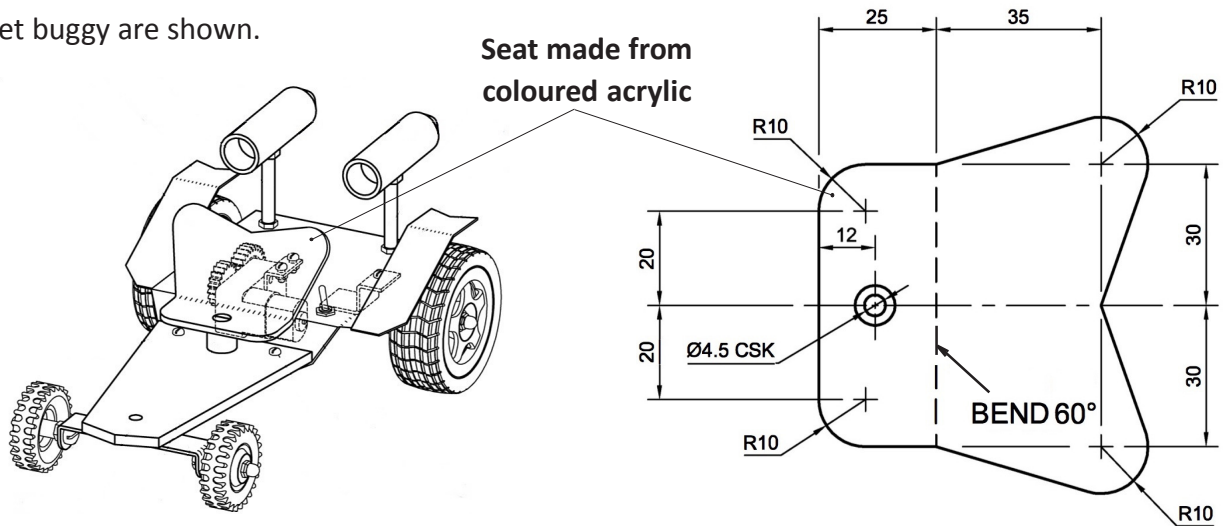
(i)   What is the overall length and width of the seat before it is bent to shape?

(ii) What does 'Ø4.5 CSK' refer to in the drawing?

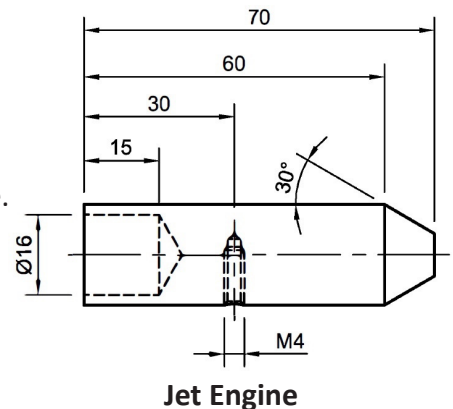(iii) What precautions should be taken when drilling acrylic?

(iv) Describe how to apply a polished finish to the edges of the acrylic seat.

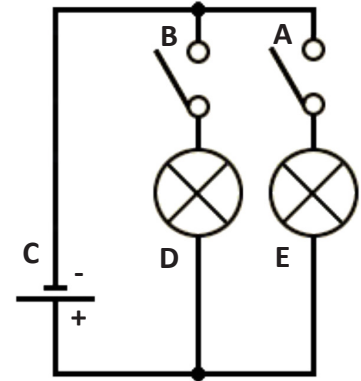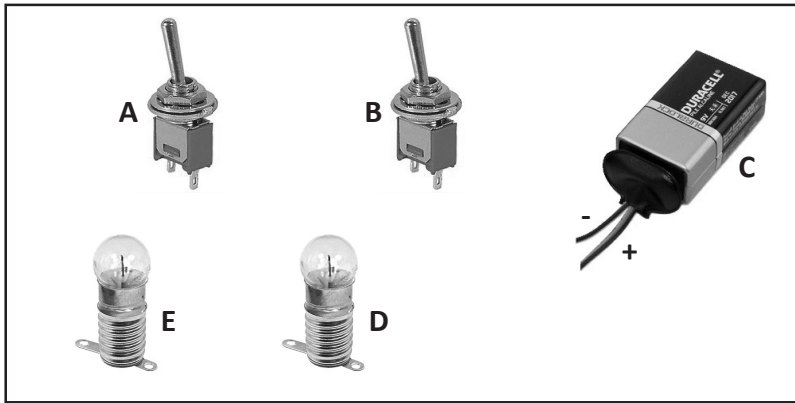(v) List **four** tools used in the manufacture of the seat.

1.
2.
3.
4.

(vi) Describe how you would drill the Ø16 hole in the jet engine.

70
60
30
15
30°
Ø16
M4
Jet Engine

(vii) Describe how you would form the 30° angle in the jet engine.

Question 5.   **20 Marks**

(a) (i) Using the circuit diagram as a reference, draw the connecting
         wires between the components **A**, **B**, **C**, **D** and **E** in the box below.

Circuit Diagram

(ii) Name the components A, C and E shown above.

A	
C	
E	

(iii) Does this circuit use AC or DC current?

(b) (i) A keyboard is a(n):

Output Device	
Input Device	
Process Device	

(iv) A bulb converts electrical energy into:

Solar Energy	
Chemical Energy	
Heat and Light Energy	

(ii) This symbol represents a:

Motor	
Transistor	
Fuse	

(v) This electronic component is a(n):

Buzzer	
Resistor	
Integrated Circuit (IC)	

(iii) This device is a(n):

LED	
LDR	
Resistor	

(vi) This device is used for:

Temperature Sensing	
Light Sensing	
Movement Sensing	

(c) Name **one** famous Engineering inventor. Write a brief note about this person's invention.

Inventor's Name:
Invention:

Question 6.   **20 Marks**

(i)   A design for a jewellery stand is shown. Name a metal suitable for making the stand. Give a reason for your choice.

Metal:

Reason:

(ii)   Describe how you would bend the base '**Y**' to shape.

(iii)   Describe how you would join parts '**X**' and '**Y**'.

X

Y

(iv)   Describe a finishing process that could be used to enhance the jewellery stand.

Finishing Process:

(v)   In the space below draw an alternative design for a jewellery stand.