



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate 2017

Marking Scheme

Technology

Ordinary Level

Note to teachers and students on the use of published marking schemes

Marking schemes published by the State Examinations Commission are not intended to be standalone documents. They are an essential resource for examiners who receive training in the correct interpretation and application of the scheme. This training involves, among other things, marking samples of student work and discussing the marks awarded, so as to clarify the correct application of the scheme. The work of examiners is subsequently monitored by Advising Examiners to ensure consistent and accurate application of the marking scheme. This process is overseen by the Chief Examiner, usually assisted by a Chief Advising Examiner. The Chief Examiner is the final authority regarding whether or not the marking scheme has been correctly applied to any piece of candidate work.

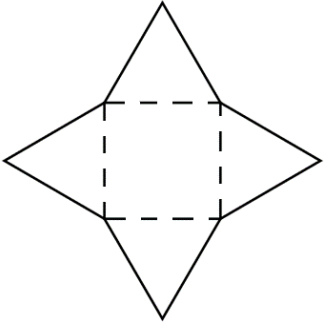
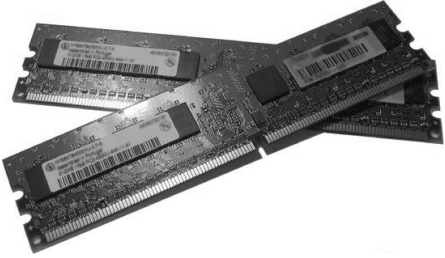



Marking schemes are working documents. While a draft marking scheme is prepared in advance of the examination, the scheme is not finalised until examiners have applied it to candidates' work and the feedback from all examiners has been collated and considered in light of the full range of responses of candidates, the overall level of difficulty of the examination and the need to maintain consistency in standards from year to year. This published document contains the finalised scheme, as it was applied to all candidates' work.


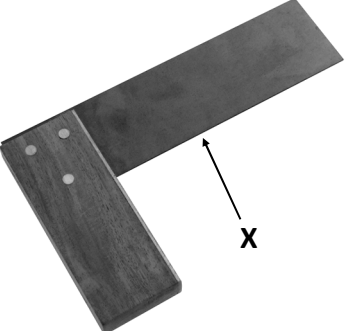
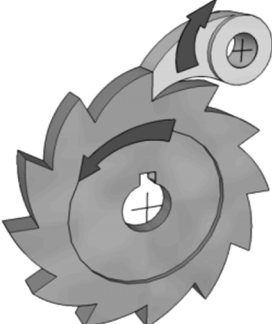

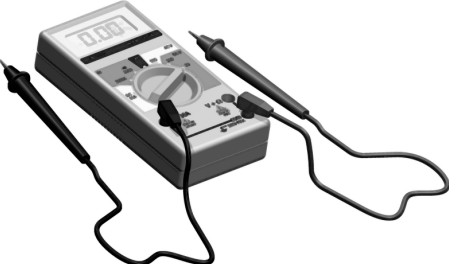
In the case of marking schemes that include model solutions or answers, it should be noted that these are not intended to be exhaustive. Variations and alternatives may also be acceptable. Examiners must consider all answers on their merits, and will have consulted with their Advising Examiners when in doubt.






Future Marking Schemes


Assumptions about future marking schemes on the basis of past schemes should be avoided. While the underlying assessment principles remain the same, the details of the marking of a particular type of question may change in the context of the contribution of that question to the overall examination in a given year. The Chief Examiner in any given year has the responsibility to determine how best to ensure the fair and accurate assessment of candidates' work and to ensure consistency in the standard of the assessment from year to year. Accordingly, aspects of the structure, detail and application of the marking scheme for a particular examination are subject to change from one year to the next without notice.


Section A – 80 marks. Answer **any sixteen** questions in this section.


<p>1.</p> 	<p>This shape can be folded to make a:</p>	<p>Cube</p>	
<p>2.</p> 	<p>In computer technology RAM stands for:</p>	<p>Remote Available Memory</p>	
<p>3.</p> 	<p>A computer mouse is an example of:</p>	<p>Software</p>	
<p>4.</p> 	<p>Drink cans are typically made from:</p>	<p>Aluminium</p>	<p>5</p>
<p>5.</p> 	<p>The classic Pantone chair shown is made from injection moulded:</p>	<p>Glass reinforced plastic</p>	
		<p>Thermosetting plastic</p>	
		<p>Thermoplastic</p>	<p>5</p>

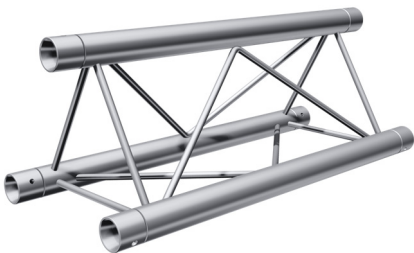
<p>6.</p> 	<p>The strings of a tennis racket are in:</p>	<p>Compression</p>	
		<p>Tension</p>	<p>5</p>
		<p>Torsion</p>	
<p>7.</p> 	<p>Part 'X' of a Try Square is called the:</p>	<p>Blade</p>	<p>5</p>
		<p>Knife</p>	
		<p>Plate</p>	
<p>8.</p> 	<p>A Ratchet and Pawl mechanism is used in a:</p>	<p>Car engine</p>	
		<p>Fishing reel</p>	<p>5</p>
		<p>Digital camera</p>	
<p>9.</p> 	<p>The car jack shown is an example of a:</p>	<p>Parallel linkage</p>	<p>5</p>
		<p>Treadle linkage</p>	
		<p>Reverse motion linkage</p>	
<p>10.</p> 	<p>An electronic multimeter cannot be used to measure:</p>	<p>Voltage levels</p>	
		<p>Resistance</p>	
		<p>Sound levels</p>	<p>5</p>


<p>11.</p> 	<p>Solar cells convert:</p>	<p>Electricity to light</p>	
		<p>Light to electricity</p>	5
		<p>Light to heat</p>	
<p>12.</p> 	<p>Bowls are examples of:</p>	<p>Shell structures</p>	5
		<p>Frame structures</p>	
		<p>Pneumatic structures</p>	
<p>13.</p> 	<p>The mechanism shown is a:</p>	<p>Compound gear train</p>	
		<p>Complex gear train</p>	
		<p>Simple gear train</p>	5
<p>14.</p> 	<p>SUV stands for:</p>	<p>Safer Utility Vehicle</p>	
		<p>Sports Utility Vehicle</p>	5
		<p>Super Utility Vehicle</p>	
<p>15.</p> 	<p>To conserve energy manufacturers are now making torches that use:</p>	<p>LEDs</p>	5
		<p>Tungsten filament bulbs</p>	
		<p>CFLs</p>	

16.		Wireless speakers typically connect to your music player using:	Bluetooth technology	5
			Microwaves	
			Infra-red signals	

17.		A 2200Ω (2k2) resistor has the colour code: Note: (Red = 2, Black = 0)	Red Red Black Black	
			Red Red Black	
			Red Red Red	5

18.		Capacitance is measured in:	Farads	5
			Coulombs	
			Volts	

19.		The triangulated truss shown is:	Rigid	5
			Flexible	
			Weak	

20.		The inventor of the Model T was:	George Stephenson	
			Karl Benz	
			Henry Ford	5

Section B – 80 Marks.

Answer **any two** questions from this section.

40 Marks

Question 1

(a) An image of a stand for a tablet computer such as an iPad is shown opposite. The stand consists of two interlocking parts.

10 marks

(i) Suggest a suitable material from which to make the stand and give a reason for your choice.

Material: Plywood, Acrylic, ABS, Polycarbonate.
2 mks

Reason: Can be bent into shape, Readily cut, shaped or any other valid reason. 2 mks

(ii) Name a machine that could be used to make the bends in the stand.

Name: Vacuum bag press, Hot wire strip heater, pan folder. 2 mks

(iii) The edges of the parts are rounded. Suggest **two** reasons for this.

Reason 1: To improve the aesthetics/appearance. 2 mks

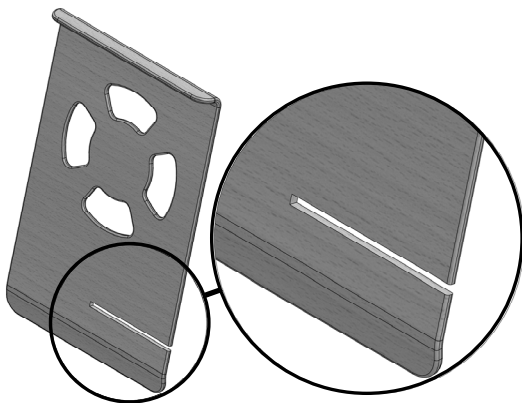
Reason 2: To create safe corners that have no sharpness. 2 mks



Tablet Stand

(b)

10 marks



Enlarged view of the slot

Using notes and sketches describe how you would cut out the slot needed to join both parts of the stand.

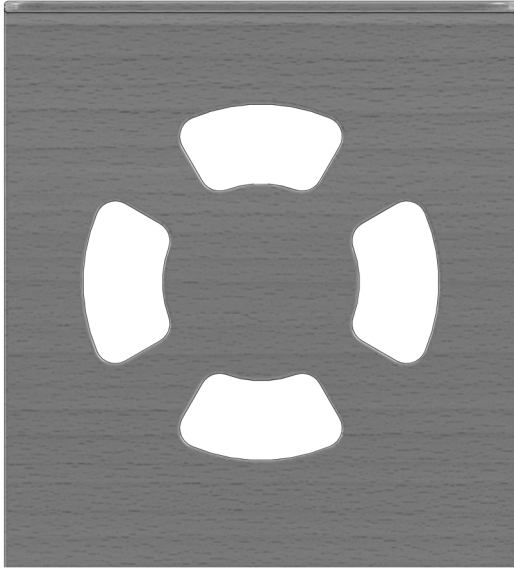
Notes and Sketches

No Attempt	0	←	→		
Fair	5			→	3
Very Good	10			→	8

Question 1

8 marks

- (c) The graphic below shows the cut-out pattern designed to improve the appearance of the stand.



In the space opposite draw **your** design for an alternative cut-out pattern.

Cut-out Pattern

Quality of Idea 0-3

Quality of Sketch 0-5

No Attempt	0	←	→	2
Fair	3			
Good	5	←	→	4

- (d) (i) Outline **two** advantages of a tablet computer over a standard laptop computer.

12 marks

Advantage 1: More portable, lighter, user friendly,
3mks

Advantage 2: Easy access to Internet/WiFi, less expensive, easy to run Apps.
3mks



Tablet computer

- (ii) Outline **two** advantages of a laptop computer over a tablet computer.

Advantage 1: Greater memory capacity, can run more advanced software,.....
3mks

Advantage 2: Have built in DVD/CDROM drive as well as other ports such as VGA.
3mks

Question 2

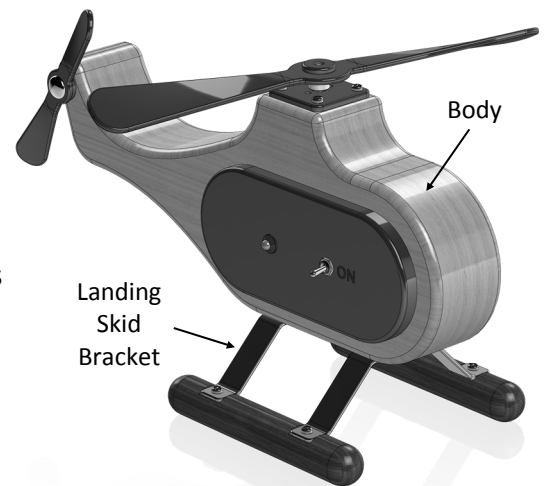
40 Marks

(a) A model of a helicopter is shown. 10 marks

- (i) Name a suitable hardwood for the body and give a reason for your choice.

Hardwood: Ash, Oak, Elm, beech, maple **2mks**

Reason: Durable, hard wearing, attractive, takes a good finish, **2mks**

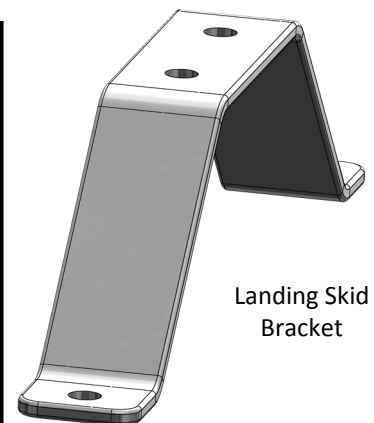


Model Helicopter

- (ii) The landing skid brackets are made from metal. Name a suitable metal for the bracket and describe, with labelled sketches, how you would bend it to the shape shown.

Metal: Aluminium, brass, copper, steel, **2mks**

No Attempt	0	←	→	1
Fair	2	←	→	3
Good	4	←	→	



Landing Skid Bracket

- (b) (i) Name a suitable machine that could be used to cut the outline shape of the helicopter body. 8 marks

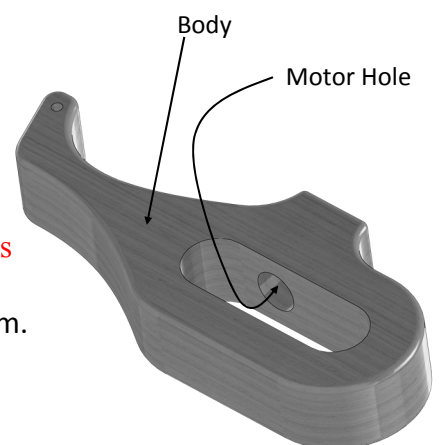
State **one** specific safety precaution to be observed when using this machine.

Machine: Scroll Saw, Band Saw, **3mks**

Precaution: Wear ear muffs and safety goggles. **3mks**

- (ii) The diameter of the hole to be drilled for the motor is 24 mm. Name a suitable type of drill bit that could be used for this purpose.

Name of drill bit: Auger Bit, Flat bit, forstner bit **2mks**



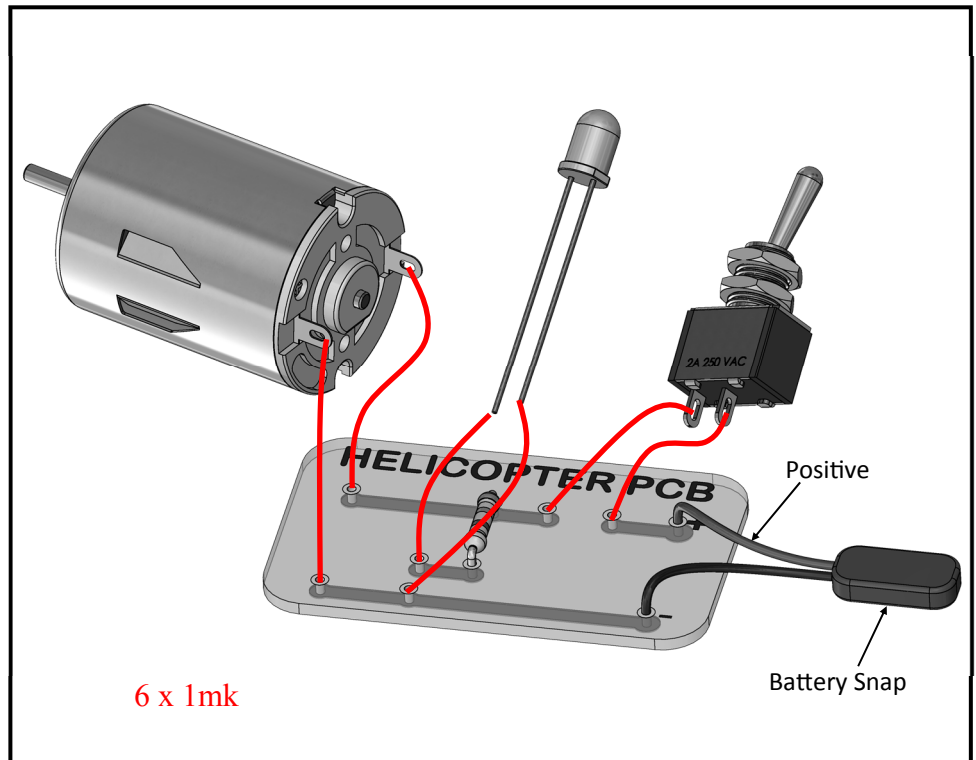
Helicopter Body

Question 2

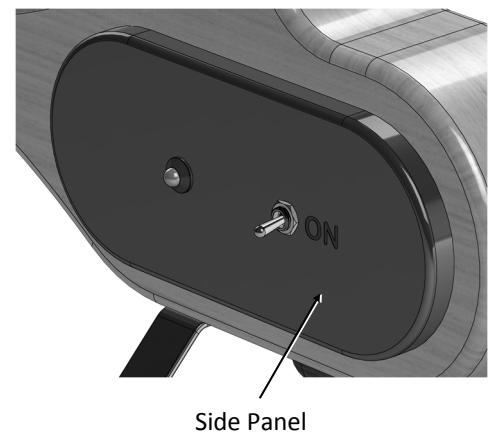
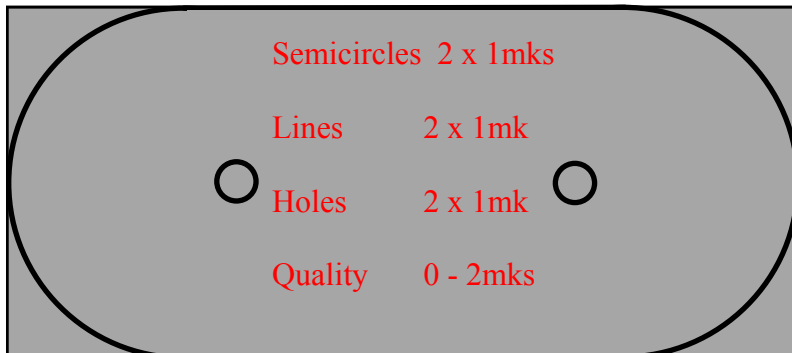
- (c) A printed circuit board (PCB) is used to build the control circuit for the model helicopter.

A resistor is included in the circuit to reduce the voltage across the LED.

Sketch in the wire connections from each component to the PCB so that the switch activates both the motor and the LED.



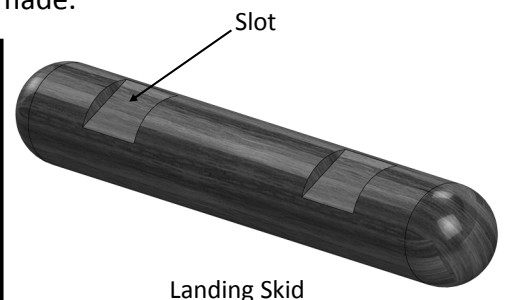
- (d) The smallest rectangular piece of plastic needed to make the side panel is shown below. On this plastic mark out the shape of the side panel. Show the positions of the holes for the LED and switch. (Estimate the dimensions for the hole positions).



- (e) The image shows a wooden landing skid for the helicopter. Describe with labelled sketches how one of the slots could be made.

8 marks

No Attempt	0	←	→		
Fair	4			←	→
Very Good	8			←	→



Question 3

40 Marks

(a) A working model of a solar-powered buggy is shown. 10 marks

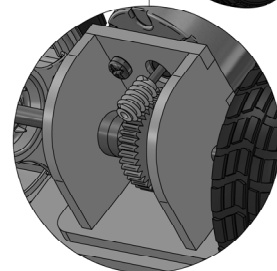
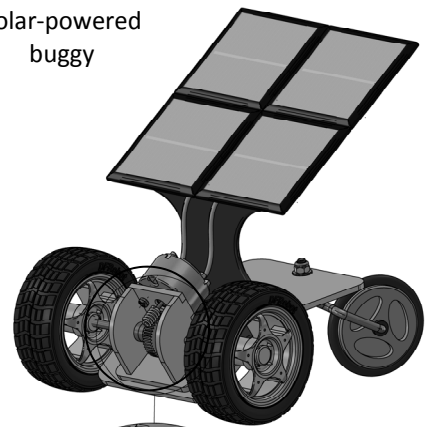
- (i) Name the type of gear mechanism used to drive the buggy and suggest **two** reasons why this mechanism was selected.

Name: Worm and Worm-Wheel 2mks

Reason 1: High velocity ratio, high output torque 2mks

Reason 2: Compact, gears do not slip, 2mks

Solar-powered buggy



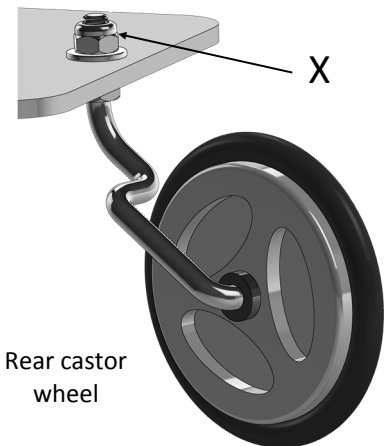
Enlarged view of gear mechanism.

- (ii) The rear single wheel of the buggy is a *castor* wheel. Explain why this is necessary.

Answer: A castor wheel is necessary so that the rear wheel can follow the movement of the vehicle. It prevents drag. 2mks

- (iii) Name the type of nut used at position 'X'.

Name: Nylon lock nut 2mks



Rear castor wheel

(b) Four views of the buggy are shown below. Name **each** view. 8 marks

Pictorial View/ Isometric view 2mks	Front Elevation Side Elevation End View 2mks	Side Elevation Front Elevation End View 2mks	Plan View Top View 2mks

Question 3

14 marks

(c) The flat-pattern of the part used to support the solar cells is shown.

(i) List **three** tools used in the *marking-out* of this part.

Tool 1: Rule/Ruler 2mks

Tool 2: Try Square 2mks

Tool 3: Compass/Spring Dividers 2mks

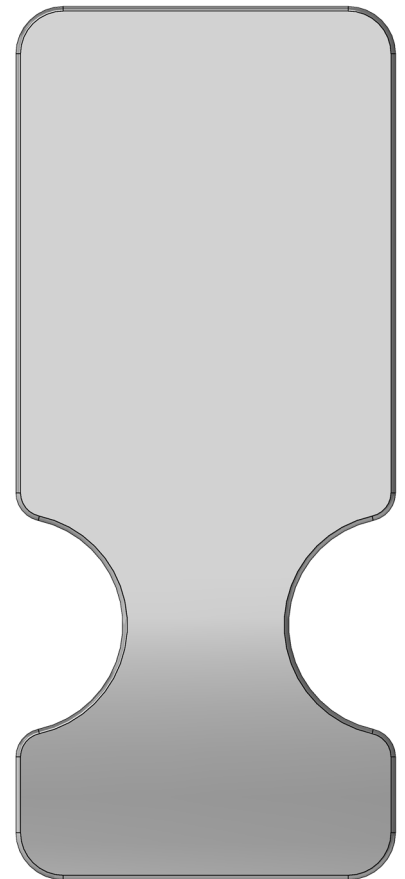
(ii) Suggest a suitable material for this part and outline **three** processes that can be used to produce a smooth edge on the material.

Material: Brass/aluminium/copper sheet, acrylic, HIPS, ply wood. 2mks (Generic material = 0mks)

Process 1: File/Sand the edges 2mks

Process 2: Sand/Steel wool the edges 2mks

Process 3: Steel Wool/polish the edges 2mks



(d) A view of the gearbox for the buggy is shown.

8 marks

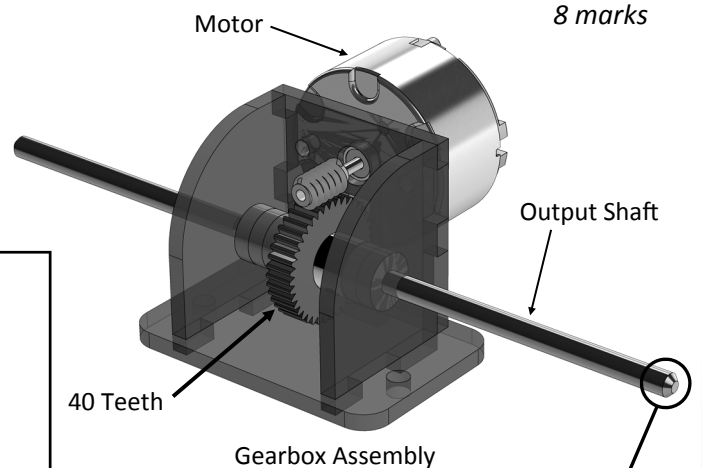
(i) If the gear attached to the output shaft has 40 teeth, calculate the speed of the output shaft if the motor rotates at 400 RPM.

Calculation

Velocity Ratio = 40/1

Output Shaft Speed = $400/40$
= 10 RPM

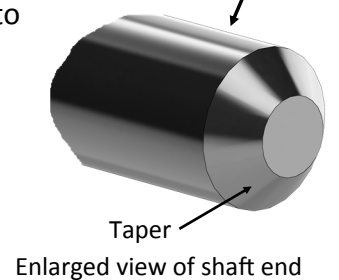
Correct solution = 4mks



(ii) The output shaft is *tapered* at both ends. Name the machine used to taper the shaft and give a reason for doing this to both ends.

Machine name: lathe, bench grinder. 2mks

Reason for tapering: To make it easier to attach the wheels 2mks



Question 4

40 Marks

- (a) 3D printing has become popular in manufacturing many kinds of products.

Describe **three** advantages of 3D printing over other production methods.



3D printed
Electric Guitar

12 marks

Advantage 1: If you can solid model it, you can make it. User friendly technology. Requires little or no supervision once the process is in train. **4mks**

Advantage 2: Easy to set up the production process. Relatively cheap production method for one off production. **4mks**

Advantage 3: Very good for prototyping. You can download model designs and print them. You can customise products. **4mks**

- (b) A handcycle as used in the Paralympics is shown. The frame and wheel rims are made from carbon fibre.



12 marks

- (i) Suggest **two** reasons for using carbon fibre.

Reason 1: High strength to weight ratio. **4mks**

Reason 2: very stiff material. Can be moulded into complex shapes. **4mks**

- (ii) Why is a chain drive considered suitable for the handcycle?

Chain drives provide a non slip/positive drive. They are strong and involve very little friction if properly lubricated. **4mks**

- (c) Drones are a product of modern design and engineering.

- (i) Suggest **two** possible uses for drones that would help society in some way:

Use 1: Search and rescue operations in difficult territory. **4mks**

Use 2: Reconnaissance in war torn countries. Dropping aid packages to the needy. Sports coverage to improve the enjoyment of sporting events such as the Winter Olympics. **4mks**



Drone

16 marks

- (ii) Suggest **two** ways in which drones could prove to be a nuisance to society.

1. Dangerous in the vicinity of airports/aircraft. **4mks**

2. Invasion of privacy when used for photographic purposes. **4mks**