Coimisiún na Scrúduithe Stáit
State Examinations Commission

2009 S.68

Junior Certificate Examination 2009

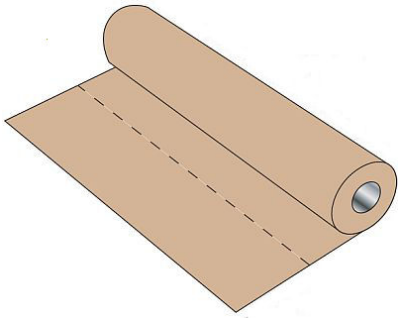
Technology

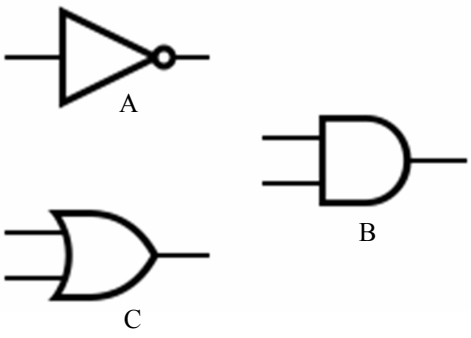
Ordinary Level

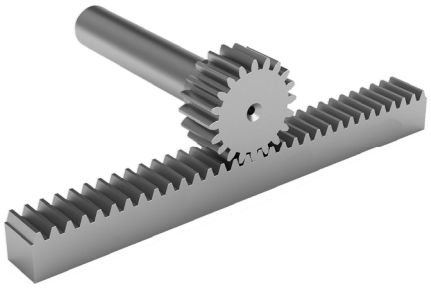
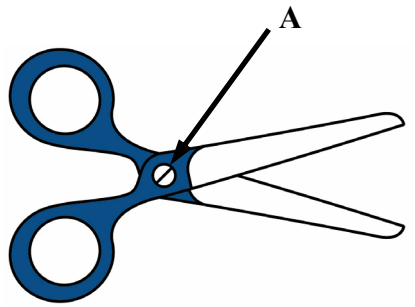
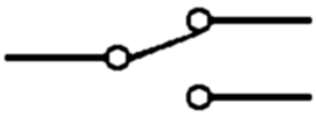
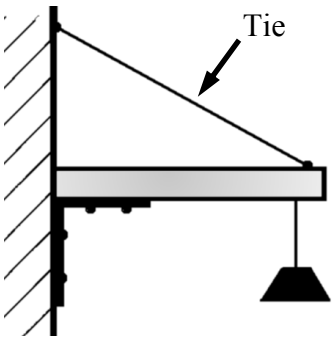
Marking Scheme

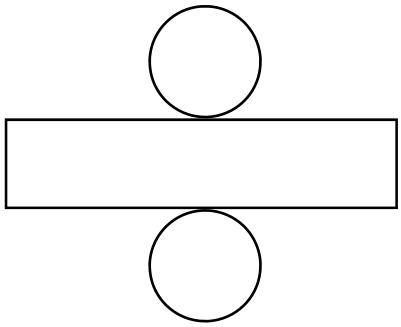
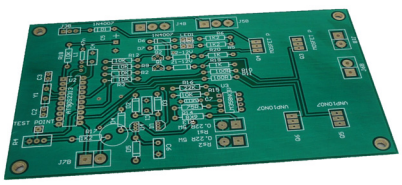
Section A, 20 short questions, candidates to answer any 16.	80 marks
Section B, 4 long questions, candidates to answer any 2.	80 marks

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

1. 	This drawing is a(n):	Elevation	⑤
		Perspective projection	
		Isometric projection	
2. 	Oak is a:	Hardwood	⑤
		Manufactured board	
		Softwood	
3. 	Modern computer hard drive capacity is measured in:	Bytes	
		Megabytes	
		Gigabytes	⑤
4. 	This is a:	9V battery	⑤
		6V battery	
		1.5V cell	
5. 	Nylon is a(n):	Animal fibre	
		Vegetable fibre	
		Synthetic fibre	⑤

6. 	This is a:	Compression spring	⑤
		Tension spring	
		Torsion spring	
7. 	The power of low energy light bulbs is measured in:	Amps	
		Volts	
		Watts	⑤
8. 	This is a:	Compass	
		Spring dividers	⑤
		Scriber	
9. 	This is a:	Band saw	
		Scroll saw	⑤
		Table saw	
10. 	Which of these symbols is a NOT gate?	Symbol A	⑤
		Symbol B	
		Symbol C	

11. 	This is a:	Worm and wheel	
		Ratchet and pawl	
		Rack and pinion	5
12. 	An engine crankshaft and piston is an example of a:	Crank and slider	5
		Bevel gear system	
		Chain and sprocket	
13. 	The arrow **A** points to the:	Fulcrum	5
		Load position	
		Effort position	
14. 	This is the symbol for a:	SPDT switch	5
		DPDT switch	
		Push switch	
15. 	The tie is in:	Shear	
		Tension	5
		Compression	

16. 	Speakers:	Convert sound into electrical energy	
		Convert electrical energy into sound	(5)
		Convert chemical energy into sound	
17. 	This development shows a:	Cube	
		Cylinder	(5)
		Pyramid	
18. 	Acrylic is a:	Thermoplastic	(5)
		Thermosetting plastic	
		Composite material	
19. 	This is a:	Pan head screw	
		Dome head screw	
		Countersunk head screw	(5)
20. 	Shown is a PCB. PCB stands for:	Photo Circuit Board	
		Printed Circuit Board	(5)
		Plastic Circuit Board	

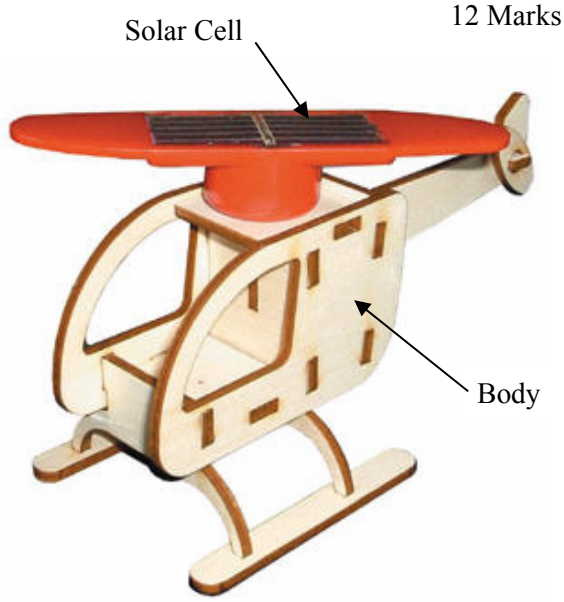
Question 1

Section B – 80 Marks
Answer any **two** questions from this section

40 Marks

(a) A solar powered wooden helicopter is shown. A solar cell is fitted into the plastic rotor of the helicopter.

12 Marks



(i) List **two** suitable manufactured boards that could be used to make the body of the helicopter.

1. *MDF, etc.* (2)

2. *Plywood, etc* (2)

(ii) What surface finish would you apply to the body of the helicopter?

Paint, varnish, etc. (2)

(iii) What tools would you use to cut out the windows in the helicopter?

Drill, scroll saw (3)

(iv) What precautions should be taken when designing a toy for a young child?

No sharp edges, no toxic paint, no loose parts, etc. (3)

(b) (i) The solar cell in the helicopter powers a motor. This motor produces rotary motion. List **four** other devices that use rotary motion.

8 Marks

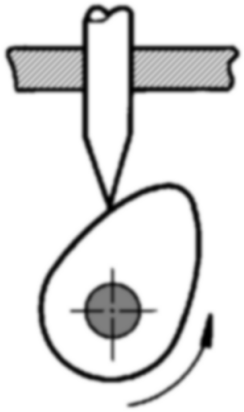
1. *Bicycle wheel* (1)

2. *Microwave oven* (1)

3. *CD Player* (1)

4. *Washing machine* (1)

(ii) A cam and follower produces reciprocating motion. In the box below draw this mechanism.



No Attempt 0
Fair 2
Good 3
Complete 4

Question 1

12 Marks

(c) (i) Give **two** common uses of solar cells.

1. *Use to charge calculator batteries* (2)

2. *Used to power garden lighting* (2)

(ii) A solar cell converts light energy to electrical energy. Complete the table below by stating the energy conversion for each device.

Device	Converts	To	
Solar Cell	*Light Energy*	*Electrical Energy*	
Microphone	*Sound Energy*	*Electrical Energy*	(1)
Motor	*Electrical Energy*	*Mechanical Energy*	(1)
Bulb	*Electrical Energy*	*Light/Heat Energy*	(1)
Buzzer	*Electrical Energy*	*Sound Energy*	(1)

(iii) Wind is a renewable source of energy. List **one** advantage and **one** disadvantage of using wind generators.

Advantage: *Good for the environment* (2)

Disadvantage: *Can be difficult and expensive to harness, can have a visual impact on the landscape.* (2)

(d) The rectangle shown below represents a blank piece of board used to make the side panel of the helicopter. Within this rectangle draw a well proportioned sketch of the side panel shape. Colour or shade all areas of waste to be removed.

8 Marks

(8)

No Attempt 0

1

Fair 2

3

Good 4

5

Complete 6

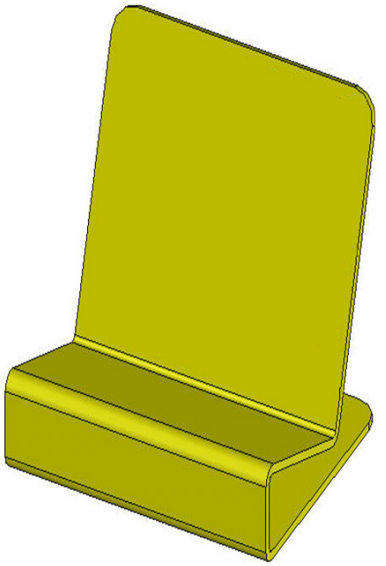
Quality of sketch = 2

Side Panel

Question 2 40 Marks

16 Marks

(a) A unit for displaying business cards is shown. This unit is formed from one piece of material.



Display Unit

(i) Name a suitable material for the display unit.

Acrylic (2)

(ii) List **four** processes necessary to make this unit.

1. *Measuring* (2)
2. *Marking out* (2)
3. *Bending* (2)
4. *Sanding* (2)

(iii) For **one** process listed above name the tools used.

Bending — strip heater (2)

(iv) The unit was found to slip easily when placed on a smooth surface. Explain how you would solve this problem.

Stick pieces of rubber to the base (2)

(v) Describe how you would produce a high quality smooth finish on the edges of the unit.

First file and then sand with different grades of sandpaper. (2)

6 Marks

(b) (i) Students use desktop publishing software to produce project reports. List **four** advantages of using this software.

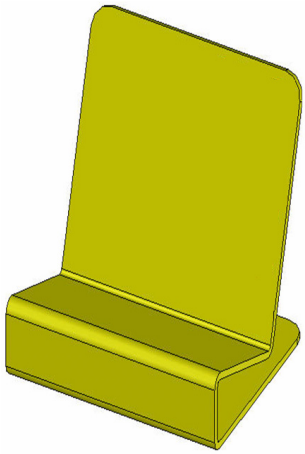
1. *What you see is what you get layout* (1)
2. *Can mix text and graphics* (1)
3. *Easy to use toolbars and icons* (1)
4. *Easy to edit document at a later time* (1)

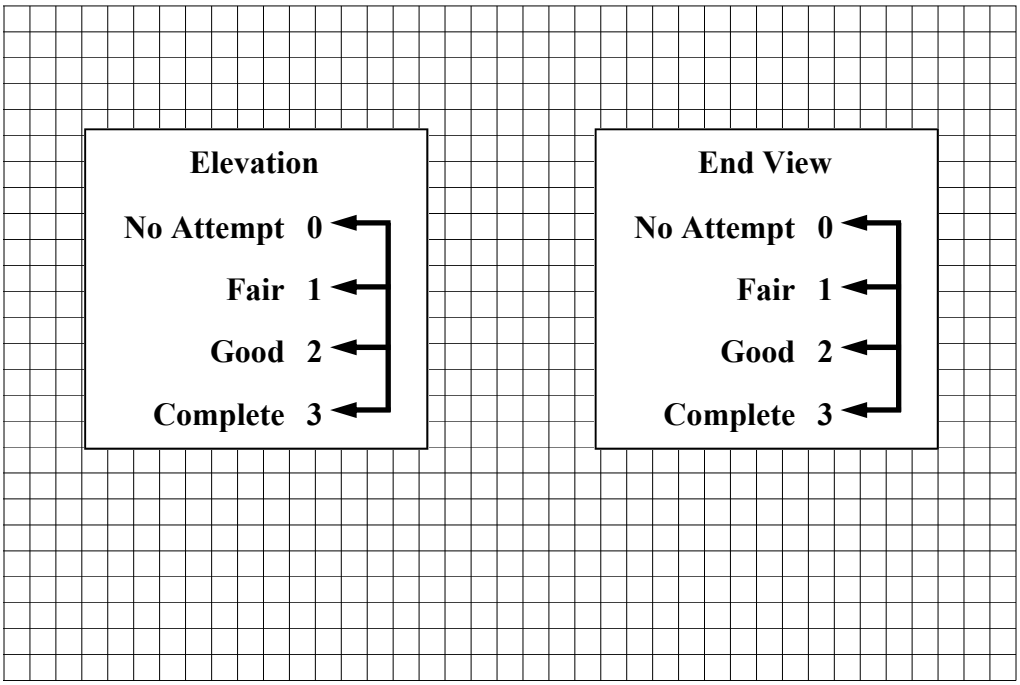
(ii) Name **two** other software applications.

1. *CAD software* (1)
2. *Wordprocessor* (1)

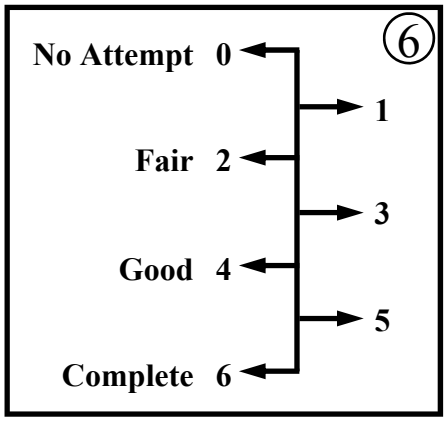
Question 2

(c) In the grid below make well proportioned sketches of an elevation and an end view of the display unit. 6 Marks





(d) When in use the business cards easily slipped off the display unit. Show using an annotated sketch, how you would change the design to prevent the cards from falling off. 6 Marks



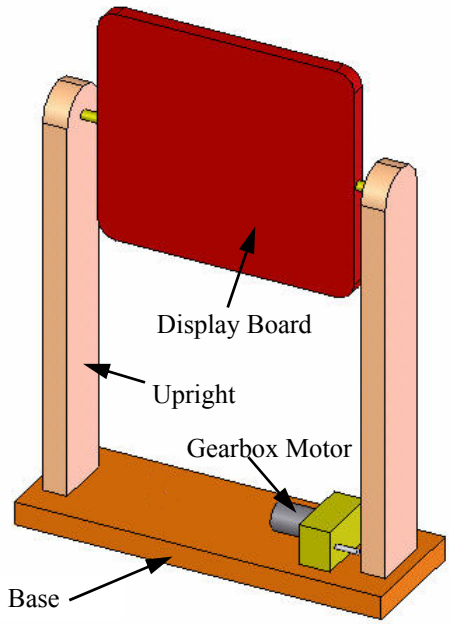
(e) Designs should be evaluated after manufacture. Give **two** reasons why this should be done. 6 Marks

1. *To make sure that the product meets the design requirements.* 3

2. *To see how well the product turned out and to check if you would do anything different if you had to make it again.* 3

Question 3 40 Marks

(a) A model of a rotating advertising sign is shown. 12 Marks
The sign is driven by a motorised gearbox.



Rotating Advertising Sign

(i) The base and upright are to be made from hardwood.
Name a suitable hardwood for this purpose.

Oak (2)

(ii) How would you join the uprights to the base?
Use a sketch to illustrate your answer.

(4)

No Attempt 0
Fair 2
Good 3
Complete 4

(iii) Name a suitable material for the display board and state how the corners could be rounded.

Acrylic (1)

The corners can be filed to shape and then sanded. (2)

(iv) What safety precautions should you take when drilling the display board?

Hold the display board firmly in a machine vice (3)

and use the correct drill and drilling speed. Also use protective eye wear.

(b) 8 Marks

(i) A mechanism must be used to join the gearbox to the rotating advertising board.
Choose a mechanism from the following list and give **two** reasons for your choice.
Mechanisms: Cam and follower, chain and sprocket, ratchet and pawl, pulley drive.

Selected mechanism: *Pulley drive* (2)

Reasons for choosing: 1. *Easier to construct* (2)

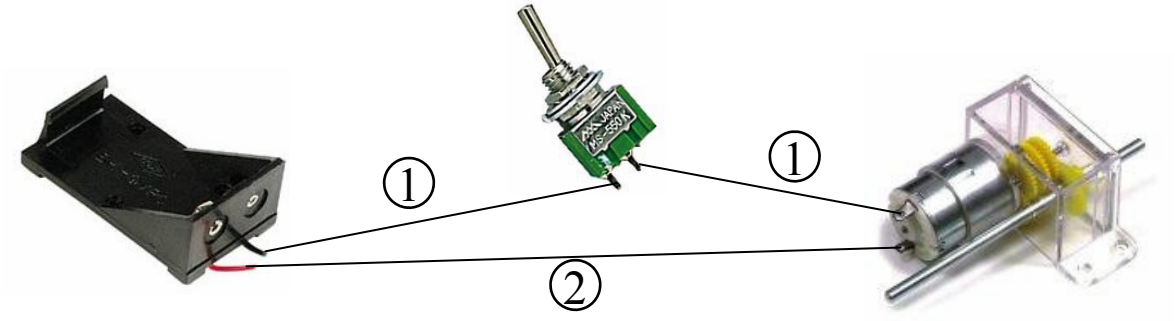
2. *Cheaper* (2)

(ii) A switch and battery have to be housed in a box made using a vacuum former.
List **two** other items that can be made using a vacuum former.

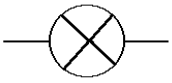
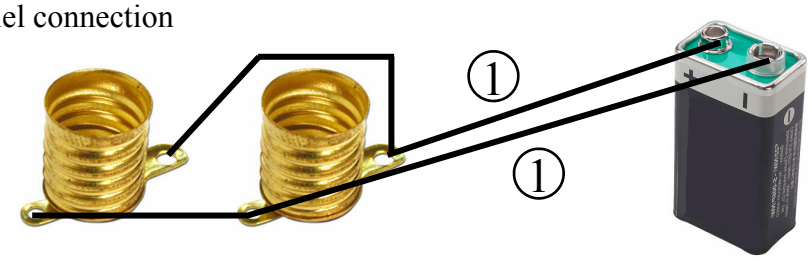
1. *Egg carton* (1)
2. *Plastic toy cars* (1)

Question 3

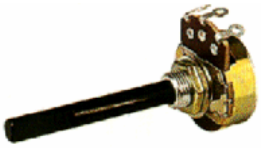
(c) (i) The components needed to build the circuit for the rotating advertising sign are shown. Draw the wires to correctly connect the battery holder, switch and motor. 12 Marks



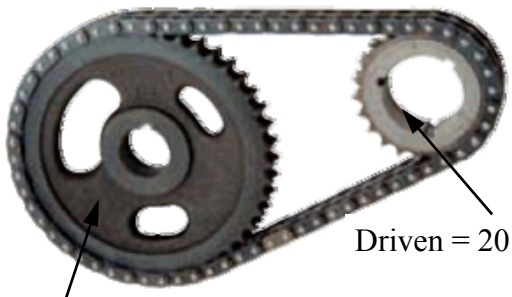
(ii) Two bulbs are to be used to illuminate the display at night. Draw the symbol for a bulb and show how both bulb holders can be connected in parallel.

Bulb symbol (2)	Parallel connection
	

(iii) Name the components shown.

			
LDR (1)	*Resistor* (1)	*Variable Resistor* (1)	*Transistor* (1)

(d) In the space opposite calculate the speed of the driven sprocket if the driver is rotating at 20 RPM. 8 Marks



Driver = 60T
Driven = 20T

60/20 = 3 => Driven = 60 RPM

Question 4 40 Marks

(a) 16 Marks

(i) An old electric washing machine is shown. List **three** features of a modern washing machine that would not have been available in older models.

1. *Electronic controls* (2)
2. *High speed drum* (2)
3. *Different cycles for different clothes* (2)

(ii) Give **three** examples where technology has changed the way we travel.

1. *Automatic pilot on planes.* (2)
2. *Computerised train signals* (2)
3. *New types of electric cars* (2)

(iii) How has computer game technology changed in recent years?

Wireless controls (2)

Internet games—play with people in other countries. (2)

(b) 12 Marks

(i) How can a house be made more energy efficient?

Insulate (3)

Use CFL bulbs (3)

(ii) Name one renewable and one non-renewable source of energy.

Renewable: *Wind power* (2)

Non-Renewable: *Coal* (2)

(iii) Why should we recycle soft drink cans?

Because aluminum can be used to make many other items (2)

(c) 12 Marks

From the history of technology name **two** inventors and describe their achievements.

Inventor: *John Dunlop* (2)

is the recognised inventor of the first practical pneumatic or inflatable tyre. (4)

Inventor: *John Baird* (2)

is best remembered for inventinga mechanical television system. (4)