BILAL COMBINED SCHOOL
TECHNOLOGY
PROJECT
GRADE 7
TERM 3

EDUCATOR: A. RAVAT
MODERATOR: I.ARABIE
DISTRICT: D11

NO. OF PAGES: 9
TOTAL: 70 MARKS

MARKING GUIDELINES

Focus: Investigate, design, make, evaluate, and communicate.

Project: A crane lifting metal scraps

COMPONENT	Planned date of completion	Maximum Marks	Learner's Marks
Investigation	Week 4 & 5 Date 7 /07 /23 to 18 /07/23	15	
Design	Week 6 & 7 Date 21 /07/23 to 01 /08 /23	20	
	Sub Total A	**35**	
Making	Week 8 & 9 Date 04 /08 /23 to 15 /08 /23	35	
Sub Total B		**35**	
Grand Total	**A + B**	**70**	

Name of Learner: _____ Teacher (Signature) _____
Class: _____ Date: _____

Scenario
A scrap-metal dealer sorts magnetic and non-magnetic metals into separate piles for recycling. The simplest way
to do this is to use a crane with a magnet but it is difficult to remove the metals that do stick to permanent magnets. **It would be beneficial to have a magnet that can switch on and off.**

NOTE 1: The model cranes should be made using simple materials (e.g. paper dowels, 'elephant' grass, etc.).
It will be a simple frame structure with a pulley and crank mechanism. Sufficient strength and rigidity should be achieved by
triangulation. Measuring and simple tool skills must be developed. Safe, cooperative working is a key skill and needed in the
world of work. The arm of the crane should be 260mm long.
NOTE 2: The electromagnet will be strongest if a long insulated wire is used – wire over 100mm long is very effective. Increasing the current by using more cells in series has a small influence in the strength of the electromagnet.
The wireshould be wound around a "relatively soft" iron core. Avoid using a steel bolt (it is far too hard). A fairly soft core can be made using a bundle of short lengths of iron wire. Nails are softer than bolts but are still fairly hard.

Source: Technology CAPS Senior Phase

1. INVESTIGATION (Individual work)

Examine the following machines in Figure 1 and 2 below and use them to answer the questions that follow:

Figure 1 Machine A
Source: myggsa.co.za

Figure 2 Machine B
Source: durbanmetals.co.za

a) Which of the two machines would you recommend to solve the problem that is posed in the above scenario?
Machine B (1)

b) Give a reason for your choice. Machine B has electromagnet which is requested in the scenario. (2)

c) How would you improve the machine which you did not select for it to be able to solve the problem indicated in the scenario?
Remove the hook and replace it with an electromagnet. (2)

d) List the uses of Crane A and Crane B

Crane A
It lift the materials by hooking (1)
Crane B
It lift the materials by using electromagnet (1)

e) Compare the two cranes and describe their differences

Crane A	Crane B
1.Hook for lifting	1.Round metal plate
2.Arm can only pivot/swivel	2.Arm can bend on three points
3.Pully mechanism used	3.Only hydraulics
4.More Wheels	4.Less wheels

And any other relevant answer.

(8)
[15]

2. DESIGN (Individual work)

2.1 Refer to the scenario and write the **DESIGN BRIEF** for the model that you are going to make in order to solve the problem. Your design brief should include the following:

- The name and type of your model and
- How the model will be used to solve the problem.

Design brief: (The learner should indicate what he/she is going to make (Electromagnetic crane) and how it is going to work (Attracting and releasing scrap metal pieces) (2)

2.2 Give specification and constrain for your model

2.2.1. Specifications: (any 1)

Purpose:
Crane electromagnet should activate magnet when it is on and deactivate it when switched off.
Size:
Crane should be 260mm long.
Material:
Model cranes should be made using simple materials (e.g. paper dowels, 'elephant' grass,etc.).

(1)

2.2.2. Constraints: (any
1) *Time factor.*
Restricted material

2.3 Sketch two possible designs for your suitable model. (any relevant sketch of a crane)

Sketch 1

Marking grid for sketches

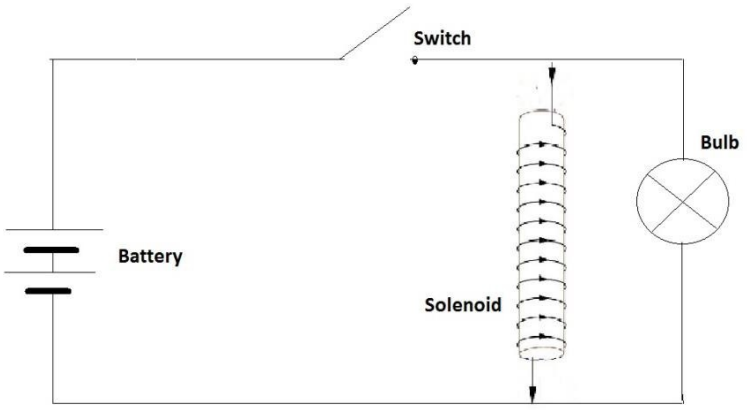
Sketch 1

CRITERIA	ALLOCATED MARKS	MARKS OBTAINED
Outer lines	0 - 1	
Line work (Difference between line types)	0 - 1	
TOTAL	**2**	

Sketch 2 Sketch 2

CRITERIA	ALLOCATED MARKS	MARKS OBTAINED
Outer lines	0 - 1	
Line work (Difference between line types)	0 - 1	
TOTAL	**2**	

2.4 Draw the circuit diagram of the electromagnet with a light to show when it is on. A battery with two 1.5 V cells connected in series with a switch, a light bulb connected in parallel with the soft iron that is coiled with a conducting wire. The circuit should be fully labeled.



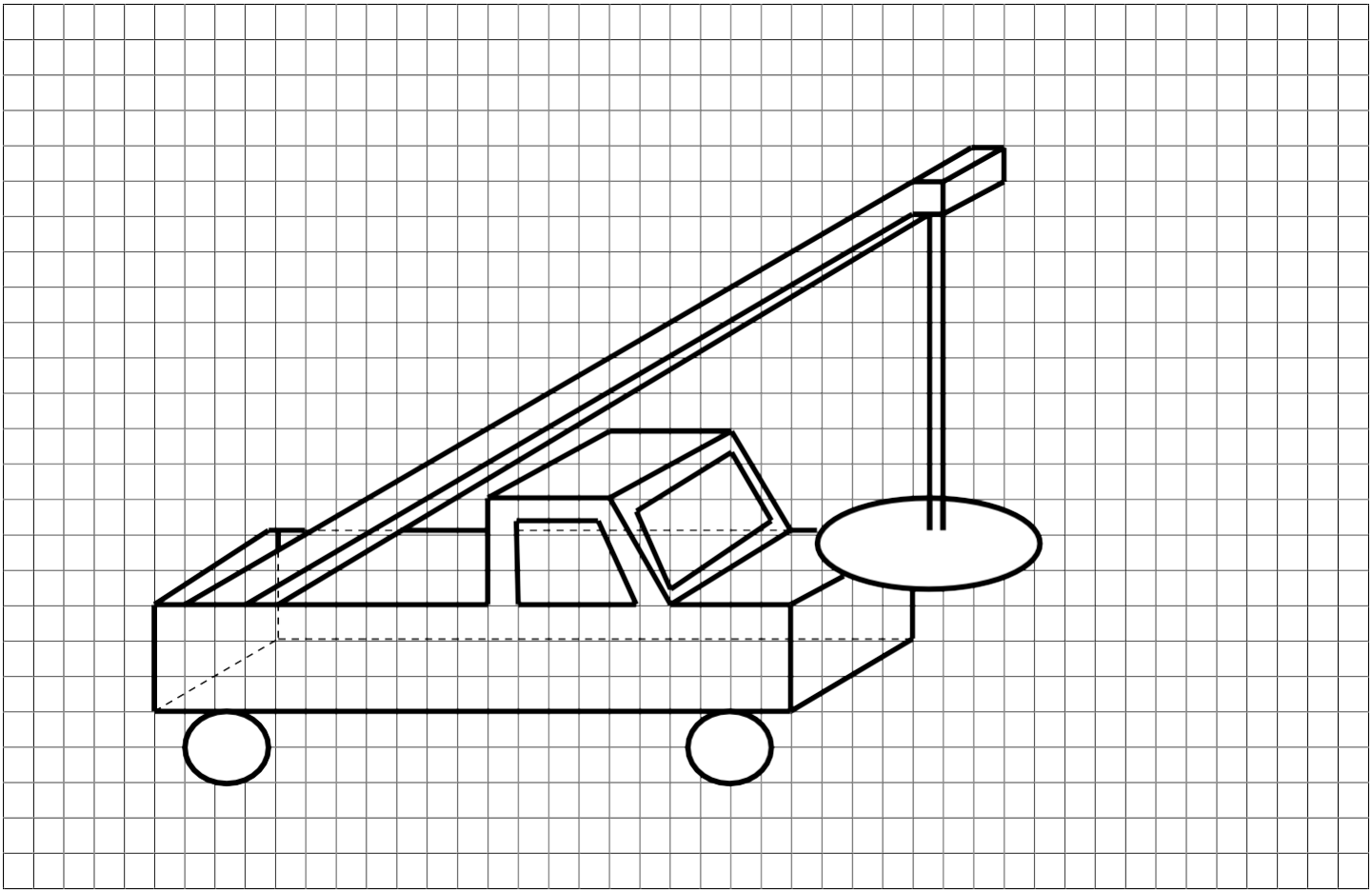
(8)

MARKING GRID FOR 2.4

CRITERIA	ALLOCATED MARKS	MARKS OBTAINED
Symbols for the four components.	2	
Relevant labeling for each component	1 x 4 = 4	
Completion of a circuit	2	
TOTAL	**8**	

2.5 (Individual work)

Each learner uses the oblique technic to draw an idea for the crane chosen from the two ideas sketched in 2.3 on the squared (quadrant) grid paper provided. Hidden details and outer lines should be clearly shown. NB. 1 square on the grid paper represent 20mm. (4)



MARKING GRID FOR 2.5

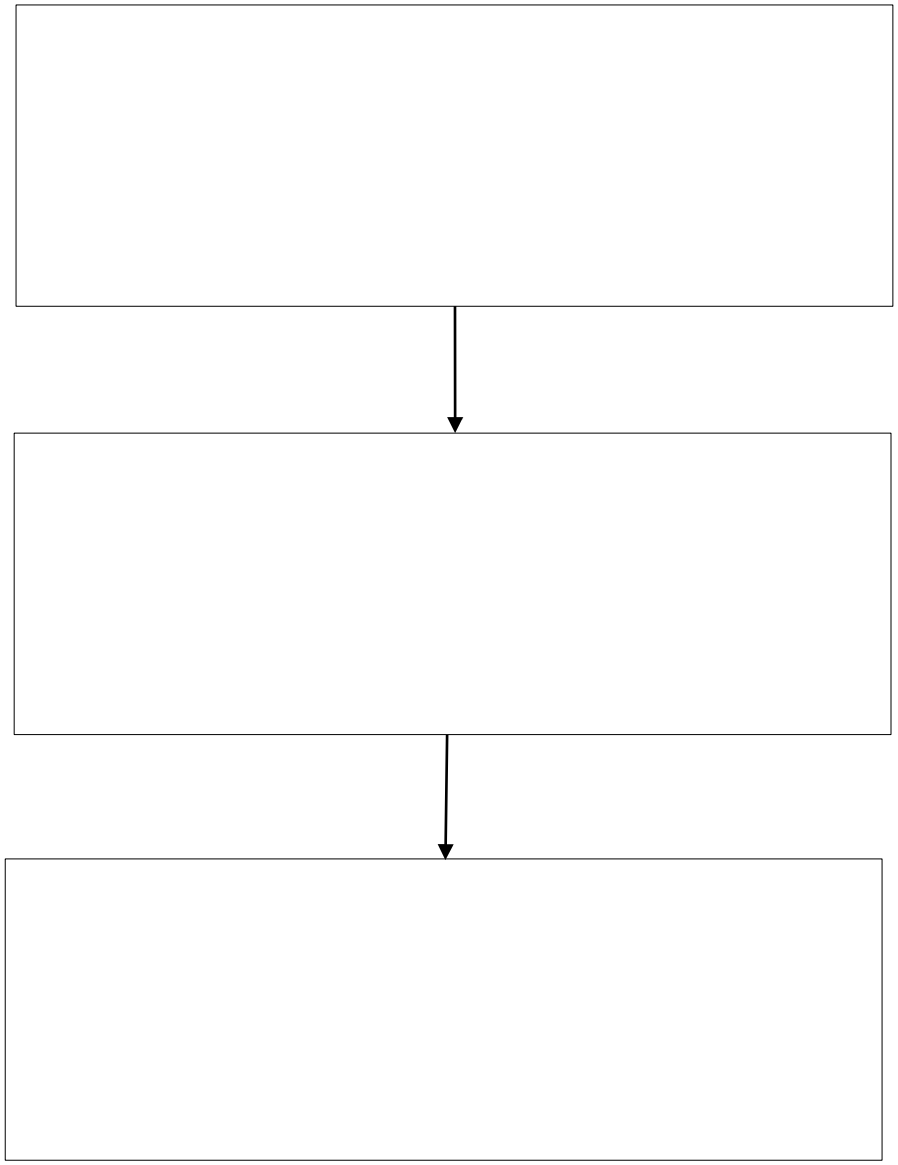
CRITERIA	ALLOCATED MARKS	MARKS OBTAINED
Outer lines	0 – 2	
Neatness	0 – 2	
TOTAL	**4**	

[20]

Name of Learner: _____ Teacher (Signature) _____
Class: _____ Date: _____

3 MAKING

3.1 Flow chart: List the steps for making the model (individual work)



CRITERIA	ALLOCATED MARKS	MARKS OBTAINED
Clearly explain steps of making.	0 – 3	
Correct sequencing of steps.	0 - 2	
TOTAL	**05**	

Name of Learner: _____ Teacher (Signature) _____
Class: _____ Date: _____

3.2 Make a working model. (Group work)

Rubric for Making

Assessment Criteria	Marks 1	Marks 2	Marks [3-4]	Marks 5	Learner's Mark
Setting out a plan for making	Unable to set a plan for making at all.	Setting out is missing key steps and is poorly conceived.	Can set out a plan for making in a simple and correctly ordered way.	Expertly sets out a plan for making in a correctly ordered and clearly detailed way.	
Cutting to size	Unable to cut materials.	Attempts to cut materials but forgets procedure and needs assistance.	Can cut materials simply, as required.	Expertly cut materials, showing confidence and advanced skills.	
Assemble and join parts	Unable to assemble and join parts at all. Shows no care.	Attempts to assemble and join parts but does so incorrectly and/or inappropriately, and with little care.	Able to assemble and join parts correctly and carefully.	Able to assemble and join parts correctly, most precisely and with great care.	
Correct usage of tools	Unable to use tools at all. Shows no care.	Attempts to use tools but does so incorrectly and/or inappropriately, and with little care.	Able to use tools correctly and carefully.	Able to use tools correctly, most precisely and with great care.	
Relevant selection of materials	A senseless selection of materials has been made.	A poor and inappropriate selection of materials has been made.	A simple, suitable and convenient selection of materials has been made.	A well-thought-out and most appropriate selection of materials has been made.	
Neatness (Aesthetic) of product	No care is evident; work is exceptionally untidy.	Some care is evident, but work is untidy.	Care has been taken but some improvement in neatness is possible.	Great care has been taken to produce exceptionally neat work.	
				TOTAL	

[35]
GRAND TOTAL: 70

END

Name of Learner: _____ Teacher (Signature) _____
Class: _____ Date: _____