Province of the
EASTERN CAPE
EDUCATION

SENIOR PHASE

GRADE 9

NOVEMBER 2016

TECHNOLOGY

MARKS: **120**

TIME: **2 hours**

9TECH

This question paper consists of 17 pages including 2 pages of annexures.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of SIX SECTIONS: SECTIONS A, B, C, D, E and F.
2. You are required to answer ALL questions.
3. Read ALL the questions carefully before you write the answers.
4. Number your questions exactly as they appear in the question paper.
5. Write neatly and legibly.
6. Sketches must be clear, neat and done in pencil.

ALLOCATION OF MARKS		
SECTION A	QUESTION 1	
	MULTIPLE-CHOICE QUESTIONS	10
SECTION B	QUESTION 2	
	STRUCTURES	12
SECTION C	QUESTION 3	
	DESIGN AND GRAPHIC COMMUNICATION	50
SECTION D	QUESTION 4	
	MECHANICAL SYSTEMS	23
SECTION E	QUESTION 5	
	ELECTRICAL AND ELECTRONIC SYSTEMS	15
SECTION F	QUESTION 6	10
	PROCESSING	
	GRAND TOTAL:	**120**

SECTION A: MULTIPLE-CHOICE QUESTIONS

QUESTION 1

Choose the correct answer and write only the letter (A–D) next to the question number (1.1–1.10) in your ANSWER BOOK, for example 1.12 C.

1.1 The type of line shown below represents an/a …

A hidden detail line.
B construction line.
C out-line.
D dimension line. (1)

1.2 Which of the following will be used to guide a designer in the completion of a drawing?

A Centre lines
B Dashed lines
C Outlines
D Construction lines (1)

1.3 The main purpose of dimensioning in graphic communication is to make sure that the drawing …

A is neat.
B is accurate.
C informs the reader of its size.
D is complete. (1)

1.4 … slows the forward motion and stops a bicycle.

A Brake lever
B Brake cable
C Brake callipers
D All of the above. (1)

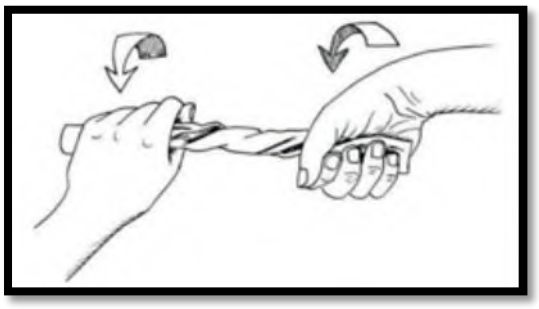
1.5 ... states that PRESSURE exerted on one part of a HYDRAULIC SYSTEM, will be transferred equally in all directions to other parts of the system without any loss.

A Pressure
B Pascal's principle/law
C Hydraulic system
D Closed system (1)

1.6 A measure of the amount of the mass of an object compared to its size.

A Hardness
B Density
C Flexibility
D Stiffness (1)

1.7 The type of force applied in the picture below is a … force.



A dynamic
B static
C torsion
D even (1)

1.8 A process whereby metal and wood could be given the same coating to keep out moisture and/or oxygen that could cause wood to rot or metal to rust.

A Electroplating
B Varnishing
C Painting
D Galvanising (1)

1.9 An ammeter is used to measure the ... in a circuit.

A energy
B resistance
C voltage
D current (1)

1.10 Which of the following would NOT be regarded as an output device?

A Bulb
B Motor
C Light-dependent resistor
D Buzzer (1)

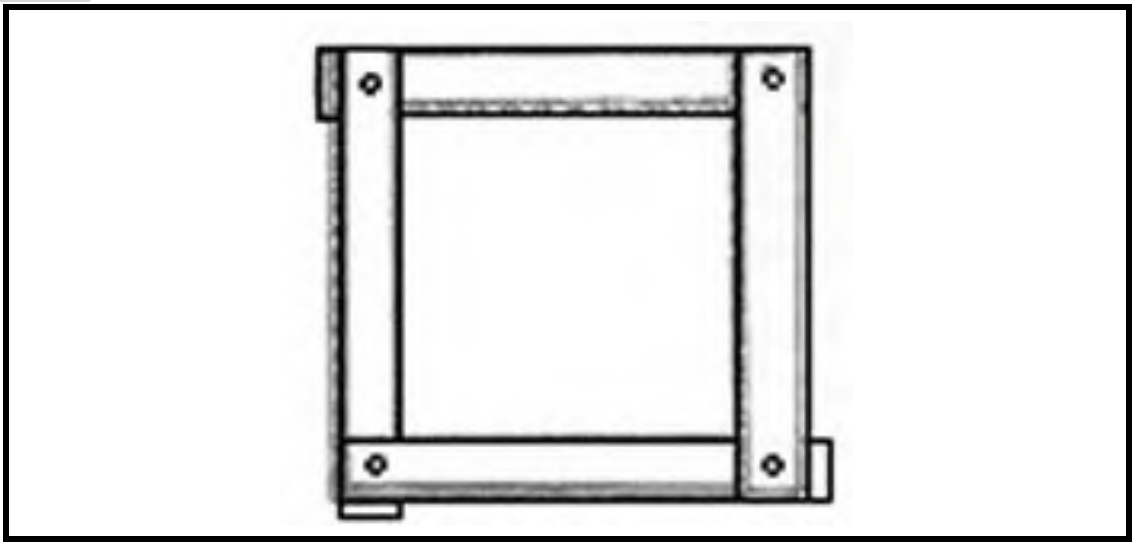
TOTAL SECTION A: 10

SECTION B: STRUCTURES

QUESTION 2

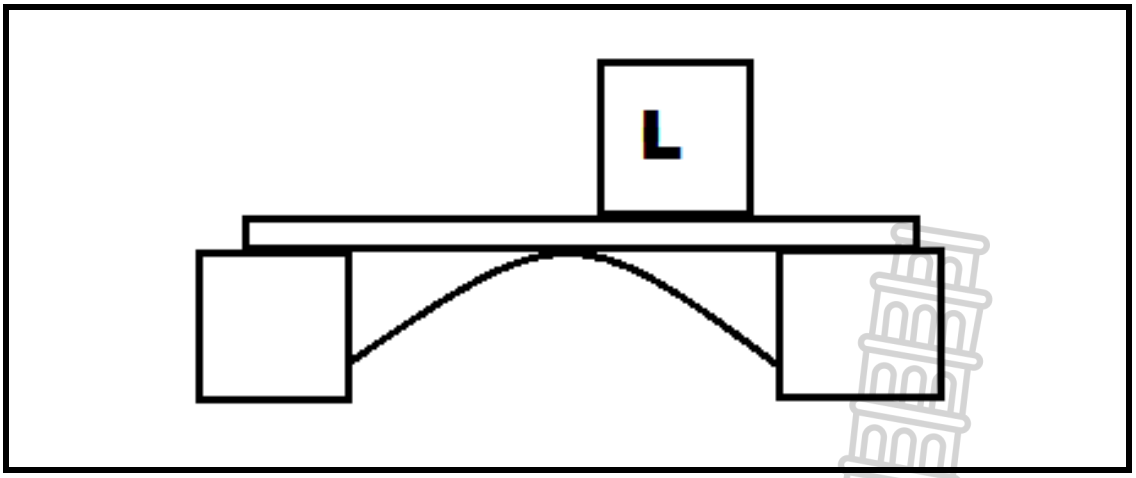
2.1 Cross-bracing is used to distribute forces that act on structures evenly so that twisting and bending do not occur.

Redraw the object shown below, and draw in the cross-bracing where it is needed.



(2)

2.2 Does the picture below show an even or an uneven load? Explain your answer.



(2)

2.3 Read the following paragraph and answer the questions that follow.

NORTHERN UKHAHLAMBA LOCAL AUTHORITY

REQUEST FOR TENDER: Access bridge for the community of Dabulamanzi

You are hereby invited to submit a tender for the requirements of Northern Ukhahlamba Local Authority.

TENDER NUMBER – NU O25

The successful tender must provide a safe, cost effective solution for the villagers to cross the local river. The river is 100 m wide at the crossing point. It rises during summer rains and there are crocodiles in the river all year round.

Construction must commence within 30 days of approval being granted and completed within 6 months.

Closing date – 25 February
Enquiries: Head of Community Council, Mr Nkululeko Mbonambi
(054 258 9870)

2.3.1 Explain what a *tender* is. (2)

2.3.2 What is a suitable solution to the problem listed in the tender advert? (2)

2.3.3 List any TWO important aspects that the applicants need to consider in their solution to the problem. (2)

2.3.4 Why is it necessary that the commencement and completion of the construction be specified in the tender advert? (2)

TOTAL SECTION B: 12

SECTION C: DESIGN AND GRAPHIC COMMUNICATION

QUESTION 3

Read the scenario below and answer the questions that follow.

SCENARIO

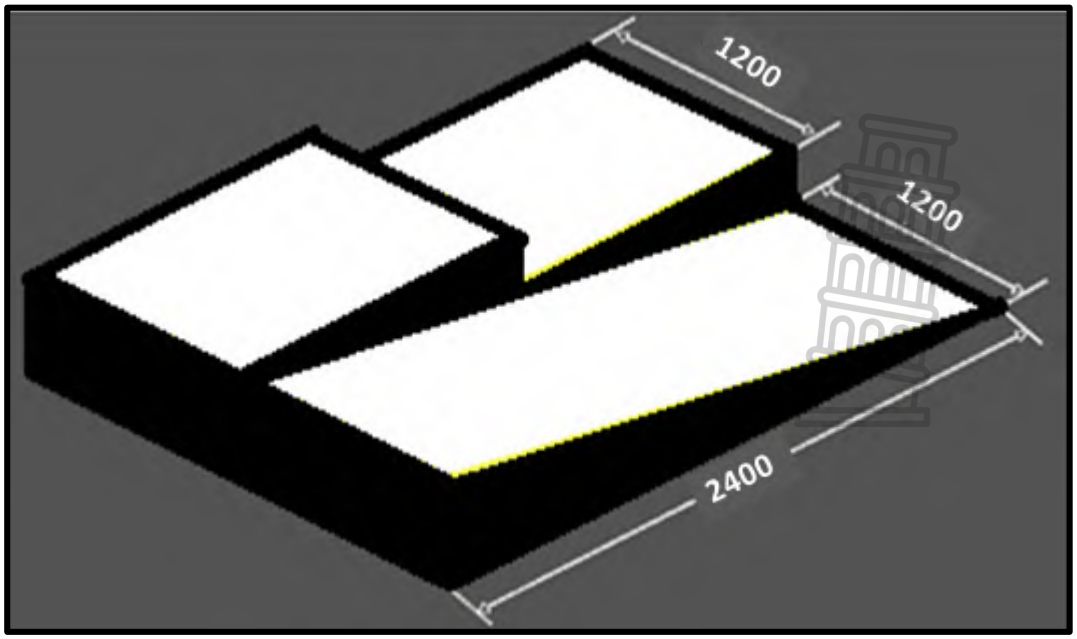
Nelson Mandela High school has a new community hall. A staircase and wheelchair ramp is needed for the stage in the hall. The principal made a list of specifications that should be kept in mind when designing the staircase and the wheelchair ramp. The specifications are as follows:

- The stairs and ramp must be made in two units that are movable.
- The unit should fit in front of the stage so that people can walk onto the stage and a wheelchair can go up and down the ramp.
- The stage is 600 mm high.
- The stairs should be wide enough for two people to move side by side at the same time; 1 000 mm.
- There should be 3 steps of 200 mm high each.
- The flat part (riser) of each step is 600 mm long.
- The ramp should be wide enough for one wheelchair, 1 000 mm.
- The base of the ramp should be 1 800 mm long.

3.1 Write down a design brief for a solution to the problem identified in the scenario above. (2)

3.2 Neatly draw a free hand, three-dimensional sketch of the combined staircase and ramp. (Include dimensions in the correct places on your drawing.) (9)

3.3 The drawing below shows another design which was submitted for the above scenario and specifications.



Compare the drawing with the specifications for the ramp.
List at least THREE specifications that were not met in the above drawing. (3)

3.4 Draw an isometric projection of the stair only, to a scale of 1 : 20.
(The ramp must not be included.)
(The hidden detail, must be shown in your drawing.)
Use the isometric grid provided in ANNEXURE A. (8)

3.5 Draw a first angle orthographic projection of your required design for the stair only, according to the specifications given in the above scenario.

Take note of the following aspects that you would need to consider:

- Use the grid provided in ANNEXURE B.
  (NOTE. Remember to place the page in the landscape position.)
- In reality if you draw it the full size it will not fit on ANNEXURE B.
- Draw only the FRONT VIEW, TOP VIEW AND LEFT VIEW to a scale of 1 : 20.
- Include the dimensioning of all the sides. (14)

3.6 Draw a flow diagram/chart of at least FIVE steps you will follow if you were asked to make the stair and ramp. (5)

3.7 Formulate FIVE questions on how the final product will be evaluated according to the specifications listed in the scenario. (5)

3.8 Study the table below and match the types of lines in COLUMN A with their uses in COLUMN B. Write down only the letter(A–D) and the question number (3.8.1–3.8.5), for example 3.8.5 E.

COLUMN A Type of line		COLUMN B Where would it be used	
3.8.1	Chain lines	A	Construction lines
3.8.2	Dark lines	B	Show symmetry
3.8.3	Dashed lines	C	Outlines
3.8.4	Feint lines	D	Hidden detail lines

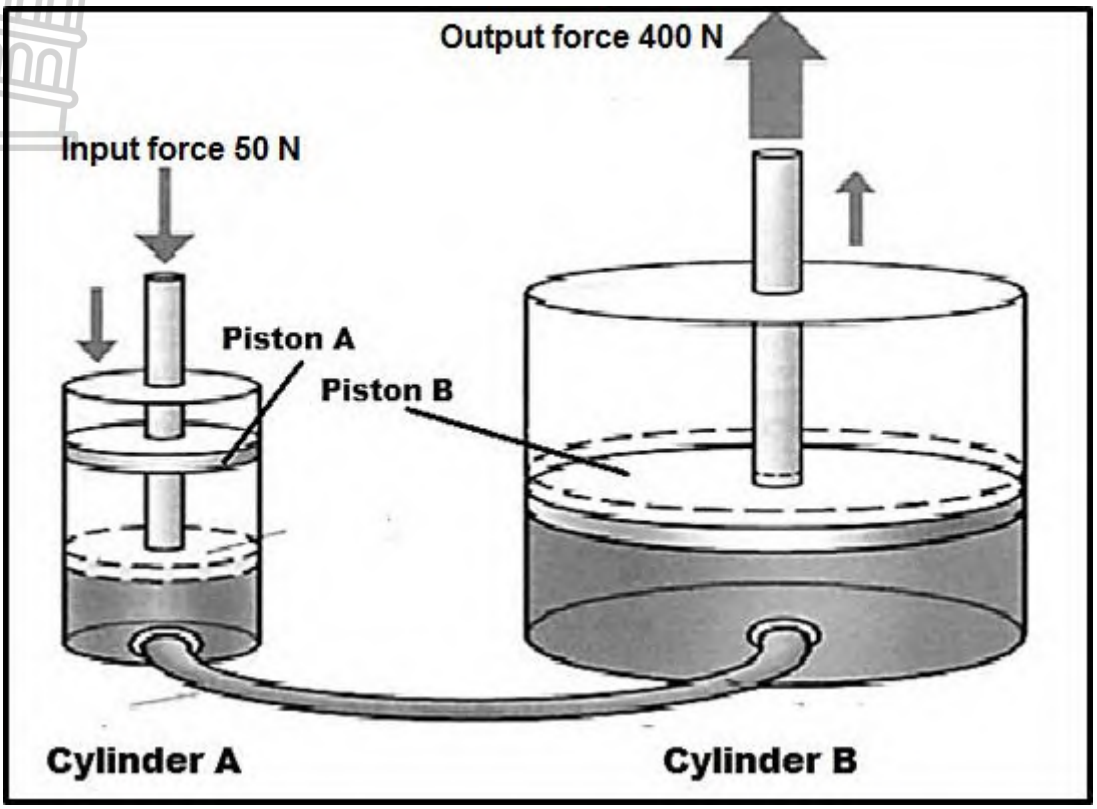
(4 x 1) (4)

TOTAL SECTION C: 50

SECTION D: SYSTEMS AND CONTROL (MECHANICAL)

QUESTION 4

4.1 Study the diagram below and answer the questions that follow.



In the above hydraulic system the input force is 50 N and the output force is 400 N.

4.1.1 If piston **A** is compressed, what happens to piston **B**? (1)

4.1.2 When piston **A** is compressed by 80 mm, how far will piston **B** move? (1)

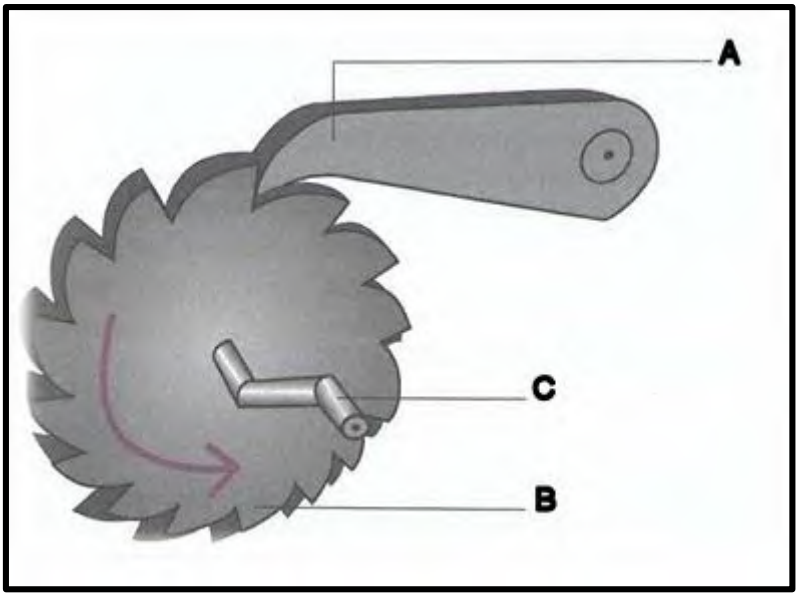
4.1.3 Calculate the mechanical advantage of this hydraulic system. (3)

4.2 What is the main function of disc brakes on a vehicle? (1)

4.3 Most bicycles use rim brakes, where a braking force is applied to the rim of the wheel.

Give TWO advantages of using rim brakes rather than disc brakes on a bicycle. (2)

4.4 The mechanism below is an important control device used in many systems.

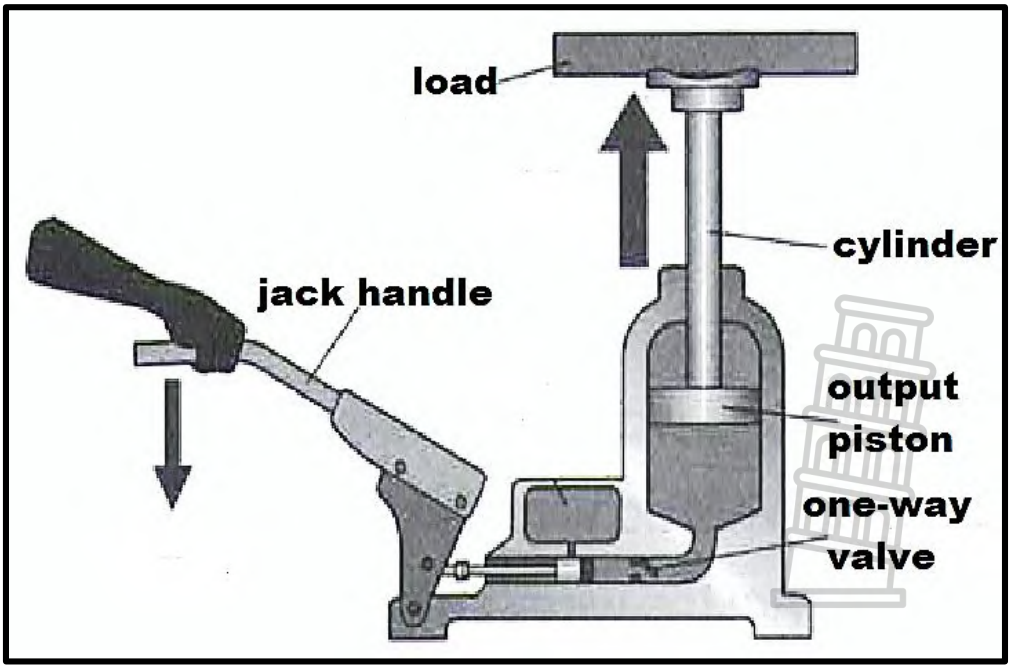


4.4.1 Name the parts labelled **A**, **B** and **C**. (3)

4.4.2 Give ONE example of a device that uses this locking system. (1)

4.5 Name TWO different types of gears (other than the one shown above).

4.6 Below is a drawing of a hydraulic jack. Draw a SYSTEMS DIAGRAM for the hydraulic jack.



(3)

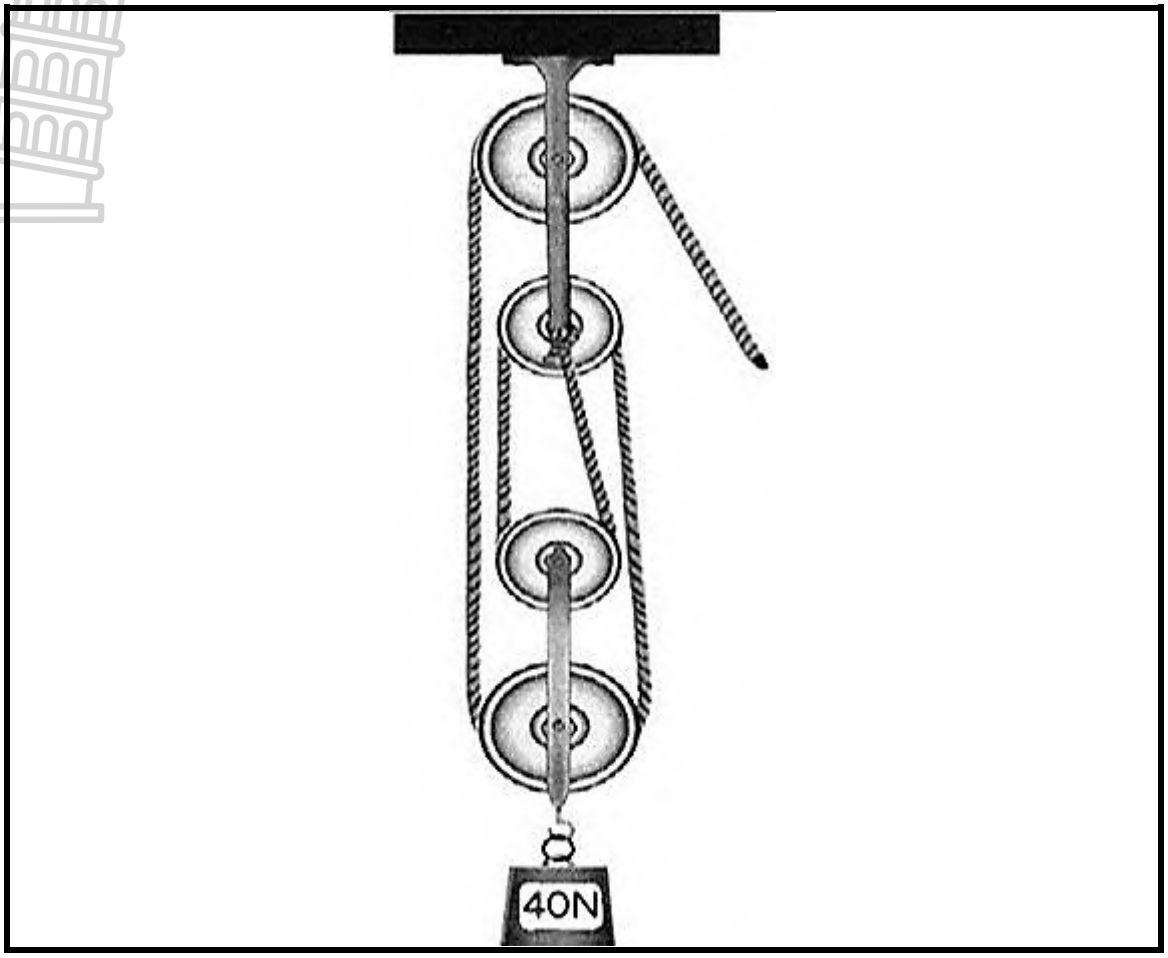
4.7 Give an example of where each of the following components is used in real life.

4.7.1 Cleat (1)

4.7.2 One-way valve (1)

4.8 Study the sketch below and answer the questions that follow.

In the lifting pulley system below a force of 40 N is lifted over a distance of 1 m.



4.8.1 Calculate the force needed to lift the load. (2)

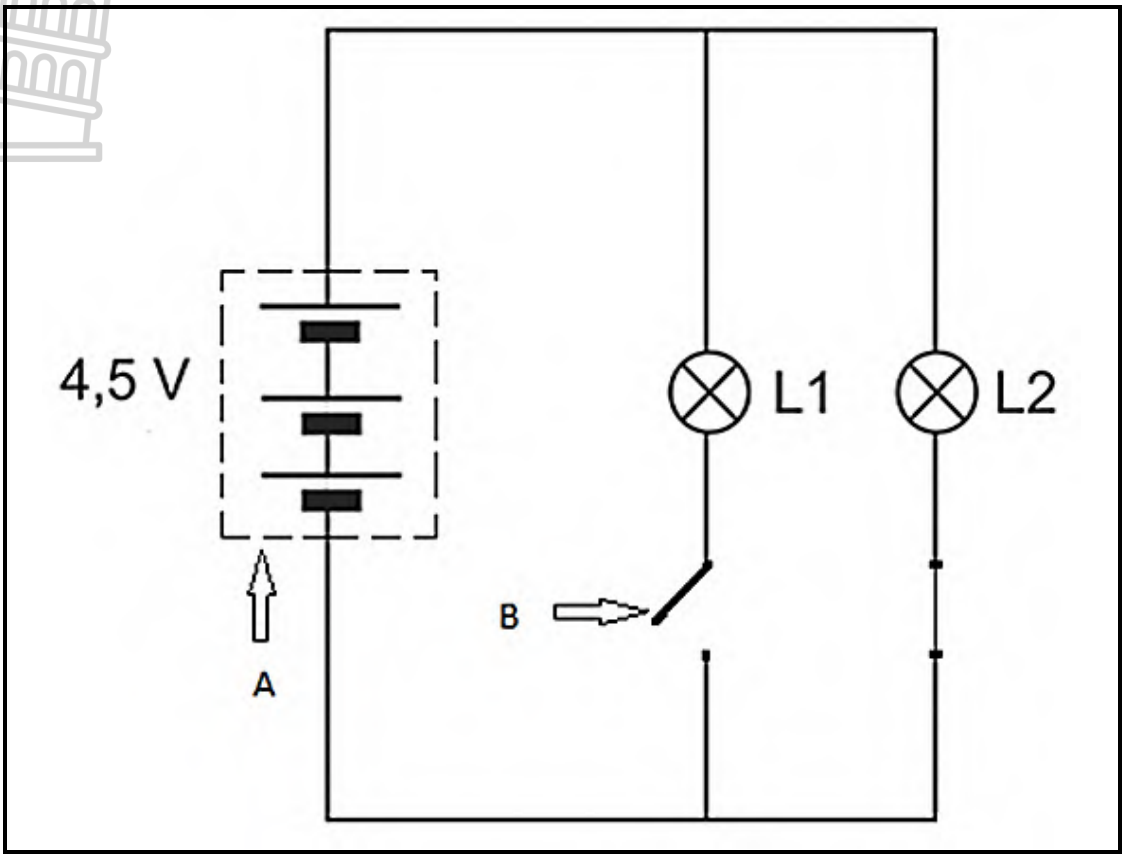
4.8.2 What is the mechanical advantage of this complex pulley system (block and tackle)? (1)

TOTAL SECTION D: 23

SECTION E: SYSTEMS AND CONTROL (ELECTRICAL)

QUESTION 5

5.1 Study the electronic circuit below and answer the questions that follow.



5.1.1 Are the lamps in the above electric circuit connected in series, or parallel? (1)

5.1.2 If current is allowed to flow in this circuit, which lamp, **L1** or **L2**, will glow? (1)

5.1.3 Identify the electrical components marked **A** and **B**. (2)

5.2 A generator has a resistance of 15 Ω and it generates a current of 2 A. Calculate the voltage that it will supply.

Formula: ($\mathbf{V = I \times R}$)
(Show ALL calculations.) (3)

5.3 Classify the following into INPUT, PROCESS or OUTPUT device:

5.3.1 Touch or moisture detector (1)

5.3.2 LED (1)

5.3.3 Photovoltaic panel/cell (1)

5.4 The picture below shows an example of a processing device that is used in many different circuits.

5.4.1 Name this device. (1)

5.4.2 Give at least ONE basic function performed by this device. (1)

5.4.3 Identify the THREE different terminals marked **e**, **b** and **c.** (3)

TOTAL SECTION E: 16

SECTION F: PROCESSING

QUESTION 6: PROCESSING

6.1 Read the following passage about food preservation and answer the questions that follow.

> Food begins to spoil the moment it is harvested. Food preservation has been part of all cultures throughout history. It has enabled some groups to live in one place and form a community. The discovery of food preservation methods meant that humans no longer had to consume hunted animals or harvests immediately. They could preserve some of their food to eat at a later time.
>
> It is interesting that different cultures preserved their local food sources using some basic methods of preservation such as heating, pickling, salting, refrigerating, drying, freezing and fermenting.

6.1.1 Name THREE methods of preserving food that was used in the olden days, as indicated in the passage above. (3)

6.1.2 Write down TWO advantages of preserving food listed above. (2)

6.2 The picture below shows plastic containers that have been collected at a recycling depot. These have been sorted by hand and they are all made of HDPE.

6.2.1 Why must all the plastics collected in recycle sorting bins be the same kind of plastic? (1)

6.2.2 Write down the full name for HDPE. (1)

6.3 Name ONE recycled plastic product that can be produced using HDPE. (1)

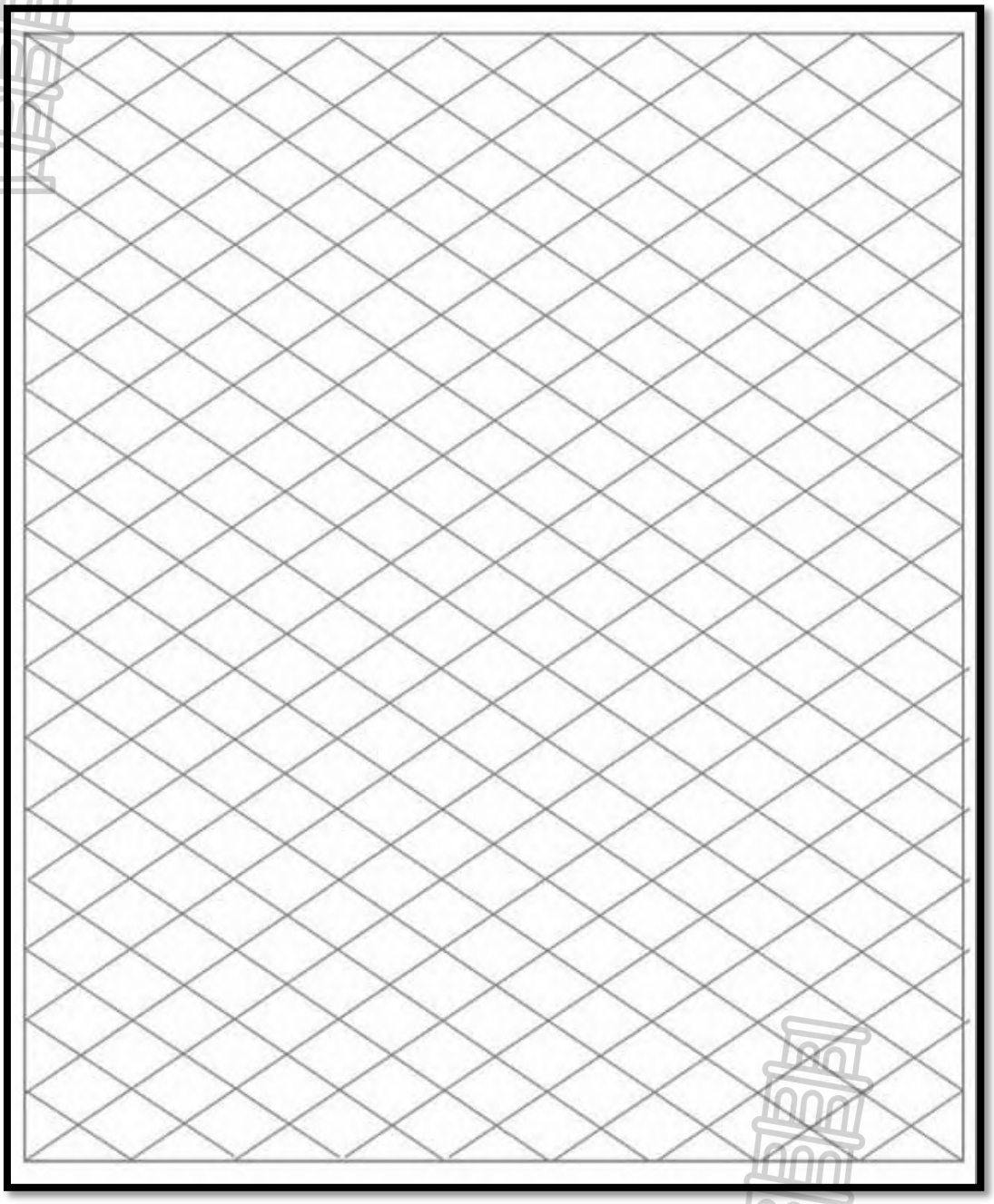
6.4 How does the work of the depot shown above have a positive impact on society and the environment? (2)

TOTAL SECTION F: 10
GRAND TOTAL: 120

ANNEXURE A (Isometric grid)

NAME: .....

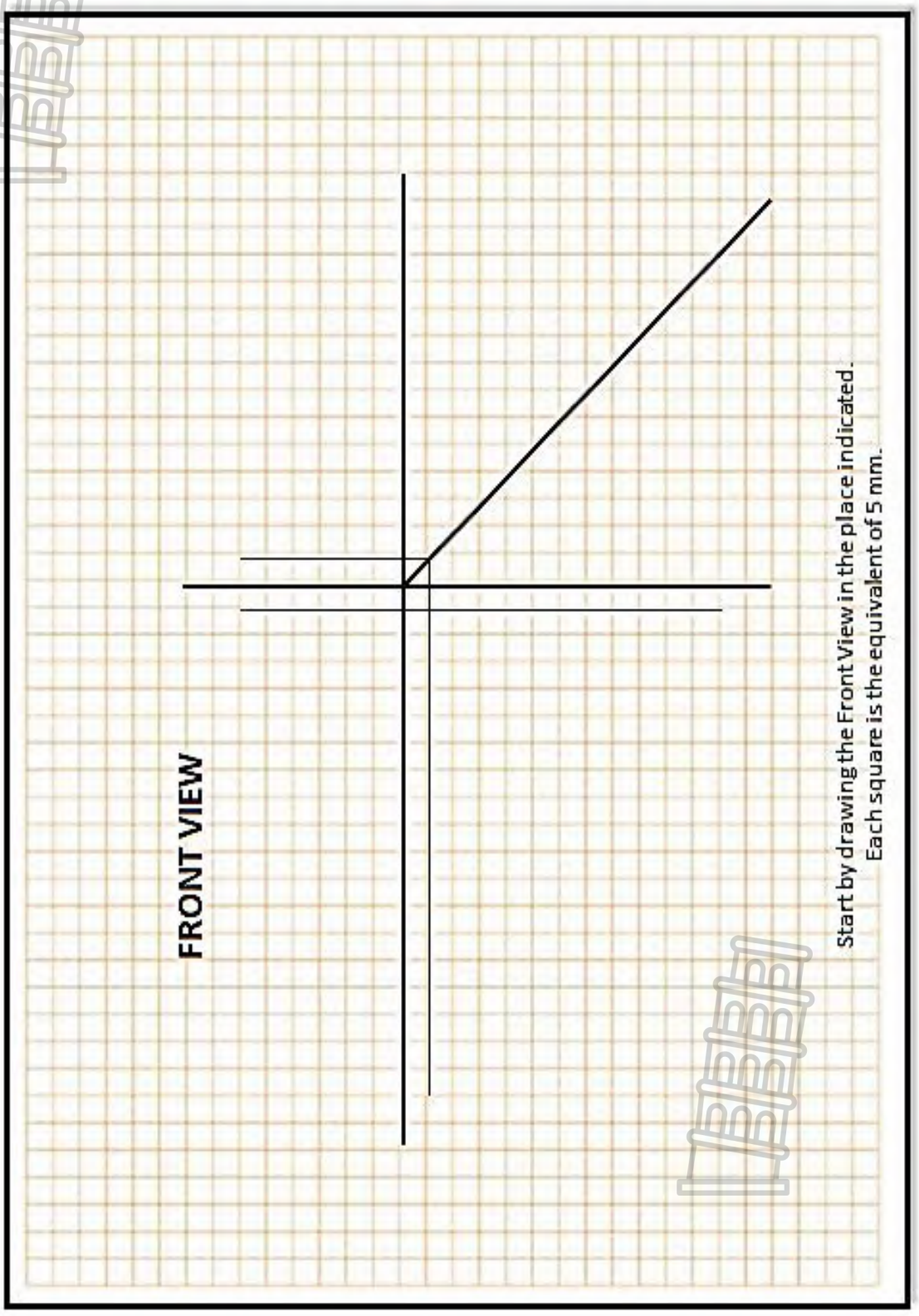
3.4



ANNEXURE B

NAME: .....

3.5



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EDUCATION

SENIOR PHASE

GRADE 9

NOVEMBER 2016

TECHNOLOGY
MEMORANDUM

MARKS: **120**

This memorandum consists of 10 pages.

SECTION A: MULTIPLE-CHOICE QUESTIONS

QUESTION 1

1.1 D ✓ (1)

1.2 D ✓ (1)

1.3 C ✓ (1)

1.4 D ✓ (1)

1.5 B ✓ (1)

1.6 B ✓ (1)

1.7 C ✓ (1)

1.8 C ✓ (1)

1.9 D ✓ (1)

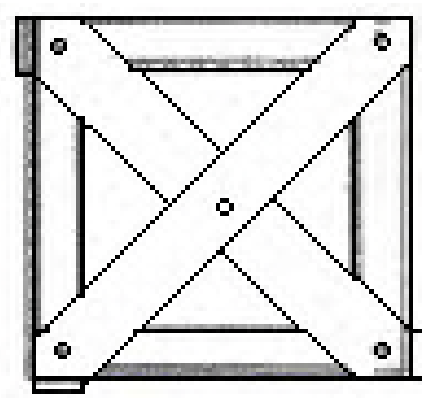
1.10 C ✓ (1)

TOTAL SECTION A: 10

SECTION B: STRUCTURES

QUESTION 2

2.1



(2)

2.2 Uneven load ✓ – It is placed off centre of the base on which it stands. ✓ (2)

2.3 2.3.1 A tender is a bid for work or providing products for a government entity or a municipality. ✓
It gives details of how much will be paid to the appointed company to complete the project. ✓ (2)

2.3.2 Building/constructing a bridge ✓ (1)

2.3.3
- Cost effective
- Safety
- The bridge is 100 m wide at the crossing point.
- River rises during summer rains.
- There are crocodiles in the river all year round. ✓✓ (2)

2.3.4 It is important so that construction can be started and be completed within a specified time to avoid delays and incomplete work. ✓✓ (2)

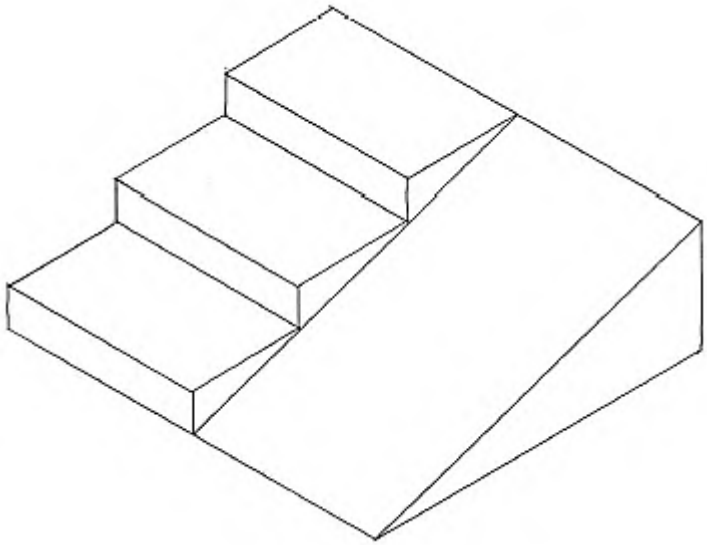
TOTAL SECTION B: 12

SECTION C: DESIGN AND GRAPHIC COMMUNICATION

QUESTION 3

3.1 Design and make a combined staircase and ramp. ✓✓ (2)

3.2 **RUBRIC FOR DESIGN SKILLS**



Possible answer for the free hand sketch

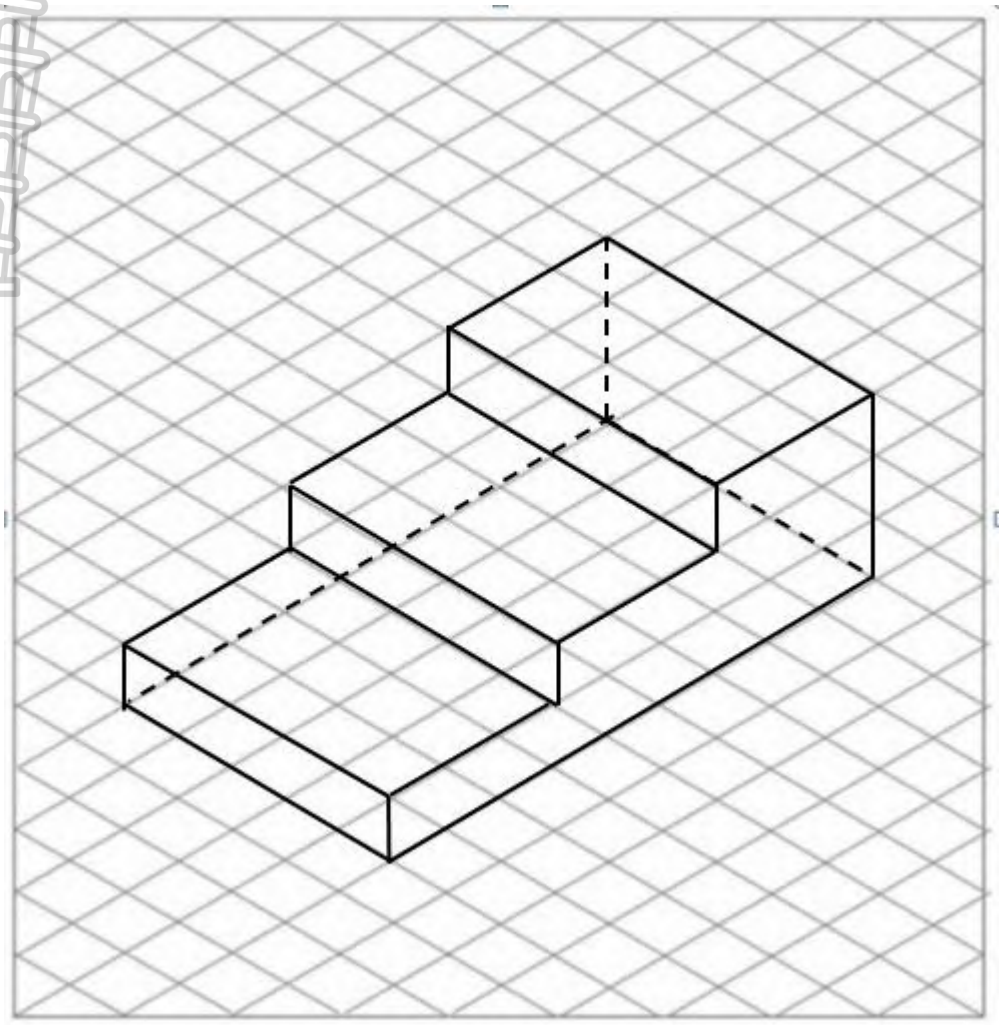
Skills	Description	Marks Allocated
Free hand sketches (maximum = 9 marks for the entire question)	It is evident from the sketch that it is a solution to the problem identified. Include stairs and ramp	(4)
	The view is complete and neatly drawn.	(3)
	All dimensions written in correct places.	(2)

3.3 a. The example shows 2 steps instead of 3. ✓

b. The length of the base shows 2 400 mm instead of 1 800 mm. ✓

c. The width of the stairs shows 1 200 mm instead of 1 000 mm. ✓ (3)

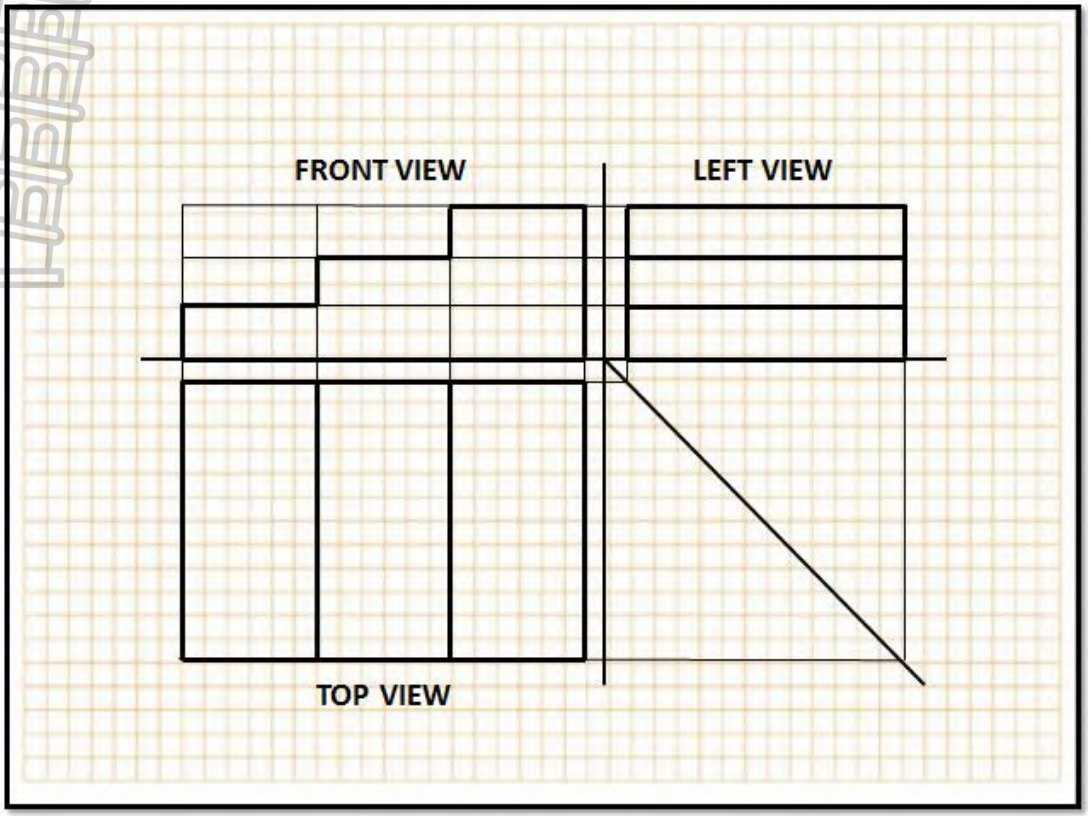
3.4 **ASSESSMENT RUBRIC**



Skill	Description		Marks Allocated
Isometric projection **(maximum marks = 8)**	(a)	The features of the sketch are those of an isometric projection, e.g. angles at 30°.	3 marks
	(b)	Hidden detail shown.	2 marks
	(c)	Lines are constructed effectively.eg. hard, soft, broken lines	1 marks
	(d)	Neatness	1 marks
	(e)	Isometric grid used effectively	1 mark

(8)

3.5 **ASSESSMENT RUBRIC – Design**



(The above drawing is an example of what learners should do in QUESTION 3.5.)

Skill	Description		Marks Allocated
First Angle Orthographic Projection Total marks allocated = 14 marks	(a)	3 views labelled and drawn to a scale of 1 : 20	6 marks
	(b)	Dimensioning	6 marks
	(c)	Layout of the drawing	2 marks

(14)

3.6 The learner must be able to draw at least FIVE steps (on sequence of operations) that he/she will follow to provide a solution.

NOTE: The teacher must check for logical sequence of steps to be followed and allocate 1 MARK for each step.

E.g.

No.	Operation
1.	Collecting materials
2.	Measuring
3.	Cutting/sawing etc.
4.	Joining/applying glue
5.	Applying of finish

(5)

3.7 Check the ability of the learner to formulate FIVE questions against the list of specifications to evaluate the final solution:

E.g.:

- Is the staircase and ramp made in two units that can be moved?
- Are the stairs wide enough for two people to move at the same time?
- Are there three steps of the same size?
- Is the flat part of each step 600 mm long?
- Is the ramp wide enough for one wheelchair to move?
- Is the base of the ramp 1 800 mm long?

(1 mark for each of the FIVE evaluation questions asked.) (Any 5 x 1) (5)

3.8 a. Show symmetry ✓ (1)

b. Outlines ✓ (1)

c. Hidden detail line ✓ (1)

d. Construction lines ✓ (1)

TOTAL SECTION C: 46

SECTION D: SYSTEMS AND CONTROL (MECHANICAL)

QUESTION 4

4.1 4.1.1 Piston B moves up. ✓ (2)

4.1.2 10 mm ✓ (1)

4.1.3 Mechanical advantage = $\frac{\text{load}}{\text{effort}}$ ✓ (ONE mark for formula)

$= \frac{400\ \text{N}}{50\ \text{N}}$ ✓

= 8 ✓ (3)

4.2 Disc brakes are used to stop a moving vehicle more effectively. ✓ (1)

4.3
- Rim brakes are cheap. ✓
- They are easy to maintain. ✓ (2)

4.4 4.4.1 A – Pawl ✓ (1)
B – Ratchet ✓ (1)
C – Crank handle ✓ (1)

4.4.2 Car seat belts, mechanical jack, turnstiles in shops, a winch in a water well, etc. ✓ (1 mark for a correct answer) (Any 1 x 1) (1)

4.5
- Rack-and-pinion gears ✓
- Bevel gears ✓
- Worm gear ✓
- Spur gears ✓ (Any 2 x 1) (2)

4.6

INPUT	PROCESS	OUTPUT
Person pushes and pulls the handle of the jack up and down. ✓	The hydraulic fluid is forced past the one way valve and moves the output piston. ✓	The jack lifts the car or the load. ✓

(3)

4.7 4.7.1 Cleat – Boats, blinds, mountain climbing equipment, flag poles ✓ (1)

4.7.2 One-way valve –- Hydraulic jack, taps, pneumatic safety valves. ✓ (1)

4.8 4.8.1 Force needed/Effort
= 40 N ÷ No. of falls away from moving pulleys ✓
= 40 N ÷ 4
= 10 N ✓ (2)

4.8.2 MA = 4 ✓ (1)

TOTAL SECTION C: 23

SECTION E: SYSTEMS AND CONTROL (ELECTRICAL)

QUESTION 5

5.1 5.1.1 Parallel ✓ (1)

5.1.2 Lamp 2 (L2) ✓✓ (2)

5.1.3 A – Battery of cells ✓
B – Open switch or circuit breaker ✓ (2)

5.2 (*Voltage)* V = I x R ✓

= 2A × 15 Ω ✓

= 30 V ✓ (3)

5.3 5.3.1 Touch or moisture detector – Input ✓ (1)

5.3.2 LED – output ✓ (1)

5.3.3 Photovoltaic panel/cell – input ✓ (1)

5.4 5.4.1 Transistor ✓ (1)

5.4.2 They can be used as switches. ✓
They can be used as amplifiers. ✓ (1)

5.4.3 e – Emitter ✓
b – Base ✓
c – Collector ✓ (3)

TOTAL SECTION E: 16

SECTION F: PROCESSING

QUESTION 6

6.1 6.1.1 Drying, pickling, fermenting, salting, heating, freezing. ✓✓✓
(Any 3 of the listed methods.) (Any 3 x 1) (3)

6.1.2 a. Food preservation enabled groups of people to live in one place and form a community. ✓ (1)

b. Humans no longer had to consume hunted animals or harvest immediately, they could preserve some of their food to eat at a later time. ✓ (1)

6.2 6.2.1 Different plastics have different properties, mixing them would also affect the expected outcomes of the recycled material. ✓ (1)

6.2.2 High Density Polyethylene ✓✓ (2)

6.2.3 Some of recycled products of HDPE are:

- Crates ✓
- Pipes ✓
- Flower pots ✓
- Buckets ✓
- Recycling bins ✓
- Dog houses ✓
- Picnic tables ✓
- Floor tiles ✓
- Motor oil, ✓ etc. (Any 1 x 1) (1)

6.2.4 Society: Employment opportunities ✓ – skills development a way of making money. ✓

Environment: Less pollution/reduces the amount of waste that ends up in landfills, reduces environmentally harmful processes such as mining, power generation and water exploitation. ✓ (1)

TOTAL SECTION F: 10
GRAND TOTAL: 120