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Lefapha la Thuto la Bokone Bophirima
Noordwes Departement van Onderwys
North West Department of Education
NORTH WEST PROVINCE

NORTH WEST PROVINCIAL ASSESSMENT

GRADE 9

PAT TECHNOLOGY (MARKING GUIDE)
TERM 1 (2023)

Marks: 76

NAME OF LEARNER: _____

NAME OF SCHOOL: _____

LOCAL MUNICIPALITY: _____

DISTRICT: _____

This task consists of 16 pages.

TOPIC: STRUCTURES**FOCUS: INVESTIGATION + DESIGN + MAKE****PROJECT: BRIDGE: Community issue****INSTRUCTIONS:**

- Write legibly and fill each page with necessary information i.e. your Name and Date.
- Draw neatly by using pencil.
- Fill all spaces with relevant answers.
- Ask your teacher if you do not understand as s/he will supervise your progress throughout.
- Complete the PAT in the set time and submit to your teacher immediately.
- Use colour crayons in artistic drawings.
- You may attach drawing or extra materials in your PAT as evidence.
- Pack your PAT according to page numbering.

Name of the learner: _____ Date: _____

Teacher signature: _____



Table of content

1. Investigation (30 marks)

- Investigating and analyzing real life bridges.
- Researching the cost of the bridge
- Initial Ideas sketches
- Final Idea sketch

2. Bridge design (28 marks)

- Design brief, specifications and constrains
- 3D Isometric drawing
- First Angle Orthographic Projection

3. Making (18 marks)

- Flow chart
- Making the model of the bridge

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Teacher signature: _____



Scenario

The small community of Motlhajoe is situated on the far side of the Groot Marico River on the Moses Kotane West area. Each day the community crosses the river by walking through the river. In rainy months, the crossing becomes very dangerous, especially for the young school children who attend the secondary school in Pitsidisulejang village.

The Bojanala local authority has decided to build a bridge for this community so that people can safely cross the Groot Marico every day. The Bojanala local authority has placed an advertisement in Herald newspaper inviting contractors to submit tenders for the bridge.

The bridge must be simple and cost effective. Due to the solid rocky banks for the river, the bridge can be constructed very easily. Your group has decided to tender for the construction of this bridge.

1. Investigations

Look at the following pictures and do your investigations.



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Teacher signature: _____

Investigate and provide an analysis for the following for the real life bridge:

- i. Mention 3 relevant materials to be used in the construction of the bridge

Cement, Concrete, Steel beams and Angle irons. (any three) (3)

- ii. Suitability of the material to be used

Steel beams: Strong and can withstand any weather conditions. (1)

Angle iron: it is strong in compression and tension. (1)

Concrete: Strong enough after drying. . (1)

- iii. Mention 2 safety procedures for the use of the machines. (2)

Correct use of machines and or tools

Wear protective equipment

Stay Sober and be alert

Any other two

N.B: It is very important to investigate the cost involved in construction. This influences whether or not you are awarded the tender and your overall design.

The local authority will not award a tender to a very expensive contractor. So when choosing the type of bridge, keep in mind the cost factor.

Research the cost of the bridge:

Make a research on the different aspects of the bridge and write down the estimated realistic prices of each of the aspect to be used.

- a. Materials: Estimated total amount of the materials needed.
(2)

Possible answer

Price = R119 400.00

- b. Labour: Mention the labour force that you are going to need and the total amount of money you will need for labour. (3)

Possible answer

Metal workers, Brick layers, carpenters, labourers, drivers and foremen

Price = R260 000.00

- c. Transport: Mention the vehicle and transport machinery you would hire and the total amount of money needed for such. (3)

Possible answer

Tipper truck, TLB machine, Road grader and bulldozer

Price = R80 000.00

Name of the learner: _____ Date: _____

Teacher signature: _____



- d. Tools and equipment: Which tools are you going to need and how much it will cost to hire them: (3)

Possible answer

Welding machines, spades, jack hammers and trowels

Price = R16 00.00

Investigating a model of the bridge.

Before building the actual bridge, you should first build the model of such a bridge which will act as a prototype to show what the actual bridge will look like.

The dimensions of your bridge to be as follows:

Length = 400 mm

Height = 100 mm

Breath = 150 mm

Anchor height = 50 mm

The bridge should be made strictly of paper dowels and be strong enough to carry at least 1 kg of weight which is approximately 1 liter of water.

(a) Initial idea sketches (Individual work)

Draw two initial ideas of the bridge that will be submitted to the group to create the final idea. (6)

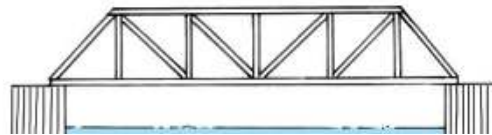
The following should be clearly indicated:-

-  The connection of the bridge from the river bank
-  The type of bridge (beam, suspension, cable-stayed, truss, arch)
-  Anchorages*(the point at which a bridge is held in place) for the bridge

The learner may choose any of the bridges below or even come with his/her own type of a bridge. The type of the bridge drawn should be given.



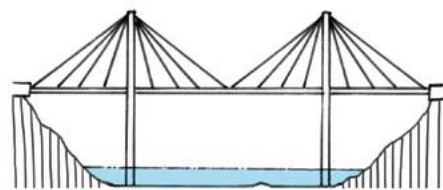
a) Beam bridge



b) Truss bridge



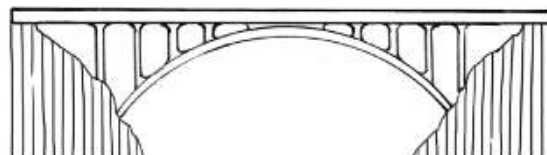
c) Suspension bridge



d) Cable stayed bridge



e) Cantilever bridge



f) Arch bridge

Name of the learner: _____ Date: _____

Teacher signature: _____



Marking grid		
CONCEPT	TOTAL MARKS	LEARNER MARK
First Idea free hand drawing	2	
First Idea's bridge name	1	
Second Idea free hand drawing	2	
Second Idea's bridge name	1	
TOTAL	6	

(b) Evaluate and adapt

The group must evaluate all the designs of each member on the group and select the best one. Questions to ask when evaluating the designs include:

CRITERIA	YES	NO
What is good about the design?		
It can carry the desired/ specified load		
What is bad about the design?		
Will the design meet the requirements for this bridge?		
Will this design be cost effective?		
Will the design serve its purpose for this community?		
Is the design safe for all members of the community?		

Comments and recommendations about modification of the Model:

NB: Once this is done, the group must choose the best ideas and develop a final idea. The final idea can include some aspects from other ideas to make one final idea.

Name of the learner: _____ Date: _____

Teacher signature: _____



2. Final chosen idea (Group work)

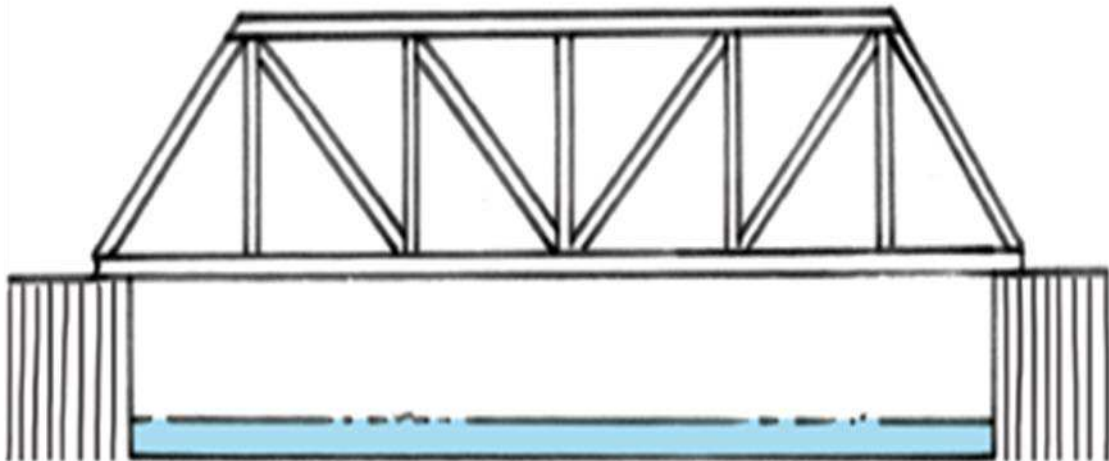
The group should now choose the final idea and individual members draw the idea in their portfolios. The final idea should adhere to the model design criteria.

a) Give at least two reasons why you make that final choice. (2)

1. Easy to construct.
 2. It has hand rails that people can use when crossing the bridge.
- Any other logic reason for choosing the type of a bridge.

Final Idea (3)

Any bridge chosen by learners acceptable.



Name of the learner: _____ Date: _____

Teacher signature: _____



2. Bridge Design

Write down the design brief for your solution to the problem that appears on the scenario. (3)

I am going to design and make the bridge that can span over a 100 m wide river and being at least 2 m from the water and can allow people to walk on across the river.

(Any logical constructed brief should be accepted)

Location (Where is the bridge? In what village or town?) (1)

Learners will find the answers from the given scenario

Specifications (Give a detailed description of the bridge) (3)

The bridge should span the full width of the river when it is in flood.

The bridge should be at least 2 metres above water.

The walkway of the bridge should be wide enough so the two people travelling in Different directions can cross each other easily, even if they are both in wheelchairs.

Constraints (What restrictions are placed on this bridge?) (3)

The bridge should not be too expensive.

It must be possible for the local people to build most of the bridge themselves, and without using too expensive machinery. The local people may need training on the construction methods.

The bridge should be built in less than 3 months during the dry season.

Type of bridge (What type of bridge are you building?) (1)

To be one selected as the 'best idea'.

Total dimensions (What is the total width, depth and height?) (1)

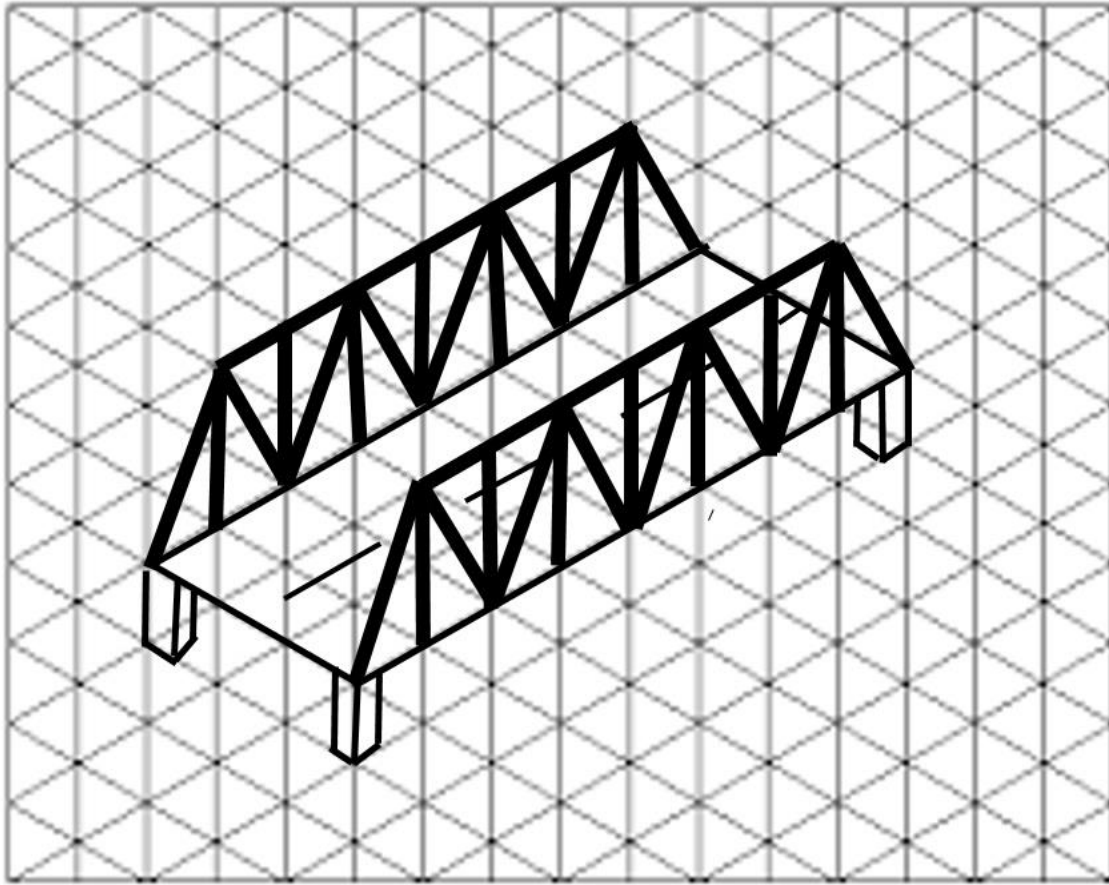
The total width, depth and height should be as scaled by learners.

Name of the learner: _____ Date: _____

Teacher signature: _____



2 (a) Draw the final idea in 3D Isometric on an Isometric Grid provided:



Marking grid for the First Angle Orthographic Projection

ASPECT	TOTAL MARKS	LEARNER'S MARK
Correct scale of the drawing	3	
Correct 3D projection	2	
Correct usage of the grid	2	
TOTAL	07	

Name of the learner: _____ Date: _____

Teacher signature: _____



2b) Working drawing in First Angle Orthographic projection

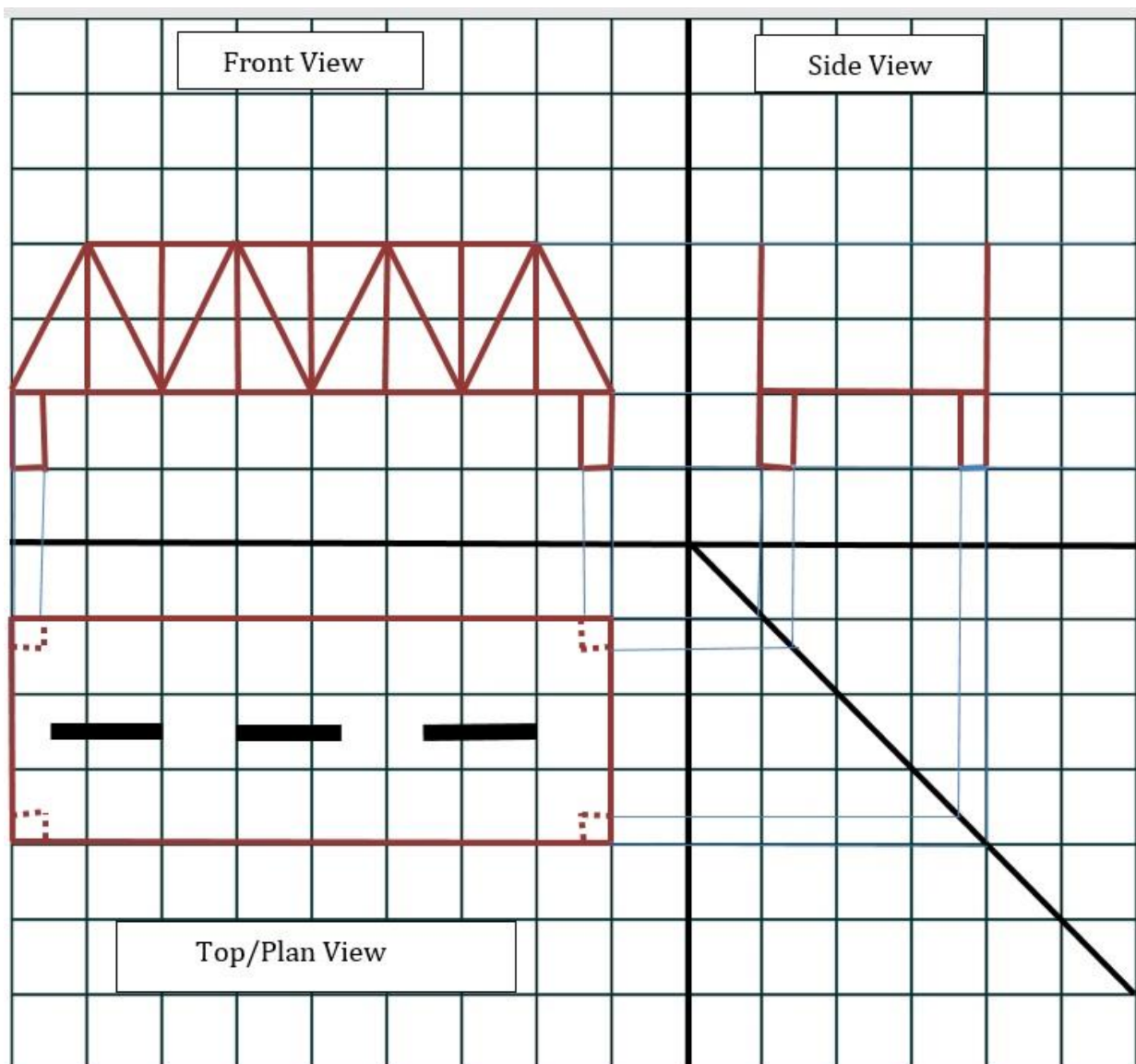
Draw your 3D Isometric drawing in First Angle Orthographic.

Use the scale: 1 block length = 5 mm.

Your placement of views should be correct.

The following line types should be visible in your drawing, Outer lines, projection lines and hidden details lines.

(NB: In the memorandum, the colours are used only to differentiate the actual drawing from the Grid lines. Learners should not be discredited for not using a different colour on the drawing)



Name of the learner: _____ Date: _____

Teacher signature: _____

Marking grid for the First Angle Orthographic Projection

ASPECT	TOTAL MARKS	LEARNER'S MARK
Correct placement of views	3	
Outer lines	1	
Construction lines	1	
Hidden details lines	1	
Correctness of:		
Side view	1	
Front view	1	
Top view	1	
TOTAL	09	

3. The Making of the model of the bridge

Flow chart of making the real bridge

NB: The group should then discuss the processes involved and the steps that they will follow when making the real bridge. Once they have established this, each learner must draw a flow chart showing the manner in which this task will unfold. The flow chart should include:

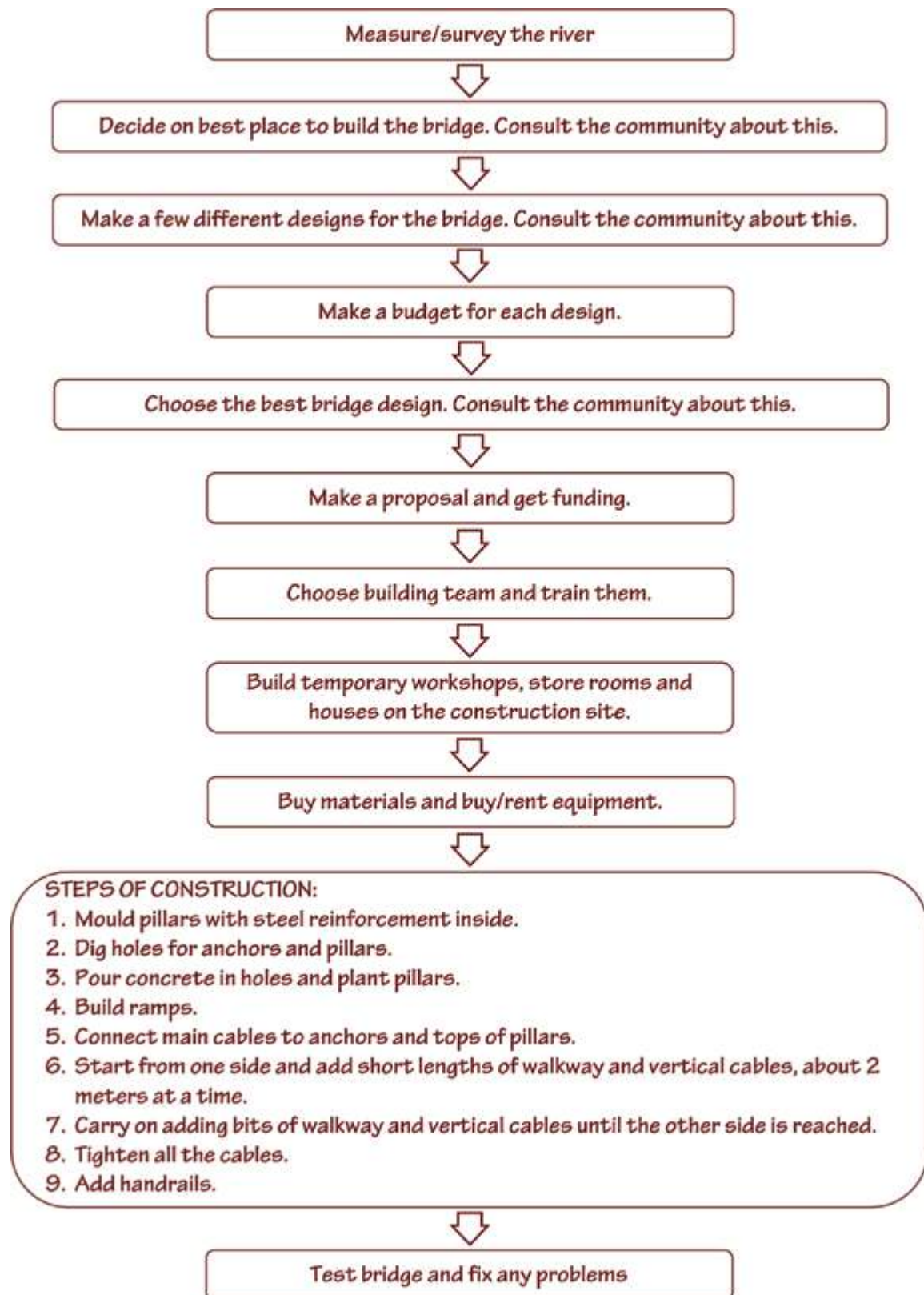
- ✚ Processes* (the number of actions that have to take place to reach the end results) involved
- ✚ A timeline of events
- ✚ A task leader for each process
- ✚ Safety precautions and rules

An exemplar of a flow chart is displayed on the next page.

Name of the learner: _____ Date: _____

Teacher signature: _____

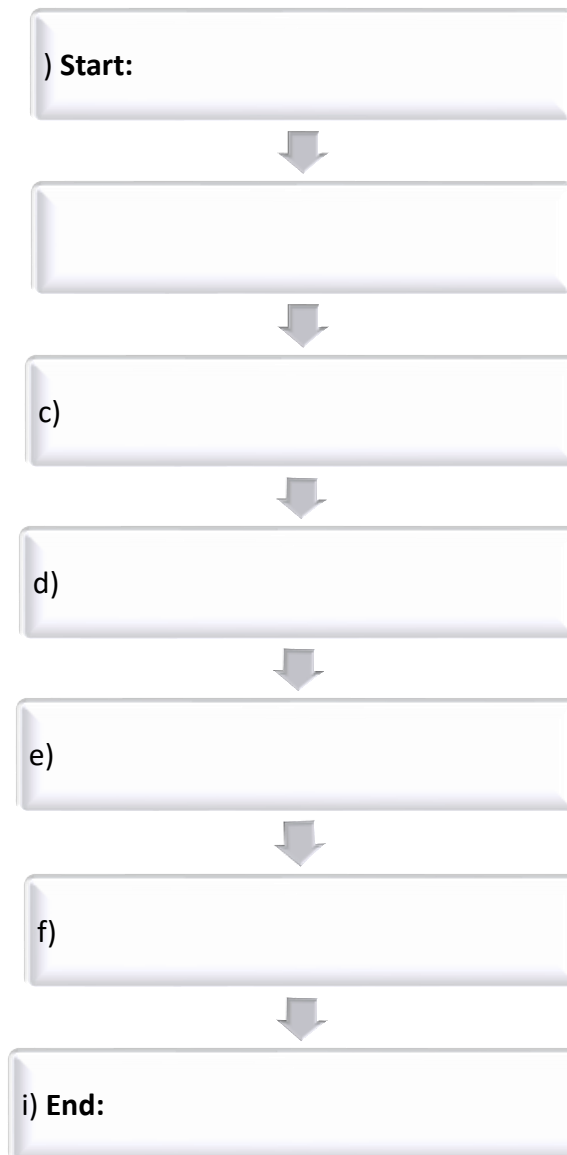




Name of the learner: _____ Date: _____

Teacher signature: _____





RUBRIC: FLOW CHART FOR MAKING					
Assessment Criteria	Marks 1	Marks 2	Marks 3	Marks 4	Learner's Mark
Developing a plan for making	Unable to develop a plan for making at all.	Development is missing key steps and is poorly conceived.	Can develop plan for making in a simple and correctly ordered way.	Expertly develops plan for making in a correctly ordered and clearly detailed way.	
Planning a product	No evidence of any planning evident.	Poor and/or incomplete planning is evident.	Basic planning is evident.	Careful and thoughtful planning is evident.	
TOTAL					

Name of the learner: _____ Date: _____

Teacher signature: _____

3. Building the Model of the bridge.

Now use the final drawing to make the model of the bridge. The size of the bridge should be according to the dimensions in the specifications of the model. The bridge should be strong enough at least to carry 1 Kg of weight.

NB: The group must now make a model of their proposed new bridge. The model must:

-  Show intelligent use of materials
-  Be made of suitable scale
-  Be made using safe working practices

It is suggested that you use the following materials to build your model:

-  Paper dowels
-  Cello tape or Staples
-  Glue

RUBRIC: Model					
Assessment Criteria	Marks 1	Marks 2	Marks 3	Marks 4	Learner's Mark
Producing a bridge	Product is seriously deficient, unable to satisfy the demanded specifications in purpose, functionality and aesthetics.	Product is poorly conceived and made, falling short of the demanded specifications in purpose, functionality or aesthetics.	Product is simple, well made and satisfies the demanded specifications in purpose, functionality and aesthetics.	Product is creative, expertly made and exceeds the demanded specifications in purpose, functionality and aesthetics.	
Neatness 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.	
Use of scale	Construction lacks correct proportions due to lack of, or senseless use of scale.	Scale is used incorrectly or inappropriately, with little accuracy.	Use of scale is mostly correct and accurate.	Use of scale is consistently correct and highly accurate.	
Choosing materials	A senseless choice has been made.	A poor and inappropriate choice has been made.	A simple and convenient choice has been made.	A well-thought-out and most appropriate choice have been made.	
Using safe working practices in making	Unable to use correct safe working practices in making.	Attempts to use safe working practices in making, but is frequently careless and negligent.	Uses safe working practices most of the time.	Conscientious and consistent application of safe working practices	
TOTAL					$\frac{\quad}{60} \times 40 = _$

Name of the learner: _____ Date: _____

Teacher signature: _____

MINI-PAT MARKS ALLOCATION

Item	Content	Mark Allocated	Mark Obtained	Weighting
1.	Investigations	30	X =	A. $\frac{X}{30} \times 15 =$
2.	Bridge Model Design	28	Y =	B. $\frac{Y}{28} \times 20 =$
3.	Make (Flow chart + Model)	18	Z =	C. $\frac{Z}{18} \times 35 =$
TOTAL		76		A + B + C =

Name of the learner: _____ Date: _____

Teacher signature: _____

