basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

GRADE 10

TECHNICAL SCIENCES

GUIDELINES FOR PRACTICAL ASSESSMENT TASKS

2016

These guidelines consist of 9 pages.

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INTRODUCTION

A practical assessment task (PAT) is compulsory for all candidates offering Technical Sciences in Grade 10 and counts 25% (100 marks) of the final promotion mark. The Grade 10 PAT is implemented across the second and third term of the school year. This is broken down into different phases or a series of smaller activities that make up the PAT. The PAT allows for learners to be assessed regularly during the school year and it also allows for the assessment of skills that cannot be assessed in a written format such as tests or examinations. It is therefore important that schools ensure that all learners complete the practical assessment tasks within the stipulated period to ensure that learners are promoted at the end of the school year. The planning and execution of the PAT differs from subject to subject. The Technical Sciences PAT in Grade 10 consists of two experiments and a project.

INSTRUCTIONS TO THE LEARNER

1. This PAT consists of TWO experiments and ONE project.

2. Complete the PAT in Term 2 and Term 3.

3. The PAT counts 25% of your final promotion mark for Grade 10.

4. All work in this PAT must be your own. Group work will NOT be allowed.

5. Show ALL your calculations clearly and include units. Round your calculations off to TWO decimal places. Use SI units.

6. Place this document in your PAT file together with the other evidence.

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Learner's name:	
School:	

EVIDENCE OF MODERATION

MODERATION	SIGNATURE	DATE	SIGNATURE	DATE
School-based				

MARK ALLOCATION

PAT COMPONENTS	MAXIMUM MARK	LEARNER'S MARK	MODERATED MARK
Experiment 1	**50**		
Experiment 2	**50**		
Project	**50**		
Total	**150**		

SCHOOL STAMP

DECLARATION OF AUTHENTICITY

I hereby declare that this practical assessment task submitted for assessment is my own, original work and has not been submitted for moderation previously.

_____ _____

SIGNATURE OF LEARNER **DATE**

As far as I know, the above declaration by the candidate is true and I accept that the work offered is his or her own.

_____ _____

SIGNATURE OF TEACHER **DATE**

EXPERIMENT 1: DETERMINE THE POTENTIAL ENERGY OF AN OBJECT AT DIFFERENT HEIGHTS

50

1.1 AIM

To determine the potential energy of an object at different heights

1.2 MATERIALS/APPARATUS

- Metre ruler
- Plastic bag
- Small objects (stones, nuts, coins, et cetera)
- THREE bricks
- Triple-beam balance

1.3 METHOD

1.3.1 Fill the plastic bag with the objects.

1.3.2 Use the triple-beam balance to determine the mass of the bag and the objects.

1.3.3 Place the bag on the edge of the laboratory table.

1.3.4 Measure the distance between the floor and the laboratory table and write it in the table below.

1.3.5 Place one brick on the edge of the table with the bag on top of the brick. Measure the distance between the floor and the bag again and write it in the table below.

1.3.6 Repeat the process, first with two bricks on top of each other and then with three bricks on top of each other. Write down the two distances between the floor and the bag in the table.

1.3.7 Now calculate the potential energy of the bag in each case. Write your answers in the table.

1.4 RESULTS

1.4.1

POSITION	MASS OF BAG m (kg)	HEIGHT h (m)	POTENTIAL ENERGY $E_p = mgh$
On the table			
Table + 1 brick			
Table + 2 bricks			
Table + 3 bricks			

(6)

1.4.2 In which unit is potential energy measured?

(1)

1.4.3 Which quantity is the independent variable?

(1)

1.4.4 Which quantity is the dependent variable?

(1)

1.4.5 Draw the graph of potential energy versus height by using the values in the table.

(6)

1.4.6 Calculate the gradient of the graph.

(4)

1.4.7 What does the gradient represent? Motivate your answer.

(2)

1.5 **CONCLUSION**

1.5.1 What is the relationship between the potential energy and the height above ground level?

(2)

1.5.2 Motivate your answer to QUESTION 1.5.1.

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(2)
[25]

TOTAL EXPERIMENT 1 (25 x 2): 50

EXPERIMENT 2: DETERMINE THE ELECTRICAL CONDUCTIVITY OF DIFFERENT MATERIALS

50

2.1 AIM

To test the electrical conductivity of different materials

2.2 VARIABLES

Complete the table below.

Independent variable	
Dependent variable	
Controlled variable(s) (Stays constant)	

(6)

2.3 MATERIAL/APPARATUS

- Switch
- THREE cells
- Ammeter
- Connecting wires
- Materials given in the results table below
- Draw a diagram of the circuit used for the experiment. (4)

2.4 METHOD

2.4.1 Build a circuit with THREE cells in series, a switch and an ammeter.

2.4.2 Leave a gap between two connecting wires.

2.4.3 Connect ONE of the materials in the gap between the connecting wires. Write down the current in the results table below. Also indicate whether the material is a conductor or an isolator.

2.4.4 Repeat the process with all the other materials.

2.5 RESULTS

	MATERIAL	CURRENT I (A)	CONDUCTOR	ISOLATOR
1	Glass			
2	Copper wire			
3	Sulphur crystal			
4	Carbon rod			
5	Zinc rod			
6	Aluminium			
7	Iron nail			
8	Paper			
9	Plastic			

(9)

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2.6 CONCLUSION

2.6.1 Which material conducted electricity the best?

---------- (1)

2.6.2 Which materials did NOT conduct electricity?

---------- (2)

2.6.3 Draw a conclusion about which materials are conductors and which materials are isolators.

---------- (3)
[25]

TOTAL EXPERIMENT 2 (25 x 2): 50

PROJECT: LEVERS

3.1 AIM

To investigate the use of levers in everyday life

3.2 INSTRUCTIONS

Complete each of the tasks below.

The project must be done on folio paper and must be in your own handwriting.

3.3 TASKS

3.3.1 Compare the THREE types of levers in table format. Use drawings and diagrams in your answer. (9)

3.3.2 Design a lever that makes a certain task easier to perform. Label the fulcrum, effort, load and type of lever.

Examples: A device that opens the lid of a paint can; a device that can move a large object (7)

3.3.3 Study the lifting system in FIGURE 1 below. It uses a hydraulic cylinder as its input force. It is a system that could be used for lifting an engine out of a motor car. The lifting lever at the top is a third-class lever.

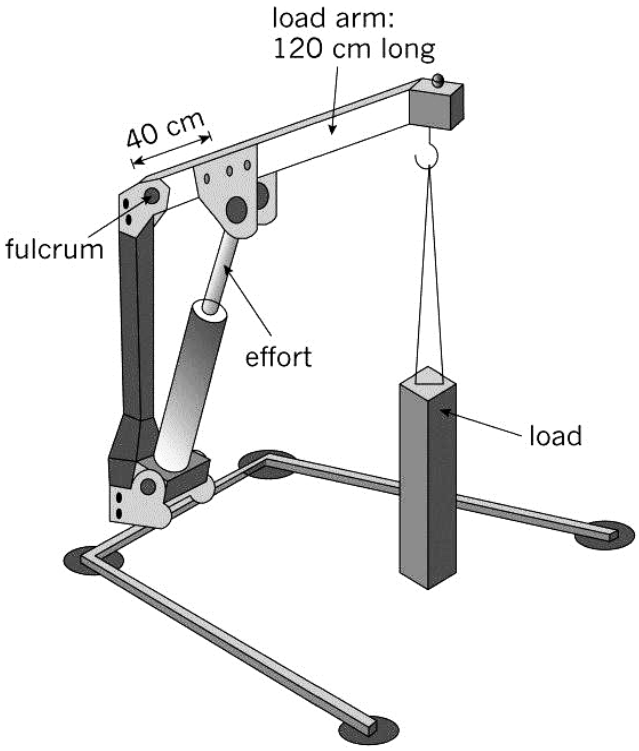

FIGURE 1: A LIFTING SYSTEM

3.3.1 How long is the input arm on this lever? (1)

3.3.2 How long is the output arm? (1)

3.3.3 Calculate the mechanical advantage that this lever gives. (5)

3.3.4 Explain what this mechanical advantage value tells you about the output and input forces. (2)

3.3.5 A person wants to use this system to lift an engine out of a car. The engine has to be lifted by 90 cm. How far should the hydraulic cylinder at the input move for the engine to be lifted 90 cm at the output? (5)

3.3.6 If the system is designed to lift objects by 180 cm, how far should the hydraulic cylinder move at the input? (5)

3.4 Many metalwork machines use levers to increase the input force in order to cut metal sheets or to make holes in steel plates.

Empty, discarded cold drink and food cans take up a lot of space. It does not have to take up so much space, since most of the volume of a can is taken up by the air inside. If the cans are crushed, they will take up very little space. Before cans are recycled to make new metal, they are crushed. It is much cheaper to transport the crushed cans to a recycling factory, since they require less space and more cans can be transported at a time.

Design and build a class 2 lever to crush cold drink and food cans. Make a rough sketch showing the dimensions. You can make this crusher from pieces of wood. (15)

TOTAL PROJECT: 50
GRAND TOTAL: 150

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