



# education

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Department:  
Education  
**REPUBLIC OF SOUTH AFRICA**

## **TECHNOLOGY**

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Common Tasks for Assessment

Grade 9

2007

**SECTION B**

**LEARNER'S BOOK**

### **Question and Answer Book**

🕒 Time: 2 hours

✓ Marks:  $80/2 = 40$

📄 No. Pages: 12

Learning Outcomes and Assessment Standards addressed in this Formal Assessment Task are given in the table below:

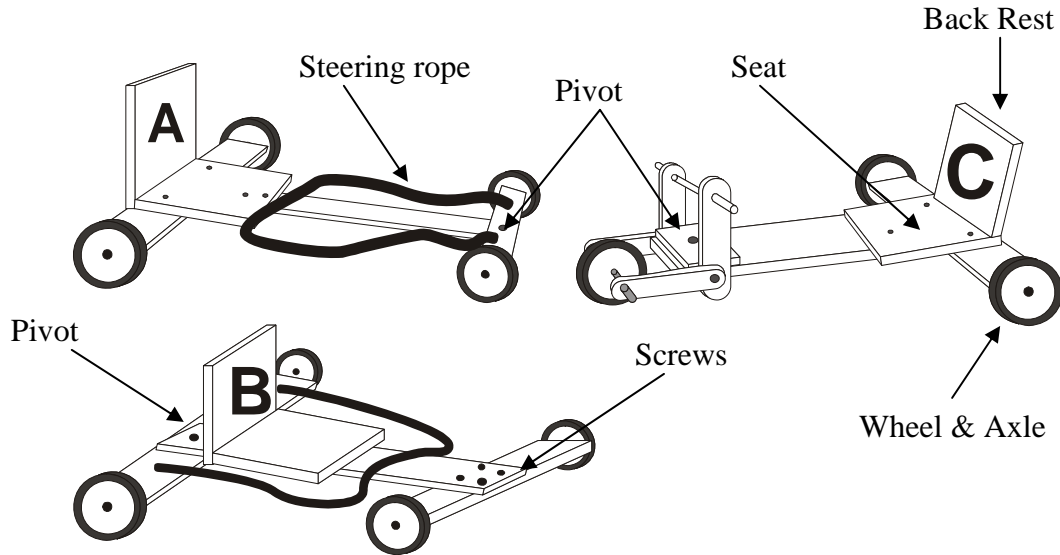
<b>Question 1</b>	
Learning Outcome	Assessment Standard
LO1	Investigates – analyses existing products relevant to an identified need in terms of safety and fitness for purpose
	Designs – chooses possible solution based on well reasoned argument
<b>Question 2</b>	
LO1	Investigates – analyses existing products relevant to an identified need in terms of suitability of materials
LO2	Processing - recycling
LO3	Impact of technology – strategies for reducing undesirable effects
<b>Question 3</b>	
LO2	Mechanical Systems & Control – gear systems
<b>Question 4</b>	
LO2	Mechanical Systems & Control – belt drives and gear systems
<b>Question 5</b>	
LO1	Designs .....
<b>Question 6</b>	
LO2	Structures – analysis of the effects of different loads and forces and knowledge of structural components
<b>Question 7</b>	
LO2	Electrical Systems & Control – how simple electronic circuits and devices are used to make an output respond to an input signal
<b>Question 8</b>	
LO1	Design – identify the problem based on all the design key words ( purpose, access, age, target market, safety, environment where the product will be used)
	Investigates – analyses an existing (design for a) product relevant to an identified need or opportunity in terms of safety and fitness for purpose
	Evaluates – the plan and demonstrates insight into the consequences of key decisions and suggest sensible improvements
LO3	Impact – recognises and identifies the impact of a technological development (design) on the quality of people’s lives and suggests strategies for reducing undesirable effects.

<b>Question</b>	<b>Marks</b>
Questions 1	15
Questions 2	9
Questions 3	7
Questions 4	6
Question 5	11
Question 6	12
Questions 7	12
Questions 8	8
<b>Total</b>	<b>80/2= 40 Marks</b>

**Question 1**

**[15 Marks]**

1. In a remote village deep in rural South Africa, there lives a little boy called Mbulaheni. He is well-liked by everyone even though he never participates when the others play soccer, nor does he help when the boys herd the village cattle into the kraal. The problem is that Mbulaheni cannot walk. Since the village is far from the nearest clinic, no one has been able to obtain a wheelchair for him. His friends decided to design and build a wheeled cart so that they will be able to help him to participate in their fun and games.



Look carefully at the designs they drew before selecting the best one to build. Answer the questions below the diagrams:

1.1. Compare A and B: In what way(s) are **they different**?

	2
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1.2. Compare A and C: In what way(s) are they **the same**?

	2
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1.3. Look at the steering mechanism of the three carts. Which one of the carts is more easily steered than the other two? Circle one letter ✓ **A B C**  
 Give two **valid reasons** for your answer: ✓✓ ✓✓

	1+4
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1.4. Compare the **stability** of all three carts. Which one is **least stable** and, therefore, most likely to turn over? Circle one ✓ **A B C**  
 Give a **valid reason** for your answer: ✓

	1+1
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1.5 Choose the cart that you think has the best overall design  
 Circle one **A B C**

	1
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Circle the letter of the best cart from the following criteria:

<b>Safety</b>	Circle one	<b>A B C</b>	1
<b>Fit-for-purpose</b>	Circle one	<b>A B C</b>	1
<b>Aesthetics</b>	Circle one	<b>A B C</b>	1
<b>TOTAL</b>			<b>15</b>

**Question 2****[9 Marks]**

Recycling and remanufacturing is the process where used materials are broken down and made into something useful. This is especially important to help sustain non-renewable resources. Most items for recycling must be sorted into categories before meaningful recycling can be done.



2.1 Below is a list of “waste” items often thrown away. Sort them into the correct category for recycling by ticking the correct column for each item.

	<b>Paper</b>	<b>Plastic</b>	<b>Metal</b>	<b>Glass</b>	<b>Plant Matter</b>
Potato peels					
Newspaper					
Tins					
Grass clippings					
Plastic bags					
Egg boxes					
500ml cooldrink bottle					
Yogurt cups					
<b>TOTAL: 8 ÷ 2</b>					<b>4 Marks</b>

2.2 Properly sorted waste material needs to be further sorted into sub-types for recycling to be possible. Paper, metal and plastics are sorted into different grades and types of material at the start of the recycling process.

Metals and Plastics need to be sorted according to type before they can be recycled.

2.2.1 How can metals like iron and steel be easily sorted from metals like copper and aluminium? Suggest two easy ways to do this. ✓✓

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<b>2</b>
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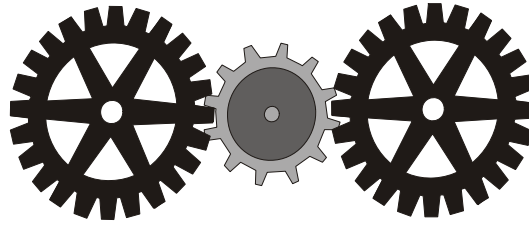
2.3 Sort the following plastic items into the correct category for recycling by ticking the correct column for each item. You may refer to Section A of the CTA.

<b>Type of Plastic</b>	<b>PET</b>	<b>PE-HD</b>	<b>PVC</b>	<b>PE-LD</b>	<b>PP</b>	<b>PS</b>
Plastic bucket						
Plastic cups						
Cooldrink bottles						
CD Cases						
Plastic plumbing pipes						
Take-away food containers						
<b>TOTAL: 6 ÷ 2</b>						<b>3 Marks</b>

**Question 3**

[7 Marks ]

A gear train of three gears is pictured below



- |  |   |
|--|---|
| 3.1 What is the <b>name</b> of the <b>centre gear</b> ?  | 1 |
| 3.2 What is the <b>function</b> (purpose) of the centre gear?                                      |   |
| <hr/> <hr/>  |   |
|  | 2 |
| 3.3 Should the centre gear be made of a <b>harder or softer material</b> than the other two gears? | 1 |
| 3.4 Explain your reasoning for the above answer  |   |
| <hr/> <hr/> <hr/>  |   |
|  | 3 |

**Question 4**

[6 Marks ]

Look at the diagrams below. In each case the driver in the mechanical system is shown with an arrow that shows the clockwise direction it is turning.

<p><b>A</b></p> <p>Belt drive system</p>	<p><b>B</b></p> <p>Belt drive system</p>
<p><b>C</b></p> <p>Gear drive system</p>	<p><b>D</b></p> <p>Gear train</p>

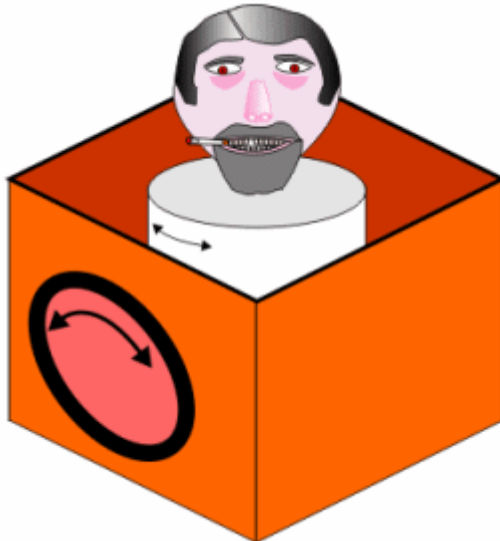
- |   |     |
|---|-----|
| 4.1 Which two mechanical systems above would you use in a machine that must have the driven wheel turn in the same direction as the driver? | [2] |
| <hr/>   |     |
| 4.2 Which gear system can be described as “gearing down?”   | [1] |
| <hr/>   |     |
| 4.3 Motivate your answer to 4.2 by referring to the number of teeth when you explain  |     |
| <hr/> <hr/>   |     |
|   | [2] |
| 4.4 Which system/s above will allow for “slippage” to occur?  |     |
| <hr/>   |     |
|   | [1] |

A shop keeper needs a display for a new product.

The purpose of the display is to show the new product in an unusual manner to attract the attention of the people.

The display will be placed on the counter of the shop.

The figure below is an example of a display.



(Illustration from: [www.technologystudent.com](http://www.technologystudent.com))

Sketch a possible design idea to present to the shop keeper. You can make use of any **mechanical system** studied in Grade 8 or 9. The sketch must be drawn so that the **mechanical system can be seen**.

**Make sure the following aspects are covered in your design:**

- Select any **suitable product** to display and **label the product**. (1)
- The model of the design must be **hand operated**. (1)
- The display must be able to **move**. (1)
- Use any suitable **Three Dimensional (3D)** sketch to show your design. (3)
- **Label the mechanical components** used in your design (2)
- Present a **systems diagram** for the design of your mechanical display. (3)  
(Describe the input, process and output under these given headings)

The **design** and **presentation** must be different to the example given.

You will be credited for using **your own ideas** and not just copying from the example given above

**ANSWER SHEET FOR QUESTION 5**

Blank area for student answers.

<b>Mark Allocation for Question 5:</b>	<b>Mark Allocated</b>	<b>Mark gained</b>
<b>1. Suitable product is selected and labelled</b>	<b>1</b>	
<b>2. Suitable hand operated design</b>	<b>1</b>	
<b>3. Suitable movement is used</b>	<b>1</b>	
<b>4. Suitable 3D Sketch</b>	<b>3</b>	
<b>5. Mechanical components are accurately labelled</b>	<b>2</b>	
<b>6. Accurate systems diagram presented</b>	<b>3</b>	
<b>Total:</b>	<b>11</b>	

**Question 6**

**[12]**

Here is a photograph of the Aloe Cove Dam across the Crocodile River in the Cradle of Humankind, Gauteng. It can be found at the Haia Safari Lodge.



This dam was built in 5 years by a small team of men working without machinery. The wall is 6m high and 240m across, and is built from natural stone and cement.

The above view shows the lake being held back by the structure of the dam



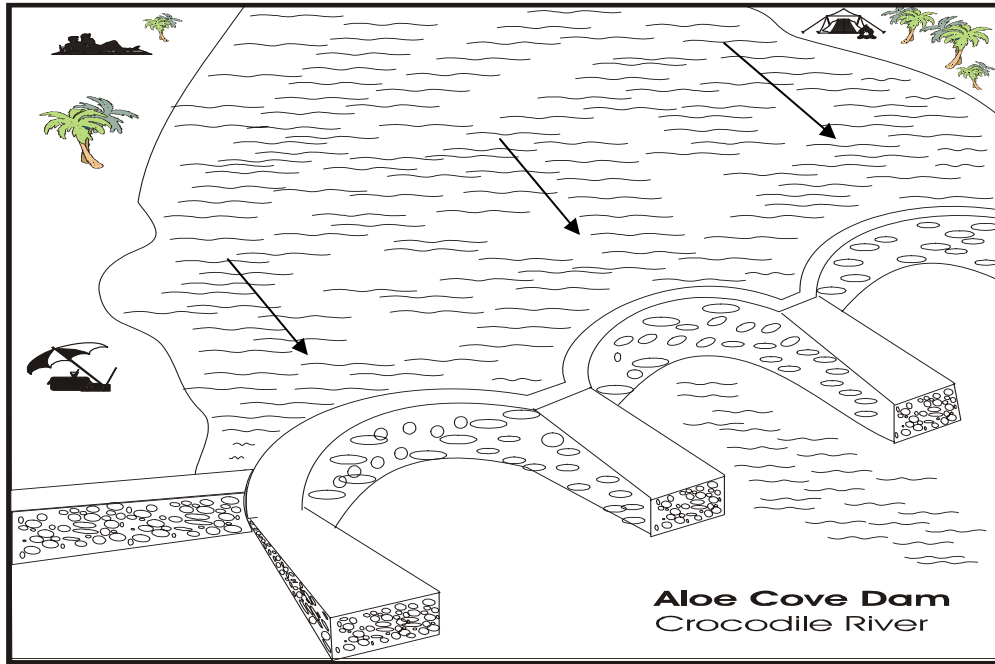
This view from the downstream side shows the large mass structures, which hold back the force of the lake.

6.1 Look at the photograph and **identify the two main structural features** that make up the dam wall.

<i>and</i>	2
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6.2 Use the sketch below to show how the structure of the wall disperses the force of the water pushing against it. Use **arrows** to represent the forces acting on the wall, and the effect of the wall shape on these forces.

5



6.3 Explain why you think the dam wall took five years to build. Refer to the following aspects: choice of materials, construction methods, and labour.

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[3]

6.4 Describe one possible positive and one negative impact that the construction of the dam wall may have had on the environment during the five years it took to build:

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
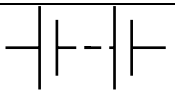

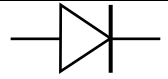
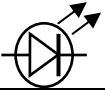

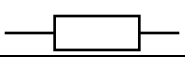

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[2]

**QUESTION 7 SYSTEMS AND CONTROL: ELECTRONIC**

The table below provides symbols for a selection of electronic components. Each component is named and the use of each component is described. Use the information in the table and answer the questions that follow.

<b>SELECTION OF ACCEPTABLE CONVENTIONS FOR ELECTRONIC COMPONENTS</b>		
<b>SYMBOL /CONVENTION</b>	<b>NAME / DESCRIPTION</b>	<b>USE</b>
	Single cell	Energy source – often 1,5 volts
	Battery (two or more cells)	Energy source
	Switch (open position)	Device to open or close a circuit
	Diode	Process device that allows current flow in one direction only
	Light Emitting Diode L.E.D.	Output device which emits light when small current passes through it
	Capacitor	Process device that can store an electric charge
	Resistor	Process device that restricts the electric current
	Buzzer	Process device that converts electric energy into sound energy

7.1	Draw a circuit diagram for a working electronic device that makes use of the following electronic components: A 6 volt battery, a light emitting diode, a switch and a resistor.	[4]
7.2	Use arrows to indicate the direction flow of the conventional current on the circuit diagram you have drawn.	[1]
7.3	What is the importance of the resistor in the circuit?	[1]
7.4	Describe a product you could design and make that will use the electronic circuit you have drawn. Indicate how you would adapt the electronic circuit you have drawn to accommodate a person who is deaf or hearing impaired.	[2]


7.5	<p>Mpho has a house with a front and a back entrance. She wants to set up two push-button switches (one at the front door and one at the back) so that visitors will be able to ring the doorbell no matter at which door they are standing.</p> <p>Draw a circuit diagram that will allow Mpho's visitors to ring her doorbell from either of the two entrances. Your diagram should show the following components, correctly connected: A 3V series battery; one buzzer, two push buttons [one for the front door; one for the rear door]</p>	[4]

**Question 8**

**STRUCTURES DESIGN PROBLEM**

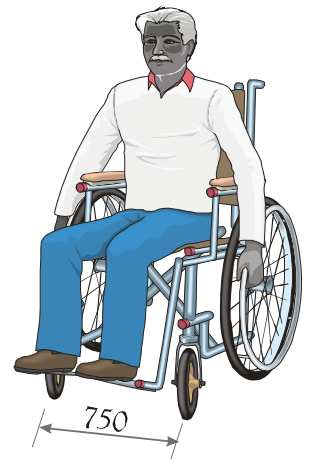
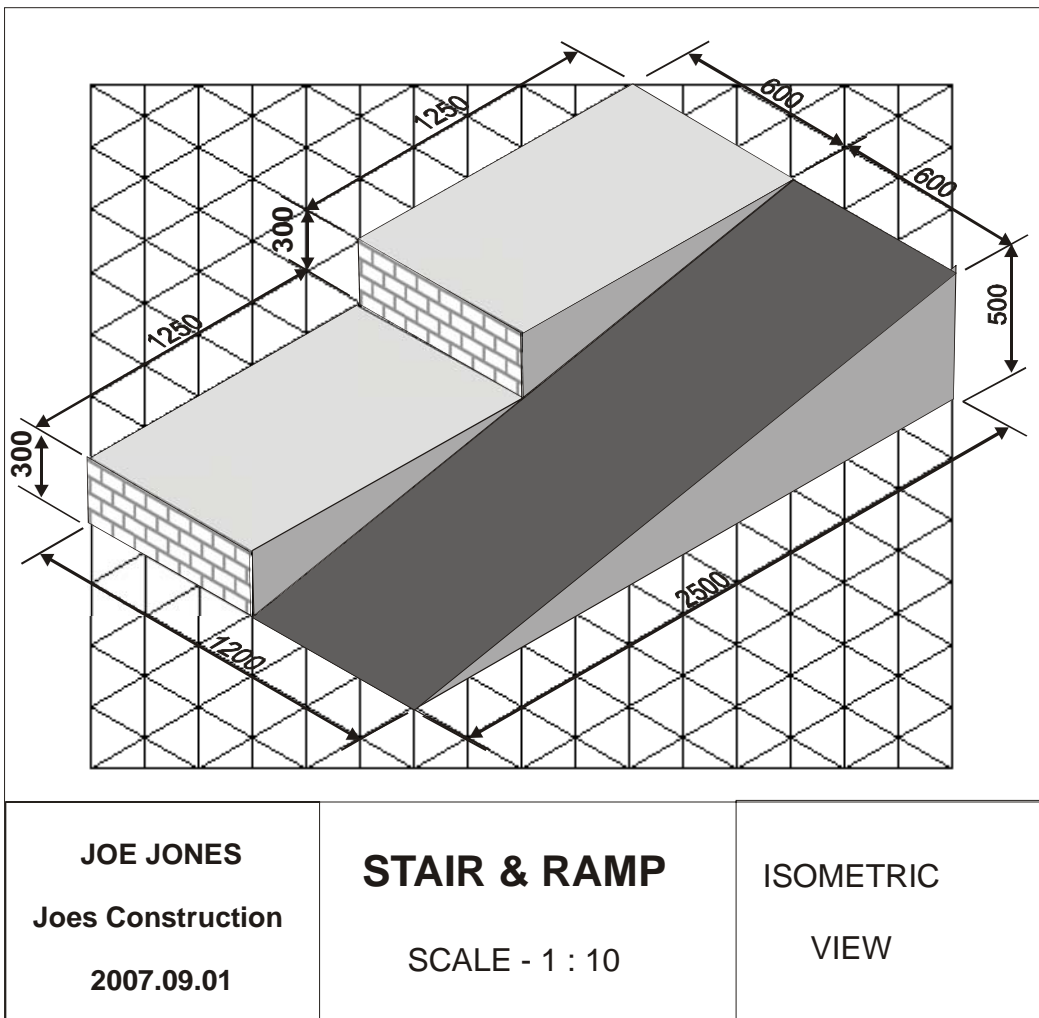
**[8]**

South Africa has been awarded the Soccer World Cup in 2010. Currently many programs have started preparing the stadiums for the big event. Soccer City has called for designs for a special section of the main grandstand to be upgraded specifically to cater for elderly and disabled spectators. The design calls for a ramp for wheelchairs, and suitable stairs for elderly people to be able to use in comfort.

Here is a design submitted by a hopeful contractor.  
Unfortunately, the design is poor and should be rejected.

8.1 List **four problems** with the design

**[8]**



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**TOTAL: 80 MARKS**