DIRECTORATE FOR QUALITY AND STANDARDS IN EDUCATION
Department for Curriculum Management and eLearning
Educational Assessment Unit
Annual Examinations for Secondary Schools 2013

FORM 4 **DESIGN & TECHNOLOGY** **TIME: 2 hours**

Name: _____ **Class: _____**

---------- Note to student: ----------
You are required to answer all questions

	Areas corrected					Marks for Written Exam.	Marks for Design Folio	TOTAL	**FINAL MARK**
	D	**RM**	**E**	**F**	**T**				
Max. Marks	20	20	20	20	20	100	100	200	**%**
Student's mark									

FOR TEACHERS' USE ONLY DISTRIBUTION OF MARKS

Enter student's mark obtained in every area of study in the above table.
D for Design, **RM** for Resistant Materials, **E** for Electronics, **F** for Food technology and **T** for Textiles technology

---

SECTION A: **DESIGN**

1. Carefully read the situation below and then answer **questions 1 to 8.**

> 'Veg to mix' is the name of a new concept of take away outlets that are going to open in the vicinity of your school. The idea of the outlet is to promote healthy lifestyle by presenting its customer a variety of healthy food. As a designer you are asked to provide an attractive healthy meal to be sold from the outlet especially to school students.

a. Write a suitable design brief. Remember that this product is to be sold from take away outlets.

_____

_____

1 mark

b. Write TWO keywords from your design brief.

• _____ • _____

1 mark × 2 = 2 marks

2. It is expected that the take away outlet carries out research to help you determine the type of products that could be produced.

a. What does research mean?

_____

1 mark

b. What type of research does the designer need to perform?

_____

1 mark

3. What is the purpose of the specifications in the design process?

_____

1 mark

4. List THREE specifications that commonly occur in a food product.

- _____
- _____
- _____

1 mark × 3 = 3 marks

5. Sketch ONE idea that you might consider for this project. *In your answer add notes, labelling, colour and a list of ingredients.*

5 marks

6. **a**. The designer must produce a particular form of drawing for the manufacturer to be able to make the product. What do we call this type of drawing?

_____ **1 mark**

b. Give TWO pieces of information that the drawing stated in **question 6a** must contain.

• _____ • _____

1 mark × 2 = 2 marks

7. When the initial ideas are ready, the designer uses a process of checking to see which idea fulfills the specifications. What do we call this process stage?

_____ **1 mark**

8. **a.** What are the next TWO stages in the design process after the making of a food product?

• _____ • _____

1 mark

b. Mention ONE sensory test used in the process mentioned in **question 8a**.

_____**1 mark**

9. Carefully read the situation below and then answer **questions 9 to 12**.

The owner of a roof-garden wants to protect his plants from excessive heat. A designer was asked to develop a retractable tent which can be opened and closed according to the owner's needs. **Figure A** shows one idea for the design of the retractable tent.

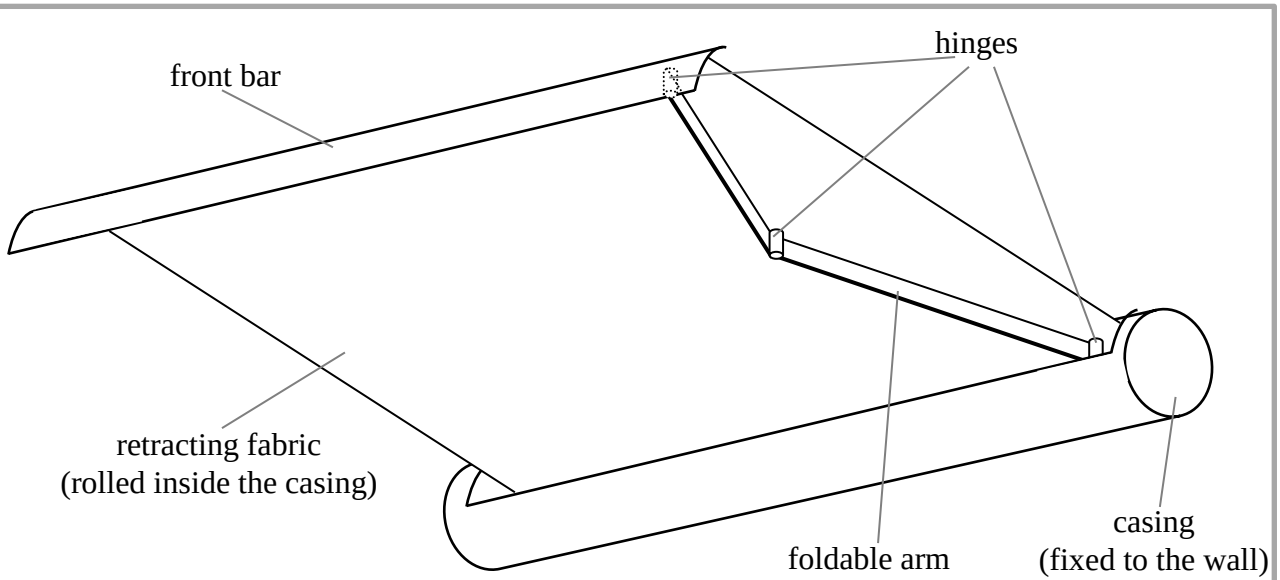

Figure A: Idea of the retractable tent

a. List TWO properties that the material of the **casing** shown in **Figure A** should have. For each property, give ONE reason for your answer.

PROPERTY	REASON

3 marks

b. Name ONE material which satisfies the properties mentioned in **question 9a**.

_____

1 mark

10. The foldable arm is planned to be made of galvanized mild steel parts. **Figure B** shows different parts which could make up the central hinge of the foldable arm.

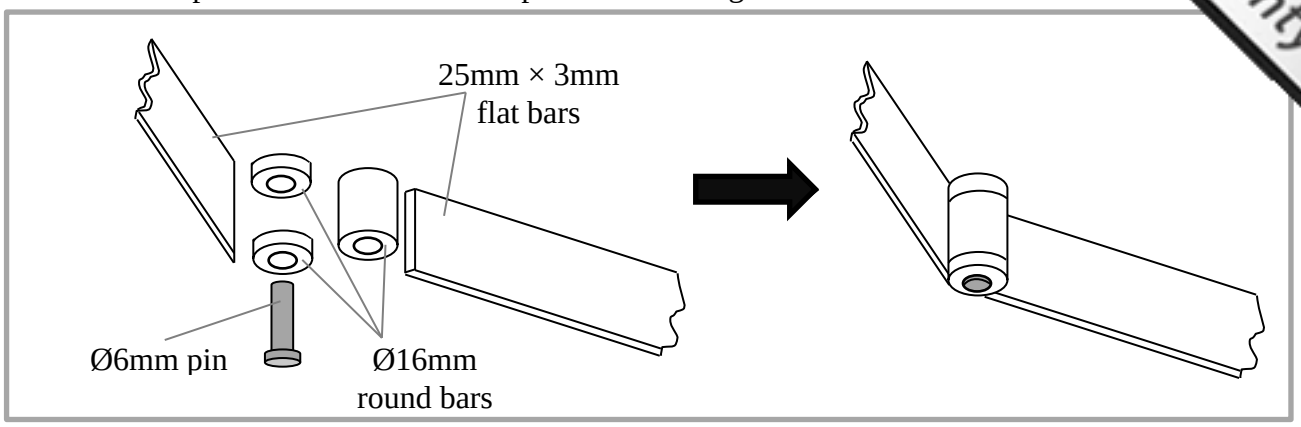

Figure B: Detail of central hinge

a. Mention ONE method by which the flat bars can be joined to the round bars as shown in **Figure B**. Briefly describe what this method is.

METHOD	
DESCRIPTION	

1 mark × 2 = 2 marks

b. A hole needs to be drilled right through the round bars so that the pin is fitted. From the selection below, underline the most suitable size of twist drill which should be used to make this hole.

▪ 5mm ▪ 6mm ▪ 7mm ▪ 10mm

1 mark

c. By means of labelled sketches, show how the pin is to be fitted and secured to form the hinge.

3 marks

11. **Figure C** shows the bottom view for the mechanical system that opens and closes

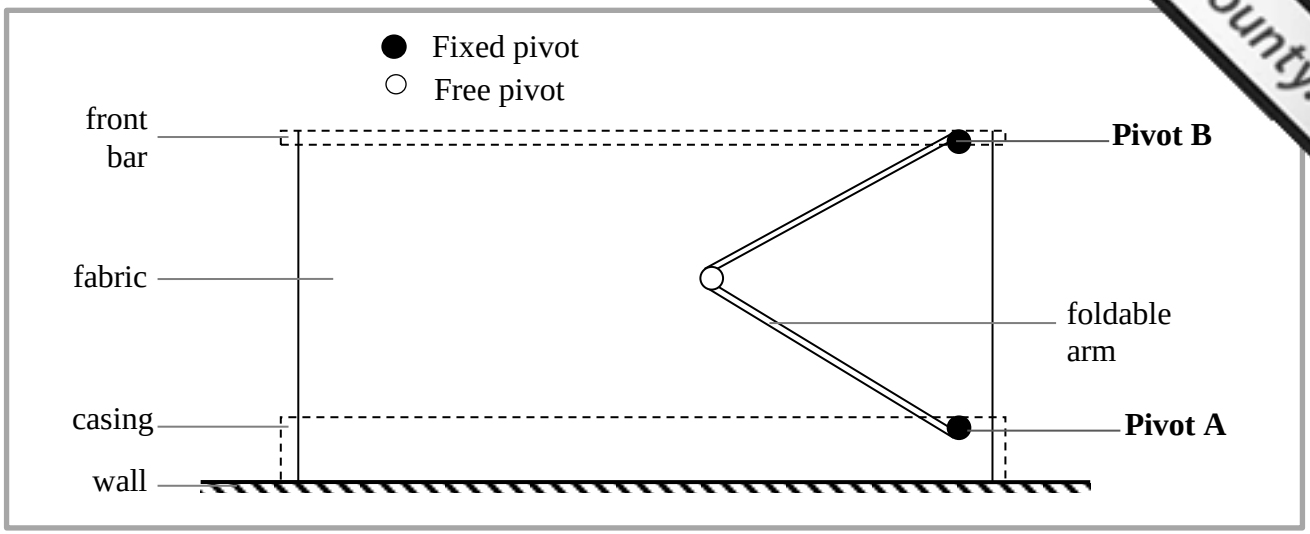

Figure C: Bottom view of mechanical system

a. Give the name of the mechanism that is being used to operate the tent.

_____ **1 mark**

b. Shortly define what a pivot is.

_____

1 mark

c. On **Figure C**, draw the movement for **pivot A** when the tent is being **opened**. **1 mark**

d. On **Figure C**, draw the movement for **pivot B** when the tent is being **closed**. **1 mark**

e. Write down the type of motion acting at:

i. Pivot A: _____

ii. Pivot B : _____ **½ mark × 2 = 1 mark**

12. A model of the mechanical system of the tent failed testing because it only opened up from one side.

a. Find ONE reason why the tent cannot open up properly.

_____

2 marks

b. On **Figure C**, add another foldable arm to make the tent open up properly. **2 marks**

c. Explain how to calculate the maximum length of the tent when it is fully opened.

_____

1 mark

SECTION C: **ELECTRONICS**

13. The manufacturer of the tent decided to improve his product by introducing an electronic circuit to automatically OPEN/CLOSE the tent and protect the indoor plants from excessive heat. The electronic system of the automatic tent works as follows:

The tent extends out ONLY

- When there is high temperature **AND** there is light

OR

- When the user decides to OPEN/CLOSE it

a. **Figure D** shows an incomplete design idea for the electronic circuit of the tent. Using the following terms, fill in the diagram shown in **Figure D.**

Light Sensor, AND Logic gate, DC Motor, Relay

1 mark × 4 = 4 marks

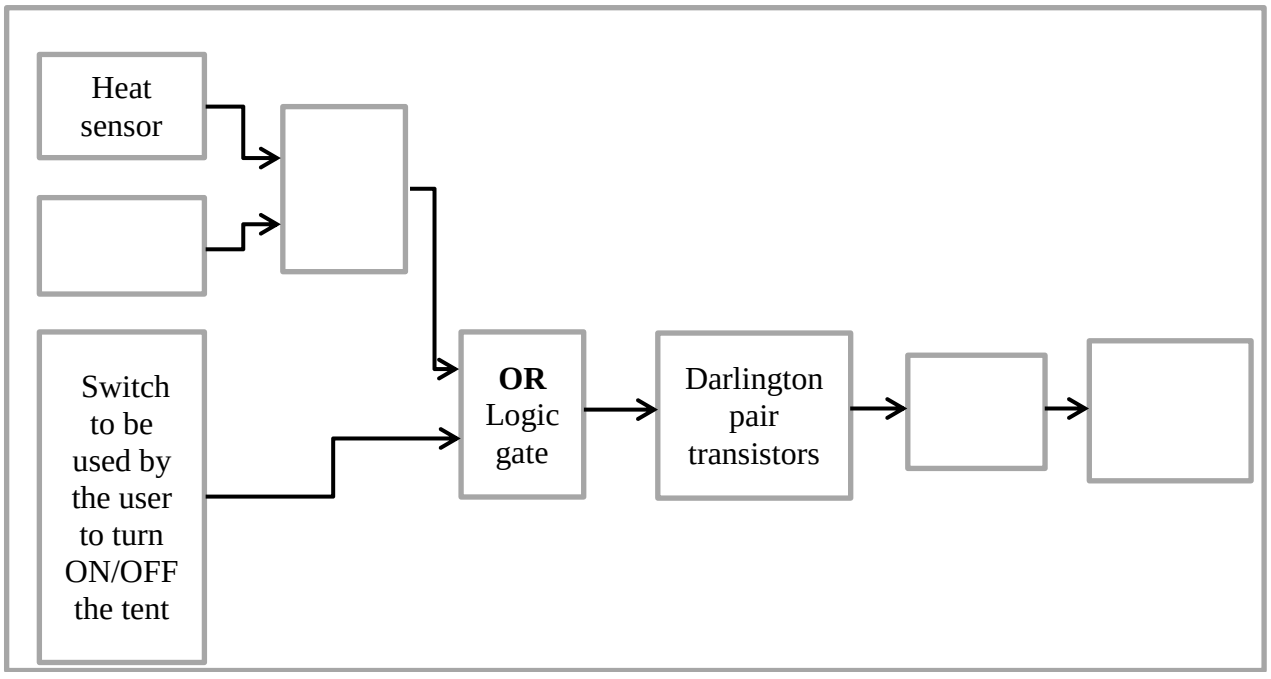

Figure D

b. What do we call the diagram shown in **Figure D**?

_____

1 mark

c. What is the purpose of using arrows as shown in **Figure D**?

_____

2 marks

14. **Figure E** shows the logic circuit used to control the tent. Study carefully the circuit **Figure E,** then answer the following questions.

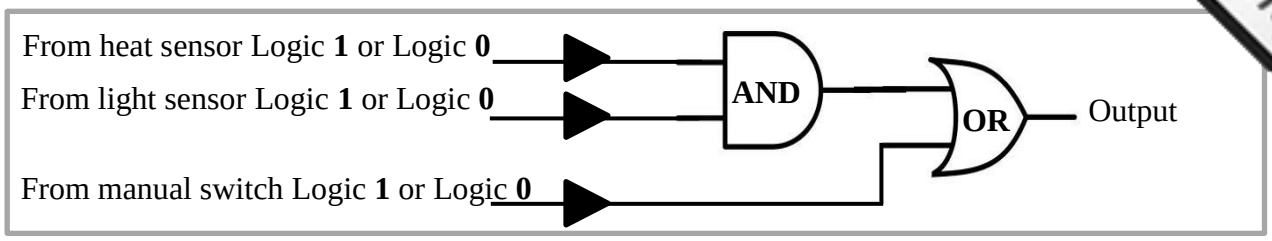

Figure E: Logic gate circuit

a. In terms of voltage, what is Logic 1 and Logic 0?

Logic 1 = _____ volts **Logic 0** = _____Volts **½ mark × 2 = 1 mark**

b. The following truth table is used for the circuit shown in **Figure E**. Complete the truth table shown below. *The first one is done for you.*

INPUTS			**OUTPUT**
Heat Sensor	**Light Sensor**	**Manual Switch**	
0	**0**	**0**	**0**
0	**1**	**0**	
0	**1**	**1**	
1	**1**	**0**	
1	**1**	**1**	

1 mark × 4 = 4 marks

c. Complete the electronic circuit shown in **Figure F** to show how the inputs are wired to form the logic ciruit. **1 mark × 2 = 2 marks**

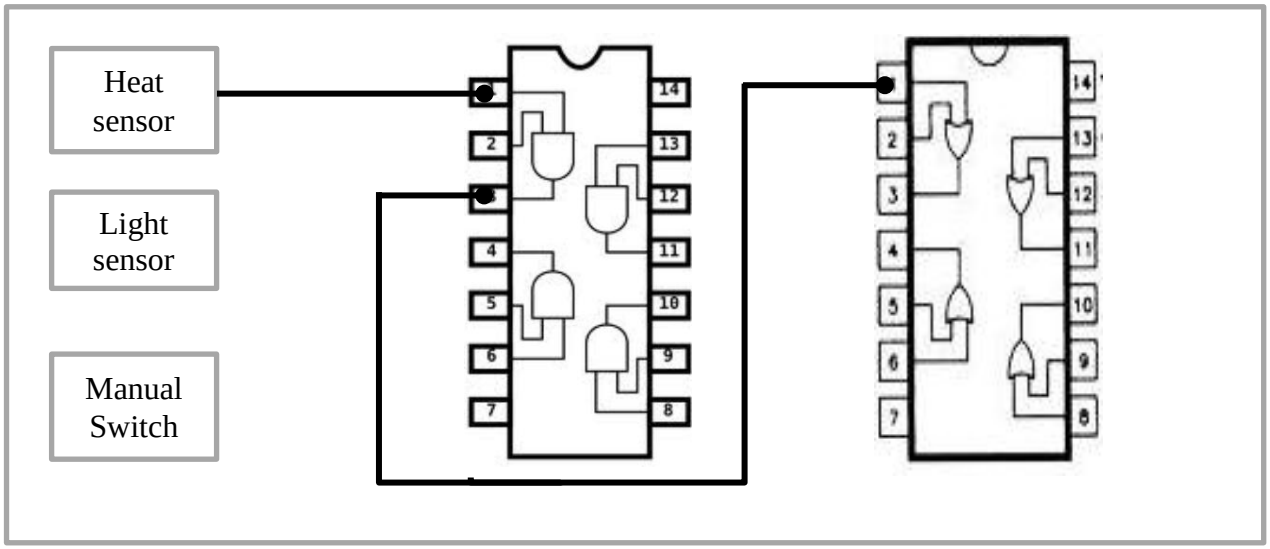

Figure F: Logic gate circuit

15. The manufacturer decided to include an LED with the electronic circuit, indicating when the circuit is switched ON. **Figure G** shows the electronic circuit needed to solve this problem. The LED uses 2.2V , 27mA to light.

Calculate the value of R1. *In your answer show ALL working.* **3 marks**

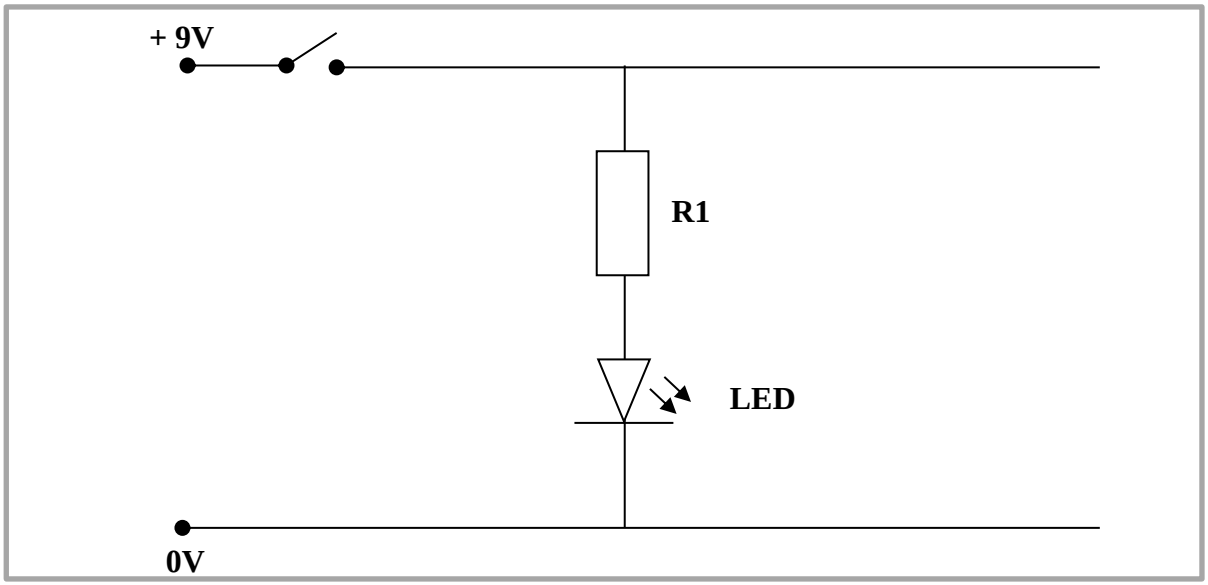

Figure G

16. Figure H shows the relay used to turn ON/OFF the motor. Complete the electronic circuit design to show how Darlington pair transistors is used to switch ON the relay. **3 marks**

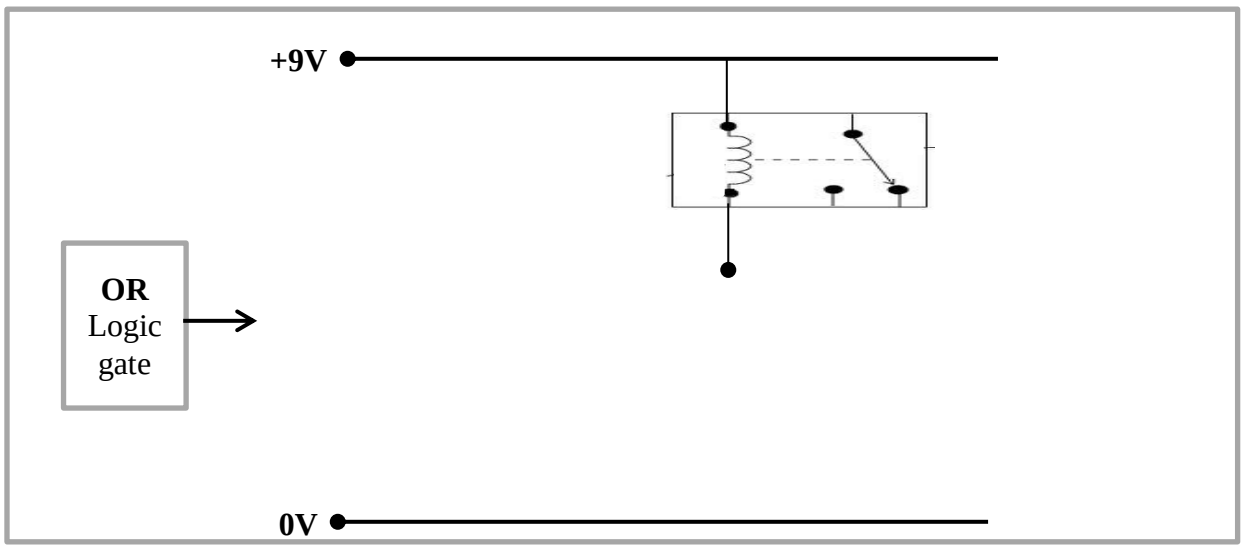

Figure H

SECTION D: **FOOD**

17. Carefully read the situation below and then answer **questions 17 to 19.**

> Your family has hosted four foreign students who are in Malta studying English. You decide buy marinated chicken kebabs and long-grain brown rice for a barbeque. The barbeque will be held on the roof as this area was lately enhanced with plants and a beautiful tent.

a. List FIVE safety precautions you should take to avoid food poisoning while cooking and serving the above food items.

- _____
- _____
- _____
- _____
- _____

1 mark × 5 = 5 marks

b. Considering students are foreigners; give ONE reason why you chose to use chicken instead of meat.

_____

1 mark

c. Why is brown rice considered a healthier choice than white rice?

_____

1 mark

18. Chicken is high in proteins while rice is high in carbohydrates.

a. In which food group of the Food Guide Pyramid do they belong?

Chicken	
Rice	

1 mark × 2 = 2 marks

b. The information on nutrition per 100g of the chicken kebabs and rice are given in the table below:

Nutrition	**Chicken kebabs**	**Boiled Brown rice**
Calories		106.0
Protein	17.3g	2.6g
Carbohydrate	1.5g	23g
Fat	3.6g	0.9g

Work out the calories in 100g of chicken kebabs.

Chicken kebabs	

19. **a.** Give ONE reason why it is important for the consumer to have information on the label of food products.

_____

1 mark

b. Give ONE example when nutritional information on food labels is required by law.

_____

2 marks

c. How should the ingredients of a food product be listed on a food label?

_____

1 mark

d. Name TWO other pieces of information required by law that a food label should have.

- _____
- _____

1 mark × 2 = 2 marks

SECTION E: **TEXTILES**

20. Carefully read the theme below and then answer **questions 20 to 25.**

Theme to be considered: Automatic foldable tent to protect indoor plants on roof top.

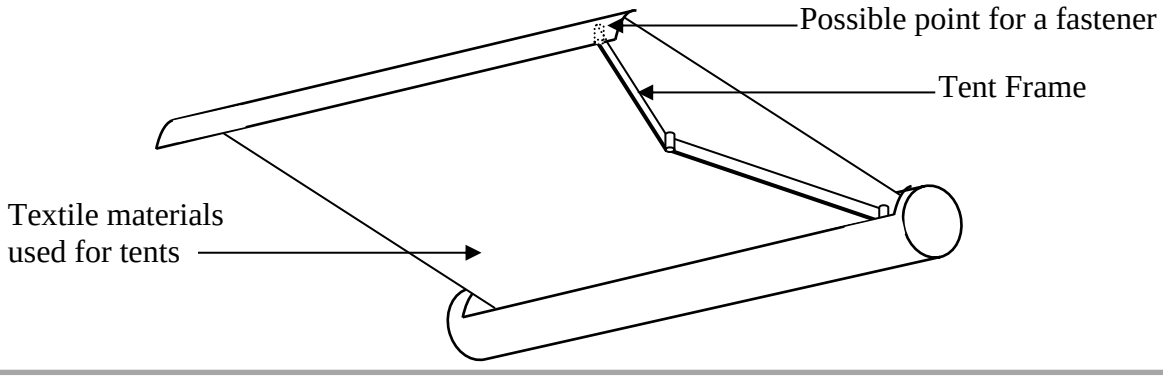

Figure I

Heavy duty *Press studs* are often used to hold the tent firmly attached to its frame as **Figure I.** List other TWO alternative fastenings that could be used.

• _____ • _____

2 marks × 2 = 4 marks

21. The tent is made to measure to fit a particular area onto the customer's roof. Underline the method of production you would choose for making the tent and give a reason to your answer:

Method of productions: One-off production, Batch production, Mass production

Reason:_____

_____

4 marks

22. Name TWO different methods by which you can give colour and decorate the tent.

• _____ • _____

1 mark × 2 = 2 marks

23. List ONE method of neatening an edge (edge finish) for the tent. Give ONE reason for your choice.

Method: _____

Reason:_____

3 marks

24. Name TWO seams used in the construction of the tent.

• _____ • _____

2 marks

25. The symbols below are sometimes found on a care label attached to a tent. Complete the table to state what each symbol means.

			
			
			

1mark × 5 = 5 marks