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

FORM 3 (3rd Yr)	**DESIGN & TECHNOLOGY**	**TIME: 2 hours**

Name: _____   **Class:** _____

_____

---------------------------------- **Note to student:** -----------------------------

You are required to answer all questions.

Useful Formulae:

$$V = IR \qquad\qquad V_{OUT} = \frac{R_2}{R_1 + R_2} \times V_{IN}$$

_____

FOR TEACHERS' USE ONLY   DISTRIBUTION OF MARKS

|	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									

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 and **T** for Textiles

_____

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SECTION A: **Design Process**

1. Put the following stages of the design process in the correct place.

- **Situation**   ▪**Development**   ▪**Planning**   ▪ **Design brief**
- **Testing and Evaluation**   ▪ **Research**   ▪ **Chosen Idea**
- **Specifications**   ▪ **Making**   ▪ **Initial Ideas**

	1.	
10.		2.
9.		3.
8.		4.
7.		5.
	6.	
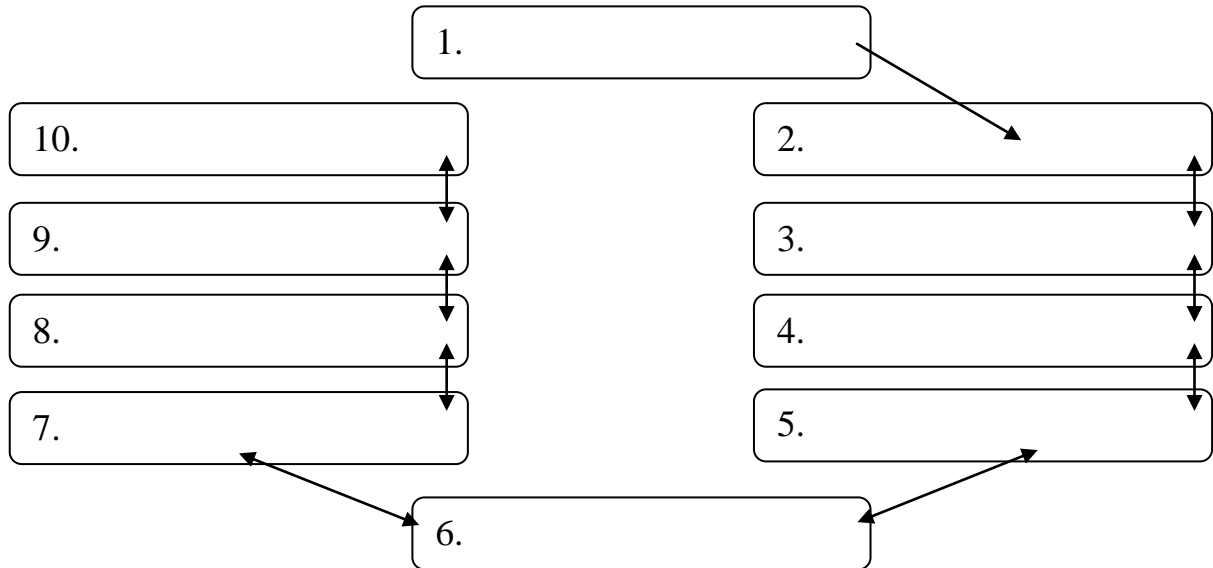
½ mark × 10 = 5 marks

2. Carefully read the following situation.

> **The local council will be organising an activity for children to encourage recycling of waste in the village. During this activity some promotional items are going to be distributed and therefore the local council needs a textile bag for each child so that all items are held in them.**

a. Prepare a design brief for the situation above.

_____

_____

2marks

b. Write down FOUR keywords from your design brief.

▪_____   ▪_____

▪_____   ▪_____

½ mark × 4 = 2 marks

3. Give TWO design requirements you would include in the specification list for the design brief you have decided in question **2a**.

▪_____

▪_____

1 mark × 2 = 2 marks

4. In the space provided, sketch one idea for the design brief decided in question~~~~. ~~~~ sketch must be clear and show materials, fastening method and aesthetic features.

5 marks

5. Explain what is meant by the term 'Chosen Idea' as part of the design process.

_____

2 marks

6. Give TWO instances when ICT can be used during a Design & Technology project.

- _____

- _____

2 marks

SECTION B: **Resistant Materials**

A food preparation area has an automatic ventilation system which switches on a fan when the place is in the dark. Figure A shows the different parts which make up the casing of its control unit.
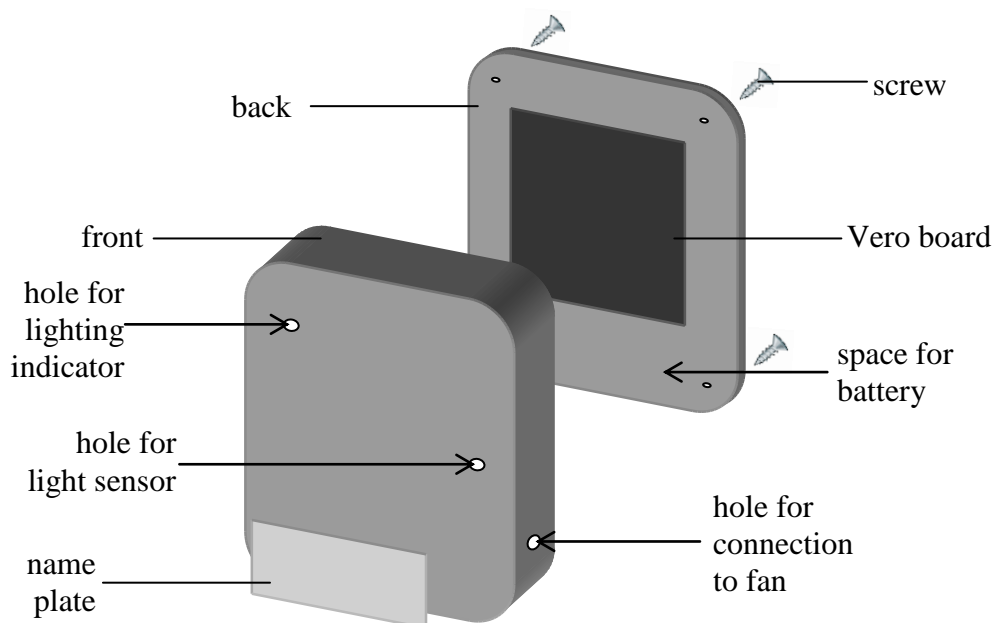

back — screw

front — Vero board

hole for lighting indicator

space for battery

hole for light sensor

name plate

hole for connection to fan

Figure A: Casing for the control circuit

7. The front part of the casing is to be vacuum formed from a plastic sheet.

a. State which type of plastic can be shaped by vacuum forming. _____

1 mark

b. Complete the following sentences in order to obtain a work plan for the process of vacuum forming.

   i. Position the _____ on the platen.

   ii. Tightly _____ the plastic sheet and set heating timer.

   iii. Move _____ onto the plastic sheet and switch it on.

   iv. Remove heater, lift the platen mould table and switch on _____ pump.

   v. Leave plastic to _____ down and _____ the mould.

½ mark × 6 = 3 marks

c. Study carefully the following data related to vacuum forming.

PLASTIC	THICKNESS (mm)	HEATING TIME (sec)
X	2	120
	3	150
Y	2	150
	3	180

3mm thick Plastic X sheet was heated for 180 seconds and then vacuum formed. However, the resultant form was not satisfactory because the plastic became ripped. Explain why this happened and propose a solution.

REASON: _____

SOLUTION: _____

1 mark × 2 = 2 marks

d. A flat area of 200mm × 130mm is required to form one front part.

   i. If the vacuum forming machine holds plastic sheets of size 400mm × 400mm, what is the maximum number of parts that can be extracted from each sheet?

   _____   **1 mark**

   ii. State ONE reason why it is important to use the plastic sheet to its maximum.

   _____

   1 mark

8. **Figure B** shows the incomplete vacuum forming mould which will be used to shape the front part of the casing.
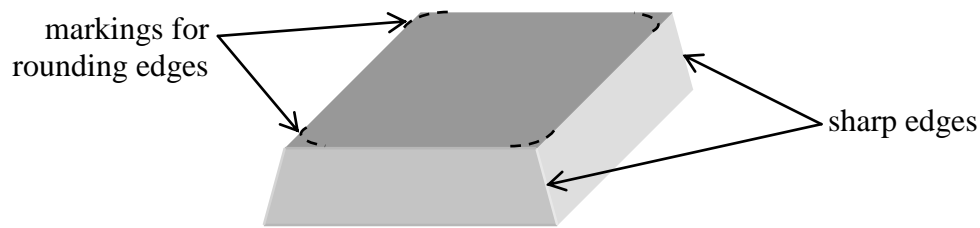

Figure B: Incomplete mould

a. Underline the most suitable material for making the vacuum forming mould.
▪ **PVC**   ▪ **Acrylic**   ▪ **MDF**

1 mark

b. Give TWO reasons for the choice you made in question **8a**.

▪ _____

▪ _____

1 mark × 2 = 2 marks

c. The sharp edges of the incomplete mould need to be rounded to obtain the required shape of the front part of the casing. Write down the hand tools required for the following processes:

i.   Marking out the centre of the arcs: _____

ii. Marking out the arcs: _____

iii. Cutting out the curves: _____

iv. Smoothing down the edges: _____

½ mark × 8 = 4 marks

9. a. Consider that the food preparation area may be humid due to steam generated from cooking. Suggest ONE reason why the screws and name plate of the casing were also made from plastic.

_____

1 mark

b. Mention ONE adhesive which can be used to join the plastic name plate to the front of the casing.

_____   **1 mark**

10. By means of sketches, show how the back of the casing can be modified so that ~~~~~~~ be fixed to the wall. Remember that the user still has to have access to open the cas~~~~~~ replacing batteries.
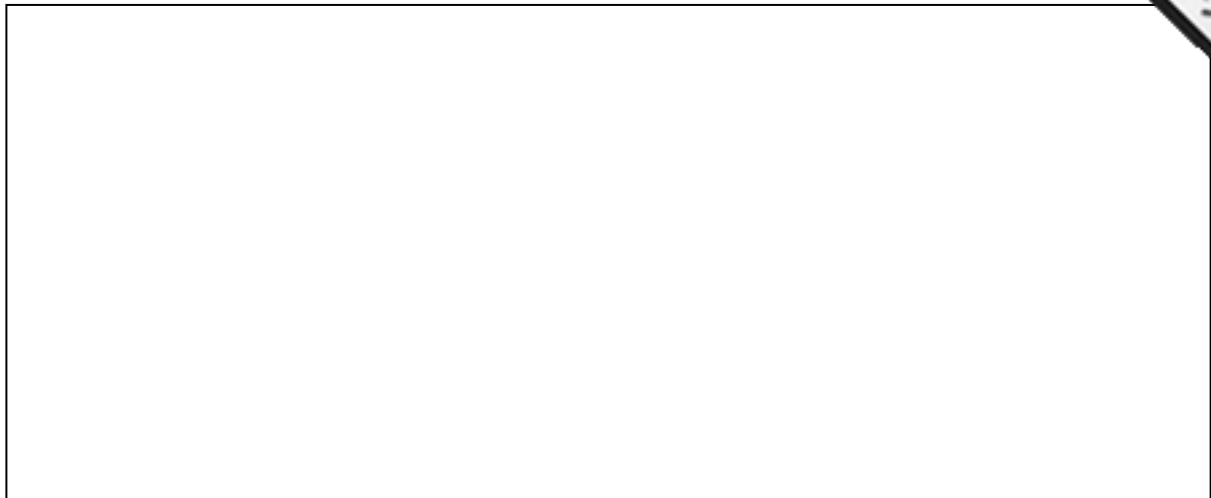
3 marks

SECTION C: **Electronics**

Figure C shows the complete automatic ventilation system for the same food preparation area. The system switches ON a 12V d.c. motor of a fan when there is no light on an LDR. The system also has a lighting indicator to show that the motor is turning.
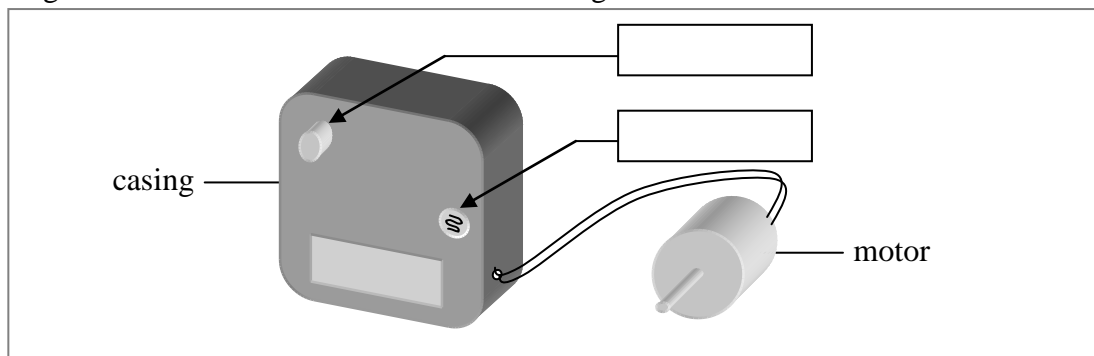
casing ⎯

motor

Figure C: Automatic ventilation system

11. On **Figure C**, label the LDR and the LED.

½ mark × 2 = 1 mark

12. **Figure D** shows an incomplete design idea for electronic circuit of the system used to control the motor.
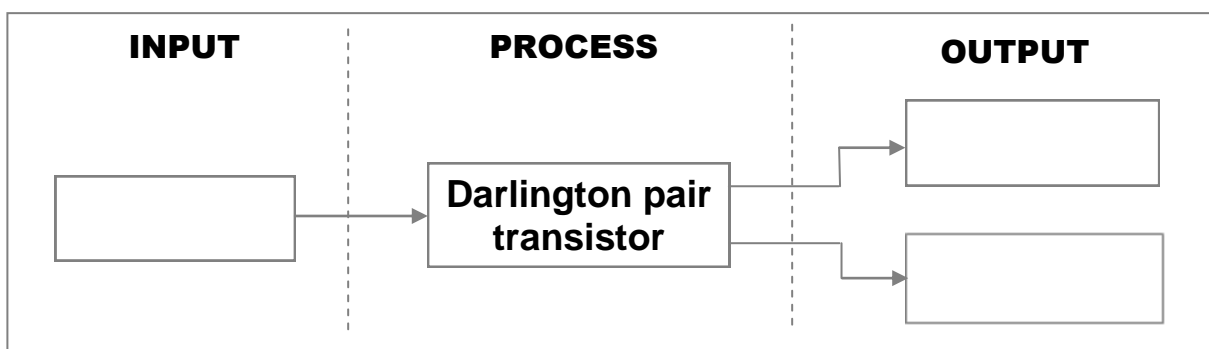
INPUT	PROCESS	OUTPUT
	Darlington pair transistor	

Figure D

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a. Give the name of the type of diagram shown in **Figure D**. _____

b. Fill in the empty boxes on **Figure D** to form a complete design idea for the au[to]
ventilation system.

<div align="right">

½ mark × 4 = 2 mark[s]

</div>

13. **Figure E** shows the INPUT circuit used for the automatic ventilation system and the data for the LDR.

a. What is the circuit shown in **Figure E** called?

_____

½ mark

b. Is R1 connected in series or in parallel with the LDR?

_____

½ mark

c. Calculate V_{OUT} when there is no light on the LDR.

_____

_____

_____

2 marks

d. The company decided to have a variable control for V_{OUT}. Add components to the electronic circuit shown in **Figure F** to show how this is possible.

3 marks

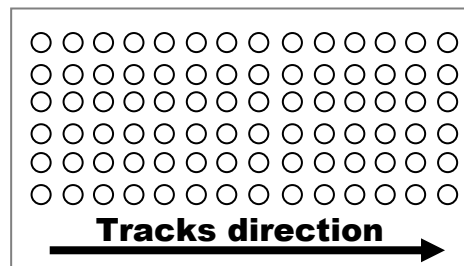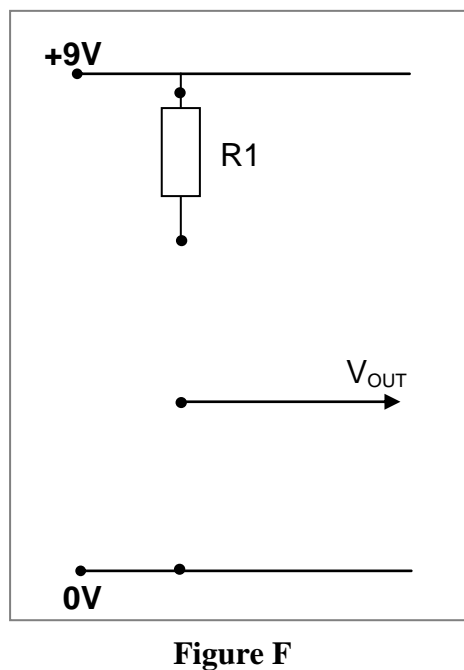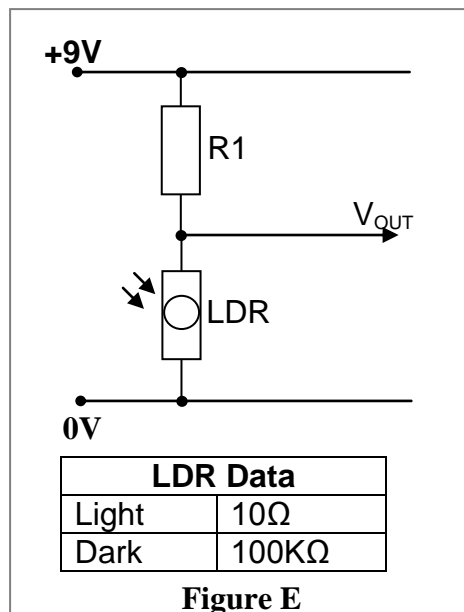**e.** What type of board is shown in **Figure G**?

_____

1 mark

f. Connect the circuit shown in **Figure E** on the board shown in **Figure G**.

2 marks

g. What tool is used to solder the components on the board shown in **Figure G**?

_____

1 mark

+9V

R1

V_{OUT}

LDR

0V

LDR Data	
Light	10Ω
Dark	100KΩ

Figure E

+9V

R1

V_{OUT}

0V

Figure F

Tracks direction

Figure G

14. **Figure H** shows the PROCESS circuit used for the automatic ventilation system. The circuit consists from TR1 and TR2 to form a Darlington pair.

   a. State why the design uses a Darlington pair rather than a

   single transistor. _____

   1 mark

   b. On **Figure H** show how the input circuit shown in **Figure E** is to be connected to the Darlington pair transistors. *In your answer do not include the source of electrical energy.*   **2 marks**
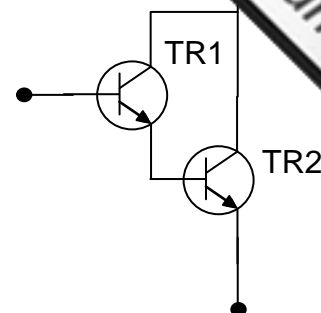

Figure H

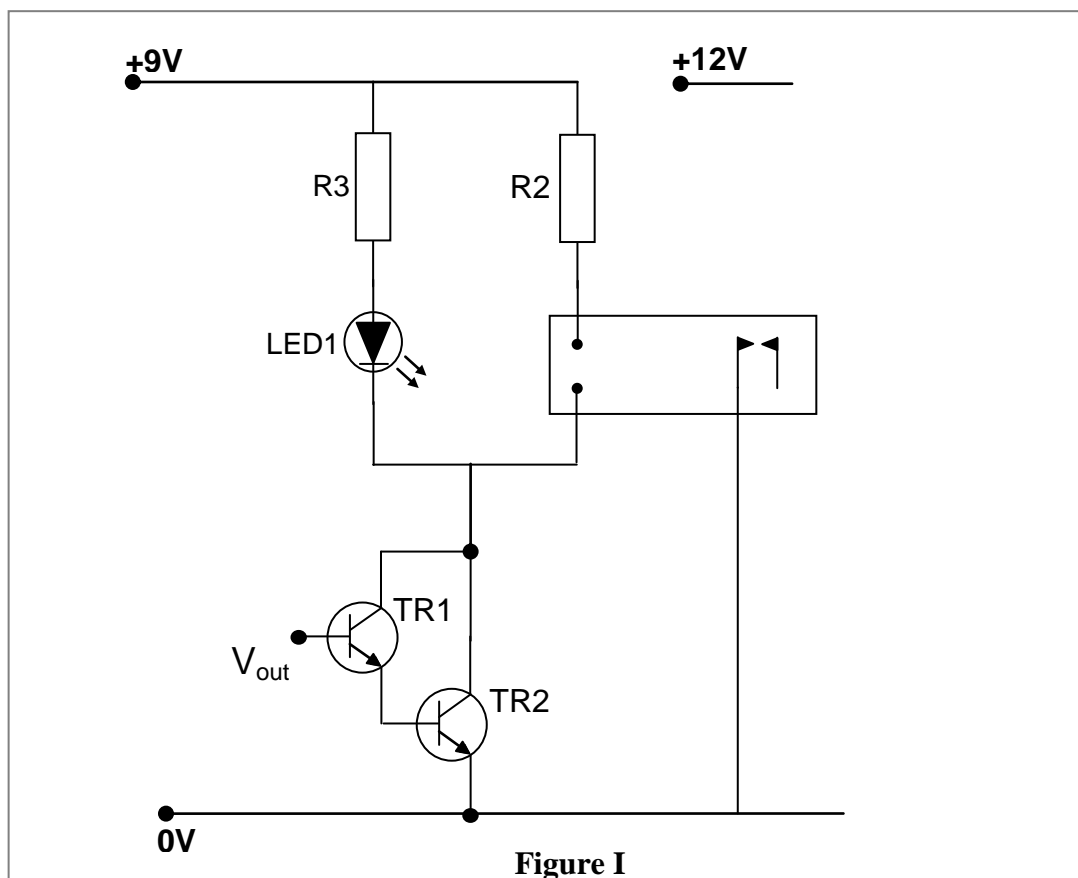15. **Figure I** shows the electronic circuit used for the OUTPUT stage.

Figure I

   a. The relay used to switch on the motor needs 6V; 35mA to be energized. Hence, calculate the value of R2.

   _____

   _____

   _____

   2 marks

   b. On **Figure I** draw the 12V d.c. motor connected to the relay.   **2 marks**

SECTION D: **Food**

Pastry products in take away outlets are very popular and sell well; however the manufactur[er] of these products would like to introduce flavoured pastry to increase the sales.

16. **a.** What are the THREE main ingredients in pastry?

▪ _____   ▪ _____

▪ _____

1 mark × 3 = 3 marks

b. List TWO flavourings that can be added to the pastry.

▪ _____   ▪ _____

1 mark × 2 = 2 marks

17. Mention ONE skill you have learnt in pastry making.

_____   **1 mark**

18. What method do we use to make the pastry?

_____   **1 mark**

19. What do you add to the dry mixture to form the dough?

_____   **1 mark**

20. State whether the following statements are TRUE or FALSE.

a.	Keep ingredients, utensils and hands as cool as possible.	
b.	Sieve flour to add air so that the pastry remains light.	
c.	Work slowly so that the fat softens and the pastry becomes greasy.	
d.	For short crust pastry the ratio of the flour to fat is 2:1.	
e.	Roll out pastry on a warm surface.	
f.	Pastry and pastry products cannot be frozen.	

½ mark × 6 = 3 marks

21. Suggest ONE savoury and ONE sweet filling both rich in iron you would use to fill your pastry keeping in line with dietary guidelines.

a.	**SAVOURY FILLING**	
b.	**SWEET FILLING**	

1 mark × 2 = 2 marks

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22. Fill in the table below with sensory descriptors after evaluating the characteristics
fillings you suggested in question **21**.

Characteristics				
Pie	**Appearance**	**Smell**	**Flavour**	**Texture**
a. SAVOURY				
b. SWEET				

½ mark × 8 = 4 marks

23. **a.** State ONE type of packaging you would use for such pies.

_____ **1 mark**

b. Give ONE advantage and ONE disadvantage of the chosen packaging.

ADVANTAGE: _____

DISADVANTAGE: _____

1 mark × 2 = 2 marks

SECTION E: **Textiles**

A designer came up with the design of the dish cosy shown in **Figure J**. A dish cosy helps to keep
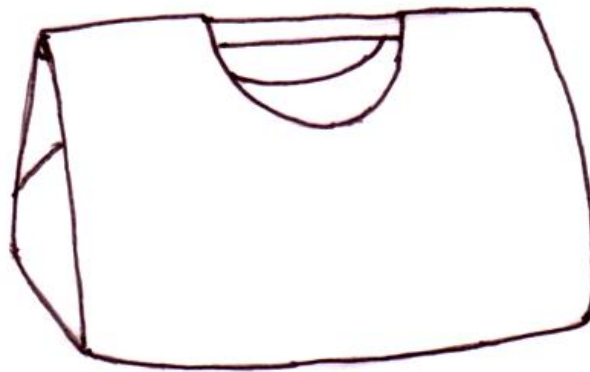food warm during travel.

Figure J

24. Explain why woollen fibre fabrics are more suitable to be used in the making up of the dish
cosy.

_____

_____

_____

3 marks

25. State TWO ways for giving shape to the dish cosy.

▪ _____   ▪ _____

26. Suggest a textile product which can be recycled and/or reused in the manufacture of the dish cosy.

_____

3 marks

27. Give THREE methods by which the dish cosy can be coloured and decorated.

▪ _____   ▪ _____

▪ _____

1 mark × 3 = 3 marks

28. The dish cosy should be securely fastened. Suggest THREE fasteners that can be applied.

▪ _____   ▪ _____

▪ _____

1 mark × 3 = 3 marks

29. a. Give TWO reasons for applying overlock stitch to the edge of your dish cosy.

▪ _____

▪ _____

1 mark × 2 = 2 marks

b. Name and sketch TWO alternative methods which can replace the overlock stitch.

NAME: _____	**NAME:** _____

2 marks × 2 = 4 marks