# 1.5 Paper, Board and Packaging

AQA 8552 · Calculator allowed · about 40 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

**Answer ALL questions.**

**1** A designer is choosing paper for an information leaflet. A sample has a mass of 120 g and an area of 2.0 m². Calculate its grammage in g/m2.

**(a)** Calculate the grammage. **(2)**

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**(Total for Question 1 is 2 marks)**

**2** A packaging trial records the following compression force before the sides buckle. Sample A: 42 N, 45 N, 43 N. Sample B: 51 N, 48 N, 50 N. Calculate the mean for each and select a sample for a package expected to carry 47 N.

**(a)** Calculate both means and make a selection. **(4)**

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**(Total for Question 2 is 4 marks)**

**3** A company is reducing packaging waste. Explain two ways to reduce material use while keeping a package fit for purpose.

**(a)** Explain two approaches. **(3)**

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**(Total for Question 3 is 3 marks)**


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**4** A paperboard pack uses 36 g of board. A redesign uses 30 g and still passes the stated protection test. Calculate the percentage reduction in board mass and state one further check before adopting it.

**(a)** Calculate the percentage reduction and name a further check. **(3)**

**(Total for Question 4 is 3 marks)**

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**5** A packaging paper sample absorbs 18 g of water in a test. Explain one property this result suggests and one packaging use where that property may matter.

**(a)** Explain your answer. **(2)**

**(Total for Question 5 is 2 marks)**

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**6** A small product needs a lightweight but stiff paperboard sleeve. State one property of paperboard that makes it suitable and explain how the property helps.

**(a)** Answer the question. **(2)**

**(Total for Question 6 is 2 marks)**

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**7** A 240 mm by 160 mm carton blank is made from a sheet measuring 300 mm by 200 mm. Calculate the material utilisation as a percentage.

**(a)** Calculate the percentage utilisation. **(3)**

**(Total for Question 7 is 3 marks)**


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**8** A box must protect a 500 g glass item during short-distance delivery. Compare a folded corrugated board insert with a flat single sheet of board as a protective structure.

**(a)** Give a justified selection. **(3)**

**(Total for Question 8 is 3 marks)**

**9** A prototype package has a glued lap joint that opens after being handled. Give two changes that could improve the joint.

**(a)** Give two changes and explain how they help. **(2)**

**(Total for Question 9 is 2 marks)**

**10** A coated paper package is printed with a design and then varnished. Explain one reason for each finishing process.

**(a)** Explain the purposes. **(2)**

**(Total for Question 10 is 2 marks)**


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**11** A package has an internal length of 180 mm. The product is 172 mm long and requires 3 mm clearance at each end. Decide whether it fits and show the clearance calculation.

**(a)** Decide whether it fits. **(2)**

**(Total for Question 11 is 2 marks)**

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**12** A shop wants a paper bag for dry groceries. Explain why a handle attachment and the bag material should be selected together.

**(a)** Give a justified explanation. **(3)**

**(Total for Question 12 is 3 marks)**


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# Mark scheme · 1.5 Paper, Board and Packaging

## Question 1

(a) 120 / 2.0 **M1**

(a) 60 g/m2 cao **A1**

**(a) Answer: 60 g/m2**

## Question 2

(a) A: (42+45+43)/3 **M1**

(a) A mean = 43.3 N **A1**

(a) B: (51+48+50)/3 **M1**

(a) B mean = 49.7 N and selects B against 47 N **A1**

**(a) Answer: A mean = 43.3 N; B mean = 49.7 N. Select B because its mean exceeds 47 N, while noting one trial or a design safety margin may still matter.**

## Question 3

(a) first valid strategy with an explanation of how it reduces material use; accept any defensible approach **B1**

(a) explains how the package remains fit for purpose, or how this is checked, for the proposed reduction or reductions **B1**

(a) second distinct valid strategy with an explanation of how it reduces material use; a trade-off alone does not earn this mark **B1**

**(a) Answer: Reduce excess package dimensions so less board is needed around the product. Use folds or ribs to provide stiffness with thinner board, reducing board mass. Check that both changes preserve the required protection through testing. Accept any two distinct defensible approaches with explanations.**

## Question 4

(a) mass saved = 36 - 30 = 6 g; percentage = 6/36 x 100 **M1**

(a) 16.7% (accept 16.67%) **A1**

(a) one relevant further performance or production check **B1**

**(a) Answer: (36 - 30) / 36 x 100 = 16.7%. Further check: confirm the pack remains suitable in storage, transport, opening, printing, or production.**

## Question 5

(a) identifies that the paper is absorbent because it takes up water; no comparison of absorbency is required **B1**

(a) links absorbency to a relevant packaging requirement or limitation **B1**

**(a) Answer: The paper is absorbent; this matters if packaging must take up moisture, though it would be unsuitable as a moisture barrier.**

## Question 6

(a) valid paperboard property such as stiffness or low mass **B1**

(a) explains how it supports the sleeve requirement **B1**

**(a) Answer: Paperboard can be stiff while remaining light, helping the sleeve retain shape without adding much mass.**

## Question 7

(a) blank area = 240 x 160 = 38 400 mm² **M1**

(a) sheet area = 300 x 200 = 60 000 mm²; utilisation = 38 400 / 60 000 x 100 **M1**

(a) 64% cao **A1**

**(a) Answer: 64%**

## Question 8

(a) selects a structure **B1**

(a) links its shape or construction to cushioning, spacing or load distribution **B1**

(a) uses the stated glass/delivery need or recognises a relevant limitation **B1**

**(a) Answer: A folded corrugated insert is a defensible choice because its flutes and shaped folds can absorb impact and hold the glass away from the outer wall. A carefully shaped single sheet could also be justified for a lower impact risk.**

## Question 9

(a) first defensible change with an explanation of how it improves the joint, such as increasing the overlap to increase the bonded area; accept any defensible change and explanation **B1**

(a) second distinct defensible change with an explanation of how it improves the joint; an explanation of the first change alone does not earn this mark **B1**

**(a) Answer: Increase the overlap to provide a larger bonded area. Allow the adhesive its required setting time before handling so that the bond develops strength. Accept any two distinct defensible changes with explanations.**

## Question 10

(a) valid purpose of printing **B1**

(a) valid purpose of varnish **B1**

**(a) Answer: Printing adds graphics or information; varnish can protect the printed surface or change its appearance.**

## Question 11

(a) 180 - 172 = 8 mm spare; centred clearance = 8 / 2 = 4 mm per end **M1**

(a) yes, because 4 mm is at least 3 mm **A1**

**(a) Answer: Yes. 180 - 172 = 8 mm spare, giving 4 mm at each end if centred, which exceeds 3 mm.**

## Question 12

(a) identifies strength/tear resistance as relevant **B1**

(a) explains force concentration at handle attachment and a way to spread/reinforce it **B1**

(a) links selection to load or use conditions; allow any defensible option **B1**

**(a) Answer: The paper must resist tearing under the load, while the handle attachment spreads force over enough area. Reinforcement or a suitable folded/glued attachment can reduce local stress; the final choice should suit the expected load.**


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