1.8 Design, testing and production: 10-minute Pack

AQA 8552 · Calculator allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions.

1 A community workshop needs a folding stool for users aged 12 to 16. Brief: carryable and stable on level indoor floors. Specification: seat height 430 mm, mass at most 2.8 kg, supports 900 N for 60 seconds, folds to a maximum thickness of 85 mm. A plywood prototype weighs 3.1 kg, folds to 92 mm and supports 1,050 N for 60 seconds without permanent bending. Suggest two justified design improvements.

(Total for Question 1 is 4 marks)

2 A portable display stand is made from 1.2 kg of aluminium and lasts 8 years in a client trial. A proposed recycled-plastic version uses 0.8 kg but lasts 3 years and cannot be repaired; both use the same delivery distance. Evaluate the trade-off and recommend a version for a client prioritising long service life and lower material use.

(Total for Question 2 is 4 marks)

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Mark scheme · 1.8 Design, testing and production: 10-minute Pack

Question 1

Suggests a mass reduction, such as cut-outs or optimised sections, while preserving load paths.	**B1**
Links that change to the 3.1 kg prototype exceeding the 2.8 kg maximum.	**B1**
Suggests changing the hinge or leg geometry, or adding a folding stop, to reduce folded thickness.	**B1**
Links that change to the 92 mm prototype exceeding the 85 mm maximum; recognises the 1,050 N support test already passes.	**B1**

Answer: Reduce mass with cut-outs or thinner/optimised sections while retaining load paths, because prototype exceeds 2.8 kg. Alter hinge/leg geometry or add a positive folding stop so folded thickness is 85 mm or less. Support test already passes; retain strength.

Question 2

States that the recycled-plastic version uses 0.4 kg less material initially (1.2 - 0.8 = 0.4 kg).	**B1**
Compares service life: recycled plastic lasts 3 years versus 8 years for aluminium, or 3/8 as long.	**B1**
Explains that the plastic version cannot be repaired, so replacement may increase material use over the service life.	**B1**
Recommends aluminium for the stated priority of long service life and weighs this against the lower initial material mass of plastic.	**B1**

Answer: Recycled plastic uses 0.4 kg less material, but lasts only 3/8 as long and is not repairable, so replacement may increase lifetime material use. Aluminium better meets service life; repair or use recycled content if available. Recommendation depends on priority, with life-cycle duration and repairability weighed against lower initial mass.

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