Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

primary: data you collect yourself, e.g. counting bikes at the gate / interviewing cyclists; secondary: data others collected, e.g. a bike-rack standard or a website on bike sizes

2.2

a load with a number and unit, e.g. holds 150 N; a condition, e.g. for 1 minute without breaking or permanent bending; test: hang weights, measure the bend before and after

2.3

X: $4 \times 3 + 3 \times 2 + 5 \times 1 = 23$; Y: $3 \times 3 + 5 \times 2 + 2 \times 1 = 21$; choose X, the higher weighted total

2.4

a criterion that cannot fail does not test anything / gives no evidence; a measurable criterion shows whether the product works and what to improve

2.5

shows each task as a bar against time, so the order, overlaps and deadlines are clear; the student can see early if they are falling behind and change the plan

3.1

(a) folds flat to 25 mm or less (32 mm); comfort, 8 of 10 users (only 6 of 10)

(b) the ¥36 covers materials only; labour, energy and finishing were not counted, so the full cost may be over ¥40

(c) only 10 users, so the result may not represent all students; a short test, so it does not show comfort over a long study session; users may be friends who rate it kindly, or tested in one setting

(d) any two, linked to evidence: thinner legs or a hinge that folds the legs inside the top, because it folded to 32 mm, not 25 mm; a slightly angled top or a lip to stop the laptop sliding, because only 6 of 10 users were comfortable; cost every part including labour to check the ¥40 target

(e) award up to [7]: strength met: held 50 N with full recovery; the three heights 80 to 150 mm met; mass met at 540 g, so it is easy to carry; but it did not fold flat enough to fit in a bag, which is a key need for students; comfort below target (6 of 10), so the main user need is only partly met; cost not fully verified; judgement: partly successful: strong and adjustable, but needs redesign of the folding and the top, then retesting with more users

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