Criteria and Constraints

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

A design constraint is a requirement a design must meet. A preference can help rank the designs that satisfy all constraints.

1 A sample rack must fit in an opening 25 cm wide. Which statement expresses that constraint?

(1) The rack should cost as little as possible.

(2) The rack should be the lightest available.

(3) The rack width must be no more than 25 cm.

(4) The rack should be easy to label.

2 Two designs meet all requirements. One is lighter and the other is cheaper. Explain what information would help choose between them. [1]

Answer and work

3 A design costs the least but fails a required stability test. What should the team do when choosing among tested designs?

(1) Choose it because it costs the least.

(2) Exclude it from designs that meet all constraints.

(3) Ignore stability whenever cost differs.

(4) Average the stability and cost numbers without units.

4 A report gives the cost of a design but omits its maximum safe load. Explain why the report is insufficient if safe load is a constraint. [1]

Answer and work

Prototype Sample Holders

Use the information below to answer the questions.

A lab compares three sample holders. A holder must support at least 4.0 kg and fit within a 30 cm width. Among holders that meet both requirements, the lab prefers the lowest cost.

Holder	Maximum supported load (kg)	Width (cm)	Cost
A	5.0	28	$12
B	3.8	26	$8
C	4.0	30	$10

5 Which holders satisfy both requirements?

(1) A only

(2) B only

(3) A and C

(4) B and C

6 Choose a holder. Use the table to explain how it meets the requirements and the cost preference. [1]

Answer and work

7 If the width limit changes to 29 cm, which holder meets the revised width requirement and the original load requirement?

(1) A

(2) B

(3) C

(4) None

8 Identify one improvement that would make holder B meet the original requirements. State the minimum measured value needed. [1]

Answer and work