

Max's Engineering Challenge: Master of Structures

Learning objective: To identify, test, and explain the properties of materials and strengthening techniques used in structural design.

Help Max the monkey solve these structural puzzles! Read each question carefully and select the best answer or provide a brief explanation. Remember, a strong structure is all about balance and stability.

Answer Key: 1.C, 2.True, 3.Triangulation, 4.B, 5.False, 6.Compression, 7.A, 8.True, 9.Foundation, 10.D.

Explanations for questions 5 and 7 involve understanding that triangles provide rigid geometry while squares can collapse without diagonal support.

Word bank: Compression · Tension · Triangulation · Reinforcement · Stability · Composite · Strut · Foundation

1. Which of these shapes is most commonly used by engineers to create rigid, non-collapsible frameworks? A) Square, B) Circle, C) Triangle*, D) Pentagon (1 mark)

2. True or False: A structure's foundation is responsible for distributing its weight evenly into the ground. (1 mark)

3. What is the name of the process where diagonal supports are added to a frame to prevent it from changing shape? (1 mark)

4. When you squash a sponge, what force are you applying? A) Tension, B) Compression*, C) Shear, D) Torsion (1 mark)

5. True or False: A simple square frame is naturally stronger than a frame reinforced with cross-bracing. (1 mark)

6. Fill in the blank: A vertical support used to hold up a roof is often called a _____. (1 mark)

7. Why do engineers use 'corrugated' cardboard for packaging instead of flat sheets? A) To increase strength and rigidity*, B) To make it cheaper, C) To change the colour, D) To make it lighter (1 mark)

8. True or False: A 'composite' material is made by combining two or more different materials to improve their overall properties. (1 mark)

9. If you were building a bridge across a river, what is the most important factor to consider for the base? (1 word) (1 mark)

10. Which material would be best for constructing a tall, lightweight, yet rigid tower? A) Soft clay, B) Thick paper, C) Dry spaghetti, D) Aluminium struts* (1 mark)

Draw: Draw a bridge design that uses at least three triangles to support a heavy load. Label the 'struts' and the 'foundation'.



Extension challenge: Max has been given a budget of £50 to build a model bridge. Explain why choosing the right material is a balancing act between cost, durability, and strength. Justify your choice of materials if you were tasked with building a bridge to support a 1kg weight.