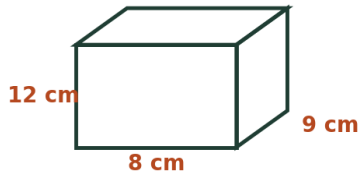
3D Pythagoras and Trigonometry

Grade 7 topic · Higher tier · Edexcel and AQA

How to use this pack
20 questions that get harder as you go. Questions 1–15 (65 marks) build up to the harder Grade 8–9 style questions at the end; aim to complete all 20. Show your working on the lines and write your final answer on the answer line, then mark yourself with the answers at the back. Diagrams are not drawn accurately. Total: 91 marks.

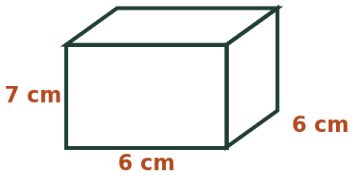
Warm-up

1 The diagram shows a cuboid. Work out the length of the diagonal of the base. Give your answer to 3 s.f. **[3 marks]**



Answer _____

2 The diagram shows a cuboid. Work out the length of the space diagonal. Give your answer to 3 s.f. **[4 marks]**



Answer _____

3 A cuboid is 3 cm by 4 cm by 12 cm. Work out the length of its space diagonal to 3 s.f. **[4 marks]**

Answer _____

4 A cube has side 4 cm. Work out the length of its space diagonal in the form a√3. **[3 marks]**

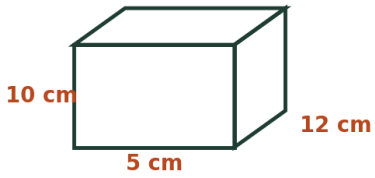
Answer _____

5 A room is 6 m by 6 m by 7 m. Work out the length of the longest straight rod that fits in it, to 3 s.f. **[4 marks]**

Answer _____

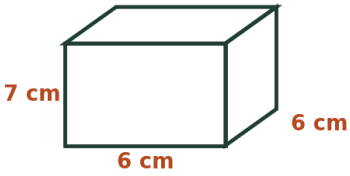
Core

6 The diagram shows a cuboid. Work out the angle between the space diagonal and the base, to 1 d.p. **[5 marks]**



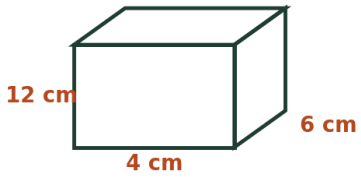
Answer _____

7 The diagram shows a cuboid. Work out the angle between the diagonal of the base and the side of length 6 cm, to 1 d.p. **[4 marks]**



Answer _____

8 Work out the angle between the space diagonal and the vertical edge (12 cm), to 1 d.p. **[5 marks]**



Answer _____

9 A cuboid is 3 cm by 4 cm by 12 cm. Work out the angle between the base diagonal and the space diagonal, to 1 d.p. **[5 marks]**

Answer _____

10 Work out the angle the space diagonal makes with the longest edge, to 1 d.p. **[5 marks]**

Answer _____

Stretch

11 A square-based pyramid has base side 6 cm and vertical height 5 cm. Work out the length of a sloping edge to 3 s.f. **[5 marks]**

Answer _____

12 A square-based pyramid has base side 10 cm and vertical height 6 cm. Work out the angle between a sloping edge and the base, to 1 d.p. **[5 marks]**

Answer _____

13 A square-based pyramid has base side 6 cm and sloping edge 8 cm. Work out the vertical height to 3 s.f. **[5 marks]**

Answer _____

14 The base of a pyramid is a square of side 6 cm. Work out the slant height of a triangular face if the vertical height is 5 cm, to 3 s.f. **[5 marks]**

Answer _____

15 A square-based pyramid has base side 10 cm and vertical height 5 cm. Work out its volume to 3 s.f. **[3 marks]**

Answer _____

Challenge

16 A cuboid ABCDEFGH has AB = 6, BC = 8 and AE = 10. Work out the angle between AG and the plane ABCD, to 1 d.p. **[6 marks]**

Answer _____

17 A ladder of length 16.4 m just fits diagonally in a box. Show that the box could be 5 m by 12 m by 10 m. **[5 marks]**

Answer _____

18 A tent is a triangular prism. Work out the length of the diagonal of the box with these dimensions 6, 8, 10 to 3 s.f. **[4 marks]**

Answer _____

19 Show that the space diagonal of a cuboid with sides a, b, c has length $\sqrt{(a^2 + b^2 + c^2)}$. **[5 marks]**

Answer _____

20 The angle between the space diagonal of a cube and the base is x. Show that tan x = 1/√2. **[6 marks]**

Answer