Solutions

Marking: **M1** a correct method, **A1** the correct answer.

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

2.1

- $\sqrt{6^2 + 8^2} = \sqrt{100}$

$$= \mathbf{10} \text{ cm}$$

2.2

- use the base diagonal 10 cm with the height 10 cm
- $\sqrt{10^2 + 10^2} = \sqrt{200}$

$$= 14.142\ldots = \mathbf{14.1} \text{ cm}$$

- equivalently $\sqrt{6^2 + 8^2 + 10^2}$ in one line

2.3

- the triangle has the base diagonal 10 cm and the height 10 cm, with the right angle between them
- $\tan\theta = \dfrac{10}{10} = 1$

$$\theta = \mathbf{45.0}^\circ$$

2.4

- space diagonal $= \sqrt{5^2 + 5^2 + 5^2} = \sqrt{75}$

$$= 8.660\ldots = \mathbf{8.66} \text{ cm}$$

2.5

- space diagonal $= \sqrt{3^2 + 4^2 + 12^2} = \sqrt{169}$

$$= \mathbf{13} \text{ cm}$$

3.1

(a)

- the base diagonal $= \sqrt{10^2 + 10^2} = \sqrt{200} = 14.142\ldots$ cm
- the centre is halfway along it

$$14.142 \div 2 = \mathbf{7.07} \text{ cm}$$

(b)

- the slant edge, the height and the half-diagonal form a right-angled triangle
- slant $= \sqrt{12^2 + 7.071^2} = \sqrt{194}$

$$= 13.928\ldots = \mathbf{13.9} \text{ cm}$$

(c)

- $\tan\theta = \dfrac{12}{7.071}$

$$\theta = 59.49\ldots = \mathbf{59.5}^\circ$$

- the horizontal side is the HALF-diagonal, not the full one and not the side of the square

3.2

- the diagonal of the field $= \sqrt{30^2 + 40^2} = 50$ m
- $\tan\theta = \dfrac{\text{opposite}}{\text{adjacent}} = \dfrac{8}{50}$

$$\theta = \mathbf{9.1}^\circ$$

3.3

- the longest straight line in the box is the space diagonal: $\sqrt{30^2 + 20^2 + 15^2} = \sqrt{1525}$
- $\sqrt{1525} = 39.05$ cm
- $39.05 < 40$, so **no**, the stick does not fit

3.4

(a)

- base diagonal $= \sqrt{8^2 + 6^2} = 10$ cm, so the centre is 5 cm from each corner
- height $h = \sqrt{13^2 - 5^2} = \sqrt{144}$

$$h = \mathbf{12} \text{ cm}$$

(b)

- the slant edge, the half-diagonal and the height form a right-angled triangle: $\cos\theta = \dfrac{5}{13}$

$$\theta = \mathbf{67.4}^\circ$$