3D 三角學練習 / 3D trigonometry

SketchMath 原創中英練習 / Original bilingual practice · Not official HKEAA papers

以下三題使用同一個 3 × 4 × 12 長方體。先找出投影，再選直角三角形；角度答案以度表示。
The three questions use a cuboid with base sides 3 and 4 and vertical height 12. Identify the projection before choosing a right triangle; give angles in degrees.

1.

求長方體底面的對角線長度。
Find the diagonal of the cuboid’s base.

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_____

2.

求連接兩個相對頂點的體對角線長度。
Find the space diagonal joining opposite vertices.

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_____

3.

求體對角線與底面的夾角 θ。
Find the angle θ between the space diagonal and the base plane.

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_____

答案及詳解 / Worked solutions

1.

1. $d^2 = 3^2 + 4^2 = 25$。
   $d^2 = 3^2 + 4^2 = 25$.
2. 長度取正根。
   Take the positive root for a length.

5。
5.

2.

1. $D^2 = 5^2 + 12^2 = 169$。
   $D^2 = 5^2 + 12^2 = 169$.
2. 也可直接寫 $3^2 + 4^2 + 12^2$。
   Equivalently use $3^2 + 4^2 + 12^2$.

13。
13.

3.

1. 投影長 5，垂直高度 12，所以 $\tan\theta = 12/5$。
   The projection has length 5 and the vertical height is 12, so $\tan\theta = 12/5$.
2. 使用度數模式：$\theta = \arctan(12/5)$。
   In degree mode: $\theta = \arctan(12/5)$.

$\theta \approx 67.38°$。
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