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| **Topic 3: Geometry and Trigonometry** | **3D Plane** |
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| Dan is building a wood container in the shape of a rectangular prism to store his swimming pool equipment. He created the diagram below on his laptop to help with the appropriate dimensions. The finished dimensions will be in feet.  z Diagram not to scale. K L  N M O P R y  Q xFor the prism above, O is at the origin of the xyz-axes and the following coordinates are known: R(2, 0, 0), P(0, 4, 0), and L(0, 4, 3).(a) Dan needs to build supports into the lid so that the container will also act as a seat. Find the distance from K to M. (b) Dan also wants to make sure that the cross supports in the lid meet one another at their midpoint. Find the midpoint of LN. (c) Dan has a skimmer pole that is 5 ft. long; decide if it will fit into the container. Explain your reasoning.  | [2 marks][2 marks][2 marks] |
| Mark scheme:(a) Finding points K(0, 0, 3) and M(2, 4, 3) and using the distance formula $d=\sqrt{\left(2-0\right)^{2}+ \left(4-0\right)^{2}+ \left(3-3\right)^{2}}$ $d= \sqrt{20 }≈4.47 ft.$(b) Finding points L(0, 4, 3) and N(2, 0, 3) and using the midpoint formula $midpoint= \left(\frac{0+2}{2}, \frac{4+0}{2}, \frac{3+3}{2}\right)$ $midpoint= \left(1, 2, 3\right)$(c) One possibility is finding points 0(0, 0, 0) and M(2, 4, 3) and using the distance formula (other diagonals can be used) $d=\sqrt{\left(2-0\right)^{2}+ \left(4-0\right)^{2}+ \left(3-0\right)^{2}}$ $d= \sqrt{29 }≈5.39 ft.$ Yes, the pole can fit into the container diagonally as the distance from 0 to M is greater than 5 ft.  | (M1) A1 [2 marks] (M1)  A1[2 marks] (M1) R1 [2 marks] |
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