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| **Topic 3: Geometry and Trigonometry** | **Bearings**  |
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| 1. Rachael is flying from Ohio (O) to Dallas (D) with a layover in Baltimore (B). This is displayed in the diagram below.

 N  *Not to scale.* O  B    D Her flight leaves Ohio on a bearing of 100° and travels 650 km to Baltimore. After changing planes in Baltimore, Rachael’s flight leaves for Dallas on a bearing of 235° and travels 2200 km.  (a) Find $O\hat{B}D$.  (b) (i) If Rachael had found a direct flight from Ohio to Dallas,  find the distance of that flight. (ii) Find the bearing of that direct flight to Dallas from Ohio.  |  (2 marks) (2 marks) (3 marks) |
|  Mark scheme:1. Methods vary.

 $180°-100°=80°$ $360°-235°-80°=45°$ $O\hat{B}D=45°$ N N  100° *Not to scale.* O 80° 650 km B 45°  235°  2200 km   D 1. (i) Using the Cosine rule

 $OD^{2}= 650^{2}+ 2200^{2}-2∙650∙2200\cos(45°)$ $OD=1800.049 ≈1800 km$ (ii) Finding $D\hat{O}B$ Sine rule: $\frac{2200}{\sin(D\hat{O}B)}= \frac{1800}{\sin(45°)}$  $D\hat{O}B ≈59.8°$, but needing to find a quadrant 2 angle, $180°-59.8°=120.2°$ **or**   Cosine rule: $\cos(D\hat{O}B)= \frac{650^{2}+ 1800^{2}- 2200^{2}}{2∙650∙1800}$ $D\hat{O}B= 120.2°$ Adding this angle to the original bearing of 100°, $100°+120.2°=220.2° ≈220°$  is the bearing from Ohio to Dallas. |   (M1) (A1)  (M1) (A1) (M1) (A1) (A1) |