| | | | | | |
|---|---|---|---|---|---|
| **22** | $9^2 = 11^2 + 16^2 - 2 \times 11 \times 16 \times \cos BCA$ oe or<br>$11^2 = 9^2 + 16^2 - 2 \times 9 \times 16 \times \cos BAC$ or<br>$16^2 = 9^2 + 11^2 - 2 \times 9 \times 11 \times \cos ABC$ or<br>(area of $\triangle ABC =) \sqrt{18 \times 2 \times 7 \times 9} (= 47.6235...)$ oe | | 5 | M1 | For a start to the correct method to find angle *BCA* or angle *BAC* or angle *ABC* or a fully correct method to find the area of the triangle |
| | $(\cos BCA =) \left( \frac{11^2 + 16^2 - 9^2}{2 \times 11 \times 16} \right) (BCA = 32.763...)$ or<br>$(\cos BAC =) \left( \frac{9^2 + 16^2 - 11^2}{2 \times 9 \times 16} \right) (BAC = 41.409...)$ or<br>$(\cos ABC =) \left( \frac{9^2 + 11^2 - 16^2}{2 \times 9 \times 11} \right) (ABC = 105.826...)$ or<br>$\frac{1}{2} \times 16 \times BD = "47.6235..."$ | | | M1 | For a correct rearrangement for cos*BCA* or cos*BAC* or cos*ABC* or a correct equation to find *BD*<br>(accept angles to the nearest whole number rounded or truncated as long as not from incorrect working) |
| | (*BD* = ) 11 sin"32.763..."(= 5.95...) oe eg<br>11 sin(180 – "41.4…" – 105.8…") (= 5.95…) or<br>9 sin"41.4…." (= 5.95…) oe or<br>$\frac{"47.6235..." \times 2}{16} (= 5.95...)$ oe or $\sqrt{11^2 - "9.25"^2}$ or $\sqrt{9^2 - "6.75"^2}$<br>$11 \sin\left( \sin^{-1}\left( \frac{9 \sin "105.826..."}{16} \right) \right)$ (= 5.95…) oe | | | M1 | For a correct calculation that will lead to the value of *BD*<br>"47.6235…" may also come from<br>0.5 × 9 × 11 × sin"105.8…" or<br>0.5 × 9 × 16 × sin"41.4…" or<br>0.5 × 16 × 11 × sin"32.7…"<br>[Students may find an angle by sine rule after already finding an angle and use this] |
| | $\tan FDB = \frac{10}{"5.95..."}$ oe | | | M1 | For a correct expression for the required angle (in form tan*x* =… or cos*x* =… or sin*x* =… ) oe |
| | *Correct answer scores full marks (unless from obvious incorrect working)* | 59.2 | | A1 | awrt 59.2 |
| | SEE OVER FOR ALTERNATIVE SCHEME | | | | **Total 5 marks** |

Angle *DBC* = 57.237…Angle *ABD* = 48.591…*AD* = 6.75 m  *CD* = 9.25 m

| | | | | | |
|---|---|---|---|---|---|
| **22** | $BD^2 = 11^2 - (16 - y)^2$ and $BD^2 = 9^2 - y^2$ oe | | 5 | M1 | For 2 different expressions in the same single variable for *BD* or $BD^2$ |
| | $11^2 - (16 - y)^2 = 9^2 - y^2$ ($y = 6.75$ or $x = 9.25$) | | | M1 | Equating the 2 expressions |
| | $BD = \sqrt{9^2 - (16 - "9.25")^2}$ or $\sqrt{11^2 - "9.25"^2}$ (= 5.95) | | | M1 | A correct calculation to find BD ("9.25" or "6.75" must come from a correct method) |
| | $\tan FDB = \frac{10}{"5.95..."}$ oe | | | M1 | For a correct expression for the required angle (in form tan*x* =… or cos*x* =… of sin*x* =… ) oe |
| | *Correct answer scores full marks (unless from obvious incorrect working)* | 59.2 | | A1 | awrt 59.2 |
| | | | | | **Total 5 marks** |