



| Q  | Answer                                                                                                                                                                                                      | Marks |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1  | Using the isosceles triangles OAC and OBC, angle $ACB = x + y$ where $2x + 2y = 180$ , so angle $ACB = 90$ degrees                                                                                          | 3     |
| 2  | Triangles OMA and OMB are congruent (RHS), so $AM = BM$ and M is the midpoint of AB                                                                                                                         | 4     |
| 3  | Triangles OAP and OBP are congruent (RHS), so $PA = PB$                                                                                                                                                     | 4     |
| 4  | Extending PO to D and using the exterior angles of the isosceles triangles OAP and OBP gives angle $AOB = 2x + 2y = 2$ angle APB                                                                            | 4     |
| 5  | Both angles equal half of angle AOB by the angle at the centre theorem, so they are equal                                                                                                                   | 4     |
| 6  | The two angles at the centre standing on arcs ADC and ABC sum to 360 degrees and equal 2 angle ABC and 2 angle ADC, so angle ABC + angle ADC = 180 degrees                                                  | 4     |
| 7  | Drawing the diameter AD: angle $TAB = 90 - \text{angle DAB} = \text{angle ADB}$ (angles of right-angled triangle ABD), and angle $ADB = \text{angle ACB}$ (same segment), so angle $TAB = \text{angle ACB}$ | 4     |
| 8  | <b>a)</b> $63^\circ$ <b>b)</b> $73^\circ$                                                                                                                                                                   | 4     |
| 9  | The perpendicular from the centre bisects each chord, so $AM = CN$ ; then Pythagoras (or RHS congruence) in triangles OMA and ONC gives $OM = ON$                                                           | 5     |
| 10 | Let $OAB = y$ . Then $TAB = 90 - y$ (tangent perpendicular to radius), $AOB = 180 - 2y$ (isosceles triangle OAB), $ACB = 90 - y$ (angle at centre is twice angle at circumference). So $TAB = ACB$ .        | 4     |
| 11 | $69^\circ$                                                                                                                                                                                                  | 4     |
| 12 | 97                                                                                                                                                                                                          | 4     |
| 13 | Proof using angles in the same segment (twice) and vertically opposite angles, so the triangles are similar (AA)                                                                                            | 4     |
| 14 | $(90 - \frac{x}{2})^\circ$                                                                                                                                                                                  | 5     |
| 15 | 105                                                                                                                                                                                                         | 4     |
| 16 | $70^\circ$                                                                                                                                                                                                  | 5     |

|    |                                                                                                                                                                             |   |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 17 | Angle TAB = angle ACB (alternate segment theorem). Angle ABC = angle ACB (isosceles triangle ABC). So TAB = ABC, which are equal alternate angles, so TS is parallel to BC. | 4 |
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Full worked solutions, written out by hand, are on the solutions sheet for this topic.