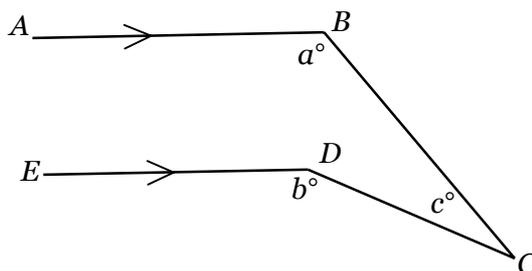


## Adding auxiliary lines: Student worksheet

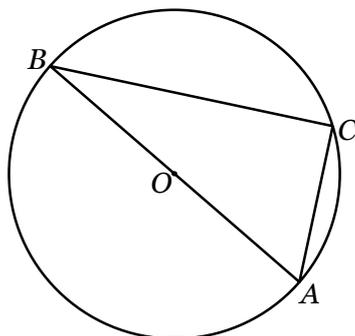
<http://topdrawer.aamt.edu.au/Geometric-reasoning/Misunderstandings/Revealing-the-invisible/Adding-auxilliary-lines>

For each of the problems below it will be necessary to construct auxiliary lines in order to prove the required result.

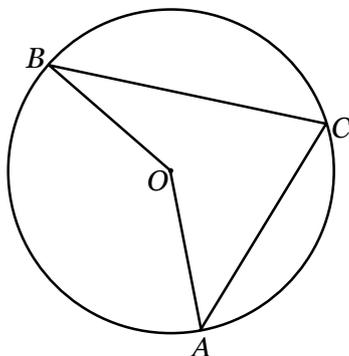
1. In the diagram below,  $AB \parallel ED$ . Prove that  $b = a + c$ .



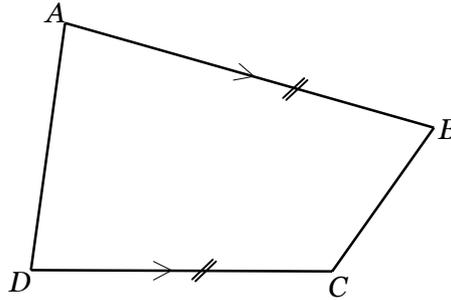
2. Prove that the angle in a semicircle is a right angle. Aim: To prove  $\angle ACB = 90^\circ$ .



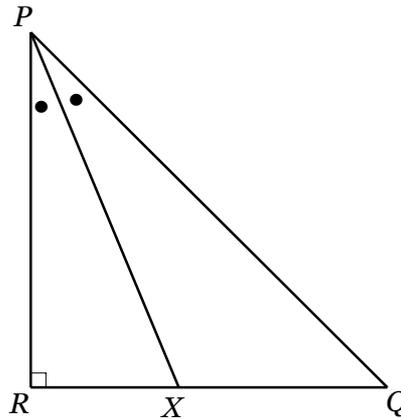
3. Prove that the angle at the centre is twice the angle at the circumference standing on the same arc. Aim: To prove  $\angle AOB = 2 \times \angle ACB$ .



4. In the quadrilateral  $ABCD$ ,  $AB = DC$  and  $AB \parallel DC$ . Prove that  $ABCD$  is a parallelogram.

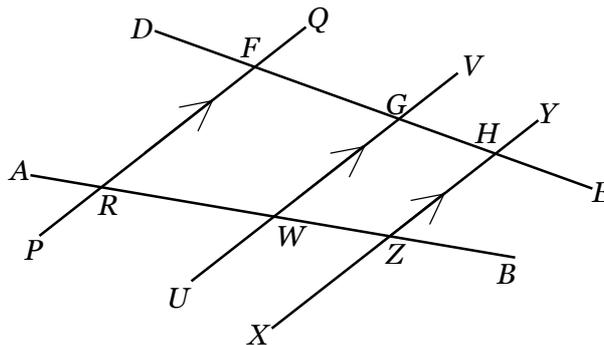


5.  $\triangle PQR$  is right-angled isosceles triangle.  $PX$  bisects  $\angle RPQ$ . Prove that  $PQ = PR + RX$ .



### Challenges

1. The line  $AB$  intersects three parallel lines,  $PQ$ ,  $UV$  and  $XY$  at  $R$ ,  $W$  and  $Z$  respectively. Also, line  $DE$  intersects  $PQ$ ,  $UV$  and  $XY$  at  $F$ ,  $G$  and  $H$  respectively. Prove that  $FG : GH = RW : WZ$ .



2. In  $\triangle PQR$ , the bisector of  $\angle PQR$  meets  $PR$  at  $X$ . Prove that  $\frac{PQ}{QR} = \frac{PX}{XR}$ .

