

# Tangent Challenge

## Student Activity

7 8 9 10 11 12



### Problem Statement

A circle of radius 1 unit is drawn such that it is centred at point  $Q(1, 0)$ .

A square is also drawn with vertices  $A(0, 0)$ ;  $B(2, 0)$ ;  $C(2, 2)$  and  $D(0, 2)$ .

The line  $DP$  passes through  $D$  and is tangent to the circle at point  $P$ . (Shown opposite)

**Aim:** Determine the equation to the line  $DP$ .

#### Question: 1.

Determine the equation to the circle.

#### Question: 2.

Use your circle equation to determine a relationship between  $m$  and  $n$ . [Equation 1]

#### Question: 3.

Determine the gradient of the circle in terms of  $m$  and  $n$  at the point  $P$ .

#### Question: 4.

Determine the gradient of the line  $DP$  in terms of  $m$  and  $n$  by consideration of the  $y$  intercept.

#### Question: 5.

Combine the results from Q4 and Q5 to form a new equation. [Equation 2]

#### Question: 6.

Use simultaneous equations to determine the values of  $m$  and  $n$ , hence determine the equation to the line  $DP$ .

#### Question: 7.

Determine the length of segment  $DP$  and discuss the results from a Geometrical perspective.

