Mathematics **Date: ……………………**

Surds - Extension

1.

In triangle ABC, B is a right angle, $AB = 5 - \sqrt{2}$ and $AC = 5 + \sqrt{2}$. Calculate and simplify $\cos \angle BAC$.

2.

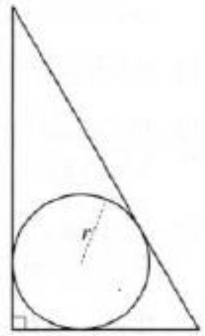
Solve the simultaneous equations $x\sqrt{5} + 2y = 3$ and $x + y = 1$, giving your answers in as simple a form as possible.

3.

A formula for the radius of the circle touching all three sides of a triangle is $r = \frac{2\Delta}{p}$, where Δ is the area of the triangle and p is its perimeter. Find, in as simple a form as possible, the radius of this circle for right-angled triangles having sides

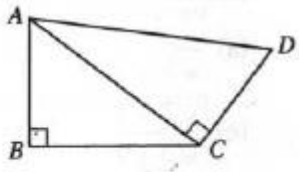
(a) 1 cm, 1 cm, $\sqrt{2}$,

(b) 1 cm, $\sqrt{3}$ cm, 2 cm,



4.

In the diagram, angles ABC and ACD are right angles. Given that $AB = CD = 2\sqrt{6}$ cm and $BC = 7$ cm, show that the length of AD is between $4\sqrt{6}$ cm and $7\sqrt{2}$ cm.



5.

In the triangle PQR, Q is a right angle, $PQ = (6 - 2\sqrt{2})$ cm and $QR = (6 + 2\sqrt{2})$ cm.

(a) Find the area of the triangle.

(b) Show that the length of PR is $2\sqrt{22}$ cm.

6.

It can be shown that $\tan 75^\circ = \frac{\sqrt{3}+1}{\sqrt{3}-1}$. Use a calculator to check this, and write an expression for $\tan 75^\circ$ in the form $a + b\sqrt{3}$, where a and b are rational numbers.

7.

Solve the simultaneous equations $5x - 3y = 41$ and $(7\sqrt{2})x + (4\sqrt{2})y = 82$.

8.

An isosceles right-angled triangle has its two shorter sides of length a. Write down an expression for its perimeter in terms of a.

A length of rope 10 metres long is to be pegged out to form an isosceles right-angled triangle. Find, in as simple a form as possible, exact expressions for the lengths of the sides.