2011

- 3. (a) A circle has equation $x^2 + y^2 = 81$.
 - (i) Write down the co-ordinates of the centre of the circle.
 - (ii) Find the radius of the circle.
 - **(b)** The circle *c* has equation $(x-3)^2 + (y+1)^2 = 17$.
 - (i) Verify that the point (7, -2) is on *c*.
 - (ii) On a co-ordinate diagram, mark the centre of c and draw c.
 - (iii) Find, using algebra, the co-ordinates of the two points at which *c* intersects the *x*-axis.

 \mathcal{A}

R

C

- (c) The points A(-1, 2), B(-3, -4), C(3, -6)and D(5, 0) are the vertices of a square. The sides of the square are tangents to the circle *s*, as shown.
 - (i) Find the co-ordinates of the centre of *s*.
 - (ii) Find the equation of s.
 - (iii) The circle $(x+4)^2 + y^2 = 10$ is the image of *s* under the translation $(p, q) \rightarrow (6, 5)$. Find the value of *p* and the value of *q*.

$\frac{\text{Solution}}{3(a)(i)}$

Circle c with centre (0, 0), radius r.



 $c: x^2 + y^2 = 81$

Centre (0, 0)

3 (a) (ii)

$$r^2 = 81 \Longrightarrow r = \sqrt{81} = 9$$



The *x*-intercepts are (7, 0) and (-1, 0).



3 (c) (iii)

Circle: $(x+4)^2 + y^2 = 10$ Centre: (-4, 0)

To go from O to (-4, 0), you need to subtract 5 from the *x*-coordinate and add 2 to the *y*-coordinate. Do the same to go from (p, q) to (6, 5).

 $p-5=6 \Rightarrow p=6+5=11$ $q+2=5 \Rightarrow q=5-2=3$

