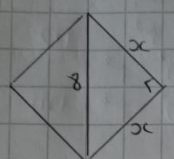# Further Maths GCSE
Circles Answers

1. Centre of circle A = $(0,0)$
   B = $(-6,8)$

   Distance between them $\sqrt{(0--6)^2 + (0-8)^2} = 10$

2. Centre = midpoint of AC = $(5,9)$

   $x^2 + x^2 = 8^2$

   $x^2 = 32$

   $x = \sqrt{32}$

   So radius = $\frac{1}{2}\sqrt{32}$

   $= \frac{1}{2}\sqrt{16}\sqrt{2}$

   $= 2\sqrt{2}$. $r^2 = 8$.

   Equation of circle = $(x-5)^2 + (y-9)^2 = 8$

3. Centre lies on the perpendicular bisector of Q and R
   so $x = 7$.

   Equation of circle is $(x-7)^2 + (y-b)^2 = r^2$

   $\overset{x}{(4,}\overset{y}{0)}$ lies on circle $(-3)^2 + (-b)^2 = r^2$

   $9 + b^2 = r^2$ (i)

   $(0,4)$ "   "   " $(-7)^2 + (4-b)^2 = r^2$

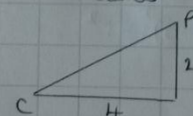 $49 + (4-b)^2 = r^2$ (ii)

   Both (i) and (ii) $= r^2$

   So $9 + b^2 = 49 + (4-b)^2$

   $9 + b^2 = 49 + 16 - 8b + b^2$

   $-56 = -8b$

   $b = 7$.

   Also $9 + b^2 = r^2 \Rightarrow 56 = r^2$

   So equation $(x-7)^2 + (y-7)^2 = 56$

4. Gradient of tangent = -2 so gradient of CP = $\frac{1}{2}$
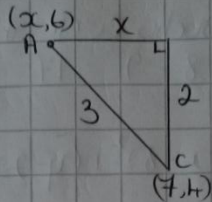
   $y = mx + c$ $y = \frac{1}{2}x + c$ let $x = 4, y = 5$

   $5 = 2 + c \Rightarrow c = 3$.

   So centre is at $(0,3)$
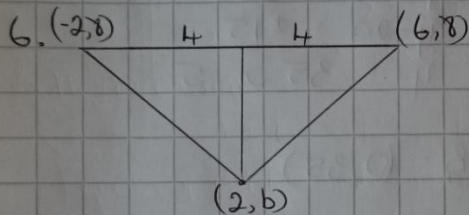
   radius^2 = $4^2 + 2^2 = 20$

   So $x^2 + (y-3)^2 = 20$

5. $C = (7,4)$

$A = (x,6)$

radius $= 3$

$(x,6)$ A · x ⌐ 4 · 2 · 3 · C (7,4)

$x = 3^2 - 2^2 = \sqrt{5}$

So $AB = 2x = 2\sqrt{5}$

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6. $(-2,8)$ ⌐4⌐ ⌐4⌐ $(6,8)$

$(2,b)$

$(x-a)^2 + (y-b)^2 = r^2$ C lies on line $x=2$.

So $(x-2)^2 + (y-b)^2 = r^2$

$\begin{array}{cc} x & y \end{array}$

$(-2,8) \Rightarrow (-4)^2 + (8-b)^2 = r^2$

$(6,8) \Rightarrow 4^2 + (8-b)^2 = r^2 \Big\}$

$(2,0) \Rightarrow 0 + (-b)^2 = r^2$ $(2,0)$ lies on circle

So $16 + (8-b)^2 = b^2$ $(=r^2)$

$16 + 64 - 16b + b^2 = b^2$

$80 = 16b$

$5 = b$ and $r^2 = 25$

So $(x-2)^2 + (y-5)^2 = 25$.

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7. tangent touches circle at $(-9,20)$

radius $= 8 - -9 = 17$

So $(x-8)^2 + (y-20)^2 = 17^2$

At A and B $x=0$

so $64 + (y-20)^2 = 289$

$(y-20)^2 = 225$

$y-20 = \pm 15$

$y = 35$ or 5

So $A = (0,5)$ $B = (0,35)$

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8. $(x-1)^2 + (y-3)^2 - 1 - 9 = 0$

$(x-1)^2 + (y-3)^2 = 10$

Centre $= (1,3)$

radius $= \sqrt{10}$