Circles P2

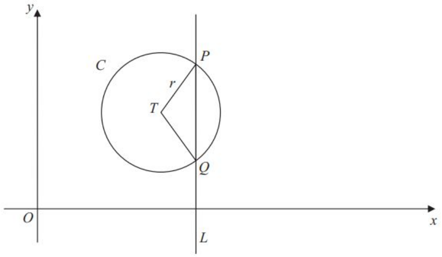


Figure 1

The circle C with centre T and radius r has equation

$$x^2 + y^2 - 20x - 16y + 139 = 0$$

(a) Find the coordinates of the centre of C.

(3)

(b) Show that $r = 5$

(2)

The line L has equation $x = 13$ and crosses C at the points P and Q as shown in Figure 1.

(c) Find the y coordinate of P and the y coordinate of Q.

(3)

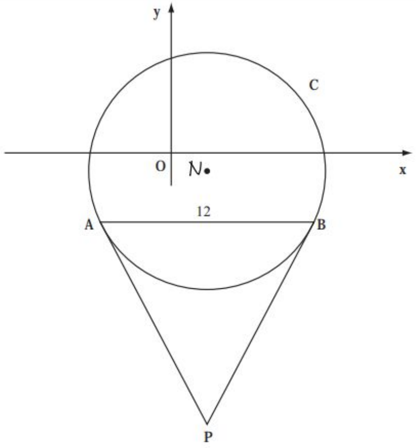


Figure 3

Figure 3 shows a sketch of the circle C with centre   and equation

$$(x-2)^2 + (y+1)^2 = \frac{169}{4}$$

(a) Write down the coordinates of N.

(2)

(b) Find the radius of C.

(1)

The chord AB of C is parallel to the x-axis, lies below the x-axis and is of length 12 units as shown in Figure 3.

(c) Find the coordinates of A and the coordinates of B

(5)

(d) Show that angle ANB = 134.8°, to the nearest 0.1 of a degree.

(2)

The tangents to C at the points A and B meet at the point P

(e) Find the length AP, giving your answer to 3 significant figures.

(2)

The circle C has equation

$$x^2 + y^2 - 20x - 24y + 195 = 0$$

The centre of C is at the point M.

(a) Find

(i) the coordinates of the point M,

(ii) the radius of the circle C.

(5)

N is the point with coordinates (25, 32).

(b) Find the length of the line MN.

(2)

The tangent to C at a point P on the circle passes through point N.

(c) Find the length of the line NP.

(2)

The circle **C** has centre **A**$(2, 1)$ and passes through the point **B**$(10, 7)$.

(a) Find an equation for **C**.

(4)

The line $_1$ is the tangent to **C** at the point **B**.

(b) Find an equation for $_1$.

(4)

The line $_2$ is parallel to $_1$ and passes through the mid-point of **AB**.

Given that $_2$ intersects **C** at the points **P** and ,

(c) find the length of **P** , giving your answer in its simplest surd form.

(3)

Circles P2

3 a) $x^2+y^2-20x-16y+139=0$

$(x-10)^2-100+(y-8)^2-64+139=0$

$(x-10)^2+(y-8)^2-25=0$

$(x-10)^2+(y-8)^2=5^2$

centre $=(10,8)$

b) $r^2=100+64-139=25$

$r=\sqrt{25}=\underline{5}$

c) $(x-10)^2+(y-8)^2=25$

when $x=13$

$(3)^2+(y-8)^2=25$

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

$y^2-16y+48=0$

$(y-4)(y-12)$

$y=4$ or $y=12$

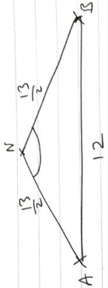
d) arc length $=r\theta=5\times1.855=9.275$

$9.275+2r=9.275+10$

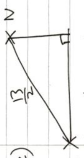
$=\underline{19.275}$

Q8a) $N(2,-1)$

b) $r=\sqrt{\frac{169}{4}}=\frac{13}{2}$



c)



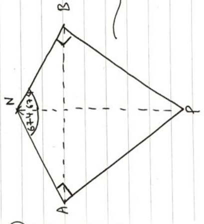
$\sqrt{(\frac{13}{2})^2-(6)^2}=\frac{5}{2}$ } A is 6 units to the left and 2.5 units down from N.

$\therefore A\left(-4,-\frac{7}{2}\right)$ and $B\left(8,-\frac{7}{2}\right)$

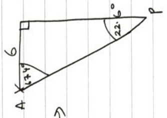
d) cosine rule : $\cos ANB=\dfrac{(\frac{13}{2})^2+(\frac{13}{2})^2-(12)^2}{2(\frac{13}{2})(\frac{13}{2})}=\dfrac{-119}{169}$

$\angle ANB=\cos^{-1}\left(\frac{-119}{169}\right)=\underline{134.8°}$

e)



$90-67.4=22.6°$



$\sin(22.6)=\frac{6}{AP}$

$AP=\frac{6}{\sin(22.6)}$

$=\boxed{15.6}$

5 a i) completing square

$(x-10)^2-100+(y-12)^2-144+195=0$

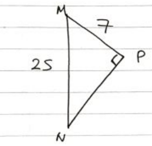
$(x-10)^2+(y-12)^2=49$

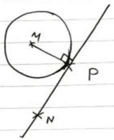
$\therefore$ centre : $(10,12)$

ii) radius $=\sqrt{49}=7$

b) $|MN|=\sqrt{(25-10)^2+(32-12)^2}=\underline{\underline{25}}$ units

c)



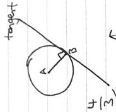


$|PN|=\sqrt{25^2-7^2}=\boxed{24}$ units

Q10a) radius $=|AB|=\sqrt{(10-2)^2+(7-1)^2}=10$

$\therefore\boxed{(x-2)^2+(y-1)^2=100}$

b) $M_{AB}=\frac{7-1}{10-2}=\frac{6}{8}=\frac{3}{4}$



$\therefore$ gradient of tangent will be $-\frac{4}{3}$

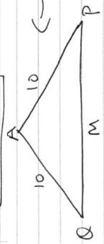
[tangent is perpendicular to AB]

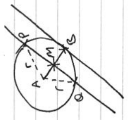
$y-7=-\frac{4}{3}(x-10)$

$y=-\frac{4}{3}x+\frac{40}{3}+7$

$\boxed{y=-\frac{4}{3}x+\frac{61}{3}}$

c)



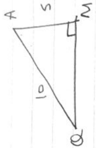


let M be midpoint of AB,

$M=\left(\frac{2+10}{2},\frac{1+7}{2}\right)=(6,4)$

$\therefore|AM|=\sqrt{(6-2)^2+(4-1)^2}=5$

now consider ΔAMQ :



$|MQ|=\sqrt{(10)^2-(5)^2}=5\sqrt{3}$ and $|MQ|=|MP|$

so distance from P to Q $=2\times5\sqrt{3}$

$=\boxed{10\sqrt{3}}$