## ESSENTIAL TECHNIQUES FOR INTERSECTIONS OF GRAPHS TOPIC.

1. Find the equations of the line and circle graphs and calculate the coordinates of P .

2. Find the equations of the line and circle graphs and calculate the coordinates of P .

|  |  |  |  |  |  |  |  |  |  |  |  | - |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | 7 |  | $1$ |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | - |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  | $\square$ |  |  |  |  |  |  |  |  |  |  |  | $X$ |
| $8-7$ | $7-6$ | $6-5$ | 5 - |  |  | 2 | 1 |  | 2 | $3$ |  |  |  | $67$ |  | 9 | 11 |
|  |  |  |  |  |  |  |  |  |  |  | $\cdots$ |  |  |  |  |  |  |
|  |  |  |  | $F$ |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

3. Find the equations of the line and circle graphs and calculate the coordinates of P.

4. Find the equations of the line and parabola graphs and calculate the coords of P .

5. Find the equations of the line and parabola graphs and calculate the coords of P .

6. Find the equations of the line and parabola graphs and calculate the coords of P .


## ESSENTIAL TECHNIQUES FOR INTERSECTIONS OF GRAPHS TOPIC.

1. Find the equations of the line and circle graphs and calculate the coordinates of P .


Circle is $x^{2}+y^{2}=16$ line is $y=1 / 2 x+1$
Subs: $\quad x^{2}+(1 / 2 x+1)^{2}=16$

$$
x^{2}+\frac{x^{2}}{4}+x+1=16
$$

$1.25 x^{2}+x-15=0$
Solving on graphics calc $x=3.087$ or -3.087
Note: if $x=-3.087$, this refers to the other intersection not shown above.
At $P, x=3.087$ and $y=2.544$
2. Find the equations of the line and circle graphs and calculate the coordinates of P .


Circle is $x^{2}+y^{2}=16 \quad$ line is $y=1 / 2 x+2$
Subs: $\quad x^{2}+(1 / 2 x+2)^{2}=16$

$$
\begin{aligned}
& x^{2}+\frac{x^{2}}{4}+2 x+4=16 \\
& x^{2}+\frac{x^{2}}{4}+2 x+4=16
\end{aligned}
$$

$1.25 x^{2}+2 x-12=0 \quad$ so $x=2.4$ (or -4 which is the other intersection) $P$ is at $x=2.4, y=3.2$
3. Find the equations of the line and circle graphs and calculate the coordinates of P..


Circle is $x^{2}+y^{2}=25 \quad$ line is $y=1 / 3 x+1$
Subs:

$$
\begin{aligned}
& x^{2}+\left(\frac{1}{2} x+1\right)^{2}=25 \\
& x^{2}+\frac{x^{2}}{9}+\frac{2 x}{3} x+1=25 \\
& x^{2}+\frac{x^{2}}{9}+\frac{2}{3} x-24=0
\end{aligned}
$$

$1.111 x^{2}+.667 x-15=0 x=4.36$ (or -4.36 for other intersection)
So $P$ is at $x=4.36, y=2.45$
4. Find the equations of the line and parabola graphs and calculate the coords of P .


The parabola is of the form $y=-b(x-4)^{2}+8$ so subs $x=0, y=6$
$6=-b(-4)^{2}+8$ so $-2=16 b$ and $b=\frac{-1}{8}$ producing $y=\frac{-(x-4)^{2}}{8}+8$
The line is $y=x+3$
Subs: $\quad x+3=\frac{-\left(x^{2}-8 x+16\right)}{8}+8$

$$
8 x+24=-x^{2}+8 x-16+64
$$

$x^{2}-8 x-24=0 \quad x=4.90$ (or -4.90 for the other intersection not required)
So $P$ is at $x=4.90$ and $y=7.90$
5. Find the equations of the line and parabola graphs and calculate the coords of P .


The parabola is of the form $y=-b x^{2}+7$ thru $(5,6)$ so $6=-25 b+7$
This means $b=\frac{1}{25}$ and the parab is $y=\frac{-x^{2}}{25}+7$
The line is $y=2 x+4$
Subs: $\quad 2 x+4=\frac{-x^{2}}{25}+7$

Either: $\frac{x^{2}}{25}+2 x-3=0$
$x=1.46$ (or -51.45 which is the other intersection not required.) $P$ is at $x=1.46, y=6.92$

Or: $2 x-3=\frac{-x^{2}}{25}$
$50 x-75=-x^{2}$ so $x^{2}+50 x-75=0$ $x=1.46$ (or -51.45 which is the other intersection not required.)
$P$ is at $x=1.46, y=6.92$
6. Find the equations of the line and parabola graphs and calculate the coords of P .


The parabola is of the form $y=-b x^{2}+10$ thru $(6,4)$ so $4=-36 b+10$ This means $b=\frac{1}{6}$ and the parab is $y=\frac{-x^{2}}{6}+10$
The line is $y=1 / 2 x+3$
Subs: $\quad \frac{x}{2}+3=\frac{-x^{2}}{6}+10 \quad$ so $\quad \frac{x^{2}}{6}+\frac{x}{2}-7=0$
$x=5.15$ (or -8.15 which is the other intersection not required.)
$P$ is at $x=5.15, y=5.58 \quad$ (NB the above parabola is not accurate)

