## UNDERSTANDING DISCRIMINANT AT A GLANCE.

 (with solutions)

| 1. $x^{2}-8 x+7=0$ | 2. $x^{2}-8 x+16=0$ | 3. $x^{2}-8 x+20=0$ |
| :---: | :---: | :---: |
| $x=\frac{8 \pm \sqrt{36}}{2}$ | $x=\frac{8 \pm \sqrt{0}}{2}$ | $x=\frac{8 \pm \sqrt{-16}}{2}$ |
| $x=1$ and 7 | $x=4$ | $x=$ no real solutions |
| Sketch the graph of $y=x^{2}-8 x+7$ | Sketch the graph of $y=x^{2}-8 x+16$ | Sketch the graph of $y=x^{2}-8 x+20=0$ |
|  |  |  |
| $\Delta>0$ <br> TWO solutions | $\Delta=\mathbf{0}$ <br> ONE solution | $\Delta<0$ <br> NO real solutions |

## UNDERSTANDING DISCRIMINANT AT A GLANCE.

 If $a x^{2}+b x+c=0$ then $x=\frac{-b \pm \sqrt{ }\left(b^{2}-4 a c\right)}{2 a}$The discriminant is $b^{2}-4 a c$

| 1. $x^{2}-8 x+7=0$ | 2. $x^{2}-8 x+16=0$ | 3. $x^{2}-8 x+20=0$ |
| :---: | :---: | :---: |
| $x=\frac{8 \pm \sqrt{ }}{2}$ | $x=\frac{8 \pm \sqrt{ }}{2}$ | $x=\frac{8 \pm \sqrt{ }}{2}$ |
| $\boldsymbol{x}=$ | $\boldsymbol{x}=$ | $x=$ |
| Sketch the graph of $y=x^{2}-8 x+7$ | Sketch the graph of $y=x^{2}-8 x+16$ | Sketch the graph of $y=x^{2}-8 x+20=0$ |
| $\uparrow$ |  |  |
| $\Delta>0$ <br> TWO solutions | $\Delta=0$ <br> ONE solution | $\Delta<0$ <br> NO real solutions |

## WORKED EXAMPLES.

1(a). Find the value of $K$ so that
$\mathbf{x}^{2}-\mathbf{8} \mathbf{x}+\mathbf{K}=\mathbf{0}$ has one real solutions.

$$
\begin{array}{rlrl}
\Delta=64-4 K & =0 & & \\
64 & =4 k \\
16 & =k & &
\end{array}
$$

1(b). Find the values of $K$ so that
$x^{2}-8 x+K=0$ has no real solutions.

$$
\begin{aligned}
\Delta=64-4 K & <0 \\
64 & <4 k \\
16 & <k
\end{aligned}
$$



1(c). Find the values of $K$ so that
$\mathbf{x}^{2}-8 \mathbf{x}+K=0$ has 2 real solutions.
$\Delta=64-4 K>0$
$64>4 k$
$16>k$

2. Find the range of values of $b$ so that $\mathbf{x}^{2}+\mathbf{b x}+\mathbf{9}=\mathbf{0}$ has no real solutions.
$\Delta=b^{2}-36<0$

$$
b^{2}<36
$$

$b<+6$ or $b>-6$
can be written as $-6<b<6$
3. Find the range of values of $n$ so that $x^{2}+(n+2) x+(n+5)=0$ has 2 real solutions.

$$
\left\lvert\, \begin{gathered}
\Delta=(n+2)^{2}-4(n+5)>0 \\
n^{2}+4 n+4-4 n-20>0 \\
n^{2}-16 \quad>0 \\
n^{2} \quad>16
\end{gathered}\right.
$$

4. Find the range of values of $p$ so that $x^{2}+(p-1) x+(p+2)=0$ has no
real
solutions.
$\Delta=(p-1)^{2}-4(p+2)<0$
$p^{2}-2 p+1-4 p-8<0$
$p^{2}-6 p-7<0$
$\Delta=(p-7)(p+1)<0$
So $-1<p<7$

