10. Find the value of k for which the equation $(k-2)x^2 + x(2k+1) + k = 0$ has equal roots.

Remember...
Discriminant = Δ
$\Delta = b^2 - 4ac$

Remember...
When roots are equal
$\Delta = 0$

$a = k-2$
$b = 2k+1$
$c = k$
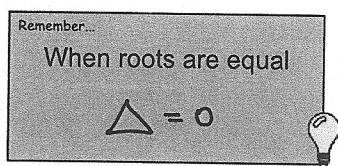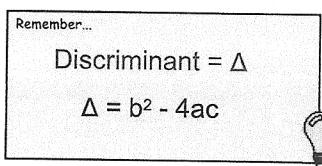
$\Rightarrow \quad (2k+1)^2 - 4(k-2)(k) = 0$

$4k^2 - 4k + 1 - 4k^2 - 8k = 0$

$1 = 12k$

$k = \dfrac{1}{12}$

13. Show that the equation $x^2 - 2px + 3p^2 + q^2 = 0$ cannot have real roots for $p, q \in R$.

Remember...
Discriminant = Δ
$\Delta = b^2 - 4ac$

Remember...
When roots are real
$\Delta \leq 0$
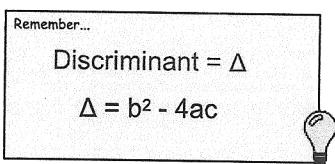
$a = 1 \qquad b = -2p \qquad c = 3p^2 + q^2$
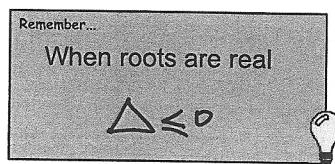
$\Delta = (-2p)^2 - 4(1)(3p^2 + q^2)$

$= 4p^2 - 12p^2 - 4q^2$

$= -8p^2 - 4q^2 \leq 0$

imaginary roots