In the quadratic equation $px^2 - 45x + 25 = 0$, $p \in \mathbb{Z}$, one root is two times the other.
Find the value of p.

$$px^2 - 45x + 25 = 0$$

Sum of roots $= \dfrac{45}{p}$

Product of roots $= \dfrac{25}{p}$

Let the roots be $\alpha , 2\alpha$

Sum of roots $= \alpha + 2\alpha = 3\alpha$

Product of roots $= \alpha \times 2\alpha = 2\alpha^2$

$$\dfrac{45}{p} = 3\alpha \Rightarrow p = \dfrac{15}{\alpha}$$

$$\dfrac{25}{p} = 2\alpha^2 \Rightarrow p = \dfrac{25}{2\alpha^2}$$

$$\dfrac{15}{\alpha} = \dfrac{25}{2\alpha^2}$$

$$\dfrac{\alpha^2}{\alpha} = \dfrac{25}{30}$$

$$\alpha = \dfrac{5}{6}$$

$$p = \dfrac{15}{\dfrac{5}{6}}$$

$$p = 18$$