9. (a) Given that $p = \log_3 x$, where $x > 0$, find in simplest form in terms of p,

   (i) $\log_3\left(\dfrac{x}{9}\right)$

   (ii) $\log_3\left(\sqrt{x}\right)$

   (2)

   (b) Hence, or otherwise, solve

   $$2\log_3\left(\frac{x}{9}\right) + 3\log_3\left(\sqrt{x}\right) = -11$$

   giving your answer as a simplified fraction.

   Solutions relying on calculator technology are not acceptable.

   (4)

(a) (i) $\log_3\left(\dfrac{x}{9}\right) = \log_3 x - \log_3 9 = \underline{p-2}$

   (ii) $\log_3(\sqrt{x}) = \log_3 x^{1/2} = \dfrac{1}{2}\log_3 x = \underline{P/2}$

(b) $\qquad 2\log_3\left(\dfrac{x}{9}\right) + 3\log_3(\sqrt{x}) = -11$

   Write in terms of p

   $2(p-2) + 3\dfrac{p}{2} = -11$

   $2p - 4 + \dfrac{3p}{2} = -11$

   $\dfrac{7p}{2} = -7 \Rightarrow \dfrac{p}{2} = -1$

   $\underline{p = -2}$

   But p is given as $\log_3 x$

   So $\log_3 x = -2$

   $x = 3^{-2}$

   $= \underline{\dfrac{1}{9}}$