3. **In this question you must show all stages of your working.**

Solutions relying on calculator technology are not acceptable.

(i) Solve the equation

$$x\sqrt{2} - \sqrt{18} = x$$

writing the answer as a surd in simplest form.

(3)

(ii) Solve the equation

$$4^{3x-2} = \frac{1}{2\sqrt{2}}$$

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(3)

(i) $x\sqrt{2} - \sqrt{18} = x$

$x(\sqrt{2}-1) = \sqrt{18} = \sqrt{9\times 2} = 3\sqrt{2}$

$x = \frac{3\sqrt{2}}{(\sqrt{2}-1)}$ — we need to rationalise the denominator to get simplest form

$= \frac{3\sqrt{2}(\sqrt{2}+1)}{(\sqrt{2}-1)(\sqrt{2}+1)}$ Making use of $(a^2-b^2) = (a+b)(a-b)$

$= \frac{3(2+\sqrt{2})}{2-1} = 3+3\sqrt{2}$

(ii) As in example 1 note that $4 = 2^2$ so

$4^{3x-2} = \frac{1}{2\sqrt{2}} \Rightarrow 2^{2(3x-2)} = \frac{1}{2\sqrt{2}} = \frac{1}{2^{3/2}}$

which gives $2^{(6x-4)} = 2^{-3/2}$

Equating the powers of 2 on both sides

$6x - 4 = -3/2$

$6x = 5/2$

$x = 5/12$