7. A farmer buys a tractor for €180 000.
He assumes that the tractor will have a trade-in value of €80 000 in 10 years time.
(i) Calculate the rate of depreciation per annum, correct to one place of decimals, based on these figures.
(ii) At this rate, when will the value of the tractor fall below €60 000?

$F = P(1-i)^t$ (i)

$\frac{F}{P} = (1-i)^t$

$\sqrt[t]{\frac{F}{P}} = 1-i$

$t = \log_{(1-i)} \frac{F}{P}$

$P = 180\,000$
$F = 80\,000$
$t = 10$
$i = ?$

$1-i = \sqrt[10]{\frac{80000}{180000}} = 0.9221$

$\Rightarrow 1 - 0.9221 = i = 0.0778$

$i = 7.78\% \approx 7.8\%$

$P = 180000$
$F = 60\,000$
$t = ?$
$i = 7.8\%$

$t = \log_{0.9221}\left(\frac{60000}{180000}\right)$

≈ 13.546 years

$t \approx 13$ years