Reverse of compound Interest or Depreciation
Ex
Suppose $t 2000$ invested for 5 years amounts to E2433.31. What was the 'interest rate per annum?

$$
\begin{aligned}
& 2000 \times M^{5}=2433.31 \\
& M^{5}=\frac{2433.31}{2000} \\
& M=\sqrt[5]{\frac{2433.31}{2000}} \\
& x^{\frac{1}{p}}=\sqrt[p]{x}=\left(\frac{2433.31}{2000}\right)^{\frac{1}{5}} \\
& M=1.040000359 \\
& \text { Annual rate of interest }=4 \%
\end{aligned}
$$

$E \times 2 \quad \pm 4350$ amounts to $t 6627.67$
in 7 years. Find annual rate of interest

$$
\begin{array}{r}
4350 \times M^{7}=6627.67 \\
M^{7}=\frac{6627.67}{4350}
\end{array}
$$

$$
\begin{aligned}
& M=\sqrt[7]{\frac{6627.67}{4350}} \\
& M=\left(\frac{6627.67}{4350}\right)^{\frac{1}{7}} \\
& M=1.062000001
\end{aligned}
$$

Annual rate of interest $=6.2 \%$

Ex $\quad z 2500$ amounts to $\neq 2282.45$ in 6 years. Find annual interest rate

$$
\begin{aligned}
2500 \times M^{6} & =2782.45 \\
M^{6} & =\frac{2782.45}{2500} \\
M & =\sqrt[6]{\frac{2782.45}{2500}} \\
M & =\left(\frac{2782.45}{2500}\right)^{\frac{1}{6}} \\
M & =1.01800027
\end{aligned}
$$

Aural rate of interest $=1.8 \%$

Depreciation
Ea A car costing t10000 new depreciates to $t 4182$ in 5 gears. What is the annual rate
of $d \in p r e c i a t i o n$.

$$
\begin{aligned}
10000 \times M^{5} & =4182 \\
M^{5} & =\frac{4182}{10000} \\
M & =\sqrt[5]{\frac{4182}{10000}} \\
M & =\left(\frac{4182}{10000}\right)^{\frac{1}{5}} \\
M & =0.8399952026 \\
M & \approx 0.84
\end{aligned}
$$

so Annual Depreciation Rate $=16 \%$

Exs $A$ car costing $\neq 36,000$ new is valued at $t 20000$ after 4 years. What percentage annual depreciation is that to 1 dec place

$$
\begin{aligned}
36000 \times M^{4} & =20000 \\
M^{4} & =\frac{20000}{36000} \\
M & =\left(\frac{20000}{36000}\right)^{\frac{1}{4}} \\
M & =0.8633400214 \\
M & \approx 0.863
\end{aligned}
$$

Deprecate rake $13.7 \%$ per anaum

Ex 6 In 1996 a bungalows cost $\{63,000$ In 2020 it is worth t235,000. What is the annual rate of house price inflation.

$$
\begin{aligned}
2020-1996 & =24 \text { years } \\
63000 \times M^{24} & =235000 \\
M^{24} & =\frac{235000}{63000} \\
M & =\left(\frac{235000}{63000}\right)^{\frac{1}{24}} \\
M & =1.056384381
\end{aligned}
$$

House price inflation $=5.6 \%$ per annum

Ex 7 At 4 ph there are approximately 14000 bacteria present in a culture

At 5 pu there are approximately 18000 present. What is the percentage growth rate per minute.

$$
1 \text { hour }=60 \mathrm{~min}
$$

$$
\begin{aligned}
14000 \times M^{60} & =18000 \\
M^{60} & =\frac{18000}{14000} \\
M & =\left(\frac{18000}{14000}\right)^{\frac{1}{60}} \\
M & =1.004197358
\end{aligned}
$$

Growth rate $0.4 \%$ per minute
Ex $8 \quad$ World Population $2000=6.122$ billion
$2020=7.8$ billion
What is annual percentage increase?

20 yeas

$$
\begin{aligned}
& 6.122 \times M^{20}=7.8 \\
& M^{20}=\frac{7.8}{6.122} \\
& M=\left(\frac{7.8}{6.122}\right)^{\frac{1}{20}} \\
& M=1.012185
\end{aligned}
$$

Increasing by $1.2 \%$ per arum.

