**Depreciation**

This topic is about how equipment (computers, vehicles, machinery, etc) lose value over time. The loss in value is called depreciation. Each year a business will set aside money in order to cover the cost of eventually replacing the item.

The estimated value of an item at any point in time is called its **book value**.

\[ \text{book value} = \text{cost price} - \text{total depreciation to that time} \]

When the book value is $0, the item is said to be written off. Scrap value is the book value of an item at the end of its useful life.

**Flat rate (straight line) depreciation**

If an item depreciates by the flat rate method, then its value depreciates by a **fixed amount each year**. This is sometimes referred to as **prime cost depreciation**. A graph of how the value of an item of equipment is changing would show a straight line decay.

\[ BV_T = P - dT \]

where

\[ P = \text{cost price} \]

\[ BV_T = \text{book value ($)} \text{ after time, } T \]

\[ T = \text{time since purchase (years)} \]

\[ d = \text{rate of depreciation ($ per year)} \]

\[ = \text{fixed amount per year or} \]

\[ = \text{percentage of} \ P \ \text{per year.} \]
Ex 13C page 673

1. a) Annual depreciation is 20% of the cost price.

\[ = 20\% \text{ of } \$25\,000 \]
\[ = 0.2 \times 25\,000 \]
\[ = \$5000 \]

b) Depreciation schedule

<table>
<thead>
<tr>
<th>Time T (years)</th>
<th>Depreciation d ($)</th>
<th>Book Value BV(_T) ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>25 000</td>
</tr>
<tr>
<td>1</td>
<td>5000</td>
<td>20 000</td>
</tr>
<tr>
<td>2</td>
<td>5000</td>
<td>15 000</td>
</tr>
<tr>
<td>3</td>
<td>5000</td>
<td>10 000</td>
</tr>
<tr>
<td>4</td>
<td>5000</td>
<td>5000</td>
</tr>
</tbody>
</table>

(c) Book value after time \(T\) years:
\[ BV = P - dT \]
\[ BV = 25000 - 5000T \]

Scrap value after 4 years:
\[ BV = 25000 - 5000 \times 4 \]
\[ BV = 25000 - 20000 \]
\[ BV = 5000 \]

\[ \text{Ex 13C p673} \]
Reducing Balance Depreciation
With this method, the value of the item depreciates by a fixed percentage rate each year. This is sometimes called *diminishing value depreciation*.

We can use a formula to find reducing balance depreciation or we can use the finance solver on your CAS.

Depreciation is a percentage of the book value

new book value = old book value - depreciation amount

\[ BV_T = P(1 - \frac{r}{100})^T, \text{ where} \]
\[ BV_T = \text{book value after time } T \]
\[ r = \text{rate of depreciation} \]
\[ P = \text{cost price (purchase price)} \]
\[ T = \text{time since purchase} \]

If you use the finance solver, you input the values as you do for a reducing balance loan, except that the rate is input as a negative value and payment is always 0.

Examples: Ex 13D
1. Depreciation schedule for the first 4 years of the bulldozer's life.
Bulldozer costs $60 000 and depreciates at 20% p.a. of the BV.

<table>
<thead>
<tr>
<th>Time in years</th>
<th>Depreciation ($)</th>
<th>Book value ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>60 000</td>
</tr>
<tr>
<td>1</td>
<td>0.2\times60000  = 12000</td>
<td>60000 - 12000 = 48000</td>
</tr>
<tr>
<td>2</td>
<td>0.2\times48000  = 9600</td>
<td>48000 - 9600  = 38 400</td>
</tr>
<tr>
<td>3</td>
<td>0.2\times38400  = 7680</td>
<td>38400 - 7680  = 30 720</td>
</tr>
<tr>
<td>4</td>
<td>0.2\times30720  = 6144</td>
<td>30720 - 6144  = 24 576</td>
</tr>
</tbody>
</table>

(b) Book value after \(\frac{4}{4}\) years = $24 576
(c) Total depreciation over 4 years = 60 000 - 24 576 = 35 424
(d) Graph of BV against time.
(a) \[ Bv = P \left(1 - \frac{r}{100}\right)^T \]

\[ P = 7320 \]
\[ r = 25 \]
\[ T = 6 \]

\[ Bv = 7320 \left(1 - \frac{25}{100}\right)^6 \]

\[ = \$1302.80 \]

(3) On calculator: list and spreadsheets
2, 4, 5, 8, 9, 10, 11
**Unit cost depreciation**

With this method, the depreciation is based on the maximum use of the item. This may mean km travelled in a vehicle or copies produced by a photocopier.

Current book value($) = previous book value($) - amount of depreciation($)

Amount of depreciation($) = amount of use x rate of depreciation ($ per use)

Rate of depreciation ($ per use) = amount of depreciation($) / amount of use

---

1. (a) (i) \( p = \$25000 \)
   
   Scrap value = $10000
   
   depreciates 26c/km
   
   distance travelled in first year 12600 km
   
   Annual depreciation = \( 12600 \times 0.26 \)
   
   = $3276
   
   (ii) Useful life = \( \frac{P - \text{scrap value}}{3276} \)
   
   = \( \frac{25000 - 10000}{3276} \)
   
   = 4.6 years

5. (a) \( p = \$7200 \) depreciates $1.50/1000 copies
   
   = 0.0015 $/copy

   (c) 620000 copies in 1st year
   
   540000 in 2nd year
   
   depreciation for 1st year = \( 620000 \times 0.0015 \)
   
   = $930
   
   depreciation for 2nd year = \( 540000 \times 0.0015 \)
   
   = $810

   (b) book value after 2 years = principal - depreciation
   
   = $7200 - (930 + 810)
   
   = $5460

---

Ex 13E 7, 4, 6, 9