 Annuity calculations

The future value of an annuity using a table

Refer to a [table of future value interest factors](https://knowledgequity.com.au/wp-content/uploads/2015/08/KEQ-FV-and-PV-tables.pdf) (pages 1 and 2) of a single cash flow and annuity or to complete this activity.

The linked table assume that payments are made / received at the end of the period.

1. Calculate the future value of an annuity given a regular contribution of $500 per annum, an interest rate of 4% p.a. compounded annually and a duration of 10 years.
2. Calculate the future value of an annuity given a regular contribution of $200 per month, an interest rate of 12% p.a. compounded monthly and a duration of 2 years.
3. Assuming an annuity with a duration of 15 years and an interest rate of 8% p.a.,
4. How much will you need to contribute each year to have a future value of $30000?
5. What single sum of money invested today would produce the same future value? Refer to a [table of present value interest factors](https://knowledgequity.com.au/wp-content/uploads/2015/08/KEQ-FV-and-PV-tables.pdf) (pages 3 and 4) of a single cash flow and annuity.

Solutions: Using interest factors of a single cash flow:

| Period | Payment (end of period) | Interest factor  | Future Value |
| --- | --- | --- | --- |
| 1 | 500 | 1.4233 | 711.65 |
| 2 | 500 | 1.3686 | 684.30 |
| 3 | 500 | 1.3159 | 657.95 |
| 4 | 500 | 1.2653 | 632.65 |
| 5 | 500 | 1.2167 | 608.35 |
| 6 | 500 | 1.1699 | 584.95 |
| 7 | 500 | 1.1249 | 562.45 |
| 8 | 500 | 1.0816 | 540.80 |
| 9 | 500 | 1.04 | 520.00 |
| 10 | 500 | 1 | 500.00 |
| Total | 500 | 12.0062 | **6,003.10** |

| Period | Payment (end of period) | Interest factor  | Future Value |
| --- | --- | --- | --- |
| 1 | 200 | 1.2572 | 251.44 |
| 2 | 200 | 1.2447 | 248.94 |
| 3 | 200 | 1.2324 | 246.48 |
| 4 | 200 | 1.2202 | 244.04 |
| 5 | 200 | 1.2081 | 241.62 |
| 6 | 200 | 1.1961 | 239.22 |
| 7 | 200 | 1.1843 | 236.86 |
| 8 | 200 | 1.1726 | 234.52 |
| 9 | 200 | 1.161 | 232.20 |
| 10 | 200 | 1.1495 | 229.90 |
| 11 | 200 | 1.1381 | 227.62 |
| 12 | 200 | 1.1268 | 225.36 |
| 13 | 200 | 1.1157 | 223.14 |
| 14 | 200 | 1.1046 | 220.92 |
| 15 | 200 | 1.0937 | 218.74 |
| 16 | 200 | 1.0829 | 216.58 |
| 17 | 200 | 1.0721 | 214.42 |
| 18 | 200 | 1.0615 | 212.30 |
| 19 | 200 | 1.051 | 210.20 |
| 20 | 200 | 1.0406 | 208.12 |
| 21 | 200 | 1.0303 | 206.06 |
| 22 | 200 | 1.0201 | 204.02 |
| 23 | 200 | 1.01 | 202.00 |
| 24 | 200 | 1 | 200.00 |
|   |   | 26.9735 | 5,394.70 |

| Period | Payment (end of period) | Interest factor  | Future Value |
| --- | --- | --- | --- |
| 1 | p | 2.9372 | 2.9372p |
| 2 | p | 2.7196 | 2.7196p |
| 3 | p | 2.5182 | 2.5182p |
| 4 | p | 2.3316 | 2.3316p |
| 5 | p | 2.1589 | 2.1589p |
| 6 | p | 1.999 | 1.999p |
| 7 | p | 1.8509 | 1.8509p |
| 8 | p | 1.7138 | 1.7138p |
| 9 | p | 1.5869 | 1.5869p |
| 10 | p | 1.4693 | 1.4693p |
| 11 | p | 1.3605 | 1.3605p |
| 12 | p | 1.2597 | 1.2597p |
| 13 | p | 1.1664 | 1.1664p |
| 14 | p | 1.08 | 1.08p |
| 15 | p | 1 | 1p |
|   | Total | 27.152 | 27.152p |

Solutions: Using interest factors of an annuity

1. (1%, 24 periods)
2. Using a present Value interest factor

Using the compound interest formula:

Note: Solutions are a few cents out due to annuity factors being rounded to 4 decimal places.