WORKSHEET

Spreadsheets – Simple and compound interest

Spreadsheet 1: Simple versus compound interest

This spreadsheet compares the progress of an investment under simple interest and compound interest. The principal and the annual percentage interest rate are entered in cells C1 and C2 respectively. The annual percentage interest rate is automatically converted to a decimal in cell C3. The interest is calculated in columns B and D, and the value of the investment at the end of each year is calculated in columns C and E.

The example below illustrates a principal of $1000 invested at a compound interest rate of 4% p.a.

	A	B	C	D	E
1		**Principal**	$1,000		
2		**Interest rate (% p.a.)**	4		
3		**Interest rate deciimal**	0.04		
4					
5		**SIMPLE INTEREST**		**COMPOUND INTEREST**	
6	Year	Interest	Investment	Interest	Investment
7	1	$40	$1,040	$40.00	$1,040.00
8	2	$40	$1,080	$41.60	$1,081.60
9	3	$40	$1,120	$43.26	$1,124.86
10	4	$40	$1,160	$44.99	$1,169.86
11	5	$40	$1,200	$46.79	$1,216.65
12	6	$40	$1,240	$48.67	$1,265.32
13	7	$40	$1,280	$50.61	$1,315.93
14	8	$40	$1,320	$52.64	$1,368.57
15	9	$40	$1,360	$54.74	$1,423.31
16	10	$40	$1,400	$56.93	$1,480.24
17	11	$40	$1,440	$59.21	$1,539.45
18	12	$40	$1,480	$61.58	$1,601.03
19	13	$40	$1,520	$64.04	$1,665.07
20	14	$40	$1,560	$66.60	$1,731.68
21	15	$40	$1,600	$69.27	$1,800.94
22	16	$40	$1,640	$72.04	$1,872.98
23	17	$40	$1,680	$74.92	$1,947.90
24	18	$40	$1,720	$77.92	$2,025.82
25	19	$40	$1,760	$81.03	$2,106.85
26	20	$40	$1,800	$84.27	$2,191.12
27	Total	$800	Total	$1,191.12	

The formulae used in this spreadsheet are shown below:

	A	B	C	D	E
1		**Principal**	1000		
2		**Interest rate (% p.a.)**	4		
3		**Interest rate deciimal**	=C2/100		
4					
5		**SIMPLE INTEREST**		**COMPOUND INTEREST**	
6	Year	Interest	Investment	Interest	Investment
7	1	=$C$3*$C$1	=C1+B7	=C1*(1+$C$3)-C1	=C1+D7
8	=A7+1	=$C$3*$C$1	=C7+B8	=E7*(1+$C$3)-E7	=E7+D8
9	=A8+1	=$C$3*$C$1	=C8+B9	=E8*(1+$C$3)-E8	=E8+D9
10	=A9+1	=$C$3*$C$1	=C9+B10	=E9*(1+$C$3)-E9	=E9+D10
11	=A10+1	=$C$3*$C$1	=C10+B11	=E10*(1+$C$3)-E10	=E10+D11
12	=A11+1	=$C$3*$C$1	=C11+B12	=E11*(1+$C$3)-E11	=E11+D12
13	=A12+1	=$C$3*$C$1	=C12+B13	=E12*(1+$C$3)-E12	=E12+D13
14	=A13+1	=$C$3*$C$1	=C13+B14	=E13*(1+$C$3)-E13	=E13+D14
15	=A14+1	=$C$3*$C$1	=C14+B15	=E14*(1+$C$3)-E14	=E14+D15
16	=A15+1	=$C$3*$C$1	=C15+B16	=E15*(1+$C$3)-E15	=E15+D16
17	=A16+1	=$C$3*$C$1	=C16+B17	=E16*(1+$C$3)-E16	=E16+D17
18	=A17+1	=$C$3*$C$1	=C17+B18	=E17*(1+$C$3)-E17	=E17+D18
19	=A18+1	=$C$3*$C$1	=C18+B19	=E18*(1+$C$3)-E18	=E18+D19
20	=A19+1	=$C$3*$C$1	=C19+B20	=E19*(1+$C$3)-E19	=E19+D20
21	=A20+1	=$C$3*$C$1	=C20+B21	=E20*(1+$C$3)-E20	=E20+D21
22	=A21+1	=$C$3*$C$1	=C21+B22	=E21*(1+$C$3)-E21	=E21+D22
23	=A22+1	=$C$3*$C$1	=C22+B23	=E22*(1+$C$3)-E22	=E22+D23
24	=A23+1	=$C$3*$C$1	=C23+B24	=E23*(1+$C$3)-E23	=E23+D24
25	=A24+1	=$C$3*$C$1	=C24+B25	=E24*(1+$C$3)-E24	=E24+D25
26	=A25+1	=$C$3*$C$1	=C25+B26	=E25*(1+$C$3)-E25	=E25+D26
27	Total	=SUM(B7:B26)	Total	=SUM(D7:D26)	

1 Modify your spreadsheet to show that:

a the difference between the simple interest and compound interest earned on a principal of $5000, invested at 4.5% p.a. over 10 years, is $514.85.

b the difference between the simple and compound interest earned on a principal of $28 000, invested at 9.35% p.a. over 20 years, is $86 954.58.

Spreadsheet 2: Compounding periods

This spreadsheet allows you to calculate and compare the simple interest and compound interest for a certain principal for different compounding periods. The principal is entered in cell B1, the annual percentage interest rate is entered in cell B2 and the term is entered in cell B4. In cell B3 the spreadsheet automatically converts the annual percentage interest rate into a decimal. Simple interest is calculated in row 7. Compound interest for various compounding periods is calculated in rows 9 to 13.

	A	B	C	D	E
1	**Principal**	$6,000			
2	**Interest rate (% p.a.)**	14			
3	**Interest rate decimal**	0.14			
4	**Term (years)**	5			
5					
6		**Interest rate (% per period)**	**Number of periods**	**Final amount**	**Total Interest**
7	**Simple interest**	0.14	5	$10,200	$4,200
8	**Compound interest**				
9	compounded yearly	0.14	5	$11,552.49	$5,552.49
10	compounded half-yearly	0.07	10	$11,802.91	$5,802.91
11	compounded quarterly	0.035	20	$11,938.73	$5,938.73
12	compounded monthly	0.0117	60	$12,033.66	$6,033.66
13	compounded daily	0.0004	1826.25	$12,080.90	$6,080.90

The formulas used in this spreadsheet are shown below. You can use these to create your own copy of the spreadsheet.

	A	B	C	D	E
1	**Principal**	6000			
2	**Interest rate (% p.a.)**	14			
3	**Interest rate decimal**	=B2/100			
4	**Term (years)**	5			
5					
6		**Interest rate (% per period)**	**Number of periods**	**Final amount**	**Total Interest**
7	**Simple interest**	=B3	=B4	=$B$1+$B$1*B7*C7	=$B$1*B7*C7
8	**Compound interest**				
9	compounded yearly	=B3	=B4	=$B$1*(1+B9)^C9	=D9-$B$1
10	compounded half-yearly	=B3/2	=B4*2	=$B$1*(1+B10)^C10	=D10-$B$1
11	compounded quarterly	=B3/4	=B4*4	=$B$1*(1+B11)^C11	=D11-$B$1
12	compounded monthly	=B3/12	=B4*12	=$B$1*(1+B12)^C12	=D12-$B$1
13	compounded daily	=B3/365.25	=B4*365.25	=$B$1*(1+B13)^C13	=D13-$B$1

2 **a** Show that the value of a principal of $3500 invested at 7% p.a., compounded half-yearly for 3 years, is $4302.39.

b Show that the interest earned on $10 000 at 4.3% p.a., compounded daily for 4 years, is $1876.66.

c Show that the difference between the interest compounded yearly and the interest compounded daily on a principal of $1000 at 6% p.a. for 1 year. is $31.83.

d Why is it better for an investor to earn interest compounded daily rather than interest compounded monthly?

Answers

2 d When interest is compounded daily, the balance of the account is increased daily, thus increasing the amount of interest paid into the account the following day, and so on. This results in a greater amount of interest being paid in total.