

Lesson Plan

NEUROHEADWAY

Neuroscience Into Education

Lesson Plan - Time Lines

The quantity of work is for two 45- minutes' lessons- one is for organizing and understanding of the use of time lines from the Power point presentation; the second lesson is for consolidation by solving the problems in the worksheet.

Pre-knowledge

- Geometric series- formula for the sum of the first n terms
- Substitution into a formula
- Solving algebraic equations
- Converting percentages to decimals and decimals to percentages
- Converting months, weeks and days into years.

Aims

- To learn the basic terminology in Mathematics of Finance
- Organising the given information in financial problem on a time line
- Visualising the problem and making the right choice of formulae
- Logical thinking.

Resources

- Power Point
- Worksheet

Activities

- By following the Power Point presentation, the learners need to learn the basic formulae and do the examples together.
- In groups or individually they must solve the application problems in the worksheet.

Worksheet

The worksheet is divided into three sections:

Section A- easy questions for the lower ability pupils

Section B- middle level of difficulty questions

Section C- advanced (difficult) questions for the gifted and talented pupils.

Note: The learners are encouraged to use a calculator only once in their solution in Mathematics of Finance. Only the final answer should be rounded off.

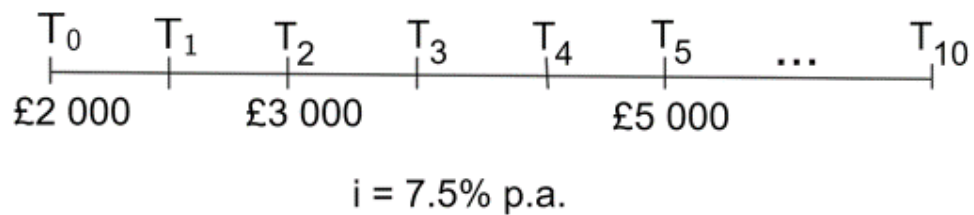
Power point Example

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EXAMPLE 1

Sean deposits £2 000 in a bank account which pays 7.5% compound interest per annum. Two years later he deposits another £3 000, and after another 3 years, he deposits £5 000. How much will the amount in his account be 10 years after the first deposit?



On this **time-line**, $T_0, T_1, \dots, T_{10}$ represent the end of each year.
The amounts of the three instalments are placed, according to the given information and the interest rate is stated.

Solution

Use the formula $F = P(1 + i)^n$

Apply this formula to each one of the three deposits.

The total amount at the end of 10 years is:

$$F = 2\,000(1 + 0.075)^{10} + 3\,000(1 + 0.075)^8 \\ + 5\,000(1 + 0.075)^5$$

$$F \approx \text{£}16\,650.65$$

EXAMPLE 2

Anne deposits £3 000 in a bank account for 5 years to save for her dream holiday. The bank offered her an annual compound interest rate of 7.75% for the first 2 years, and 8.2% per annum compound interest for the following 3 years. What is the amount that she will receive after 5 years?

Teachers Evaluation and Handouts

Time Lines - Worksheet

In each question round your answer off to two decimal places (if necessary).

Section A.

1. Sally invested £1 000 in a bank which paid compound interest of 6.5% per annum for the first 3 years and 6.2% per annum, compounded monthly for the following 7 years. What amount is in Sally's account 10 years after she invested the money?
2. Mary invested £1 200 in a bank account which pays compound interest of 7% per annum, compounded monthly. At the end of the 10th month she withdraws £300. Six months later she deposits £800 into the account. How much is in Mary's account at the end of the second year?

Section B.

1. Chris decided to save money to buy a new car which will cost £16 000 in 8 years' time. He deposits £2 000 now in a bank account, £1 500 after one year, £2 800 three years after the second deposit and £2 200 at the end of the seventh year. The bank quotes an interest rate of 12% per annum, compounded quarterly. How much more money will Chris need at the end of the 8th year to buy the car?
2. A loan of £8 000 was repaid to a bank in the following manner: £4 000 at the end of the second year, £2 500 was paid 18 months later, and a final amount of x pounds 6 years after the loan was taken. The bank charges interest at a rate of 9% per annum, compounded monthly throughout this investment period. What is the value of x , the last payment made to the bank?

3. A loan of x pounds was repaid to a bank in the following manner: £2 000 at the end of the first year, £3 000 at the end of the third year after the loan was taken, and a final payment of $\frac{x}{3}$ pounds after a further 2 years. The bank pays interest of 8.5% per annum, compounded monthly. Calculate the value of x .

Section C.

1. A family decides to save money in a bank account to give as a present to their 6 – year - old child for his 21st birthday. They deposit £3 000 on his 6th birthday, £5 000 on his 10th birthday, £4 000 after a further three years, and £6 000 on his 16th birthday. The bank pays interest of 10% per annum, compounded monthly for the first 6 years and 10.45% per annum, compounded quarterly for the rest of the time. How much money will be in the account for the 21st birthday of the child?
2. An investor wishes to invest a lump sum of money (x pounds) today which will yield three payments: £5 000 after 3 years, £6 000 after a further 5 years, and 2 years later, a final payment of £12 000. If the interest is 8.2% per annum, compounded monthly for the first 8 years and thereafter is 9.6% per annum, compounded monthly, what initial amount, x , must be invested?

Answers:

Section A.

1. £1 836.18
2. £1 892.42

Section B.

1. £448.65
2. £4 846,62
3. £5 327,04

Section C.

1. £32 601.58
2. £12 188,04