Percentages - Lesson 1

% Appreciation and Depreciation

<u>LI</u>

- Know meanings of Appreciation and Depreciation.

- Calculate appreciated and depreciated values.

<u>SC</u>

- %s with a calculator.

Apr 23-08:21

Appreciation : increase

e. g. antiques, paintings, fancy houses

Example 1

A house is bought for £ 250 000. It appreciates in value by 6 % for each of the next 3 years.

How much is it now worth ?

Price @ end of 1st year :

= 250 000 + (6 x 250 000 ÷ 100)

= 250 000 + 15 000

= 265 000

Price @ end of 2nd year :

= 265 000 + (6 x 265 000 ÷ 100)

= 265 000 + 15 900

= £ 280 900

Price @ end of 3rd year :

= 280 900 + (6 x 280 900 ÷ 100)

= 280 900 + 16 854

= £ 297 754

Starting amount   Years

Quick way : 250 000 x $(1 . 06)^3$ = £ 297 754

y^x or x^y or   ∧

Example 2

A house is bought for £ 370 000. It appreciates in value by 7 % for each of the next 4 years.

How much is it now worth ?

370 000 x $(1 . 07)^4$ = £ 484 994 . 52

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Depreciation : decrease

e. g. cars, boats, rubbish houses

Example 3

A car is bought for £ 13 000. It depreciates in value by 3 % over 3 years.

New price at end of third year ?

$$13\ 000 \times (0.97)^3 = \boxed{£\ 11\ 864.75}$$

Example 4

80 ml of a drug is injected into a patient at 12 noon. The amount of drug in the patient decreases at a rate of 7.5 % each hour.

Calculate the amount of drug in the patient at 4 pm (to the nearest ml).

$$80 \times (0.925)^4 = 58.56\ldots$$

$$= \boxed{59\ ml\ \ (\text{to the nearest ml})}$$

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1) Find the compound interest on a sum of £2500 at a rate of 6% per annum for 3 years.

2) Find the compound interest on a sum of £1400 at a rate of 7.6% p.a. over a period of 7 years.

3) A vinyard produced 250 kilograms of grapes in 2005. It is estimated the vinyard will be able to increase production at a rate of 3% p.a. for the next 5 years. Calculate the weight of grapes that will be produced in 5 years time.

4) The number of bacteria in a test tube is 50 000. The bacteria reproduce at a rate of 35% every 4 hours. Calculate the number of bacteria in the test tube after one day.

5) In the year 2004 it was estimated the Amazon rain forest was home to 60 000 poison arrow frogs. Due to loss of habitat the number of frogs is falling at a rate of 15% per annum. Calculated the estimate number of frogs there will be in 2008.

6) 40 millilitres of a drug are injected into a patient at 12 noon. The amount of drug in the body falls at a rate of 8.5% per hour. Calculate the amount of drug in the body at 5p.m.

7) The area of the Sahara desert is approximately 3 500 000 square miles. If the Sahara desert is increasing in size at a rate of 4% per annum, calculate its size in 5 years time.

8) An antique teddy bear valued at £350 in 2002 has increased in value at a rate of 12.5% per annum. Find the value of the teddy bear in 2006.

9) The supermarket chain Bainbury recorded a profit of £125 million in 2005. Economic forecasts suggest the company can increase their profits at a rate of 6.5% per annum over the next 10 years. Calculate the expected profits in 10 years time.

10) It is estimated a swarm of locusts contains 750 000 individuals. If the swarm increases in size at a rate of 20% every week, calculate the number of individuals in the swarm in 6 weeks time.

11) A raincloud contains 2500 litres of water. The cloud is increasing in size at a rate of 4.3% per hour. Calculate the volume of water in the cloud in 8 hours time.

12) Hillside secondary school had a roll of 1400 in 2001. If the roll falls at a rate of 4% per annum, calculate the roll of the school in 2006.

13) The population and population change in 5 different cities is given in the table below.

City	Population	Population Change
Ayton	120 000	Up 6% p.a.
Beeton	165 000	Down 1.5% p.a.
Ceeton	108 000	Up 7.5% p.a.
Deeton	180 000	Down 8% p.a.
Eaton	210 000	Down 9% p.a.

Which city will have the largest population in 5 years time?

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1) Find the compound interest on a sum of £2500 at a rate of 6% per annum for 3 years. £ 2 977 . 54

2) Find the compound interest on a sum of £1400 at a rate of 7.6% p.a. over a period of 7 years. £ 2 337 . 84

3) A vinyard produced 250 kilograms of grapes in 2005. It is estimated the vinyard will be able to increase production at a rate of 3% p.a. for the next 5 years. Calculate the weight of grapes that will be produced in 5 years time.
289 . 82 kg

4) The number of bacteria in a test tube is 50 000. The bacteria reproduce at a rate of 35% every 4 hours. Calculate the number of bacteria in the test tube after one day. 302 672 bacteria

5) In the year 2004 it was estimated the Amazon rain forest was home to 60 000 poison arrow frogs. Due to loss of habitat the number of frogs is falling at a rate of 15% per annum. Calculated the estimate number of frogs there will be in 2008. 31 320 frogs

6) 40 millilitres of a drug are injected into a patient at 12 noon. The amount of drug in the body falls at a rate of 8.5% per hour. Calculate the amount of drug in the body at 5p.m. 25 . 65 ml

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7) The area of the Sahara desert is approximately 3 500 000 square miles. If the Sahara desert is increasing in size at a rate of 4% per annum, calculate its size in 5 years time. 4 258 285 . 16 square miles

8) An antique teddy bear valued at £350 in 2002 has increased in value at a rate of 12.5% per annum. Find the value of the teddy bear in 2006. £ 560 . 63

9) The supermarket chain Bainbury recorded a profit of £125 million in 2005. Economic forecasts suggest the company can increase their profits at a rate of 6.5% per annum over the next 10 years. Calculate the expected profits in 10 years time. £ 234 . 64 million

10) It is estimated a swarm of locusts contains 750 000 individuals. If the swarm increases in size at a rate of 20% every week, calculate the number of individuals in the swarm in 6 weeks time. 2 239 488 locusts

11) A raincloud contains 2500 litres of water. The cloud is increasing in size at a rate of 4.3% per hour. Calculate the volume of water in the cloud in 8 hours time. 3 501 . 18 litres

12) Hillside secondary school had a roll of 1400 in 2001. If the roll falls at a rate of 4% per annum, calculate the roll of the school in 2006. 1 141 pupils

13) The population and population change in 5 different cities is given in the table below.

City	Population	Population Change	
Ayton	120 000	Up 6% p.a.	160 587
Beeton	165 000	Down 1.5% p.a.	152 990
Ceeton	108 000	Up 7.5% p.a.	155 047
Deeton	180 000	Down 8% p.a.	118 634
Eaton	210 000	Down 9% p.a.	131 046

Which city will have the largest population in 5 years time? Ayton