

1. Two students Ann and Ben play a game. Each time Ann passes GO she receives \$15. Each time Ben passes GO he receives 8% of the amount he already has. Both students start with \$100.

- (a) How much money will Ann have after she has passed GO 10 times?
- (b) How much money will Ben have after he passes GO 10 times?
- (c) How many times will the students have to pass GO for Ben to have more money than Ann?

**(Total 6 marks)**

2. The population of big cats in Africa is increasing at a rate of 5 % per year. At the beginning of 2004 the population was 10 000.

- (a) Write down the population of big cats at the beginning of 2005.

**(1)**

- (b) Find the population of big cats at the beginning of 2010.

**(2)**

- (c) Find the number of years, from the beginning of 2004, it will take the population of big cats to exceed 50 000.

**(3)**

**(Total 6 marks)**

3. Ann and John go to a swimming pool.

They both swim the first length of the pool in 2 minutes.

The time John takes to swim a length is 6 seconds more than he took to swim the previous length.

The time Ann takes to swim a length is 1.05 times that she took to swim the previous length.

- (a) (i) Find the time John takes to swim the third length.
- (ii) Show that Ann takes 2.205 minutes to swim the third length.

**(3)**

- (b) Find the time taken for Ann to swim a total of 10 lengths of the pool.

**(3)**

**(Total 6 marks)**

4. A National Lottery is offering prizes in a new competition. The winner may choose one of the following.

**Option one:** \$1000 each week for 10 weeks.

**Option two:** \$250 in the first week, \$450 in the second week, \$650 in the third week, increasing by \$200 each week for a total of 10 weeks.

**Option three:** \$10 in the first week, \$20 in the second week, \$40 in the third week continuing to double for a total of 10 weeks.

- (a) Calculate the amount you receive in the tenth week, if you select

(i) **option two;**

(ii) **option three.**

(6)

- (b) What is the total amount you receive if you select **option two**?

(2)

- (c) Which option has the greatest total value? Justify your answer by showing all appropriate calculations.

(4)

(Total 12 marks)

5. On Vera's 18<sup>th</sup> birthday she was given an allowance from her parents. She was given the following choices.

Choice A \$100 every month of the year.

Choice B A fixed amount of \$1100 at the beginning of the year, to be invested at an interest rate of 12% per annum, compounded monthly.

Choice C \$75 the first month and an increase of \$5 every month thereafter.

Choice D \$80 the first month and an increase of 5% every month.

- (a) Assuming that Vera does not spend any of her allowance during the year, calculate, for each of the choices, how much money she would have at the end of the year.

(8)

- (b) Which of the choices do you think that Vera should choose? Give a reason for your answer.

(2)

- (c) On her 19<sup>th</sup> birthday Vera invests \$1200 in a bank that pays interest at  $r\%$  per annum compounded annually. Vera would like to buy a scooter costing \$1452 on her 21<sup>st</sup> birthday. What rate will the bank have to offer her to enable her to buy the scooter?

(4)

(Total 14 marks)

6. Mr Jones decides to increase the amount of money he spends on food by  $d$  GBP every year. In the first year he spends  $a$  GBP. In the 8th year he spends twice as much as in the 4th year. In the 20th year he spends 4000 GBP.

Find the value of  $d$ .

(Total 4 marks)

7. Annie is starting her first job. She will earn a salary of \$26000 in the first year and her salary will increase by 3% every year.

(a) Calculate how much Annie will earn in her 5<sup>th</sup> year of work.

(3)

Annie spends \$24800 of her earnings in her first year of work. For the next few years, inflation will cause Annie's living expenses to rise by 5% per year.

(b) (i) Calculate the number of years it will be before Annie is spending more than she earns.

(ii) By how much will Annie's spending be greater than her earnings in that year?

(6)

(Total 9 marks)

8. A woman deposits \$100 into her son's savings account on his first birthday. On his second birthday she deposits \$125, \$150 on his third birthday, and so on.

(a) How much money would she deposit into her son's account on his 17th birthday?

(b) How much in total would she have deposited after her son's 17th birthday?

(Total 4 marks)

9. Give all answers in this question correct to the **nearest dollar**.

Clara wants to buy some land. She can choose between two different payment options. Both options require her to pay for the land in **20** monthly installments.

Option 1: The first installment is \$2500. Each installment is \$200 more than the one before.

Option 2: The first installment is \$2000. Each installment is 8% more than the one before.

(a) If Clara chooses option 1,

(i) write down the values of the second and third installments;

(ii) calculate the value of the final installment;

(iii) show that the **total amount** that Clara would pay for the land is \$88 000.

(7)

(b) If Clara chooses option 2,

(i) find the value of the second installment;

(ii) show that the value of the fifth installment is \$2721.

(4)

- (c) The price of the land is \$80 000. In option 1 her total repayments are \$88 000 over the 20 months. Find the annual rate of simple interest that gives this total. (4)
- (d) Clara knows that the **total amount** she would pay for the land is not the same for both options. She wants to spend the least amount of money. Find how much she will save by choosing the cheaper option. (4)
- (Total 19 marks)**

**10. Throughout this question all the numerical answers must be given correct to the nearest whole number.**

Park School started in January 2000 with 100 students. Every full year, there is an increase of 6 % in the number of students.

- (a) Find the number of students attending Park School in
- (i) January 2001;
- (ii) January 2003. (4)
- (b) Show that the number of students attending Park School in January 2007 is 150. (2)

Grove School had 110 students in January 2000. Every full year, the number of students is 10 more than in the previous year.

- (c) Find the number of students attending Grove School in January 2003. (2)
- (d) Find the year in which the number of students attending Grove School will be first 60 % **more than** in January 2000. (4)

Each January, one of these two schools, the one that has more students, is given extra money to spend on sports equipment.

- (e) (i) Decide which school gets the money in 2007. Justify your answer.
- (ii) Find the first year in which Park School will be given this extra money. (5)
- (Total 17 marks)**

**11. The population of Bangor is growing each year. At the end of 1996, the population was 40 000. At the end of 1998, the population was 44 100. Assuming that these annual figures follow a geometric progression, calculate**

- (a) the population of Bangor at the end of 1997;
- (b) the population of Bangor at the end of 1992.

**(Total 4 marks)**