**IB Math SL Year 1 Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Review – Unit 9**

**1.** An arithmetic series has five terms. The first term is 2 and the last term is 32. Find the sum of the series.

|  |  |
| --- | --- |
| *Working:* |  |
|  | *Answer:*...................................................................... |

(Total 4 marks)

 **2.** The *Acme* insurance company sells two savings plans, Plan A and Plan B.

 For Plan A, an investor starts with an initial deposit of $1000 and increases this by $80 each month, so that in the second month, the deposit is $1080, the next month it is $1160 and so on.

 For Plan B, the investor again starts with $1000 and each month deposits 6% more than the previous month.

(a) Write down the amount of money invested under Plan B in the second and third months.

(2)

 *Give your answers to parts (b) and (c) correct to the nearest dollar.*

(b) Find the amount of the 12th deposit for each Plan.

(4)

(c) Find the total amount of money invested during the first 12 months

(i) under Plan A;

(2)

(ii) under Plan B.

(2)

(Total 10 marks)

**3.** Portable telephones are first sold in the country *Cellmania* in 1990. During 1990, the number of units sold is 160. In 1991, the number of units sold is 240 and in 1992, the number of units sold is 360.

 In 1993 it was noticed that the annual sales formed a geometric sequence with first term 160, the 2nd and 3rd terms being 240 and 360 respectively.

(a) What is the common ratio of this sequence?

(1)

Assume that this trend in sales continues.

(b) How many units will be sold during 2002?

(3)

(c) In what year does the number of units sold first exceed 5000?

(4)

Between 1990 and 1992, the total number of units sold is 760.

(d) What is the total number of units sold between 1990 and 2002?

(2)

 During this period, the total population of *Cellmania* remains approximately 80 000.

(e) Use this information to suggest a reason why the geometric growth in sales would not continue.

(1)

(Total 11 marks)

**4.** The diagram shows a square ABCD of side 4 cm. The midpoints P, Q, R, S of the sides are joined to form a **second** square.

(a) (i) Show that PQ =  cm.

(ii) Find the area of PQRS.

(3)

 The midpoints W, X, Y, Z of the sides of PQRS are now joined to form a **third** square as shown.

(b) (i) Write down the area of the **third** square, WXYZ.

(ii) Show that the areas of ABCD, PQRS, and WXYZ

form a geometric sequence. Find the common ratio

 of this sequence.

(3)

 The process of forming smaller and smaller squares (by joining the midpoints) is **continued indefinitely**.

(c) (i) Find the area of the 11th square.

(ii) Calculate the sum of the areas of **all** the squares.

(4)

(Total 10 marks)

**5.** Consider the infinite geometric sequence 25, 5, 1, 0.2, … .

(a) Find the common ratio.

(b) Find

(i) the 10th term;

(ii) an expression for the *n*th term.

(c) Find the sum of the infinite sequence.

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(Total 6 marks)

**6.** The diagrams below show the first four squares in a sequence of squares which are subdivided in half. The area of the shaded square A is .

(a) (i) Find the area of square B and of square C.

(ii) Show that the areas of squares A, B and C are in geometric progression.

(iii) Write down the common ratio of the progression.

(5)

(b) (i) Find the **total** area shaded in diagram 2.

(ii) Find the **total** area shaded in the 8th diagram of this sequence.
Give your answer correct to six significant figures.

(4)

(c) The dividing and shading process illustrated is continued indefinitely.
Find the total area shaded.

(2)

(Total 11 marks)

**7.** The following table shows four series of numbers. One of these series is geometric, one of the series is arithmetic and the other two are neither geometric nor arithmetic.

(a) Complete the table by stating the type of series that is shown.

|  |  |  |
| --- | --- | --- |
| Series |  | Type of series |
| (i) | 111111111111111… |  |
| (ii) | 1… |  |
| (iii) | 0.90.8750.850.8250.8… |  |
| (iv) |  |  |

(b) The geometric series can be summed to infinity. Find this sum.

|  |  |
| --- | --- |
| *Working:* |  |
|  | *Answer:*(b) ………………………………………….. |

(Total 6 marks)

 **8.** (a) Consider the geometric sequence −3, 6, −12, 24, ….

(i) Write down the common ratio.

(ii) Find the 15th term.

Consider the sequence *x* − 3, *x* +1, 2*x* + 8, ….

(3)

(b) When *x* = 5, the sequence is geometric.

(i) Write down the first three terms.

(ii) Find the common ratio.

(2)

(c) Find the other value of *x* for which the sequence is geometric.

(4)

(d) For this value of *x*, find

(i) the common ratio;

(ii) the sum of the infinite sequence.

(3)

(Total 12 marks)

**9.** The first term of an infinite geometric sequence is 18, while the third term is 8. There are two possible sequences. Find the sum of each sequence.

(Total 6 marks)

**10.** Find the term containing *x*10 in the expansion of (5 + 2*x*2)7.

(Total 6 marks)

**11.** When the expression (2 + *ax*)10 is expanded, the coefficient of the term in *x*3 is 414 720. Find the value of *a*.

(Total 6 marks)

12. Write a recursive formula for the sequence 8, 10, 12, 14, 16, .... Then find the next term.

 13. Write a recursive formula for the sequence 15, 26, 48, 92, 180, .... Then find the next term.

 14. Write an explicit formula for the sequence 7, 2, –3, –8, –13, ... Then find .

 15. Write an explicit formula for the sequence , , , , , .... Then find .

 16. The table shows the predicted growth of a particular bacteria after various numbers of hours. Write an explicit formula for the sequence of the number of bacteria.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Hours (*n*) | 1 | 2 | 3 | 4 | 5 |
| Number of Bacteria | 19 | 38 | 57 | 76 | 95 |

 17. Is the formula  is *explicit* or *recursive*? Find the first five terms of the sequence.

18. Evaluate the series .

 19. Evaluate the series .

 20. Evaluate the series 1 + 4 + 16 + 64 + 256 + 1024.

 21. Evaluate the series 6 – 24 + 96 – 384 + ... to .

 22. Evaluate the series 1000 + 500 + 250 + ... to .

**Evaluate the infinite geometric series. Round to the nearest hundredth if necessary.**

 23. 

 24. 1 + 0.1 + 0.01 + ...