

SHARP

Worksheet 6: Term 1 Revision

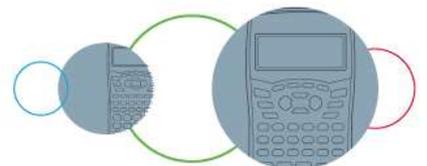
Grade 12 Mathematics

1. Determine whether the pattern is arithmetic, quadratic, geometric or none.
 - a) 7 15 23 31...
 - b) 0 1 1 2 3 5...
 - c) 48 36 27 $20\frac{1}{4}$...
 - d) 88 95 107 126 154...
 - e) 38 58 68 68...
 - f) 85 -51 $30\frac{3}{5}$ $-18\frac{9}{25}$...
 - g) 22 30 38 46...
 - h) 14 21 29 40 57...
 - i) 1 2 4 8...
 - j) 77 88 99 110 121...

2. For each of the linear and geometric series above give:
 - i) the formula T_n in terms of n
 - ii) the 22nd term of the series
 - iii) the Sigma notation of the series.
 - iv) the sum of the first 9 terms. If the geometric series is converging, also find the sum to infinity for the series.

3. In a geometric and linear series, the sum of the first nine linear terms is equal to the fifth term of the geometric series and the third term of the geometric series is one less than the eighth term of the linear series. The ratio of the first term of the linear sequence to the geometric first term is 25:16. Given that the first term of the linear series is 9, determine:
 - a) The common ratio (where $r > 0$) and difference of the two series, and the first term of the geometric series.
 - b) Is the geometric series and converging or diverging series? If it is converging determine the sum to infinity.
 - c) Which term in the linear series is equal to 53.
 - d) Which term in the geometric series is equal to $8789\frac{1}{16}$.

4. For each of the equations below
 - i) Say whether each of these equations is a function or not.
 - ii) For those that are not functions, restrict the domain so that it becomes a one-to-one function.
 - iii) give the inverse for each of the equations.



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|----|----------------------|----|------------------|
| a) | $y = \text{Log}_3 x$ | b) | $y^2 = 25 - x^2$ |
| c) | $y = 3x^2 - 7$ | d) | $x = y^2 + 2$ |
| e) | $y = x^3$ | f) | $y = 3^x$ |
| g) | $y = \sqrt{x^3 - 9}$ | h) | $y^3 = x^2$ |

5. Sipiwe has a car cleaning business. He replaces the cleaning equipment for R20 000. In 3 years he will need some new cleaning equipment.
- What will the new cleaning equipment cost in 3 years-time if the rate of inflation is 8.5% p.a.?
 - What will his current car cleaning equipment be worth in 3 years-time if it depreciates at a rate of 7.6% per annum?
 - Sipiwe would like to pay his equipment off in 36 equal monthly instalments. The bank offers him an interest rate of 11.2% per annum compounded monthly. What will Sipiwe monthly instalments be?
 - Sipiwe decides to create a sinking fund for the new equipment he will have to buy. The bank gives him an interest rate of 12.5% per annum compounded quarterly. What will Sipiwe's quarterly payments be?
 - Determine the effective interest rate in questions c) and d). Which interest rate is better?
 - If Sipiwe decides to increase his monthly instalments from question c) by 15%, how long will it now take him to pay off the bank loan?
6. Prove the following identities:
- $\frac{\cos 2a}{1 + \sin 2a} = \frac{\cos a - \sin a}{\cos a + \sin a}$
 - $\sin 3b = \sin b (4 \cos^2 b - 1)$
 - $\cos 3a - \sin 3a = (\cos a + \sin a)(1 - 4 \cos a \sin a)$
 - $\sin 2f - \tan f = \tan f \cdot \cos 2f$
 - $\frac{\sin 2a + \sin 3a}{\sin a} = 4 \cos^2 a + 2 \cos a - 1$

