LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF EDUCATION

VHEMBE WEST DISTRICT

GRADE 12

MATHEMATICS

CONTROL TEST 1 – 2022

DATE: 11 MARCH 2022

MARKS: 50

DURATION: 1 HOUR

This question paper consists of **09** pages including **formula** and **diagram sheet.**

 Please turn over

INSTRUCTIONS

1. Read and answer all questions carefully.
2. It is in your own interest to write legibly and to present your work neatly.
3. All necessary working which you have used in determining your answers **must** be clearly shown.
4. Approved non-programmable calculators may be used except where otherwise stated. Where necessary give answers correct to **2 decimal places** unless otherwise stated.
5. Ensure that your calculator is in DEGREE mode.
6. Diagrams have not necessarily been drawn to scale.
7. **Use spaces provided on the question paper to answer Question 4 and 5.**

Question 1

1.1. Given : 0; 5; 16; 33 are the first four terms of the quadratic sequence.

1.1.1. Show that the n^{th} term is given by, $T_n = 3n^2 - 4n + 1$. (4)

1.1.2. Determine which term in the sequence is equal to 5896? (2)

[06]

Question 2

2.1 The first three terms of an arithmetic sequence are $2p - 3$; $p + 5$; $2p + 7$.

2.1.1. Determine the value(s) of p.. (2)

2.1.2. Calculate the sum of the first 120 terms. (2)

2.2 The following pattern is true for above arithmetic sequence:

$$T_1 + T_4 = T_2 + T_3$$

$$T_5 + T_8 = T_6 + T_7$$

$$T_9 + T_{12} = T_{10} + T_{11}$$

$$\therefore T_k + T_{k+3} = T_x + T_y$$

2.2.1. Write the value of x and y in terms of k. (2)

2.2.2. Hence, calculate the value of $T_x + T_y$ in terms of k in simplest form. (4)

[10]

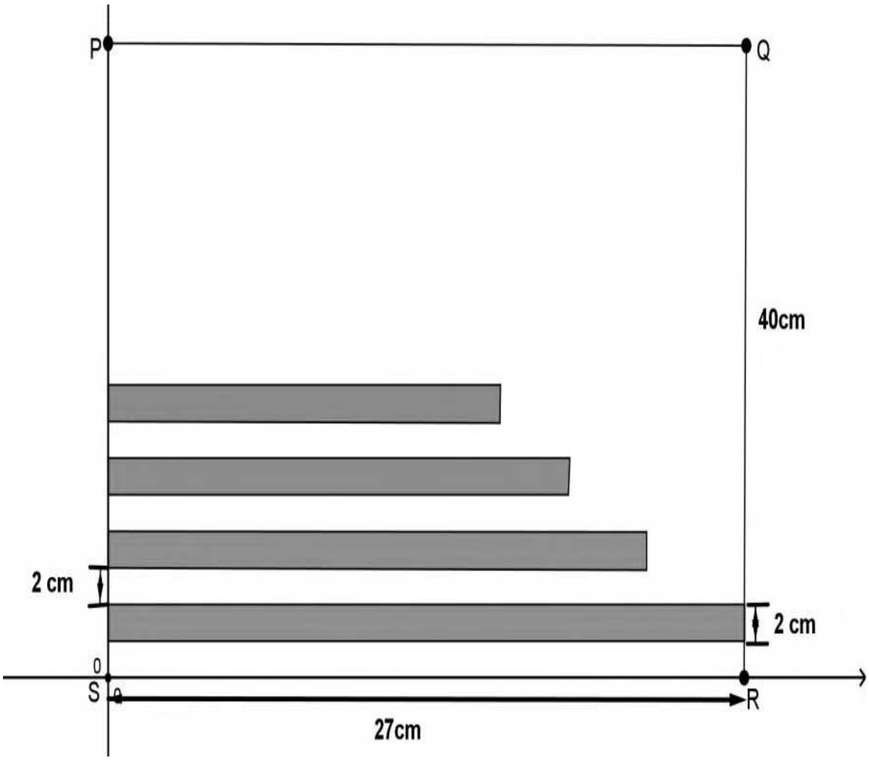
Question 3

3.1. Consider the following geometric sequence:

$$\sin 30^0 ; \cos 30^0 ; \frac{3}{2} ; \ldots . \frac{81\sqrt{3}}{2}$$

Determine the number of terms in the sequence. (4)

3.2. Rectangles of width **2** cm are drawn from the edge of a sheet of paper that is **40** cm long such that there is a **2** cm gap between on rectangle and the next. The length of the first rectangle is **27** cm and the length of each successive rectangle is 85% of the length of the previous rectangle until there are rectangles drawn along the entire length of PS. Each rectangle is coloured dark grey.



3.3.1. Calculate the length of 12^{th} rectangle. (3)

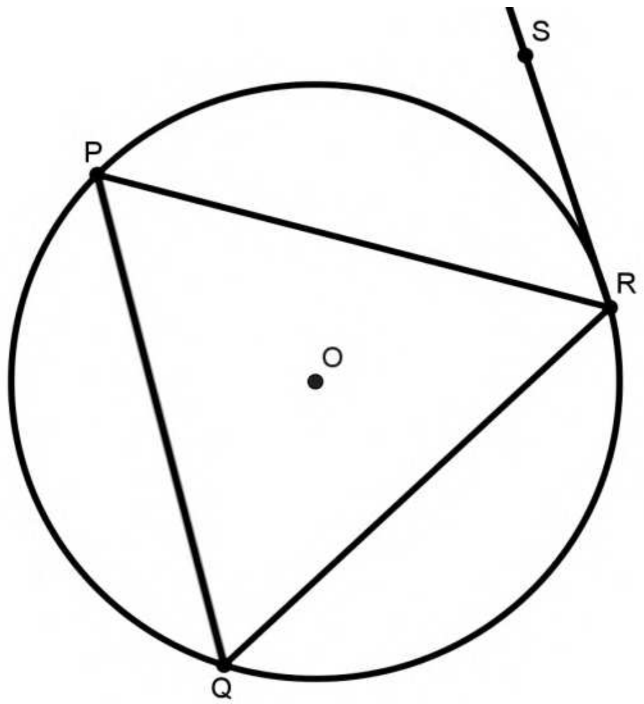
3.3.3. Calculate the percentage of paper is coloured dark grey. (4)

[11]

Question 4

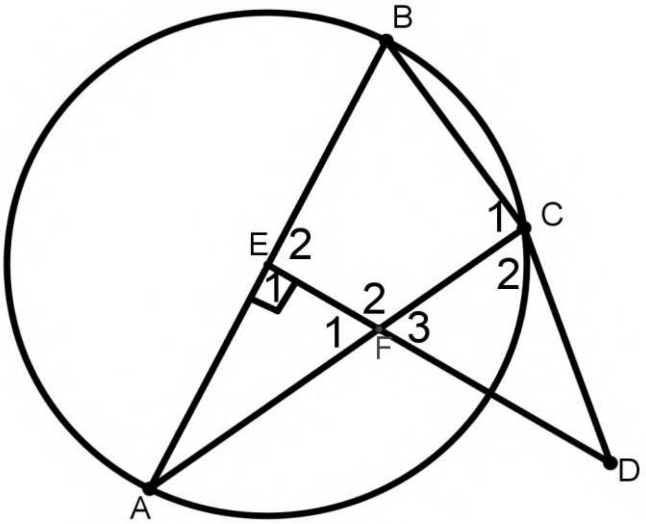
4.1. In the figure below below, O is the centre of the circle with P , Q and R on the

circumference. SR is the tangent to circle centre O at R.



	Prove that $P\hat{R}S = \hat{Q}$	(5)

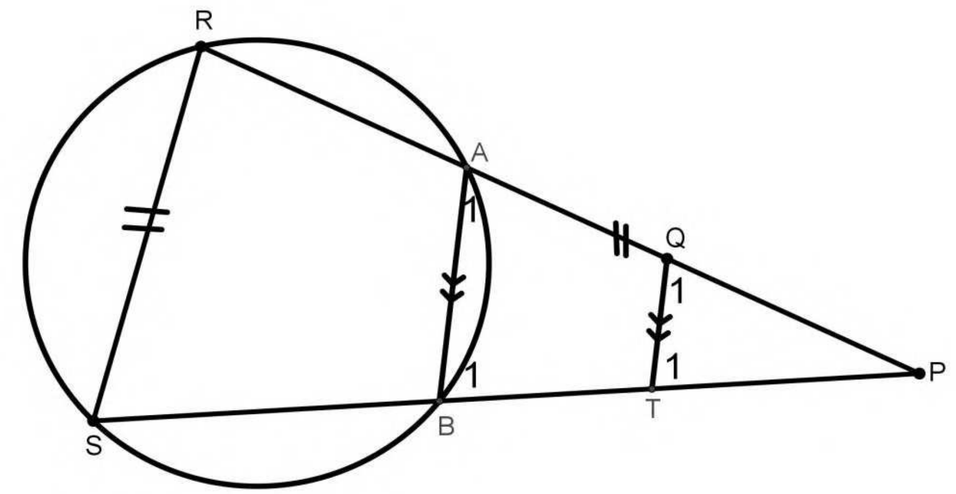
4.2 In the figure below, E is the centre of the circle and DE is perpendicular to AB. AC and DE intersect at F and $DF = DC$.



4.2.1.	Prove that $BEFC$ is a cyclic quadrilateral.	
		(3)
4.2.2.	Prove that DC is a tangent at C	
		(3)

Question 5

In the diagram, circle $ABSR$ is drawn. Chords RA and SB produced to meet at P. $PA = RS$ and $QT \parallel AB$.



5.1.	Prove that $\Delta PSR \parallel\!\parallel\!\mid \Delta PAB$	(3)

5.2.	$PS \times BA = SR^2$	(3)
5.3.	If $RS = 10cm$ and $\frac{PT}{TB} = \frac{2}{3}$ calculate the length of PQ.	(3)
5.4.	Calculate $\frac{area\ of\ \Delta PAB}{area\ of\ \Delta PTQ}$	

INFORMATION SHEET: MATHEMATICS

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \qquad A = P(1+ni) \qquad A = P(1-ni) \qquad A = P(1-i)^n$$

$$A = P(1+i)^n \qquad \sum_{i=1}^{n} 1 = n \qquad \sum_{i=1}^{n} i = \frac{n(n+1)}{2} \qquad T_n = a + (n-1)d$$

$$S_n = \frac{n}{2}\left(2a + (n-1)d\right) \quad T_n = ar^{n-1} \quad S_n = \frac{a\left(r^n - 1\right)}{r-1} \;;\quad r \neq 1 \quad S_\infty = \frac{a}{1-r}\;;\; -1 < r < 1$$

$$F = \frac{x\left[(1+i)^n - 1\right]}{i} \qquad P = \frac{x[1-(1+i)^{-n}]}{i} \qquad f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad \mathrm{M}\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c \qquad y - y_1 = m(x - x_1) \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad m = \tan\theta$$

$$(x-a)^2 + (y-b)^2 = r^2 \quad \textit{In } \Delta ABC\text{:} \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \qquad a^2 = b^2 + c^2 - 2bc.\cos A$$

$$area\,\Delta ABC = \frac{1}{2} ab.\sin C$$

$$\sin(\alpha + \beta) = \sin\alpha.\cos\beta + \cos\alpha.\sin\beta \qquad \sin(\alpha - \beta) = \sin\alpha.\cos\beta - \cos\alpha.\sin\beta$$

$$\cos(\alpha + \beta) = \cos\alpha.\cos\beta - \sin\alpha.\sin\beta \qquad \cos(\alpha - \beta) = \cos\alpha.\cos\beta + \sin\alpha.\sin\beta$$

$$\cos 2\alpha = \begin{cases} \cos^2\alpha - \sin^2\alpha \\ 1 - 2\sin^2\alpha \\ 2\cos^2\alpha - 1 \end{cases} \qquad \sin 2\alpha = 2\sin\alpha.\cos\alpha$$

$$\bar{x} = \frac{\sum fx}{n} \qquad \sigma^2 = \frac{\sum_{i=1}^{n}\left(x_i - \bar{x}\right)^2}{n}$$

$$P(A) = \frac{n(A)}{n(S)} \qquad P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$\hat{y} = a + bx \qquad b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$