



Province of the
EASTERN CAPE
EDUCATION

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REPUBLIC OF SOUTH AFRICA

CHIEF DIRECTORATE – CURRICULUM MANAGEMENT

**GRADE 12 LEARNER SUPPORT
PROGRAMME**

**REVISION AND REMEDIAL TEACHING
INSTRUMENT:
QUESTIONS AND ANSWERS**

SUBJECT: MATHEMATICS – THIRD PAPER

June 2009

This document consists of 14 pages.

Strictly not for test/examination purposes

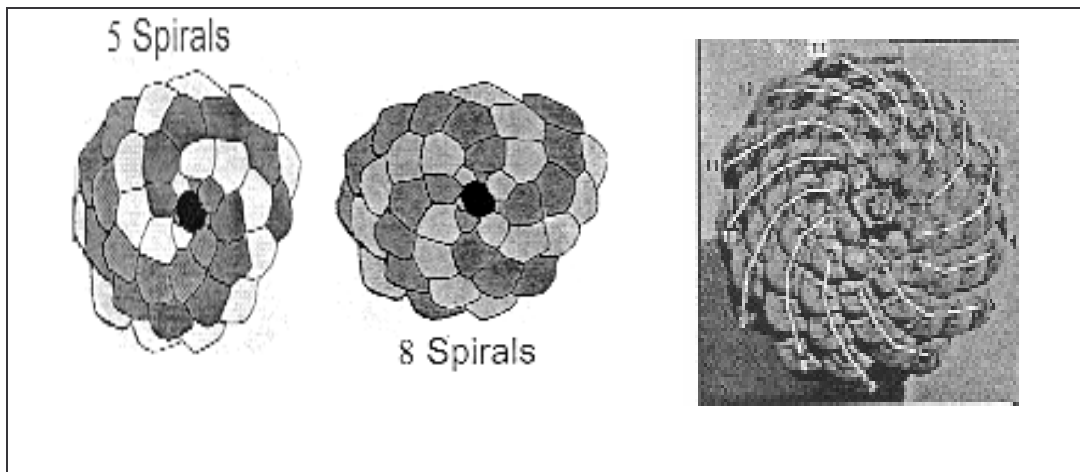
INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 9 questions. Answer ALL the questions.
2. Clearly show ALL calculations, diagrams, graphs, et cetera, which you have used in determining the answers.
3. An approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.
4. If necessary, answers should be rounded off to TWO decimal places, unless stated otherwise.
5. Number the answers correctly according to the numbering system used in this question paper.
6. Diagrams are NOT necessarily drawn to scale.
7. It is in your own interest to write legibly and to present work neatly.
8. TWO diagram sheets for answering, QUESTION 5, QUESTION 6, QUESTION 7, QUESTION 8 and QUESTION 9 are attached at the end of this question paper. Write your NAME/EXAMINATION number in the spaces provided and hand them in together with your ANSWER BOOK.

QUESTION 1

- 1.1 Given the formula $T_{n+1} = \frac{1}{4}T_n$ and $T_1 = \frac{1}{2}$, write down the next three terms of the sequence. (2)
- 1.2 The following picture represents the spiral growth of a pine cone.



Picture 1

Picture 2

Picture 3

If the number of spirals in the third picture is **13**, determine the recursive formula which will generate the sequence.

(3)
[5]**QUESTION 2**

The table represents the tariffs for calls per minute of two cellphone companies.

Calls to any network	Cellphone company A	Cellphone company B
Domestic (peak)	R2,99	R2,87
Domestic (off-peak)	R1,43	R1,57
International (peak)	R3,51	R3,63
International (off-peak)	R2,35	R2,33

- 2.1 Determine, on average, which cellphone company offers better value for money? (2)
- 2.2 Cellphone company A increases its tariffs by 15 cents per minute and cellphone company B increases its tariffs by 12 cents per minute. How does the average of the tariffs of the companies compare after the increase? (2)
- 2.3 In your opinion, what will happen to the number of subscribers of cellphone companies A and B if a third cellphone company is introduced to the market? (2)

[6]

QUESTION 3

- 3.1 The following table represents the speed (in km/h) of fifty cars travelling on a national road between King William's Town and East London, on a particular day between 07:00 and 08:00. The speed limit on the road is 120 km/h.

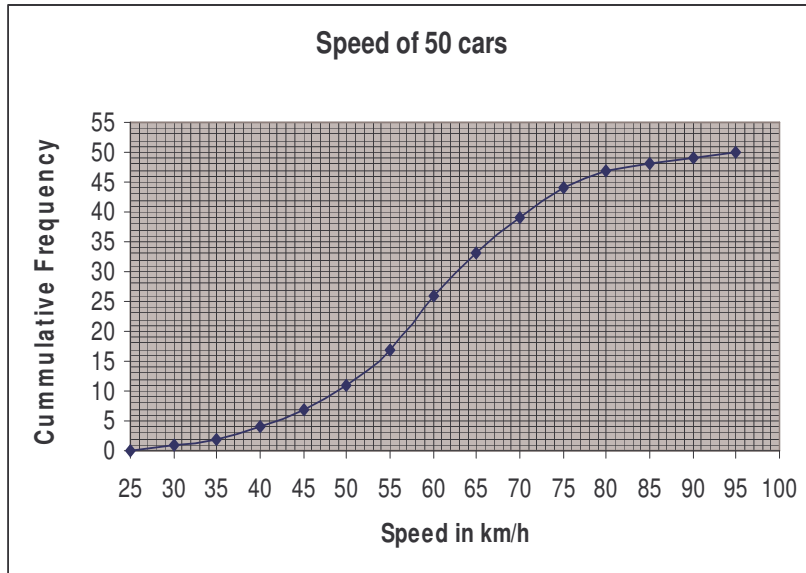
115	127	108	117	109	130	105	112	133	134
105	117	109	117	112	105	118	118	119	113
108	111	109	119	109	116	120	104	107	115
112	111	111	101	126	121	106	102	114	105
120	103	111	122	99	130	105	118	111	114

The data is grouped as shown in the table below:

Speed interval (km/h)	Midpoint of interval (x)	Frequency (f)	$f \times x$	$(x - \bar{x})^2$	$f \times (x - \bar{x})^2$
98 - 102	100	3	300	184,96	554,88
103 - 107	105	9	945	73,96	665,64
108 - 112	110	14	1540	12,96	181,44
113 - 117	115	9	1035	1,96	17,64
118 - 122	120	9	1080	40,96	360,64
123 - 127	125	2	250	129,96	259,92
128 - 132	130	2	260	268,96	537,92
133 - 137	135	2	270	457,96	915,92
SUM	→	50	5680		3494

- 3.1.1 Calculate the mean. (2)
- 3.1.2 Calculate the standard deviation. (2)
- 3.1.3 Determine how many cars are within 1 standard deviation of the mean. (2)

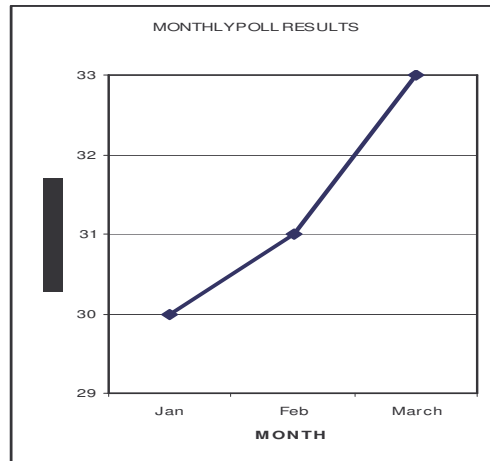
3.2 The speeds of 50 cars were recorded by a traffic officer in the main street of a town on a Friday morning. The graph illustrates the information as an ogive.



3.2.1 How many cars were traveling within the legal speed limit (60 km/h or less)? (2)

3.2.2 What was the median speed? (2)

3.3 A candidate in the election publishes the graph shown here. The graph displays the results of opinion polls regarding the percentage of voters who prefer her.



3.3.1 Has there been much change in the popularity of the candidate? Motivate your answer. (2)

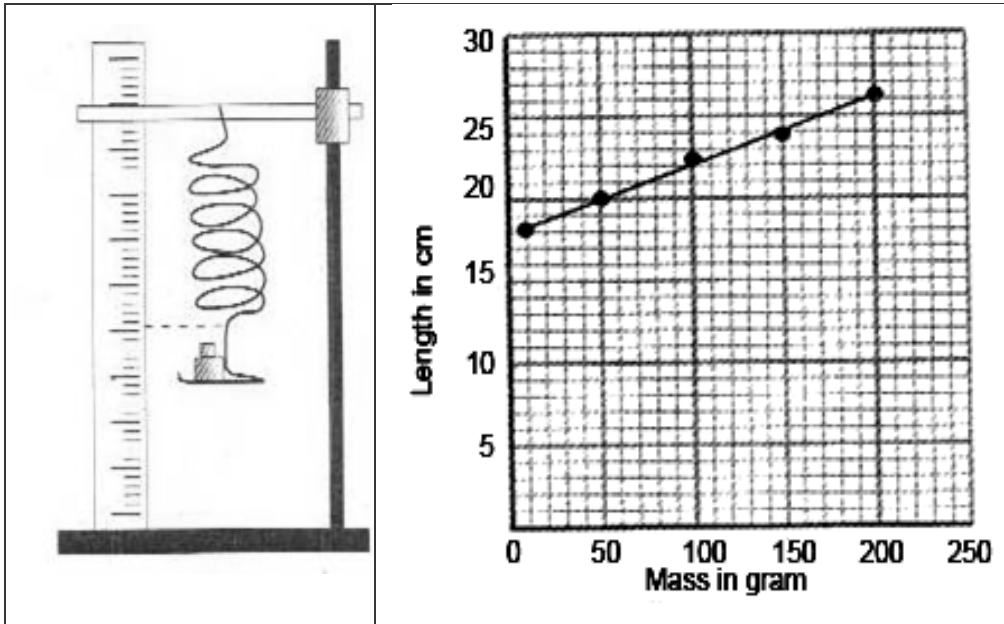
- 3.3.2 What impression is created by the graph? Explain how this impression is created. (2)
- 3.3.3 What effect is the graph likely to have on voters? (2)
- [16]**

QUESTION 4

- 4.1 There is an 80% chance that Kwezi will pass his driving test and a 90% chance that Emma will pass hers. Calculate the probability that:
- 4.1.1 Kwezi passes and Emma fails. (2)
- 4.1.2 Only one of them passes. (3)
- 4.2 In a group of 110 Grade 12 learners, each takes at least one of the following three subjects, Mathematics, Physical Sciences or Accounting. 20 take Mathematics and Accounting, 30 take Mathematics and Physical Sciences, 15 take Physical Sciences and Accounting, 32 take only Mathematics, 21 take only Physical Sciences and 16 take only Accounting. If x learners take all three subjects:
- 4.2.1 Draw a Venn diagram to represent the information. (3)
- 4.2.2 Calculate the value of x . (2)
- 4.2.3 Calculate the probability that a Grade 12 learner, chosen at random, does not take Accounting but does take Mathematics and Physical Sciences. (3)
- 4.2.4 Determine if the event that a learner takes Accounting is independent of the event that a learner takes Physical Sciences. (3)
- 4.3 Lumka has a blue jeans, a white jeans and three blouses, a blue, a red and a striped blouse to choose from to wear on casual day at school.
- 4.3.1 How many combinations are there in total? (1)
- 4.3.2 What is the probability that Lumka will be wearing something blue? (2)
- [19]**

QUESTION 5 (USE THE DIAGRAM SHEET TO ANSWER QUESTION 5.1.1)

A science teacher sets up the apparatus shown below (left) to investigate the relationship between the length of a spring and the mass hung from it. The graph (right) below represents the relationship.



5.1.1 Use the plotted points to complete the table below.

Mass (in grams)	10	50	100	150	200
Length of spring (in mm)					

(1)

5.1.2 Determine the equation of the line of best fit.

(4)

5.1.3 Describe the type and strength of the correlation between the two sets of data.

(2)

5.1.4 Estimate, by using the graph, the length of the spring when the mass hung is 120 g.

(1)

5.1.5 Calculate the correlation coefficient.

(3)

- 5.2 The following information was obtained using technology, during research of the relationship between maximum temperature and electricity used.

Option 1: $y = -1,35x + 64,18$ with $r^2 = 0,887$

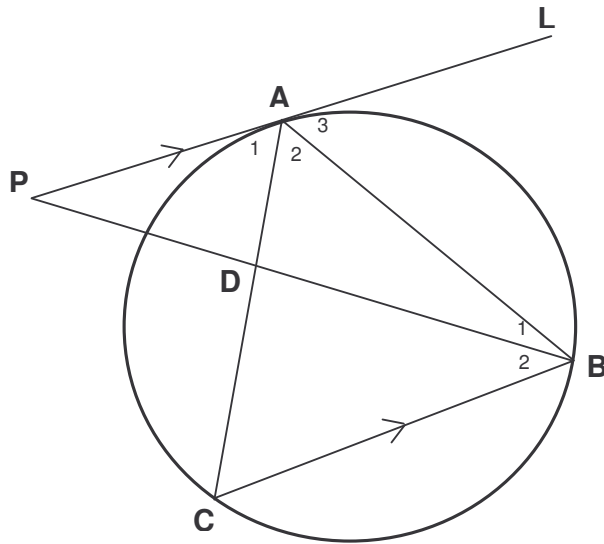
Option 2: $y = -0,07x^2 + 2,04x + 27,06$ with $r^2 = 0,978$

Which option best describes the relationship between the electricity and temperature? Explain your answer.

(3)
[14]

QUESTION 6

- 6.1 Given that PAL is a tangent to the circle at point A. $AP \parallel BC$, BP cuts AC at D.

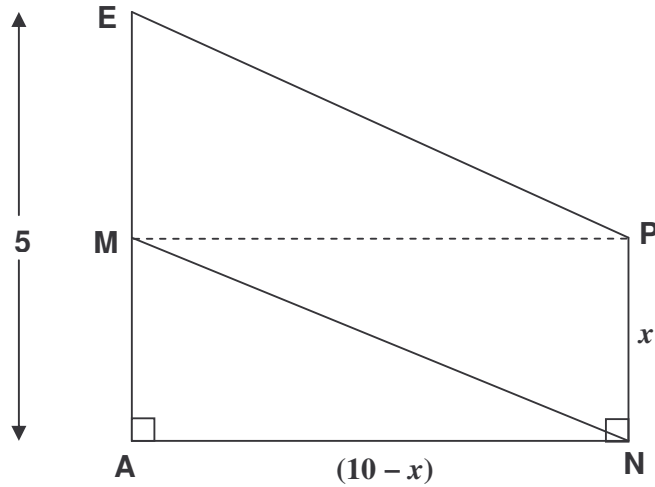


Prove that $\triangle ABC$ is an isosceles triangle.

(5)
[5]

QUESTION 7

In the diagram below, $EA \perp AN$ and $AN \perp PN$. $AN = (10 - x)$ units, $PN = x$ units and $EA = 5$ units.

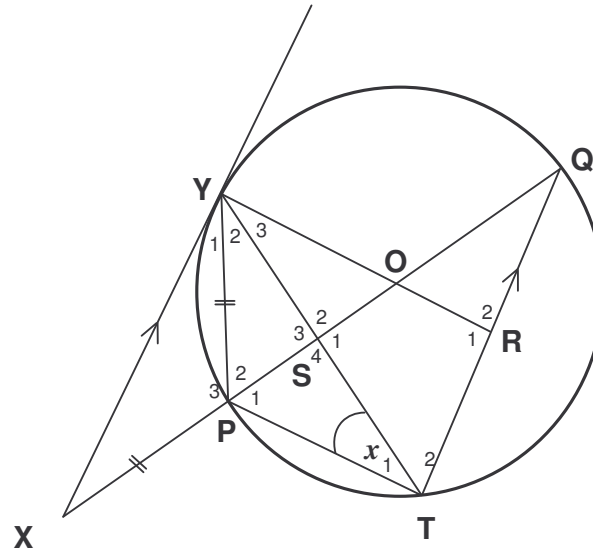


- 7.1 Calculate MN^2 in terms of x . (2)
- 7.2 Calculate EP^2 in terms of x . (2)
- 7.3 Determine the value of x , if $MN = EP$. (2)

[6]

QUESTION 8

In the diagram XY is a tangent to the circle, with centre O , at Y . XPO , YOR and YST are straight lines, $PX = PY$ and $XY \parallel TQ$. Let $\hat{T}_1 = x$.

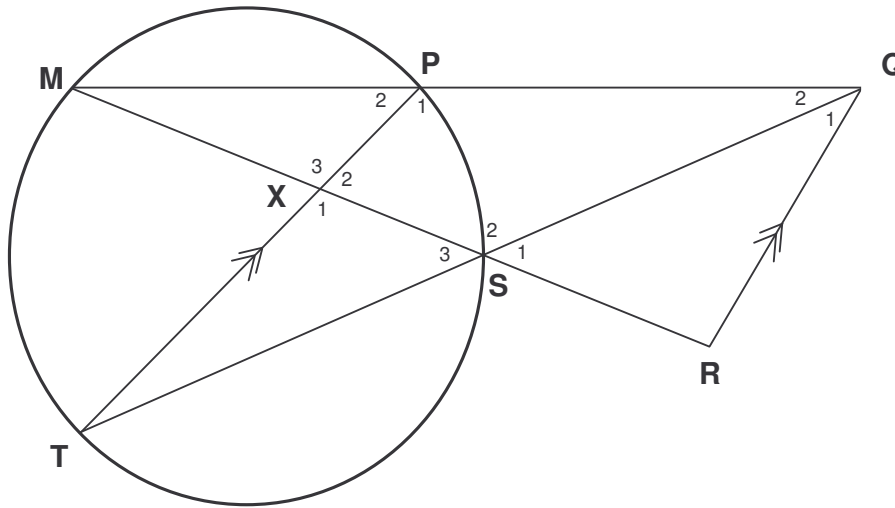


- 8.1 Find, with reasons, FOUR other angles each equal to x . (6)
- 8.2 Prove that $\hat{T}_2 = 2\hat{T}_1$ (3)
- 8.3 Determine the size of \hat{T}_1 . (2)
- 8.4 Show that SORT is a cyclic quadrilateral. (3)
- 8.5 Deduce that $TR = RQ$. (3)

[17]

QUESTION 9

In the diagram $TP \parallel RQ$. MPQ , $MXSR$, TXP and TSQ are all straight lines.



9.1 Prove that $\Delta SRQ \parallel \Delta QRM$. (4)

9.2 Prove that $\Delta QRM \parallel \Delta PXM$. (3)

9.3 Hence, deduce that $QR = \frac{SR \times MX}{PX}$. (5)

[12]

TOTAL: 100