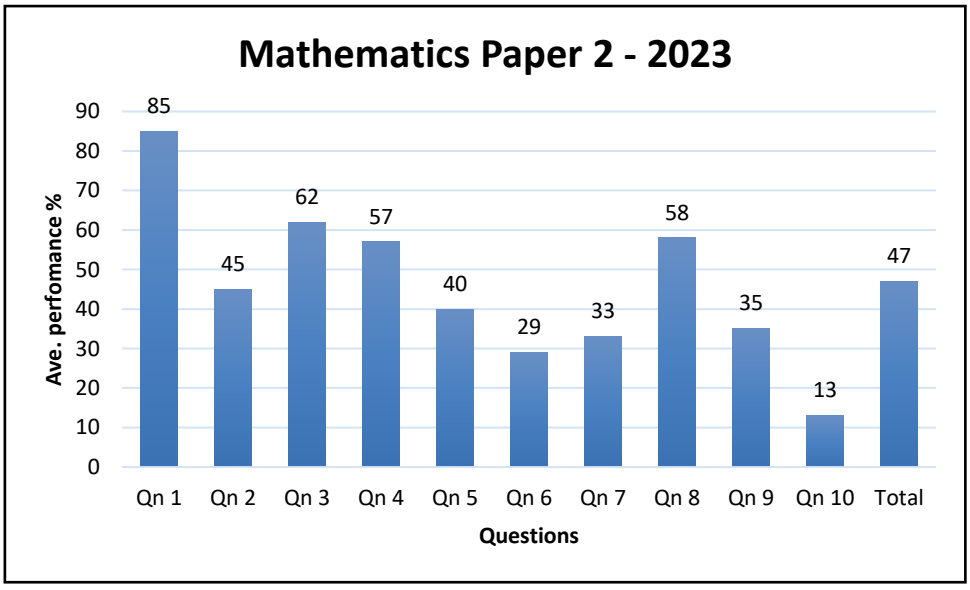
Province of the
EASTERN CAPE
EDUCATION

EXAMINATIONS AND ASSESSMENT CHIEF DIRECTORATE
Home of Examinations and Assessment, Zone 6, Zwelitsha, 5600
REPUBLIC OF SOUTH AFRICA, Website: www.ecdoe.gov.za

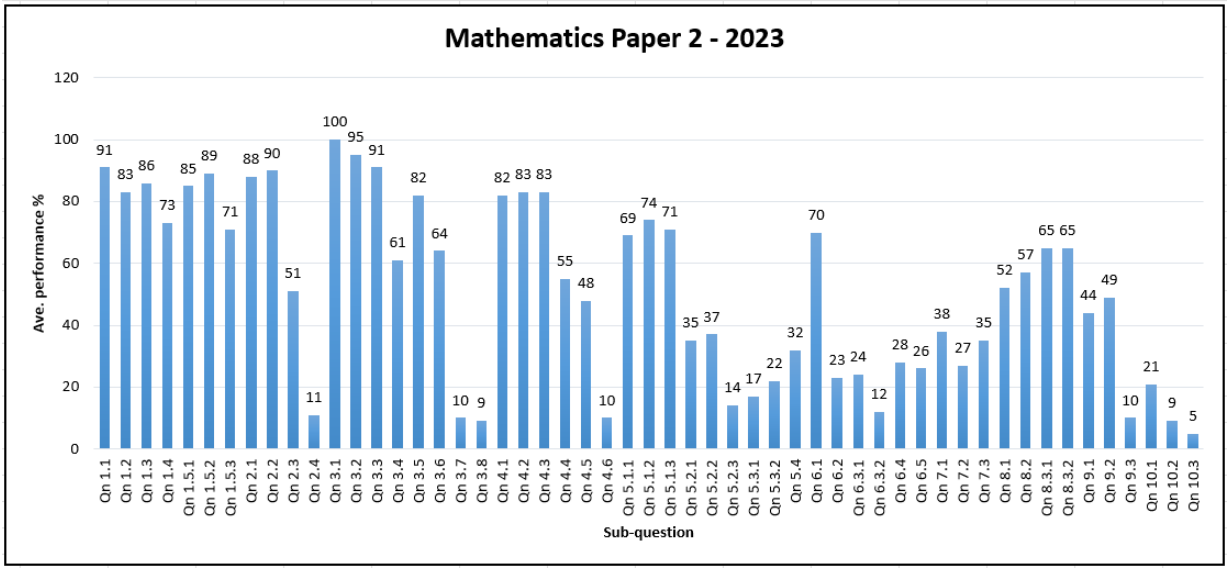
2023 NSC CHIEF MARKER'S REPORT

SUBJECT	**MATHEMATICS**		
QUESTION PAPER		2	
DURATION OF QUESTION PAPER	**3 HOURS**	**150 MARKS**	
PROVINCE	EASTERN CAPE		
DATES OF MARKING	**04/12/2023 – 18/12/2023**		

SECTION 1: (General overview of Learners Performance in the question paper as a whole)

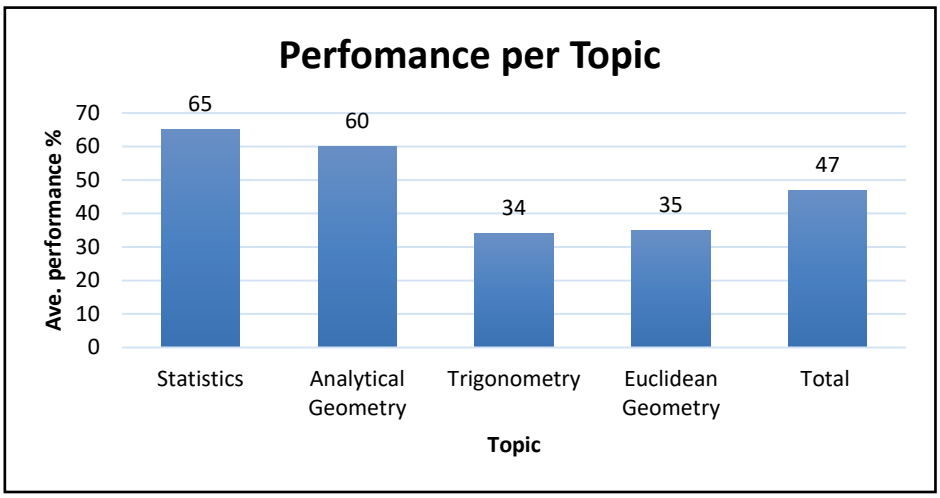


From the random sampled 100 scripts used to complete the Rasch Analysis candidates managed to get high marks in Question 1 which was testing grade 12 bivariate data. Calculator skill has been mastered by most candidates. Question 10, Euclidean Geometry was poorly answered.



From the sub question analysis, most candidates failed to answer 2.4, 3.7, 3.8, 4.6, 9.3, 10.2 and 10.3 properly. The sub questions above were the most poorly answered.

The performance per topic is depicted by the following graph. Paper 2 questions are drawn from 4 topics which are Statistics (20 marks), Analytical Geometry (40 marks), Trigonometry (50 marks) and Euclidean Geometry (40 marks).



Mark	Levels	Number of candidates
0 – 44	1	24
45 – 59	2	15
60 – 74	3	17
75 – 89	4	12
90 – 104	5	12
105 – 119	6	14
120 – 150	7	6
Total		100

SECTION 2: Comment on candidates' performance in individual questions

QUESTION 1

QUESTION 1

Truck drivers travel a certain distance and have a rest before travelling further. A driver kept record of the distance he travelled (in km) on 8 trips and the amount of time he rested (in minutes) before he continued his journey. The information is given in the table below.

Distance travelled (in km) (x)	180	200	400	600	170	350	270	300
Amount of rest time (in minutes) (y)	20	25	55	120	15	50	40	45

1.1 Determine the equation of the least squares regression line for the data. (3)

1.2 If a truck driver travelled 550 km, predict the amount of time (in minutes) that he should rest before continuing his journey. (2)

1.3 Write down the correlation coefficient for the data. (1)

1.4 Interpret your answer to QUESTION 1.3. (1)

1.5 At each stop, the truck driver spent money buying food and other refreshments. The amount spent (in rands) is given in the table below.

100	150	130	200	50	180	200	190

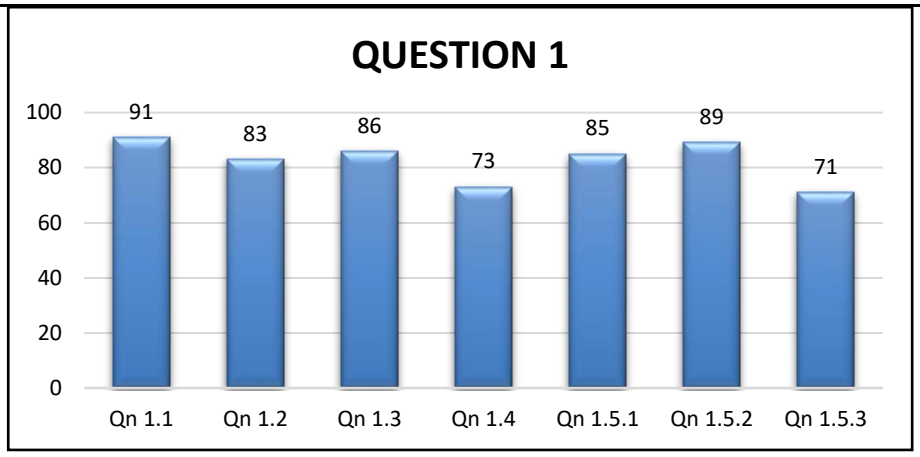
1.5.1 Calculate the mean amount of money he spent at each stop. (2)

1.5.2 Calculate the standard deviation for the data. (1)

1.5.3 At how many stops did the driver spend an amount that was less than one standard deviation below the mean? (2)

[12]

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?



Question 1 was testing Statistics skills and calculator skills. This was the most well answered question. The reason is basically that candidates were able to punch the values correctly without any mistakes. The tendency is normally that once a candidate managed to punch all the values correctly in the calculator then they will be able to score full marks in Question 1.2 – 1.4 and Question 1.5. These answers depend on whether you have punched calculator correctly. It is strongly advised that learners must be used to their calculators from as early as grade 10. This topic is difficult for learners to understand if they do not have calculators.

(b). Why were the questions poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

There are a few candidates who struggled to interpret the value of correlation coefficient (r). Learners should be encouraged to interpret the relation correctly. The correct interpretation should be as follows.

Value of r	Interpretation	Value of r	Interpretation
- 1	Perfect negative	1	Perfect positive
-1< r < -0,9	Very strong negative	0,9 < r <1	Very strong positive
-0,9 < r < 0,8	Strong negative	0,8 < r < 0,9	Strong positive
-0,8 < r < -0,7	Substantial negative	0,7 < r < 0,8	Substantial positive
-0,6 < r < -0,5	Moderate negative	0,5 < r < 0,6	Moderate positive
-0,5 < r < 0,2	Weak negative	0,2 < r < 0,5	Weak positive
0	No relationship		

In Question 1.5.3, candidates swopped mean and standard deviation that is $\partial x - \bar{x}$ instead of $\bar{x} - \partial x$. This led to losing one mark. Many candidates wasted their time looking for the range of within one standard deviation which was not required. Candidates must interpret the questions correctly before they start answering.

(c). Provide suggestions for improvement in relation to Teaching and Learning

Statistics knowledge must be built up from grade 10. All learners must get used to their own calculator; they must not get used to borrowing calculators when they are about to write examinations. The topic should be addressed well in grade 10, most candidates will get

maximum marks from the topic and boost their chances of passing if they have their own calculators when the topic is taught.
Regular assessment of the topic will boost learners' confidence. Teachers must plan and prepare thoroughly to teach the topic. All teachers are strongly advised to attend 1 + 9 workshops in their districts before they start a new topic. Subject advisors should effectively monitor curriculum coverage. Teachers must make sure that all learners have their calculators.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Many candidates are struggling with rounding off. This skill must always be assessed during the year. When commenting on the correlation many candidates are not mentioning positive or negative. Learners are supposed to be exposed to the calculator for them to calculate the mean, standard deviation, correlation coefficient, equation of the least squares regression line.

There are some candidates who swopped the values of A and B, others write the correct values of A and B but substitute them wrongly in the equation. In question 1.2, some candidates are substituting the 550 where there is y instead of where there is x. A few candidates rounded off the value of r and get 1 which becomes perfect. There are few candidates who calculated the range instead of the mean. In Question 1.5.3 many candidates leave the answer as interval, they are failing to count how many stops the driver spent less than R99,50. Reading data from graphs must be part of regular assessment.

QUESTION 2

QUESTION 2

At a certain school, the staff committee wanted to determine how many glasses of water the staff members drank during a school day. All teachers present on a specific day were interviewed. The information is shown in the table below.

NUMBER OF GLASSES OF WATER DRANK PER DAY	NUMBER OF STAFF MEMBERS
$0 \le x < 2$	5
$2 \le x < 4$	15
$4 \le x < 6$	13
$6 \le x < 8$	5
$8 \le x < 10$	2

2.1 Complete the cumulative frequency column provided in the table in the ANSWER BOOK. (2)

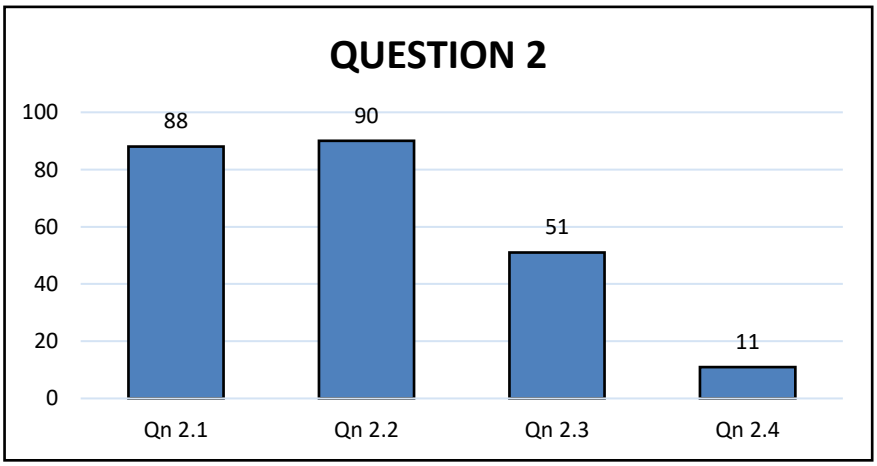
2.2 How many staff members were interviewed? (1)

2.3 How many staff members drank fewer than 6 glasses of water during a school day? (1)

2.4 The staff committee observed that k teachers were absent on the day of the interviews. It was found that half of these k teachers drank from 0 to fewer than 2 (that is $0 \le x < 2$) glasses of water per day, while the remainder of them drank from 4 to fewer than 6 (that is $4 \le x < 6$) glasses of water per day. When these k teachers are included in the data, the estimated mean is 4 glasses of water per staff member per day.

How many teachers were absent on the day of the interviews? (4)
[8]

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?



The question was not well answered by most of the candidates. Question 2.1 – 2.3 were well answered, but 2.4 was poorly answered. Many candidates were able to add the frequency to

get cumulative frequency. Question 2.2 and 2.3 depended on question 2.1, so many candidates were able to use the previous question (question 2.1) to get the two marks.

(b). Why were the questions poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Question 2.4 was poorly answered mainly because the question was too long, and many candidates who are First Additional Language speakers were not patient to read and answer the question. The question required candidates to correctly put half of the absent teachers in the correct interval. There are few candidates who struggled to complete the cumulative frequency column.

(c) Provide suggestions for improvement in relation to Teaching and Learning

The best way for learners to master higher order questions is for teachers to assess them regularly. All assessments tasks administered must have all cognitive levels. Teachers must also plan with other teachers and make sure that all the concepts are fully prepared and taught.

Statistics knowledge must be built up from grade 10. All learners must get used to their own calculator; they must not get used to borrowing calculators when they are about to write examinations. If the topic is well addressed from grade 10, most candidates will get maximum marks from the topic and boost their chance of passing.

Learners must be exposed on how to read information from graphs, tables, and cumulative frequency tables.

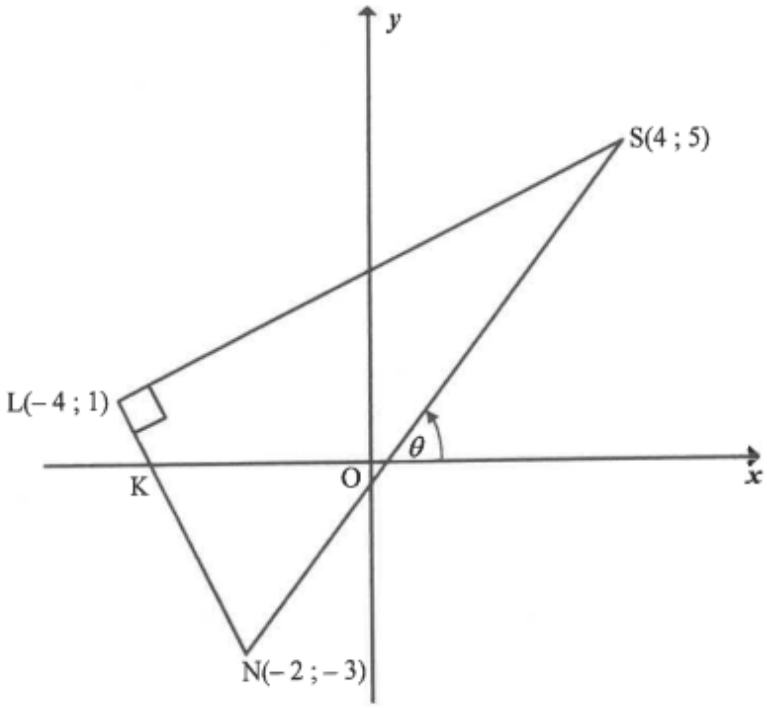
All teachers are strongly advised to attend 1 + 9 workshops in their districts before they start a new topic. The subject advisors must plan and arrange a day where teachers will meet and plan for the topic to be taught. Teachers must make sure that all learners have their calculators.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

There are some candidates who multiplied the upper boundary limits with the frequency to get the cumulative frequency. Candidates failed to read from cumulative frequency for them to answer question 2.3. Many candidates failed to apply the concept of estimated mean, a concept taught in grade 10. Many candidates did not attempt to answer question 2.4.

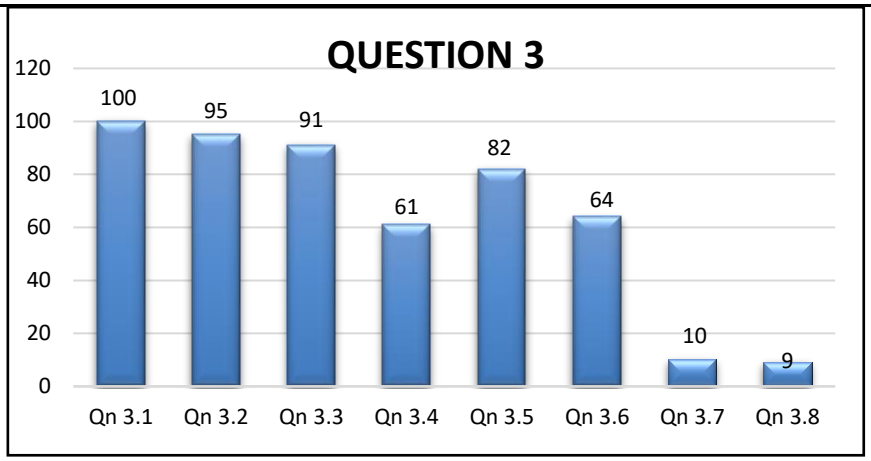
QUESTION 3

In the figure, L(−4 ; 1), S(4 ; 5) and N(−2 ; −3) are the vertices of a triangle having $S\hat{L}N = 90°$. LN intersects the x-axis at K.



3.1	Calculate the length of SL. Leave your answer in surd form.	(2)
3.2	Calculate the gradient of SN.	(2)
3.3	Calculate the size of θ, the angle of inclination of SN.	(2)
3.4	Calculate the size of $L\hat{N}S$.	(3)
3.5	Determine the equation of the line which passes through L and is parallel to SN. Write your answer in the form $y = mx + c$.	(3)
3.6	Calculate the area of ΔLSN.	(3)
3.7	Calculate the coordinates of point P, which is equidistant from L, S and N.	(3)
3.8	Calculate the size of $L\hat{P}S$.	(2)
		[20]

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?



Analytical Geometry from grade 10 and 11 was assessed in question 3. Most candidates were able to answer question 3.1 to 3.6 well except for 3.4 which was partially answered. There is evidence that most of the candidates revised thoroughly for this topic.

(b). Why were the questions poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Question 3.7 and 3.8 was poorly answered because many candidates failed to link and integrate the concept of angle subtend by diameter will be 90. Angle L was given as 90 that means SN will be the diameter and point P will be the midpoint of SN which is the centre of the circle. Most candidates calculated the midpoint of SN and then applied the parallelogram concept and calculated point P as

(6 ; 1) instead of (1 ; 1), many candidates lost marks. Question 3.8 depended on 3.7 many candidates did not attempt to answer the question. Question 3.4 was testing inclination of more than one line. Candidates mixed lines and were not able to identify the angle there were working with.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Teachers must always integrate other topics with Analytical Geometry. Team teaching and planning is always encouraged to master the topic. When revising with learners, there must be a session where integration of topics is revised in class. Subject advisors are strongly advised to monitor curriculum coverage thoroughly.

(d)Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

In question 3.1 there are a few candidates who struggled to substitute in the distance formula. The instruction of leaving the answer in surd form was not followed by some of the candidates. There are still candidates who are failing to calculate the gradient properly. The few candidates who got the wrong answer were calculating $m = \frac{x_2 - x_1}{y_2 - y_1}$ instead of $m = \frac{y_2 - y_1}{x_2 - x_1}$. In question 3.4 some candidates lost marks when they did not indicate the angle LKO. In question 3.5 some candidates substituted the coordinates of S instead of L.

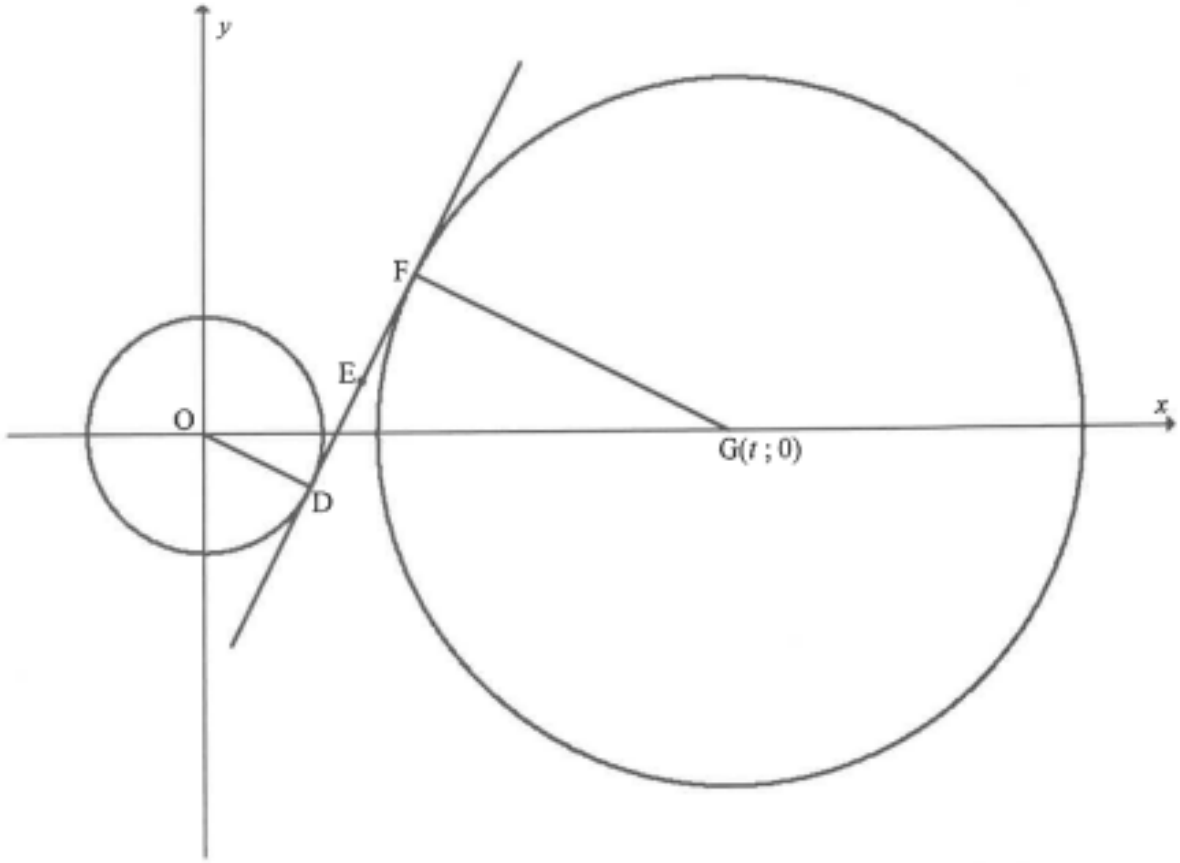
Some candidates used angle θ when calculating angle LKO, yet θ was given as angle of

inclination of line NS. A few candidates calculated the x intercept of line LN and SN and then calculated the length of the sides below the x axis.

Learners must be encouraged to use the diagram provided in the answer booklet to indicate all the angles that they have calculated to reach their answers. Teachers must always expose learners to the use of diagrams by always providing learners with diagram sheets when they are assessing them during the year.

QUESTION 4

In the diagram, the circle with centre O has the equation $x^2 + y^2 = 20$. $G(t\ ;\ 0)$ is the centre of the larger circle. A common tangent touches the circles at D and F respectively, such that $D(p\ ;\ -2)$ lies in the 4th quadrant.



4.1 Given that $D(p\ ;\ -2)$ lies on the smaller circle, show that $p = 4$. (2)

4.2 $E(6\ ;\ 2)$ is the midpoint of DF. Determine the coordinates of F. (3)

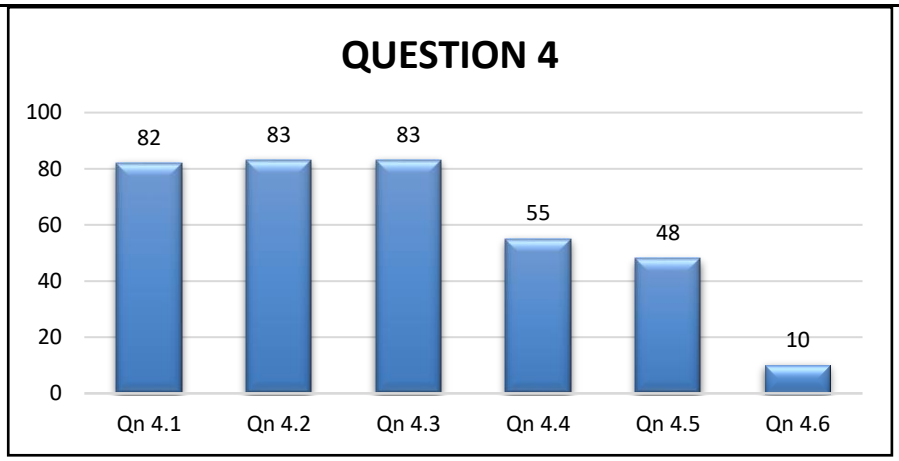
4.3 Determine the equation of the common tangent, DF, in the form $y = mx + c$. (4)

4.4 Calculate the value of t. Show ALL working. (3)

4.5 Determine the equation of the larger circle in the form $ax^2 + by^2 + cx + dy + e = 0$. (4)

4.6 The smaller circle must be translated by k units along the x-axis to touch the larger circle internally. Calculate the possible values of k. (4)

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?



Grade 12 Analytical Geometry was assesed. Only question 4.1 to 4.3 were well answered by most of the candidates. The candidates who were well taught circles were getting the maximum marks.

(b). Why were the questions poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

The candidates who got low marks failed to substitute the coordinates of D to calculate the value of p. Many candidates failed to recognize that FG is perpendicular to FD in question 4.4. Most of the candidates got 4.5 wrong because the radius was written as zero. Question 4.6 was a higher order question that many candidates failed to answer. Many of the candidates did not attempt to answer the question at all.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Translation of circles is part of the CAPS and it must be addressed well during the academic year. The concept of transformation must be carefully integrated in Analytical Geometry otherwise learners will lose a lot of marks. Learners must be encouraged to name the angles that they are working with. Regular assessment of the topic is strongly recommended.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Some candidates substituted the value of x instead of y in question 4.1. There are some candidates who failed to use brackets and ended up getting wrong answer, for example instead of getting $(-2)^2 = 4$, they get $-2^2 = -4$. In question 4.2 many candidates calculated the midpoint of DF instead of applying the midpoint formula to calculate the coordinates of F. In question 4.3 candidates swopped the x coordinate and y coordinate when substituting in the equation of the straight-line DF. Some are getting the negative slope of the line. Candidates must be encouraged to check the slope of the line so that they correct themselves and avoid losing marks.

There are candidates who used the equation of DF and substitute the coordinates of G to get a wrong value of t. in question 4.5, candidates failed to follow instructions and left the equation of the circle as $(x-a)^2 + (y-b)^2 = r^2$ instead of $ax^2 + by^2 + cx + dy + e = 0$. Most of the candidates did not attempt question 4.6.

The formula for gradient has been incorrectly used by some candidates, instead of calculating $m = \frac{y_2 - y_1}{x_2 - x_1}$ they used $m = \frac{x_2 - x_1}{y_2 - y_1}$. Application of perpendicular lines is still a challenge and must be addressed adequately. The concept of collinear points, parallel lines and perpendicular must be emphasized thoroughly.

QUESTION 5

5.1 Given: $\sin\beta = \frac{1}{3}$, where $\beta \in (90° ; 270°)$

Without using a calculator, determine each of the following:

5.1.1 $\cos\beta$ (3)

5.1.2 $\sin 2\beta$ (3)

5.1.3 $\cos(450° - \beta)$ (3)

5.2 Given: $\frac{\cos^4 x + \sin^2 x.\cos^2 x}{1 + \sin x}$

5.2.1 Prove that $\frac{\cos^4 x + \sin^2 x.\cos^2 x}{1 + \sin x} = 1 - \sin x$ (4)

5.2.2 For what value(s) of x in the interval $x \in [0° ; 360°]$ is $\frac{\cos^4 x + \sin^2 x.\cos^2 x}{1 + \sin x}$ undefined? (2)

5.2.3 Write down the minimum value of the function defined by $y = \frac{\cos^4 x + \sin^2 x.\cos^2 x}{1 + \sin x}$ (2)

5.3 Given: $\cos(A - B) = \cos A\cos B + \sin A\sin B$

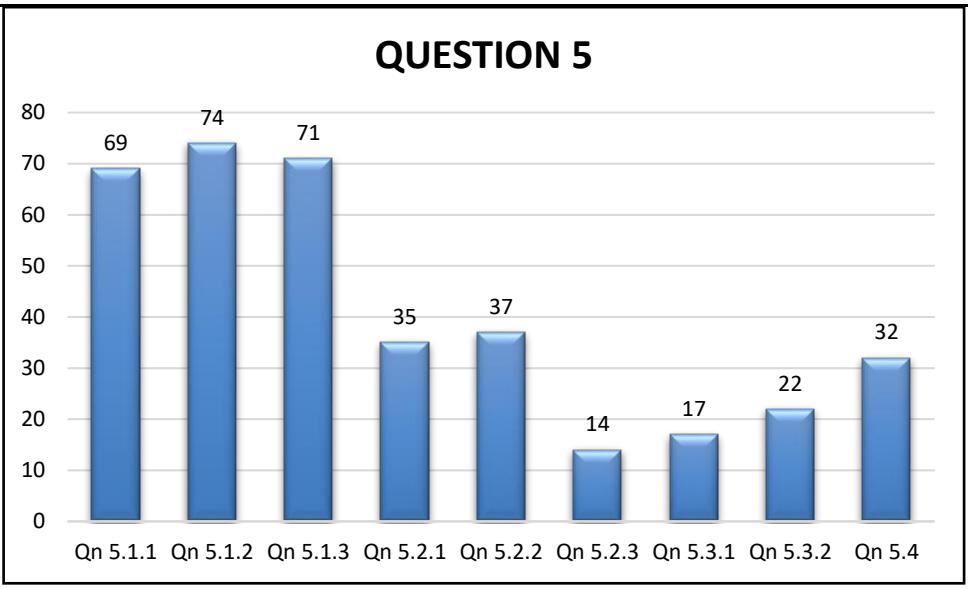
5.3.1 Use the above identity to deduce that $\sin(A - B) = \sin A\cos B - \cos A\sin B$ (3)

5.3.2 Hence, or otherwise, determine the general solution of the equation $\sin 48°\cos x - \cos 48°\sin x = \cos 2x$ (5)

5.4 Simplify $\frac{\sin 3x + \sin x}{\cos 2x + 1}$ to a single trigonometric ratio. (6)

[31]

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?



Question 5.1 was well answered because it was assessing on the basics of Trigonometry. Many candidates were able to score some marks in the following sub questions.

(b). Why were the questions poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Question 5.2 to 5.4 were poorly answered because candidates did not apply the identities properly, others failed to simplify Trigonometric expressions. Question 5.3.1 was straight forward book work proof but many candidates failed to use the co ratio of sine to deduce the compound angle identity. Question 5.3.2 was a follow up question to the book work which candidates were supposed to score high marks, but they failed to link with the previous question.

Question 5.4 was also poorly answered because candidates failed to break $3x$ to $2x + x$ and expand. Some candidates failed to use the correct identity for $cos2x$.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Trigonometry is taught as the last topic in Term One when learners are busy writing March tests. Many teachers fail to adequately teach and revise with learners before they write the examination. Schools must not treat March Test as examinations. Teaching must still carry on during the weeks that tests are administered. Trigonometry carries 50 marks in paper 2, therefore the topic must be thoroughly taught, assessed, and revised. Subject advisors, principals and teachers must ensure Annual Teaching Plan is adequately for each term. Minimum / maximum value of the graphs need to be emphasized.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Some candidates drew the diagram in the first quadrant instead of second quadrant and failed to substitute and simplify Pythagoras theorem. There are some that failed to choose the correct value for x. There are candidates who failed to apply reduction formulae properly. In

question 5.1.2 there are some candidates who failed to write the correct double angle of $sin2x$, they wrote it as $2sinx$ instead of $2sinxcosx$.

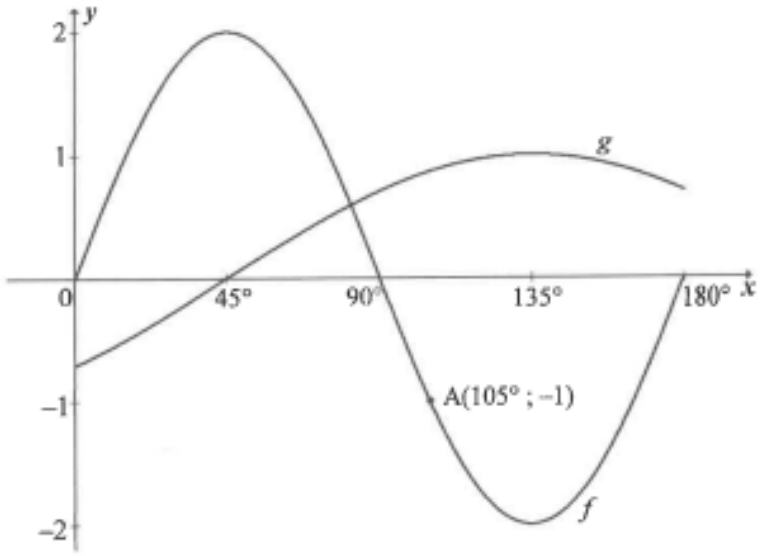
In question 5.4 candidates failed to expand $\sin(3x)$ correctly. Many candidates failed to prove the identity because they failed to manipulate Trigonometric expressions when removing brackets. Application of minimum value was poorly answered because candidates failed to link the Left-Hand Side and the Right-Hand Side of the expression. Some candidates struggled with the general solution, and they lost marks for not considering both quadrants and not writing k as an integer. Some candidates write the minimum value as $x = 0$ instead of $y = 0$. Minimum and maximum values refer to the y values of the function.

Candidates wrote the general solution whilst they were to give a specific angle.

The topic must be thoroughly assessed and revised. All topic tests must include Trigonometric questions.

QUESTION 6

In the diagram, the graphs of $f(x)=2\sin 2x$ and $g(x)=-\cos(x+45°)$ are drawn for the interval $x\in[0°;180°]$. A$(105°;-1)$ lies on f.



6.1 Write down the period of f. (1)

6.2 Determine the range of g in the interval $x \in [0° ; 180°]$. (2)

6.3 Determine the values of x, in the interval $x \in [0° ; 180°]$, for which:

6.3.1 $f(x).g(x)>0$ (2)

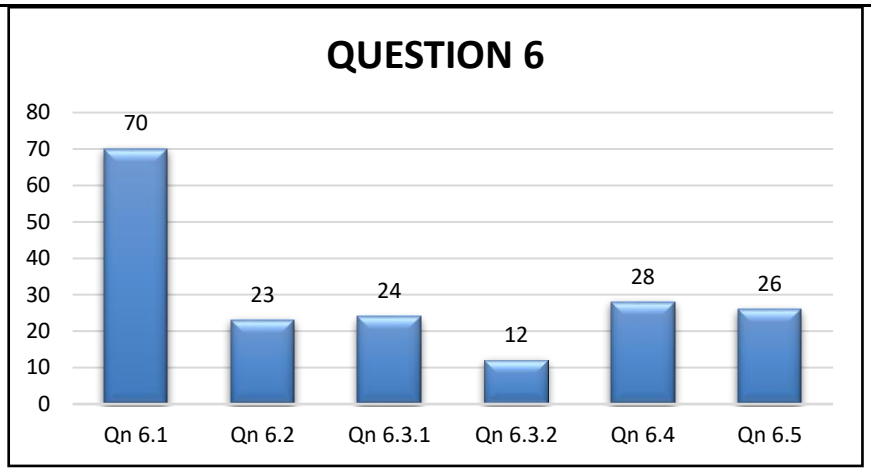
6.3.2 $f(x)+1\leq 0$ (2)

6.4 Another graph p is defined as $p(x)=-f(x)$. D$(k;-1)$ lies on p. Determine the value(s) of k in the interval $x \in [0° ; 180°]$. (3)

6.5 Graph h is obtained when g is translated $45°$ to the left. Determine the equation of h. Write your answer in its simplest form. (2)

[12]

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?



Question 6.1 was well answered by most candidates. The basic concept was taught in grade 10 and advanced in grade 11. The concept was mastered properly.

(b). Why were the questions poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

The questions 6.2 to 6.5 were poorly answered because Trigonometric graphs and application is not adequately covered during teaching and learning. Revision of Trigonometric graphs should be done before June examinations. Transformation is a concept that should be integrated when graphs are being taught.

The topic must be assessed regularly.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Trigonometric graph is a concept that learners are likely to score high markers if they are taught well. Teachers must attend workshops organized by the district subject advisors to address content gap in the topic. 1 + 9 workshops can be utilized to assist with preparation of the topic before it is taught.

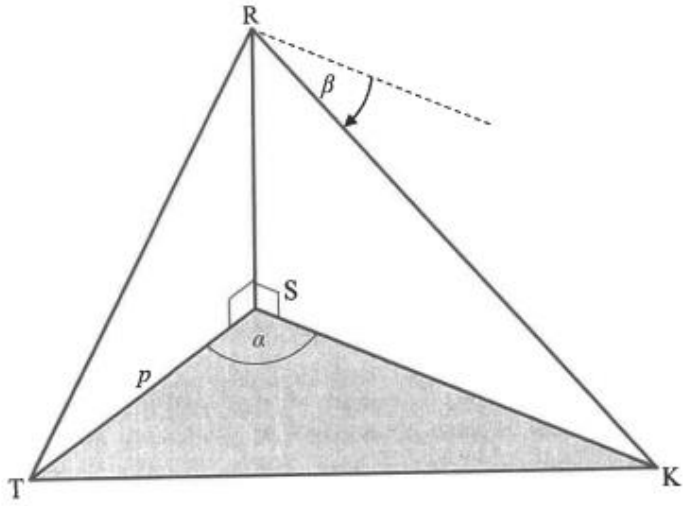
(d)Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Candidates failed to read information from the graph. Many wrote the lower limit of the range as -1 instead of $-0{,}7071$. A few candidates wrote the domain as range. Interval notation was not properly done in the three questions that were asking about interval notation. Some candidates wrote the period as the interval for example $p = (0°; 180°)$. In question 6.3 candidates lost marks for wrong notation even if the end points were correct. Transformation concept was not answered properly as well as reduction of $-\cos(x + 90°)$. In question 6.4 candidates left their answers as general solution, they did not get the specific angle in the interval.

Reading from the Trigonometric graphs should be done thoroughly in grade 10 using one graph before integrating with other graphs. When teaching Functions, interpretation of graphs must be thoroughly taught.

QUESTION 7

In the diagram, S, T and K lie in the same horizontal plane. RS is a vertical tower. The angle of depression from R to K is β. $\hat{TSK} = \alpha$, TS = p metres and the area of ΔSTK is q m^2.

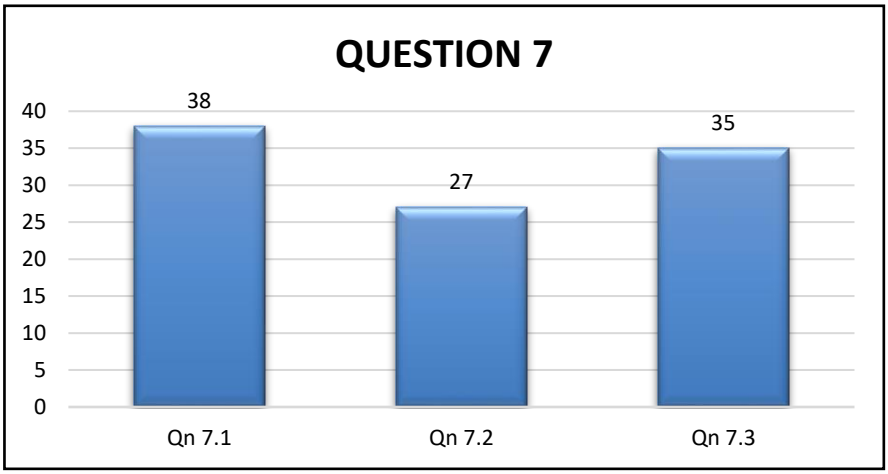


7.1 Determine the length of SK in terms of p, q and α. (2)

7.2 Show that $RS = \dfrac{2q \tan \beta}{p \sin \alpha}$ (2)

7.3 Calculate the size of α if $\alpha < 90°$ and RS = 70 m, p = 80 m, q = 2 500 m^2 and $\beta = 42°$. (3)
[7]

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?



Question 7.1 was fairly answered. 3D Trigonometry is another concept that is not being fully addressed in teaching and assessment.

(b). Why were the questions poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

The question was poorly answered probably because the topic was not thoroughly taught in class. The

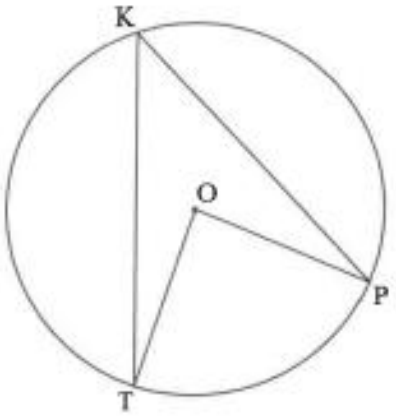
concept is supposed to be addressed properly in grade 11. The candidates failed to identify the correct triangle to work with.

(c) Provide suggestions for improvement in relation to Teaching and Learning
The 2 D Trigonometry should be thoroughly taught in grade 11, and more exercises should be given when learners are in grade 12 including 3 D Trigonometry.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.
Most candidates failed to read the information given and analyse the 3 D diagram. Many failed to recognize and use the right-angled triangle. Most candidates were not able to choose the correct angles and sides to apply in the sine rule and area rule. Many candidates struggled to make SK the subject of the formula. Many candidates failed to apply the concept of angle of depression to find angle RKS. There are quite a few candidates who failed to substitute and simplify to get the required angle.

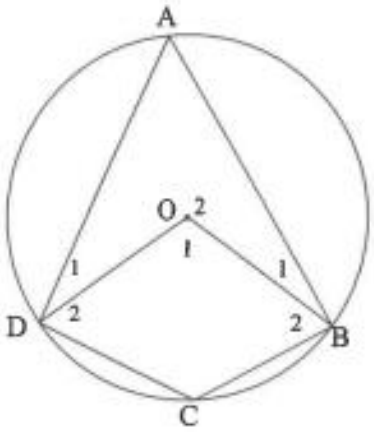
QUESTION 8

8.1 In the diagram, O is the centre of the circle.



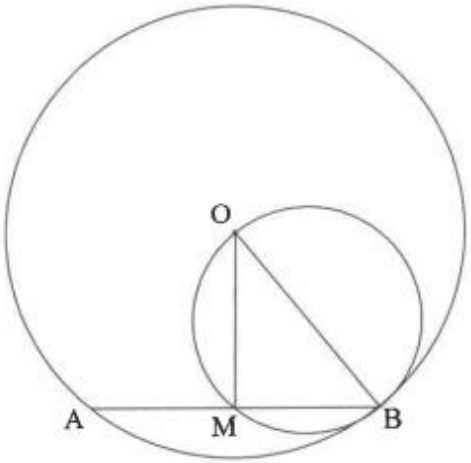
Use the diagram above to prove the theorem which states that the angle subtended by a chord at the centre of the circle is equal to twice the angle subtended by the same chord at the circumference, that is, prove that $T\hat{O}P = 2T\hat{K}P$. (5)

8.2 In the diagram, O is the centre of the circle and ABCD is a cyclic quadrilateral. OB and OD are drawn.



If $\hat{O}_1 = 4x + 100°$ and $\hat{C} = x + 34°$, calculate, giving reasons, the size of x. (5)

8.3 In the diagram, O is the centre of the larger circle. OB is a diameter of the smaller circle. Chord AB of the larger circle intersects the smaller circle at M and B.

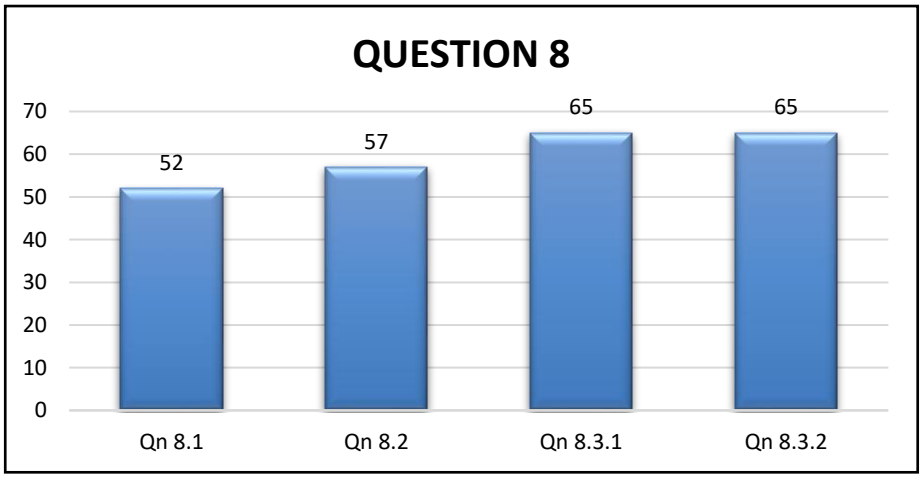


8.3.1 Write down the size of $O\hat{M}B$. Provide a reason. (2)

8.3.2 If $AB = \sqrt{300}$ units and $OM = 5$ units, calculate, giving reasons, the length of OB. (4)

[16]

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?



The application of Euclidean Geometry was well answered.

(b). Why were the questions poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

The formal theorem of Euclidean Geometry was done in grade 11 but many candidates failed to get full marks in the question. In Question 8.1 some candidates failed to construct the line joining KO produced and as it became breakdown and candidates lost marks. In Question 8.2 they failed to link the two angles that will give them the required answer of $x = 32°$. The mistakes, that were done by many candidates was to multiply angle O_1 by 2 to get A instead of dividing by 2. In question 8.3 candidates lost marks for writing wrong reasons for example in 8.3.1 many wrote line from centre perpendicular to the chord instead of writing angle in a

semicircle or angle subtended by diameter. In question 8.3.2 many candidates failed to use Pythagoras theorem properly and wrote a wrong a reason for the statement AM = MB.

(c) Provide suggestions for improvement in relation to Teaching and Learning

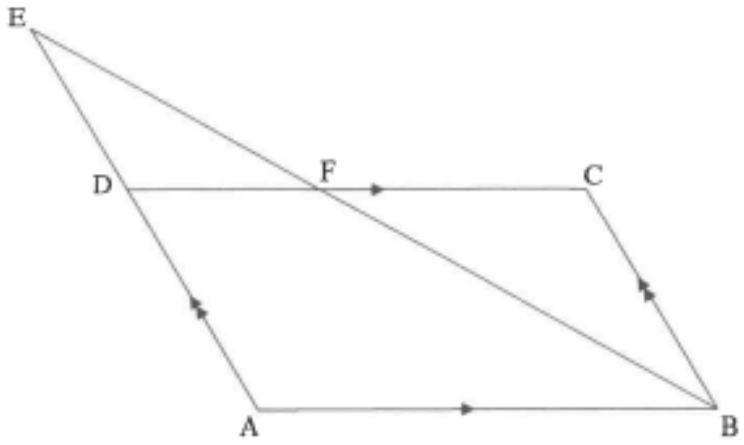
Formal proofs should be over emphasized when teaching the concept. Solving riders must be done on a regular basis. If Euclidean Geometry can be taught adequately learners will be confident to solve riders. Subject advisors should arrange more workshops to cater for content gap that teachers might have.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Candidates failed to construct and name angles properly. There are candidates who used tan chord theorem and angles in the same segment theorems to prove that angle at the centre is twice the angle at the circumference. These theorems are proved using angle at the centre is twice the angle angle at the circumference. In question 8.2 many candidates failed to connect the two angles that can be used to give them the correct answer.

QUESTION 9

In the diagram, ABCD is a parallelogram with AB = 14 units. AD is produced to E such that AD : DE = 4 : 3. EB intersects DC in F. EB = 21 units.

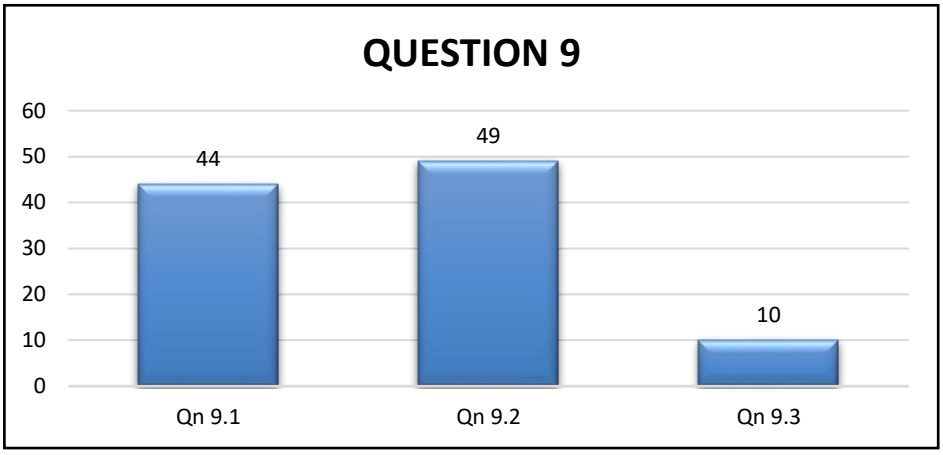


9.1 Calculate, with reasons, the length of FB. (3)

9.2 Prove, with reasons, that $\Delta EDF \,|||\, \Delta EAB$. (3)

9.3 Calculate, with reasons, the length of FC. (3)
[9]

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?



Question 9.2 was well answered because candidates did not struggle in matching the angles since it was given.

(b) Why were the questions poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Proportional theorem question was not well answered as most candidates lost marks for not writing the correct reason and indicating parallel lines. There are some candidates who applied the midpoint theorem, some failed to write correct ratios. In question 9.3 they equated the ratio to the actual length.

(c) Provide suggestions for improvement in relation to Teaching and Learning

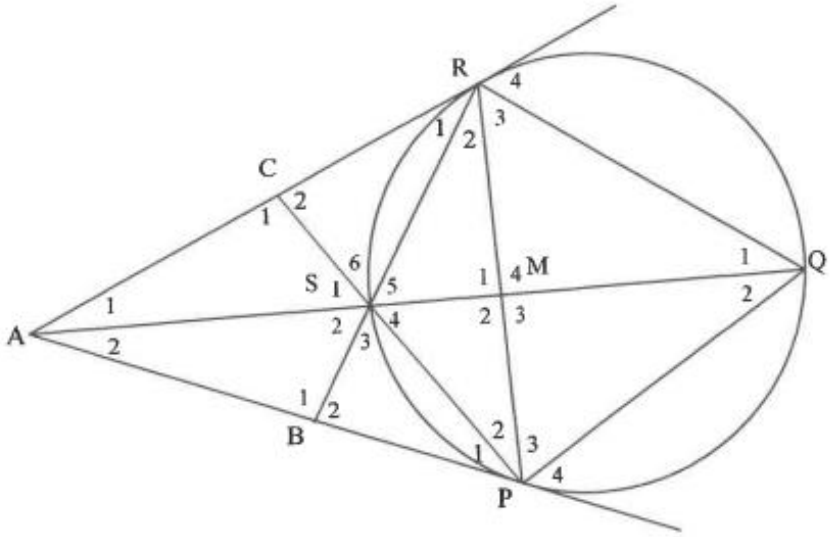
Proportional theorem must be taught thoroughly and revised adequately for learners to get more marks. 1 + 9 planning workshops organised by subject advisors should be done on a regular basis. The use of technological applets for example Geogebra must be used to make learners understand the topic better.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Some candidates wrote proportional theorem without indicating the parallel lines. In question 9.2 there are candidates that wrote third angle of triangle as a reason, yet they were referring to the second angle. It must be clear that reasons like third angle and sum of angles in a triangle must be written when referring to the third angle only and logic must be followed always. Proportional theorem reason must be accompanied by parallel lines.
In question 9.3 many candidates assumed that DF is half of AB.

QUESTION 10

In the diagram, PQRS is a cyclic quadrilateral such that PQ = PR. The tangents to the circle through P and R meet QS produced at A. RS is produced to meet tangent AP at B. PS is produced to meet tangent AR at C. PR and QS intersect at M.



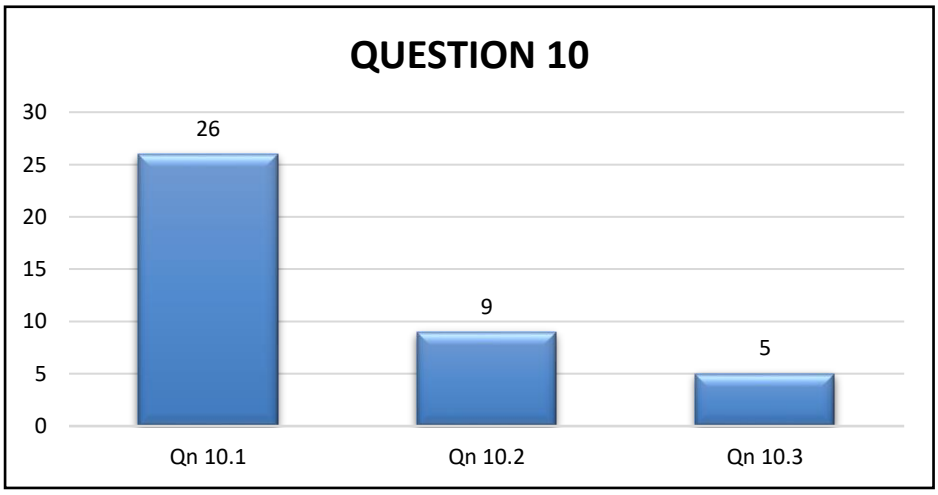
Prove, giving reasons, that:

10.1 $\hat{S}_3 = \hat{S}_4$ (5)

10.2 SMRC is a cyclic quadrilateral (4)

10.3 RP is a tangent to the circle passing through P, S and A at P (6)
[15]

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?



Question 10 was poorly answered with the average of 14%. Most of the candidates failed to find a set of exterior angles to work with and conclude that $S_3 = S_4$.

(b). Why were the questions poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.
One of the possible reasons candidates failed to get the correct answer was that the diagram was overcrowded with many small numbers. It took time for candidates to analyse the diagram and answer the questions. Some candidates used their own methods that are not in the marking guideline.

(c) Provide suggestions for improvement in relation to Teaching and Learning
Euclidean Geometry must be taught thoroughly and revised adequately for learners to get more marks. 1 + 9 planning workshops organised by subject advisors should be done on a regular basis. The use of technological applets for example Geogebra must be used to make learners understand the topic better. The best way to pass Euclidean geometry is to practice.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.
A few candidates assumed that APQR is a kite. There were candidates who were just throwing statements and reasons, but they did not led them to the required solution.