Province of the
EASTERN CAPE
EDUCATION

FET CURRICULUM: FET MATHEMATICS

A COMPILATION OF 2018 TRIAL PAPERS FROM DIFFERENT PROVINCES.

MATHEMATICS PAPER 1

FINAL PUSH REVISION MATERIAL

FROM 1 OCTOBER 2018 ONWARDS!

THE 50 HOUR PROGRAMME:

ENSURE YOU HAVE AT LEAST 50 HOURS OF INTENSIVE REVISION BEFORE YOU WRITE YOUR FINAL EXAMINATION FROM 1 OCTOBER 2018!

- **ATTEND ALL REVISION CLASSES AT YOUR SCHOOL/ CENTRE!**
- **REVISE ALL TOPICS, STARTING FROM THE ONES YOU CAN COLLECT A LOT OF MARKS FROM TO THE LAST ONE!**
- **WATCH AND LISTEN TO PROGRAMMES BROADCASTING MATHEMATICS ON TV AND RADIO AND USE NEWSPAPERS WITH MATHEMATICS SUPPLEMENTS! E.T.C**

REMEMBER: HARDWORK NEVER KILLS!!! SO, PRACTICE! PRACTICE! PRACTICE!

1. ALGEBRA, EQUATIONS AND INEQUALITIES

FREE STATE

QUESTION 1

1.1 Solve for x:

1.1.1 $-3x^2+2x+2=0$ (Round off the answer to TWO decimal places)
(3)

1.1.2 $x^2+2x-3=5$ (3)

1.1.3 $x^2-2x-15\leq 0$ (3)

1.1.4 $-\sqrt{2x-1}=2-x$ (4)

1.1.5 $7.3^x-3^{x+1}=36$ (3)

1.2 Solve x and y simultaneously:

$2x-1=y$ and $x^2-xy=3x-3$ (5)

1.3 Simplify without using a calculator:

$\sqrt{5}.\sqrt{125}-\frac{5^x.5^{x+1}}{5^{2x}}$ (3)

[24]

GAUTENG

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2-x-30=0$ (2)

1.1.2 $3x^2-8x=4$ (correct to TWO decimal places) (4)

1.1.3 $\sqrt{5-x}-x=1$ (5)

1.1.4 $\frac{6x^2-3x}{3}\leq 3x^2$ (5)

1.1.5 $2^{x+2}+7\sqrt{2^x}=2$ (5)

1.2 Prove that the equation $6x^2+2px-3x-p=0$ has rational roots for all rational values of p. (4)

[25]

LIMPOPO

QUESTION 1

1.1 Solve for x:

1.1.1 $(x-3)(x+1)=0$ (2)

1.1.2 $x^2 - x = 4$ (correct to two decimal places) (4)

1.1.3 $x+\sqrt{x-2}=4$ (5)

1.1.4 $x(2x-1)\geq 0$ (3)

1.2 Given: $P = \dfrac{4^{x+3}+4^{x}}{8^{x+2}+8^{x}}$

1.2.1 Simplify P fully. (4)

1.2.2 Hence solve for x if $P = 8$. (2)

1.3 Given: $3y=-3+x+x^2$ and $\sum_{k=3}^{4} x(k-2)^2 = 5y$

Determine x and y. (5)

$x(3-2)^2 + x(4-2)^2 = 5y$

$x + 4x = 5y$

[25]

NORTH WEST

QUESTION 1

1.1 Solve for x:

1.1.1 $2x(5x-3)=0$ (2)

1.1.2 $-x^2+4=5x$ (Leave your answer correct to TWO decimal places.) (4)

1.1.3 $\sqrt{x-6}-2=\dfrac{15}{\sqrt{x-6}}$ (5)

1.1.4 $(x^2+2)(x-3)<0$ (2)

1.2 Solve for x and y simultaneously:

$x+2y=3$ and $3x^2+4xy+9y^2-16=0$ (6)

1.3 Determine the sum of the digits of: $2^{2022} . 5^{2018}$ (4)

[23]

KZN

QUESTION 1

1.1 Solve for x:

1.1.1 $\frac{x}{2}(x-5)=0$ (2)

1.1.2 $3x^2+4x=2$, correct to TWO decimal places. (4)

1.1.3 $\sqrt{2x+3}=x$ (4)

1.1.4 $9^x=4.3^x$, correct to TWO decimal places. (5)

1.2 Solve the following equations simultaneously:

$x=2y$ and $\frac{-4}{x}+\frac{y}{2}=1\frac{1}{2}$ (6)

1.3 $2^{-x}(x+4)\leq 0$ (4)

[25]

MPUMALANGA

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2+5x+6=0$ (2)

1.1.2 $x(2x-5)+1=0$ (5)

1.1.3 $3x^2-8x+4>0$ (3)

1.2 Solve for x and y in the following simultaneously:

$$y+\frac{1}{2}x=2$$

$$x^2+y^2+6x=4y-4$$ (7)

1.3 Determine for which values of p will the equation $px^2+(p-2)x+p=0$ have equal roots. (5)

[26]

EASTERN CAPE

QUESTION 1

1.1 Solve for x:

1.1.1 $\frac{1}{2}x^2 - x - 4 = 0$ (3)

1.1.2 $-3(x^2 + 3x) + 7 = 0$ (correct to two decimal places) (4)

1.1.3 $2x^2 - 3x < 0$ (4)

1.2 Solve for x and y simultaneously in the following equations:

$$x - 2y = 3 \quad \text{and} \quad 4x^2 - 3 = -6y + 5xy$$ (6)

1.3 Prove that the roots of $2x^2 - (k-1)x + k - 3 = 0$ are real for all real values of k. (5)

1.4 Given: $3^{2m} = \dfrac{3p}{3-p}$, where $p \neq 3$.

1.4.1 Calculate the value of m if $p = 1{,}5$ (2)

1.4.2 Calculate the value of p if $m = 0$ (2)

[26]

2. NUMBER PATTERNS, SEQUENCES AND SERIES

FREE STATE

QUESTION 2

2.1 Consider the arithmetic sequence: $3\,;-2\,;-7\,;-12\,;...$

2.1.1 Calculate the 21^{st} term of the sequence. (2)

2.1.2 Which term of the sequence is equal to -177? (2)

2.2 The sum of the first terms in an arithmetic series is given by: $S_n = n^2 - 2n$

Calculate:

2.2.1 the sum of the first 13 terms. (2)

2.2.2 the 13^{th} term. (2)

2.3 Given the quadratic pattern: $x\,;6\,;9\,;y\,;24;...$

Calculate the sum of x and y. (5)

[13]

QUESTION 3

3.1 Prove that $a + ar + ar^2 + ...$ (to n terms) $= \dfrac{a(1-r^n)}{1-r}, r \neq 1$ (4)

3.2 Given: $\sum_{k=1}^{\infty} 4(0,2)^{k-1}$

3.2.1 Write down the first THREE terms of the series. (1)

3.2.2 Calculate the sum to infinity of the series. (3)

3.2.3 Hence calculate the smallest number of terms of the series whose sum will differ by less than 0,0001 from the sum to infinity of the series. (5)

[13]

GAUTENG

QUESTION 2

2.1 Calculate the number of terms in the following arithmetic sequence:

$6;\ 1;\ -4;\ -9;\ ...\ ;-239$ (3)

2.2 The 3^{rd} term of a geometric series is 18 and the 5^{th} term is 162.
Determine the sum of the first 7 terms, where $r < 0$. (6)

2.3 The following terms form a quadratic sequence:
$3;\ x;\ 11;\ 21;\ 35;\ ...$
Determine the value of x. (3)

2.4 The first term of a geometric sequence is 9. The ratio of the sum of the first eight terms to the sum of the first four terms is 97 : 81.
Determine the first THREE terms of the sequence, if all terms are positive. (6)

2.5 Consider the infinite geometric series:
$2(p-5)+2(p-5)^2+2(p-5)^3+...$

2.5.1 For which value(s) of p is the series convergent? (3)

2.5.2 If $p=4\frac{1}{2}$, calculate S_∞. (3)

[24]

LIMPOPO

QUESTION 2

The first four terms of a quadratic sequence are: $10-3y$; 7 ; 15 ; $8y+1$..

2.1 Calculate y. (4)

2.2 If $y=3$, determine T_n (4)

2.3 Determine the first term in this quadratic sequence that is greater than 2157 (3)

[11]

QUESTION 3

3.1 The first two terms of an arithmetic series are p and q.
Express the following in terms of : p and q. Leave answers as a simplified expression.

3.1.1 The tenth term (2)

3.1.2 The sum of the first twenty terms. (2)

3.2 In an arithmetic sequence, $T_3+T_4=167$ and $T_{21}=-4$

3.2.1 Show that the value of the constant difference is -5. (4)

3.2.2 Calculate the sum of the first 21 terms. (3)

3.3 The first term of a geometric sequence is -3, and the common ratio is $-\frac{1}{3}$.
Determine the sum to infinity of all the negative terms. (5)

[16]

NORTH WEST

QUESTION 2

2.1 If $x+1;\ x-1;\ 2x-5$ are the first 3 terms of a geometric series, calculate:

2.1.1 The value(s) of x (5)

2.1.2 For which value of x in QUESTION 2.1.1 will the series converge? (4)

2.1.3 The sum to infinite if $x=3$ (2)

2.2 If you had a choice between receiving 3 million rand on your 21^{st} birthday, or rather R1 on your 21^{st} birthday, R2 on the day after your birthday, R4 on the 2^{nd} day after your birthday and so forth, until the end of the month for 30 days, what will you choose? Show all calculations to motivate your answer. (3)

[14]

QUESTION 3

The seats in an open-air theatre are numbered as in the sketch below.

Platform

Row 1					1	2	3		4	5					
Row 2				6	7	8	9		10	11	12				
Row 3			13	14	15	16	17		18	19	20	21			
Row 4		22	23	24	25	26	27		28	28	30	31	32		
Row 5	33	34	35	36	37	38	39		40	41	42	43	44	45	
.					.						.				
.					.						.				
n^{th} Row															

3.1 If 1; 6; 13; 22; 33 forms a sequence of seat numbers of the first seat in each row, determine the n^{th} term of this row. (4)

3.2 Hence, find the seat number of the 7^{th} seat in row 15. (2)

3.3 How many chairs are in the 25^{th} row? (3)

3.4 The theatre manager bought 2000 chairs. Use a relevant formula to determine how many complete rows can be placed. (5)

[14]

KZN

QUESTION 2

The first four terms of a quadratic sequence are $9 ; 19 ; 33 ; 51 ;...$

2.1 Write down the next TWO terms of the quadratic sequence. (2)

2.2 Determine the n^{th} term of the sequence. (4)

2.3 Prove that all the terms of the quadratic sequence are odd. (3)

[9]

QUESTION 3

$3-t ; -t ; \sqrt{9-2t}$ are the first three terms of an arithmetic sequence.

3.1 Determine the value of t. (4)

3.2 If $t=-8$, then determine the number of terms in the sequence that will be positive. (3)

[7]

QUESTION 4

4.1 Given the infinite geometric series $(x-3)+(x-3)^2+(x-3)^3+...$

4.1.1 Write down the value of the common ratio in terms of x. (1)

4.1.2 For which value(s) of x will the series converge? (3)

4.2 An arithmetic sequence and a geometric sequence have their first term as 3. The common difference of the arithmetic sequence is p and the common ratio of the geometric sequence is p. If the tenth term of the arithmetic sequence is equal to the sum to infinity of the geometric sequence, determine the value of p. (5)

[9]

MPAUMALANGA

QUESTION 2

2.1 $... ; ... ; 1 ; 7 ; 15 ; ...$ are the third, fourth and fifth terms of a quadratic sequence.

2.1.1 Calculate the first term of the sequence. (2)

2.1.2 Calculate the general term of the sequence.. (4)

2.1.3 Which term in the sequence is 415? (3)

2.2 $x\,;\,x+3\,;\,3x-1$ is a geometric sequence

2.2.1 Calculate the value of x. (4)

2.2.2 Calculate the sum of the first 20 terms of the sequence if $x=-1$. (3)

2.2.3 Give a reason why the series will, or will not, converge, if $x=\dfrac{9}{2}$. (2)

2.3 The k^{th} term of an arithmetic sequence is m, and the m^{th} term is equal to k, where $m \neq k$. Find the common difference of the sequence. (5)

2.4 Given: $\sum_{p=1}^{5}(p+q)=15k$

Determine q in terms of k. (3)

[26]

EASTERN CAPE

QUESTION 2

2.1 $7x+1\,;\,2x+2\,;\,x-1$ are the first three terms of a geometric sequence. Determine the values of x. (5)

2.2 A car that has been moving at a constant speed begins to slow down at a constant rate. It travels 25 m in the first second, 20 m in the second second, 16 m in the third second and so on. Show that the total distance covered, before it stops, does not exceed 125 metres. (4)

2.3 In an arithmetic sequence the first term is 2, the last term is 29 and the sum of all the terms is 155. Calculate the common difference. (5)

[14]

QUESTION 3

A quadratic number pattern, $T_n = an^2 + bn + c$, has the following information: $T_1 = T_5 = 24$ and it has a constant second difference of 4.

Determine the equation of the general term of the quadratic pattern. (8)

[8]

CWED

QUESTION 2

2.1 Prove that in any arithmetic series of which the first term is a and where the constant difference is d, the sum of the first n terms is given by $S_n = \frac{n}{2}[2a + (n-1)d]$ (4)

2.2 Given the following sequence: $-5\,;\ -1\,;3\,;7\,;\ldots\ldots\ldots\ldots\ldots\ldots.;35$

2.2.1 Determine the number of terms in the sequence. (3)

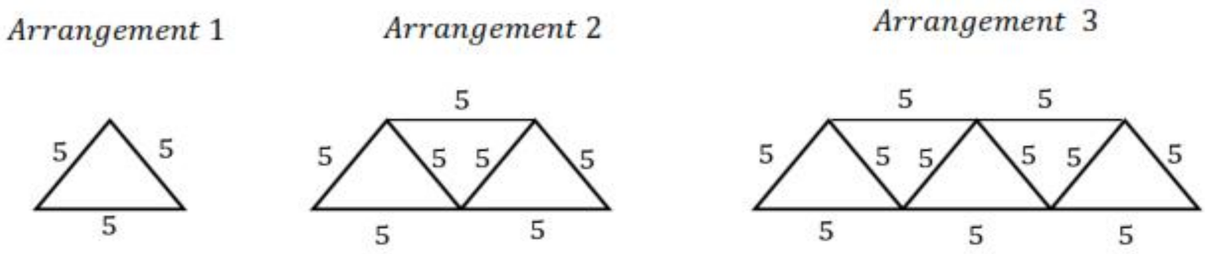
2.2.2 Calculate the sum of the sequence. (2)

2.3 For an arithmetic series consisting of 15 terms, $S_n = 2n - n^2$
Determine:

2.3.1 the first term of the sequence. (2)

2.3.2 the sum of the last 3 terms. (3)

2.4 A series of bridges, formed by equilateral triangles, are built with steel bars with length 5 m each.
Please note: the length of the bridge (driving surface) is the length of the bottom side(s)



Calculate how many bars are needed for a bridge with a driving surface of 75 m. (3)
[17]

QUESTION 3

3.1 A quadratic number pattern $T_n = an^2 + bn + c$ has a third term equal to -1, while the first differences of the quadratic sequence are given by: $-12; -8; -4$

3.1.1 Write down the values of the first four terms of the quadratic sequence. (2)

3.1.2 Calculate the value of a, b and c. (3)

3.2 Consider the geometric series $4 + p + \frac{p^2}{4} + \frac{p^3}{16} + \cdots$

3.2.1 Calculate the value(s) of p for which the series converges. (2)

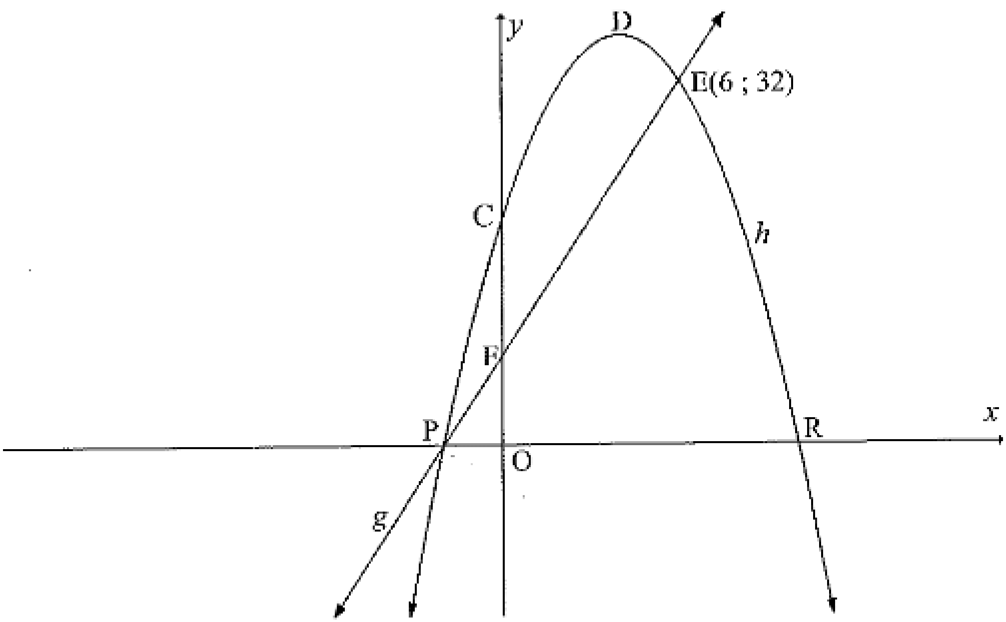
3.2.2 Calculate the value of p if the sum to infinity is 3. (3)
[10]

3. FUNCTIONS AND INVERSES

FREE STATE

QUESTION 4

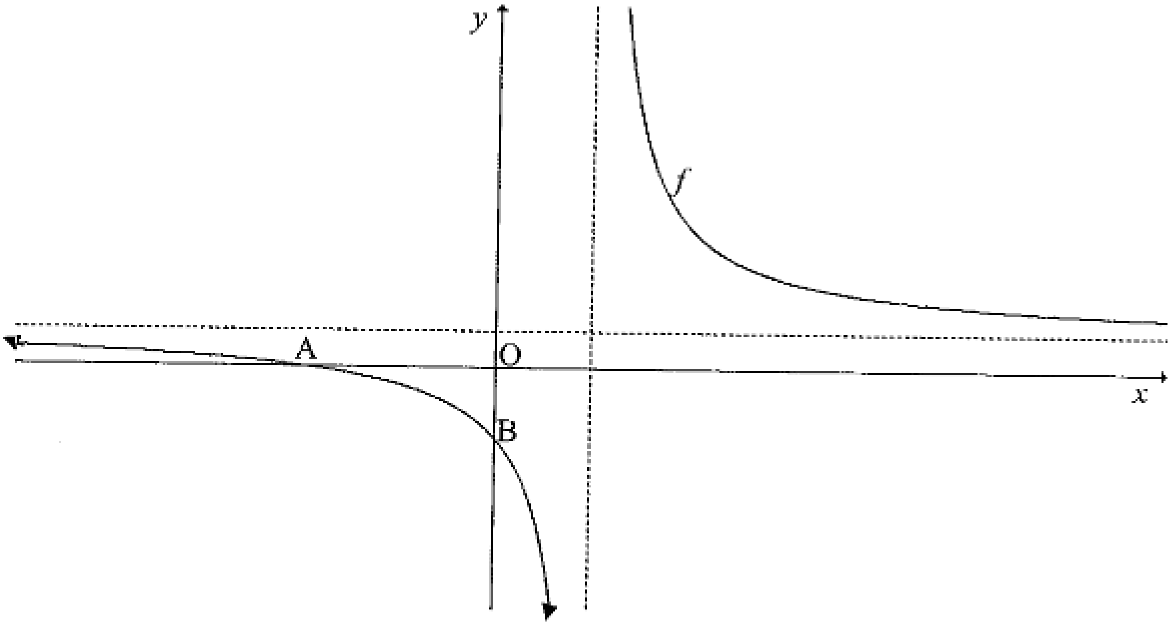
In the sketch below, the graphs of $h(x)=ax^2+bx+c$ and $g(x)=4x+8$ are drawn.
P and R are the x-intercepts of h and D is the turning point of h. C and F are the y-intercepts of h and g respectively. The two graphs intersect at P and $E(6;32)$.



4.1	Write down the coordinates of point P.	(2)
4.2	If the equation of the axis of symmetry of h is $x=4$, write down the coordinates of point R.	(2)
4.3	Determine the equation of h in the form $h(x)=ax^2+bx+c$.	(4)
4.4	Calculate the length of FC.	(2)
4.5	Determine the range of h.	(2)
4.6	For which values(s) of x is $h(x).g(x)<0$?	(2)
4.7	Determine the value of k if $y=4x+k$ is a tangent to $h(x)=-x^2+8x+20$.	(4)
		[18]

QUESTION 5

The sketch below shows the graph of $f(x)=\frac{2+x}{x-1}$. A and B are the x- and the y-intercepts of f.



5.1 Write down the equation of f in the form $f(x)=\frac{a}{x+p}+q$. (3)

5.2 Determine the equations of the asymptotes of f. (2)

5.3 Write down the coordinates of A, the x-intercept of f. (2)

5.4 The graph of $k(x)$ is obtained by shifting the graph of $f(x)$ horizontally such that point A is at the origin, O. Write down the equation of the vertical asymptote of $k(x)$. (1)

[8]

QUESTION 6

6.1 Given: $f(x)=3^{-x}$

6.1.1 Write down the equation of $f^{-1}(x)$, the inverse of $f(x)$, in the form $f^{-1}(x)=...$ (2)

6.1.2 On the same set of axes, sketch the graphs of $f(x)$ and $f^{-1}(x)$ in your ANSWER BOOK. Clearly indicate the intercepts with the axes and one other point on the graphs and label the TWO graphs. (4)

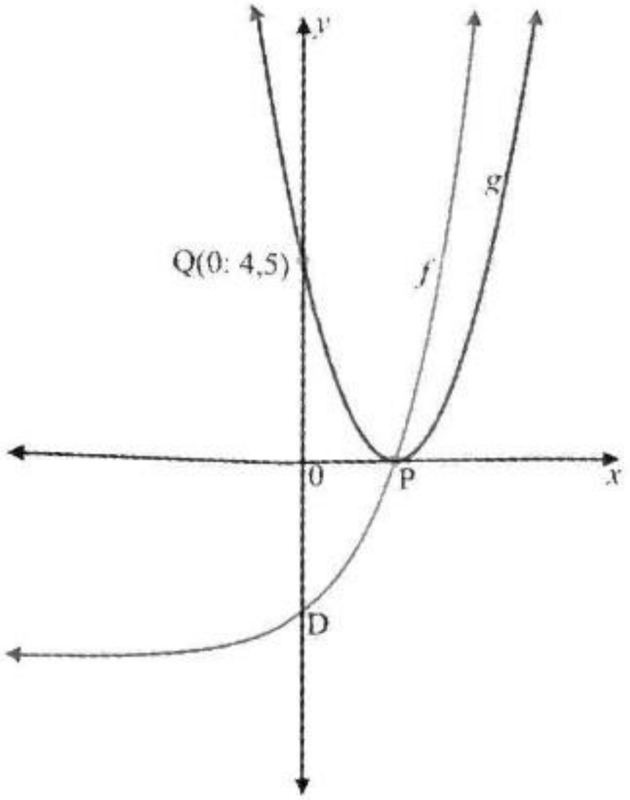
6.2 A linear function satisfies the following conditions: $p(-3)=10$ and $p'(x)=-2$. Determine the inverse of p in the form $p^{-1}(x)=...$ (4)

[10]

GAUTENG

QUESTION 4

The graphs of $f(x) = 2^x - 8$ and $g(x) = ax^2 + bx + c$ are sketched below.
Point Q $(0 ; 4,5)$ and point D are the y – intercepts of graphs g and f espectively.
The graphs intersect at point P, which is the turning point of graph g and the common x – intercept of f and g.



4.1 Write down the equation of the asymptote of graph f. (1)

4.2 Determine the coordinates of point P and point D. (4)

4.3 Determine the equation of h if $h(x) = f(2x) + 8$. (2)

4.4 Determine the equation of h^{-1} in the form $y = ...$ (2)

4.5 Write down the range of h^{-1}. (1)

4.6 Determine the equation of g. (3)

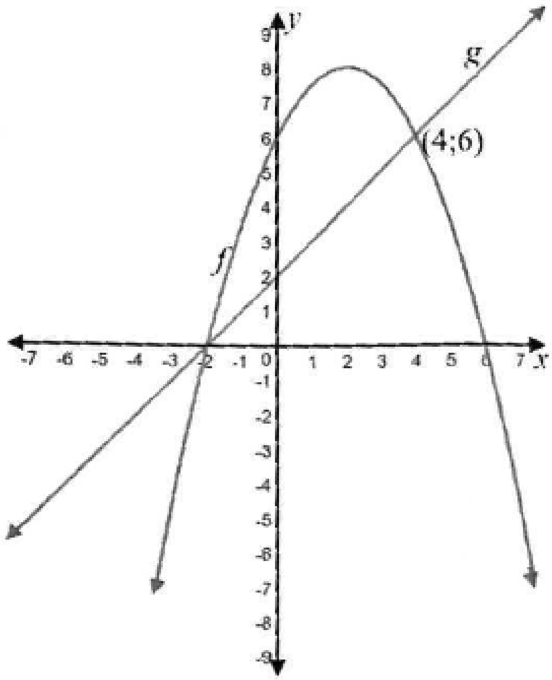
4.7 Calculate: $\sum_{k=0}^{3} g(k) - \sum_{k=4}^{5} g(k)$ (3)

4.8 Describe the transformation that should be applied to graph g so that the new graph obtained will have non-real roots? (1)

[17]

QUESTION 5

The graphs of $f(x) = -\frac{1}{2}x^2 + 2x + 6$ and $g(x) = x + 2$ are sketched below. The graphs intersect at $(-2; 0)$ and $(4; 6)$.



Use the graphs to determine the values of x for which:

5.1 $f(x) = g(x)$ (2)

5.2 $\dfrac{f(x)}{g(x)} \geq 0$ (2)

QUESTION 6

Given: $f(x) = \frac{1}{4}x^2$

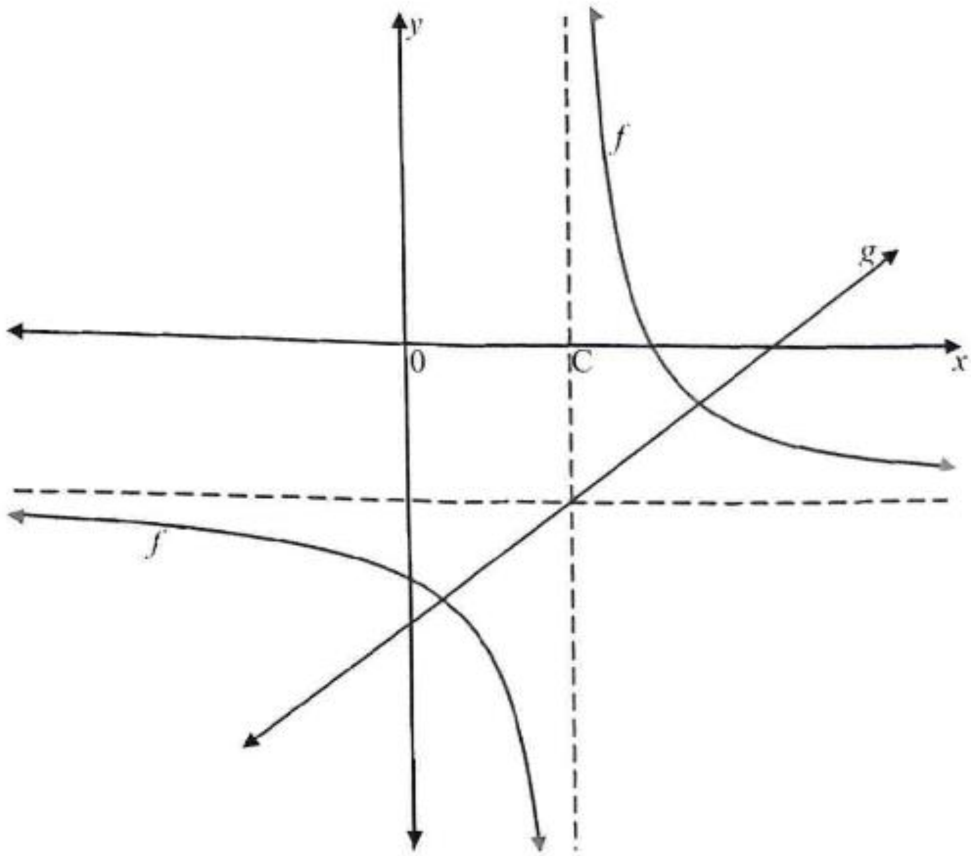
6.1 Write down the equation of g if g is the reflection of f about the y-axis. (1)

6.2 Write down the equation of h if f is translated TWO units down to obtain h. (1)

6.3 Write down the range of h. (1)
[3]

QUESTION 7

The graphs of $f(x)=\dfrac{3}{x-2}-3$ and g, an axis of symmetry of f, are sketched below. The vertical asymptote cuts the x-axis at C.



7.1 Write down the equation of the vertical asymptote of f. (1)

7.2 Describe how the graph of $h(x)=\dfrac{3}{x}$ was transformed to obtain f. (2)

7.3 Write down the domain of $f(x-1)$. (1)

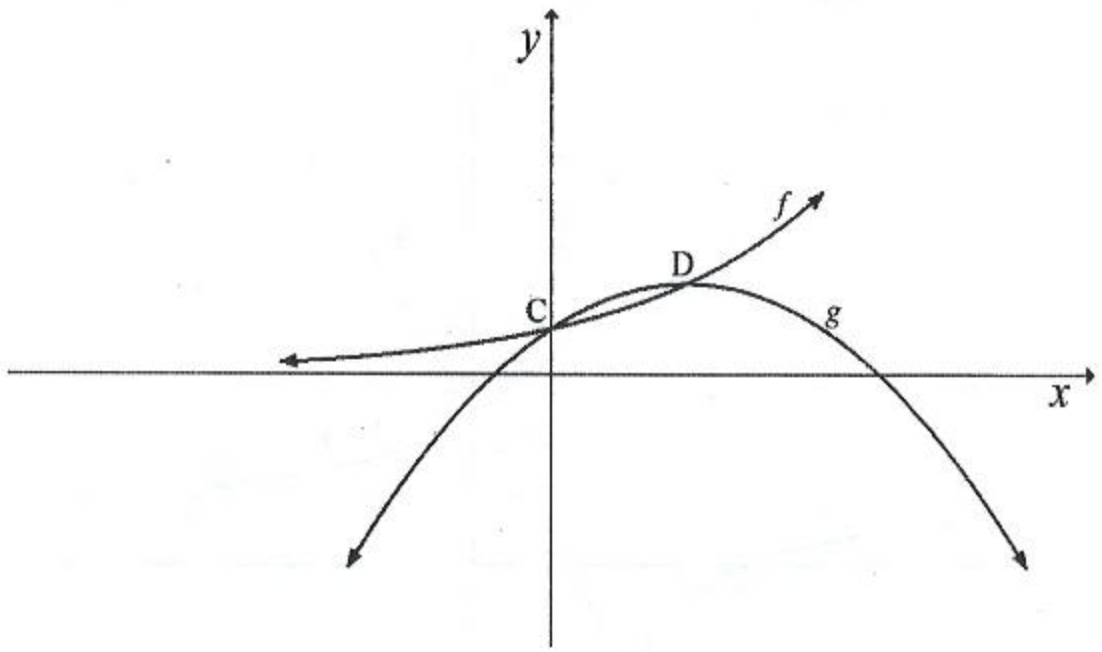
7.4 Determine the equation of the line, parallel to g (an axis of symmetry of f) passing through point C. (3)

[7]

LIMPOPO

QUESTION 4

Sketched below are graphs of $f(x)=2^x$ and $g(x)=-(x-1)^2+q$, where q is a constant.
The graphs of f and g intersect at C and D.
C is the y-intercept of both f and g
D is the turning point of g.



4.1 Show that $q=2$. (2)

4.2 Write down the coordinates of the turning point of g. (2)

4.3 Determine the value(s) of t for $g(x)=t$ if the roots are equal. (1)

4.4 Write down the equation of $f^{-1}(x)$ in the form $y=....$ (2)

4.5 Sketch the graph of f^{-1} on a system of axes. Indicate the x – intercept and the coordinates of one other point on your graph. (3)

4.6 Write down the equation of h if $h(x)=g(x+1)-2$ (2)

4.7 How can the domain of h be restricted so that h^{-1} will be a function? (1)

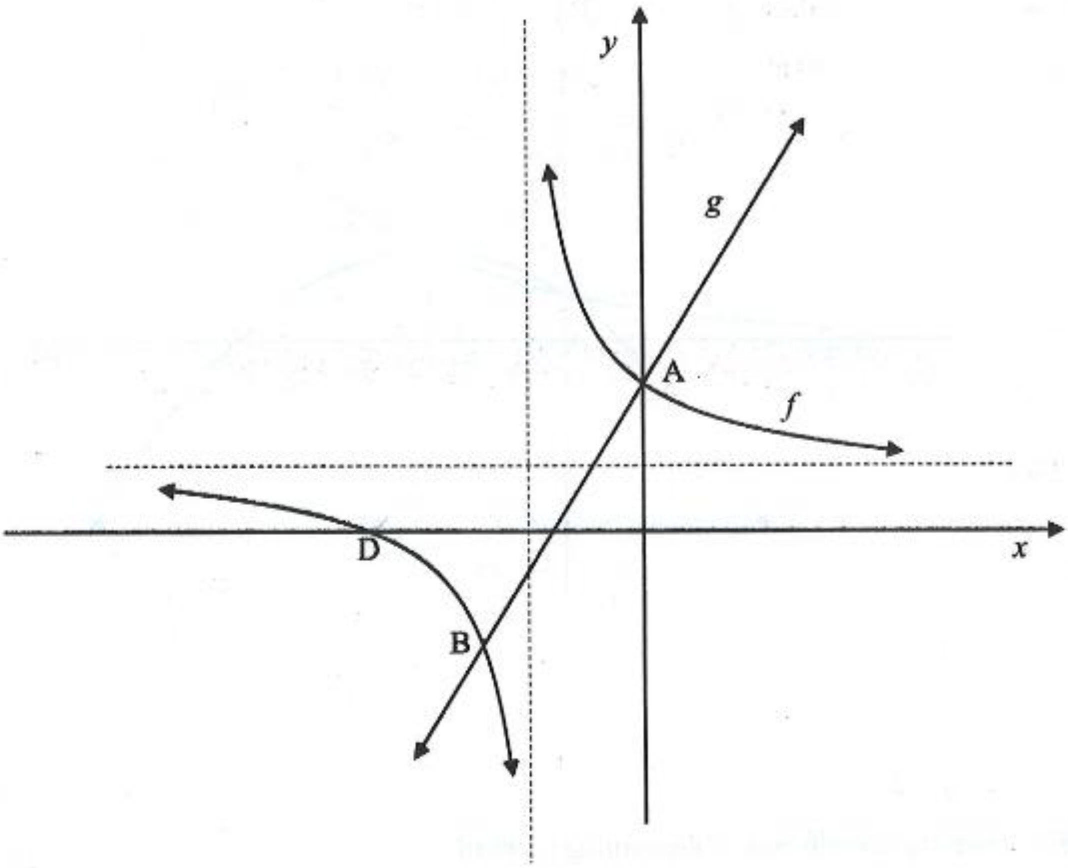
[13]

QUESTION 5

Sketched below are the graphs of $y = f(x) = \dfrac{4}{x+2} + 1$ and $g(x) = 2x + 3$.

A, the y – intercept of both f and g, and B are the points of intersection of f and g.

D is the x – intercept of f.



5.1	Write down the equations of the asymptotes of f.	(2)
5.2	Determine the coordinates of :	
	5.2.1 A	(1)
	5.2.2 D	(3)
	5.2.3 B	(4)
5.3	Calculate the average gradient of f between A and D.	(2)
5.4	For which value(s) of x is $f(x).g^{/}(x) \leq 0$	(3)

[15]

NORTH WEST

QUESTION 4

Given: $f(x) = \dfrac{a}{x-p} + q$.

- The point B(–1 ; 0) is an x-intercept of f.
- The domain of f is real numbers, but $x \neq 2$.
- The range of f is real numbers, but $y \neq 3$.
- f is a decreasing function.

4.1 Determine the equation of f. (3)

4.2 Determine the coordinates of the y-intercept of f. (2)

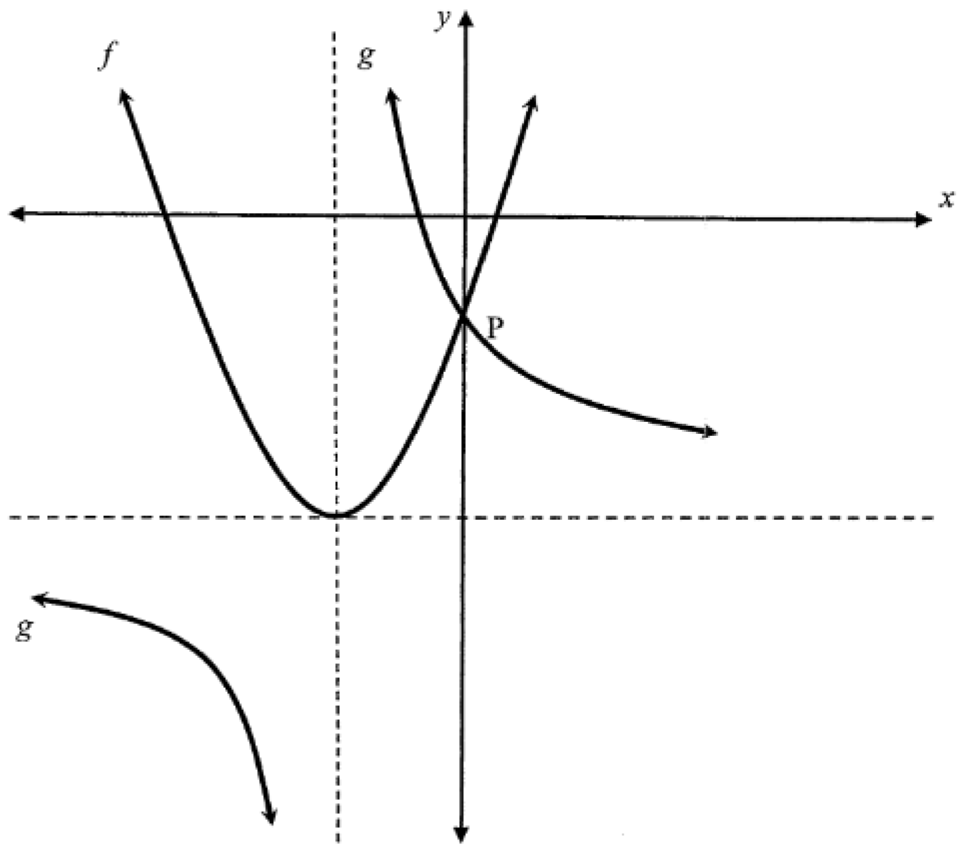
4.3 Sketch the graph of f in your ANSWER BOOK, clearly showing the asymptotes and the intercepts with the axes. (3)

[8]

QUESTION 5

The graphs of $f(x) = a(x+p)^2 + q$ and $g(x) = \dfrac{2}{x+1} - 3$ are sketched below.

P is the y-intercept of f and g. The horizontal asymptote of g is also a tangent to f at the turning point of f.



5.1 Write down the equation of the vertical asymptote of g. (1)

5.2 Determine the coordinates of P. (2)

5.3 Determine the equation of f. (3)

5.4 One of the axes of symmetry of g is a decreasing function. Write down the equation of this axis of symmetry, $h(x)$. (2)

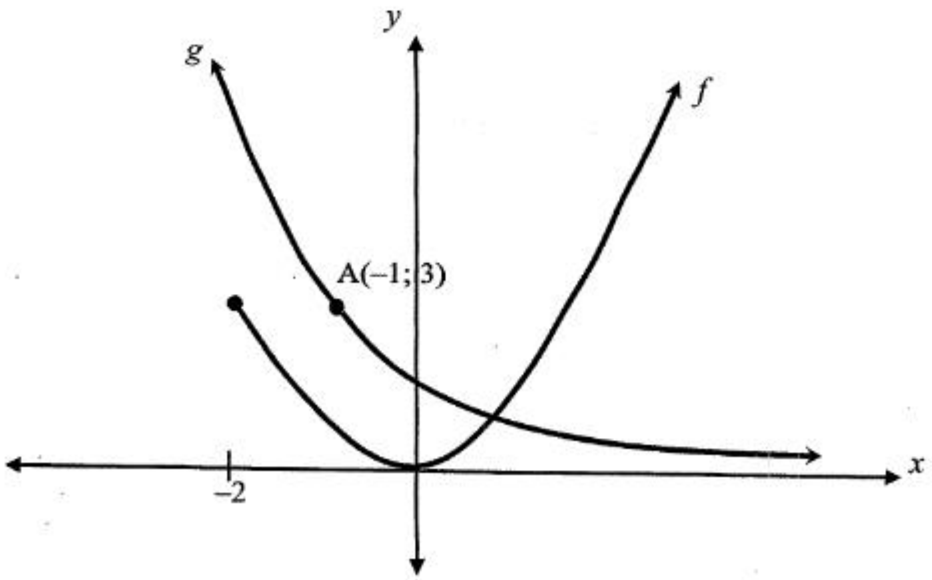
5.5 For which values of k will $g(x) = h(x) + k$ have TWO real roots that are of opposite signs? (2)

5.6 Give the domain of $m(x)$ if $m(x) = g(2x) + 5$. (3)

[13]

QUESTION 6

The diagram below shows the curves of $f(x) = \frac{1}{4}x^2$, where $x \geq -2$ and $g(x) = a^x$, where $a > 0$. The point A(–1 ; 3) lies on the graph of g.



6.2 For which value(s) of x is the graph of f strictly decreasing? (2)

6.3 Determine the inverse of f in the form $y = \ldots$ (2)

6.4 Sketch the graph of f^{-1} in your ANSWER BOOK. (2)

6.5 Write down the range of f^{-1}. (2)

6.6 Determine the inverse of g in the form $y = \ldots$ (2)

6.7 For which values of x will $g^{-1}(x) \geq -1$? (2)

[13]

KZN

QUESTION 5

Given $f(x)=\dfrac{x-3}{x+2}$

5.1 Show that $f(x)=1-\dfrac{5}{x+2}$ (1)

5.2 Write down the equations of the vertical and horizontal asymptotes of f. (2)

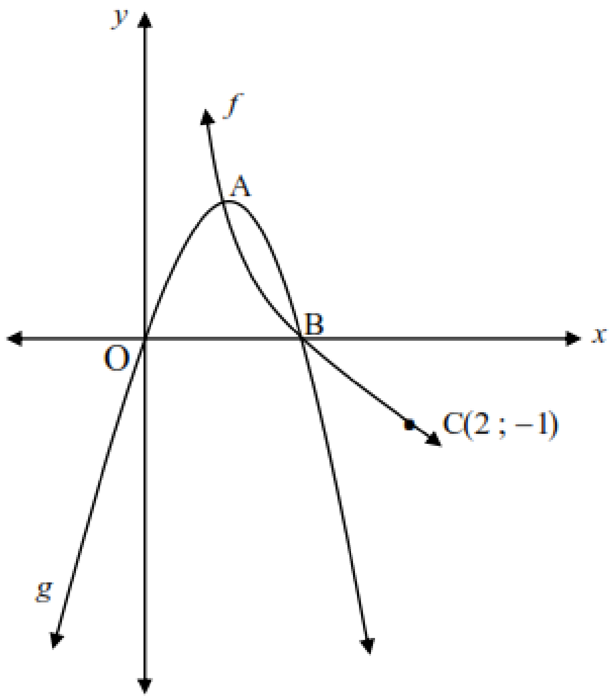
5.3 Determine the intercepts of the graph of f with the x – axes and y – axes. (2)

5.4 Write down the value of c if $y = x + c$ is a line of symmetry to the graph of f. (2)

[7]

QUESTION 6

$f(x)=\log_p x$ and $g(x)=ax^2+bx$ are sketched below. A is the turning point of f and B is the common x – intercept of f and g. The point $C(2;-1)$ lies on the graph of f.



6.1 Calculate the value of p. (2)

6.2 Write down the co-ordinates of B. (1)

6.3 If $p=\dfrac{1}{2}$, determine the co-ordinates of A. (3)

6.4 Determine the values of a and b. (4)

6.5 Write down the equation of f^{-1}, inverse of f, in the form $y = \ldots$ (2)

6.6 Determine the values of x for which $f(x)\geq -1$. (2)

6.7 Determine the values of x for which $f(x).g^{/}(x)\leq 0$. (2)

[16]

MPUMALANGA

QUESTION 3

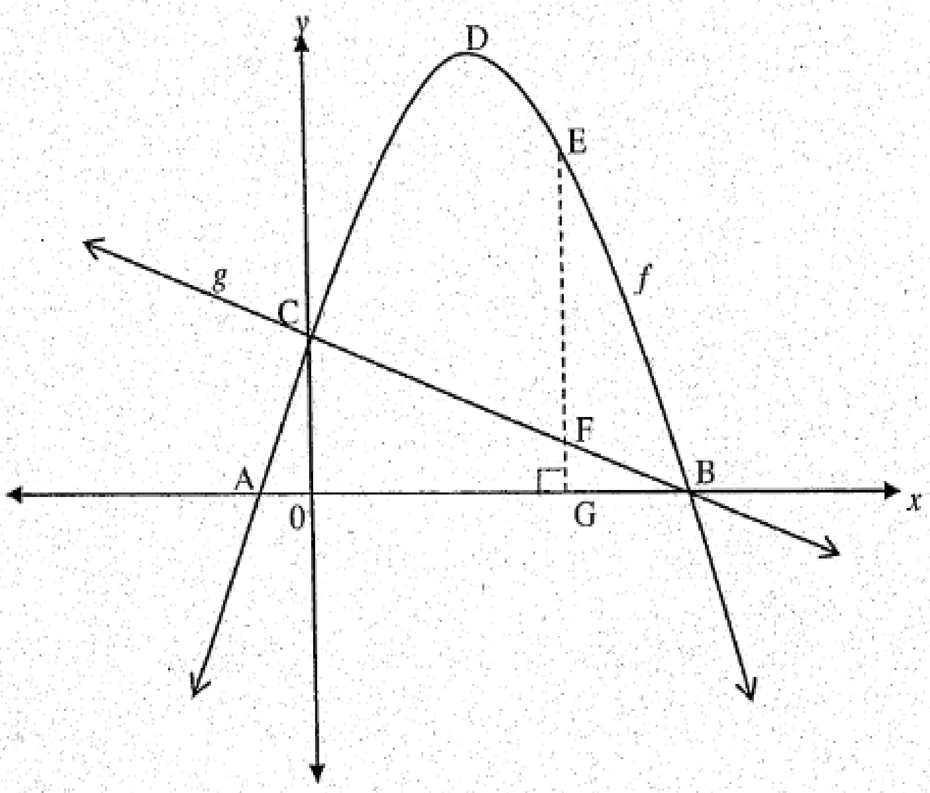
In the diagram below, $f(x) = -x^2 + 2x + 3$ and $g(x) = -x + 3$ are draw.

C is the $y-$ intercept of f and g.

A and B are the $x-$intercepts of f, and B is the $x-$intercept of g.

D is the turning point of f.

EFG is a straight line parallel to the $y-$axis with E on f and F on g.



3.1	Determine the coordinates of D, the turning point of f.	(4)
3.2	Calculate the length of AB.	(3)
3.3	Calculate the value of x for which EF has a maximum length.	(4)
3.4	Determine the range of p if $p(x) = f(x) - 2$	(2)
3.5	If $h(x) = x^2$,	
	3.5.1 Describe the transformation from f to h.	(3)
	3.5.2 Restrict the domain of h for h^{-1} to be a function.	(2)
3.6	Determine the values of x for which:	
	3.6.1 $f(x) - g(x) > 0$	(2)
	3.6.2 $f'(x) < 0$	(2)

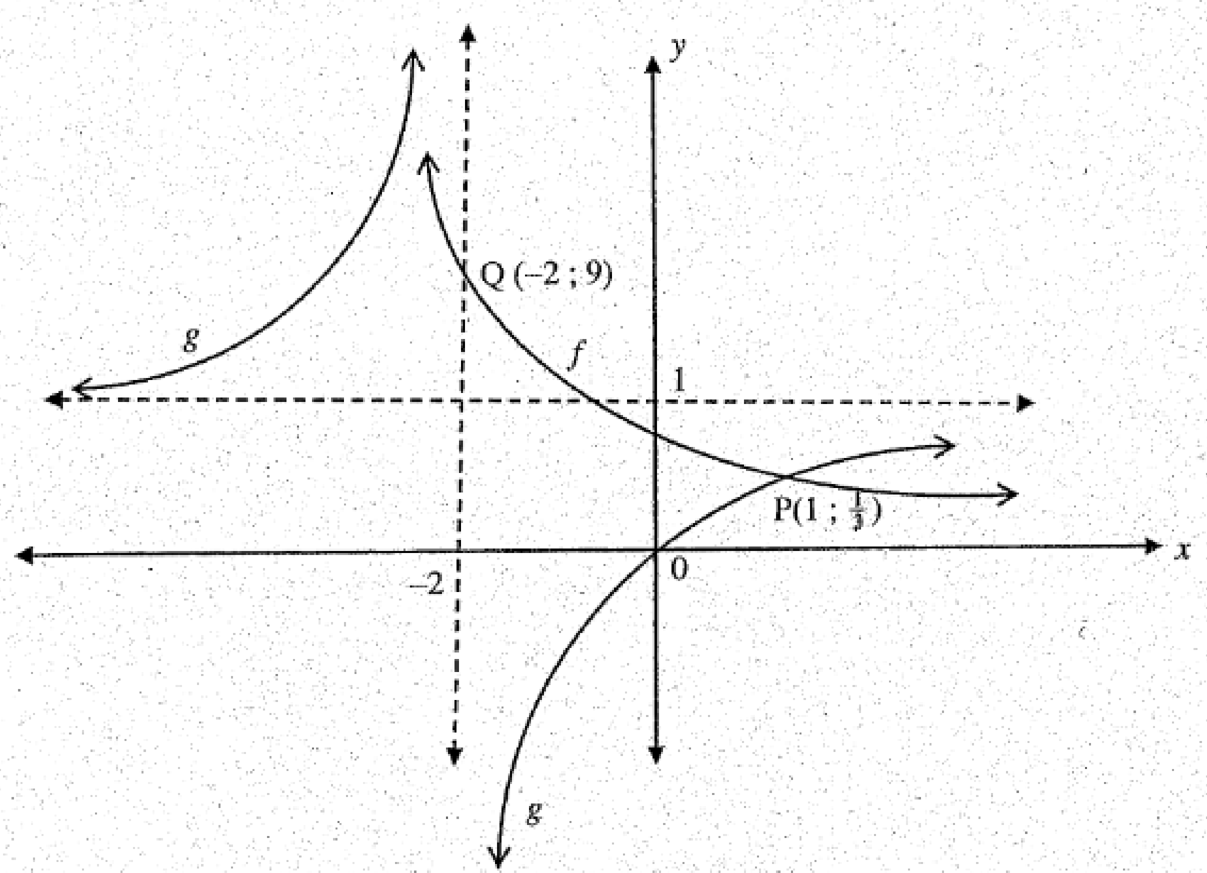
[21]

QUESTION 4

In the diagram below, the graphs of $f(x) = a^x$ and $g(x) = \frac{k}{x+p} + q$ are drawn.

$P\left(1;\frac{1}{3}\right)$ is the point of intersection of f and g.

$Q(-2;9)$ is the point of intersection of f and the vertical asymptote of g.



4.1 Determine:

4.1.1 the value a. (2)

4.1.2 the equation of g. (4)

4.2 Write down the equation of $f^{-1}(x)$, in the form $f^{-1}(x) = ...$ (1)

4.3 If $h(x) = x + c$ is the axis of symmetry of g, determine the value of c. (2)

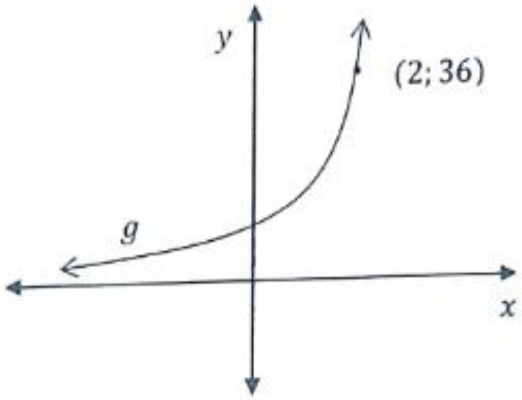
4.4 Use the graph to find the solution of $\log_a x > 0$. (2)

[11]

EASTERN CAPE

QUESTION 4

See given diagram below: $g(x) = k^x$; where $k > 0$ and $(2\,;36)$ is a point on g.



4.1 Determine the value of k. (2)

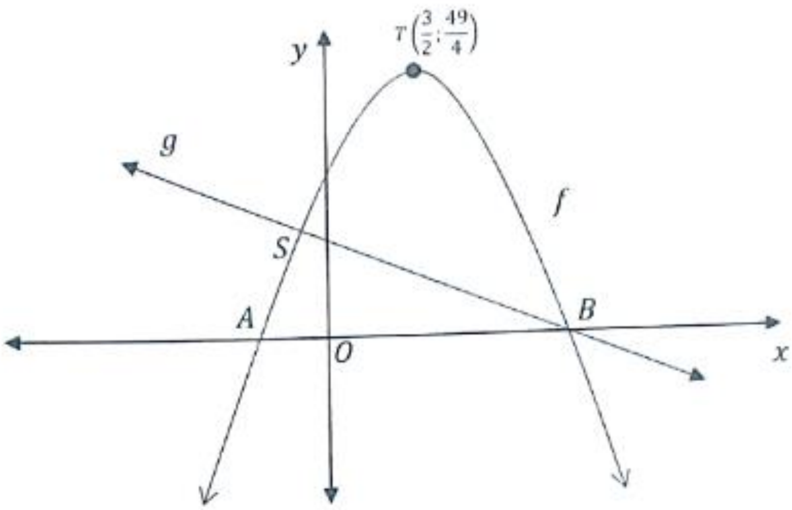
4.2 Determine the equation of $g^{-1}(x)$ in the form $y = \dots\dots$ (2)

4.3 For which values of x is $g^{-1}(x) \leq 0$? (2)

4.4 Write down the range of h if $h(x) = g(x-3)+2$ (2)
[8]

QUESTION 5

Sketched below are the graphs of $f(x) = ax^2 + bx + c$ and $g(x) = -x + 5$.
A and B are the x-intercepts of f. $T\left(\frac{3}{2};\frac{49}{4}\right)$ is the turning point of f . B and S are the points of intersection of f and g.



5.1 Calculate the coordinates of B. (2)

5.2 Determine the equation of f in the form $y = ax^2 + bx + c$ (4)

5.3 If $f(x) = -x^2 + 3x + 10$, calculate the coordinates of S. (4)

5.4 Use the graphs to solve for x where:

5.4.1 $f(x) \geq g(x)$ (2)

5.4.2 $-x^2 + 3x - 2\frac{1}{4} < 0$ (3)

[15]

QUESTION 6

Given: $f(x) = \frac{2}{x} - 1$

6.1 Draw a neat sketch of f indicating all intercepts and asymptotes. (4)

6.2 Determine $f'(x)$. (2)

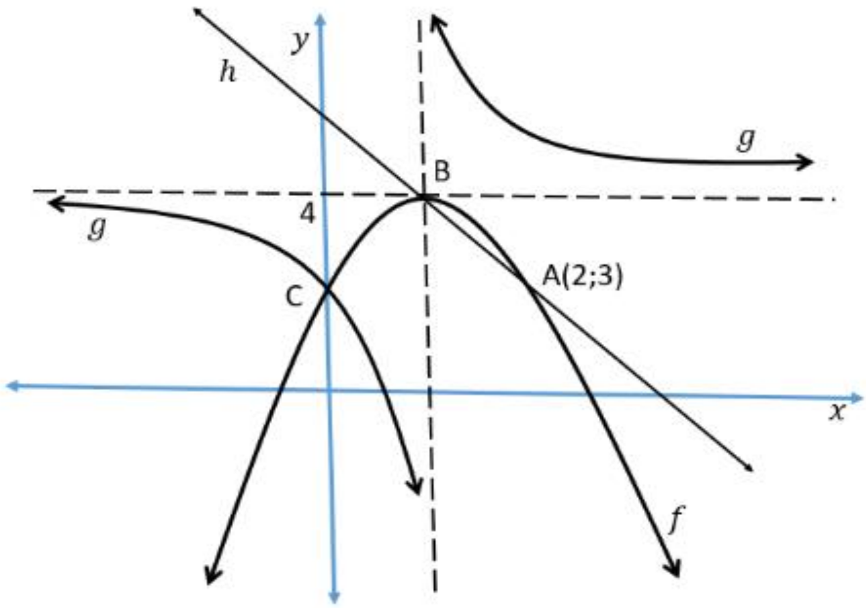
6.3 Determine the equation of h , the axis of symmetry of f that has a negative gradient. (2)

6.4 A constant value k is added to h so that the straight line becomes a tangent to the graph of f with $x > 0$. Determine the value of k. (5)

[13]

QUESTION 4

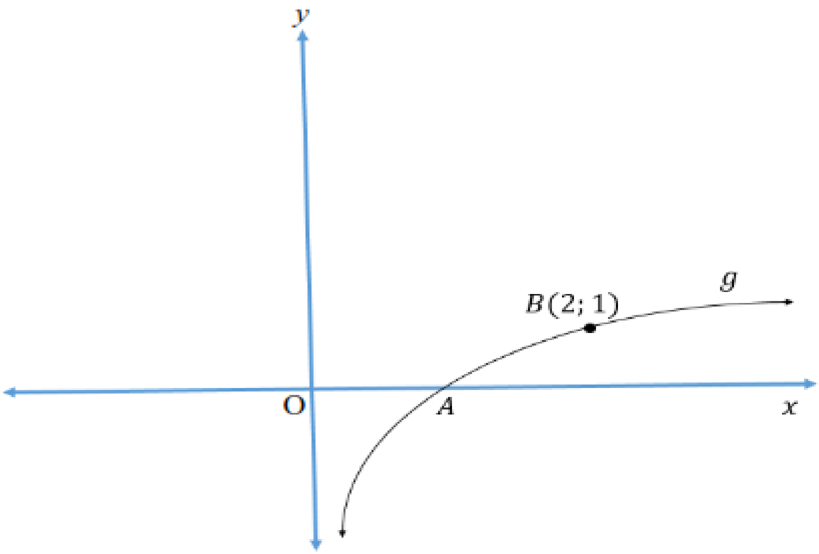
In the sketch below, the graphs of $g(x) = \frac{k}{x+p} + 4$ and $f(x) = ax^2 + bx + c$ are given. The asymptotes of g intersect at B, the turning point of f. The graphs of f and g intersect at C. The axis of symmetry of g that has a negative gradient, is the line $h(x)$ that intersects the graph of f at A $(2\,;\,3)$ and B.



4.1	Determine the equation of h.	(2)
4.2	Show that the coordinates of B are $(1; 4)$. Clearly show all calculations.	(2)
4.3	Show that the equation of $f(x)$ is given by $f(x) = -x^2 + 2x + 3$. Clearly show all calculations.	(4)
4.4	Determine the equation of g.	(3)
4.5	Determine the equations of the asymptotes of $g(x+1)$.	(2)
4.6	Determine the value(s) of x for which $g'(x).f'(x) \geq 0$.	(2) **[15]**

QUESTION 5

The graph of $g(x) = log_2 x$ is given below. A is the point of intersection of g with the x-axis.



5.1 Write down the coordinates of A. (2)

5.2 Determine the equation of g^{-1} in the form $y =$ .... (2)

5.3 Sketch the graph of $p(x) = -g(x)$. Clearly indicate all intercept(s) with the axes as well as the coordinates of any other point on the graph. (2)

5.4 Use the graph to determine for which value(s) of x will $log_{½} x \geq 0$ (2)

[8]

QUESTION 6

Sketch the graph of $f(x) = \frac{k}{x+p} + q$ if:

- the domain is given as: $x \in R ; x \neq -1$.
- the range is given as: $y \in R ; y \neq 2$.
- $k < 0$
- the $x - intercept$ is: $(-\frac{1}{2}; 0)$.
- $f(0) = 1$

[5]

4. FINANCIAL MATHEMATICS

FREE STATE

QUESTION 7

7.1 An investment company offers interest on a fixed deposit at the rate of 9,6% compounded monthly. Calculate the effective annual interest rate correct to two decimal places. (3)

7.2 A motor car costing R150 000 depreciated annually at a rate of 8,8% per annum on a reducing-balance method. Calculate how long it took for the car to depreciate to R60 000 under these conditions. (3)

7.3 David is paying off a loan of R250 000 over 10 years by making monthly instalments. He made his first payment exactly one month after the loan is granted. Interest is charged at 10% per annum compounded monthly.

7.3.1 Calculate David's monthly payment. (4)

7.3.2 Calculate the balance outstanding immediately after David paid his 36^{th} instalment. (4)

[14]

GAUTENG

QUESTION 3

3.1 Lungile bought a car for R134 000. It depreciates on a reducing balance method at a rate of 6,8% per annum.
After how many years will its value be R100 000? (4)

3.2 A bank granted Clive a loan of R150 000 at an interest rate of 15,25% per annum, compounded monthly. Clive will repay the loan in 24 equal monthly payments. Payments will start 3 months after the loan was granted.

3.2.1 Calculate his monthly payment. (5)

3.2.2 Calculate the balance outstanding immediately after Clive makes his 18^{th} payment. (4)

[13]

LIMPOPO

QUESTION 6

6.1 Abel bought a motorbike for R12 500. It depreciated in value to R5 546,32 after 5 years. Calculate the annual depreciation rate. (3)

6.2 Shaun purchased an Internet Café for R1 800 000. He paid a deposit of 60% and which had to be repaid at the end of each month at an interest rate of 8% per annum compounded monthly. The first payment was made two months after the loan was received.

6.2.1 Calculate the effective annual interest rate of Shaun's loan. (4)

6.2.2 Show that the monthly instalment to the nearest Rand is R8 842,16 if the loan is repaid 10 years after it was granted. (5)

6.2.3 Based on the monthly instalment of R8 842,16 calculate the outstanding balance of the loan immediately after the 36^{th} payment to the nearest Rand (5)

[17]

NORTH WEST

QUESTION 7

7.1 William receives an amount of R2 000 000 upon his retirement. He invests this amount immediately at an interest rate of 9,3% per annum, compounded monthly.

He needs an amount of R35 000 per month to maintain his current lifestyle. He plans to withdraw the first amount by the end of the first month.

For how many months will he be able to live from his investment? (5)

7.2 John has just bought a new truck for R1 200 000. He has decided to replace the truck in 6 years' time, when the trade-in value of the truck would be R400 000. The replacement cost of the truck is expected to increase by 7,5% per annum.

7.2.1 Take into account the trade-in value of his old truck and calculate how much cash John will need in 6 years' time to buy a new truck. (3)

7.2.2 John starts a sinking fund to provide for a new truck. Determine the quarterly deposit if his first deposit is made 6 months after he bought his truck and his last deposit 6 months before the end of the 6 years. The interest rate for the money in the sinking fund is 11% per annum, compounded quarterly. (5)

7.2.3 Suppose that 2 years after the purchase of his truck and every year thereafter for the next 3 years, John wants to withdraw R8 000 from his account, to pay for services for his truck. If he makes 4 such withdrawals, what will the new quarterly deposit be during this time period? (4)

[17]

KZN (KWAZULU NATAL)

QUESTION 8

8.1 A tractor costing R180 000 depreciates on the reducing balance method to R65 000 at the end of 8 years. Determine the rate at which the tractor is depreciating per annum. (3)

8.2 Tebogo buys a flat at the beach front for R850 000. She takes out a loan from the bank at an interest rate of 14,25 % per annum compounded monthly. Her first instalment will commence in one month after she has taken out the loan.

8.2.1 Calculate the monthly repayments over a period of 20 years. (4)

8.2.2 If the monthly repayment is increased by 20 % before the first payment is being made towards the loan, determine the number of payments that will now be made to settle the loan. (4)

8.2.3 Calculate the final payment to settle the loan in question 8.2.2. (4)

[15]

MPUMALANGA

QUESTION 5

5.1 How many years will it take for an article to depreciate to half its' value according to the reducing balance method at 7,5% per annum?
Give your answer to the nearest month. (5)

5.2 Kevin is planning to buy his first home. The bank will allow him to use a maximum of 30% of his monthly salary to repay his bond.

5.2.1 If Kevin earns R18 480 per month, calculate the maximum amount that the bank will allow Kevin to spend per month on his bond repayments. (1)

5.2.2 Suppose, at the end of each month, Kevin repays the maximum amount allowed by the bank. How much does Kevin borrow if he takes 25 years to repay the loan at a rate of 8% p.a., compounded monthly. The first repayment is made one month after the loan is granted. (4)

5.3 Maria opens a savings account with a single deposit of R1 000 on 1 April 2015. Then she makes 18 monthly deposits of R700 at the end of every month. Her first payment is made on 30 April 2015 and her last payment on 30 September 2016. The account earns 15% per annum compounded monthly.
Determine the amount that should be in her savings account immediately after her last payment is made. (That is 30 September 2016) (5)

[15]

EASTERN CAPE

QUESTION 7

7.1 Jack and Jill invest R2 000 each at different banks. Jack invests his R2 000 at 8% interest per annum compounded monthly and Jill invests her R2 000 at r % interest per annum compounded semi-annually. Their investment is worth the same after 12 months. Calculate Jill's investment rate. (3)

7.2 Anne bought a notebook laptop for R9 500. If the annual rate of depreciation was 7,7% per annum, how many years did it take for the notebook to depreciate to R4 500? (5)

7.3 Raeez buys a car for R170 500. He pays 25% deposit and takes out a loan for the balance. The bank charges interest at 13,2% per annum compounded monthly.

7.3.1 Determine the value of his loan. (2)

7.3.2 Calculate the monthly repayment if the loan is to be repaid over 5 years and the first instalment is made one month after the loan has been granted. (5)

[15]

CWED

QUESTION 7

7.1 After how many years will the price of a vehicle that has a value of R85 000 depreciate to R48 000 if the depreciation rate is 13,4% p.a. on the reducing balance? (4)

7.2 A man takes out a mortgage loan for a house. He plans to pay back the loan monthly over a period of 20 years. The size of the bond is R600 000 and the interest rate is calculated at 11% p.a. compounded monthly.

7.2.1 Calculate his monthly repayment. (4)

7.2.2 After 14 years he decides to settle the mortgage loan. Calculate the outstanding balance after 14 years. (3)

7.2.3 The man can only pay R200 000 of the settlement amount after 14 years. He makes an arrangement with the bank to settle the rest of the loan amount 3 months later in one payment.
Calculate the value of the second settlement amount if :

- he doesn't make any further payments on the loan
- he will pay a once-off amount three months later
- the interest rate remains the same. (3)

[14]

5. DIFFERENTIAL CALCULUS

FREE STATE

QUESTION 8

8.1 Determine $f'(x)$ from first principles if $f(x)=-3x^2$ (4)

8.2 Determine $\frac{dy}{dx}$ if $y=7x^4-5\sqrt{x}-\frac{3}{x}$ (4)

8.3 It is given that $g(x)=ax^3-24x+b$ has a local minimum turning point at $(-2;17)$. Determine the values of a and b. (5)

[13]

QUESTION 9

Given: $f(x)=-x^3+10x^2-17x-28$

9.1 Calculate the coordinates of the intercepts of f with the axes. (5)

9.2 Calculate the coordinates of the turning points of f. (5)

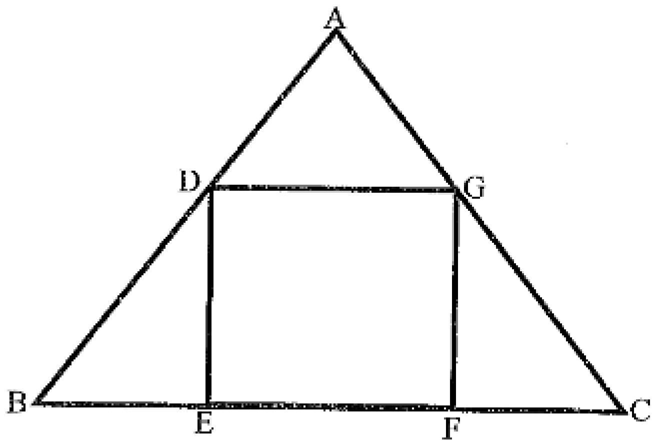
9.3 Sketch the graph of f, clearly indicating the intercepts with the axes and the turning points. (3)

9.4 Determine the values of k for which $-x^3+10x^2-17x=25+k$ will have only one real root. (2)

[15]

QUESTION 10

In the sketch, $\triangle ABC$ is an equilateral triangle with sides equal to y units. DEFG is a rectangle. BE = FC = x units.



10.1 Prove that the area of the rectangle is $A=\sqrt{3}xy-2\sqrt{3}x^2$. (4)

10.2 Determine, in terms of y, the maximum area of the rectangle. (5)

[9]

GAUTENG

QUESTION 9

Determine the following:

9.1 $\frac{d}{dt}[(t-2)(t+3)]$ (3)

9.2 $D_x\left[\frac{5x^3-4}{x}\right]$ (3)

[6]

QUESTION 10

The gradient of a tangent to the curve $f(x) = ax^3 + bx^2$ at point C (1 ; 7) is 17.

10.1 Calculate the values of a and b. (6)

10.2 If it is given that $a = 3$ and $b = 4$, determine the coordinate of one other point on the curve where the gradient of the curve is also equal to 17. (6)

10.3 Sketch the graph of $f(x) = 3x^3 + 4x^2$, indicating all intercepts with the axes as well as the turning points. (4)

10.4 Calculate the values of x for which $f(x) = 3x^3 + 4x^2$ is concave up. (3)

[19]

QUESTION 11

The path travelled by a meteor can be tracked using the formula:
$s(t) = 6000 - 600t - 0{,}2t^3 + 2\times10^{-3}t^5$, where $s(t)$ is the distance (in meters) that the meteor is from the earth, t seconds after being detected.

11.1 Determine the velocity at which the meteor approaches the earth when FIRST detected. (3)

11.2 Show that the meteor will collide with the earth at $t = 10s$. (2)

11.3 Determine the acceleration (rate of change of velocity) of the meteor at $t = 5s$. (3)

[8]

LIMPOPO

QUESTION 7

7.1 Given: $f(x) = 3x^2 + 2$, determine $f^{/}(x)$ from first principles. (5)

7.2 Determine $\frac{dy}{dx}$ given $y = -(2x-3)^2$ (3)

7.3 Given: $f(x) = x\sqrt{x} + 2\sqrt{x}$, calculate $f^{/}(4)$ (4)

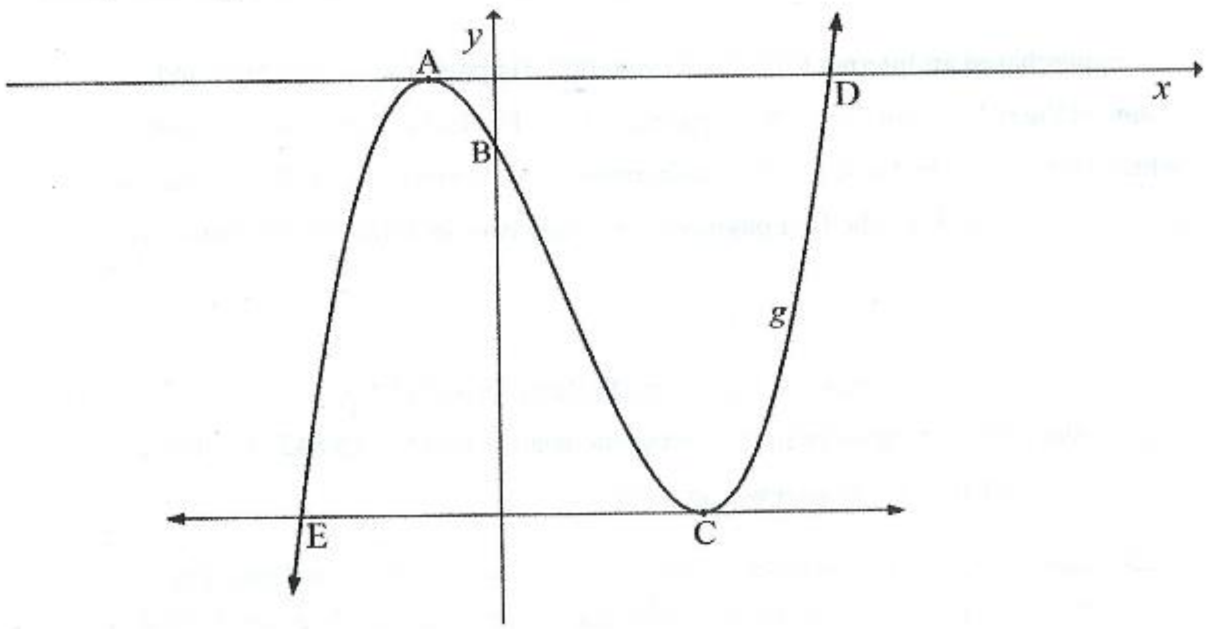
[12]

QUESTION 8

The sketch represents of cubic function $g(x) = x^3 - 3x^2 - 9x - 5$.

A and C are local maxima and minima. D is an x-intercept of g. B is the y-intercept of g.

E is a point on g such that EC is a tangent to g at C.



8.1 Calculate the co-ordinates of the x – intercepts of g if $(x+1)$ is a factor of $g(x)$ (2)

8.2 Determine the coordinates of A and C the turning points of g (3)

8.3 Determine the x coordinate of E. (3)

8.4 Determine:

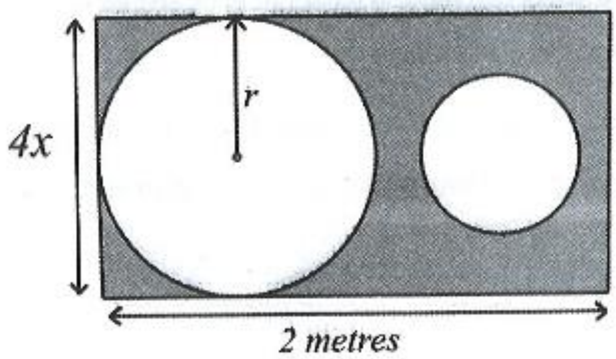
8.4.1 The coordinates of the point of inflection of g. (3)

8.4.2 The equation of the tangent to g at the point of inflection (4)

[15

QUESTION 9

Jane wants to cut two circles out of a rectangular piece of cardboard of 2 metres long and $4x$ metres wide. The radius of the larger circle is half the width of the cardboard and the smaller circle has a radius that is $\frac{2}{3}$ the radius of the bigger circle.



9.1 Show that the area of the shaded region is $A = 8x - \frac{52\pi x^2}{9}$ (4)

9.2 Determine the value of x, such that the area of the shaded region is a maximum. (4)

9.3 Calculate the maximum shaded region. (1)

[9]

NOTH WEST

QUESTION 8

8.1 If $f(x) = 2x^2 - 5x + 3$, determine $f'(x)$ from first principles. (5)

8.2 Determine $\frac{dy}{dx}$ if $y = \frac{2x^2}{3\sqrt{x}} - \frac{2x^3 + 1}{x^3}$ (5)

[10]

QUESTION 9

9.1 Given: $f(x) = -2x^3 + 5x^2 + 4x - 3$

9.1.1 Calculate the coordinates of the x-intercepts of f if $f(3) = 0$. Show all calculations. (4)

9.1.2 Calculate the x-values of the stationary points of f. (4)

9.1.3 For which values of x is f concave up? (2)

9.2 The function g, defined by $g(x) = ax^3 + bx^2 + cx + d$ has the following properties:

- $g(-2) = g(4) = 0$
- The graph of $g^{/}(x)$ is concave up.
- The graph of $g^{/}(x)$ has x-intercepts at $x = 0$ and $x = 4$ and a turning point at $x = 2$.

9.2.1 Use this information to draw a neat sketch graph of g without actually solving for a, b, c and d. Clearly show all x-intercepts, x-values of the turning points and x-value of the point of inflection on your sketch. (4)

9.2.2 For which values of x will $g(x) \cdot g^{//}(x) > 0$? (3)

[17]

QUESTION 10

A shopkeeper finds that the number of people visiting his shop at any moment during the 10 hours that the shop is open, is represented by:

$$N(t) = t^3 - 12t^2 + 36t + 8 \ ,$$

where $N(t)$ is the number of people in the shop, t hours after the shop opened.

10.1 How many people are in the shop when the shop opens? (1)

10.2 At what stage is the number of people in the shop increasing? (5)

10.3 At which stage is it the best time for the shopkeeper to take a break and leave his assistant alone in the shop? (1)

[7]

KZN (KWAZULU NATAL)

QUESTION 9

9.1 Determine the derivative of $f(x)=-5x^2+3x$ from first principles. (5)

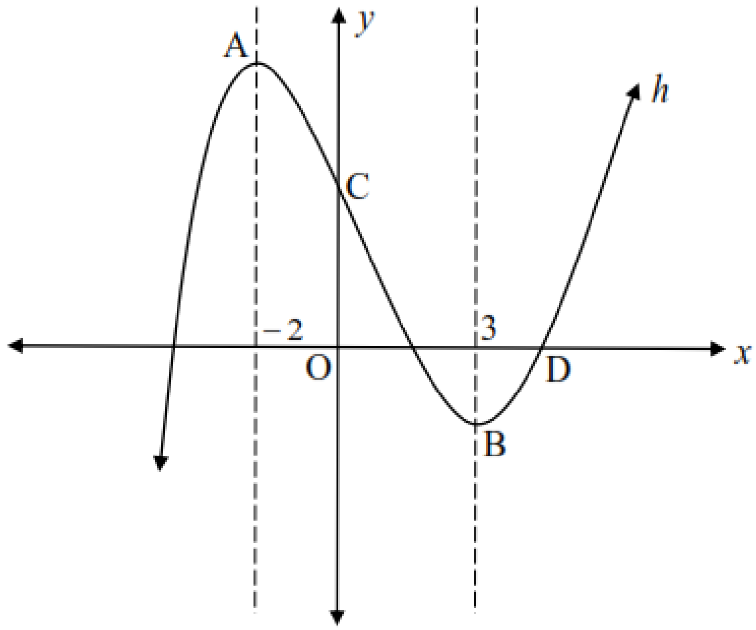
9.2 Calculate $g'(4)$ if $g(x)=\dfrac{1}{2\sqrt{x}}$ (4)

9.3 Determine $D_x[(2x-3)^3]$ (4)

[13]

QUESTION 10

$h(x)=x^3-\dfrac{3}{2}x^2+cx+d$ is sketched below. A and B are the turning points of h at $x=-2$ and $x=3$ respectively. C is the y – intercept of h. D is the point (4 ; 0).



10.1 Show that $c=-18$ and $d=32$. (5)

10.2 Calculate the co-ordinates of A. (2)

10.3 Determine the x – value of the point of inflection. (2)

10.4 Write down the interval for which h is concave up. (1)

10.5 If $g(x)=h(-x)$, write down the co-ordinates of the turning point that is the image of A. (2)

10.6 Determine the values of k for which $h(x)=k$ has 2 unequal negative real roots and one positive real root. (2)

[14]

QUESTION 11

The depth of water (in metres) left in the dam, t hours, after the sluice gate was opened to allow the flow of water to drain from the dam is given by the equation

$D(t) = 28 - \frac{1}{9}t^2 - \frac{1}{27}t^3$.

11.1 Calculate the average rate of change in the depth of the water after the first 2 hours. (4)

11.2 Determine the rate at which the level of the water is decreasing after 16 hours. (4)

[8]

MPUMALANGA

QUESTION 6

6.1 Given: $f(x) = -2x^2 + 5$

Determine $f'(x)$ from FIRST PRINCIPLES. (5)

6.2 Determine $\frac{dy}{dx}$, if $y = 5x + \frac{6}{\sqrt{x}}$ (4)

6.3 Given: $g(x) = \frac{2x^3 + x^2 - 3x}{x - 1}$

Calculate $g'(2)$ if $x \neq 1$. (4)

[13]

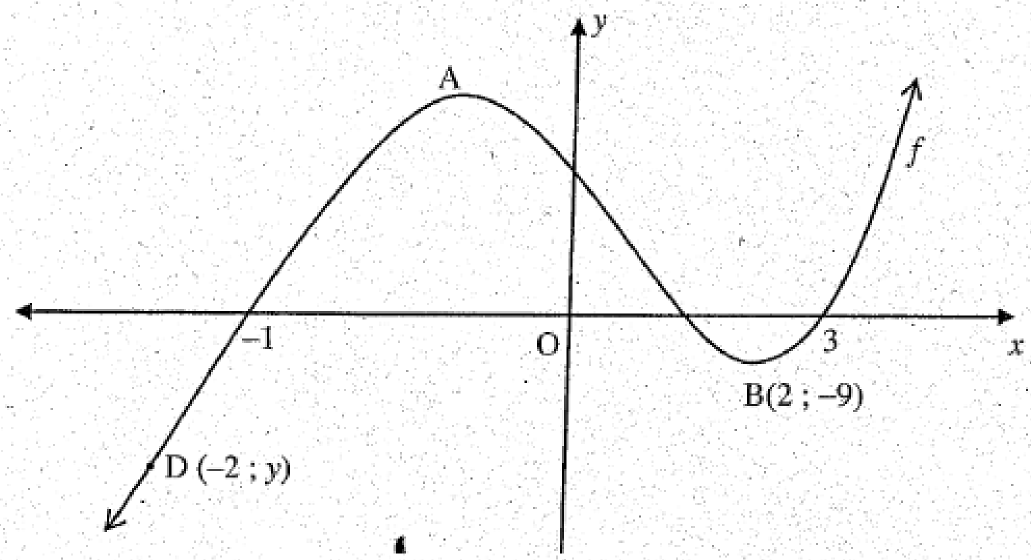
QUESTION 7

In the diagram below, the graph of $f(x) = 2x^3 + bx^2 + cx + d$ is drawn.

The $x-$ intercepts of f are -1, $\frac{1}{2}$, and 3.

A and B(2 ; –9) are turning points of f.

D (–2 ; y) is a point on f.

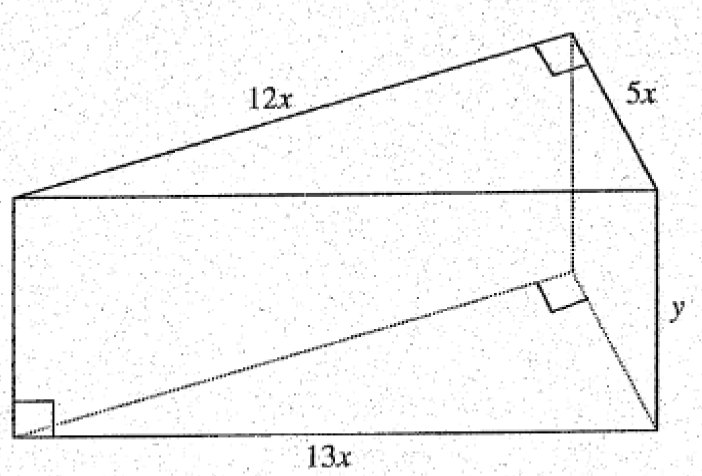


7.1	Find the equation of f.	(4)
7.2	Calculate the coordinates of A if it is given that $f(x) = 2x^3 - 5x^2 - 4x + 3$	(6)
7.3	Determine the equation of the tangent to f, through the point D, in the form $y = mx + c$.	(4)
7.4	For which value(s) of x will f be concave up?	(2)

[16]

QUESTION 8

A wooden block is made as shown in the diagram below. The ends are right angled triangles having sides $5x$, $12x$ and $13x$. The length of the block is y. The total surface area of the block is $600 cm^2$.



8.1 Show that :

$$y = \frac{20 - 2x^2}{x}$$ (3)

8.2 Determine the value of x for which the block would have the maximum volume. (4)

[7]

EASTERN CAPE

QUESTION 8

8.1 Given: $f(x) = x - 2x^2$

Determine $f'(x)$ from first principles. (6)

8.2 Determine $\frac{dy}{dx}$ if:

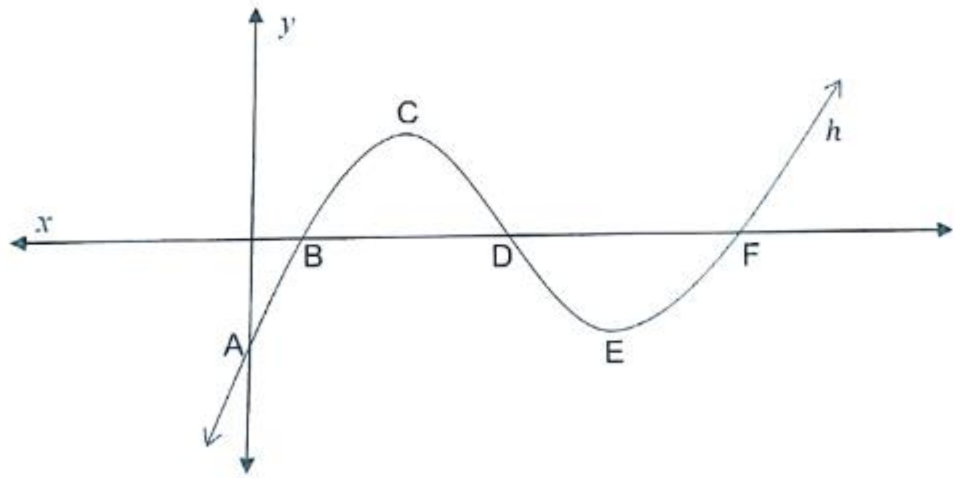
8.2.1 $y = \frac{1}{9}x^{-3} + 9x$ (2)

8.2.2 $y = -\frac{1}{2x\sqrt{x}} + x^3$ (4)

[12]

QUESTION 9

The sketch below shows the graph of $h(x) = x^3 - 9x^2 + 23x - 15$. C and E are the turning points of h. B , D and F are the x-intercepts of h and A is the y-intercept.



9.1 Determine the x-coordinate of the turning point C, correct to two decimal places. (4)

9.2 If the x-coordinate of B is 1 , determine the coordinates of F. (4)

9.3 The graph of h is concave down for $x < k$. Calculate the value of k. (3)

9.4 Determine the equation of the tangent at D in the form $y = \ldots\ldots$ (3)

[14]

QUESTION 10

In a home industry, the total cost (in rand) of producing x number of cakes per day is $R(\frac{1}{4}x^2 + 35x + 25)$. The price at which they are sold is $R(50 - \frac{1}{2}x)$ each.

10.1 Show that the profit made is given by the formula: $P = -\frac{3}{4}x^2 + 15x - 25$. (2)

10.2 Calculate the daily output of cakes to obtain maximum profit. (3)

10.3 Show that the cost of baking is a minimum at $x = 10$. (5)

[10]

CWED

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QUESTION 8

8.1 Given: $f(x) = 3 - x^2$

8.1.1 Determine $f'(x)$ from first principles. (5)

8.1.2 Determine the gradient of the tangent to f where $x = -1$. (2)

8.2 Differentiate with respect to x:

8.2.1 $f(x) = -3x^3 - 2\sqrt{x}$ (3)

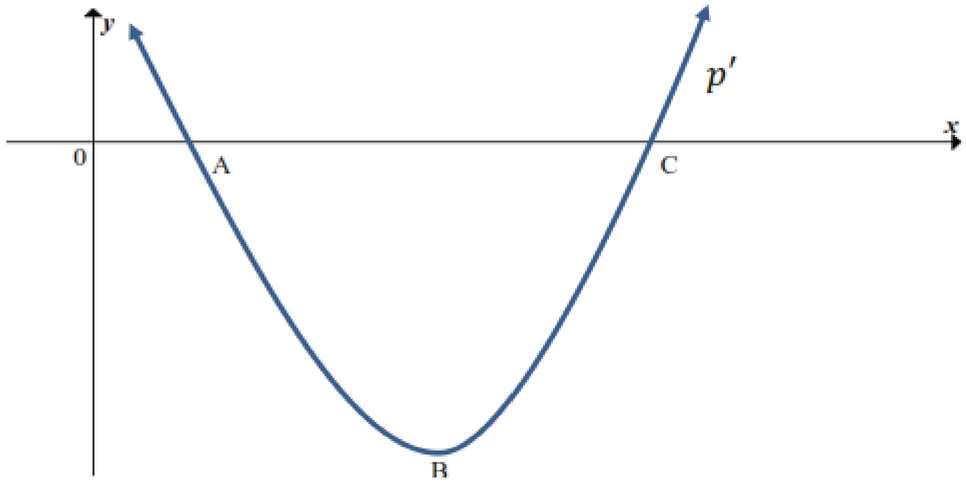
8.2.2 $xy = \left(x - \frac{1}{x^2}\right)\left(x + \frac{1}{x^2}\right)$ (4)

8.3 Given the functions $h(x) = \frac{k}{x}$ and $g(x) = 3x + 6$

8.3.1 Determine the equation of $h'(x)$ in terms of k. (2)

8.3.2 Calculate the value of k if g is a tangent to h. (5)

8.4 The sketch below shows the graph of $p'(x)$ where $p(x) = x^3 + bx^2 + 24x + c$. A(2;0) is an x-intercept of both $p(x)$ and $p'(x)$. C is the other x-intercept of $p'(x)$.



8.4.1 Show that the numerical value of b is equal to -9. Clearly show all your calculations. (3)

8.4.2 Calculate the coordinates of C. (3)

8.4.3 For which value(s) of x will $p(x)$ be increasing? (3)

8.4.4 Calculate the value(s) of x for which the graph of p is concave up. (2)

8.4.5 Sketch a possible graph of $p(x)$. Clearly indicate the x-coordinates of the turning points and the point of inflection. (4)

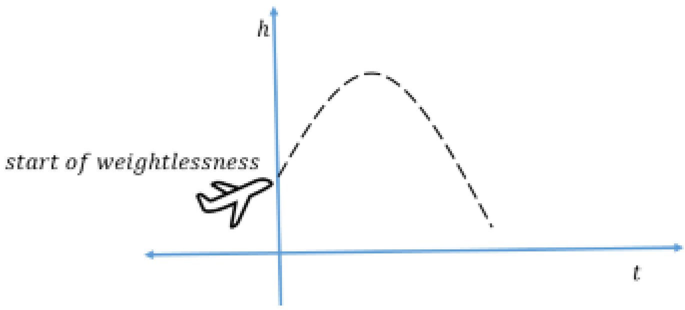
[36]

QUESTION 9

The parabolic flight of an aeroplane that uses weightlessness, can be modelled by the quadratic equation

$$h(t) = -10t^2 + 300t + 9750$$

where h is the height of the aeroplane, in metres, and t the time, in seconds, when weightlessness is reached.



9.1 Determine the height when weightlessness is reached initially. (2)

9.2 Calculate the number of seconds that it takes the aeroplane to reach its maximum height after weightlessness has been reached. (3)

9.3 Calculate the number of seconds (duration) of weightlessness if weightlessness is lost at the same height as when it is reached. (2)

[7]

6. PROBABILITY

FREE STATE

QUESTION 11

11.1 P(A) = 0,45 and P(B) = 0,29. Calculate the P(A *or* B) if:

11.1.1 A and B are mutually exclusive events. (2)

11.1.2 A and B are independent events. (4)

11.2 The probability that it will be sunny tomorrow is $\frac{1}{3}$. If it is sunny, the probability that Pitso plays soccer is $\frac{4}{5}$. If it is not sunny, the probability that Pitso plays soccer is $\frac{2}{5}$. Determine the probability that Pitso does not play soccer. (4)

11.3 How many four character codes can be formed if the first character must be an alphabetical letter and the remaining characters must be digits that may not be repeated? (3)

[13]

TOTAL: 150

LIMPOPO

QUESTION 10

10.1 A box contains 7 cards numbering 1 to 7.
Two cards are drawn at random, one after the other without replacement.
Calculate the probability that the numbers on the cards drawn out of the box, when multiplied result in an odd product. (3)

10.2 For two events A and B, in the sample space S, it is given that
$P(\text{A}) = 0{,}55$, $P(\text{B}) = 0{,}6$ and $P(\text{A and B}) = 0{,}25$.

10.2.1 Draw a Venn diagram to represent the information. (3)

10.2.2 Determine:

(a) $P(\text{A and B}')$ (2)

(b) $P(\text{A or B}')$ (1)

[9]

QUESTION 11

A EASY FLY Airways aeroplane has 6 seats in each row.

11.1 How many possible unique arrangements are there for 6 people to sit in a row? (2)

11.2 Sammy, Anees and 4 other passengers sit in a certain row on a EASY FLY flight. In how many different ways can these 6 passengers be seated if Sammy and Anees must sit next to each other? (2)

11.3 Cois and 5 other passengers are to be seated in a certain row. If seats are allocated at random, what is the probability that Cois will sit at an end of the row? (4)

[8]

NORTH WEST

QUESTION 11

11.1 N and M are two events. P(N) = 0,3; P(M) = 0,4 and P(M or N) = 0,6.

11.1.1 Sketch a Venn-diagram to represent the events. (5)

11.1.2 Are the events N and M independent? Motivate your answer by showing all relevant calculations. (5)

11.2 A five-digit code is created by using digits 0 to 9. Digits may not be repeated. How many different codes are possible if the code must be a multiple of 5 and the code must start with an 8? (4)

[14]

GAUTENG

QUESTION 12

Events A, B and C occur as follows where A and B are independent events.

- $P(A) = 0{,}38$
- $P(B) = 0{,}42$
- $P(A \cap B) = 0{,}1596$
- $P(C) = 0{,}28$
- There are 456 people in event A.

12.1 Are A and B mutually exclusive events? Motivate your answer. (2)

12.2 By using an appropriate formula, show that the value of $P(A \cup B) = 0{,}64$. (2)

12.3 Calculate the number of people in the sample space. (2)

12.4 Determine $n(C')$. (2)

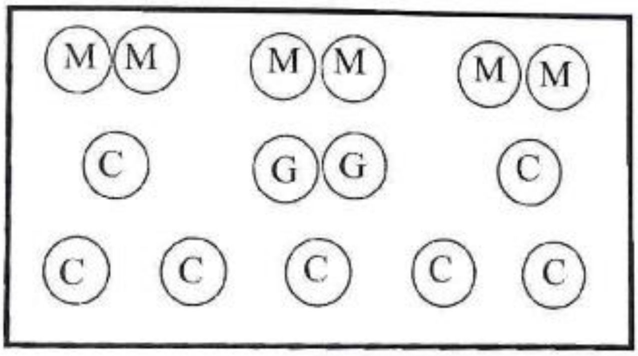
[8]

QUESTION 13

13.1 The letters in the word JOHAN are arranged in any order WITHOUT repetition. What is the probability that the word JOHAN will start with the letter J and end with the letter A? (3)

13.2 The Lauwrens family takes family photos. The photographer arranges three married couples, seven children and two grandparents as follows:

The couples stand husband and wife together at the back, the grandparents in the middle and the children in the other positions as shown in the diagram below.



M	Married Couples
G	Grandparents
C	Children

How many different ways can the Lauwrens family be arranged for the photo? (4)

[7]

KZN (KWAZULU NATAL)

QUESTION 12

Study the table below and answer the questions that follow.

	Like Sport	Do not like Sport	Totals
Males	**80**	***b***	***c***
Females	***a***	**90**	***d***
Totals	**200**	**150**	**350**

12.1 Write down the values of a, b, c and d. (4)

12.2 Is the event liking a sport independent of gender? Show all working. (4)

[8]

QUESTION 13

Consider the letters of the word "DEPENDENT" . Determine, using all letters

13.1 the number of unique arrangements of the letters that can be formed? (3)

13.2 the number of unique arrangements of letters that can be formed in 13.1 starting with the letter "N"? (3)

13.3 the number of unique arrangements of letters that can be formed in 13.1 starting and ending with the letter "N"? (3)

[9]

MPUMALANGA

QUESTION 9

9.1 A six sided dice is rolled and the number of dots landing face up is noted.

Consider the following events:

Event A: the number observed is 2 at the most

Event B: the number landed face up is an even number

Event C: the number 6 is facing up

9.1.1 Calculate P(A or B) (4)

9.1.2 Which events are mutually exclusive? Give a reason for your answer. (2)

9.1.3 Are B and C independent events? Give a reason for your answer. (3)

9.2 A British tourist plans on visiting South-Africa. He intends to visit the following attractions: the Kruger National Park in Mpumalanga, the State Theatre in Gauteng, Table Mountain in Western Cape, the Big Hole in Northern Cape, Ushaka Marine World in Kwa-Zulu Natal and Sun City in North West.

9.2.1 How many different travelling plans can be made if:

9.2.1.1 there are no restrictions (2)

9.2.1.2 he has to visit the State Theatre first and Table Mountain last (2)

9.2.2 What is the probability if he has to visit the attractions in the Cape Province together ? (2)

[15]

EASTERN CAPE

QUESTION 11

11.1 In a survey done at a local traffic department, the following information was obtained.

	Failed	Passed	Total
Male	*A*	*B*	1200
Female	*C*	*D*	400
Total	200	1400	1600

11.1.1 Calculate the probability that a person selected at random will be male. (1)

11.1.2 Calculate the probability that a person selected at random failed the test. (1)

11.1.3 If being male and failing the test are independent events, show that the value of **A** = 150. (3)

11.1.4 Use the value of **A** to determine the values of **B**, **C** and **D**. (3)

11.1.5 Calculate the probability of choosing a female that has failed. (2)

11.2 9 cars of different makes of which 4 are black are to be parked in a straight line.

11.2.1 In how many different ways can all the cars be parked? (2)

11.2.2 If the 4 black cars must be parked next to each other, determine in how many different ways the cars can be parked. (3)

[15]