AMAJUBA DISTRICT MATHS

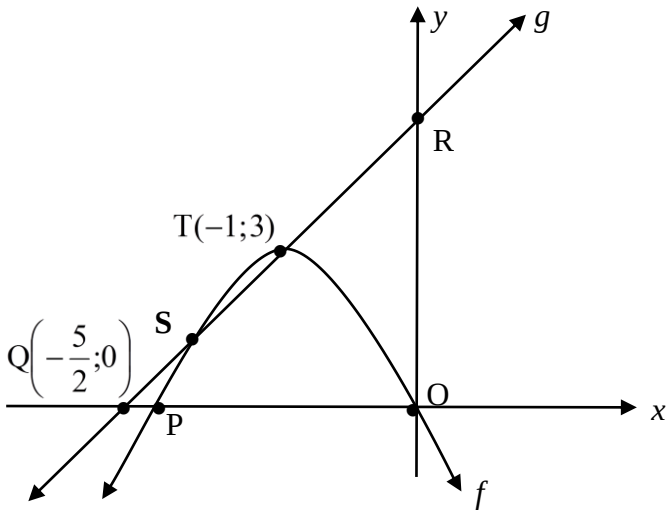
REVISION MATERIAL GR. 11 MATHEMATICS 2019

FUNCTIONS

P1 2014 JUNE KZN

QUESTION 3

The graphs of $f(x) = ax^2 + bx$ and $g(x) = mx + c$ are drawn below: f intersects g at S and T, and f passes through the origin O. T (-1; 3) is the turning point of f. P and $Q(-\frac{5}{2};0)$ are the x-intercepts of f and g respectively and R is the y-intercept of g.



3.1 Determine the values of m and c and hence the length of OR. (3)

3.2 Determine the values of a and b and hence the length of OP. (6)

3.3 Calculate the co-ordinates of S. (3)

3.4 Write down the range of f. (2)

3.5 Use your graphs to solve for x where:

3.5.1 $f(x) \leq 0$ (2)

3.5.2 f is decreasing (1)

3.5.3 $f(x) - g(x) \geq 0$ (2)

3.5.4 $g(x) < 0$. (1)

3.6 For which values of k will $f(x) = k$ have equal roots? (2)

[22]

QUESTION 4 (KZN JUNE 2014 KZN)

The equations of h and p are given by:

$h(x) = \frac{-1}{x-3} + 2$ and $p(x) = 4^{-x} - 2$

4.1 Write down the x and y asymptotes of h. (2)

4.2 Determine the x and y intercepts of h. (3)

4.3 Determine the x and y intercepts of p. (3)

4.4 Write down the equation of the asymptote of p. (2)

4.5 Sketch the graphs of h and p on the same set of axes provided. Indicate ALL intercepts with the axes and asymptotes clearly and name your graphs. (6)

[16]

Question 7

GIVEN: $f(x) = \dfrac{6}{x+2} - 1$

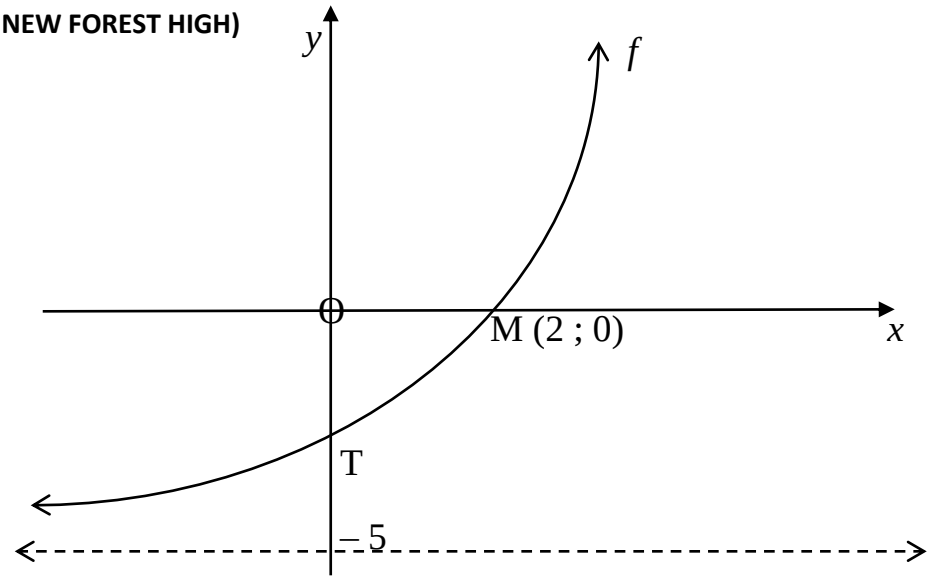
7.1 State the equations of the asymptotes of f. (2)

7.2 Find the co-ordinates of the x and y intercepts of f. (4)

7.3 Sketch the graph of f on the axes provided on the diagram sheet (3)

7.4 The equation of a line of symmetry of f is $y = -x + d$.
Find the value of d. (2)
[11]

Question 8 (2014 NEW FOREST HIGH)



Sketched above is the graph of $f(x) = 5^{x-p} + q$.
T is the y – intercept and the co-ordinates of M are (2 ; 0).

8.1 Write down the value of q. (1)

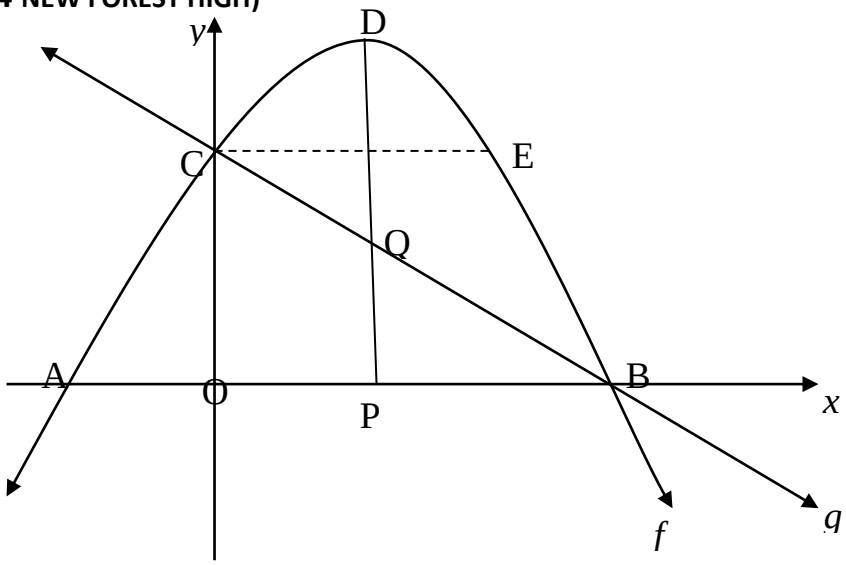
8.2 Calculate the value of p. (3)

8.3 Determine the co-ordinates of T. (2)

8.4 Write down the equation of h if h is the graph of f reflected about the x – axis. (2)
[8]

Question 9 (2014 NEW FOREST HIGH)

9.1



In the above diagram, $f(x) = -x^2 + 8x + 20$ and $g(x) = tx + d$.
The graphs of f and g intersect at C and B.

9.1.1 Find the co-ordinates of A and B, the x – intercepts of x. (4)

9.1.2 Find the values of t and d. (2)

9.1.3 Calculate the co-ordinates of D, the turning point of f (3)

9.1.4 If CE is parallel to the x –axis and E lies on f, write down the co-ordinates of E. (2)

9.1.5 Calculate the average gradient of f between the points E and B. (2)

9.1.6 DQP is perpendicular to the x –axis with Q on g.
Find the length of DQ. (2)

9.1.7 Find the co-ordinates of the turning point of h if
$h(x) = f(x-4) - 3$ (2)

9.2 GIVEN: $f(x) = ax^2 + bx + c$

Draw a sketch graph of f if it is given that $a < 0$, $c < 0$ and $\Delta > 0$. (3)

[20]

Grosvenor Girls High School

Question 4

Given : $f(x) = \frac{8}{x-8} + 4$

4.1 Write down the domain of f. (1)

4.2 For which value of x is $f(x) = 0$? (2)

4.3 Determine the value of p if A (0 ; p) lies on the graph of f. (2)

4.4 Write down the equations of the asymptotes of f. (2)

4.5 Draw a neat sketch graph of f, on the grid provided, clearly indicating asymptotes and intercepts. (4)

[11]

Question 6

Consider : $f(x) = 2^x - 4$.

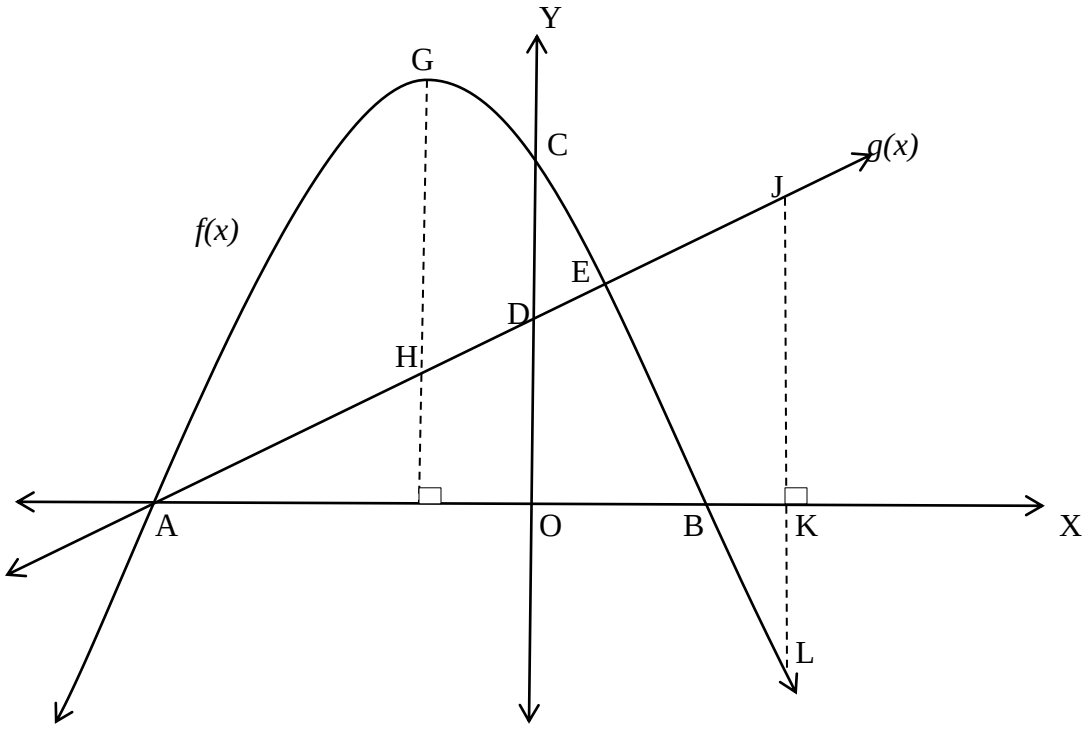
6.1 Sketch the graph of f , in your answer book , clearly showing all intercepts and asymptotes. (4)

6.2 Write down the range of f. (2)

[6]

Question 5

Refer to the diagram below. The graphs of $f(x) = -2x^2 - 4x + 30$ and $g(x) = 2x + 10$ are drawn. A and B are the *x* intercepts and C is the *y* intercept of *f*. G is the turning point of *f*. A is the *x* intercept and D is the *y* intercept of *g*.



5.1 Determine the coordinates of A , B , C and D. (5)

5.2 Hence write down the values of *x* , for which *f(x)* > 0. (2)

5.3 Determine the coordinates of E, a point of intersection of *f* and *g*. (4)

5.4 Determine the equation of the axis of symmetry of *f*. (2)

5.5 Determine the length of GH if GH is parallel to the *y* axis. (5)

5.6 If JL = 60 units, determine the length of OK. (5)

[23]

JUNE 2015 KZN

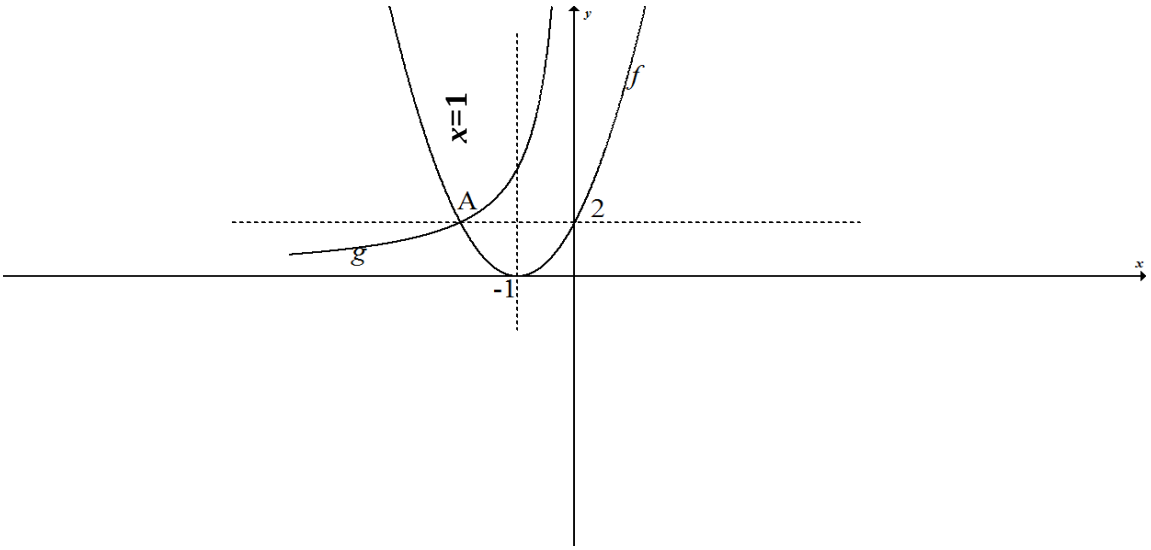
QUESTION 4

4.1 The sketch below shows the sketch of;

$f(x) = ax^2 + bx + c$, with the line of symmetry $x = -1$

$g(x) = \frac{k}{x}$; $x < 0$

and the line $y = 2$. The curves of f and g and the line $y = 2$ intersect at **A.**



4.1.1 Write down the co-ordinates of **A**. (1)

4.1.2 Show that $a = 2$, $b = +4$ and $c = 2$ (4)

4.1.3 Determine the equation of g. (3)

4.1.4 Write down the equations of the line of symmetry of g. (2)

4.1.5 For what values of x is f increasing? (1)

4.1.6 Determine the average gradient on the curve of f between $x = -1$ and $x = 0$ (2)

4.1.7 If the graph of f is shifted **2 units** to the r**igh**t and **3 units down,** write down the equation of the new graph. (2)

[15]

JUNE 2015 KZN

4.2 Given $y = -2x^2 + 8x + 10$ and $y = -2x - 2$

4.2.1 Determine the x and y intercepts of $y = -2x^2 + 8x + 10$ (4)

4.2.2 Sketch both graphs on the system of axes provided. (6)

4.2. 3 Determine the coordinates of the points of intersection of the two graphs. (2)

[12]

QUESTION 5

Consider the following functions;

$$g(x) = \frac{3}{x-2} + 1$$

$$h(x) = 3^{x-2} - 1$$

5.1 State the x and y intercepts of g. (2)

5.2 Write down the y asymptote of h. (2)

5.3 State the range for g (2)

5.4 Sketch both graphs on the system of axes provided. (6)

[12]

FREESTATE JUNE 2015

QUESTION 5

5.1 $f(x) = -x^2 + 2x + 1$ and g: $4y - 4x = 5$

5.1.1 Write $f(x)$ in the form $f(x) = a(x + p)^2 + q$ (4)

5.1.2 Determine:

(a) $f(x) = 0$ (3)
(b) $g(0)$ (2)
(c) Turning point of f (1)

5.1.3 Sketch graph of f and g on the same set of axes. Indicating all the intercepts as calculated in 5.1.2. (4)

5.1.4 Determine the intersection of f and g. (4)

5.1.5 What name is given to g in relation to f? (1)

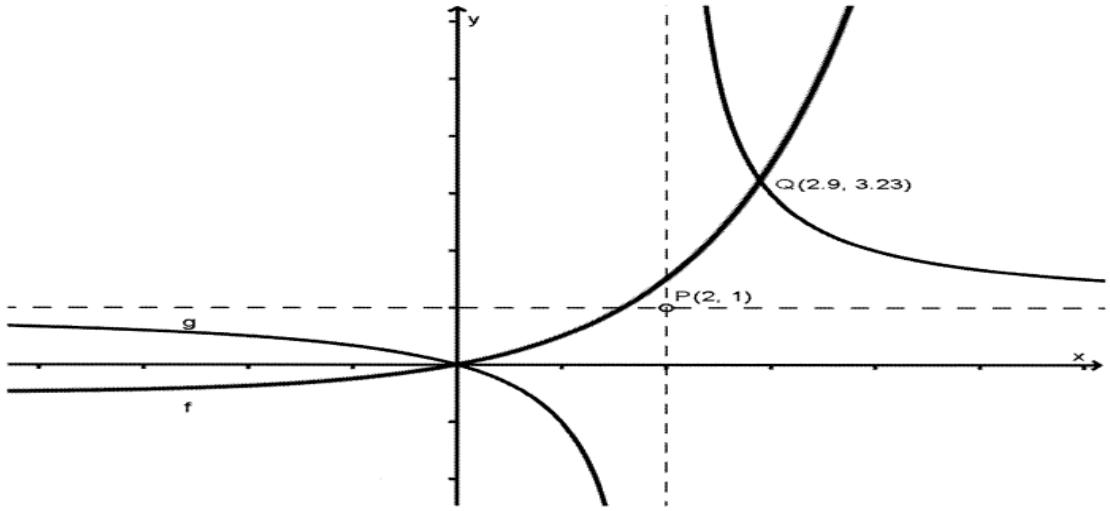
5.1.6 If $h(x) = f(x) - k$ determine all k values for which:

(a) $f(x)$ touches the x −axis at one point. (1)
(b) f does not touch the x-axis. (1)

[21]

QUESTION 6

6.1 The graphs of $f(x) = 2^{x-1} - \frac{1}{2}$ and g are given in the sketch. Study the diagram below and answer the questions that follow.



6.1.1 Write down the equations of the asymptotes. (2)

6.1.2 Determine the equation of g. (2)

6.1.3 Solve $f(x) - g(x) = 0$ graphically. (2)

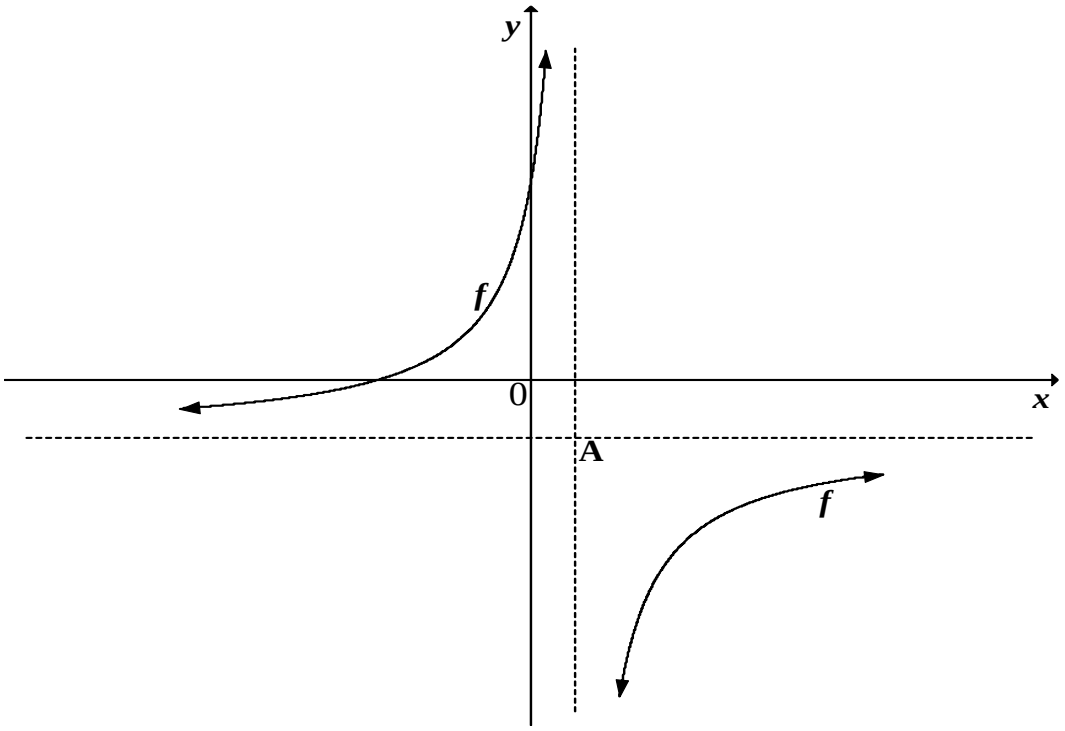
6.2 Determine the values of x which satisfy $\frac{1}{2} \leq f(x) < 3\frac{1}{2}$. (2)

[8]

NOV 2015 DBE

QUESTION 5

5.1 The sketch below shows the graph of $f(x) = \frac{-9}{x-1} - 2$.
A is the point of intersection of the asymptotes of f.



5.1.1 Write down the coordinates of A. (2)

5.1.2 Determine the coordinates of the x- and y-intercepts of f. (5)

5.1.3 Write down an equation of the axis of symmetry of f that has a negative gradient. (2)

5.1.4 Hence, or otherwise, determine the coordinates of a point that lies on f in the fourth quadrant which is the closest to point A. (5)

5.1.5 The graph of f is reflected about the x-axis to obtain the graph of g. Write down the equation of g in the form $y = ...$ (2)

5.2 Given: $h(x) = 4\left(2^{-x}\right)+1$

5.2.1 Determine the coordinates of the *y*-intercept of h. (2)

5.2.2 Explain why h does not have an *x*-intercept. (2)

5.2.3 Draw a sketch graph of h, clearly showing any asymptotes, intercepts with the axes and at least one other point on h. (3)

5.2.4 Describe the transformation from h to g if $g(x) = 4\left(2^{-x}+2\right)$. (2)

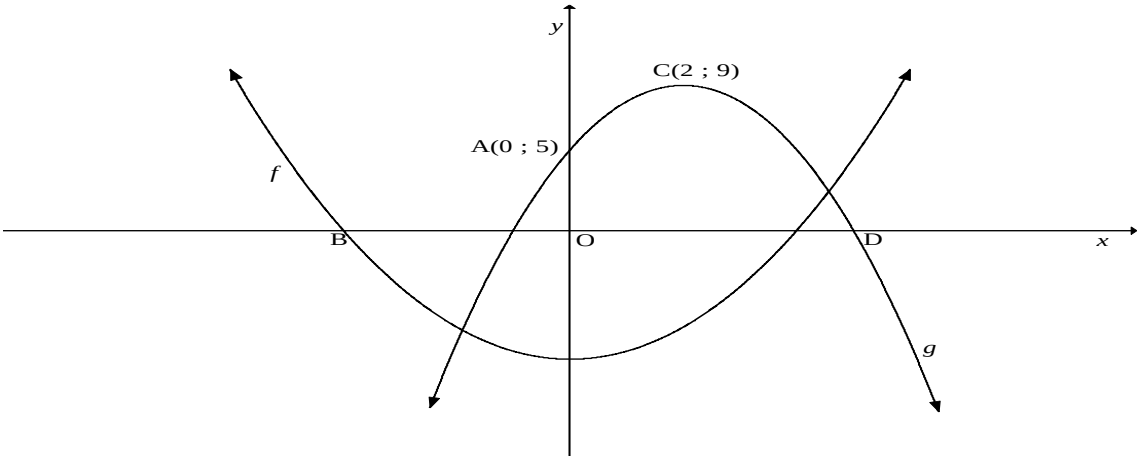
[25]

QUESTION 6

The sketch below represents the graphs of two parabolas: f and g.

$f(x) = \frac{1}{2}x^2 - 8$

The turning point of g is $\mathrm{C}(2;9)$ and the *y*-intercept of g is $\mathrm{A}(0;5)$.
B and D are *x*-intercepts of f and g respectively.



6.1 Show that $g(x) = -x^2 + 4x + 5$. (4)

6.2 Calculate the average gradient of g between A and C. (2)

6.3 Calculate the length of BD. (5)

6.4 Use the graphs to solve for *x*, if

6.4.1 $f(x) \geq 0$. (2)

6.4.2 f and g are both strictly increasing. (2

QUESTION 4

4.1 Given $f(x) = -x^2 - 2x + 3$.

4.1.1 Write f in the form $y = a(x + p)^2 + q$. (3)

4.1.2 Draw a neat sketch graph of f.

Indicate all intercepts with the axes and the coordinates of the turning point. (5)

4.1.3 Write down the range of f. (2)

4.1.4 Describe the transformation from f to h if $h(x) = x^2 + 2x - 3$ (2)

4.1.5 On the same set of axes as f, draw a neat sketch graph of g if $g(x) = -2x + 2$, showing all intercepts with the axes. (2)

4.1.6 Now use your graphs to answer the following questions:

For which value(s) of x is:

(a) $f(x) - g(x) = 0$? (2)

(b) $f(x) > 0$? (2)

4.2 Draw a sketch graph of $k(x) = ax^2 + bx + c$, if it is given that

- k has no real roots;
- $b > 0$ and
- $c > 0$. (3)

[21]

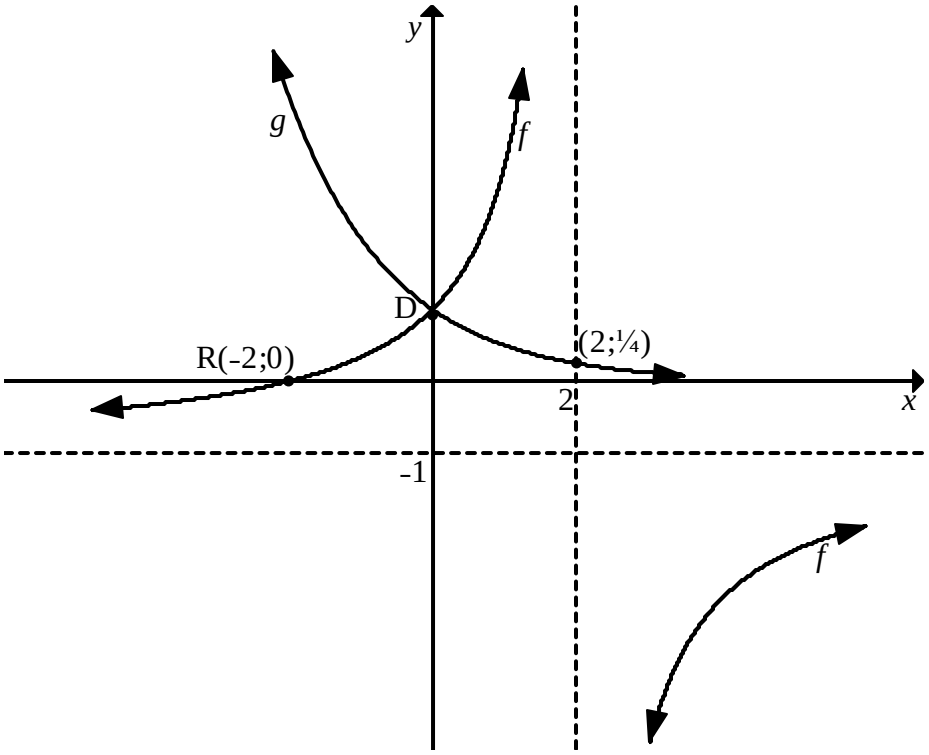
QUESTION 5 (JUNE 2016 KZN)

The diagram below represents the graphs of $f(x) = \frac{a}{x+p} + q$ and $g(x) = t^x$.

f cuts the x-axis at $R(-2;0)$ and the y-axis at D.

$\left(2;\frac{1}{4}\right)$ is a point on the graph of g.

f and g intersect at point D.



5.1 Write down the values of p and q. (2)

5.2 Determine the value of a. (3)

5.3 Determine the value of t. (3)

5.4 Calculate the average gradient of g between $x = -2$ and $x = 2$. (3)

5.5 Write down the equation of the asymptote of g. (1)

5.6 Write down the coordinates of D. (2)

5.7 Determine the equation of the axis of symmetry of f that has a positive gradient. (3)

5.8 Point D is reflected in the line determined in 5.7 to give point E.
Write down the coordinates of E. (2)

NOV 2017 DBE

QUESTION 5

Given: $f(x)=\frac{-3}{x+2}+1$ and $g(x)=2^{-x}-4$

5.1 Determine $f(-3)$. (1)

5.2 Determine x if $g(x)=4$. (2)

5.3 Write down the asymptotes of f. (2)

5.4 Write down the range of g. (1)

5.5 Determine the coordinates of the x- and y- intercepts of f. (5)

5.6 Determine the equation of the axis of symmetry of f which has a negative gradient. Leave your answer in the form $y=mx+c$. (2)

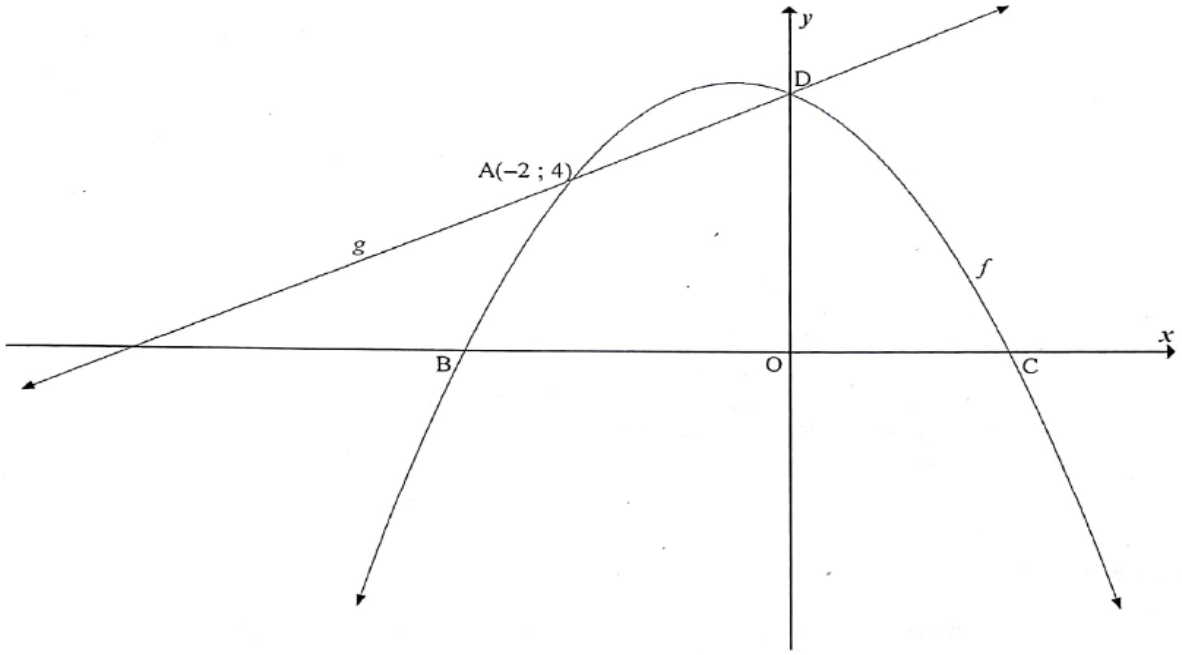
5.7 Sketch the graphs of f and g on the same system of axes. Clearly show ALL intercepts with the axes and any asymptotes. (6)

5.8 If it is given that $f(-1)=g(-1)$, determine the values of x for which $g(x)\geq f(x)$. (2)

[21]

QUESTION 6

The diagram below shows the graphs of $f(x) = -x^2 - x + 6$ and $g(x) = mx + c$. A$(-2\ ;\ 4)$ is the point of intersection of the graphs.



6.1 Determine the x-intercepts f. (4)

6.2 Write down the equation of the axis of symmetry of f. (2)

6.3 Determine the range of f. (3)

6.4 Write down the equation of g in the form $g(x) = mx + c$. (3)

6.5 Write down the average gradient between points A and D. (1)

6.6 Determine the equation of h, if h is the reflection of f about the x-axis and then translated 3 units to the right. Leave your answer in the form $h(x) = a(x + p)^2 + q$. (3)

6.7 Write down the values of x for which $f(x) > 0$. (2)

6.8 If $f(p) = f(r) = 4$, calculate the value of $p - r$ if $r < 0$. (4)

[22]

JUNE 2018 KZN

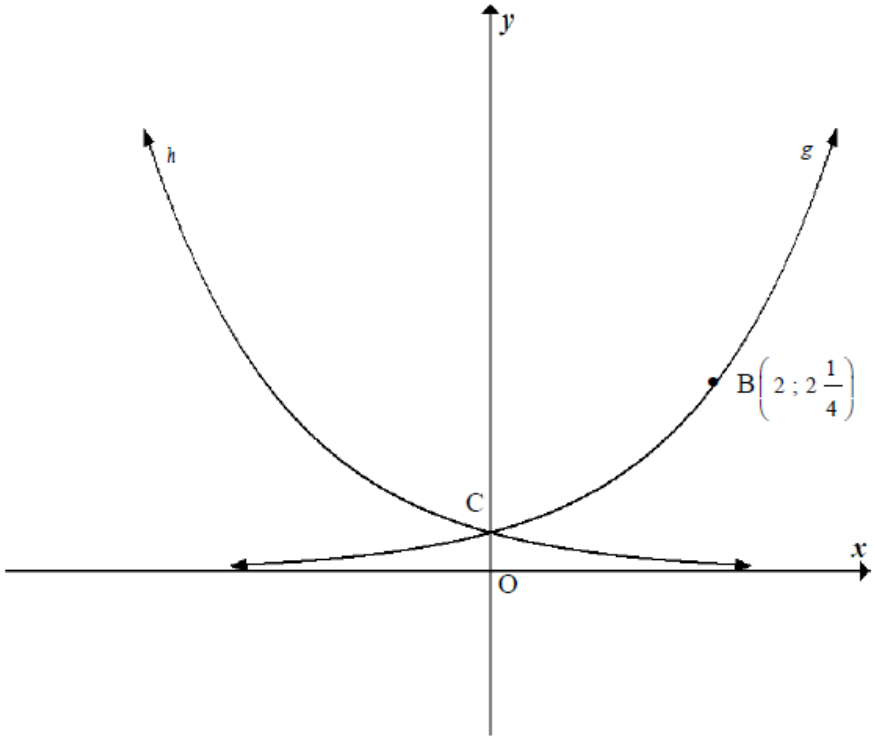
QUESTION 5

5.1 Given: $f(x) = \frac{-6}{x+3} + 2$.

5.1.1 Draw a neat sketch graph of f, indicating the asymptote(s) and intercept(s) with the axes. Show all your calculations. (6)

5.1.2 An axis of symmetry of f has the equation $y = mx + 5$. Write down the value of m. (1)

5.2 In the diagram below, g represents the function $g(x) = a^x, a > 0$. The graph h is symmetrical to g about the y – axis. The point $B\left(2; 2\frac{1}{4}\right)$ lies on the curve of g and C is the y-intercept of both g and h.



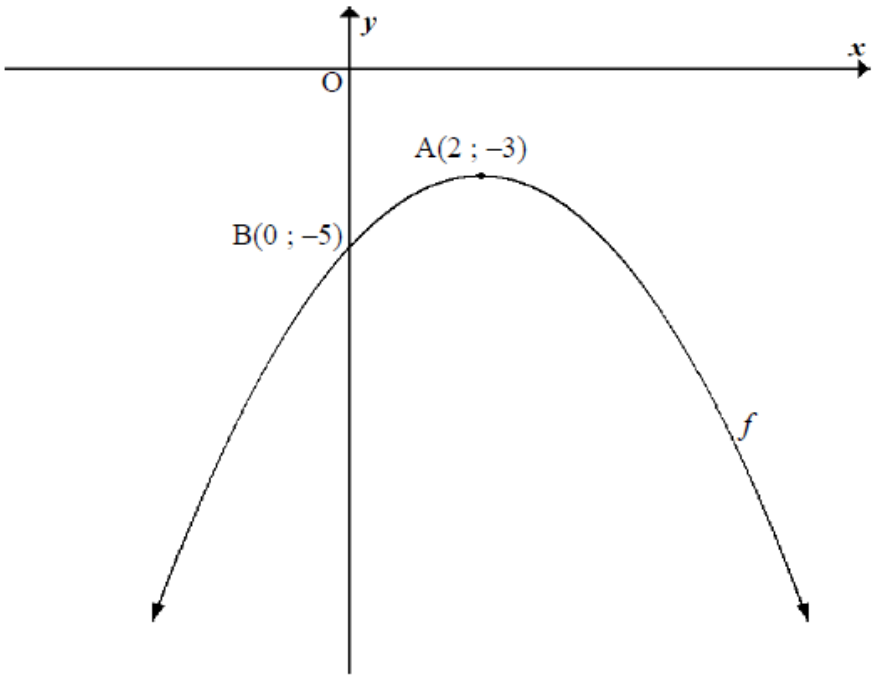
5.2.1 Write down the range of g. (1)

5.2.2 Calculate the value of a. (2)

5.2.3 Determine the equation of h in the form $y = b^x$. (2)

5.2.4 B′ is the reflection of B in the y-axis. Calculate the average gradient between B′ and C. (4)

5.3 The diagram below shows the graph of a parabola f, with turning point A(2 ; –3) and y – intercept B(0 ; –5).



5.3.1 Show that the equation of the parabola can be written as

$$y = -\frac{1}{2}x^2 + 2x - 5 .$$ (5)

5.3.2 Use the graph to determine the value(s) of k for which the equation $-\frac{1}{2}x^2 + 2x - 5 = k$ will have real and unequal roots. (2)

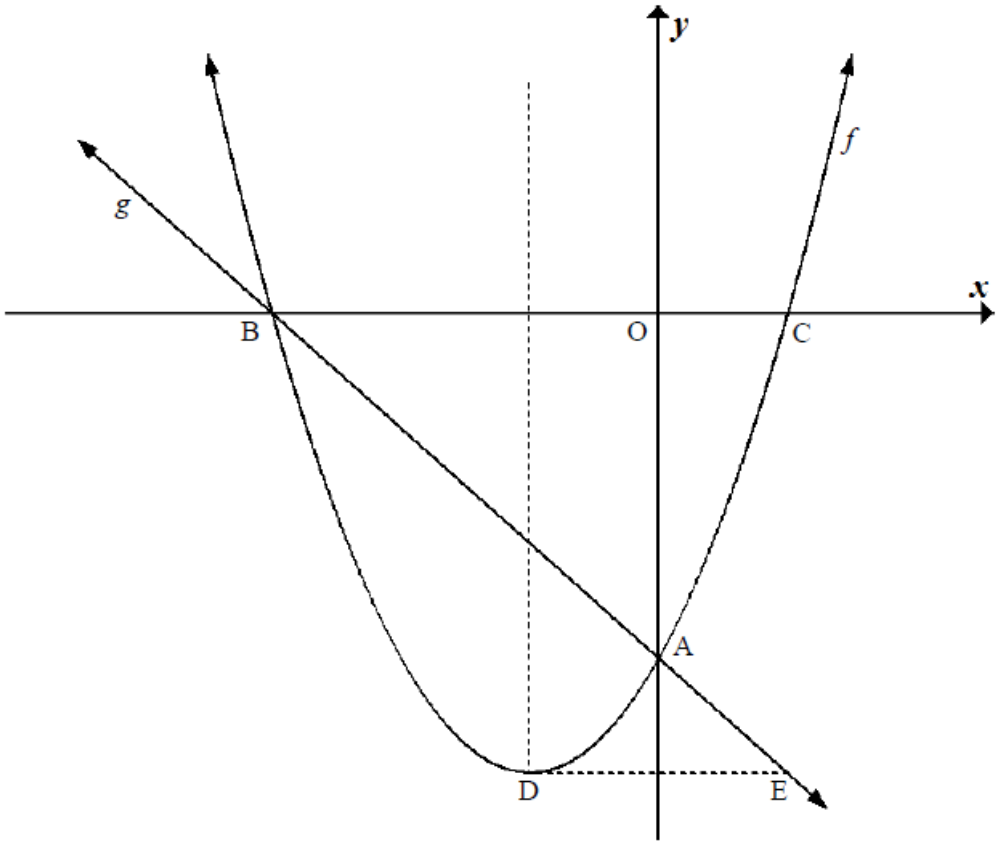
5.3.3 The parabola f is shifted vertically until the new y – intercept is at the origin. Determine the new turning point of the parabola. (2)

[25]

QUESTION 6

The diagram below represents the functions: $f(x) = \frac{3}{2}x^2 + 3x - \frac{9}{2}$ and $g(x) = mx + c$.

- A, B and C are the points at which f intersects the axes.
- D is the turning point of f.
- g passes through A and B.
- E is a point on g.



6.1 Determine the coordinates of A, B and C. (5)

6.2 Determine the coordinates of D. (3)

6.3 Use the graphs to determine the values of x for which $f(x) \geq g(x)$. (2)

6.4 Determine the equation of g in the form $g(x) = mx + c$. (3)

6.5 Determine the length of DE, if DE is perpendicular to the y-axis. (4)

[17]

QUESTION 5

Given: $f(x)=\frac{4}{x-3}+2$ and $g(x)=x+2$

5.1 Write down the equations of the asymptotes of f. (2)

5.2 Determine the x-intercept of f. (3)

5.3 Determine the y-intercept of f. (2)

5.4 Sketch the graphs of f and g on the same system of axes. Show clearly ALL the intercepts with the axes and any asymptotes. (5)

5.5 Calculate the x-coordinates of the points of intersection of f and g. (4)

5.6 If $x<3$, determine the values of x for which $\frac{4}{x-3}+2<x+2$. (2)

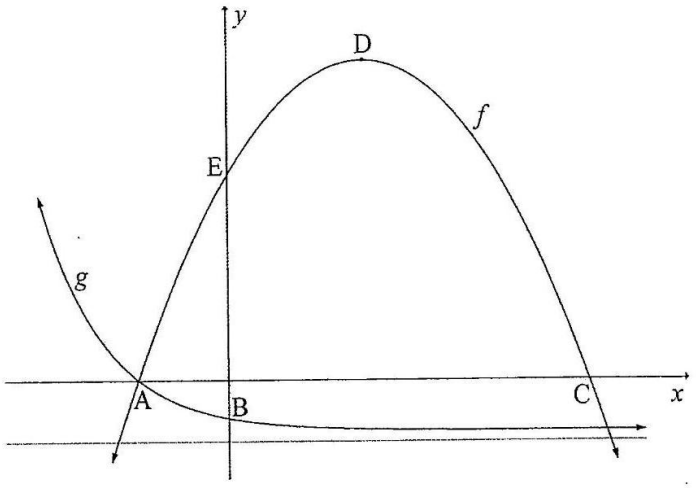
5.7 The line $y=x-1$ cuts f at P(1 ; 0) and Q. Write down the coordinates of Q. (3)

[21]

QUESTION 6

The diagram below shows the graphs of $f(x) = -(x-3)^2 + 25$ and $g(x) = 2\left(\frac{1}{2}\right)^{x+1} - 4$.

Graph f cuts the x-axis at A and C, the y-axis at E and has a turning point at D.
Graph g cuts the x-axis at A and the y-axis at B.



6.1 Write down the equation of the asymptote of g. (1)

6.2 Write down the coordinates of D. (2)

6.3 Write down the range of f. (1)

6.4 Calculate the length of EB. (4)

6.5 Determine the values of x for which f is decreasing. (2)

6.6 Calculate the average gradient between points A and B. (5)

6.7 Graph t is obtained by reflecting g about the x-axis. Write down the range of t. (2)

6.8 If $p(x) = f(x) + 2$, write down the coordinates of the turning point of p. (2)

6.9 Determine the value of k for which the straight line $y = 2x + k$ will be a tangent to f. (4)
[23]