



MATHEMATICS

Grade 12

LIVE: FUNCTIONS

30 JUNE 2014



Lesson Description

In this lesson we:

- Revise paper 1.



Test Yourself

Question 1

The value of x in the following is:

i. $2 \log_x 6 = 7$

| | | | | |
|------|------|--------|---------|--------|
| A. 2 | B. 1 | C. 0.5 | D. 1.67 | E. 2.5 |
|------|------|--------|---------|--------|

ii. $3^{2x} - 2 \cdot 3^{x+1} = 3^3$

| | | | | |
|------|-------|------------|-----------|------|
| A. 2 | B. -3 | C. -3 or 2 | D. 2 or 3 | E. 0 |
|------|-------|------------|-----------|------|

iii. $x^4 - 81 > 0$

| | | | | |
|------------------------|-----------------|----------------|------------|------------------------|
| A. $x < -3$ or $x > 3$ | B. $-3 < x < 3$ | C. no solution | D. $x = 3$ | E. $x = 3$ or $x = -3$ |
|------------------------|-----------------|----------------|------------|------------------------|

Question 2

If $p = \log 2$, determine the following in terms of p:

i. $\log 2 + \log 2^2 + \log 2^3 + \dots + \log 2^{10}$

| | | | | |
|-------|--------|---------|--------|------|
| A. -p | B. 55p | C. 0.5p | D. 54p | E. 0 |
|-------|--------|---------|--------|------|

ii. $\sum_{n=1}^{\infty} (\log 2)^n$

| | | | | |
|--------------------|--------|--------------------|----------|------|
| A. $\frac{p}{1+p}$ | B. 55p | C. $\frac{p}{1-p}$ | D. p - 1 | E. 0 |
|--------------------|--------|--------------------|----------|------|





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Question 3

The gradient of the tangent to the curve defined by $y = ax^3 + bx^2$ at the point $(1; 7)$ is 17. The value of:

i. $a =$

| | | | | |
|------|------|------|------|------|
| A. 1 | B. 2 | C. 3 | D. 4 | E. 5 |
|------|------|------|------|------|

ii. $b =$

| | | | | |
|------|------|------|------|------|
| A. 1 | B. 2 | C. 3 | D. 4 | E. 5 |
|------|------|------|------|------|

iii. Determine the x - coordinate of another point on the curve where the gradient of the tangent is also 17.

| | | | | |
|-------------------|------|-------------------|--------------------|------------------|
| A. $\frac{17}{9}$ | B. 1 | C. $-\frac{1}{9}$ | D. $-\frac{17}{9}$ | E. $\frac{1}{2}$ |
|-------------------|------|-------------------|--------------------|------------------|

Question 4

Given the arithmetic sequence 80, 77, 74, ...

i. Find the 100th term.

| | | | | |
|--------|--------|---------|-------|--------|
| A. 217 | B. 200 | C. -217 | D. -2 | E. 145 |
|--------|--------|---------|-------|--------|

ii. Find the minimum number of terms that must be added together to ensure the sum is less than zero.

| | | | | |
|-------|-------|--------|-------|--------|
| A. 12 | B. 55 | C. -16 | D. -8 | E. 5.5 |
|-------|-------|--------|-------|--------|



Improve your Skills

Question 1

a) Given: $f(x) = \frac{2}{x+1} - 3$

i. Calculate the coordinates of the y -intercept of f . (2)

ii. Calculate the coordinates of the x -intercept of f . (2)

b) Sketch the graph of f , showing clearly the asymptotes and the intercepts with the axes. (3)

i. One of the axes of symmetry of f is a decreasing function. Write down the equation of this axis of symmetry. (2)

c) The graph of an increasing exponential function with equation $f(x) = a \cdot b^x + q$ has the following properties:

- Range: $y > -3$
- The points $(0; -2)$ and $(1; -1)$ lie on the graph of f .

i. Determine the equation that defines f . (4)

ii. Describe the transformation from $f(x)$ to $h(x) = 2 \cdot 2^x + 1$ (2)

[15]

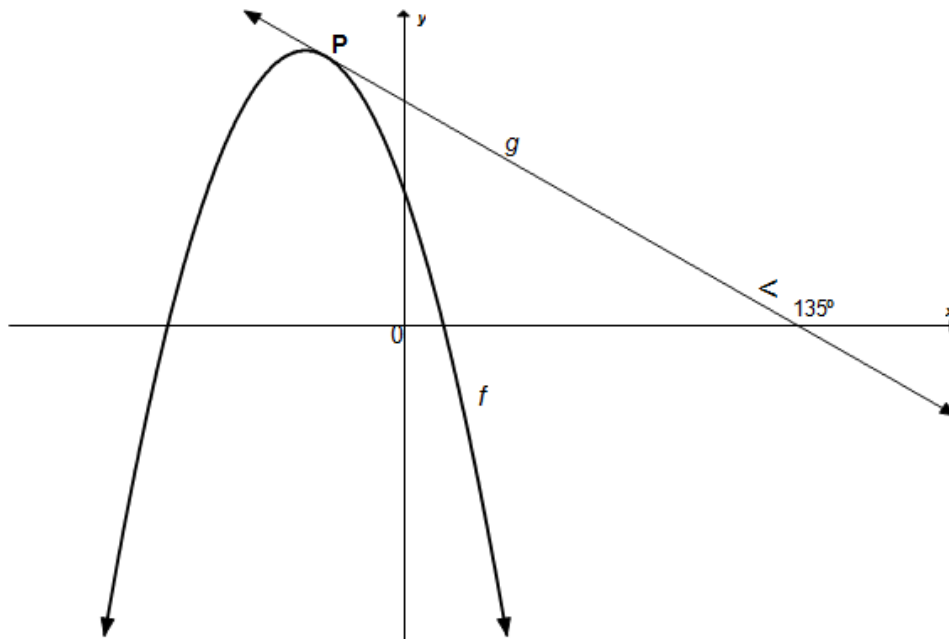




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Question 2

The sketch below shows the graphs of $f(x) = -2x^2 - 5x + 3$ and $g(x) = ax + q$. The angle of inclination of graph g is 135° in the direction of the positive x -axis. P is the point of intersection of f and g such that g is a tangent to the graph of f at P .



Calculate the coordinates of the turning point of graph of f .

- a) Calculate the coordinates of P , the point of contact between f and g . (4)
 - b) Hence or otherwise, determine the equation of g . (2)
 - c) Determine the values of d for which the line $k(x) = -x + d$ will not intersect the graph of f . (1)
- [10]**

Question 3

The graph of g is defined by the equation $g(x) = \sqrt{ax}$. The point $(8 ; 4)$ lies on g .

- a) Calculate the value of a . (2)
 - b) If $g(x) > 0$, for what values of x will g be defined? (1)
 - c) Determine the range of g . (1)
 - d) Write down the equation of g^{-1} , the inverse of g , in the form $y = \dots$ (2)
 - e) If $h(x) = x - 4$ is drawn, determine ALGEBRAICALLY the point(s) of intersection of h and g . (4)
 - f) Hence, or otherwise, determine the values of x for which $g(x) > h(x)$. (2)
- [12]**

Question 4

Given: $f(x) = x^3 - 4x^2 - 11x + 30$.

- a) Use the fact that $f(2) = 0$ to write down a factor of $f(x)$. (1)
 - b) Calculate the coordinates of the x -intercepts of f . (4)
 - c) Calculate the coordinates of the stationary points of f . (5)
 - d) Sketch the curve of f . Show all intercepts with the axes and turning points clearly. (3)
 - e) For which value(s) of x will $f'(x) < 0$? (2)
- [15]**

