

AVERAGE GRADIENT OF A FUNCTION

14 APRIL 2014

 **Lesson Description**

In this lesson we:

- Determine the equation of the parabola
- Interpret information given on a graph
- Calculate the average gradient

 **Summary**

- The gradient of a linear function (straight line) remains constant. To calculate the gradient of a straight line we use the formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

- A non-linear curve, such as a parabola, does not have a constant gradient, but we can calculate the average gradient of the curve.
- The average gradient of a curve between two points is the gradient of the straight line joining the two points on the curve.

 **Test Yourself**

Question 1

If $f(x) = -8 - 2(x - 1)^2$ what is the maximum value of f ?

- A. 8 B. -8 C. -2 D. 1

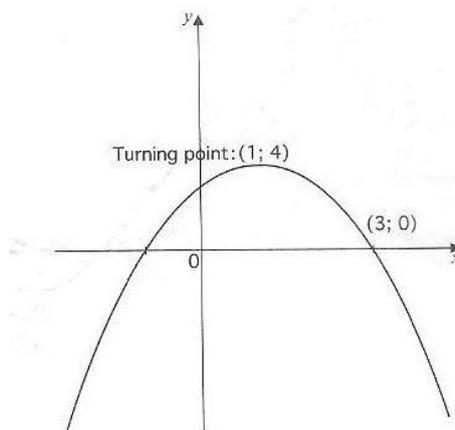
Question 2

If $x > y$ and $x - 3y = 6$ and $xy = 24$, then $x - y = \dots$

- A. 2 B. -10 C. -2 D. 10

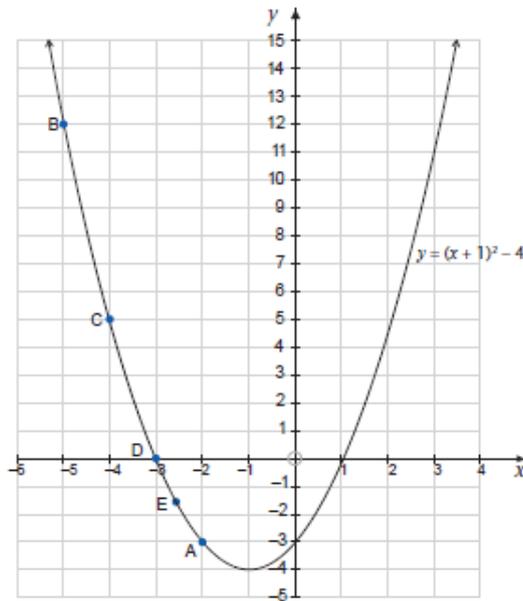
Question 3

Find the equation of the following graph:



Question 4

The diagram represents the graph of $y = (x + 1)^2 - 4$.

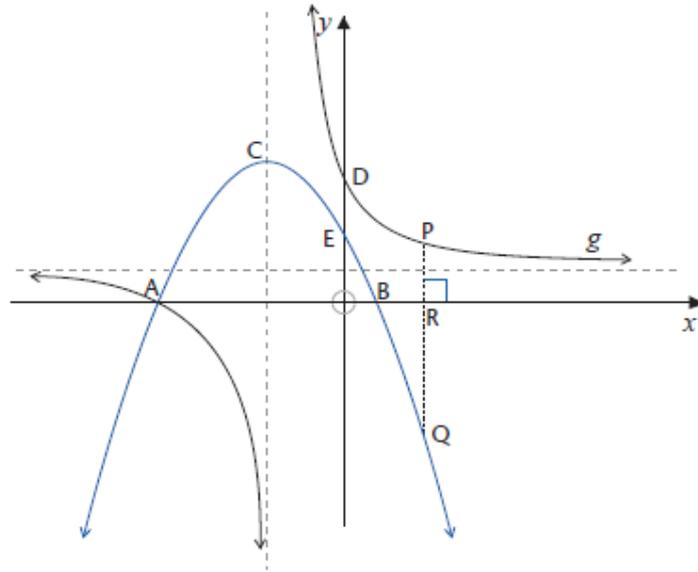


- a.) Determine the coordinates of the points.
 - i. A
 - ii. B
 - iii. C
 - iv. D
- b.) Calculate the average gradient of the curve between:
 - i. the points A and B
 - ii. the points A and C
 - iii. the points A and D.
- c.) If the point E has an x-coordinate of -2,5:
 - i. calculate the y-coordinate
 - ii. determine the gradient of AE.

Question 5

The diagram represents the graphs of $y = f(x) = -1(x + 1)^2 + 4$ and $y = g(x) = \frac{4}{(x+1)} + 2$

- a.) Write down the coordinates of point C, the turning point of f.
- b.) Write down the equations of the asymptotes of g.
- c.) Calculate the lengths of:
 - i. AB
 - ii. DE
- d.) Calculate the length of PQ if OR = 2 units.



Question 6

- a.) Sketch the graph of $f(x) = 2\left(\frac{1}{2}\right)^{x-2} - 4$, clearly showing any intercepts with the axes.
- b.) Write down the domain and range of f.
- c.) If the graph of f is shifted two units to the right and one unit up, write down the new equation of the graph.

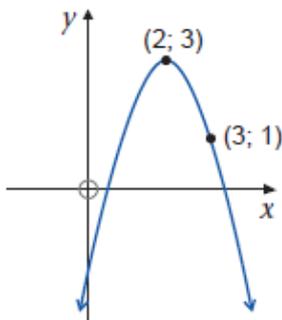


Improve your Skills

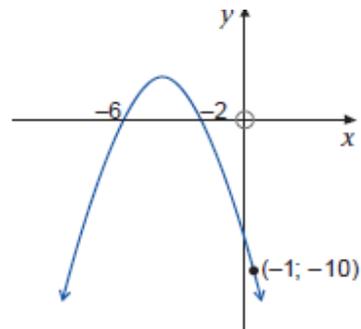
Question 1

Find the equations of the following graphs:

a.)



b.)



Question 2

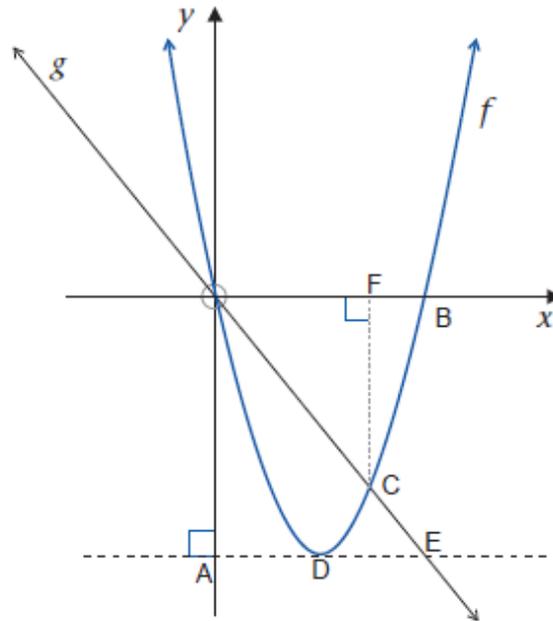
The graphs of the following functions are given:

$Y = f(x) = 2x^2 - 12x$ and $y = g(x) = ax + q$

The two graphs intersect at O and C. D is the turning point of the parabola, and $DE \parallel x$ -axis. $CF \parallel y$ -axis with F on the x-axis.

Determine:

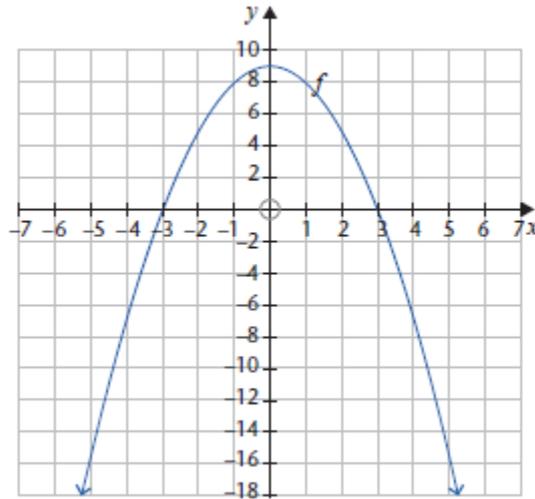
- a.) The coordinates of B
- b.) The coordinates of D
- c.) The coordinates of C if CF is 10 units
- d.) The values of a and q
- e.) The length of DE
- f.) The length of OC, giving your answer in simplest surd form
- g.) The area of $\triangle OFC$
- h.) The values of x for which
 - i. $f(x) \leq g(x)$
 - ii. $f(x) \geq 0$
 - iii. $f(x).g(x) \leq 0$



Question 3

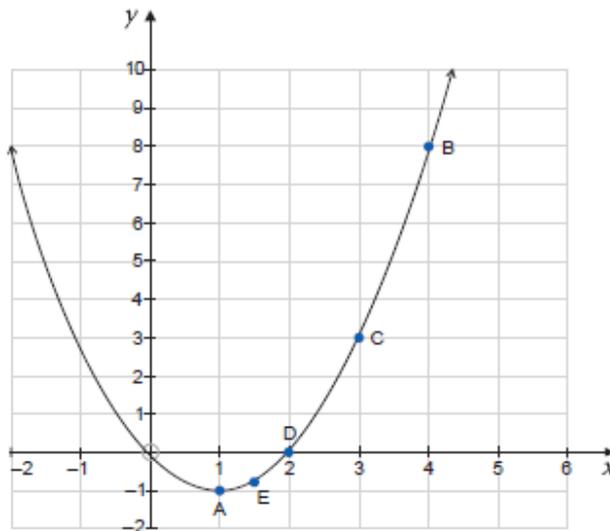
Given the equation $y = f(x) = -x^2 + 9$.

- a.) Determine the average gradient of the curve between the points where $x = 1$ and $x = 5$.
- b.) For which values of x is $f(x)$
 - i. increasing
 - ii. decreasing?



Question 4

The diagram represents the graph of $y = x^2 - 2x$.



- a.) Determine the coordinates of the points.
 - i. A
 - ii. B
 - iii. C
 - iv. D

notes for...

- b.) Calculate the average gradient of the curve between:
- the points A and B
 - the points A and C
 - the points A and D.
- c.) If the point E has an x-coordinate of 1,5:
- calculate the y-coordinate
 - determine the gradient of AE.