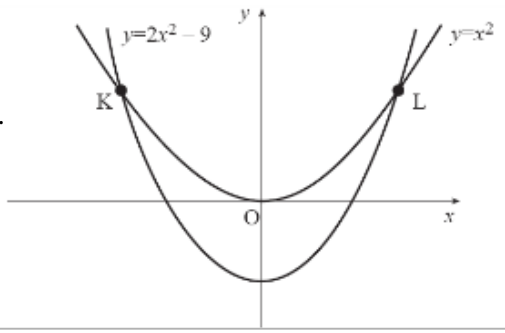
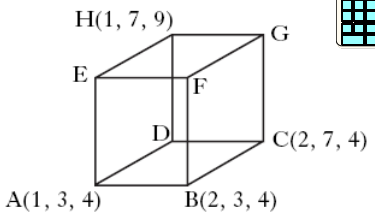
Higher Homework 14

1) The curves with equations $y = x^2$ and $y = 2x^2 - 9$ intersect at K and L as shown.

Calculate the area enclosed between the curves.



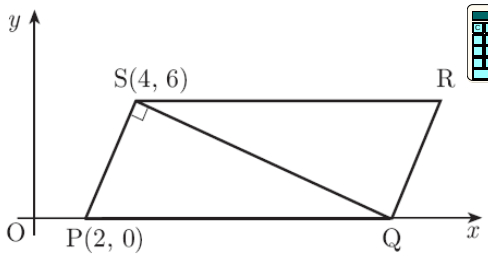
2) The diagram shows a wire framework in the shape of a cuboid with the edges parallel to the axes.
Relative to these axes A, B, C and H have coordinates (1, 3, 4), (2, 3, 4), (2, 7, 4) and (1, 7, 9) respectively.



a) State the lengths of AB, AD and AE.

b) Write down the components of $\overrightarrow{HB}$ and $\overrightarrow{HC}$ and hence or otherwise calculate the size of the angle BHC.

3) PQRS is a parallelogram. P is the point (2,0), S is (4,6) and Q lies on the x-axis as shown.
The diagonal QS is perpendicular to the side PS.



a) Show that the equation of QS is $x + 3y = 22$.

b) Hence, find the coordinates of Q and R.

4) Find $\int_0^1 \frac{dx}{(3x+1)^{\frac{1}{2}}}$.

5) A function f is defined by $f(x) = (2x+1)^5$.

Find the coordinates of the stationary point on the graph with equation $y = f(x)$ and determine its nature.

6) Find the value of $\int_0^2 \sin(4x + 1)\ dx$

7) The point P (x , y) lies on the curve $y = 6x^2 - x^3$.

a) Find the value of x for which the gradient of the tangent is 12.

b) Hence, find the equation of the tangent at P.

8) P, Q and R have coordinates (1, 3, -1) (2, 0, 1) and (-3, 1, 2) respectively.

a) Express the vectors $\overrightarrow{QP}$ and $\overrightarrow{QR}$ in component form.

b) Hence or otherwise find the size of the angle PQR.