Initial question (Edexcel FP1, Jan 2009):

8. A parabola has equation $y^2 = 4ax$, $a > 0$. The point Q $(aq^2, 2aq)$ lies on the parabola.

(a) Show that an equation of the tangent to the parabola at Q is

$$yq = x + aq^2.$$

(4)

This tangent meets the y-axis at the point R.

(b) Find an equation of the line l which passes through R and is perpendicular to the tangent at Q.

(3)

(c) Show that l passes through the focus of the parabola.

(1)

(d) Find the coordinates of the point where l meets the directrix of the parabola.

(2)

This becomes:

A parabola has equation $y^2 = 4ax, a > 0$. The tangent to the point Q, which lies on the parabola, meets the y −axis at the point R. Show that the line l which passes through R and is perpendicular to the tangent at Q passes through the focus of the parabola. Find also, the coordinates where l meets the directrix of the parabola.

Initial Question (Edexcel FP1 June 2011):

5. $\mathbf{A} = \begin{pmatrix} -4 & a \\ b & -2 \end{pmatrix}$, where a and b are constants.

Given that the matrix **A** maps the point with coordinates $(4, 6)$ onto the point with coordinates $(2, -8)$,

(a) find the value of a and the value of b.

(4)

A quadrilateral R has area 30 square units.
It is transformed into another quadrilateral S by the matrix **A**.
Using your values of a and b,

(b) find the area of quadrilateral S.

(4)

This becomes:

The matrix $A = \begin{pmatrix} -4 & a \\ b & -2 \end{pmatrix}$ (a and b are constants) maps the point with coordinates $(4,6)$ onto the point with coordinates $(2, -8)$. A quadrilateral R is transformed into another quadrilateral S by the matrix A. Given that the area of R is 30 square units, what is the area of S?

Initial Question (Edexcel FP1, June 2011):

7. (a) Use the results for $\sum_{r=1}^{n} r$ and $\sum_{r=1}^{n} r^2$ to show that

$$\sum_{r=1}^{n}(2r-1)^2 = \frac{1}{3}n(2n+1)(2n-1)$$

for all positive integers n.

(6)

(b) Hence show that

$$\sum_{r=n+1}^{3n}(2r-1)^2 = \frac{2}{3}n\left(an^2+b\right)$$

where a and b are integers to be found.

(4)

This becomes:

Using standard results show that

$$\sum_{r=n+1}^{3n}(2r-1)^2 = \frac{2}{3}n(an^2+b)$$

Where a and b are integers to be found.

Initial Question (Edexcel FP1, January 2011)

4. Given that 2 – 4i is a root of the equation

$$z^2 + pz + q = 0,$$

where p and q are real constants,

(a) write down the other root of the equation,

(1)

(b) find the value of p and the value of q.

(3)

This becomes:

Find the value of p and q such that $2-4i$ is a root of $z^2+pz+q=0$.