Section A: Pure Mathematics

Answer **all** the questions.

1 **In this question you must show detailed reasoning.**

Solve the equation $x(3-\sqrt{5}) = 24$, giving your answer in the form $a+b\sqrt{5}$, where a and b are positive integers. **[3]**

2 **(a)** Express $5x^2 - 20x + 3$ in the form $p(x+q)^2 + r$, where p, q and r are integers. **[3]**

(b) State the coordinates of the minimum point of the curve $y = 5x^2 - 20x + 3$. **[2]**

(c) State the equation of the normal to the curve $y = 5x^2 - 20x + 3$ at its minimum point. **[1]**

3 **(a)** Sketch the curve $y = -\frac{1}{x^2}$. **[1]**

(b) The curve $y = -\frac{1}{x^2}$ is translated by 2 units in the positive x-direction.

State the equation of the curve after it has been translated. **[2]**

(c) The curve $y = -\frac{1}{x^2}$ is stretched parallel to the y-axis with scale factor $\frac{1}{2}$ and, as a result, the point $\left(\frac{1}{2}, -4\right)$ on the curve is transformed to the point P.

State the coordinates of P. **[2]**

4 **(a)** Find and simplify the first three terms in the expansion of $(2-5x)^5$ in ascending powers of x. **[3]**

(b) In the expansion of $(1+ax)^2(2-5x)^5$, the coefficient of x is 48.

Find the value of a. **[3]**