Edexcel AS Maths Exponentials & logarithms

Section 3: Modelling curves

Exercise level 2

1. The relationship between two variables x and y is believed to be of the form $y = kx^n$, where k and n are constants.

    In an experiment, the following values of x and y are recorded.

x	1	2	3	4	5	6	7
y	3	8	16	24	34	44	56

    (i)   Plot the graph of ln y against ln x and explain why this tells you that the model $y = kx^n$ is appropriate.
    (ii) Use your graph to estimate the values of k and n.
    (iii) Estimate the value of y when $x = 10$.

2. The relationship between two variables p and q is believed to be of the form $q = ab^p$, where a and b are constants.

    In an experiment, the following values of p and q are recorded.

p	1.2	3.4	5.7	6.2	7.4	9.8
q	2.5	3.7	5.8	6.1	7.7	11.9

    (i)   Plot the graph of log q against p, and explain why this tells you that the model $q = ab^p$ is appropriate.
    (ii) Use your graph to estimate the values of a and b.
    (iii) Estimate the value of q when $p = 12$.

3. An engineer finds the following data in an investigation into the breaking strain of a bridge cable when it is subjected to different levels of a particular treatment. The data is given in suitable, but undefined, units.

Treatment x	0.2	0.4	0.6	0.8	1
Breaking strain y	0.07	0.33	0.77	1.43	2.25

    (i)   Sketch a graph of y against x, and suggest a form for a rule connecting them.
    (ii) Write your rule in terms of logarithms, and hence plot a suitable graph and use it to find approximately the law.