Unit 8: Linear relationships (3) Cyclical process
Consolidation: C
Title: Cycles and chaos Underline the title
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The main goal of many scientists is to describe cycles in nature in such a way that the cycle can be written down, preferably in some equation or set of equations. The reader then can sit down with a calculator and simulate the process by starting somewhere in the cycle by entering a given parameter and following the cycle by feeding the calculator with results of preceding cycle actions that delivered those values.

Since the introduction of computers in areas like economics, quantum mechanics, fluid dynamics etc. the scientists working in these fields have been feeding their computers with thousands and sometimes millions of numbers, derived from their experiments. The objective was to let the computer 'chew' on the numbers, look at them in many ways and, hopefully, come with a (usually extremely complex) formula that describes the process. Super computers have been 'crunching numbers' to produce THE weather forecast equation, an equation that describes the 'red spot' storm on the planet jupiter or a formula that describes the air intake turbulence in jet engines that drives airplane engineers up the wall.

When an experiment was carried out which didn't not lead to a crisp and clear equation, the experiment was cancelled for reasons like 'not the right conditions', 'bad equipment' or usually 'this cycle or process is (yet) too complex to describe'.

"Not true", do say an increasing number of scientists since the 1970's. These scientists, working in the field of nonlinear dynamics or popularly called 'the science of chaos', say that 'simple systems may give rise to complex behaviour'. The last two decades mathematicians have developed some simple equations having just 3 or 4 parameters which describe very complex processes. An interesting example is the 'fern equation'. This equation, when processed by a computer and plotted on a screen, seems to produce a random pattern at first but gradually the image of a fern emerges. Formulas for fluid turbulence and ecological cycles have also been produced. Many of these equations seem to produce 'noise' at first (too quick scientists would say that their experiment doesn't not behave as predicted) but in the long run the right picture emerges from the millions of numbers fed into the equation. It is believed that in the coming decades 'chaos' will be used as the basic principle to describe most physical processes and cycles.

excellent work !

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