## A - Level Maths 15 Minute Boost 8

| If $y$ is a function of $t$ and $t$ <br> is a function of $x$ then the <br> chain rule states that |  |
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| The length of the vector <br> $a \mathbf{i}+b \mathbf{j}+c \mathbf{k}$ is |  |
| $\int \frac{1}{a x+b} \mathrm{~d} x$ |  |
| How do you solve the <br> differential equation <br> dy <br> $\mathrm{d} x$$=f(x) g(y) ?$ |  |
| A parametric form of the <br> equation of a circle with <br> centre $(a, b)$ and radius $r$ <br> is: |  |

1 a) Expand $(3+2 x)^{\frac{1}{5}}$ up to the term including $x^{3}$
b) Use your expansion in (a) to approximate $3.02^{\frac{1}{5}}$

2 Newton's law of cooling states that the rate at which the temperature of a hot body decreases is proportional to the difference between the temperature of the body and that of the surroundings. Given that $\theta^{\circ} C$ is the excess of the temperature of the the body over the surroundings at time $t$ minutes after the start, show that the relationship between $\theta$ and $t$ is of the form $\theta=A \mathrm{e}^{-k t}$ where $A$ and $k$ are constants.

