CALCULUS
Average rates of change
OLD2

0130-1. Water is being added to a tub, and the
OLD2 amount in the tub is constantly monitored, and is tabulated against time as follows:

hrs:	2	4	6	8
gallons:	62	100	146	200

Let W be the amount in the tank at time t.
Let $B = (6, 146)$, a point on the graph of W.

a. Find the slope of the secant lines between B and the other points on the graph of W appearing in the table above.

b. Estimate the slope of the tangent line to the graph of W at the point B,
by averaging the following two numbers:

the slope of the secant line
between B and $(4, 100)$
and the slope of the secant line
between B and $(8, 200)$.

0130-2. Let A be the point $(1,5)$ on the graph of $y = x^2 + 4x$. Let B be a variable point $(x, x^2 + 4x)$ on the same graph.

OLD2

a. Compute the slope of the secant line between A and B, when x is equal to

(i) 2	(ii) 1.1	(iii) 1.01
(iv) 0	(v) 0.9	(vi) 0.99

(vii) $1 + h$, with $h \neq 0$

b. Guess the slope of the tangent line to $y = x^2 + 4x$ at A.

c. Using b, write an equation of the tangent line to $y = x^2 + 4x$ at A.

0130-3. A tennis player, in a fit of rage over OLD2 a lost point, throws his racquet into the air. Assume that its distance, in feet, above the ground, t seconds later, is $6 + 50t - 16t^2$.

a. Find its average velocity over the time period starting at time 2, and continuing for the following number of seconds:

(i) 1 (ii) 0.5 (iii) 0.01
(iv) 0.001 (v) 0.0001 (vi) 0.00005
(vii) $\triangle t$, with $\triangle t \neq 0$

b. Guess its instantaneous velocity 2 seconds after it's thrown.