CALCULUS
Average rates of change
NEW

0130-1. Water is being drained from a tub; the amount in the tub is constantly monitored, and is tabulated against time as follows:
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hrs:	2	4	6	8
liters:	101	79	33	25

Let W be the amount in the tank at time t.
Let $B = (6, 33)$, 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 $(4, 79)$
and the slope of the secant line between B and $(8, 25)$.

0130-2. NEW Let A be the point $(1, 4)$ on the graph of $y = 5 - x^3$. Let B be a variable point $(x, 5 - x^3)$ on the same graph.

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 $y = 5 - x^3$ at A.

c. Using b, write an equation of the tangent line to $y = 5 - x^3$ at A.

0130-3. A tennis player, in a fit of rage over a lost point, throws his racquet into the air. Assume that its distance, in feet, above the ground, t seconds later, is $8+30t-16t^2$.

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a. Find its average velocity over the time period starting at time 1, 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) Δt, with $\Delta t \neq 0$

b. Guess its instantaneous velocity 1 second after it's thrown.