CALCULUS
Average rates of change
NEW

0130-1. Water is being drained from a tub; the
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amount in the tub is constantly monitored, and is tabulated against time as follows:

hrs:	3	6	9	12
gallons:	101	80	35	26

Let W be the amount in the tank at time t.
Let $B = (9, 35)$, 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 $(6, 80)$
and the slope of the secant line between B and $(12, 26)$.

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

c. Using b, write an equation of the tangent line to $y = 3 - 2x^4$ 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 $5 + 60t - 16t^2$.

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a. Find its average velocity over the time period starting at time 4, 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 4 seconds after it's thrown.