# Using the Difference Quotient to Find Instantaneous Rates of Change

<u>Warm-Up</u>   (*complete on a separate page*)

Determine all of the points on the curve $f(x) = 5x^2 - 7x + 9$ at which the slope of the tangent is 28.

# Using the Difference Quotient to Find Instantaneous Rates of Change

Since we know how to use the difference quotient to determine the slope of a tangent, we can also apply it to real world situations involving instantaneous rate of change.

(*complete the following examples on a separate page*)

**Velocity**

A toy rocket is launched straight up so that its height, *s*, in metres, at time *t*, in seconds, is given by $s(t) = -5t^2 + 30t + 2$. What is the velocity of the rocket 4 seconds after it is launched?

**Cost**

The total cost, in dollars, of manufacturing *x* calculators is given by $C(x) = 10\sqrt{x} + 1000$.   Determine the rate of change of cost when 100 calculators are being manufactured.

**Geometry**

A spherical balloon is inflated by an electrical pump.  Determine the rate of change of volume with respect to radius when the radius measures exactly 6 cm.