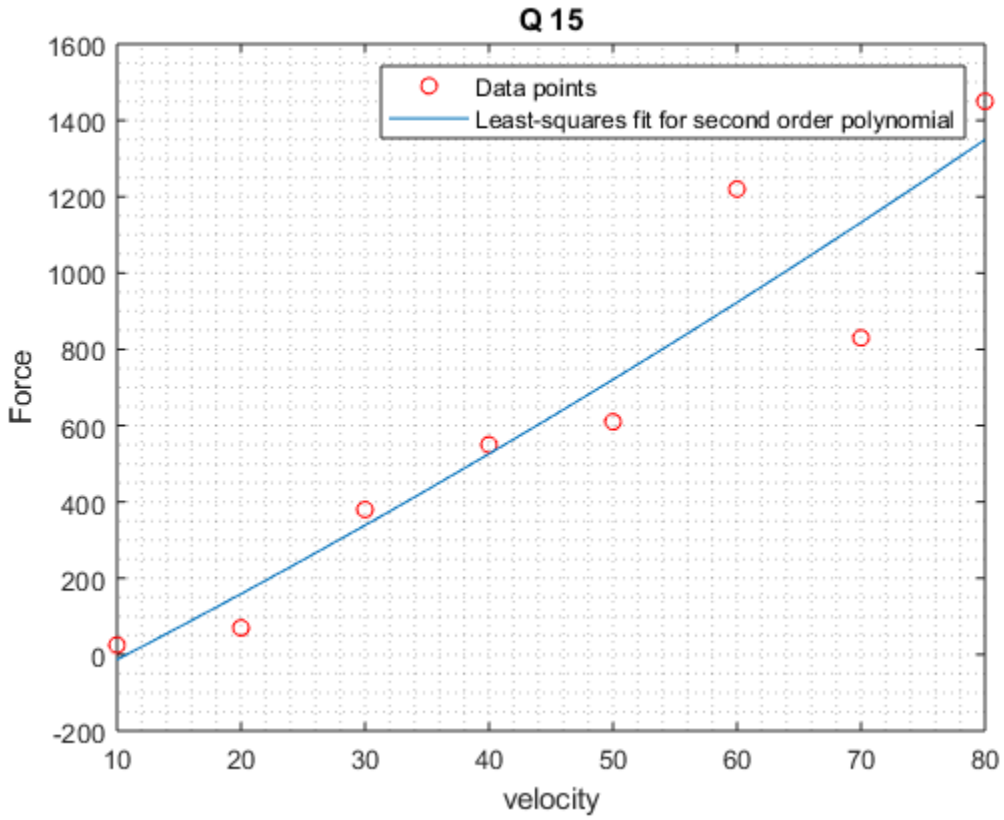
Given Data

```
velocity = [ 10 20 30 40 50 60 70 80];
force = [ 25 70 380 550 610 1220 830 1450];

plot(velocity,force,'ro');
hold on;
grid minor;
%we need to find the coefficients using least square fit for a second-
order
%polynomial
% p = a0*x^2 + a1 *x + c
% the coefficient matrix that I get is
% The Sol that I get are the coefficients of the second order
 polynomial
p = (leastsquares2ndorder2(velocity,force))'
p = fliplr(p);   %% fliping the coefficients becuase they are in the
 reverse order  and using the idea of polynomial expressed in array
 form
velocity1 =  10:5:80;
force1 = polyval(p,velocity1);
plot(velocity1,force1);
xlabel('velocity');
ylabel('Force');
legend('Data points','Least-squares fit for second order polynomial');
title('Q 15');

% function b = leastsquares2ndorder1(x,y)
%   A =  zeros(length(x),3);
%   A(:,1) = x.^2;
%   A(:,2) = x;
%   A(:,3) = 1;
%
%   B = y;
%
%   b = pinv(A)*B;
% end

function c = leastsquares2ndorder2(x,y)
 A = [ length(x) sum(x) sum(x.^2);sum(x) sum(x.^2) sum(x.^3);sum(x.^2)
 sum(x.^3) sum(x.^4)]
 B = [sum(y) sum(x.*y) sum((x.^2).*y) ]';
 c = A\B;

end


A =

          8         360       20400
        360       20400     1296000
      20400     1296000    87720000
```

```
p =

  -178.4821   16.1220    0.0372
```



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