Note: They don’t need to compute decimal approximations; those are given for reference purposes. (But they probably need to know them to do the sketch)

Enter the equation of the parabola.
> y1 := 8 - x^2;

$y_1 := 8 - x^2$

Enter the area formula for the rectangle, with y given by the formula above.
> A := 2 * x * y1;

$A := 2x(8 - x^2)$

Compute the derivative.
> A_prime := diff(A, x);

$A_{prime} := 16 - 6x^2$

Set the derivative equal to zero and solve for x.
> solve(A_prime = 0, x);

$\frac{2}{3}\sqrt{6}, \frac{-2}{3}\sqrt{6}$

> x1 := %[1];

$x_1 := \frac{2}{3}\sqrt{6}$

> evalf(%);

1.632993162

Check to see if there's a max there.
> subs(x=x1, diff(A_prime, x));

$-8\sqrt{6}$

The second derivative is negative there, so it's a max.

Compute the maximum area.
> A_max := subs(x=x1, A);

$A_{max} := \frac{64}{9}\sqrt{6}$

> evalf(%);

17.41859373

Compute the y-coordinate corresponding to x1.
> subs(x=x1, y1);

$\frac{16}{3}$

> evalf(%);

5.333333333

Page 1
The vertices are: (2/3*sqrt(6),0), (-2/3*sqrt(6),0), (2/3*sqrt(6),16/3), (-2/3*sqrt(6),16/3).

Sketch the result.

> plot(y1,x=-4..4,y=0..8);

Should show the parabola & the rectangle, with vertices at the right places points.

Extra plot for labeling vertices.