Problem 1. Sketch the following curves.

1. $y = 2x - x^2$.
2. $y = 2(x-2)^2$.
3. $y = x^3 - 12x + 6$.
4. $y = -\frac{1}{3}x^3 + x^2$.
5. $y = x^4 - 4x^3 + 8x - 5$.
6. $y = 13 + 16x - 8x^3 - 2x^4$.
7. $y = x^3 - 9x^2 + 27x - 27$.

Problem 2. Find the two positive numbers whose sum is 60 and whose product is a maximum.

Problem 3. A rectangle has a perimeter of 8 cm. What should the dimensions be so that its area is maximum?

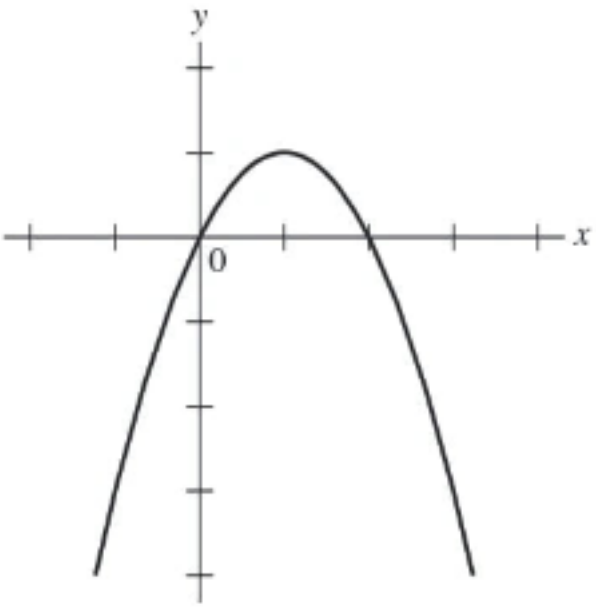
Problem 4. The drag on an airplane traveling at a velocity v is

$$v^2 + \frac{16}{v^2} .$$

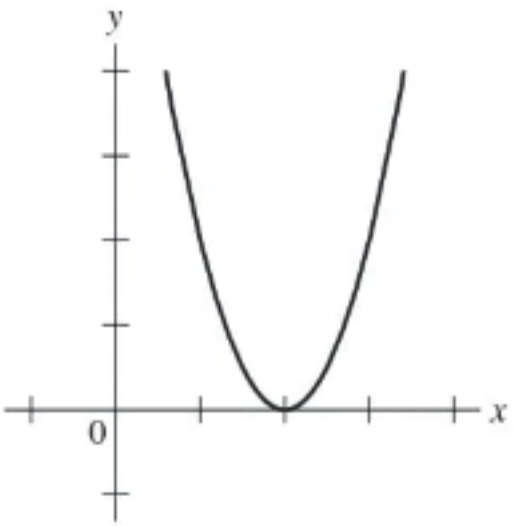
At what speed does the airplane experience the least drag?

Answers to problem 1.

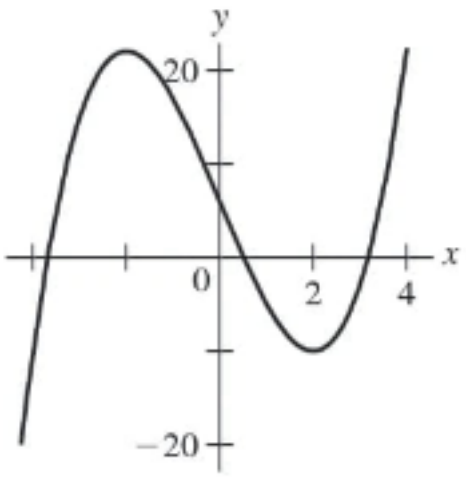
$y = 2x - x^2$



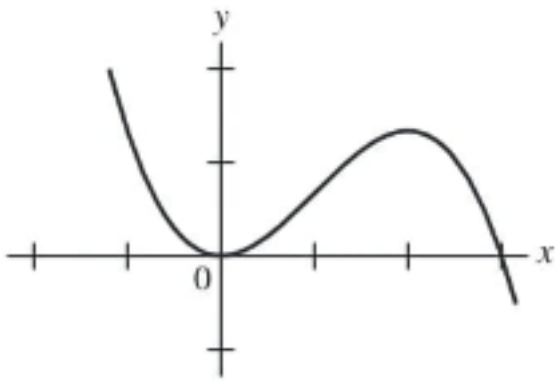
$y = 2(x - 2)^2$



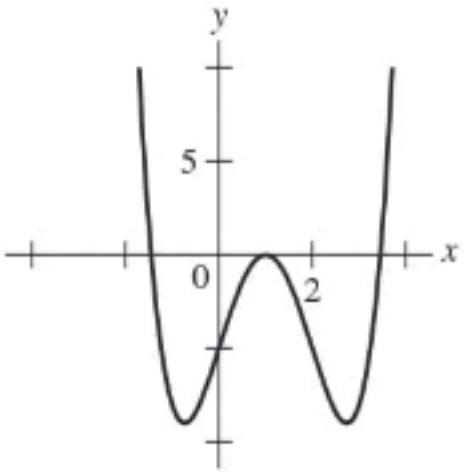
$y = x^3 - 12x + 6$



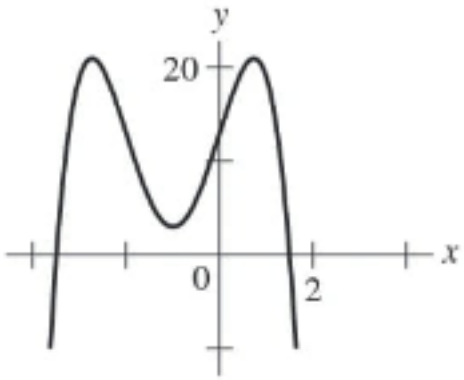
$y = -\frac{1}{3}x^3 + x^2$



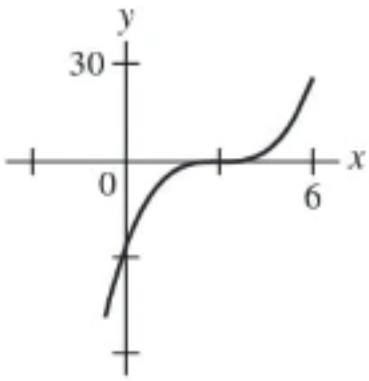
$y = x^4 - 4x^3 + 8x - 5$



$y = 13 + 16x - 8x^3 - 2x^4$



$y = x^3 - 9x^2 + 27x - 27$



Answers to Problem 2. Both the numbers are 30.

Answers to Problem 3. Both length and width are 2 cm.

Answers to Problem 4. At speed of 2 m/s the drag is least.