Name _____ Date _____

LESSON 9.1

Challenge Practice

For use with the lesson "Graph $y = ax^2 + c$"

In Exercises 1–5, write the function of the form $y = ax^2 + c$ whose graph passes through the given points.

1. $(0, 4), (-1, 7), (1, 7)$
2. $(1, -1), (-1, -1), (3, -17)$
3. $(1, -6), (2, 6), (3, 26)$
4. $(-1, 4), (2, 1), (3, -4)$
5. $\left(1, \frac{3}{2}\right), (0, 2), (-2, 0)$

In Exercises 6–10, use the following information.

Einstein's famous formula $E = mc^2$ relates mass m (in kilograms) to the energy E (in joules) contained within the mass. The constant c is equal to the speed of light in a vacuum (in meters per second), $c \approx 3.1 \times 10^8$ meters per second.

6. What is the mass (in kilograms) of an object containing 9.61×10^{16} joules of energy?
7. The average automobile uses 5×10^{10} joules of energy per year. What is the mass represented by this energy?
8. Suppose Einstein's formula holds true in an alternate universe where the speed of light is not the same as in our universe. If an experiment is conducted in which 1 kilogram of mass is equivalent to 1×10^{20} joules of energy, then what is the speed of light in the alternate universe?
9. The average home uses 1×10^8 joules of energy per year. What is the mass represented by this energy?
10. Suppose Einstein's formula holds true in an alternate universe where the speed of light is not the same as in our universe. If the speed of light in the alternate universe is 4×10^5 meters per second, then how much mass would be needed to produce 5×10^{11} joules of energy?