Name: _____ Date: _____

Section 5.5 Literacy Connect

Before Reading

Carefully read the statements in the centre of the chart. Discuss each statement with a partner. Then make a decision. Do you agree or disagree with the statement? Record your choice in the left-hand column.

During Reading

Read the article Safety and Quadratic Reasoning. As you find information related to the statement, discuss the information with your partner.

After Reading

Decide if your original choice is supported by the text or not. Indicate your decision in the column on the right.

Before Reading Do you agree or disagree with the statement?		**Statements**	**After Reading** Does the article support your opinion? Record your evidence from the article under this chart.	
Agree	Disagree		Supported	Unsupported
		Galileo and Newton worked together to solve problems in mathematics and physics.		
		The motion of balls thrown in the air basically follows the quadratic equation.		
		A car travelling at 30 km/h stops and makes a skid mark 5 m long. If the car were travelling at twice the speed, it would make a skid mark twice as long.		
		Some police officers use mathematics to study traffic accidents.		
		Understanding the quadratic formula can help you understand safety.		

Evidence from the article

Name: _____ Date: _____

Safety and Quadratic Reasoning

Galileo (1564–1642) was an Italian Professor of Mathematics at the University of Pisa. He spent a lot of time studying how things move. At the heart of Galileo's work was an understanding of *acceleration* and the role that quadratic equations play in it.

Sir Isaac Newton (1643–1727), an English physicist, took Galileo's work further and developed three laws of motion which let us figure out how forces like gravity act on soccer balls and amusement park rides and how friction acts on hockey pucks and cars.

Motion follows the quadratic equation, except at high speeds where air friction becomes a serious force. For example, if a car accelerates from rest, then the distance the car travels is proportional to the square of the time it has been accelerating.

$s = ut + \frac{1}{2}at^3$

This idea, "proportional to the square", has a lot of information packed into it. But what does all this have to do with safety?

If your car is moving slowly, and you slam on the brakes, your car will skid on the road for a short distance. The faster your car is moving, the further it will skid along the road until the car stops. The skid marks on the road are called the *stopping distance* of the car.

The quadratic formula tells us that if you double your speed, then you quadruple your stopping distance. This is because the stopping distance is proportional to the square of the speed. So suppose your stopping distance is 3 m. If you double your speed, then your stopping distance will quadrupled to 12 m.

Forensic police officers use this knowledge to work backwards. They can figure out how fast a car was going by measuring the length of a car's skid marks.

So quadratic reasoning helps us understand how dangerous it is to speed. Who would have thought that a formula could save a life!