Solving a Cubic Inequality

Solve $x^3 + 2x^2 - 1 \geq 0$ graphically.

Projectile Motion

The movement of an object that is propelled vertically, but then subject only to the force of gravity, is an example of **projectile motion**.

Projectile Motion

Suppose an object is launched vertically from a point s_0 feet above the ground with an initial velocity of v_0 feet per second. The vertical position s (in feet) of the object t seconds after it is launched is

$$s = -16t^2 + v_0 t + s_0.$$

Finding Height of a Projectile

A projectile is launched straight up from ground level with an initial velocity of 288 ft/sec.

(a) When will the projectile's height above ground be 1152 ft?

(b) When will the projectile's height above ground be at least 1152 ft?

Assignment:

In Exercises 27–30, solve the cubic inequality graphically.

27. $3x^3 - 12x + 2 \geq 0$

29. $2x^3 + 2x > 5$

31. Group Activity Give an example of a quadratic inequality with the indicated solution. Answers may vary.

(a) All real numbers

(b) No solution

(c) Exactly one solution

(d) $[-2, 5]$

(e) $(-\infty, -1) \cup (4, \infty)$

(f) $(-\infty, 0] \cup [4, \infty)$

33. Projectile Motion A projectile is launched straight up from ground level with an initial velocity of 256 ft/sec.

(a) When will the projectile's height above ground be 768 ft?

(b) When will the projectile's height above ground be at least 768 ft?

(c) When will the projectile's height above ground be less than or equal to 768 ft?

34. Projectile Motion A projectile is launched straight up from ground level with an initial velocity of 272 ft/sec.

(a) When will the projectile's height above ground be 960 ft?

(b) When will the projectile's height above ground be more than 960 ft?

(c) When will the projectile's height above ground be less than or equal to 960 ft?

37. Connecting Algebra and Geometry Consider the collection of all rectangles that have length 2 in. less than twice their width.

(a) Find the possible widths (in inches) of these rectangles if their perimeters are less than 200 in.

(b) Find the possible widths (in inches) of these rectangles if their areas are less than or equal to 1200 in.^2.

38. **Boyle's Law** For a certain gas, $P = 400/V$, where P is pressure and V is volume. If $20 \leq V \leq 40$, what is the corresponding range for P?