Nolan and Rodger are throwing snowballs into a parking lot from their balcony that is 256 feet above the parking lot. Nolan is throwing snowballs with an upward velocity of 96 feet per second. Rodger is simply dropping his snowballs over the balcony edge.

$h = h_0 + V_0 t - 16t^2$

$h_0 \rightarrow$ initial height

$V_0 \rightarrow$ initial velocity

a. Write a function rule that will represent the height from the ground as a function of time for a Nolan thrown snowball.

$h(t) = 256 + 96t - 16t^2$

$= -16t^2 + 96t + 256$

b. Find the height of a Nolan thrown snowball at 2 second. Show your work.

$h(2) = -16(2)^2 + 96(2) + 256$

$-16(4) + 96(2) + 256$

$-64 + 192 + 256$

384 ft

$$\begin{array}{r} {}^{1}{}^{8}9^{1}2 \\ -\ 64 \\ \hline 128 \\ 254 \\ \hline 384 \end{array}$$

c. Find the height of a Nolan thrown snowball at 7 seconds. Show your work.

$h(7) = -16(7)^2 + 96(7) + 256$

$= 144$ ft

d. How long does it take for a Nolan thrown snowball take to hit the ground?

$0 = -16t^2 + 96t + 256$

$t = 8$ seconds

$$\frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

e. Find the maximum height of a Nolan thrown snowball. At what time does the snowball reach its maximum height? $h(t) = -16t^2 + 96t + 256$

$t = \frac{-b}{2a}$

$= \frac{-96}{2(-16)}$

$= \frac{-96}{-32}$

$= \boxed{3}$

$\frac{8+(-2)}{2} = \frac{6}{2} = \boxed{3}$

$h(3) = -16(3)^2 + 96(3) + 256$

Max height 400 ft

happens @ 3sec.

f. Write a function rule that will represent the height from the ground as a function of time for a Rodger dropped snowball. $h(t) = h_0 + v_0 t - 16t^2$

$h(t) = 256 - 16t^2$

g. At what time does a Rodger dropped snowball hit the ground?

$0 = 256 - 16t^2$

$\frac{16t^2}{16} = \frac{256}{16}$

$\sqrt{t^2} = \sqrt{16}$

$t = \pm 4$

$\boxed{t = 4}$

h. How much longer is a Nolan thrown snowball in the air than a Rodger dropped one? $8 - 4 = 4$ sec

Solve by factoring -54 ($9 \cdot -6$)

a. $x^2 + 3x - 54 = 0$

$(x+9)(x-6) = 0$

$x+9=0 \quad x-6=0$

$x=-9 \quad x=6$

b. $x^2 + 7x + 10 = 0$

$(x+5)(x+2) = 0$

$x+5=0 \quad x+2=0$

$x=-5 \quad x=-2$

c. $x^2 - 7x - 30 = 0$

$(x-10)(x+3) = 0$

$x-10=0 \quad x+3=0$

$x=10 \quad x=-3$

d. $x^2 + 16x = -15$

$x^2+16x+15=0$

$(x+15)(x+1)=0$

$x+15=0 \quad x+1=0$

$x=-15 \quad x=-1$

15 ($15 \cdot 1$)

e. $x^2 = 5x + 84$

$x^2-5x-84=0$

$(x-12)(x+7)=0$

$x-12=0 \quad x+7=0$

$x=12 \quad x=-7$

-24 ($4 \cdot 6$)

f. $x^2 - 2x - 19 = -4$

$x^2-2x-15=0$

$(x-5)(x+3)$

$x=5 \quad x=-3$

-60 ($-15 \cdot 4$)

g. $3x^2 + 16x + 5 = 0$

$(3x^2+15x)+(x+5)=0$

$3x(x+5)+1(x+5)=0$

$(3x+1)(x+5)=0$

$3x+1=0 \quad x+5=0$

$3x=-1 \quad x=-5$

$x=\frac{-1}{3}$

h. $8x^2 + 2x - 3 = 0$

$(8x^2-4x)+(6x-3)=0$

$4x(2x-1)+3(2x-1)=0$

$(4x+3)(2x-1)=0$

$4x+3=0 \quad 2x-1=0$

$4x=-3 \quad 2x=1$

$x=\frac{-3}{4} \quad x=\frac{1}{2}$

i. $6x^2 - 11x - 10 = 0$

$(6x^2-15x)+(4x-10)$

$3x(2x-5)+2(2x-5)$

$(3x+2)(2x-5)=0$

$3x+2=0 \quad 2x-5=0$

$3x=-2 \quad 2x=5$

$x=\frac{-2}{3} \quad x=\frac{5}{2}$