Example #2: After experimentation, it was found that the safe stopping distance, d, (in metres) for a heavy aircraft that taxis at a speed, v, (in km/h) is given by...

$$d = 0.003(6v^2 + 400v + 50\,000)$$

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a) What is the safe stopping distance of the aircraft taxiing at 100 km/h? 450m

b) Determine the speed at which the aircraft is taxiing to take 200 m to stop safely. ≈

a) $d = 0.003(6(100)^2 + 400(100) + 50000)$

$d = 450\text{m}$

b) $\frac{200}{0.003} = \frac{0.003(6v^2 + 400v + 50000)}{0.003}$

$66666.\overline{6} = 6v^2 + 400v + 50000$

$0 = 6v^2 + 400v - 16666.\overline{6}$

$$V = \frac{-400 \pm \sqrt{(400)^2 - 4(6)(-16666.\overline{6})}}{2(6)}$$

400²-4(6)(-16666.666) 559999.984
√(Ans 748.3314667

$$V = \frac{-400 \pm 748.331}{12}$$

$$V = \frac{-400 + 748.331}{12} \quad \text{or} \quad V = \frac{-400 - 748.331}{12}$$

$V = 29.03$ km/h

(can't be (−))

Warm Up

A frustrated Math student opens his second floor bedroom window and throws his textbook up into the air and it lands on the lawn below the window. The height h (metres) of the textbook at any time t (seconds) as is falling toward the ground is represented by the equation $h = -4.9t^2 + 39.2t + 8$

(a) What is the maximum height reached by the textbook? [3]
(b) How high is the student's bedroom window above the ground? [1]
(c) When will the textbook hit the lawn? [2]

a) $h = -4.9(t^2 - 8t + 16) + 8 + 78.4$

$h = -4.9(t-4)^2 + 86.4$

$V(4, 86.4)$

(t, h)

$= 86.4\text{ m}$

(b) Sub. $t = 0$:

$h = 0 + 0 + 8$

$h = 8\text{m}$

(c) $0 = -4.9(t-4)^2 + 86.4$

$\frac{-86.4}{-4.9} = (t-4)^2$

$\pm\sqrt{\frac{86.4}{4.9}} = t - 4$

$t = 4 \pm \sqrt{\frac{86.4}{4.9}}$

$t = 8.199$ or -0.199

Quad. Formula:

$0 = -4.9t^2 + 39.2t + 8$

$t = \frac{-39.2 \pm \sqrt{(39.2)^2 - 4(-4.9)(8)}}{2(-4.9)}$

$t = \frac{-39.2 \pm 41.15}{-9.8}$

39.2²+4*4.9*8
1693.44
√(Ans
41.15142768

$t = \frac{-39.2 - 41.15}{-9.8}$ or $t = \frac{-39.2 + 41.15}{-9.8}$

$t = 8.199$ sec $\quad t = -0.199$

$(-39.2 - 41.15) \div -9.8$

Homework...

Practice Sheet

* Quiz coming up on Thursday