



## Problem of the Week

### Problem B and Solution

### Stop Motion - an Oxymoron



#### Problem

Alysia has decided to shoot a stop motion video using some of her toy cartoon characters.

- If she wants her video to be 30 seconds long with each photo running for 0.3 seconds, how many photos will she need to take?
- She discovers that it is taking her about 2 minutes and 20 seconds to take each photo. How many minutes will it take her to shoot all the photos for her video?
- After researching why her video seems so jerky, she discovers that stop motion movies are shot at 20 frames per second. How many photos will she need to take to make a 30 second (half a minute) stop motion movie?

#### Solution

- For a 30 second video, Alysia will need to take  $30 \div 0.3 = 100$  photos.
- To take 100 photos at 2 minutes and 20 seconds or  $120 + 20 = 140$  seconds each, it will take Alysia  $100 \times 140 = 14\,000$  seconds, or  $14\,000 \div 60 \approx 233.3$  minutes. (The exact answer is  $233\frac{1}{3}$  minutes, or 233 minutes and 20 seconds.)
- To prevent jerkiness in her 30 second video, Alysia will need 20 photos for each second. So for 30 seconds she will need  $20 \times 30 = 600$  photos.

Another way to obtain the same answer is to determine the required running time per photo to obtain 20 frames per second. Each photo runs for  $1 \div 20 = 0.05$  seconds. She now needs  $0.3 \div 0.05 = 6$  times as many photos as her first attempt. Therefore, she requires  $6 \times 100 = 600$  photos to shoot her 30 second video at 20 frames per second.

