



March 2000

**Activity 2: All About Film
Solutions**

1. Silent films ran at 16 frames per second (64 holes/foot divided by 4 holes per frame times one foot per second).
2. 1.5 ft/sec or $1 \frac{1}{2}$ ft per sec. (the original speed of 1 ft/sec times 24 frames divided by 16 frames).
3. Estimate 8100 feet (1.5 ft/sec times 60 second per minute = 90 ft per minute. 90 ft per minute times 90 minutes). Exact answer: 8280 feet (1.5 times 60 times 92). Of course, the actual film is longer because of previews of coming attractions, cute announcements not to smoke or talk in the theater, and a section of blank film to allow the projectionist to thread the camera. Teachers might ask students to estimate how much length all this adds.
4. 132480 (24 frames per second times 60 seconds/minute times 92 minutes). Teachers might note that *Toy Story 2* was made using computers, but in older animated movies like *Snow White* or *Fantasia*, each frame had to be drawn and colored separately. That took an army of artists.
5. You would need at least 162,000 feet of film (8100 feet times 20). That is 405 rolls (162,000/400). Your budget for film and developing needs to be at least \$89,100 (\$220/roll times 405 rolls). Your budget for developing needs to be at least \$32,400 (162,000 feet times \$0.20 per foot). The total is \$121,500.

Another way to solve this problem is to calculate the cost of film per foot ($\$220/400 = \0.55) to get a total cost of \$0.75 per foot for film and developing. Then multiply the total cost per foot by the 162,00 foot length. An extra credit answer would take into account the fact that some film would be wasted at the end of each roll.

6. There is no "right" answer. One estimate would be to assume that the cost is proportional to the total area of film. We know that a 400 foot roll of 35 mm film costs \$220. So one estimate of the cost for a 16 mm roll of the same length would be \$101 (220 times $16/35$). But there are other costs that do not change much like perforating the guide holes, packaging and paying for the building, machinery and the workers salaries. The actual cost for the same type of film is \$126.56, based on the Kodak catalog at <http://www.kodak.com/US/plugins/acrobat/en/motion/catalog/quick.pdf>