

Math 120 A - Spring 2008
Final Exam
June 7, 2008

Name: _____

Student ID no. : _____

Signature: _____

Section: _____

1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
Total	80	

- Complete all eight questions.
- You may use a scientific calculator during this examination. Graphing calculators are not allowed. Also, other electronic devices are not allowed, and should be turned off and put away for the duration of the exam.
- If you use a trial-and-error or guess-and-check method, or read a numerical solution from a graph on your calculator when an algebraic method is available, you will not receive full credit.
- You may use one hand-written 8.5 by 11 inch page of notes. Write your name on your notesheet and turn it in with your exam.
- Show all work for full credit.
- You have 170 minutes to complete the exam.

1. Bob has Sinusoidal Fever, which causes his body temperature to be a sinusoidal function of time. At 1:00 AM today, his temperature reached its lowest point, 96 degrees. His temperature will reach its highest point, 105 degrees, for the third time today at 2:00 PM. For how much time today (from midnight to midnight) will Bob's temperature be above 100 degrees?

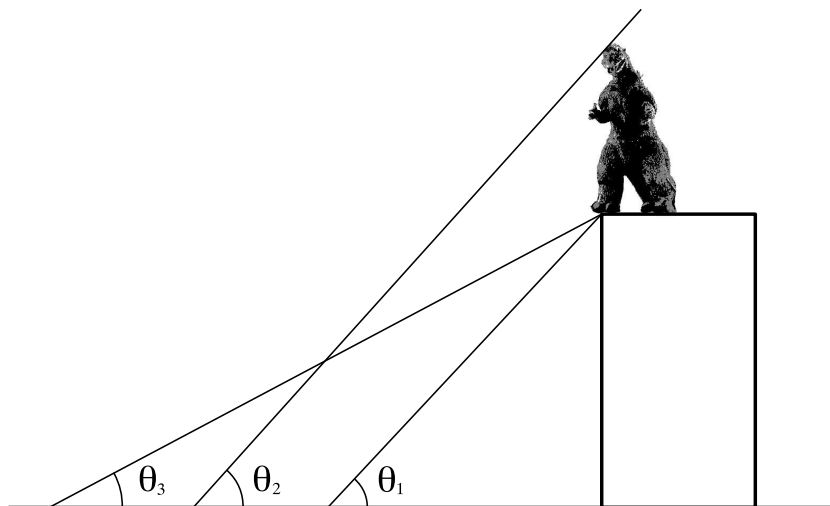
2. The town of Snub had a population of 1,000 in the year 1970. The population increases by 2.11% each year. The town of Goot had a population of 700 in the year 1977. In the year 1990, there were twice as many people in Goot as in Snub.

(a) What is Goot's doubling time?

(b) When will there be 10 times as many people in Goot as in Snub? Express your answer in years after 1970.

3. Godzilla is attacking, but at the moment he is standing on top of a building downtown. You want to determine Godzilla's height, so you measure three angles. First, from a certain distance away from the building, you measure the angle the top of the building makes with the horizontal: $\theta_1 = 72^\circ$. You then move 50 meters farther from the building and measure the angle Godzilla's head makes with the horizontal: $\theta_2 = 74^\circ$. You then move 75 meters farther from the building and measure the angle the top of the building makes with the horizontal: $\theta_3 = 60^\circ$.

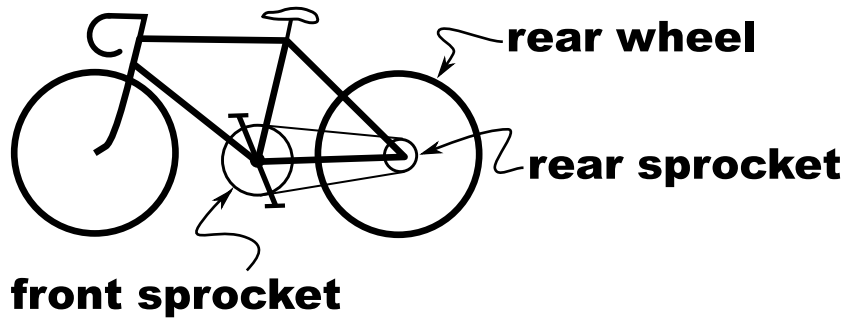
The figure may not be to scale.



How tall is Godzilla?

4. Maria is riding a bicycle. The rear wheel has a radius of 34.3 cm, and the front sprocket has a radius of 8.7 cm. If she travels at a speed of 27 kilometers per hour when pedaling at a rate of 96 revolutions per minute, what is the radius of the rear sprocket?

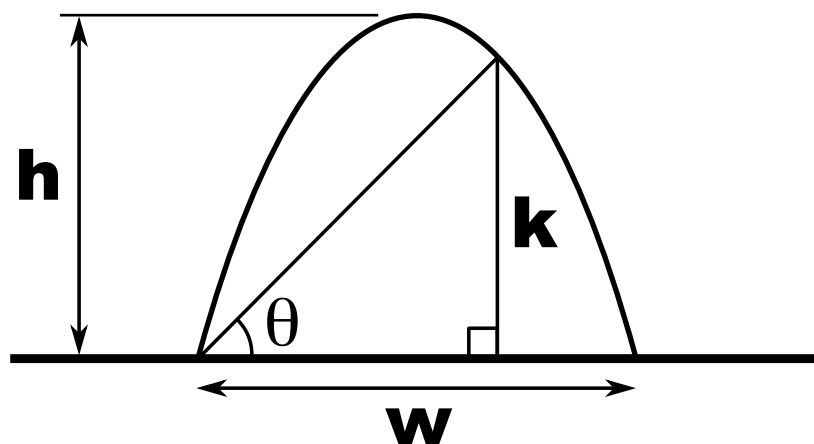
The figure may not be to scale.



5. Alberto is planning to hike from his house in the forest directly to the village of Target, which is 10 km away from his house. Target is due north of the village of Argh. Alberto's house is 9 km due west of Argh. The village of Lump is 3 km south and 4 km west of Target.

On Alberto's hike, how close does he come to Lump?

6. The figure below shows a parabolic arch. The width w between the bases of the arch is 20 feet. The height h of the arch above the ground is 33 feet. The angle θ shown in the figure is 48° . Find the length of the line segment labeled k .



7. Find a linear function $g(x)$ such that the function $f(x) = g(g(x))$ has the properties

$$f(0) = -24 \text{ and } f(5) = -4.$$

8. Let $k(x) = \frac{2x - 8}{5x + 7}$. Find $k^{-1}(x)$.