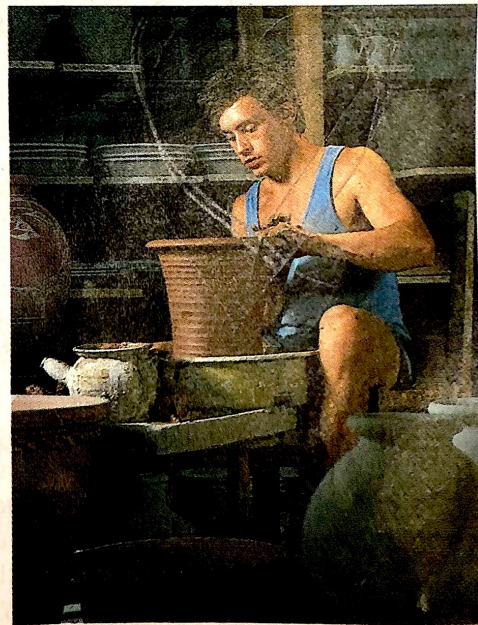


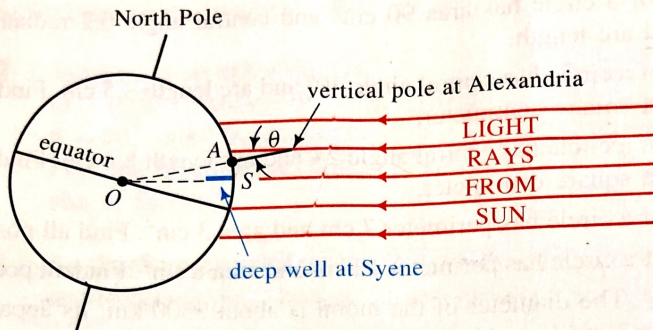
## WRITTEN EXERCISES

- A**
1. A sector of a circle has radius 6 cm and central angle 0.5 radians. Find its arc length and area.
  2. A sector of a circle has radius 5 cm and central angle 3 radians. Find its arc length and area.

3. A sector of a circle has arc length 11 cm and central angle 2.2 radians. Find its radius and area.
4. A sector of a circle has arc length 2 cm and central angle 0.4 radians. Find its radius and area.
5. A sector of a circle has area  $25 \text{ cm}^2$  and central angle 0.5 radians. Find its radius and arc length.
6. A sector of a circle has area  $90 \text{ cm}^2$  and central angle 0.2 radians. Find its radius and arc length.
7. A sector of a circle has central angle  $30^\circ$  and arc length 3.5 cm. Find its area to the nearest square centimeter.
8. A sector of a circle has central angle  $24^\circ$  and arc length 8.4 cm. Find its area to the nearest square centimeter.
9. A sector of a circle has perimeter 7 cm and area  $3 \text{ cm}^2$ . Find all possible radii.
10. A sector of a circle has perimeter 12 cm and area  $8 \text{ cm}^2$ . Find all possible radii.
11. **Astronomy** The diameter of the moon is about 3500 km. Its apparent size is about 0.0087 radians. About how far is it from Earth?
12. **Astronomy** At its closest approach, Mars is about  $5.6 \times 10^7$  km from Earth and its apparent size is about 0.00012 radians. What is the approximate diameter of Mars?
13. **Physics** A compact disc player uses a laser to read music from a disc. The player varies the rotational speed of the disc depending on the position of the laser. When the laser is at the outer edge of the disc, the player spins the disc at the slowest speed, 200 rpm.
  - a. At the slowest speed, through how many degrees does the disc turn in a minute? Through how many radians does it turn in a minute?
  - b. If the diameter of the disc is 11.9 cm, find the approximate distance that a point on the outer edge travels at the slowest speed in 1 min.
  - c. Use part (b) to give the speed in cm/s.
14. **Physics** To make a clay vase, an artist uses a potter's wheel that has a diameter of 13 in. and spins at 120 rpm. Find the approximate distance traveled in 1 min by a point on the outer edge of the wheel.
- B** 15. **Astronomy** The moon and the sun have approximately the same apparent size for viewers on Earth. The distances from Earth to the moon and to the sun are about  $4 \times 10^5$  km and  $1.5 \times 10^8$  km, respectively. The diameter of the moon is about 3500 km. What is the approximate diameter of the sun?



Erastosthenes (about 276 B.C.–194 B.C.) determined the circumference of Earth. It was reported to him that at noon on the first day of summer the sun was directly overhead in the city of Syene because there was no shadow in a deep well. Eratosthenes observed at this same time in the city of Alexandria that the sun's rays made an angle  $\theta = 7.2^\circ$  with a vertical pole.

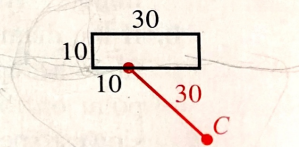


- How did Eratosthenes conclude that the measure of  $\angle AOS = \theta = 7.2^\circ$ ?
- If Alexandria was known to be 5000 stadia due north of Syene, show how Eratosthenes could conclude that the circumference of Earth was about 250,000 stadia. (1 stadium  $\approx$  0.168 km)
- Given that

$$\text{percent difference} = \frac{\text{old value} - \text{modern value}}{\text{modern value}} \times 100,$$

what is the percent difference between Eratosthenes' value for the circumference of Earth and the modern value of 40,067 km?

- Farming** A cow at  $C$  is tethered to a post alongside a barn 10 m wide and 30 m long. If the post is 10 m from a corner of the barn and if the rope is 30 m long, find the cow's total grazing area to the nearest square meter.



- Optics** What is the apparent size of an object 1 cm long held 80 cm from your eyes?
- Optics** You are traveling in a car toward a certain mountain at a speed of 80 km/h. The apparent size of the mountain is  $0.5^\circ$ . Fifteen minutes later the same mountain has an apparent size of  $1^\circ$ . About how tall is the mountain?
- Optics** A ship is approaching a lighthouse known to be 20 m high. The apparent size of the lighthouse is 0.005 radians. Ten minutes later the lighthouse has an apparent size of 0.010 radians. What is the approximate speed of the ship (in km/h)?

