

# TEST YOUR SKILLS

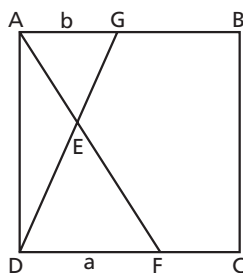
**1 TEST** A 4 m flagpole is in front of a building. The shadow from the top of the flagpole coincides with the shadow from the top of the building. If the flagpole casts a 6 m shadow at the same time that the building casts a 24 m shadow, how tall is the building?

- A 36 m
- B 16 m
- C 28 m
- D 10 m
- E None of the above.

(USA Catawba College NCCTM Mathematics Contest, 2005)

**2 TEST** In the unit square, find the distance from  $E$  to  $AD$  in terms of  $a$  and  $b$ , the lengths of  $DF$  and  $AG$ , respectively.

- A  $\frac{ab}{a+b}$
- B  $\frac{b}{a+b}$
- C  $\frac{a-b}{a+b}$
- D  $\frac{a}{a+b}$
- E  $\frac{2a-b}{a+b}$



(USA University of North Carolina: Geometry State Finals, 2003)

**3** In a normally-shaped room, there is a light on the floor. If I hold a disc 4 feet above the light, then it casts a circular shadow on the ceiling of diameter 6 feet. If I then raise the disc 2 feet, what will be the new diameter of the shadow on the ceiling?

(USA Bay Area Math Meet, BAMB, Bowl Sampler, 1995)

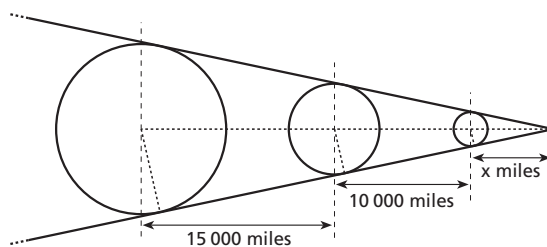
[4 feet]

**4** A circle of greatest area is cut out of a 4 cm square of material. A square of greatest area is then cut out of the circle. How much material is wasted?

(USA Southeast Missouri State University: Math Field Day, 2005)

[8 cm<sup>2</sup>]

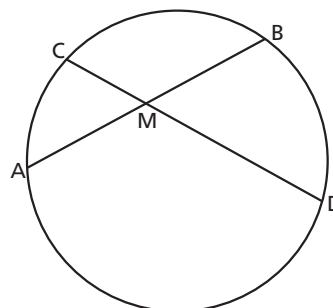
**5 TEST** Three planets are aligned as shown. The diameter of the smallest planet is 3000 miles and the diameter of the planet in the middle is 8000 miles. Given the other dimensions in the figure, what is the diameter of the largest planet?



- A 12 500 miles
- B 12 800 miles
- C 15 100 miles
- D 15 500 miles
- E None of these.

(USA University of North Carolina: Geometry State Finals, 1999)

**6 TEST** Let  $AB$  be a chord of length 16 that is bisected by a second chord  $CD$ . How long is  $CD$  if  $DM$  is 3 times as long as  $CM$ ?



- A  $\frac{8\sqrt{3}}{3}$
- B  $\frac{64}{3}$
- C  $8\sqrt{3}$
- D  $\frac{32\sqrt{3}}{3}$
- E  $\frac{20\sqrt{2}}{3}$

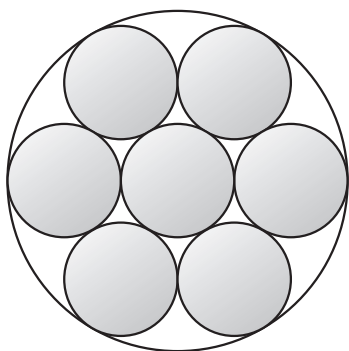
(USA North Carolina State High School Mathematics Contest, 2004)

- 7 The circumference of a circle (measured in feet) is equal to its area (measured in square feet). Find the radius of the circle.

(USA Bay Area Math Meet, BAMM, Bowl Sampler, 1995)

[2 feet]

- 8 **TEST** Each of the small circles in the figure has radius one. The innermost circle is tangent to the six circles that surround it, and each of those circles is tangent to the large circle and to its small-circle neighbors. Find the area of the unshaded region.



- A  $\pi$   
 B  $1.5\pi$   
 C  $2\pi$   
 D  $3\pi$   
 E  $3.5\pi$

(USA American Mathematics Contest 10, AMC 10, Sample questions, 2002)

## GLOSSARY

**aligned:** allineato

**building:** edificio

**to cast:** proiettare

**ceiling:** soffitto

**chord:** corda

**to cut-cut-cut out:** tagliare via

**flagpole:** asta di bandiera

**floor:** pavimento

**to hold-held-held:** sostenere

**innermost:** il più interno

**length:** lunghezza

**neighbor:** vicino

**planet:** pianeta

**radius:** raggio

**to raise:** sollevare

**shadow:** ombra

**to surround:** circondare

**top:** cima

**unshaded:** non ombreggiato

**to waste:** sprecare