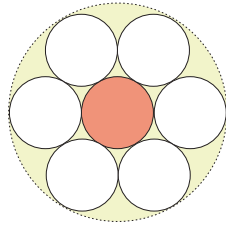


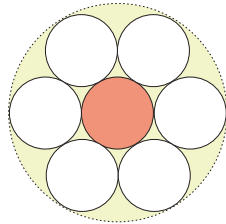
**Problem 1.** A man can saw a long cylindrical log into 5 cylindrical pieces in 5 minutes. Working at exactly the same pace, into how many such pieces can he saw it in 10 minutes?

**Problem 1.** A man can saw a long cylindrical log into 5 cylindrical pieces in 5 minutes. Working at exactly the same pace, into how many such pieces can he saw it in 10 minutes?

**Problem 2.** Six circles of radius 1 are packed tightly between a circle of radius 1 and an outer circle, as pictured. What portion of the area of the outer ring is covered by the six circles?



**Problem 2.** Six circles of radius 1 are packed tightly between a circle of radius 1 and an outer circle, as pictured. What portion of the area of the outer ring is covered by the six circles?



**Problem 3.** Solve for  $x$ :

$$2 \log_3 x - \log_3(2x + 7) = 2.$$

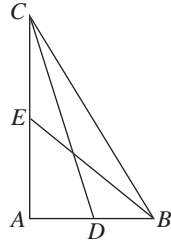
**Problem 3.** Solve for  $x$ :

$$2 \log_3 x - \log_3(2x + 7) = 2.$$

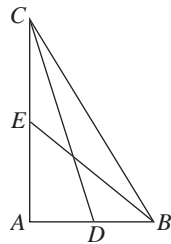
**Problem 4.** A drawer contains 6 red socks and 4 black socks. Two socks are selected randomly (without replacement). What is the probability that the socks are the same color?

**Problem 4.** A drawer contains 6 red socks and 4 black socks. Two socks are selected randomly (without replacement). What is the probability that the socks are the same color?

**Problem 5.**  $\overline{BC}$  is the hypotenuse of right triangle  $\triangle ABC$ .  $D$  is the midpoint of  $\overline{AB}$  and  $E$  is the midpoint of  $\overline{AC}$ . If  $CD = 7$  and  $BE = 4$ , then what is  $BC$ ?



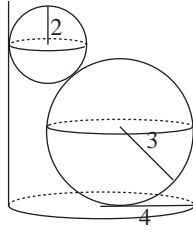
**Problem 5.**  $\overline{BC}$  is the hypotenuse of right triangle  $\triangle ABC$ .  $D$  is the midpoint of  $\overline{AB}$  and  $E$  is the midpoint of  $\overline{AC}$ . If  $CD = 7$  and  $BE = 4$ , then what is  $BC$ ?



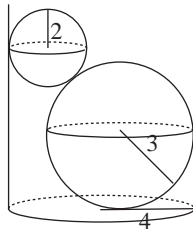
**Problem 6.** The polynomial  $f(x) = (-4x + 3)^7$  is written out as a sum of multiples of powers of  $x$ . Find the sum of the coefficients.

**Problem 6.** The polynomial  $f(x) = (-4x + 3)^7$  is written out as a sum of multiples of powers of  $x$ . Find the sum of the coefficients.

**Problem 7.** A ball of radius 3 is put at the bottom of a cylindrical can of radius 4, touching the side of the can. We then put a ball of radius 2 on top of it, so that it is tangent to the opposite side. How high above the bottom of the can will the top of the second ball be?




**Problem 7.** A ball of radius 3 is put at the bottom of a cylindrical can of radius 4, touching the side of the can. We then put a ball of radius 2 on top of it, so that it is tangent to the opposite side. How high above the bottom of the can will the top of the second ball be?



**Problem 8.** How many 3-digit numbers with one each of the digits 5, 7, and 9 are divisible by 11?

**Problem 8.** How many 3-digit numbers with one each of the digits 5, 7, and 9 are divisible by 11?



**Problem 9.** Three point masses with masses 1, 2, and 2 are placed, equally spaced, on the unit circle. How far from the center of the circle is the center of mass?

**Problem 9.** Three point masses with masses 1, 2, and 2 are placed, equally spaced, on the unit circle. How far from the center of the circle is the center of mass?

**Problem 10.** Find the smallest value of  $f(x) = |x + 1| + |x| + |x - 1| + 2|x - 3|$ .

**Problem 10.** Find the smallest value of  $f(x) = |x + 1| + |x| + |x - 1| + 2|x - 3|$ .