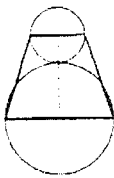
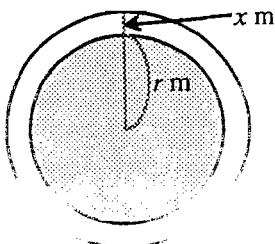


- How many two-digit integers are evenly divisible by 8?
- When graduating seniors were being seated at graduation, three people were put on each bench, but then there were 25 people who could not be seated. When four people were put on each bench, there were exactly 4 benches remaining. How many graduates were there?
- If  $x + \frac{1}{x} = 3$ , what is the value of  $x^4 + \frac{1}{x^4}$ ?
- Two non-congruent circles are externally tangent to each other. Each base of an isosceles trapezoid is a diameter of one of the circles. If the distance between the centers of the circles is 9 units, what is the area of the trapezoid?

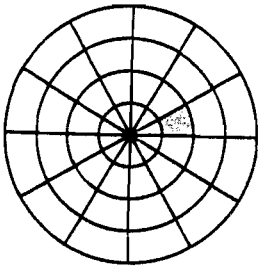


- Imagine the Earth as a very large ball with radius  $r = 6,357,000$  meters. If we circle the Earth's equator with a string 10 cm longer than the circumference of the Earth at the equator, what is the distance between the Earth and the string? Express your answer in terms of  $\pi$ .



6. The student population at a certain school was 850 last year. But this year it increased by 30, because the number of male students increased 4% and the number of the female students increased 3%. How many male and female students are there this year?

7. A decorative arrangement of floor tiles forms concentric circles, as shown in the figure below. The smallest circle has a radius of 2 feet, and each successive circle has a radius 2 feet longer. All the lines shown intersect at the center and form 12 congruent central angles. What is the area of the shaded region? Express your answer in terms of  $\pi$ .



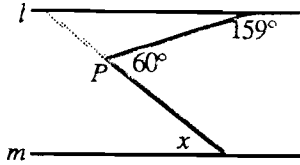
8. For how many positive integral values of  $a$  is it true that  $x = 2$  is the only positive integer solution of the system of inequalities

$$\begin{aligned} 2x &> 3x - 3, \\ 3x - a &> -6? \end{aligned}$$

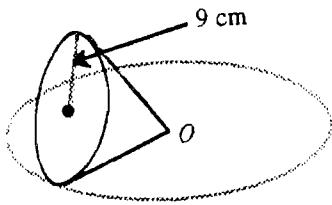
9. In the figure below, what is the measure of angle 4 if the measure of the angles 1, 2, and 3 are  $76^\circ$ ,  $27^\circ$  and  $17^\circ$  respectively?



11. In the diagram below  $l \parallel m$ . Find the measure of  $\angle x$ .



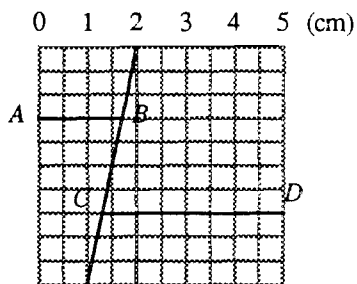
12. In a bag of three balls, there are exactly two red balls. If Alex randomly chooses two balls without replacement, the probability of choosing the two red balls is one-third. However, before Alex chooses his two balls, additional balls are added to the bag. The probability of picking two red balls without replacement is still one-third. What is the least number of balls that could be in the bag after the additional balls have been added.
13. In the figure below, a cone of radius 9cm is revolving on a plane. It takes  $2\frac{1}{2}$  revolutions of the cone to form one complete circumference of the circle described by the pale line. What is the volume of the cone?



14. Let  $X = (2 - 5 - 7 + 11)^{2009}$  and  $Y = (-2 + 5 + 7 - 11)^{2009}$ . What is the value of  $(2 + 5 + 7 + 11)^{X+Y}$ ?
15. Ten balls numbered 1 to 10 are in a bag. Marx reaches into the bag and randomly removes one of the balls. Then James reaches into the bag and randomly removes a different ball. What is the probability that the sum of the two numbers on the balls is even?

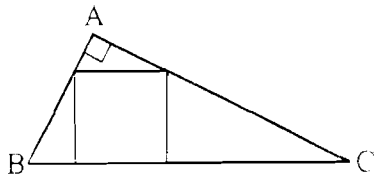
16. Two real numbers  $x$  and  $y$  satisfy that  $x^2 + \frac{1}{x^2} = 2009^2 + \frac{1}{2009^2}$  and  $y^2 + \frac{1}{y^2} = 2010^2 + \frac{1}{2010^2}$ . What is the biggest possible positive difference between  $x$  and  $y$ ?

17. Segment  $AB$  in the diagram below is 1.7 cm long. With this in mind, find the length of  $CD$ .



18. The digits 2, 3, 4, 7 and 8 will be put in random order to make a positive five-digit integer. What is the probability that the resulting integer will be divisible by 11?

19. Right triangle  $ABC$  has one leg of length 6 cm, one leg of length 8 cm and a right angle at  $A$ . A square has one side on the hypotenuse of the triangle  $ABC$  and has a vertex on each of the two legs of the triangle  $ABC$ . What is the length of the one side of the square?



20. A circle is centered at  $(5, 15)$  and has a radius of  $\sqrt{130}$  units. Point  $P(x, y)$  is on the circle such that its  $y$ -coordinate is half of its  $x$ -coordinate. What is the maximum value of  $y$ ?