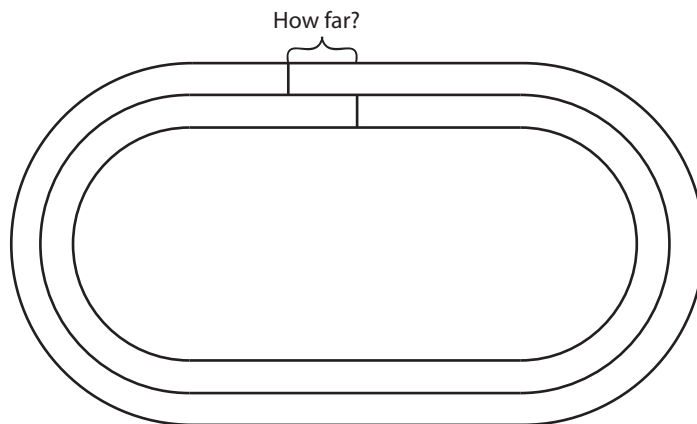


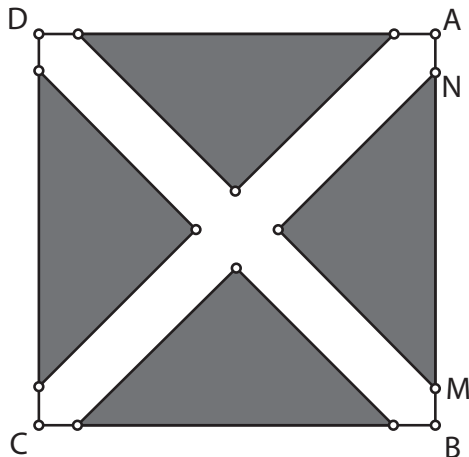
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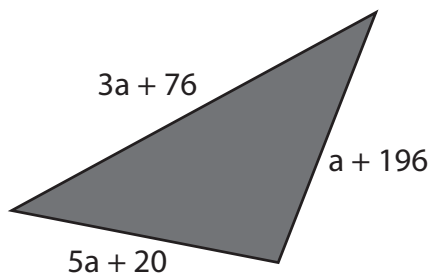
32. A large sphere is on a horizontal surface on a clear, sunny day and casts a shadow that is 10 m long when measured from where the sphere touches the surface. At the same instant in time, a meter stick, placed on the same horizontal surface and perpendicular to it, casts a 2 m long shadow. What is the radius of the sphere? For the sake of this problem, assume the sun's rays are parallel and that the meter stick is a line segment. Write an explanation of how you got your answer.
33. A running track has straight parallel sides and semicircular ends. It measures  $Y$  long as you go along the inside edge of the inside lane. The innermost lane is Lane 1. The next lane to it is Lane 2. Each lane is one meter wide. Assume that the finish line is at the center of one of the straight sides and perpendicular to that straight side of the track. The race we are discussing is a one-lap race that requires runners to stay in their respective lanes for the entire race, so a staggered start is necessary to compensate for the radii of the circles in the ends. How far ahead of the starting mark for Lane 1 should the starting mark for Lane 2 be placed so both runners cover the same distance as they make their lap? Write an explanation of how you got your answer.



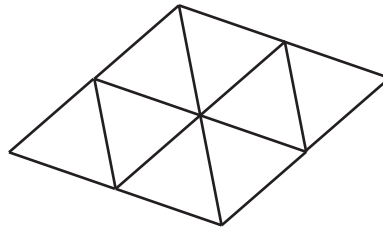
76. Quadrilateral ABCD is a square with side lengths of 20 cm. The distance from point N to point M is 16 cm. If each of the shaded regions represents equal isosceles triangles, what is the area of the non-shaded region inside the square?



77. The side lengths of an isosceles triangle are  $5a + 20$ ,  $a + 196$ , and  $3a + 76$  respectively. If “a” represents a rational number, what is the greatest possible perimeter of this isosceles triangle?



126. A rhombus is formed by two congruent equilateral triangles sharing a common side. The midpoints of each of the sides of the equilateral triangles are connected, creating eight smaller congruent equilaterals. Use toothpicks to form each side of the small triangles and then remove four toothpicks from this figure, leaving exactly four triangles. Do this at least two different ways. Write an explanation or draw a picture that shows how you got your answer.



127. Square ABCD is divided and shaded as shown below. The black square is one-fourth the area of square ABCD. If the pattern continued forever and ever, what percentage of the original square would be shaded?

