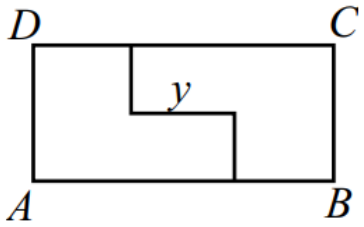
UNIT 1 EXERCISES 6-10

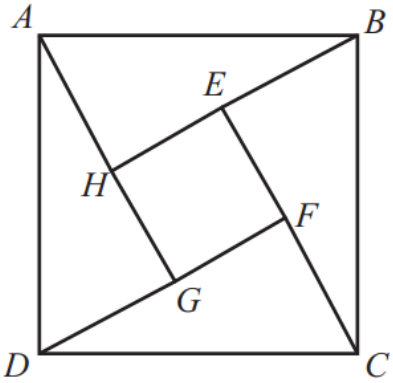
2D Geometry

2006A 6. The 8×18 rectangle $ABCD$ is cut into two congruent hexagons, as shown, in such a way that the two hexagons can be repositioned without overlap to form a square. What is y?



(A) 6 **(B)** 7 **(C)** 8 **(D)** 9 **(E)** 10

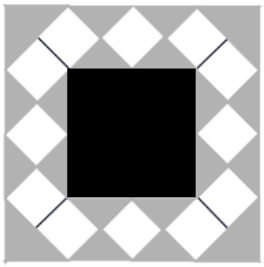
2005A 7. Square $EFGH$ is inside square $ABCD$ so that each side of $EFGH$ can be extended to pass through a vertex of $ABCD$. Square $ABCD$ has side length $\sqrt{50}$, E is between B and H, and $BE = 1$. What is the area of the inner square $EFGH$?



(A) 25 **(B)** 32 **(C)** 36 **(D)** 40 **(E)** 42

2002A

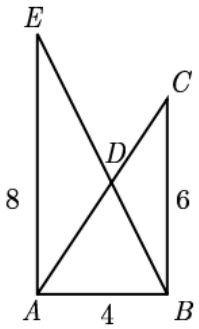
8. Betsy designed a flag using blue triangles (■), small white squares (□), and a red center square(■), as shown. Let B be the total area of the blue triangles, W the total area of the white squares, and R the area of the red square. Which of the following is correct?



(A) $B = W$ **(B)** $W = R$ **(C)** $B = R$ **(D)** $3B = 2R$ **(E)** $2R = W$

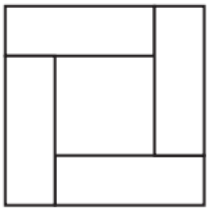
2004A

8. In the Figure, $\angle EAB$ and $\angle ABC$ are right angles, $AB = 4$, $BC = 6$, $AE = 8$, and $\overline{AC}$ and $\overline{BE}$ intersect at D. What is the difference between the areas of $\triangle ADE$ and $\triangle BDC$?



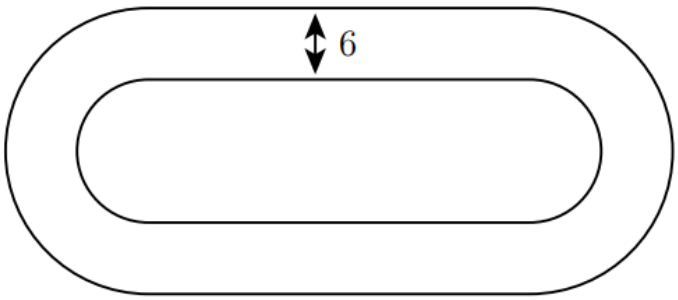
(A) 2 **(B)** 4 **(C)** 5 **(D)** 8 **(E)** 9

2009A 8. Four congruent rectangles are placed as shown. The area of the outer square is 4 times that of the inner square. What is the ratio of the length of the longer side of each rectangle to the length of its shorter side?



(A) 3 **(B)** $\sqrt{10}$ **(C)** $2+\sqrt{2}$ **(D)** $2\sqrt{3}$ **(E)** 4

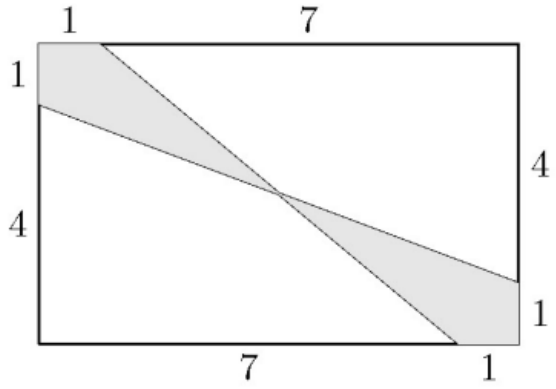
2011B 8. Keiko walks once around a track at exactly the same constant speed every day. The sides of the track are straight, and the ends are semicircles. The track has width 6 meters, and it takes her 36 seconds longer to walk around the outside edge of the track than around the inside edge. What is Keiko's speed in meters per second?



(A) $\frac{\pi}{3}$ **(B)** $\frac{2\pi}{3}$ **(C)** π **(D)** $\frac{4\pi}{3}$ **(E)** $\frac{5\pi}{3}$

2016A

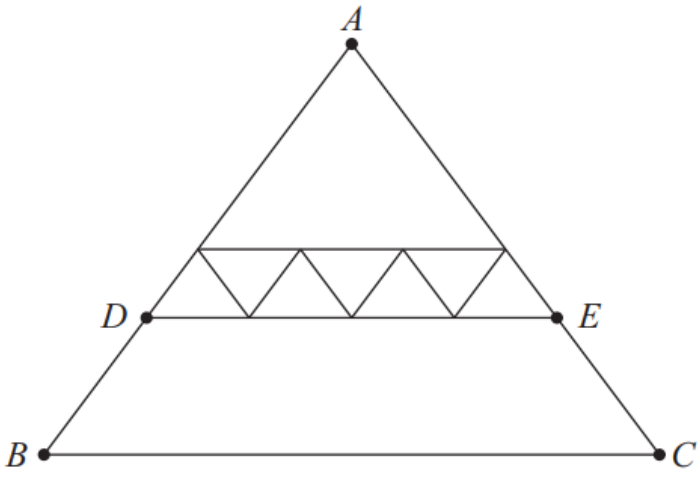
8. What is the area of the shaded region of the given 8×5 rectangle?



(A) $4\frac{3}{4}$ **(B)** 5 **(C)** $5\frac{1}{4}$ **(D)** $6\frac{1}{2}$ **(E)** 8

2018A

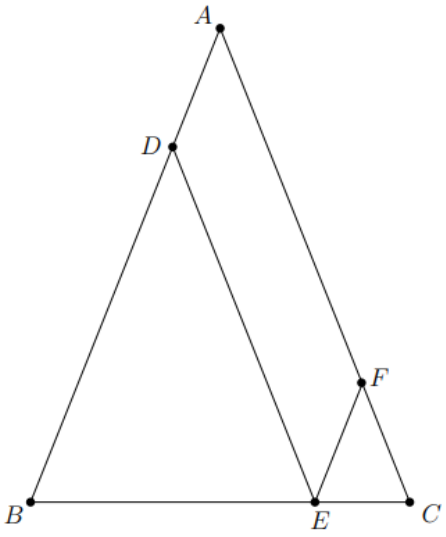
8. All of the triangles in the diagram below are similar to isosceles triangle ABC, in which $AB = AC$. Each of the 7 smallest triangles has area 1, and $\triangle ABC$ has area 40. What is the area of trapezoid $DBCE$?



(A) 16 **(B)** 18 **(C)** 20 **(D)** 22 **(E)** 24

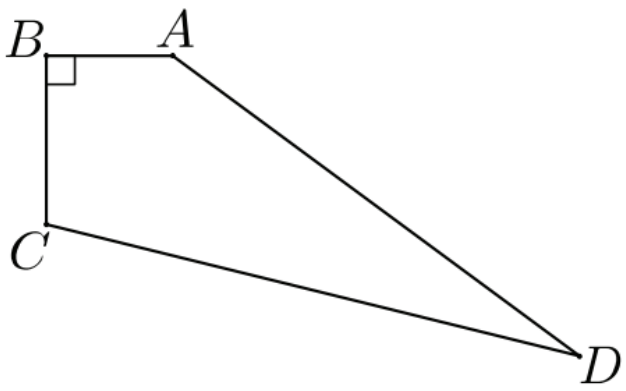
2013A

9. In $\triangle ABC$, $AB = AC = 28$ and $BC = 20$. Points D, E, and F are on sides $\overline{AB}$, $\overline{BC}$, and $\overline{AC}$, respectively, such that $\overline{DE}$ and $\overline{EF}$ are parallel to $\overline{AC}$ and $\overline{AB}$, respectively. What is the perimeter of parallelogram $ADEF$?



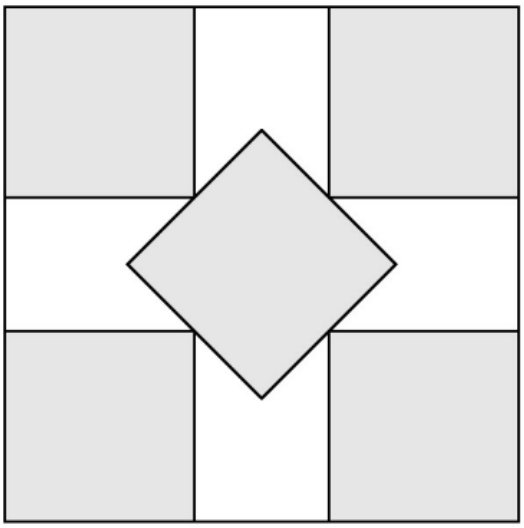
(A) 48 **(B)** 52 **(C)** 56 **(D)** 60 **(E)** 72

2014B 9. Convex quadrilateral $ABCD$ has $AB = 3$, $BC = 4$, $CD = 13$, $AD = 12$, and $\angle ABC = 90^\circ$, as shown. What is the area of the quadrilateral?



(A) 30 **(B)** 36 **(C)** 40 **(D)** 48 **(E)** 58.5

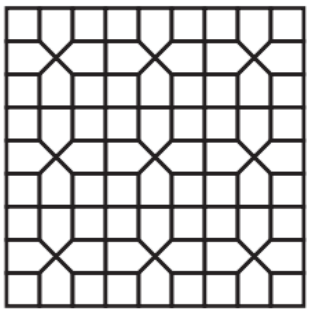
2016A 9. The five small shaded squares inside this unit square are congruent and have disjoint interiors. The midpoint of each side of the middle square coincides with one of the vertices of the other four small squares as shown. The common side length is $\frac{a-\sqrt{2}}{b}$, where a and b are positive integers. What is $a+b$?



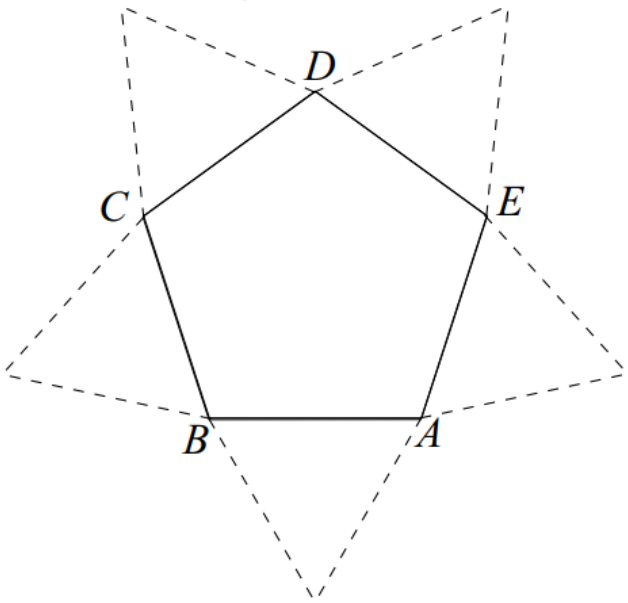
(A) 7 **(B)** 8 **(C)** 9 **(D)** 10 **(E)** 11

2001 10. The plane is tiled by congruent squares and congruent pentagons as indicated. The percent of the plane that is enclosed by the pentagons is closest to

(A) 50 **(B)** 52 **(C)** 54 **(D)** 56 **(E)** 58



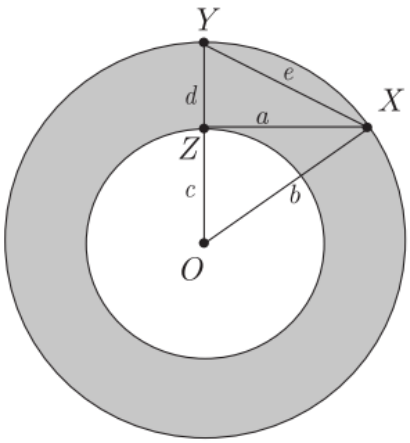
2003B 10. Several figures can be made by attaching two equilateral triangles to the regular pentagon $ABCDE$ in two of the five positions shown. How many non-congruent figures can be constructed in this way?



(A) 1 **(B)** 2 **(C)** 3 **(D)** 4 **(E)** 5

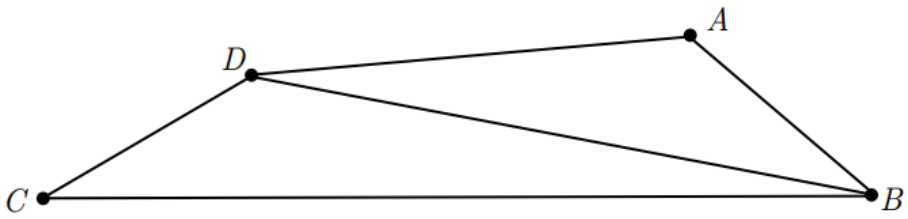
2004B 10. An *annulus* is the region between two concentric circles. The concentric circles in the figure have radii b and c, with $b > c$. Let $\overline{OX}$ be a radius of the larger circle, let $\overline{XZ}$ be tangent to the smaller circle at Z, and let $\overline{OY}$ be the radius of the larger circle that contains Z. Let $a = XZ$, $d = YZ$, and $e = XY$. What is the area of the annulus?

(A) πa^2 **(B)** πb^2 **(C)** πc^2 **(D)** πd^2 **(E)** πe^2



2009A

10. In quadrilateral $ABCD$, $AB = 5$, $BC = 17$, $CD = 5$, $DA = 9$, and BD is an integer. What is BD?



(A) 11 **(B)** 12 **(C)** 13 **(D)** 14 **(E)** 15