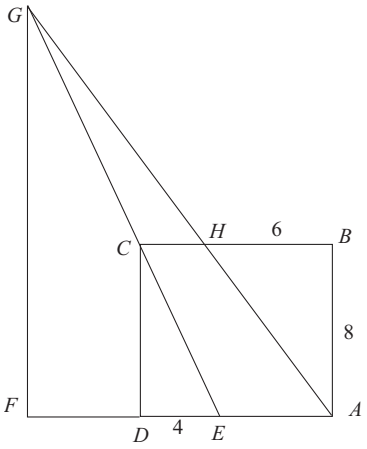
1. In rectangle $ABCD$, we have $AB = 8$, $BC = 9$, H is on $\overline{BC}$ with $BH = 6$, E is on AD with $DE = 4$, line EC intersects line AH at G, and F is on line AD with $\overline{GF} \perp \overline{AF}$. Find the length $\overline{GF}$.



(A) 16 **(B)** 20 **(C)** 24 **(D)** 28 **(E)** 30

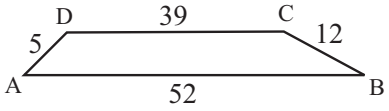
2. A convex quadrilateral $ABCD$ with area 2002 contains a point P in its interior such that $PA = 24$, $PB = 32$, $PC = 28$, and $PD = 45$. Find the perimeter of $ABCD$.

(A) $4\sqrt{2002}$ **(B)** $2\sqrt{8465}$ **(C)** $2\left(48 + \sqrt{2002}\right)$

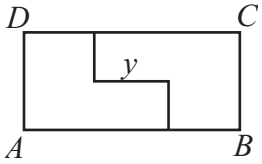
(D) $2\sqrt{8633}$ **(E)** $4\left(36 + \sqrt{113}\right)$

3. In trapezoid $ABCD$ with bases $\overline{AB}$ and $\overline{CD}$, we have $AB = 52$, $BC = 12$, $CD = 39$, and $DA = 5$. The area of $ABCD$ is

(A) 182 **(B)** 195 **(C)** 210 **(D)** 234 **(E)** 260



4. 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?



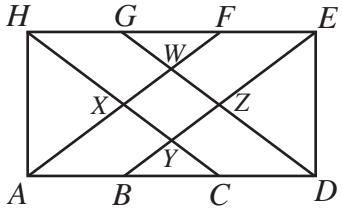
(A) 6 **(B)** 7 **(C)** 8 **(D)** 9 **(E)** 10

5. Which of the following describes the graph of the equation $(x + y)^2 = x^2 + y^2$?

(A) the empty set **(B)** one point **(C)** two lines **(D)** a circle

(E) the entire plane

6. In rectangle $ADEH$, points B and C trisect $\overline{AD}$, and points G and F trisect $\overline{HE}$. In addition, $AH = AC = 2$. What is the area of quadrilateral $WXYZ$ shown in the figure?

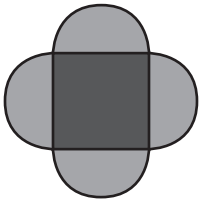


(A) $\frac{1}{2}$ **(B)** $\frac{\sqrt{2}}{2}$ **(C)** $\frac{\sqrt{3}}{2}$ **(D)** $\frac{2\sqrt{2}}{3}$ **(E)** $\frac{2\sqrt{3}}{3}$

7. Centers of adjacent faces of a unit cube are joined to form a regular octahedron. What is the volume of this octahedron?

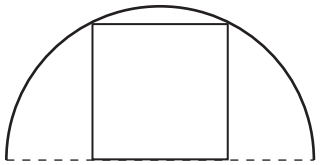
(A) $\frac{1}{8}$ **(B)** $\frac{1}{6}$ **(C)** $\frac{1}{4}$ **(D)** $\frac{1}{3}$ **(E)** $\frac{1}{2}$

8. A region is bounded by semicircular arcs constructed on the side of a square whose sides measure $2/\pi$, as shown. What is the perimeter of this region?



(A) $\frac{4}{\pi}$ **(B)** 2 **(C)** $\frac{8}{\pi}$ **(D)** 4 **(E)** $\frac{16}{\pi}$

9. A square of area 40 is inscribed in a semicircle as shown. What is the area of the semicircle?



(A) 20π **(B)** 25π **(C)** 30π **(D)** 40π **(E)** 50π