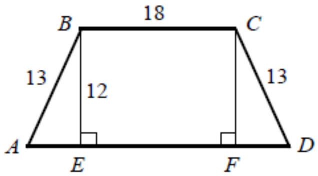
Practice Test
Polygons

1



What is the area of the isosceles trapezoid above?

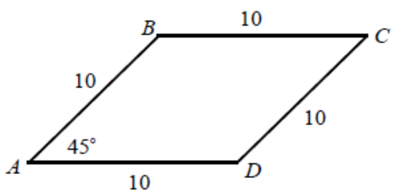
A) 238

B) 252

C) 276

D) 308

2



What is the area of rhombus $ABCD$ above?

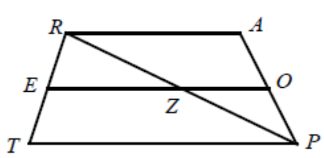
A) $20\sqrt{2}$

B) $25\sqrt{2}$

C) $50\sqrt{2}$

D) $100\sqrt{2}$

3

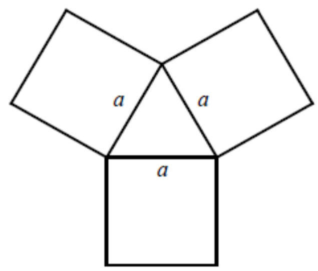


In the figure above, $\overline{EO}$ is the midsegment of trapezoid $TRAP$ and $\overline{RP}$ intersect $\overline{EO}$ at point Z. If $RA = 15$ and $EO = 18$, what is the length of $\overline{EZ}$?

4

A rectangle has a length that is 6 meters more than twice its width. What is the perimeter of the rectangle if the area of the rectangle is 1,620 square meters?

5



The figure above shows an equilateral triangle with sides of length a and three squares with sides of length a. If the area of the equilateral triangle is $25\sqrt{3}$, what is the sum of the areas of the three squares?

A) 210

B) 240

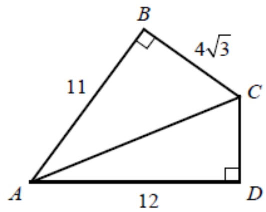
C) 270

D) 300

6

The perimeter of a rectangle is $5x$ and its length is $\frac{3}{2}x$. If the area of the rectangle is 294, what is the value of x?

7



In the figure above, what is the area of the region $ABCD$?

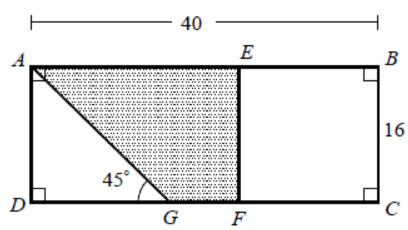
A) $22\sqrt{3}+30$

B) $22\sqrt{3}+36$

C) $22\sqrt{3}+42$

D) $22\sqrt{3}+48$

8



In the figure above, $ABCD$ is a rectangle and $BCFE$ is a square. If $AB=40$, $BC=16$, and $m\angle AGD=45$, what is the area of the shaded region?

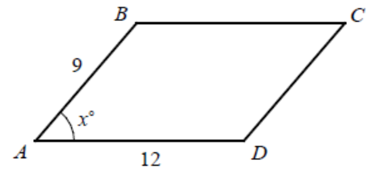
A) 240

B) 248

C) 256

D) 264

9



The figure above shows parallelogram $ABCD$. Which of the following equations represents the area of parallelogram $ABCD$?

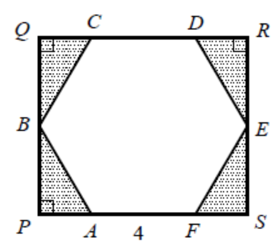
A) $12\cos x^\circ \times 9\sin x^\circ$

B) $12\times 9\tan x^\circ$

C) $12\times 9\cos x^\circ$

D) $12\times 9\sin x^\circ$

10



In the figure above, $ABCDEF$ is a regular hexagon with side lengths of 4. $PQRS$ is a rectangle. What is the area of the shaded region?

A) $8\sqrt{3}$

B) $9\sqrt{3}$

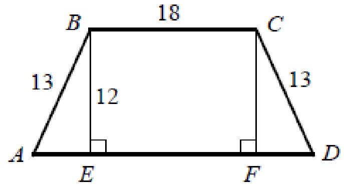
C) $10\sqrt{3}$

D) $12\sqrt{3}$

Answers

Polygons

1. C



$AE^2 + BE^2 = AB^2$ Pythagorean Theorem

$AE^2 + 12^2 = 13^2$

$AE^2 = 13^2 - 12^2 = 25$

$AE = \sqrt{25} = 5$

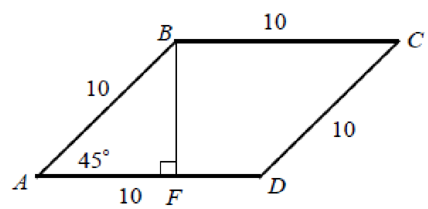
Also $DF = 5$.

$AD = AE + EF + DF = 5 + 18 + 5 = 28$

Area of trapezoid $= \frac{1}{2}(AD + BC) \cdot BF$

$= \frac{1}{2}(28 + 18) \cdot 12 = 276$

2. B



Draw $\overline{BF}$ perpendicular to $\overline{AD}$ to form a 45°-45°-90° triangle.

In a 45°-45°-90° triangle, the hypotenuse is $\sqrt{2}$ times as long as a leg. Therefore, $\sqrt{2}BF = AB$.

$\sqrt{2}BF = 10$ Substitution

$BF = \frac{10}{\sqrt{2}} = \frac{10 \cdot \sqrt{2}}{\sqrt{2} \cdot \sqrt{2}} = \frac{10\sqrt{2}}{2} = 5\sqrt{2}$

Area of rhombus $ABCD$

$= \frac{1}{2} AD \cdot BF = \frac{1}{2}(10)(5\sqrt{2}) = 25\sqrt{2}$

Answers

Polygons

3. 10.5

The length of the midsegment of a trapezoid is the average of the lengths of the bases. Therefore,

$EO = \frac{1}{2}(TP + RA)$.

$18 = \frac{1}{2}(TP + 15)$ Substitution

$2 \times 18 = 2 \times \frac{1}{2}(TP + 15)$

$36 = TP + 15$

$21 = TP$

In ΔTRP, $EZ = \frac{1}{2}TP = \frac{1}{2}(21) = 10.5$.

4. 174

Let $w =$ the width of the rectangle in meters, then $2w + 6 =$ the length of the rectangle in meters.

Area of rectangle = length $\times$ width

$= (2w + 6) \times w = 2w^2 + 6w$.

Since the area of the rectangle is 1,620 square meters, you can set up the following equation.

$2w^2 + 6w = 1620$

$2w^2 + 6w - 1620 = 0$ Make one side 0.

$2(w^2 + 3w - 810) = 0$ Common factor is 2.

Use the quadratic formula to solve the equation, $w^2 + 3w - 810 = 0$.

$$w = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-3 \pm \sqrt{3^2 - 4(1)(-810)}}{2(1)}$$

$$= \frac{-3 \pm \sqrt{3249}}{2} = \frac{-3 \pm 57}{2}$$

Since the width is positive, $w = \frac{-3 + 57}{2} = 27$.

The length is $2w + 6 = 2(27) + 6 = 60$.

The perimeter of the rectangle is

$2(\text{length} + \text{width}) = 2(60 + 27) = 174$

5. D

Area of an equilateral triangle with side length of $a = \frac{\sqrt{3}}{4}a^2$. Since the area of the equilateral triangle is given as $25\sqrt{3}$, you can set up the following equation.

$\frac{\sqrt{3}}{4}a^2 = 25\sqrt{3}$

$a^2 = 25\sqrt{3} \cdot \frac{4}{\sqrt{3}} = 100$

The area of each square is a^2, or 100, so the sum of the areas of the three squares is 3×100, or 300.

6. 14

Let $w =$ the width of the rectangle.
The perimeter of the rectangle is given as $5x$.
Perimeter of rectangle = 2(length + width)

$5x = 2(\frac{3}{2}x + w)$

$5x = 3x + 2w$

$2x = 2w$

$x = w$

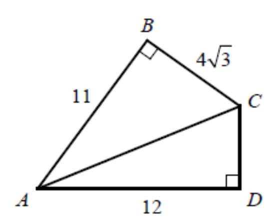
Area of rectangle = length $\times$ width = 294

$\frac{3}{2}x \cdot x = 294$

$x^2 = 294 \cdot \frac{2}{3} = 196$

$x = \sqrt{196} = 14$

7. A



$AC^2 = AB^2 + BC^2$ Pythagorean Theorem

$AC^2 = 11^2 + (4\sqrt{3})^2$ Substitution

$AC^2 = 121 + 48 = 169$

$AC = \sqrt{169} = 13$

$AC^2 = AD^2 + CD^2$ Pythagorean Theorem

$169 = 12^2 + CD^2$ Substitution

Answers
Polygons

$25 = CD^2$
$5 = CD$

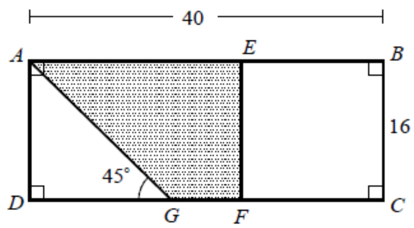
The area of region $ABCD$ is the sum of the area of ΔABC and the area of ΔADC.

Area of the region $ABCD$

$= \frac{1}{2}(11)(4\sqrt{3}) + \frac{1}{2}(12)(5)$

$= 22\sqrt{3} + 30$

8. C



Since $BCFE$ is a square,
$BC = BE = CF = EF = 16$.
$AE = AB - BE$
$= 40 - 16 = 24$

Triangle AGD is a $45°$-$45°$-$90°$ triangle.

In a $45°$-$45°$-$90°$ triangle, the length of the two legs are equal in measure. Therefore,
$AD = DG = 16$.

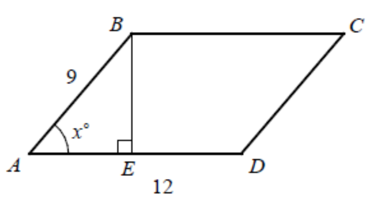
$FG = DC - DG - CF$
$= 40 - 16 - 16 = 8$

Area of the shaded region

$= \frac{1}{2}(AE + FG) \cdot EF$

$= \frac{1}{2}(24 + 8) \cdot 16 = 256$

9. D

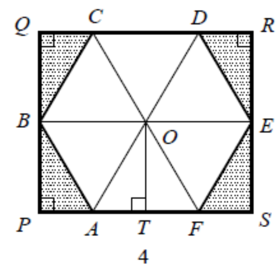


Draw $\overline{BE}$ perpendicular to $\overline{AD}$.

In ΔABE, $\sin x° = \frac{BE}{9}$.

Therefore, $BE = 9 \sin x°$.
Area of parallelogram $ABCD$
$= AD \times BE = 12 \times 9 \sin x°$

10. A



Draw the diagonals of a regular hexagon, $\overline{AD}$, $\overline{BE}$, and $\overline{CF}$.
$BE = BO + OE = 8$ and $QR = BE = 8$

Since $ABCDEF$ is a regular hexagon, the diagonals intersect at the center of the hexagon. Let the point of intersection be O. The diagonals divide the hexagon into 6 equilateral triangles with side lengths of 4. Area of each equilateral triangle with side lengths of 4 is $\frac{\sqrt{3}}{4}(4)^2 = 4\sqrt{3}$.

Draw $\overline{OT}$ perpendicular to $\overline{PS}$.

Triangle AOT is a $30°$-$60°$-$90°$ triangle.

Therefore, $AT = \frac{1}{2}AO = \frac{1}{2}(4) = 2$ and

$OT = \sqrt{3}AT = 2\sqrt{3}$.

In rectangle $PQRS$, $RS = 2OT = 2(2\sqrt{3}) = 4\sqrt{3}$.

Area of rectangle $PQRS = QR \times RS$

$= 8 \times 4\sqrt{3} = 32\sqrt{3}$.

Area of regular hexagon $ABCDEF$
$= 6 \times$ area of the equilateral triangle
$= 6 \times 4\sqrt{3} = 24\sqrt{3}$

Area of shaded region
$=$ area of rectangle $-$ area of hexagon
$= 32\sqrt{3} - 24\sqrt{3} = 8\sqrt{3}$.