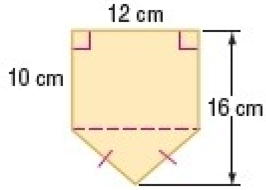
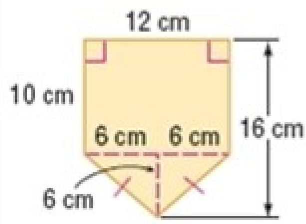
11-4 Areas of Regular Polygons and Composite Figures

ORGANIZE IDEAS **Find the area of each figure. Round to the nearest tenth if necessary.**

15. 

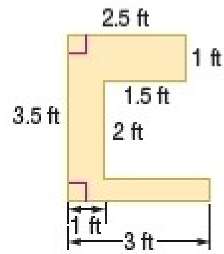
SOLUTION:



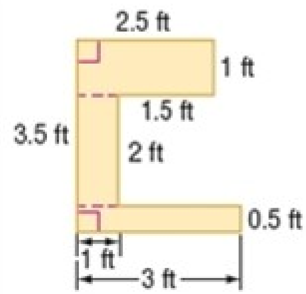
$$\begin{aligned}\text{Area} &= \text{rectangle} + \text{triangle}\\ &= 12(10) + \frac{1}{2} \times 12 \times 6\\ &= 120 + 36\\ &= 156 \text{ cm}^2\end{aligned}$$

ANSWER:

156 cm^2

16. 

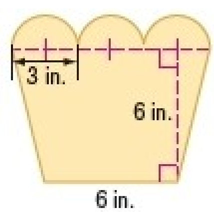
SOLUTION:



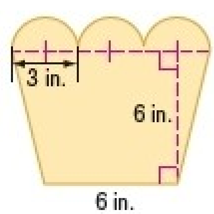
$$\begin{aligned}\text{Area} &= 2.5(1) + 2(1) + 3(0.5)\\ &= 6 \text{ ft}^2\end{aligned}$$

ANSWER:

6 ft^2

17. 

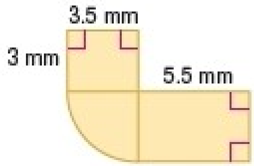
SOLUTION:



$$\begin{aligned}\text{Area} &= \text{trapezoid} + \text{triangle} + 3 \text{ semicircles}\\ &= \tfrac{1}{2}(7.5 + 6)6 + 3\left(\tfrac{1}{2}\pi(1.5)^2\right) + \tfrac{1}{2}(1.5)(6)\\ &\approx 40.5 + 10.6 + 4.5\\ &= 55.6 \text{ in}^2\end{aligned}$$

ANSWER:

55.6 in^2

18. 

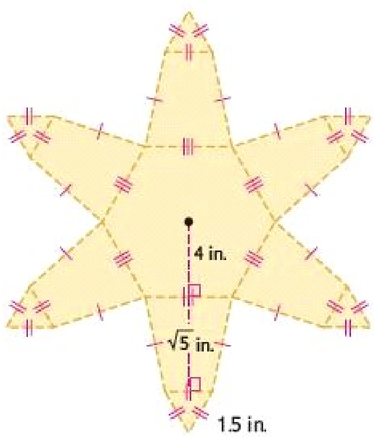
SOLUTION:

$$\text{Area} = \text{sm. rectangle} + \text{lg rectangle} + \tfrac{1}{4}(\text{circle})$$
$$= (3.5 \times 3) + (5.5 \times 3.5) + \tfrac{1}{4}\left(\pi(3.5)^2\right)$$
$$\approx 10.5 + 19.25 + 9.62$$
$$\approx 39.4\ \text{mm}^2$$

ANSWER:

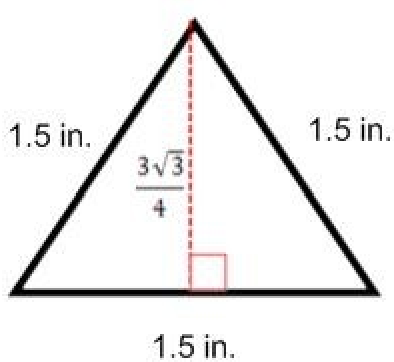
$39.4\ \text{mm}^2$

20. **VOLUNTEERING** James is making pinwheels at a they want to paint one side of each pinwheel, find the area of 10 pinwheels.



SOLUTION:

Start by finding the area of each part of the composit
There are 6 equilateral triangles:



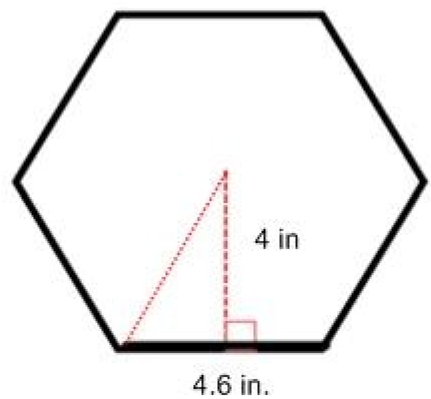
$A = \frac{1}{2}\left(\frac{3\sqrt{3}}{4}\right)$

area of six triangles would be $6 \cdot 1 = 6$ in².
There are 6 isosceles trapezoids:

$A = \frac{1}{2}\left(\sqrt{5}\right)$

So, the area of six trapezoids is $6 \cdot 6.82 = 40.92 in^2$

Lastly, there is one regular hexagon:
The side length of the hexagon can be found using th 60-90 special right triangle.



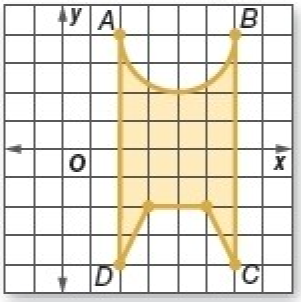
$A = \frac{1}{2}(4)(4.$

Now, combine all the areas to find the total area: $A = 6 + 41 + 55.3 \approx 102.3$. Multiply by 10, for the you get approximately 1023 in².

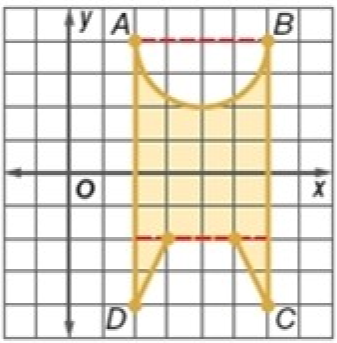
ANSWER:

$\approx 1023 in^2$

ORGANIZE IDEAS **Find the area of each shaded region. Round to the nearest tenth.**

29. 

SOLUTION:

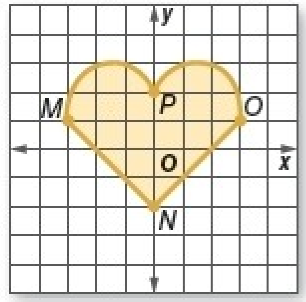


To find the area of the shaded region, subtract the area of the semicircle and the area of the trapezoid from the area of the rectangle.

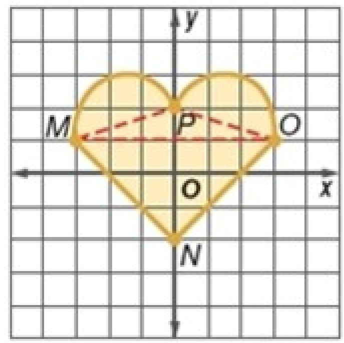
$$A = ABCD - \text{trapzoid} - \text{semicircle}$$
$$= (4)(8) - \left[\frac{1}{2}(2+4)(2)\right] - \frac{1}{2}\pi(2)^2$$
$$= 32 - 6 - 2\pi$$
$$= 26 - 2\pi$$
$$\approx 19.7$$

ANSWER:

19.7 units^2

30. 

SOLUTION:



To find the area of the figure, separate it into triangle *MNO* with a base of 6 units and a height of 3 units, two semicircles, and triangle *MPO* with a base of 6 units and a height of 1 unit.

First, use the Distance Formula to find the diameter of one semicircle.

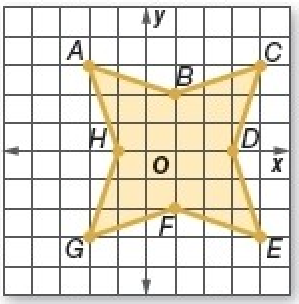
$$MP = \sqrt{(0+3)^2 + (2-1)^2}$$
$$= \sqrt{10}$$

So, the radius is $\frac{\sqrt{10}}{2}$.

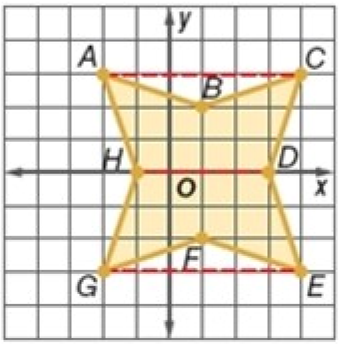
$$\text{Area} = \Delta MNO + 2(\text{semicircle}) + \Delta MPO$$
$$= \frac{1}{2}bh + 2\left(\frac{180}{360}\pi r^2\right) + \frac{1}{2}bh$$
$$= \frac{1}{2}(6)(3) + 2\left[\frac{180}{360}\pi\left(\frac{\sqrt{10}}{2}\right)^2\right] + \frac{1}{2}(6)(1)$$
$$= 9 + 2.5\pi + 3$$
$$\approx 19.9$$

ANSWER:

19.9 units^2

31. 

SOLUTION:



Using *DH* as a divider, we have two trapezoids, *ACDH* and *GEDH*. We need to find the areas of these and subtract the areas of the two triangles, *ABC* and *GFE*.

$$
\begin{aligned}
A &= ACDH - ABC + (GEDH - GFE) \\
&= \tfrac{1}{2}(6+4)3 - \tfrac{1}{2}(6)(1) + \left[\tfrac{1}{2}(6+4)3 - \tfrac{1}{2}(6)(1)\right] \\
&= 15 - 3 + (15 - 3) \\
&= 12 + 12 \\
&= 24
\end{aligned}
$$

ANSWER:

24 units^2