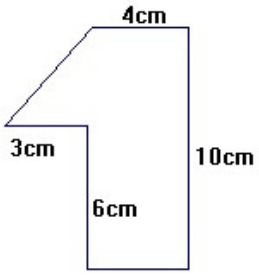
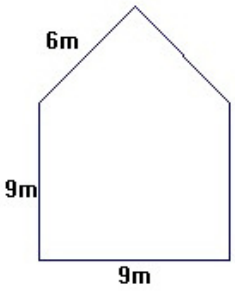
AREAS AND PERIMETERS

1. Find the area and perimeter of each of these shapes:

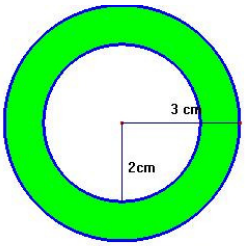




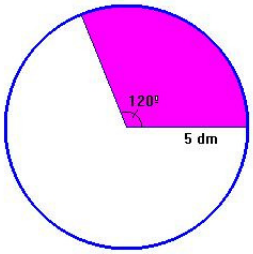
2. Find the base of the triangle where: the height is 5.6 feet and the area is 35 square feet.

3. Find the area and perimeter of the shaded part in each diagram:

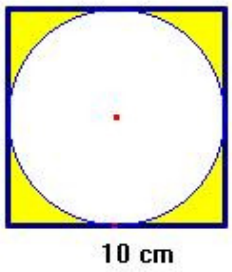
a)



b)



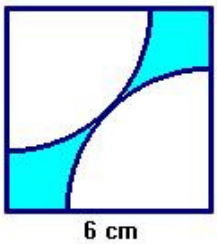
c)



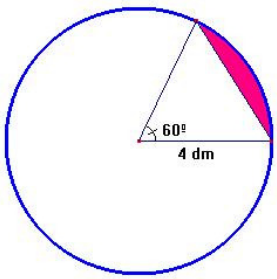
4. Find the area of a rhombus where: the side is 5 cm and one of the diagonals is 8 cm long.

5. Find the area and perimeter of the shaded part in each diagram:

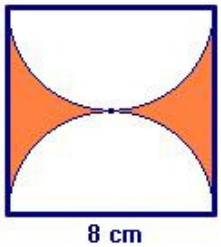
a)



b)



c)

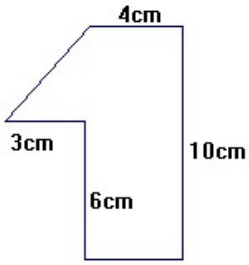


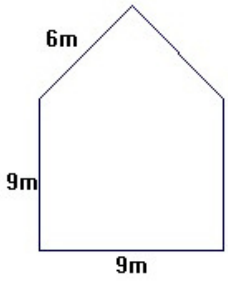
6. Calculate the area of a hexagon of side 7 m.

7. If one side of a square is doubled in length and the adjacent side is decreased by two centimeters, the area of the resulting rectangle is 96 square centimeters larger than that of the original square. Find the dimensions of the rectangle.

SOLUTION

1. Find the area and perimeter of each of these shapes:





Rectangle:
height 10, base 4
Triangle:
Base 3, height 4

$$A = 4\times 10 + \frac{3\times 4}{2} \rightarrow A = 46\ cm^2$$

Perimeter: $x^2 = 3^2 + 4^2 = 25 \rightarrow x = 5$

$$P = 3+5+4+10+4+6 = 32cm$$

Square: side 9
Triangle: base 9
height: $6^2 = 4.5^2 + x^2 \rightarrow x = 3.97m$

$$A = 9^2 + \frac{9\times 3.97}{2} \rightarrow A = 98.865\ m^2$$

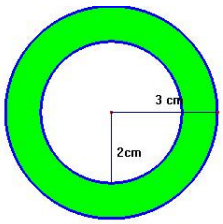
$$P = 3\times 9 + 2\times 6 = 39m$$

2. Find the base of the triangle where: the height is 5.6 feet and the area is 35 square feet.

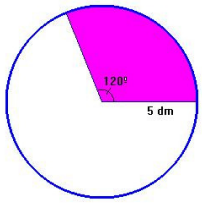
$$A = \frac{b\times h}{2} \rightarrow 35 = \frac{5.6b}{2} \rightarrow 70 = 5.6b \rightarrow b = \frac{70}{5.6} = 12.5 \text{ feet}$$

3. Find the area and perimeter of the shaded part in each diagram:

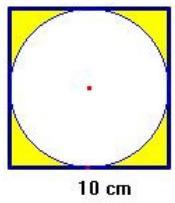
a)



b)



c)



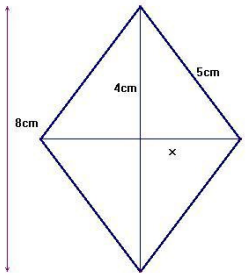
a) $A = \pi(R^2 - r^2) = \pi(9-4) = 15.71\ cm^2$; $P = 2\pi\times 3^2 + 2\pi\times 2^2 = 81.68cm$

b) $A = \frac{\pi\, r^2 n^o}{360^o} = \frac{\pi\cdot 25\cdot 120}{360} = 26.18\ dm^2$; $P = 2\times 5 + \frac{2\pi\times 5}{3} = 20.47dm$

c) $A = A_{square} - A_{circle} = 10^2 - \pi\cdot 5^2 = 21.46\,cm^2$

$P = 4\times 10 + 2\pi\times 5 = 71.42cm$

4. Find the area of a rhombus where: the side is 5 cm and one of the diagonals is 8 cm long.



We calculate the other diagonal d:

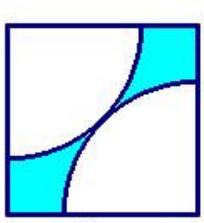
$x^2 = 5^2 - 4^2 = 25 - 16 = 9 \rightarrow x = 3$

d = 6 cm

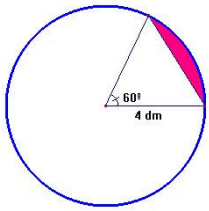
$$A = \frac{D \times d}{2} = \frac{8 \times 6}{2} = 24 cm^2$$

5. Find the area and perimeter of the shaded part in each diagram:

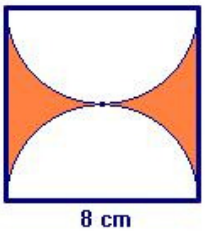
a)



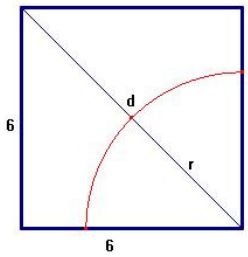
b)



c)



a)



Area of the circle:

We calculate the diagonal:

$d^2 = 6^2 + 6^2 = 72 \rightarrow d = \sqrt{72} = 6\sqrt{2} cm$

$A_{circle} = \pi \cdot r^2 = \pi \cdot \left(3\sqrt{2}\right)^2 = 56.55 cm^2$

$$A = A_{square} - A_{circle/2} = 6^2 - \frac{56.55}{2} = 7.73 cm^2$$

$$P = \pi \times 3\sqrt{2} + 4 \times \left(6 - 3\sqrt{2}\right) = 20.36 cm$$

b) $A = A_{sector} - A_{triangle}$

$$A_{sector} = \frac{\pi \cdot r^2 \cdot n^o}{360^o} = \frac{\pi \cdot 4^2 \cdot 60}{360} = \frac{16\pi}{6} = 8.36$$

Triangle: height $\rightarrow h^2 = 4^2 - 2^2 \rightarrow h = \sqrt{14}$

$$A_{triangle} = \frac{4\sqrt{14}}{2} = 2\sqrt{14} = 7.48$$

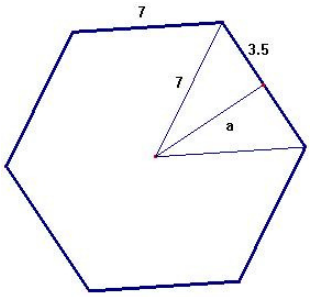
$A = A_{sector} - A_{triangle} = 8.36 - 7.48 = 0.88 dm^2$

$$P = 4 + \frac{2\pi \times 4 \times 60}{360} = 8.19 dm$$

c) $A = A_{square} - A_{circle} = 8^2 - \pi \cdot 4^2 = 64 - 16\pi = 13.73 cm^2$

$P = 2 \times 8 + 2\pi \times 4 = 41.13 cm$

6. Calculate the area of a hexagon of side 7 m.

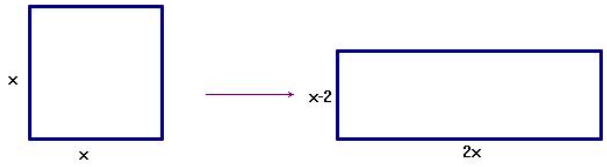


Perimeter: 42 m

Apothem $\rightarrow a^2 = 7^2 - 3.5^2 \rightarrow a = \sqrt{36.75} = 6.06\,\text{m}$

$$A = \frac{P \cdot a}{2} = \frac{42 \cdot 6.06}{2} = 127.26\text{m}^2$$

7. If one side of a square is doubled in length and the adjacent side is decreased by two centimeters, the area of the resulting rectangle is 96 square centimeters larger than that of the original square. Find the dimensions of the rectangle.



Sol: dimensions $24 \times 10\,\text{cm}$

$A_{square} = x^2$; $A_{rectangle} = 2x(x-2) \rightarrow x^2 + 96 = 2x(x-2)$

$$x^2 + 96 = 2x^2 - 4x \rightarrow x^2 - 4x + 96 = 0 \rightarrow x = \frac{4 \pm \sqrt{400}}{2} = \begin{cases} 12 \\ -8 \end{cases}$$