

## §1 三平方の定理

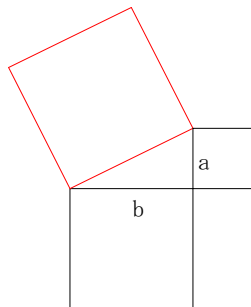
1. (1)  $\sqrt{10^2 + 5^2} = \sqrt{125} = 5\sqrt{5} \text{ cm}$   
 (2)  $\sqrt{13^2 - 12^2} = \sqrt{169 - 144} = \sqrt{25} = 5 \text{ cm}$
2. (2), (3), (4)

## 練習

1. (1)  $\sqrt{6^2 + 8^2} = \sqrt{100} = 10 \text{ cm}$   
 (2)  $\sqrt{7^2 + 14^2} = \sqrt{245} = 7\sqrt{5}$
2.  $AB = \sqrt{2.2^2 + 4.8^2} = \sqrt{27.88} = 5.28 \text{ m}$
3. (ア)  $b = \sqrt{5^2 - 3^2} = \sqrt{25 - 9} = \sqrt{16} = 4$   
 (イ)  $a = \sqrt{13^2 - 5^2} = \sqrt{169 - 25} = \sqrt{144} = 12$   
 (ウ)  $b = \sqrt{17^2 - 8^2} = \sqrt{289 - 64} = \sqrt{225} = 15$   
 (エ)  $c = \sqrt{10^2 + 10^2} = \sqrt{200} = 10\sqrt{2}$   
 (オ)  $a = \sqrt{10^2 - 5^2} = \sqrt{100 - 25} = \sqrt{75} = 5\sqrt{3}$

	(ア)	(イ)	(ウ)	(エ)	(オ)
a	3		8	10	
b		5		10	5
c	5	13	17		10

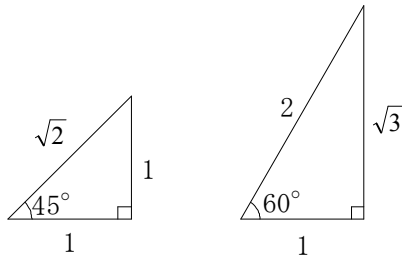
4.



§2 三平方の定理の利用

1. 面積 =  $\frac{1}{2} \times \text{底辺} \times \text{高さ} = \frac{1}{2} \times 8 \times 4\sqrt{3} = 16\sqrt{3} \text{ cm}^2$

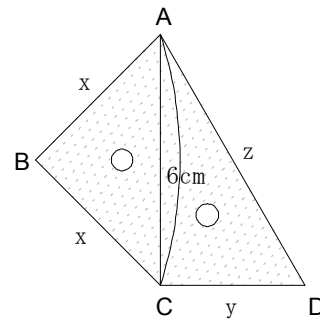
2.



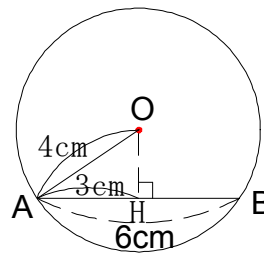
3.  $6:x = \sqrt{2}:1 \quad x = \frac{6}{\sqrt{2}} = 3\sqrt{2} \text{ cm}$

$6:y = \sqrt{3}:1 \quad y = \frac{6}{\sqrt{3}} = 2\sqrt{3} \text{ cm}$

$6:z = \sqrt{3}:2 \quad z = \frac{12}{\sqrt{3}} = 4\sqrt{3} \text{ cm}$



4.  $OH = \sqrt{4^2 - 3^2} = \sqrt{7} \text{ cm}$



5. (1)  $AB = \sqrt{(4-1)^2 + (6-2)^2} = \sqrt{9+16} = \sqrt{25} = 5$

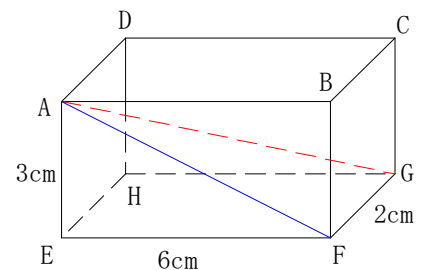
(2)  $AB = \sqrt{(4-5)^2 + [-1-(-4)]^2} = \sqrt{(-1)^2 + 3^2} = \sqrt{1+9} = \sqrt{10}$

(3)  $OA = \sqrt{(5-0)^2 + (-5-0)^2} = \sqrt{25+25} = \sqrt{50} = 5\sqrt{2}$

(4)  $AB = \sqrt{[2-(-3)]^2 + [3-(-2)]^2} = \sqrt{5^2 + 5^2} = \sqrt{50} = 5\sqrt{2}$

6.  $AF = \sqrt{3^2 + 6^2}$

$AG = \sqrt{AF^2 + 2^2} = \sqrt{3^2 + 6^2 + 2^2} = \sqrt{49} = 7$



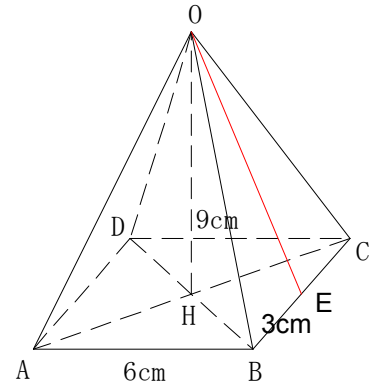
$$7. (1) \sqrt{4^2 + 4^2 + 7^2} = \sqrt{71} \text{ cm}$$

$$(2) \sqrt{3^2 + 4^2 + 5^2} = \sqrt{50} = 5\sqrt{2} \text{ m}$$

$$8. \sqrt{5^2 + 5^2 + 5^2} = \sqrt{75} = 5\sqrt{3} \text{ cm}$$

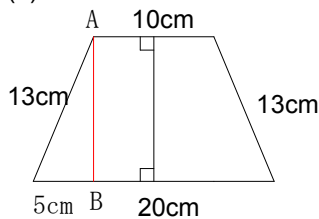
$$9. OE = \sqrt{9^2 - 3^2} = \sqrt{72} = 6\sqrt{2} \text{ cm}$$

$$\begin{aligned} \text{側面積} &= \frac{1}{2} \times BC \times OE \times 4 = \frac{1}{2} \times 6 \times 6\sqrt{2} \times 4 \\ &= 72\sqrt{2} \text{ cm}^2 \end{aligned}$$



### 練習

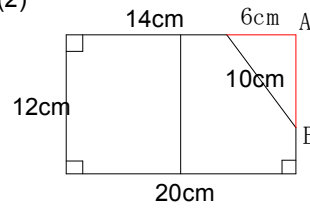
1. (1)



$$AB = \sqrt{13^2 - 5^2} = 12 \text{ cm}$$

$$\text{面積} = \frac{(10 + 20) \times 12}{2} = 180 \text{ cm}^2$$

(2)



$$AB = \sqrt{10^2 - 6^2} = \sqrt{64} = 8 \text{ m}$$

$$\text{面積} = 12 \times 20 - \frac{1}{2} \times 6 \times 8 = 216 \text{ m}^2$$

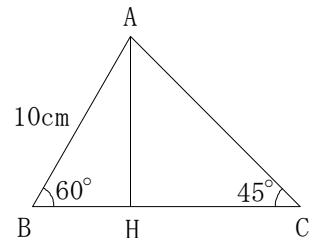
2.  $BH = 5 \text{ cm}$

$$AH = CH = 5\sqrt{3} \text{ cm}$$

$$BC = BH + CH = 5 + 5\sqrt{3} \text{ cm}$$

$$CA = \sqrt{2} AH = \sqrt{2} \times 5\sqrt{3} = 5\sqrt{6} \text{ cm}$$

$$\text{面積} = \frac{1}{2} \times BC \times AH = \frac{1}{2} \times (5 + 5\sqrt{3}) \times 5\sqrt{3} = \frac{1}{2} \times (25\sqrt{3} + 75) = \frac{25}{2}(\sqrt{3} + 3) \text{ cm}^2$$



$$3. (1) AB = \sqrt{3^2 + 6^2} = \sqrt{45} \quad BC = \sqrt{(-8-3)^2 + (4-6)^2} = \sqrt{125}$$

$$CA = \sqrt{(-8)^2 + 4^2} = \sqrt{80}$$

$AB^2 + CA^2 = BC^2$  となるので,  $\angle A = 90^\circ$  の直角三角形

$$(2) DE = \sqrt{(-2-6)^2 + (6-2)^2} = \sqrt{80}$$

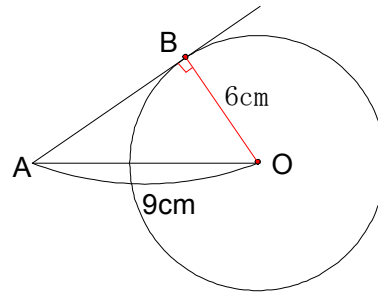
$$EF = \sqrt{[2 - (-2)]^2 + (-6-6)^2} = \sqrt{160}$$

$$FD = \sqrt{(6-2)^2 + [2 - (-6)]^2} = \sqrt{80}$$

$DE = FD$  で, かつ,  $DE^2 + FD^2 = EF^2$  となるので,

$\angle D = 90^\circ$  の直角二等辺三角形

$$4. AB = \sqrt{9^2 - 6^2} = \sqrt{45} = 3\sqrt{5} \text{ cm}$$



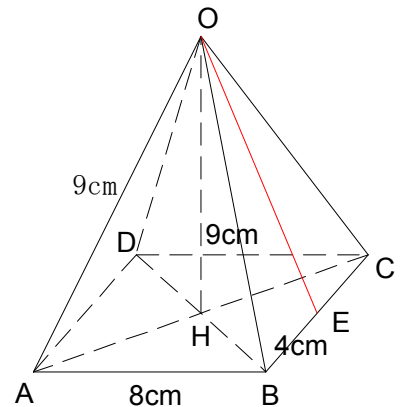
5. 右の図で,  $AC = 8\sqrt{2} \text{ cm}$

$$AH = \frac{AC}{2} = \frac{8\sqrt{2}}{2} = 4\sqrt{2} \text{ cm}$$

$$\text{高さ } OH = \sqrt{OA^2 - AH^2} = \sqrt{9^2 - (4\sqrt{2})^2}$$

$$= \sqrt{81 - 32} = \sqrt{49} = 7 \text{ cm}$$

$$\text{体積} = \frac{1}{3} \times \text{底面積} \times \text{高さ} = \frac{1}{3} \times 8 \times 8 \times 7 = \frac{448}{3} \text{ cm}^3$$



問題

1.  $AB = x$  cm とすると,  $BC = 14 - x$  cm

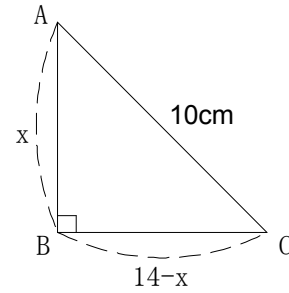
$$AB^2 + BC^2 = CA^2 \text{ より}$$

$$x^2 + (14 - x)^2 = 10^2$$

$$x^2 - 14x + 49 = 0$$

$$(x - 7)^2 = 0 \quad x = 7 \text{ cm}$$

$$AB = BC = 7 \text{ cm}$$



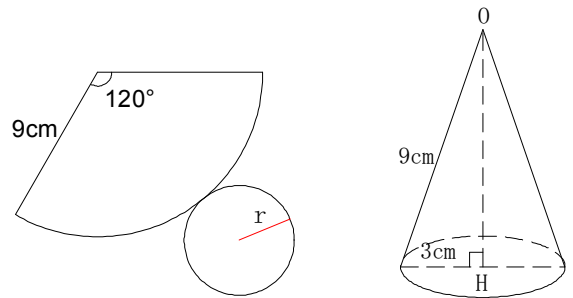
2. 底面の円の半径を  $r$  とすると,

$$2\pi r = 2\pi \times 9 \times \frac{120}{360} \quad \text{より,}$$

$$r = 3 \text{ cm}$$

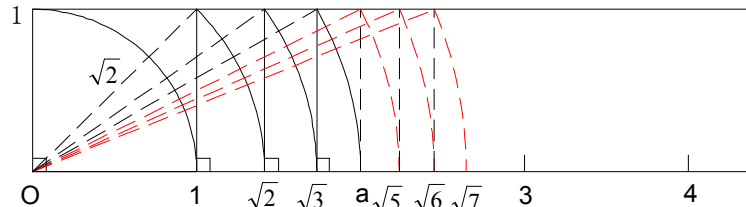
$$\begin{aligned} \text{円錐の高さ } OH &= \sqrt{9^2 - r^2} = \sqrt{9^2 - 3^2} \\ &= \sqrt{72} = 6\sqrt{2} \text{ cm} \end{aligned}$$

$$\text{体積} = \frac{1}{3} \times \pi \times 3^2 \times 6\sqrt{2} = 18\sqrt{2} \pi \text{ cm}^3$$



3. (1)  $a = \sqrt{1^2 + (\sqrt{3})^2} = \sqrt{4} = 2$

- (2) 下図参照



4. (1)  $\triangle ABH$  で,  $AH = 13^2 - x^2$

$$\triangle ACH \text{ で, } AH = 15^2 - CH^2 = 15^2 - (14 - x)^2$$

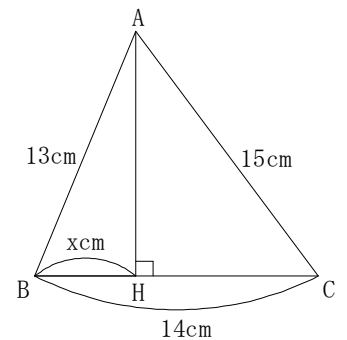
$$\text{よって, } 13^2 - x^2 = 15^2 - (14 - x)^2$$

$$(2) \quad 169 - x^2 = 225 - x^2 + 28x - 196$$

$$28x = 140 \quad x = 5 \text{ cm}$$

$$(3) \quad AH = \sqrt{13^2 - x^2} = \sqrt{13^2 - 5^2} = \sqrt{144} = 12$$

$$\triangle ABC = \frac{1}{2} \times BC \times AH = \frac{1}{2} \times 14 \times 12 = 84 \text{ cm}^2$$



以上