

電験三種 オンライン講座

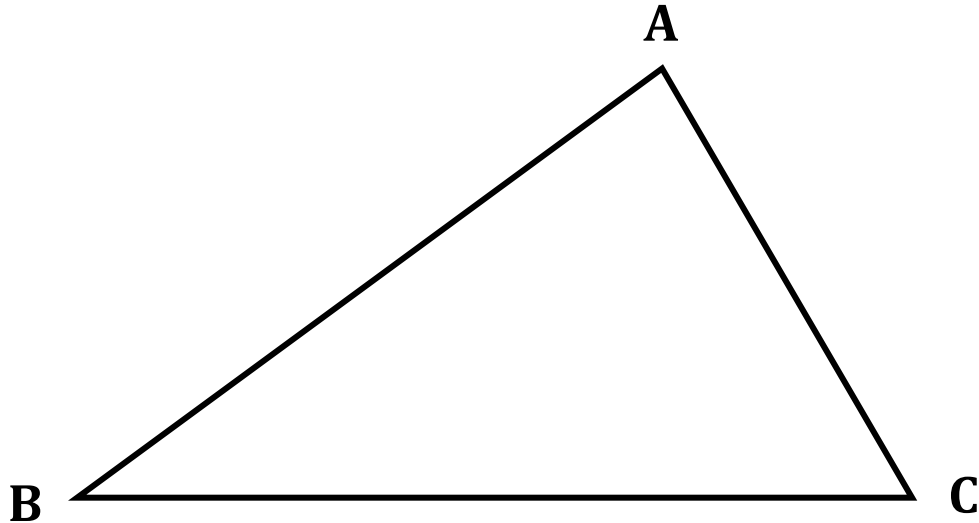
電気数学 第8回

図形

(正三角形、二等辺三角形、直角三角形)

三角形とは

3つの辺からなる多角形を三角形という



頂点：三角形の角の部分
三角形は三つの頂点をもつ

頂点の部分の角を内角といい
 $\angle A$ 、 $\angle B$ 、 $\angle C$ と表す

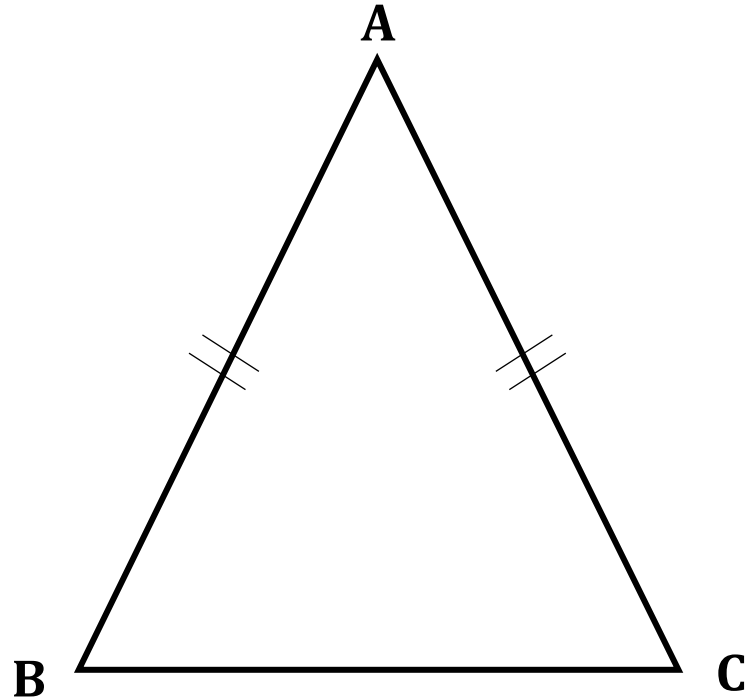
三角形の内角の和は 180° となる

A、B、Cを頂点とする三角形は $\triangle ABC$ と表す

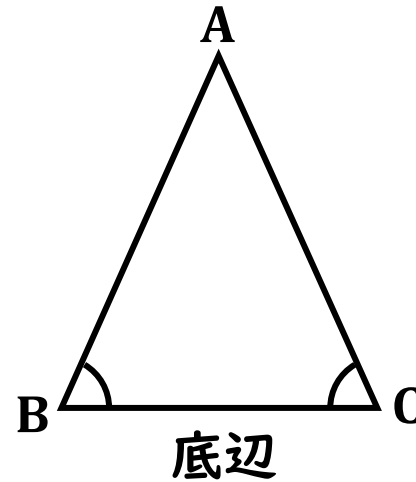
辺：頂点同士を結ぶ線分
三角形は3つの辺（辺AB、辺BC、辺CA）
からなる

二等辺三角形

<二等辺三角形のその他の特徴>

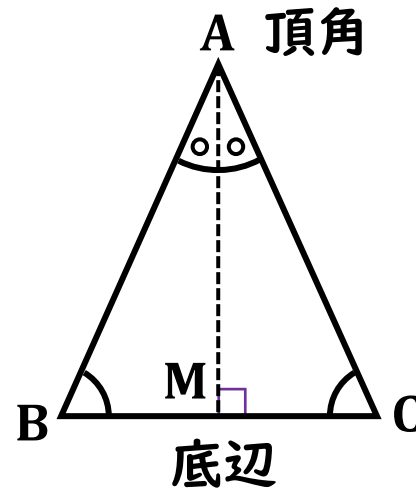


2つの辺の長さが等しい三角形を二等辺三角形という



二等辺三角形の底辺の両端の角の大きさは等しい

$$\angle B = \angle C$$



二等辺三角形の頂角から底辺に垂線を引くと、底辺を二等分する

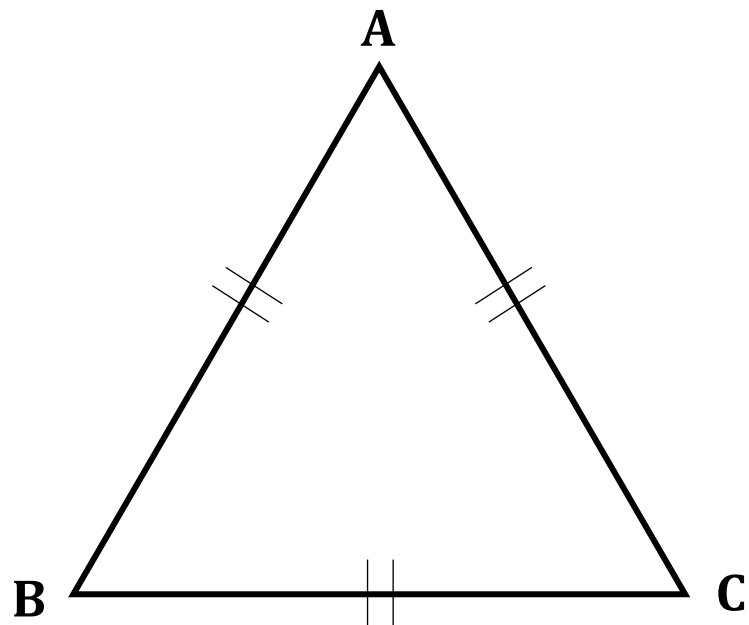
$$BM = CM$$

また、垂線により頂角Aは二等分される

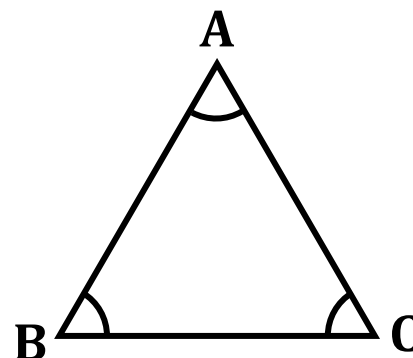
$$\angle BAM = \angle CAM$$

正三角形

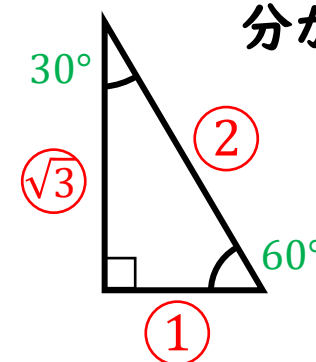
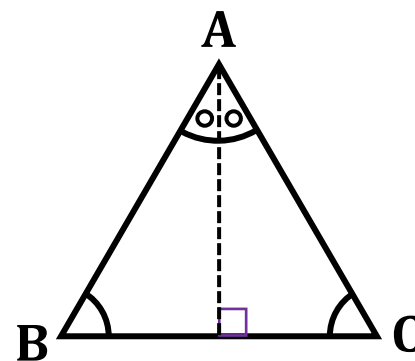
<正三角形のその他の特徴>



3つの辺の長さが等しい三角形を
正三角形という



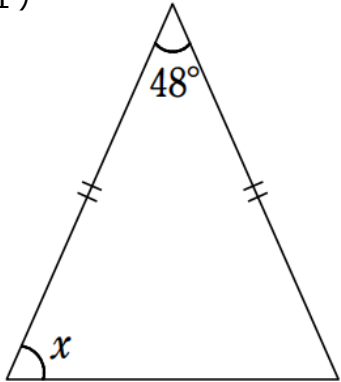
正三角形の内角は全て60°
 $\angle A = \angle B = \angle C = 60^\circ$



正三角形の頂角から底辺に
垂線を引くと各辺と内角が
分かる直角三角形ができる

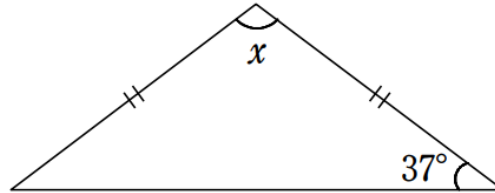
練習問題 I

(1)



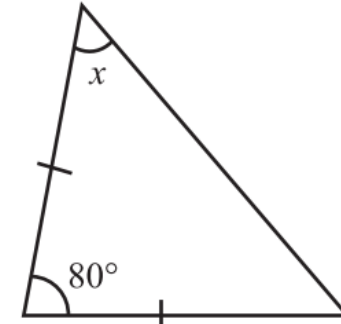
Ans. $x =$ _____

(2)



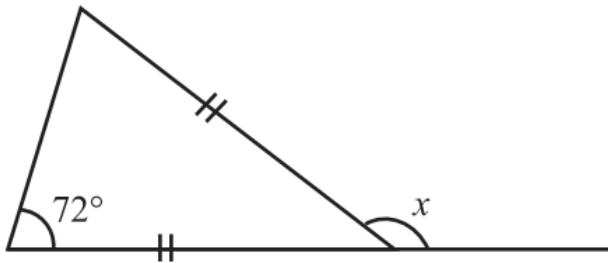
Ans. $x =$ _____

(3)



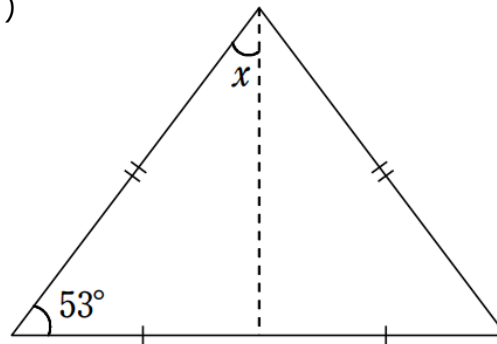
Ans. $x =$ _____

(4)



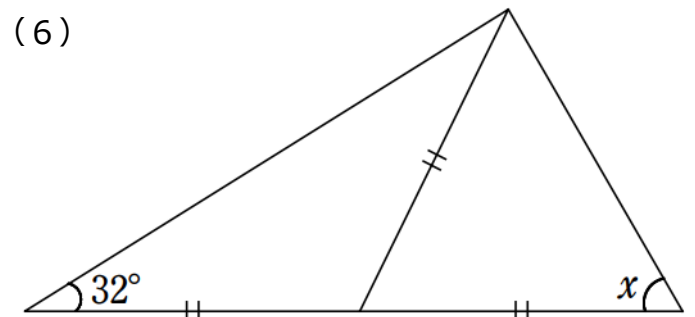
Ans. $x =$ _____

(5)



Ans. $x =$ _____

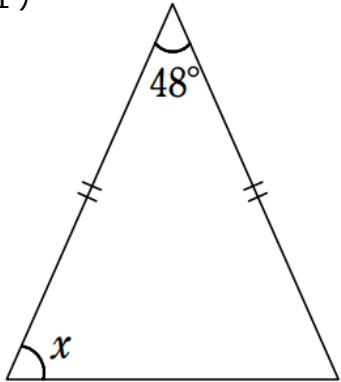
(6)



Ans. $x =$ _____

練習問題 I (解答)

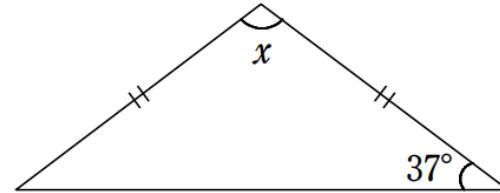
(1)



$$\begin{aligned} 180 - 48 &= 2x \\ 132 &= 2x \\ x &= 66 \end{aligned}$$

Ans. $x = 66^\circ$

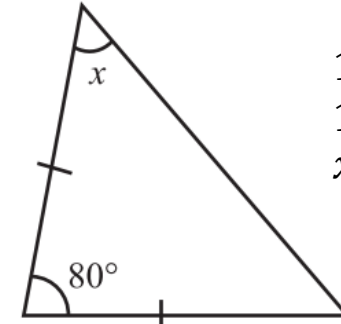
(2)



$$x = 180 - 2 \times 37 = 106$$

Ans. $x = 106^\circ$

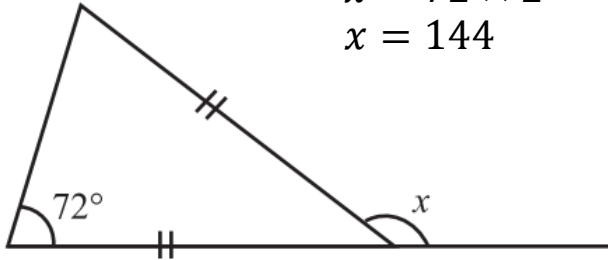
(3)



$$\begin{aligned} 180 - 80 &= 2x \\ 100 &= 2x \\ x &= 50 \end{aligned}$$

Ans. $x = 50^\circ$

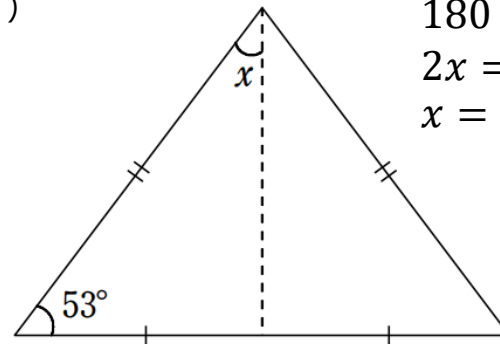
(4)



$$\begin{aligned} x &= 72 \times 2 \\ x &= 144 \end{aligned}$$

Ans. $x = 144^\circ$

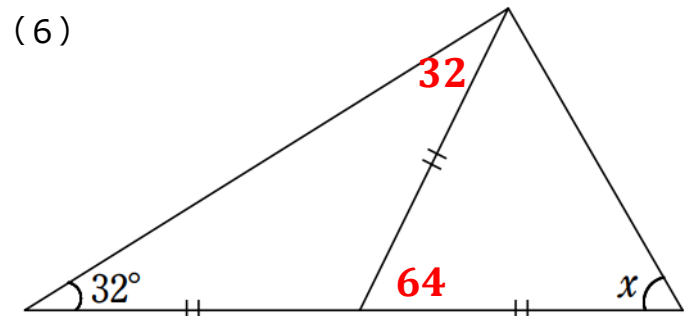
(5)



$$\begin{aligned} 180 - 53 \times 2 &= 2x \\ 2x &= 74 \\ x &= 37 \end{aligned}$$

Ans. $x = 37^\circ$

(6)

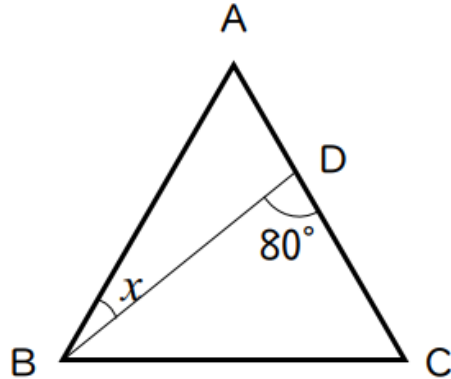


$$\begin{aligned} 180 - 64 &= 2x \\ 116 &= 2x \\ x &= 58 \end{aligned}$$

Ans. $x = 58^\circ$

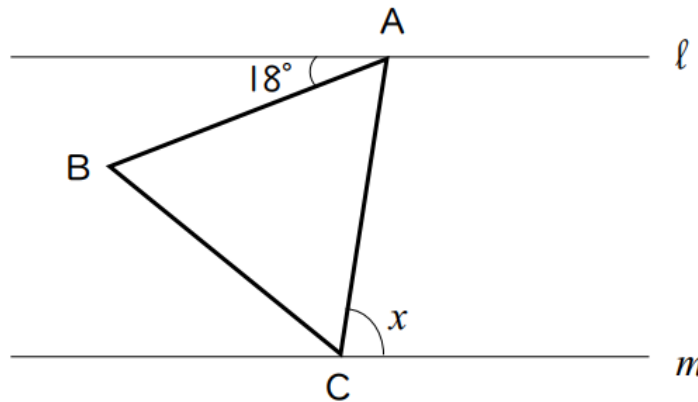
練習問題2

(1) $\triangle ABC$ は正三角形



Ans. $x =$ _____

(2) $\triangle ABC$ は正三角形。直線 l と m は平行

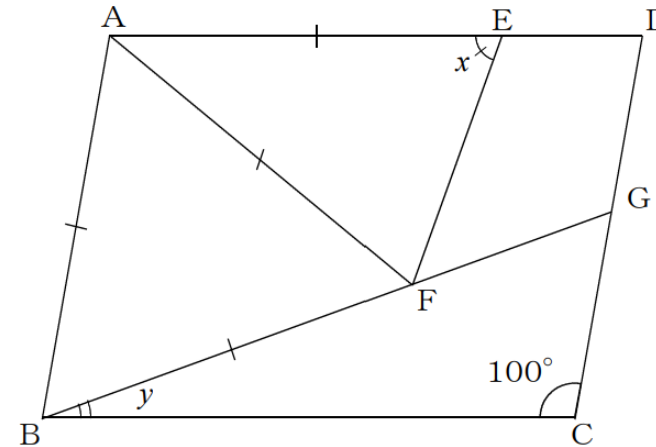


Ans. $x =$ _____

(3) 四角形ABCDは平行四辺形

$\triangle ABF$ は正三角形

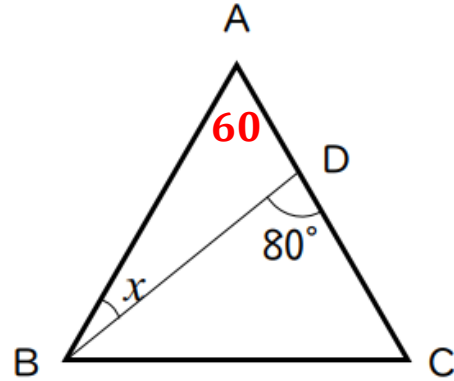
$AE = AF$ である



Ans. $x =$ _____ $y =$ _____

練習問題2 (解答)

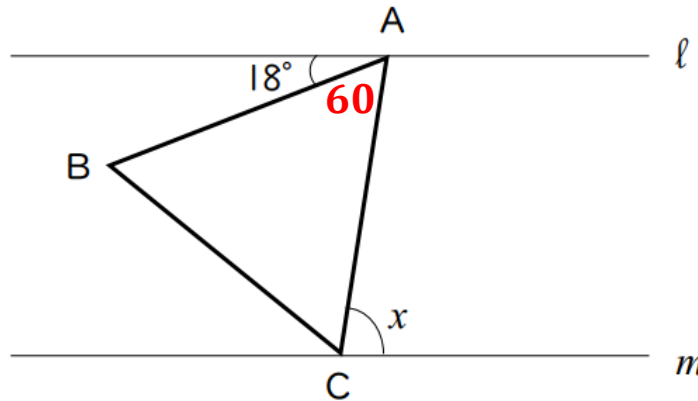
(1) $\triangle ABC$ は正三角形



$$\begin{aligned} x + 60 &= 80 \\ x &= 20 \end{aligned}$$

Ans. $x = 20^\circ$

(2) $\triangle ABC$ は正三角形。直線 l と m は平行

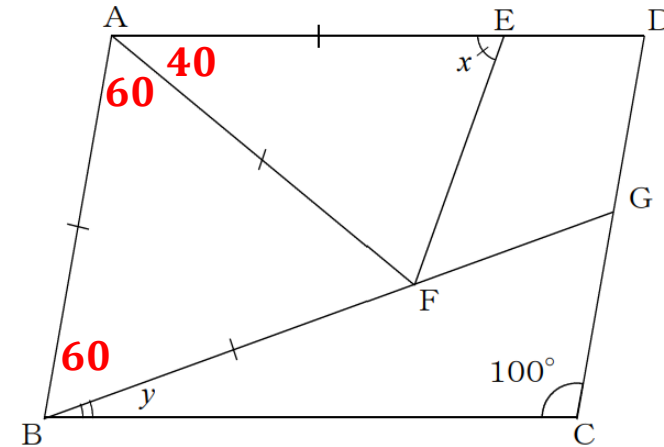


Ans. $x = 78^\circ$

(3) 四角形ABCDは平行四辺形

$\triangle ABF$ は正三角形

$AE = AF$ である



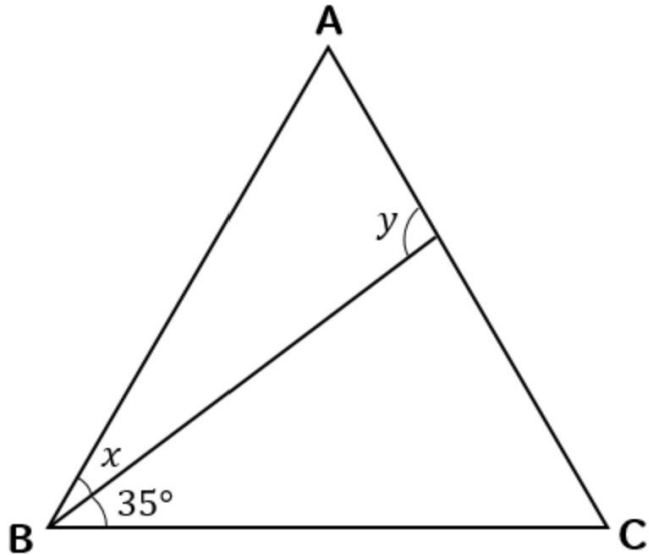
$$\begin{aligned} 180 - 40 &= 2x \\ 140 &= 2x \\ x &= 70 \end{aligned}$$

$$\begin{aligned} 180 - 100 &= 60 + y \\ y &= 180 - 100 - 60 \\ y &= 20 \end{aligned}$$

Ans. $x = 70^\circ$ $y = 20^\circ$

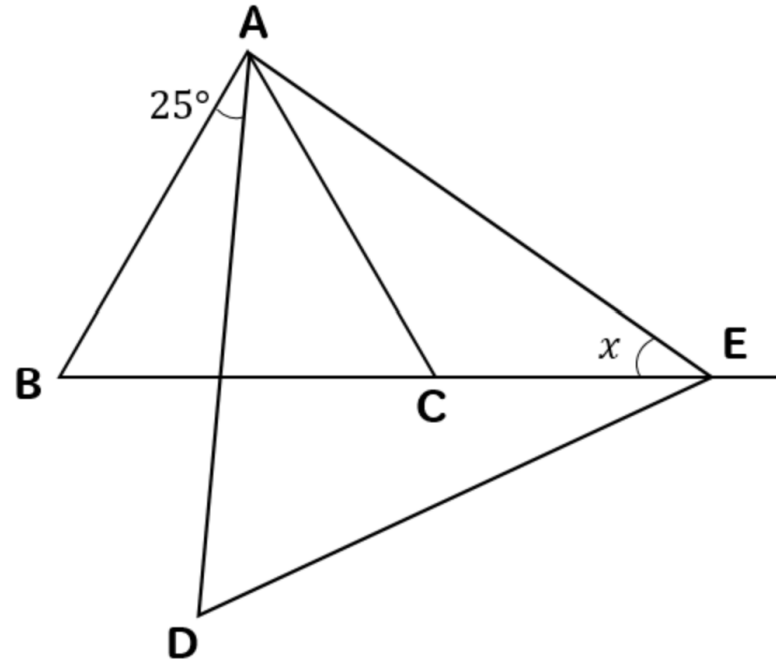
練習問題3

(1) $\triangle ABC$ は正三角形



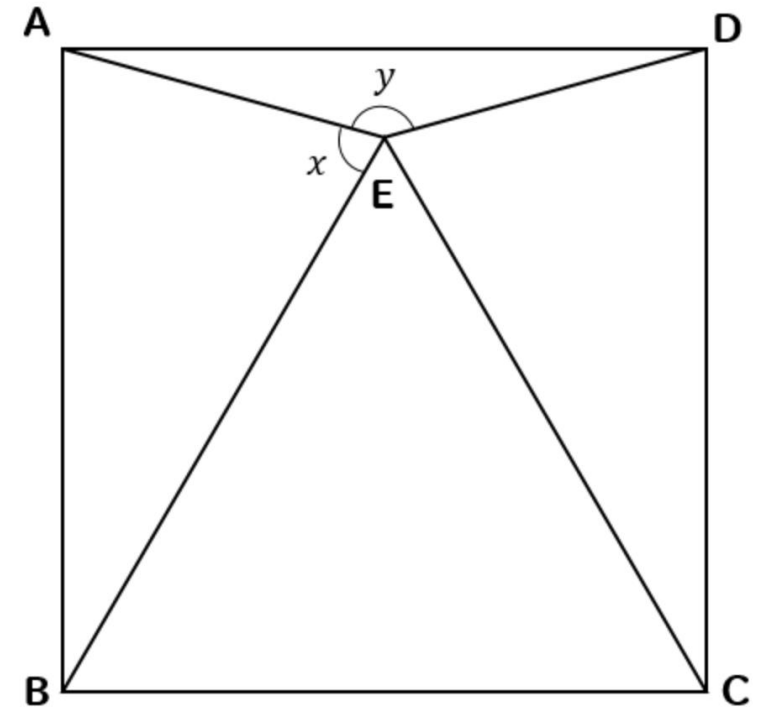
Ans. $x =$ $y =$

(2) $\triangle ABC$ 、 $\triangle ADE$ は正三角形



Ans. $x =$

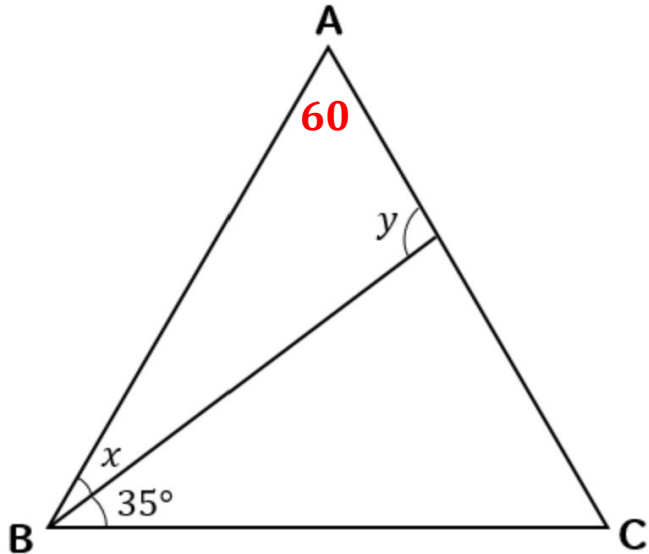
(3) 四角形ABCDは正方形
 $\triangle EBC$ は正三角形



Ans. $x =$ $y =$

練習問題3 (解答)

(1) $\triangle ABC$ は正三角形

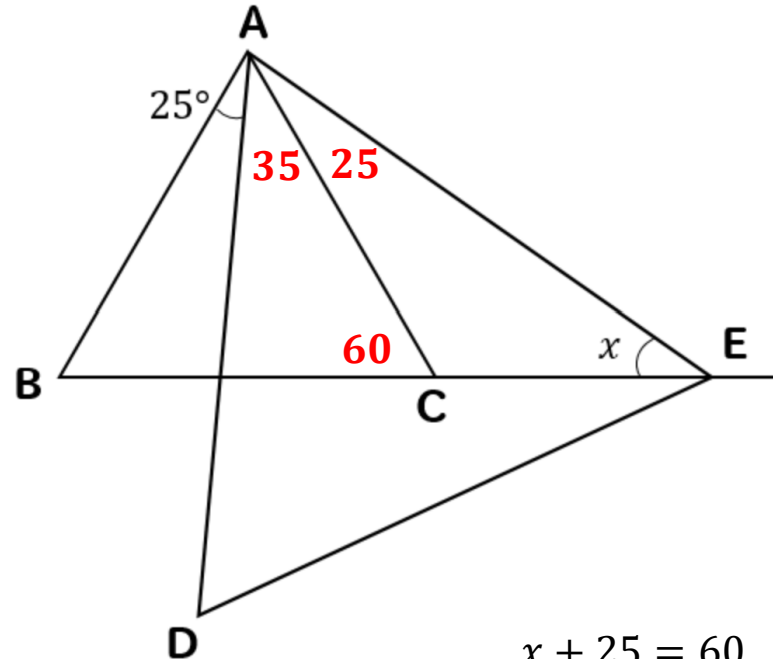


$$\begin{aligned} x + 35 &= 60 \\ x &= 25 \end{aligned}$$

$$\begin{aligned} x + y + 60 &= 180 \\ y &= 180 - 60 - x \\ y &= 120 - 25 = 95 \end{aligned}$$

Ans. $x = 25^\circ$ $y = 95^\circ$

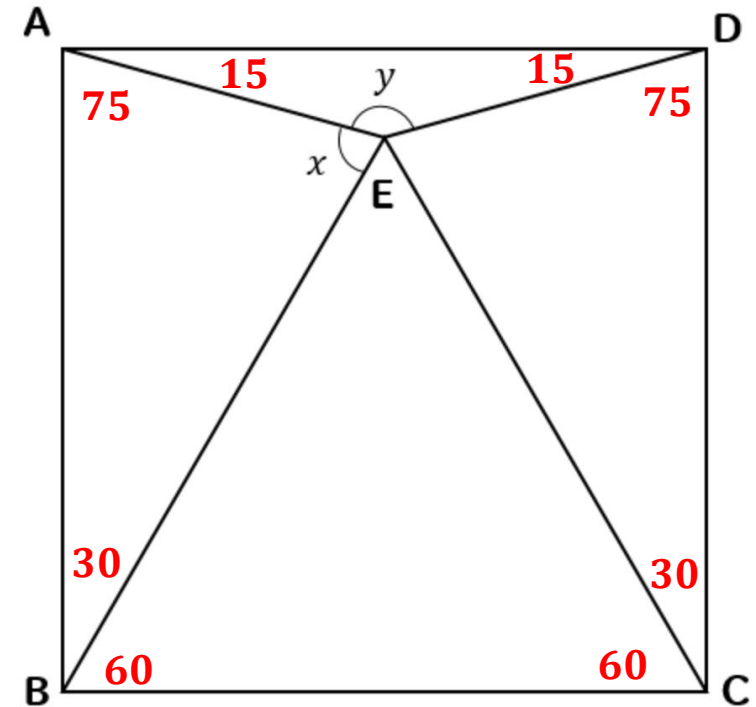
(2) $\triangle ABC$ 、 $\triangle ADE$ は正三角形



$$\begin{aligned} x + 25 &= 60 \\ x &= 35 \end{aligned}$$

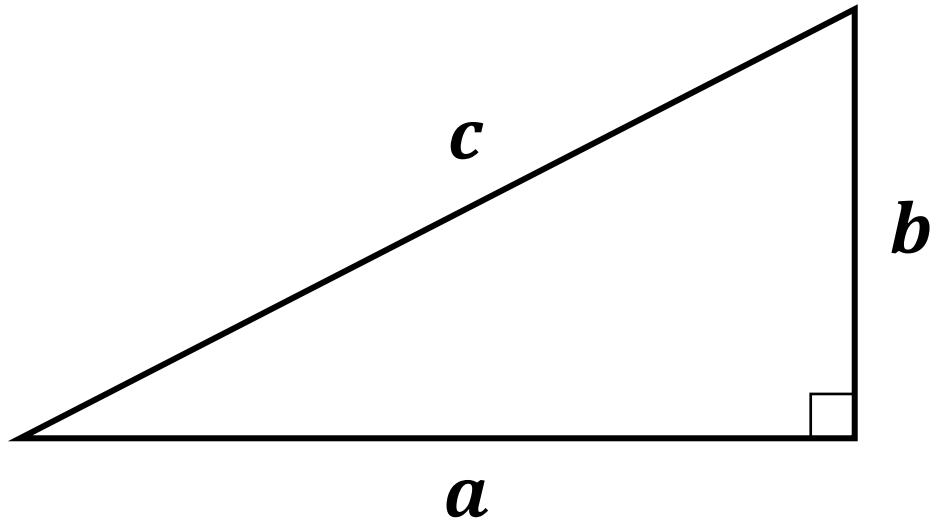
Ans. $x = 35^\circ$

(3) 四角形ABCDは正方形
 $\triangle EBC$ は正三角形



Ans. $x = 75^\circ$ $y = 150^\circ$

三平方の定理



2辺の長さをa, b, 斜辺の長さをcとする
直角三角形において次式が成り立つ。

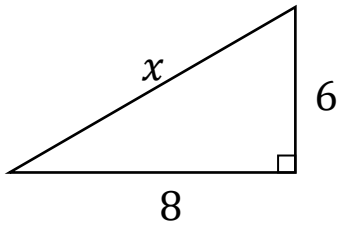
$$c^2 = a^2 + b^2$$
$$c = \sqrt{a^2 + b^2}$$

- 直角三角形に対する公式
- 直角三角形の各辺の長さの関係を表す
- 直角を作る2つの辺の長さとして直角と向かい合う辺（斜辺）の関係を表す

練習問題4

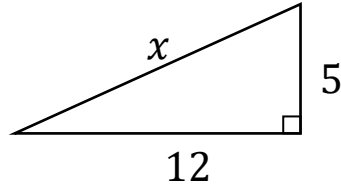


(1)



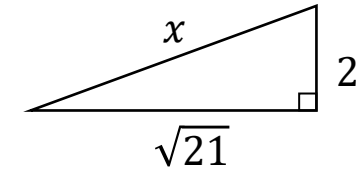
Ans. _____

(2)



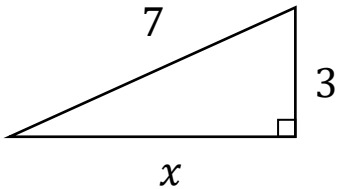
Ans. _____

(3)



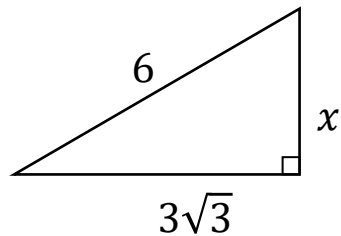
Ans. _____

(4)



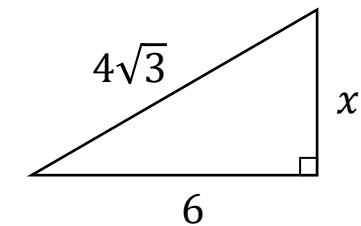
Ans. _____

(5)



Ans. _____

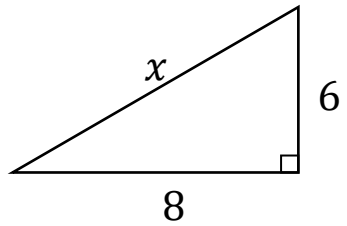
(6)



Ans. _____

練習問題4 (解答)

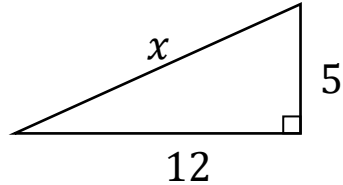
(1)



$$\begin{aligned}x^2 &= 6^2 + 8^2 = 100 \\x^2 &= 10^2 \\x &= 10\end{aligned}$$

Ans. $x = 10$

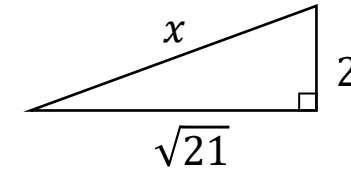
(2)



$$\begin{aligned}x^2 &= 5^2 + 12^2 = 169 \\x^2 &= 13^2 \\x &= 13\end{aligned}$$

Ans. $x = 13$

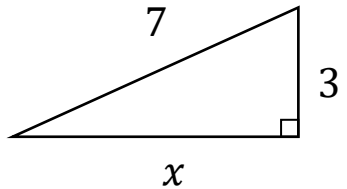
(3)



$$\begin{aligned}x^2 &= 2^2 + \sqrt{21}^2 \\&= 25 \\x^2 &= 5^2 \\x &= 5\end{aligned}$$

Ans. $x = 5$

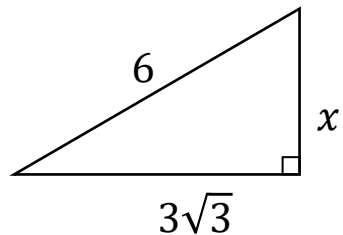
(4)



$$\begin{aligned}x^2 &= 7^2 - 3^2 = 40 \\x &= \sqrt{40} = 2\sqrt{10}\end{aligned}$$

Ans. $x = 2\sqrt{10}$

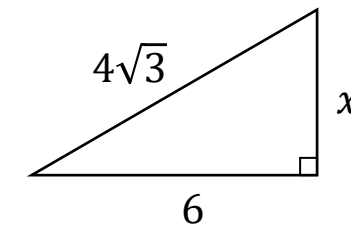
(5)



$$\begin{aligned}x^2 &= 6^2 - (3\sqrt{3})^2 \\x^2 &= 9 = 3^2 \\x &= 3\end{aligned}$$

Ans. $x = 3$

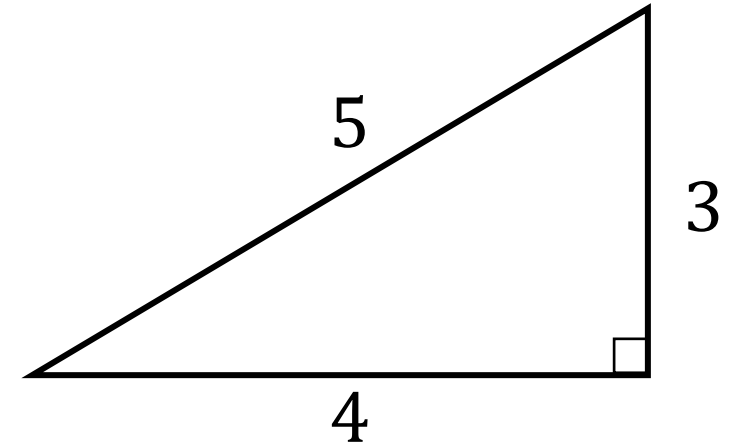
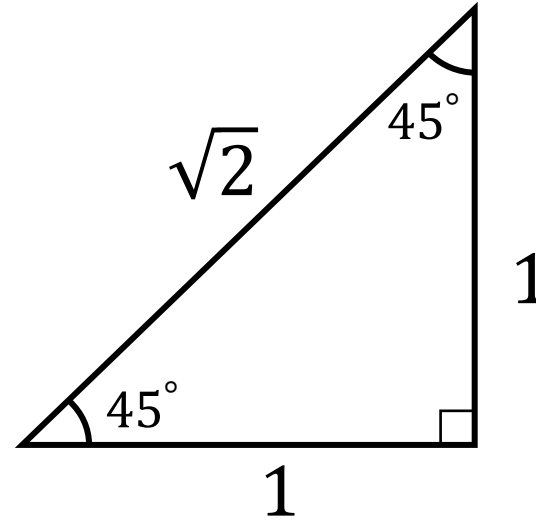
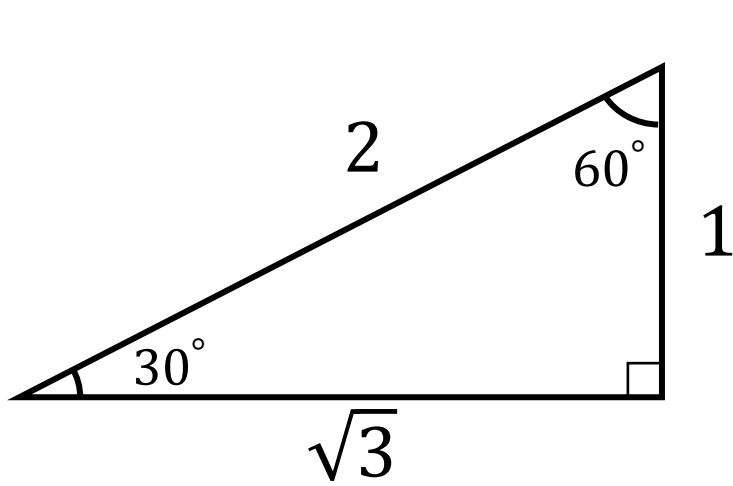
(6)



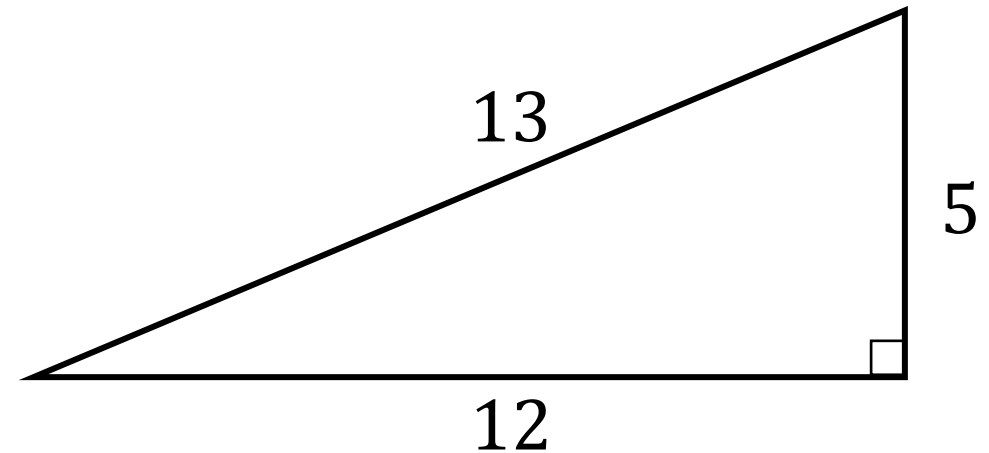
$$\begin{aligned}x^2 &= (4\sqrt{3})^2 - 6^2 \\x^2 &= 48 - 36 = 12 \\x &= \sqrt{12} = 2\sqrt{3}\end{aligned}$$

Ans. $x = 2\sqrt{3}$

特徴的な直角三角形

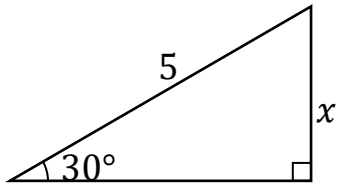


この4つの三角形の角度と辺の長さの比は全て覚えること!



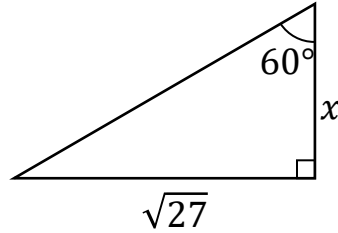
練習問題5

(1)



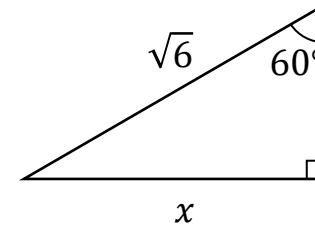
Ans. _____

(2)



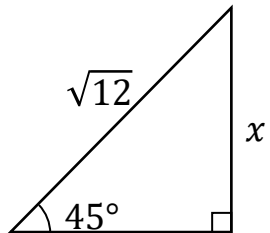
Ans. _____

(3)



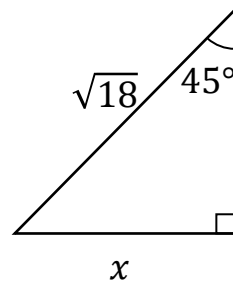
Ans. _____

(4)



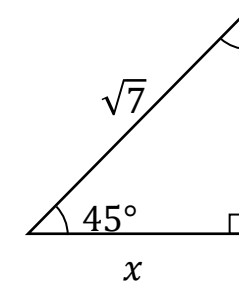
Ans. _____

(5)



Ans. _____

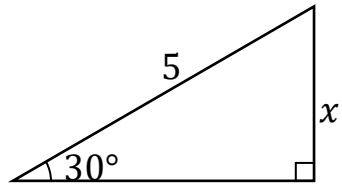
(6)



Ans. _____

練習問題5 (解答)

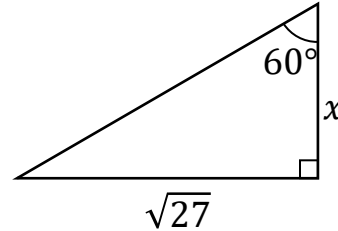
(1)



$$\begin{aligned} 1 : 2 &= x : 5 \\ 2x &= 5 \\ x &= \frac{5}{2} \end{aligned}$$

Ans. $x = \frac{5}{2}$

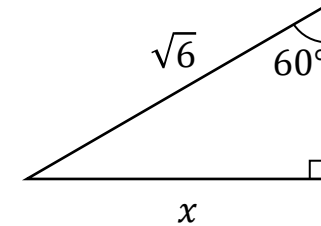
(2)



$$\begin{aligned} 1 : \sqrt{3} &= x : \sqrt{27} \\ \sqrt{3}x &= \sqrt{27} = 3\sqrt{3} \\ x &= 3 \end{aligned}$$

Ans. $x = 3$

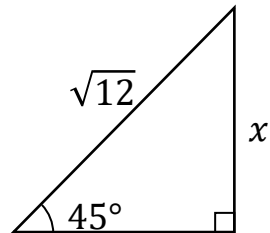
(3)



$$\begin{aligned} \sqrt{3} : 2 &= x : \sqrt{6} \\ 2x &= \sqrt{18} = 3\sqrt{2} \\ x &= \frac{3}{2}\sqrt{2} \end{aligned}$$

Ans. $x = \frac{3}{2}\sqrt{2}$

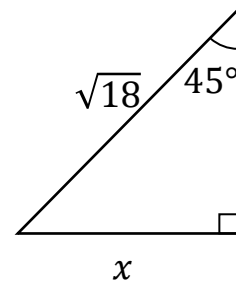
(4)



$$\begin{aligned} 1 : \sqrt{2} &= x : \sqrt{12} \\ \sqrt{2}x &= \sqrt{12} \\ x &= \sqrt{6} \end{aligned}$$

Ans. $x = \sqrt{6}$

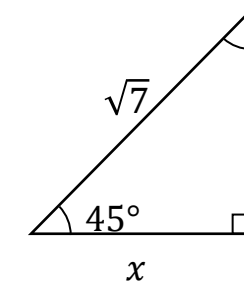
(5)



$$\begin{aligned} 1 : \sqrt{2} &= x : \sqrt{18} \\ \sqrt{2}x &= \sqrt{18} = 3\sqrt{2} \\ x &= 3 \end{aligned}$$

Ans. $x = 3$

(6)

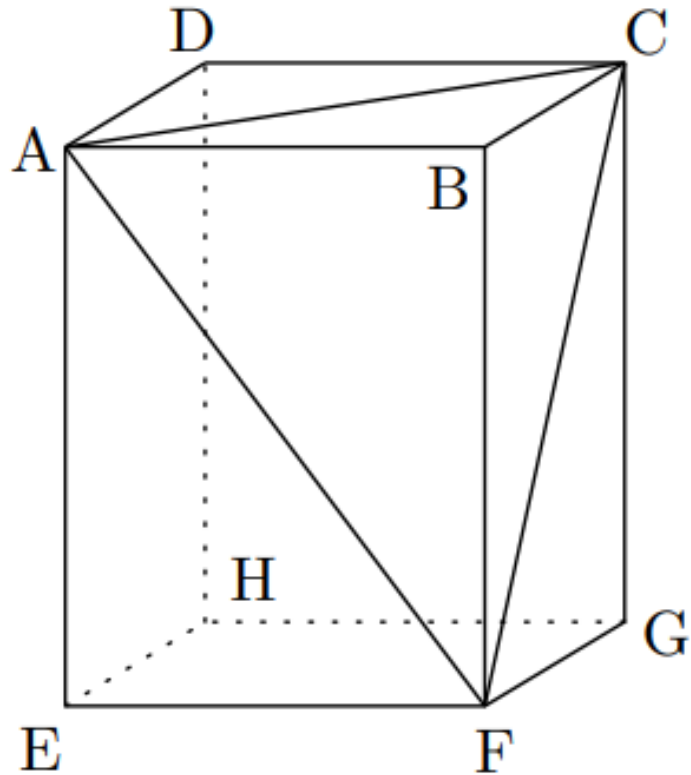


$$\begin{aligned} 1 : \sqrt{2} &= x : \sqrt{7} \\ \sqrt{2}x &= \sqrt{7} \\ x &= \frac{\sqrt{7}}{\sqrt{2}} = \frac{\sqrt{14}}{2} \end{aligned}$$

Ans. $x = \frac{\sqrt{14}}{2}$

練習問題6

図のような、底面が1辺4 cmの正方形で高さが6 cmの直方体がある。



(1) $\triangle AFC$ の3辺の長さの和を求めよ。

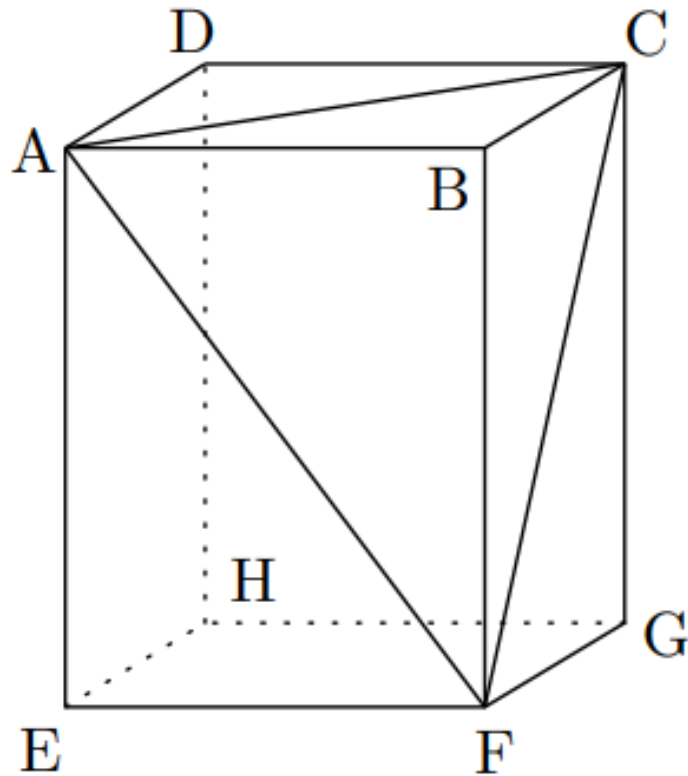
Ans. _____

(2) $\triangle AFC$ の面積を求めよ。

Ans. _____

練習問題6 (解答)

図のような、底面が1辺4 cmの正方形で高さが6 cmの直方体がある。



(1) $\triangle AFC$ の3辺の長さの和を求めよ。

$$AF = \sqrt{6^2 + 4^2} = 2\sqrt{13}$$

$$FC = AF = 2\sqrt{13}$$

$$AC = \sqrt{4^2 + 4^2} = 4\sqrt{2}$$

$$AF + FC + AC = 4\sqrt{13} + 4\sqrt{2}$$

Ans. $4\sqrt{13} + 4\sqrt{2}$ cm

(2) $\triangle AFC$ の面積を求めよ。

$$h = \sqrt{AF^2 - \left(\frac{AC}{2}\right)^2} = \sqrt{(2\sqrt{13})^2 - (2\sqrt{2})^2} = \sqrt{52 - 8} = 2\sqrt{11}$$

$$\triangle AFC = \frac{1}{2} \times AC \times h = \frac{1}{2} \times 4\sqrt{2} \times 2\sqrt{11} = 4\sqrt{22}$$

Ans. $4\sqrt{22}$ cm²



ご聴講ありがとうございました!!