

## §1 平方根

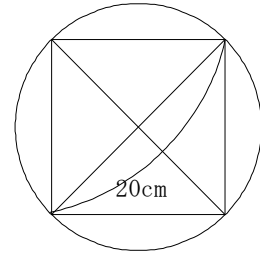
練習

1. (1)  $\pm 20$  (2)  $\pm 0.8$  (3)  $\pm \frac{3}{7}$
2. (1)  $\sqrt{81} = 9$  (2)  $\sqrt{0.16} = 0.4$  (3)  $-\sqrt{\frac{4}{25}} = -\frac{2}{5}$
3.  $(\sqrt{6})^2 = 6$   $(-\sqrt{6})^2 = 6$
4.  $-\sqrt{5}$ ,  $-\sqrt{2}$ ,  $0$ ,  $\sqrt{3}$ ,  $\sqrt{6}$
5.  $0 < a < 4$   $a = 1, 2, 3$

## §2 平方根の値

練習

1.  $\sqrt{20} = 4.472136 \text{ cm} \approx 4.5 \text{ cm}$



## §3 平方根の乗法・除法

平方根の積と商

1. (1)  $\sqrt{5} \times \sqrt{6} = \sqrt{30}$  (2)  $\sqrt{10} \times \sqrt{40} = \sqrt{400} = 20$  (3)  $\sqrt{7} \times (-\sqrt{2}) = -\sqrt{14}$   
 (4)  $\sqrt{39} \div \sqrt{3} = \sqrt{13}$  (5)  $\sqrt{45} \div \sqrt{5} = \sqrt{9} = 3$  (6)  $(-\sqrt{14}) \div \sqrt{12} = -\sqrt{\frac{7}{6}}$
2. (1)  $2\sqrt{2} = \sqrt{8}$  (2)  $3\sqrt{3} = \sqrt{27}$  (3)  $\frac{\sqrt{18}}{3} = \sqrt{2}$
3. (1)  $\sqrt{20} = 2\sqrt{5}$  (2)  $\sqrt{45} = 3\sqrt{5}$  (3)  $\sqrt{\frac{5}{64}} = \frac{\sqrt{5}}{8}$
4. (1)  $\sqrt{135} = \sqrt{3^2 \times 3 \times 5} = 3\sqrt{15}$  (2)  $\sqrt{252} = \sqrt{2^2 \times 3^2 \times 7} = 6\sqrt{7}$
5. (1)  $\sqrt{80} = 4\sqrt{5} = 4 \times 2.236 = 8.944$  (2)  $\sqrt{\frac{5}{4}} = \frac{\sqrt{5}}{2} = \frac{2.236}{2} = 1.118$

$$6. \quad (1) \sqrt{300} = 10\sqrt{3} = 17.32 \quad (2) \sqrt{3000} = 10\sqrt{30} = 54.77$$

$$(3) \sqrt{0.3} = \frac{\sqrt{30}}{10} = 0.5477 \quad (4) \sqrt{0.03} = \frac{\sqrt{3}}{10} = 0.1732$$

$$7. \quad (1) \frac{1}{\sqrt{6}} = \frac{\sqrt{6}}{6} \quad (2) \frac{\sqrt{3}}{\sqrt{5}} = \frac{\sqrt{15}}{5} \quad (3) \frac{9}{\sqrt{18}} = \frac{9}{3\sqrt{2}} = \frac{3}{\sqrt{2}} = \frac{3\sqrt{2}}{2}$$

練習

$$1. \quad (1) \sqrt{6} \times 2\sqrt{3} = 2\sqrt{18} = 2 \times 3\sqrt{2} = 6\sqrt{2} \quad (2) \sqrt{18} \div \sqrt{8} = \sqrt{\frac{18}{8}} = \sqrt{\frac{9}{4}} = \frac{3}{2}$$

$$(3) \sqrt{10} \div \sqrt{5} \times (-\sqrt{2}) = -\sqrt{\frac{10}{5}} \times 2 = -\sqrt{4} = -2$$

$$(4) \sqrt{72} \div (-\sqrt{18}) \div \sqrt{3} = -\sqrt{\frac{72}{18}} \div \sqrt{3} = -\sqrt{4} \div \sqrt{3} = \frac{-2}{\sqrt{3}} = -\frac{2\sqrt{3}}{3}$$

$$2. \quad (1) \sqrt{72} = \sqrt{6^2 \times 2} = 6\sqrt{2} \quad (2) \sqrt{125} = \sqrt{5^2 \times 5} = 5\sqrt{5}$$

$$(3) \sqrt{405} = \sqrt{9^2 \times 5} = 9\sqrt{5} \quad (4) \frac{\sqrt{27}}{3} = \frac{\sqrt{3^2 \times 3}}{3} = \frac{3\sqrt{3}}{3} = \sqrt{3}$$

$$3. \quad (1) \sqrt{500} = 10\sqrt{5} = 22.36 \quad (2) \sqrt{0.05} = \frac{\sqrt{5}}{10} = 0.2236$$

$$(3) \sqrt{5000} = \sqrt{10^2 \times 5^2 \times 2} = 50\sqrt{2} = 50 \times 1.414 = 70.7$$

$$4. \quad (1) \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \frac{\sqrt{3}}{3} \quad (2) \frac{\sqrt{3}}{\sqrt{7}} = \frac{\sqrt{3} \times \sqrt{7}}{\sqrt{7} \times \sqrt{7}} = \frac{\sqrt{21}}{7}$$

$$(3) \frac{2}{\sqrt{6}} = \frac{2 \times \sqrt{6}}{\sqrt{6} \times \sqrt{6}} = \frac{2\sqrt{6}}{6} = \frac{\sqrt{6}}{3}$$

§4 根号をふくむ式の計算

1. (1)  $8\sqrt{6} - 2\sqrt{6} = 6\sqrt{6}$  (2)  $-\sqrt{3} + 6\sqrt{3} - 2\sqrt{3} = 3\sqrt{3}$   
 (3)  $5\sqrt{2} - 7\sqrt{2} + 2 = -2\sqrt{2} + 2$  (4)  $4\sqrt{5} + 6\sqrt{3} - 3\sqrt{5} = \sqrt{5} + 6\sqrt{3}$

2. (1)  $\sqrt{50} + \sqrt{32} = 5\sqrt{2} + 4\sqrt{2} = 9\sqrt{2}$   
 (2)  $\sqrt{75} + \sqrt{27} = 5\sqrt{3} + 3\sqrt{3} = 8\sqrt{3}$   
 (3)  $\sqrt{8} - \sqrt{18} + \sqrt{2} = 2\sqrt{2} - 3\sqrt{2} + \sqrt{2} = 0$   
 (4)  $\sqrt{20} - \sqrt{45} - \sqrt{5} = 2\sqrt{5} - 3\sqrt{5} = -\sqrt{5}$

3. (1)  $\sqrt{3} + \frac{6}{\sqrt{3}} = \sqrt{3} + \frac{6\sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \sqrt{3} + \frac{6\sqrt{3}}{3} = \sqrt{3} + 2\sqrt{3} = 3\sqrt{3}$   
 (2)  $\frac{10}{\sqrt{5}} - \sqrt{45} = \frac{10\sqrt{5}}{\sqrt{5} \times \sqrt{5}} - \sqrt{3^2 \times 5} = \frac{10\sqrt{5}}{5} - 3\sqrt{5} = 2\sqrt{5} - 3\sqrt{5} = -\sqrt{5}$

4. (1)  $\sqrt{3}(1 - \sqrt{3}) = \sqrt{3} - 3$  (2)  $\sqrt{5}(\sqrt{20} - 2) = \sqrt{100} - 2\sqrt{5} = 10 - 2\sqrt{5}$

5. (1)  $(\sqrt{2} + 1)(\sqrt{3} + 2) = \sqrt{6} + 2\sqrt{2} + \sqrt{3} + 2$   
 (2)  $(\sqrt{6} - 2)(2\sqrt{6} + 3) = 12 + 3\sqrt{6} - 4\sqrt{6} - 6 = 6 - \sqrt{6}$

6. (1)  $(\sqrt{2} - 1)^2 = 2 - 2\sqrt{2} + 1 = 3 - 2\sqrt{2}$   
 (2)  $(\sqrt{5} + \sqrt{6})(\sqrt{5} - \sqrt{6}) = 5 - 6 = -1$

練習

1. (1)  $2\sqrt{3} + 5\sqrt{3} = 7\sqrt{3}$  (2)  $6\sqrt{7} - 5\sqrt{7} = \sqrt{7}$   
 (3)  $3\sqrt{5} + 7\sqrt{5} - 6\sqrt{5} = 4\sqrt{5}$  (4)  $2\sqrt{6} - \sqrt{3} - 8\sqrt{6} = -6\sqrt{6} - \sqrt{3}$   
 (5)  $\frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{4} = \frac{3\sqrt{3}}{4}$  (6)  $\sqrt{\frac{3}{2}} - \frac{6}{\sqrt{6}} = \frac{\sqrt{6}}{2} - \sqrt{6} = -\frac{\sqrt{6}}{2}$

2. (1)  $\sqrt{5}(\sqrt{45} - 3) = 15 - 3\sqrt{5}$   
 (2)  $(\sqrt{3} + 4)(\sqrt{3} - 2) = 3 + 2\sqrt{3} - 8 = -5 + 2\sqrt{3}$   
 (3)  $(\sqrt{2} - \sqrt{3})^2 = 2 - 2\sqrt{6} + 3 = 5 - 2\sqrt{6}$   
 (4)  $(\sqrt{7} + \sqrt{3})(\sqrt{7} - \sqrt{3}) = 7 - 3 = 4$

問題

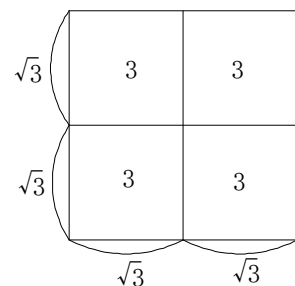
1. (1)  $\pm 9$             (2)  $\pm 40$             (3)  $\pm 0.6$             (4)  $\pm \frac{5}{7}$

2. (1) 64の平方根は  $\pm 8$ である。  
 (2)  $\sqrt{900}$  は30である。  
 (3)  $\sqrt{(-7)^2}$  は 7である。  
 (4)  $\sqrt{2} + \sqrt{8} = 3\sqrt{2}$  である。

3. (1)  $\sqrt{32} \times \sqrt{2} = \sqrt{64} = 8$   
 (2)  $7\sqrt{2} \div \sqrt{7} = \frac{7\sqrt{2}}{\sqrt{7}} = \frac{7\sqrt{14}}{7} = \sqrt{14}$   
 (3)  $\sqrt{90} \div \sqrt{15} \div \sqrt{2} = \sqrt{\frac{90}{15 \times 2}} = \sqrt{3}$   
 (4)  $(-\sqrt{14}) \div \sqrt{21} \times \sqrt{75} = -\sqrt{\frac{14}{21}} \times 75 = -\sqrt{2 \times 25} = -5\sqrt{2}$   
 (5)  $\sqrt{50} + 2\sqrt{18} - 8\sqrt{2} = 5\sqrt{2} + 6\sqrt{2} - 8\sqrt{2} = 3\sqrt{2}$   
 (6)  $(3 + 2\sqrt{2})(3 - 2\sqrt{2}) = 9 - 8 = 1$   
 (7)  $(5\sqrt{2} - 1)^2 = 50 - 10\sqrt{2} + 1 = 51 - 10\sqrt{2}$   
 (8)  $\frac{\sqrt{24}}{3} - \frac{2}{\sqrt{6}} = \frac{2\sqrt{6}}{3} - \frac{2\sqrt{6}}{6} = \frac{2\sqrt{6}}{3} - \frac{\sqrt{6}}{3} = \frac{\sqrt{6}}{3}$

4.  $\frac{\sqrt{2}}{3}, \frac{2}{3}, \sqrt{\frac{2}{3}}, \frac{2}{\sqrt{3}}$

5. 面積が3の正方形の1辺の長さは $\sqrt{3}$   
 1辺の長さが  $\sqrt{3} + \sqrt{3} = 2\sqrt{3}$  の正方形の  
 面積は  $3 \times 4 = 12$   
 面積が12の正方形の1辺の長さは  $\sqrt{12}$   
 したがって、 $2\sqrt{3} = \sqrt{12}$

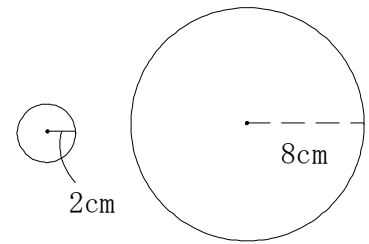


6. (1) 求める半径を  $r$  とすると

$$2\pi r = 2\pi \times 2 + 2\pi \times 8$$
$$= 2\pi(2 + 8)$$

$$= 2\pi \times 10$$

よって,  $r = 10.0 \text{ cm}$



(2) 求める半径を  $r$  とすると

$$\pi r^2 = \pi \times 2^2 + \pi \times 8^2$$

$$= \pi(4 + 64)$$

$$= \pi \times 68$$

よって  $r^2 = 68$

$$r = \sqrt{68} = \sqrt{2^2 \times 17} = 2\sqrt{17}$$

$$= 2 \times 4.123105$$

$$= 8.24621$$

$$\doteq 8.2 \text{ cm}$$

以上