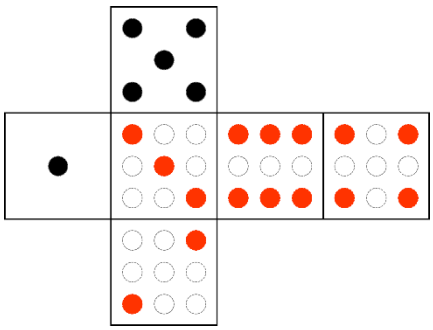
# 工業スタートノート　詳しい解答

## p.5　5　展開図

練習

(1)



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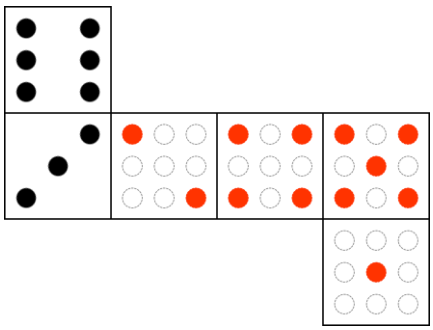
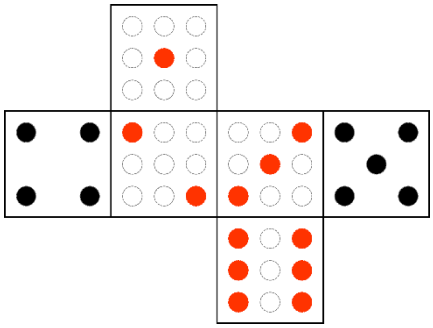
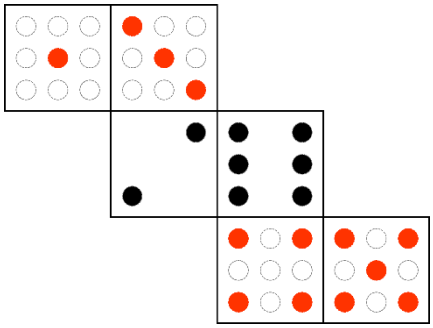


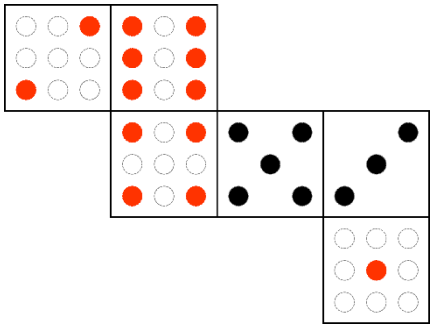
(3)



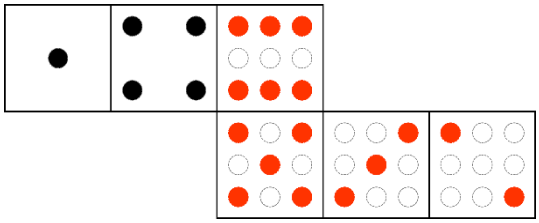
(4)



(5)



(6)



## p.6　6　四則演算

練習 1

(1) $13 + 14 = \mathbf{27}$　　(2) $48 - 16 = \mathbf{32}$　　(3) $23 + 38 = \mathbf{61}$

(4) $60 - 35 = \mathbf{25}$　　(5) $14 \times 8 = \mathbf{112}$　　(6) $88 \div 44 = \mathbf{2}$

練習 2

(1) $-36 + 16 = \mathbf{-20}$　　(2) $-16 - 4 = \mathbf{-20}$　　(3) $83 + (-23) = \mathbf{60}$

(4) $24 \div (-6) = \mathbf{-4}$　　(5) $-12 \times (-4) = \mathbf{48}$　　(6) $-30 \div 6 = \mathbf{-5}$

練習 3

(1) $12 + (-3) \times 2 = 12 + (-6) = \mathbf{6}$

(2) $-8 - (-4) \times 3 = -8 - (-12) = \mathbf{4}$

(3) $10 \times (-4) - (-3) \times 7 = -40 - (-21) = \mathbf{-19}$

(4) $-15 \times (-2) + 4 \times (-7) = 30 + -28 = \mathbf{2}$

練習 4

(1) $2 \times 4 - (6 - 5) \times 3 = 8 - 1 \times 3 = 8 - 3 = \mathbf{5}$

(2) $4 \times 4 - (5 - 6 \div 3) \times 3 = 16 - (5 - 2) \times 3 = 16 - 3 \times 3 = \mathbf{7}$

(3) $5 + 2 \times \{14 - (8 + 4)\} = 5 + 2 \times (14 - 12) = 5 + 2 \times 2 = 5 + 4 = \mathbf{9}$

(4) $2 \times 5 - [6 \div 2 - \{7 - (1 + 4)\}] = 10 - \{3 - (7 - 5)\} = 10 - (3 - 2) = \mathbf{9}$

## P.7 7 累乗と根号

練習 1

(1) $5^2 = 5 \times 5 = \mathbf{25}$

(2) $3^3 = 3 \times 3 \times 3 = \mathbf{27}$

(3) $(-2)^2 = (-2) \times (-2) = \mathbf{4}$

(4) $-2^2 = -(2 \times 2) = \mathbf{-4}$

(5) $-2^3 = -(2 \times 2 \times 2) = \mathbf{-8}$

(6) $(-2)^3 = (-2) \times (-2) \times (-2) = \mathbf{-8}$

(7) $2^2 + 5 = 2 \times 2 + 5 = \mathbf{9}$

(8) $2^2 - 5^2 = 2 \times 2 - 5 \times 5 = 4 - 25 = \mathbf{-21}$

(9) $4^3 + (-3)^2 = 4 \times 4 \times 4 + (-3) \times (-3) = 64 + 9 = \mathbf{73}$

練習 2

(1) $\sqrt{16} = \sqrt{4 \times 4} = \mathbf{4}$

(2) $\sqrt{100} = \sqrt{10 \times 10} = \mathbf{10}$

(3) $\sqrt{18} = \sqrt{2 \times 3 \times 3} = \mathbf{3\sqrt{2}}$

(4) $\sqrt{28} = \sqrt{2 \times 2 \times 7} = \mathbf{2\sqrt{7}}$

(5) $-\sqrt{27} = -\sqrt{3 \times 3 \times 3} = \mathbf{-3\sqrt{3}}$

(6) $\sqrt{3} + \sqrt{3} = \mathbf{2\sqrt{3}}$

(7) $\sqrt{8} - \sqrt{2} = \sqrt{2 \times 2 \times 2} - \sqrt{2} = 2\sqrt{2} - \sqrt{2} = \mathbf{\sqrt{2}}$

(8) $\sqrt{3} \times \sqrt{12} = \sqrt{3 \times 12} = \sqrt{3 \times 3 \times 2 \times 2} = \mathbf{6}$

(9) $\sqrt{8} \div \sqrt{2} = \sqrt{4} = \sqrt{2 \times 2} = \mathbf{2}$

## p.8 8 分数の計算

練習 1

(1) $\frac{2}{4} = \frac{\cancel{2}}{\cancel{2} \times 2} = \mathbf{\frac{1}{2}}$

(2) $\frac{3}{18} = \frac{\cancel{3}}{\cancel{3} \times 6} = \mathbf{\frac{1}{6}}$

(3) $\frac{18}{21} = \frac{\cancel{3} \times 6}{\cancel{3} \times 7} = \frac{6}{7}$

(4) $\frac{20}{16} = \frac{\cancel{4} \times 5}{\cancel{4} \times 4} = \frac{5}{4}$

## 練習 2

(1) $\frac{1}{2}$ と $\frac{1}{6}$ → $\frac{1}{2} \times \frac{3}{3} = \frac{3}{6}$ と $\frac{1}{6}$ $\frac{3}{6}$ と $\frac{1}{6}$

(2) $\frac{1}{2}$ と $\frac{1}{3}$ → $\frac{1}{2} \times \frac{3}{3} = \frac{3}{6}$ と $\frac{1}{3} \times \frac{2}{2} = \frac{2}{6}$ $\frac{3}{6}$ と $\frac{2}{6}$

(3) $\frac{3}{5}$ と $\frac{5}{2}$ → $\frac{3}{5} \times \frac{2}{2} = \frac{6}{10}$ と $\frac{5}{2} \times \frac{5}{5} = \frac{25}{10}$ $\frac{6}{10}$ と $\frac{25}{10}$

(4) $\frac{1}{2}$ と $\frac{2}{7}$ → $\frac{1}{2} \times \frac{7}{7} = \frac{7}{14}$ と $\frac{2}{7} \times \frac{2}{2} = \frac{4}{14}$ $\frac{7}{14}$ と $\frac{4}{14}$

## 練習 3

(1) $\frac{1}{2} + \frac{3}{2} = \frac{1+3}{2} = \frac{4}{2} = \frac{\cancel{2} \times 2}{\cancel{2}} = 2$

(2) $\frac{3}{4} + \frac{3}{4} = \frac{3+3}{4} = \frac{6}{4} = \frac{\cancel{2} \times 3}{\cancel{2} \times 2} = \frac{3}{2}$

(3) $\frac{4}{7} - \frac{2}{7} = \frac{4-2}{7} = \frac{2}{7}$

(4) $\frac{7}{8} - \frac{3}{8} = \frac{7-3}{8} = \frac{4}{8} = \frac{\cancel{4}}{\cancel{4} \times 2} = \frac{1}{2}$

## 練習 4

(1) $\frac{1}{3} + \frac{1}{4} = \frac{1}{3} \times \frac{4}{4} + \frac{1}{4} \times \frac{3}{3} = \frac{4}{12} + \frac{3}{12} = \frac{7}{12}$

(2) $\frac{3}{4} - \frac{3}{8} = \frac{3}{4} \times \frac{2}{2} - \frac{3}{8} = \frac{6}{8} - \frac{3}{8} = \frac{3}{8}$

(3) $\frac{3}{5} - \frac{1}{6} = \frac{3}{5} \times \frac{6}{6} - \frac{1}{6} \times \frac{5}{5} = \frac{18}{30} - \frac{5}{30} = \frac{13}{30}$

## 練習 5

(1) $\frac{1}{3} \times \frac{1}{4} = \frac{1 \times 1}{3 \times 4} = \frac{1}{12}$

(2) $\frac{1}{2} \times \frac{2}{3} = \frac{1 \times \cancel{2}}{\cancel{2} \times 3} = \frac{1}{3}$

(3) $\frac{5}{6} \times \frac{3}{5} = \frac{5 \times 3}{6 \times 5} = \frac{\cancel{5} \times \cancel{3}}{2 \times \cancel{3} \times \cancel{5}} = \frac{1}{2}$

練習 6

(1) $\frac{3}{4} \div \frac{1}{2} = \frac{3}{4} \times \frac{2}{1} = \frac{3 \times 2}{4 \times 1} = \frac{3 \times \cancel{2}}{\cancel{2} \times 2 \times 1} = \frac{3}{2}$

(2) $\frac{1}{6} \div \frac{5}{3} = \frac{1}{6} \times \frac{3}{5} = \frac{1 \times 3}{6 \times 5} = \frac{1 \times \cancel{3}}{2 \times \cancel{3} \times 5} = \frac{1}{10}$

(3) $\frac{1}{2} \div \frac{1}{2} = \frac{1}{2} \times \frac{2}{1} = \frac{1 \times \cancel{2}}{\cancel{2} \times 1} = 1$

## p.10 9 面積

練習

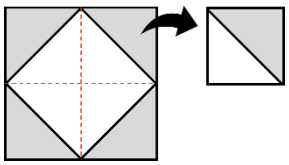
(1) $4 \times 4 = 16$ **16 cm²**

(2) $6 \times 4 \div 2 = 12$ **12 cm²**

(3) $(5 + 8) \times 4 \div 2 = 13 \times 4 \div 2 = 26$ **26 cm²**

(4) $4 \times 4 \times \pi = 16\pi$ **16π cm²**

チャレンジ



取り出した小さな正方形において，グレー部分の面積は小さな正方形の半分。大きな正方形でも，グレー部分の面積は大きな正方形の半分。

$2\sqrt{2} \times 2\sqrt{2} \div 2 = 4$ **4 cm²**

## p.11 10 体積

練習

(1) $4 \times 4 \times 4 = 64$ **64 cm³**

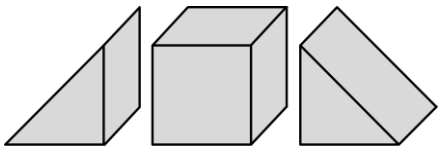
(2) $4 \times 4 \div 2 \times 4 = 32$ **32 cm³**

(3) 底面の円の半径は 2 cm

$2 \times 2 \times \pi \times 6 = 24\pi$ **24π cm³**

(4) $4 \times 4 \times 6 \div 3 = 32$ **32 cm³**

チャレンジ



大きな立体を三つに分けて考える。

中央の立方体の体積は

$4 \times 4 \times 4 = 64$ 64 cm³

左右の三角柱の体積は，それぞれ

$4 \times 4 \div 2 \times 4 = 32$　　$32\ \mathrm{cm}^3$

よって，全体の体積は

$64 + 32 + 32 = 128$　　**$128\ \mathrm{cm}^3$**

## p.12　11　三平方の定理

### 練習

(1) $6^2 + 3^2 = x^2$

$36 + 9 = x^2$

$x^2 = 45$

$x = \pm\sqrt{45} = \pm\sqrt{3 \times 3 \times 5} = \pm 3\sqrt{5}$

辺の長さは正の値なので　**$3\sqrt{5}$ cm**

(2) $3^2 + 4^2 = x^2$

$9 + 16 = x^2$

$x^2 = 25$

$x = \pm\sqrt{25} = \sqrt{5 \times 5} = \pm 5$

辺の長さは正の値なので　**5 cm**

(3) $3^2 + x^2 = 6^2$

$9 + x^2 = 36$

$x^2 = 36 - 9$

$x^2 = 27$

$x = \pm\sqrt{27}\ \sqrt{3 \times 3 \times 3} = 3\sqrt{3}$

辺の長さは正の値なので　**$3\sqrt{3}$ cm**

(4) $3^2 + 3^2 = x^2$

$9 + 9 = x^2$

$x^2 = 18$

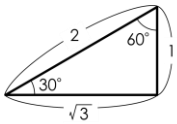
$x = \pm\sqrt{18} = \pm\sqrt{2 \times 3 \times 3} = \pm 3\sqrt{2}$

辺の長さは正の値なので　**$3\sqrt{2}$ cm**

## p.13　12　三角比

### 練習

(1)



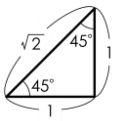

$2 : 1 = x : 4$

$2 \times 4 = 1 \times x$

$x = 8$

**8 cm**

(2)




$\sqrt{2} : 1 = 3\sqrt{2} : x$

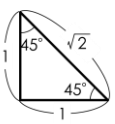
$\sqrt{2} \times x = 1 \times 3\sqrt{2}$

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

$x = 3$

**3 cm**

### チャレンジ




$1 : 1 = 6 : x$

$1 \times x = 1 \times 6$

$x = 6$

ネコの目の高さ 1 m を加えて，　$6 + 1 = 7$　　**7 m**

## p.16 13 割合

### 練習 1

⑴ $0.45 \times 100 = \mathbf{45\ \%}$　　⑵ $1.304 \times 100 = \mathbf{130.4\ \%}$

⑶ $34 \div 100 = \mathbf{0.34}$　　⑷ $185 \div 100 = \mathbf{1.85}$

### 練習 2

もとにする量：全体の人数　**40**　　比べる量：B 型の人数　**8**

B 型の割合は，

$$\text{割合} = \frac{\text{比べる量}}{\text{もとにする量}} = \frac{8}{40} = \frac{\mathbf{1}}{\mathbf{5}} = \mathbf{0.2}$$

$$\text{割合[\%]} = \frac{\text{比べる量}}{\text{もとにする量}} \times 100 = 0.2 \times 100 = \mathbf{20\ \%}$$

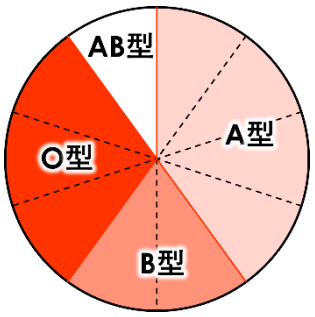
同様にして，

$$\text{A 型の割合[\%]} = \frac{16}{40} \times 100 = 0.4 \times 100 = 40\ \%$$

$$\text{O 型の割合[\%]} = \frac{12}{40} \times 100 = 0.3 \times 100 = 30\ \%$$

$$\text{AB 型の割合[\%]} = \frac{4}{40} \times 100 = 0.4 \times 100 = 10\ \%$$

よって，円グラフは右のようになる。




## p.17 14 密度

### 練習 1

$$\text{A の密度} = \frac{\text{質量}}{\text{体積}} = \frac{270\ \text{g}}{100\ \text{cm}^3} = \mathbf{2.7\ g/cm^3}$$

$$\text{B の密度} = \frac{\text{質量}}{\text{体積}} = \frac{790\ \text{g}}{100\ \text{cm}^3} = \mathbf{7.9\ g/cm^3}$$

$$\text{C の密度} = \frac{\text{質量}}{\text{体積}} = \frac{1930\ \text{g}}{100\ \text{cm}^3} = \mathbf{19.3\ g/cm^3}$$

### 練習 2

⑴ グラフから，それぞれの質量と体積を読み取る。

$$\text{A の密度} = \frac{\text{質量}}{\text{体積}} = \frac{20\ \text{g}}{5\ \text{cm}^3} = \mathbf{4\ g/cm^3}$$

$$\text{B の密度} = \frac{\text{質量}}{\text{体積}} = \frac{10\ \text{g}}{5\ \text{cm}^3} = \mathbf{2\ g/cm^3}$$

C の密度 $= \dfrac{\text{質量}}{\text{体積}} = \dfrac{20\ \text{g}}{10\ \text{cm}^3} =$ **2 g/cm³**　　D の密度 $= \dfrac{\text{質量}}{\text{体積}} = \dfrac{15\ \text{g}}{15\ \text{cm}^3} =$ **1 g/cm³**

E の密度 $= \dfrac{\text{質量}}{\text{体積}} = \dfrac{10\ \text{g}}{20\ \text{cm}^3} =$ **0.5 g/cm³**

(2) (1)より　**A**　　(3) (1)より　**B と C**　　(4) **水**

(5) 水よりも密度が小さい物質は水に浮く。よって　**E**

## p.18　15　単位

練習

(1) 2 km = **2000** m = $2 \times 10^3$ m　　(2) 80 mm = **0.08** m = $8 \times 10^{-2}$ m

(3) 8 m² = **80000** cm² = $8 \times 10^4$ cm²　　(4) 1000 cm³ = **0.001** m³ = $1 \times 10^{-3}$ m³

(5) 3 kg = **3000** g = $3 \times 10^3$ g　　(6) 10 g = **10000** mg = $1 \times 10^4$ mg

チャレンジ

ここでは，密度の単位[g/cm³]を考慮して，長さの単位を[cm]に揃えて計算する。

50 mm = 5 cm，1 m = 100 cm

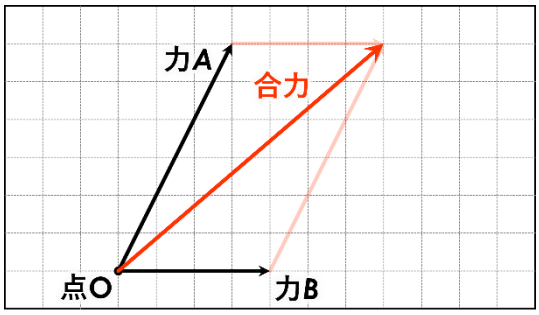
3 cm × 5 cm × 100 cm = 1500 cm³

質量 = 密度 × 体積 = 3 g/cm³ × 1500 cm³ = 4500 g = **4.5 kg**

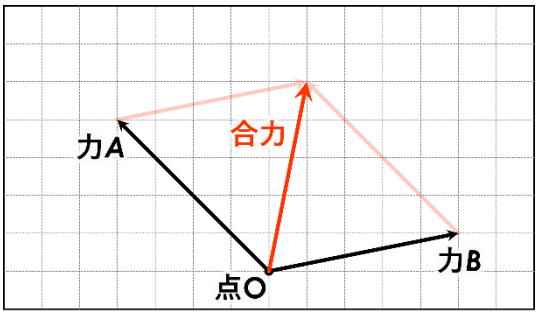
## p.19　16　力

練習 1

(1) **46 N**

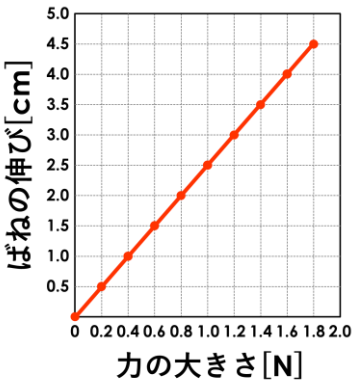



(2) **26 N**



練習 2

(1)




(2) **比例**

(3) 10 個のおもりによる力の大きさは 2.0 N

(1)のグラフを 2.0 N まで広げると，そのときの縦軸の大きさは，**5.0 cm**

練習 3

(1) 20 N/m² = **20 Pa**

(2) 450 N/m² = **450 Pa**

(3) 8 Pa = **8 N/m²**

(4) 200 Pa = **200 N/m²**

練習 4

(1) (a) 圧力[N/m²] = $\dfrac{\text{面を垂直に押す力[N]}}{\text{力がはたらく面積[m²]}} = \dfrac{20\ \text{N}}{1\ \text{m}^2} = 20\ \text{N/m}^2 =$ **20 Pa**

(b) 圧力[N/m²] = $\dfrac{\text{面を垂直に押す力[N]}}{\text{力がはたらく面積[m²]}} = \dfrac{20\ \text{N}}{4\ \text{m}^2} = 5\ \text{N/m}^2 =$ **5 Pa**

(c) 圧力[N/m²] = $\dfrac{\text{面を垂直に押す力[N]}}{\text{力がはたらく面積[m²]}} = \dfrac{20\ \text{N}}{8\ \text{m}^2} = 2.5\ \text{N/m}^2 =$ **2.5 Pa**

(2) 同じ大きさの力が加わるとき，底面積が小さいほど，圧力は **大きい** 。

## p.24 17 時間・距離・速さ

練習 1

(1) 1.5 時間 = 1.5 × 60 = **90 分**

(2) 300 分 = 300 ÷ 60 = **5 時間**

(3) 180 秒 = 180 ÷ 60 = **3 分**

(4) 14400 秒 = 14400 ÷ 3600 = **4 時間**

練習 2

(1) 1 km = 1000 m，1 h = 3600 s

$$18\ \text{km/h} = 18 \times \frac{1000\ \text{m}}{3600\ \text{s}} = \textbf{5 m/s}$$

⑵ 1 m = 0.001 km, 1 s = $\frac{1}{3600}$ h

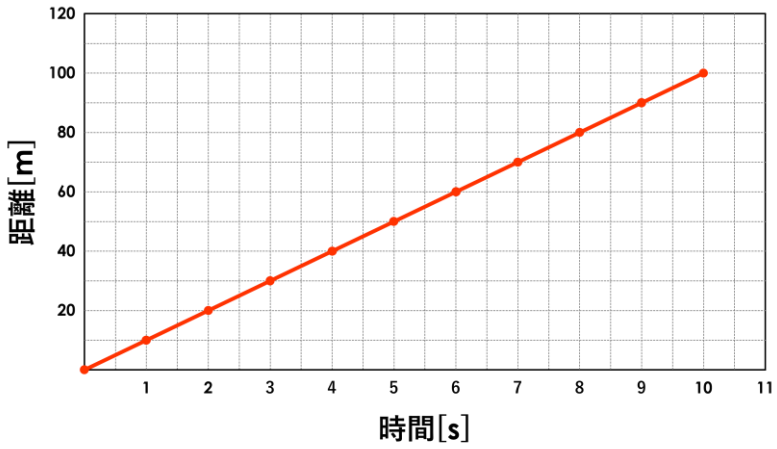
$$10\ \text{m/s} = 10 \times \frac{0.001\ \text{km}}{\frac{1}{3600}\ \text{h}} = \textbf{36 km/h}$$

練習３

⑴ 表から 1 s(秒)間に 10 m 進むことがわかるので,

10 m ÷ 1 s = **10 m/s**

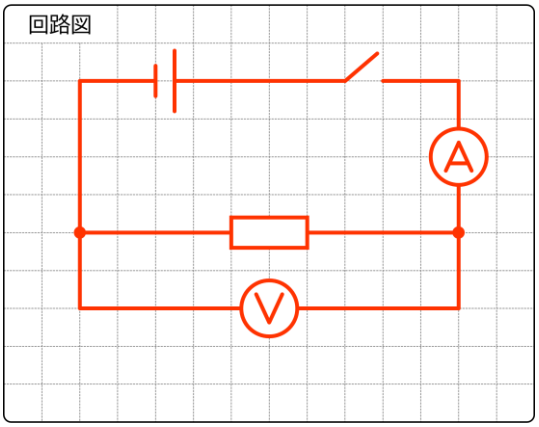
⑵




⑶ **比例**

## p.26 18 電気

練習１



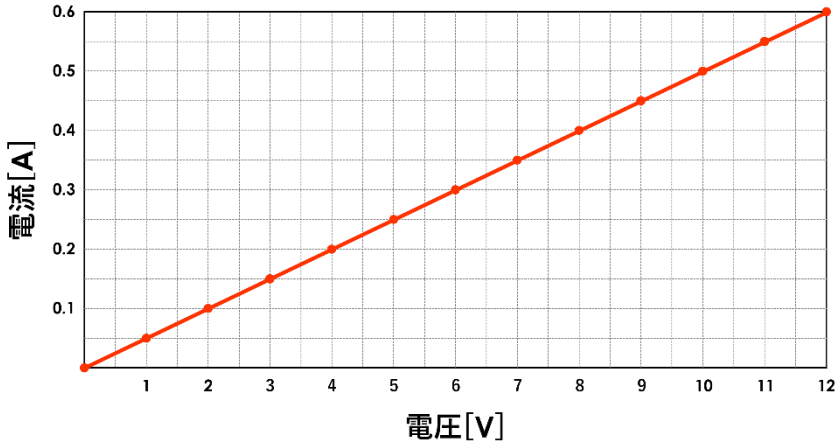
練習 2

⑴ 表より，電圧 1 V のとき，0.05 A の電流が流れることがわかるので，

オームの法則　電圧[V] = 抵抗[Ω] × 電流[A]　より，

$$\text{抵抗[Ω]} = \frac{\text{電圧[V]}}{\text{電流[A]}} = \frac{1\ \text{V}}{0.05\ \text{A}} = \mathbf{20\ \Omega}$$

⑵




⑶ **比例**

## p.30　19　電卓を使ってみよう

練習 1

⑴ $5.29 + 9.36 = \mathbf{14.65}$　　⑵ $3.71 - 2.19 = \mathbf{1.52}$

⑶ $4.47 \times 4.16 = \mathbf{26.19}$　　⑷ $9.34 \div 2.61 = \mathbf{3.58}$

チャレンジ

⑴ $x = 1.34$ のとき　　$4.5x + 5.43 = 4.5 \times 1.34 + 5.43 = \mathbf{11.46}$

⑵ $a = 3.12$，$b = 4.56$ のとき　　$3ab = 3 \times 3.12 \times 4.56 = \mathbf{42.68}$

練習 2

⑴ $\dfrac{12.68}{3.41} = \mathbf{3.72}$　　⑵ $\dfrac{26.71}{5.83} + 6.95 = \mathbf{11.53}$

練習 3

⑴ $(-8.17) \times 1.38 + (-4.54) \times 5.91 = \mathbf{-38.11}$

⑵ $7.42 \times \{(9.64 - 2.19) \div 10.52\} = \mathbf{5.25}$

(3) $\dfrac{13.85}{9.38-2.17}$ = **1.92**

(4) $4.64+\dfrac{48.93}{3.19+4.08\times 3.14}$ = **7.70**

チャレンジ

(1) $x=3.14$ のとき

$0.23\times\{6x-(8.37+2.93)\}=0.23\times\{6\times 3.14-(8.37+2.93)\}$ = **1.73**

(2) $a=6.73,\ \ b=3.77$ のとき

$\dfrac{5.44}{a+b}=\dfrac{5.44}{6.73+3.77}$ = **0.52**

## p.32 20 電卓演習

練習 1

(1) $\sqrt{12}$ = **3.46**

(2) $\sqrt{23.87}$ = **4.89**

(3) $\sqrt{7.59}+4.91$ = **7.66**

(4) $\sqrt{86.22}-3.35$ = **5.94**

(5) $\sqrt{6.55+2.07}$ = **2.94**

(6) $\sqrt{12.46}+\sqrt{14.27}$ = **7.31**

(7) $\sqrt{1.43\times 1.85}$ = **1.63**

(8) $\sqrt{19.34}\times\sqrt{28.38}$ = **23.43**

(9) $\sqrt{56.73}\div\sqrt{12.52}$ = **2.13**

(10) $\dfrac{5.16}{\sqrt{7.86}}$ = **1.84**

チャレンジ

(1) $x=\sqrt{6}$ のとき　$4x-3.71=4\times\sqrt{6}-3.71$ = **6.09**

(2) $a=\sqrt{3}$ のとき　$-\sqrt{5}\ a+6.98=-\sqrt{5}\times\sqrt{3}+6.98$ = **3.11**

(3) $a=\sqrt{5},\ \ ,b=\sqrt{7}$ のとき　$a+2ab-b=\sqrt{5}+2\times\sqrt{5}\times\sqrt{7}-\sqrt{7}$ = **11.42**

練習 2

(1) $6.69^2$ = **44.76**

(2) $8.33^2+6.21^2$ = **107.95**

(3) $\sqrt{7.16^2+5.42^2}$ = **8.98**

(4) $\sqrt{19.15}+3.84^2$ = **19.12**

(5) $\dfrac{5.59^2}{\sqrt{4.83}}$ = **14.22**

(6) $\sqrt{10.55-(4.94-3.15)^2}$ = **2.71**

(7) $\sqrt{3.98^2-4\times 0.35}$ = **3.80**

(8) $\dfrac{59.37}{\sqrt{9.63^2+10.06^2}}$ = **4.26**

(9) $\dfrac{66.82}{\sqrt{10.42}+12.34^2}$ = **0.43**

(10) $\dfrac{\sqrt{9.53^2-4\times 1.35\times 2.29}}{2\times 1.35}$ = **3.28**

チャレンジ

三平方の定理より，

$3.6^2 + 10.8^2 = x^2$

$x^2 = 129.6$

$x = \pm\sqrt{129.6} = \pm 11.38$

辺の長さは正の値なので　**11.38 cm**

## p.35　21　電卓演習（発展）

練習

(1)

| $x$ | $y$ | $z$ | $x+y+z$ |
|---|---|---|---|
| 85 | 169 | 191 | **445** |
| 107 | 29 | 114 | **250** |
| 155 | 171 | 163 | **489** |
| | | | **1184** |

(2)

| $x$ | $y$ | $z$ | $xyz$ |
|---|---|---|---|
| 2.2 | 5.2 | 1.5 | **17.16** |
| 5.1 | 4.3 | 9.8 | **214.91** |
| 7.7 | 1.9 | 6.7 | **98.02** |
| | | | **330.09** |

(3)

| 商品 | 販売数 | 構成比(割合) |
|---|---|---|
| りんご | 1096 | **48.5** |
| みかん | 837 | **37.0** |
| バナナ | 328 | **14.5** |
| | **2261** | 合計 100.0 |

⑷

| 通学手段 | 人数 | 構成比(割合) |
|---|---|---|
| 徒歩 | 165 | **27.5** |
| 自転車 | 346 | **57.7** |
| バス | 89 | **14.8** |
| | **600** | 合計 100.0 |

⑸ $y = 4.32x$

| $x$ | 1.87 | 4.39 | 7.71 | 10.66 |
|---|---|---|---|---|
| $y$ | **8.08** | **18.96** | **33.31** | **46.05** |