# 科学技術英語2C

第3回

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100 a [one] hundred (one, a を忘れないこと)

10,000 ten thousand

628,000 six hundred and twenty eight thousand

12,000,000 twelve million

2,000,000,000 two billion

2,000,000,000,000 two trillion

3.55 three point five five

0.32 zero point three two

$0.333\cdots$ zero point three recurring

$0.35848484\cdots$ zero point three five eighty-four recurring

20 – 30 twenty to thirty

$4 \times 10^5$ four times ten to the fifth/
four times ten to the fifth power/
four times ten to the power of five

$6.5 \times 10^{-3}$ six point five times ten to the minus three

$\infty$ infinity

Cf. bla bla bla

# 分数 (fractions)

$a/b$ $a$ over $b$

$ab/cd$ $a$ times $b$ over $c$ times $d$

$1/n$ one $n$th/ one over $n$

1/2 one half/a half/one-half

1/3 one third/a third/one-third

1/4 one quarter/a quarter/one-quarter

3/4 three quarters/three-quarters

1/5 one fifth/a fifth/one-fifth

2/3 two-thirds

4/3 four over three/four thirds/four-thirds

1/10 one tenth/a tenth/one-tenth

3/7 three sevenths/three-sevenths

112/303 a [one] hundred (and) twelve over three hundred (and three

$5\frac{2}{5}$ five (and) two-fifths

$\frac{21}{311}$ twenty one over three hundred (and) eleven

# 英語の学習時間

- 英語に接する時間:
  - nativeの4歳まで 5x365x4=7300 hours
  - 日本人: 中高6年間　6x40weeksx6=1440 hours
- 脳の発達抜きにしてもこれは足りない
  - 文法で補う
  - 大学生でも勉強する（2000時間はlistening）
  - NHKラジオ講座（internetバージョンもあり）
  - AFN 810kHz, Science Friday, 4:00am-6:00am (Sat.)など。podcastでも手にはいる。

# 英作文の基本

- 大文字で始める。
- Periodの後はスペース2個，commaの後はスペース1個。
- Periodで終える。
- 式にもpunctuationを忘れずに。

The model Hamiltonian used in this study describes noninteracting electrons on a simple cubic lattice. With nearest neighbor interactions only, we have

$$\begin{aligned} \langle \vec{r}|H|\vec{r}\rangle &= V(\vec{r}), \\ \langle \vec{r}|H|\vec{r}-\hat{x}\rangle &= 1, \\ \langle \vec{r}|H|\vec{r}-\hat{y}\rangle &= 1, \\ \langle \vec{r}|H|\vec{r}-\hat{z}\rangle &= \exp(-i2\pi\phi x), \end{aligned} \tag{1}$$

where $\hat{x}$, $\hat{y}$, and $\hat{z}$ are the basis vectors of the lattice.

In practice, we have truncated this series at $n = 3$. The relation between (3) and (4) can be made apparent by writing

$$f_+ = \Lambda_c + \sum_{n=1} a_n (L/\xi)^{n/\nu}, \qquad a_n = A_n (\xi^+)^{n/\nu}, \tag{5}$$

$$\begin{aligned} f_- &= \Lambda_c + \sum_{n=1} b_n (L/\xi)^{n/\nu}, \\ b_n &= (-1)^n A_n (\xi^-)^{n/\nu}. \end{aligned} \tag{6}$$

# conservation laws (保存則)

- 4 basic conservations laws in physics:
  - Energy (エネルギー)
  - momentum （運動量）
  - angular momentum （角運動量）
  - charge （電荷）

# Energy

- work = force x distance, $W=F\,d$
- power = work / (over, by) time interval
- mechanical energy = kinetic energy + potential energy
- quiz: Can you read this equation?

$$E = \frac{m(v_x^{\,2} + v_y^{\,2} + v_z^{\,2})}{2} + V(x,y,z)$$

# definitions

- potential energy: The energy that something possesses because of its position.
- kinetic energy: Energy of motion, quantified by the relationship, one half times mass times velocity squared.

# law of energy conservation

Energy cannot be created or destroyed; it may be transformed from one form into another, but the total amount of energy never changes.

- エネルギーは作ったり消したり出来ない。ある形から別の形へ変換は出来るが，全エネルギーは不変である。
  - c.f. power station [plant], nuclear power station, wind-power generation, water-power [hydroelectric power] generation, thermal power generation

# momentum

- momentum=(is equal to, equals)
  mass x(times) velocity.

impulse=force x time interval.

impulse= change in momentum

$$\Delta(mv) = Ft$$

# conservation law of momentum

- In the absence of an external force, the momentum of a system remains unchanged.
- 外力が働いていない場合，系の運動量は変化しない。

学籍番号　　氏名

# quiz

1. Comic-strip hero Superman meets an asteroid in outer space and hurls it at 800[m/s], as fast as a bullet. The asteroid is a thousand times more massive than Superman. What would be his recoil velocity?
2. Elastic scattering conserves kinetic energy, while inelastic scattering does not. Where did it go?