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走进数理思维

麦格劳-希尔教育集团 ● 主编
刘庆双 刘永佳 丁丽蓉 ● 译

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麦格希 中英双语阅读文库



走进数理思维

Timed Readings Plus in Mathematics 3

第3辑

美国麦格劳-希尔教育出版公司 © 主编

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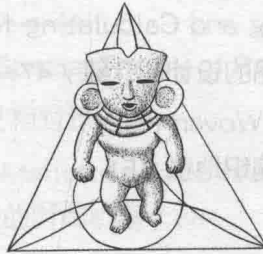
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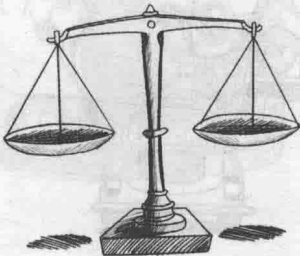


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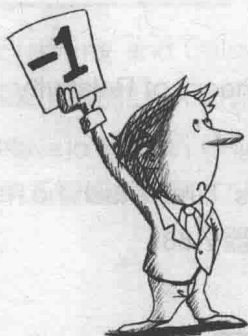
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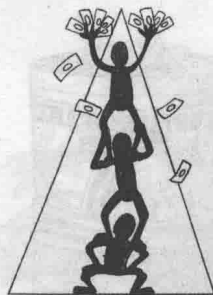
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1

Putting Music on Compact Discs

Since they were first sold in the 1980s, compact discs (CDs) have been a popular means of listening to *recorded* music. The older, long-playing records and *audiotapes* are easily *scratched* and damaged. CDs, however, given reasonable care, almost never wear out.



使用激光唱片播放音乐

自20世纪80年代首次销售以来，激光唱片一直被作为收听录制音乐最流行的工具。古老的密纹唱片和录音带都很容易被刮花和损坏。然而，因为有合理的保护，激光唱片几乎不会被用坏。不仅仅是因

record *v.* 录制（声音、广播等）

scratch *v.* 划伤；刻

audiotape *n.* 录音磁带

Not only are they made from *durable* materials, but they are “played” by a *beam* of light. A *needle* moving through the grooves of a *vinyl* record can scratch and damage the record’s surface, but the beam of light does not leave a mark on a CD. CD technology is also used to make video recordings, such as digital video discs (DVDs).

In the making of a CD, a microphone captures sound waves in a process called signal sampling. The amplitude, or size, of each sound wave or signal is measured many times per second. Up to 65,000 samples can be taken each second, but most CDs use 44,100 samples per second. The more samples taken, the more accurate or true the sound produced by the CD. Each sample is

为它是由耐用的材料制成，还因为它是用光束播放的。留声机里的指针在黑胶唱片的凹槽间移动时会刮花和损伤唱片的表面，但是光束不会在激光唱片表面留下任何痕迹。激光唱片技术还被应用于视频记录，例如数字视频光盘。

制作激光唱片的过程中，使用话筒来捕获声波的过程被称作是信号采集。每一秒声波或者信号的振幅或大小都被测量很多次。最多一秒可以采集65 000个样本，而多数激光唱片每秒使用44 100个样本。使用越多的样本，制作出的激光唱片声音就越准确越真实。每一个样本都采用二进制的

durable *adj.* 持久的；耐用的；可存放的
needle *n.* 指针

beam *n.* 光线；光柱
vinyl *n.* 留声机唱片；黑胶唱片

saved, or “digitized,” as *binary* code. Binary code has only two symbols, or digits, a “0” and a “1”. Each sample of sound, therefore, is a string of 16 “*bits*”, or binary digits of binary code.

Most recordings are *stereo*; they separate sound into two *channels*. Each channel produces its own string of code, and both strings are cut into the CD. How many bits of code are in one second of music? The number of bits equals the number of signal samples (44,100) times the number of seconds (1) times the number of channels (2) times the number of bits per sample (16). There are 1,411,200 bits of code for every second of music.

代码进行储存或数字化。二进制只有两种符号：“0”和“1”。每个声音样本都是一串16位的二进制数字，或者是表示二进制代码的二进制数字。

多数的唱片都是立体声的，它们会把声音分为两个信道。每个信道都会有一串自己的代码，所有的代码串都包含在激光唱片中。那么一个一秒音乐中会包含多少个二进制代码？二进制数字的数量等于信号样本的数量（44 100）乘以音乐的长度（1）乘以信道的数目（2）再乘以一个样本中含有的二进制数字的数目（16），最后得出一段一秒音乐中包含有1 411 200个二进制代码。

binary *adj.* 二元的；二进制的
stereo *adj.* 立体声的；有立体感的

bit *n.* 比特；二进制符号
channel *n.* （录音带等的）信道

This digitized information is *transferred* to the CDs. On the disc, the code is expressed through a *spiral* of *pits* and lands. The pits are tiny holes, and the lands are flat areas that reflect the light of the *laser* beam. “Dark” pits represent the zeros in binary code, and “bright” lands represent the ones. The laser beam reads the pits and lands, and the information is translated back into sound.

Each CD is duplicated, or copied, from a master disc. The machines that produce the copies can make one CD every five seconds, or about 720 an hour. More than a million CDs may be duplicated when a new recording by a popular group or artist is to be released.

这些数字化信息被转入激光唱片中。在唱片中，代码会被表示成螺旋状的凹面和平面。凹面就是一些很小的洞，平面就是些用来反射激光光束的平整表面。“黑暗的”凹面在二进制代码中表示0，而“明亮的”平面则表示1。激光光束读取凹面和平面时，这些信息就会被转化成声音。

每一片激光唱片都是从一个母片复制而来的。生产副本的机器每5秒就可以生产出一片激光唱片，或者一个小时生产720片。当一个知名的组合或者艺人发行一张新的唱片时，可能有100多万张激光唱片被复制出来。

transfer *v.* 转移；调动

pit *n.* 洞；坑

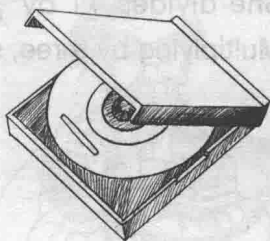
spiral *n.* 螺旋；螺旋形

laser *n.* 激光（器）

2

Storing Compact Discs

Lynette wants to store her *compilation* of favorite CDs in the top drawer of her *nightstand*. A CD case measures $5\frac{5}{8}$ inches by $4\frac{7}{8}$ inches and is $\frac{2}{8}$ inch thick. Lynette's top drawer is $15\frac{1}{4}$ inches long by 11 inches wide and is $6\frac{1}{4}$ inches deep. Lynette stores her CDs by standing the *cases* so that each CD's title can be easily read.



存放光盘

利奈特想要把她最喜欢的CD都整理到床头柜最上层的抽屉里去。一张CD盒的尺寸是5.625英寸×4.875英寸，0.375英寸厚。利奈特最上层的抽屉的长是15.25英寸，宽11英寸，深6.25英寸。她把所有的CD盒子都立起来放置，这样能很方便地看到CD名字。

compilation *n.* 收集；选择

case *n.* 盒；箱

nightstand *n.* 床头柜；床头小几

Lynette can store the CDs in rows in two directions—down the *length* of the drawer or across its *width*. First she figures out how many CDs will fit if they are down the length of the drawer. She divides 11 by $4\frac{7}{8}$ and finds that she can fit two CDs across, with their *titles* facing up. She then divides $15\frac{1}{4}$ by $\frac{9}{8}$ and calculates that she can fit 40 CDs in a row, so she can store 80 CDs in the two rows. Lynette then calculates how many CDs will fit in the other direction. She divides $15\frac{1}{4}$ by $4\frac{7}{8}$ and finds that she can fit three rows across. She divides 11 by $\frac{3}{8}$ and finds that 29 CDs will fit in each row. Multiplying by three, she finds she can fit 87 CDs in this direction.

利奈特可以把这些CD按两个方向摆放成排：顺着抽屉的长度或者是沿着宽度。于是她开始计算顺着抽屉的长度可以放多少CD：如果是把4.875英寸的CD盒沿着11英寸宽的抽屉摆两排，还要使CD的名字朝上，这样15.25英寸长的抽屉一行就可以放0.375英寸的CD40张，那么两排一共可以放80张CD。接着她又按另一种方向计算：如果把4.875英寸的CD盒顺着15.25英寸长的抽屉摆，可以放3排，11英寸宽的抽屉一行就可以放29张0.375英寸的CD。这样沿着抽屉的宽度摆放三排就可以放87张CD。

length *n.* 长；长度

title *n.* 名称；标题

width *n.* 宽度

3

Calories and Health

People need energy to grow, move, and do everything in life. They eat food to *gain* that energy, which is measured in *calories*. A calorie is a unit of energy. One calorie is the amount of energy, or heat, needed to raise the temperature of 1 gram of water 1 degree Celsius. The calories on food *labels* are really *kilocalories*. A



卡路里与健康

生活中，人们成长、运动以及做任何事情都需要能量。人们通过摄入食物来获取能量，而能量通常用卡路里来衡量，它是能量的单位。与1卡路里相当的能量或者热度可以让1克水升温1摄氏度。食物商标上的卡路里是以千卡计量的。1千卡等于1 000卡路里。一块糖果所含

gain *v.* 获得；增加
label *n.* 标签；标志

calorie *n.* 卡路里（热量单位）
kilocalorie *n.* 千卡；大卡

kilocalorie equals 1,000 calories. A candy bar containing 200 calories really contains 200 kilocalories, or 200,000 calories.

Food calories (cal) come from the three main parts of all foods—fat, *protein*, and *carbohydrates* (carbs). A *gram* of fat has 9 calories, a gram of protein has 4 calories, and a gram of carbs has 4 calories. The *nutrition* label on the side of a box of cereal might say that a serving has 4 grams of fat, 2 grams of protein, and 22 grams of carbs for a total of 132 calories. Of the total calories, 36 come from fat ($4\text{g} \times 9\text{ cal} = 36\text{ cal}$), 8 from protein ($2\text{g} \times 4\text{ cal} = 8\text{ cal}$), and 88 from carbs ($22\text{g} \times 4\text{ cal} = 88\text{ cal}$).



的200卡路里实际上是200千卡，也就是200 000卡。

食物的卡路里主要来自三方面：脂肪、蛋白质和碳水化合物。1克脂肪9卡，1克蛋白质4卡，1克碳水化合物4卡。1箱谷物侧面的营养成分标签会显示：1份食物含有4克脂肪，2克蛋白质和22克碳水化合物，一共132卡。其中有36克来自脂肪（ $4\text{g} \times 9\text{cal} = 36\text{cal}$ ），8克来自蛋白质（ $2\text{g} \times 4\text{cal} = 8\text{cal}$ ），还有88克来自碳水化合物（ $22\text{g} \times 4\text{cal} = 88\text{cal}$ ）。

protein *n.* 蛋白质

gram *n.* 克

carbohydrate *n.* 碳水化合物

nutrition *n.* 营养；营养物

Because fat contains more than twice the calories of protein and of carbs, *fatty* foods contain the most calories. For instance, butter, some vegetable oils, and fatty meats contain lots of fat and therefore store lots of calories. A large double-patty cheeseburger is a fatty food containing about 700 calories. Of the total calories, 393.3 come from fat ($43.7\text{g} \times 9\text{ cal}$), 158.8 come from carbs ($39.7\text{g} \times 4\text{ cal}$), and 152 come from protein ($38.0\text{g} \times 4\text{ cal}$).

Everyone needs to eat about 2,000 calories each day to stay at the same weight. The number varies based on height, weight, gender, age, and activity level. The Food and Drug Administration (FDA) *recommends* 1,600 calories for women and 2,200 calories for men who don't get much exercise. The FDA recommends 2,200

由于脂肪所含的卡路里是蛋白质和碳水化合物两倍还多，多脂的食物包含最多的卡路里。例如，黄油、植物油和多脂的肉类都含有很多脂肪，当然也储存了很多的卡路里。一大块双层的芝士汉堡就是多脂的食物，含有700卡。其中393.3卡来自脂肪($43.7\text{g} \times 9\text{cal}$)，158.8卡来自碳水化合物($39.7\text{g} \times 4\text{cal}$)，152卡来自蛋白质($38.0\text{g} \times 4\text{cal}$)。

每人每天都需要摄入大概2 000卡以保持相同的体重。这个具体的数字会根据身高、体重、性别、年龄和活动量的不同而改变。食品及药物管理局建议不做过量的运动时，女性摄入1 600卡，男性摄入2 200卡。而对

fatty *n.* 含脂肪多的；高脂的

recommend *v.* 推荐；建议

calories for *active* women, such as dancers. The *guideline* for active men, such as football players, is 2,800 calories.

The guidelines should be *adjusted* until the right balance is found for each person. People keep a healthy weight by balancing the calories *consumed* with the calories used each day. People who eat fewer calories than they use can become too thin. People who eat more calories than they use can become obese. Small changes in diet can help people get just the right amount of energy they need each day.

于做运动的女性，如舞蹈演员，食品及药物管理局建议她们摄入的能量为2 200卡。对于运动的男性，例如足球运动员，标准则需要改为2 800卡。

标准需要作出适当的调整直到每个人达到平衡。人们通过平衡每天消耗和摄入的卡路里来保持健康的体重。当摄入的卡路里少于消耗的，人就会变瘦；而摄入的卡路里多于消耗的，人就会变胖。在饮食中一些小的改变能够帮助人们获取每天所需的适量的能量。

active *adj.* 活动的；活跃的

adjust *v.* 调整；调节

guideline *n.* 准则；标准

consume *v.* 消耗；耗费