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The Man's Book

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Extract

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HEALTH

EVERYMAN

Here is a statistical portrait of the modern-day John Bull, the typical male today. Unless otherwise indicated, he is aged 16 or over.

PHYSICAL ATTRIBUTES

Height	5 ft 9.5 in	Body mass index[1]	25.3
Weight	174 lb	Left-handed	11%
Chest	42 in	Cholesterol[2]	6.2 mmol/l
Waist	37 in	Life expectancy at birth	77 yr
Hips	40.5 in	Healthy life expectancy	67 yr
Shoe size	9	Lose hair	66%
Underweight	4%	Circumcised[3]	6%
Overweight (not obese)	47%	Have a lower left testicle[4]	62%
Obese	21%	Women per 1000 men	1048

HABITS AND BELIEFS

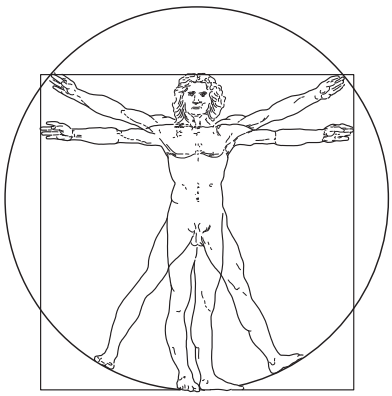
Smoke cigarettes	26%	Number of shirts (with buttons)	16
Hand-roll their own	8%	Number of neckties	14
Smoke cigars[5]	5%	Pass their driving test	46%
Smoke a pipe	2%	Hold a car-driving licence	82%
Age at first marriage	31	Median hourly pay	£11.04
Age at any marriage	35	Wear Y-fronts	44%
Cost of engagement ring	£1,289	Have a religion	83%
Exercise per week (hr:min)[6]	1:47	Admit to racial prejudice	39%
Reading per week[6]	2:03	Weekly ethanol intake[7]	181 ml
TV, video and radio[6]	15:54	Work over 40 hours a week[8]	65%
Married, cohabiting	53%	Wear a wedding ring (married)	46%
Never married, not cohabiting	27%	Have a 1st class degree	10%

(1) Body mass index (BMI) is weight in kilograms divided by height in metres squared; 20–25 is normal. **(2)** 45–64-year-olds. Under 5.2 is desirable, 5.2–6.2 is borderline high risk; mmol/l = millimoles per litre. **(3)** 16–44-year-olds. See p. 10. **(4)** 27% have a lower right testicle; the rest are indistinguishable. See p. 11. **(5)** At least one cigar a month. **(6)** Full-time workers. **(7)** Recommended = 210 ml or 7.4 pints of beer. See p. 19. **(8)** Amongst fathers.

PROPORTION OF MAN

Leonardo da Vinci's well-known Vitruvian Man is based on the ancient ideal proportions of man written down by Vitruvius. According to the Roman architect and the text accompanying da Vinci's drawing, the proportions of ideal man satisfy the following criteria:

1 height
= 1 arms out
= 2 halves
= 4 widths
= 4 nipples up
= 5 forearms
= 7 feet
= 8 heads

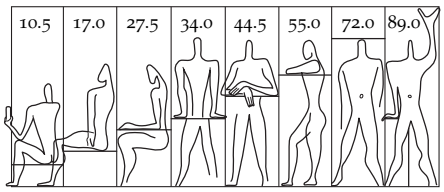


= 8 upper arms
= 10 hands
= 10 faces
= 24 palms
= 30 ears
= 30 foreheads
= 30 mouths
= 96 fingers

where *half* = beginning of genitals to top of head; *width* = width at shoulders; *nipples up* = nipples to top of head; *forearm* = elbow to tip of hand; *head* = bottom of chin to top of head; *upper arm* = elbow to armpit; *hand* = length of hand; *face* = bottom of chin to hairline; *palm* = width of palm; *ear* = length of ear; *forehead* = eyebrows to hairline; *mouth* = bottom of chin to nose; *finger* = width of finger.

The Swiss architect and designer Le Corbusier (Charles-Edouard Jeanneret) developed the Modulor, 'a measure based on mathematics and the human scale: it is constituted of a double series of numbers, the red series and the blue'. The blue series is twice the red, and any two consecutive lengths in the same series differ by a factor of the Golden ratio (see opposite), making the series infinitely extendable.

	4	3	2	1	0	-1	-2	-3	-4	-5
Red series (in)	188	116	72.0	44.5	27.5	17.0	10.5	6.5	4.0	2.5
Blue series (in)	377	233	144	89.0	55.0	34.0	21.0	13.0	8.0	5.0



STAGES OF MAN

Man's life is sometimes broken into stages by analogy with the 12 months of the year. A medieval example, in which each month symbolizes six years, is given in the upper right-hand pages of the Almanack (pp. 73–100). If the periods are to correlate with the physical and mental stages of man, the early periods must be shorter than the later ones. One purely abstract method breaks life into periods according to the Fibonacci numbers, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ..., where $1+2=3$, $2+3=5$, $3+5=8$, and so on. Each period corresponds to a different stage in man's life. (The stages of a woman's life, by contrast, are given by the related sequence of Lucas numbers, 1, 3, 4, 7, 11, 18, 29, 47, 76, ...) It has been suggested that one's sense of time speeds up with age such that each period seems to be of similar duration.

I	0–1	infancy	VI	8–13	adolescence
II	1–2		VII	13–21	youth
III	2–3		VIII	21–34	second youth
IV	3–5		IX	34–55	maturity
V	5–8	boyhood	X	55–89	old age

☢ *For geeks* The Fibonacci numbers above are defined by

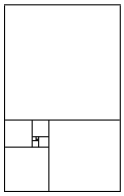
$$F_n = F_{n-1} + F_{n-2}, \text{ where } F_1 = 1 \text{ and } F_2 = 2.$$

The Lucas numbers are similarly defined: $L_n = L_{n-1} + L_{n-2}$, but with $L_1 = 1$ and $L_2 = 3$. The ratio F_n/F_{n-1} approaches the Golden ratio $\phi = 1.61803\ldots$:

$$\tfrac{3}{2} = 1.5, \quad \tfrac{5}{3} = 1.667, \quad \tfrac{8}{5} = 1.6, \quad \tfrac{13}{8} = 1.625, \text{ and so on.}$$

The Golden ratio ϕ itself has many special properties. Its inverse is itself minus one ($1/\phi = \phi - 1$) and its square is itself plus one ($\phi^2 = \phi + 1$). From these properties its exact value can be deduced:

$$\phi = (\sqrt{5}+1)/2 = 0.5 \times 5^{0.5} + 0.5.$$



Geometrically, it is represented by the rectangle with ratio of width to height equal to ϕ. If one removes a square from the rectangle, the resulting rectangle is again in the proportion of the Golden ratio. The series of powers $\phi^2, \phi^3, \phi^4, \phi^5, \phi^6, \ldots$ can be written

$$\phi+1, \quad 2\phi+1, \quad 3\phi+2, \quad 5\phi+3, \quad 8\phi+5, \ldots,$$

in which the Fibonacci numbers can be observed. Furthermore,

$$\phi = \sqrt{1+\sqrt{1+\sqrt{1+\ldots}}} \quad \text{and} \quad \phi = 1 + \cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\ldots}}}.$$

BEARDS

Though not widely seen today, one of the most striking visual differences between the sexes is man's natural display of facial hair. The beard 'is the badge of a man', wrote St Clement of Alexandria. 'Whatever smoothness or softness there was in him God took from him when he fashioned the delicate Eve from his side. . . '

On average, facial hair grows as long as it is wide every three hours. It grows about 0.4 inches a month, or a third of a millimetre a day. A more natural unit for beard length can be borrowed from typography: the point, where 72.3 points = 1 inch (see p. 135). Beards grow 1 point (pt) per day. Different lengths of facial hair have different names.

Name	*Days*	*Length (pt)*	*Notes*
shadow	<1	<1	Change of shade; whiskers not noticeable.
umbra	1–2	1–2	Worn with impunity: 'I've been *very* busy.'
stubble	3–4	3–4	Ambiguous: 'Did he forget to shave?'
designer stubble	5–8	5–8	Stubble with intent; no longer negligence.
bristle	9–16	9–16	Most awkward stage of growing a beard.
beard	17+	17+	Will continue to grow at five inches a year.

There are two myths about beards which should be dispelled. The first is that the speed of growth diminishes with the length of hair. This is not possible, since the hair follicle cannot tell how long the hair has been cut: there is no communication along the hair shaft, which is dead. But the follicle does know how old the hair is, and after a fixed period the hair is expelled and a new hair emerges, which is why hair does not grow beyond a set length. The second myth is that shaved hair grows back thicker. This is only partly true, in that the first growth of a hair is the finest part, with further growth of normal thickness. Cutting off the tip makes the new end thicker, but cutting it again has no effect.

Trimming a beard not only reduces its length but also makes it thicker: the surface of an untrimmed beard is sparse, because not all hairs grow at the same rate. The hair below the neckline should always be shaved, even in the case of full beards. The only facial hair allowed in the British armed forces is the moustache, except in the Royal Navy, which permits a 'full set', that is, a moustache and beard combined. At one point, the Catholic Church allowed priests to have facial hair only on the condition that they did not trim it, this being a sign of vanity. The fashion for facial topiary during the 1990s now seems rather studied, and today the the most accepted form of facial hair is a full set not longer than 3/4 inch = 54 points = 54 days.

INSTRUCTIONS FOR SHAVING

The average man will shave his beard approximately 15,000 times in his lifetime, spending a total of 80 full days. So it is worth considering how this essential ritual is best executed. Shaving comprises three steps: (1) pre-shave; (2) shave; and (3) post-shave.

1 The most important ingredient for shaving with a razor is water. Not only should the face be wet, but the skin and whiskers should also have absorbed water. If you can't shave right after a shower, rinse your face generously with hot water a couple of minutes before shaving. Then, using a brush or your hand, lather cream onto face for at least 15 seconds.

2 Using a sharp razor, apply short strokes along the grain of growth. Don't press down—a light contact will do if the blade is sharp. Begin with the least dense areas and finish with the densest: the sides, then cheeks, neck, upper lip, lower lip and chin. Whilst shaving against the grain may cause later irritation, the best barbers finish by shaving across the grain.

3 Rinse your face with cold water to remove cream and close pores. Press small cuts with wet paper, then dry paper, or apply an alum block. A skin cream at this stage would not go amiss (though no eyebrow plucking). If using a brush, rinse it in warm water, shake out excess and stand to dry.

SHAVING BRUSHES

Shaving razors have advanced so much during the last century that nearly all standard cartridge razors are superior to the traditional double-edged safety and straight razors. What is often neglected, however, is the choice and application of shaving lubricant. The best lubricants are not available as a foam or gel, but rather as a cream or hard soap which must be whisked into a foam with the aid of a shaving brush. Cream comes in a tub, and the brush is dipped into it and whisked into a foam directly on the face; soap must be whisked partly in the pot. For those who have sensitive skin, it is wise to mix an equal part of skin lotion directly into the cream before lathering.

The best shaving brushes are made from badger hair. Badger hair is flexible, stores heat and retains water. But not all badger bristles are equal; the softest, finest-tipped hairs are found around the badger's neck, and only in winter. A brush made of these makes anything lather.

Name	*Source*	*Colour*	*Texture*	*Animal rights activist response*
Boar	various	white or dark	coarse	tepid
Dark badger	underbelly	nearly black	coarse	threatening stares
Pure badger	tail	grey	medium	hate mail
Best badger	back	light-dark-light	fine	prick car tyres
Super badger	neck	silver-tipped	very fine	tar & feather owner

INTRODUCTION

Given that two-thirds of men will suffer from hair loss at some point in their lives, it is puzzling to find the subject so full of misinformation, pseudoscience and charlatanism. In part this is explained by a limited understanding of what causes—and prevents—the spontaneous thinning of hair. The rest is due to opportunistic marketing of alternative and quack medicines to gullible and often desperate men. Differentiating fact from fiction and finding reliable, transparent information on the subject remains difficult.

Healthy hair on the scalp has a two-stage life cycle: a growth period of two to six years, during which hair grows about 0.3 mm per day, followed by a dormant period of two to four months. After this the hair falls out, and a new hair emerges from the same hair follicle. (Hair on other parts of the body has a shorter life cycle and therefore does not grow as long.) Different hairs are in different phases in this cycle, so that on any given day only about 50–150 hairs fall out, which is less than 0.1% of the total number of hairs on the scalp.

The dominant form of hair loss in men is called androgenetic alopecia, or male pattern baldness. It generally follows a fixed pattern of progression: the corners of the hairline recede first, giving rise to an 'M'-shaped hairline. This is followed by a thinning of the hairline generally and also the crown (the top of the head). Eventually the exposed areas of the hairline and crown join, leaving hair at the back and sides only, which itself may continue to thin. This is the course to total baldness; in most men hair loss will tail off at some intermediate point.

Hair loss is not caused by the sudden loss of hair but rather increasingly diminished growth of individual hairs over time. In the early stages, the number of hairs remains constant, and what appears as hair loss is in fact a reduction in the thickness and rate of growth of new hairs. Each generation of new hair grows back finer, shorter, often lighter-coloured than before. As the condition progresses, hair appears wispy, then like peach fuzz, and eventually cannot be seen at all.

There are several commonly believed myths about hair loss. One is that the incidence of hair loss in a man is solely determined by the maternal grandfather. Although it is heritable, there is at present no way to accurately predict who will lose his hair or when he will lose it. A recent study has found that men whose fathers exhibit hair loss are 2–2.5 times as likely to suffer from hair loss as those whose fathers have a full head of hair. Another myth is that wearing hats, caps or bandannas promotes hair loss, for which there is no support. It is often claimed that stress or significant mental exercise can initiate or hasten hair loss, but the evidence for this is scant.

TREATMENTS

All hair-loss drugs are more successful at preventing the decay of healthy hair follicles than reviving dormant follicles which produce fine, wispy hair. So the earlier hair loss is treated, the greater is the amount of hair that is likely to be maintained. Right now, baldness is more preventable than reversible.

The primary contributing factor in male pattern baldness is believed to be the androgenic hormone dihydrotestosterone (DHT). Increased levels of DHT are known to inhibit hair growth, although how this occurs remains poorly understood. Higher testosterone levels are not in themselves correlated with increased likelihood of hair loss.

In what might appear to be a stroke of fortune for drug companies, hair-loss treatments do not cure hair loss once and for all; rather the medicine has to be taken indefinitely. If the treatment is terminated, the rate of hair loss will return to its pre-treatment levels. Bear in mind, however, that the state of the art in treating baldness is changing rapidly, and today's maintenance will likely prove to be a stop-gap until the arrival of superior, possibly permanent treatments.

Finasteride, marketed as Propecia, is, along with Minoxidil, the only US Food and Drug Administration-approved hair-loss drug. This does not imply that other treatments are not effective; gaining FDA approval is expensive and requires additionally that a drug's side effects are understood and minimal. Propecia is currently accepted as the most effective treatment for hair loss, with 30–75% of users reporting constant or increased hair levels. It works by inhibiting the production of DHT, and is administered in the form of a pill taken daily.

Minoxidil, marketed as Regaine in the UK and Rogaine in the US, has been shown to slow or stop hair loss in 25–40% of patients. It was originally developed as a high-blood-pressure treatment, with increased hair growth an unintended side effect. Despite its commercial success, how it combats hair loss is not well understood. It is applied as a cream directly to the afflicted area, usually once or twice a day. Despite Homer Simpson's immediate results with Dimoxinil (Simpson and Delilah, episode 7F02), both Propecia and Regaine require three to six months' use before clear results appear.

As with most aspects of men's appearance, an air of indifference is essential to wearing thin hair. At some point, manipulating thinning hair to hide the head must come to an end. Yul Brynner shaved his head completely and made baldness chic. Zinedine Zidane knew when to make the cut, as did Andre Agassi, both of whom keep their hair close-cropped. John Malkovich and Sean Connery kept their hair mid-length but never wore a comb-over.

JOHN THOMAS

Circumcision The ancient Egyptians practised circumcision, and the Book of Jeremiah (9:26) adds the Jews, Edomites, Ammonites and Moabites. The Ancient Greeks thought circumcision unbecoming, and associated it with satyrs, the promiscuous man-goat race that wandered the forest. While the early Christian Church frowned upon the practice, by medieval times it was prohibited: '[The Holy Roman Church] strictly orders all who glory in the name of Christian, not to practise circumcision either before or after baptism, since. . . it cannot possibly be observed without loss of eternal salvation,' declared Pope Eugenius IV in his 1442 papal bull. The curious popularity of circumcision in the English-speaking world largely originated in the late 19th century in the United States, where by the turn of the century the removal of the foreskin was associated with all sorts of remedial and preventive medicine. Although circumcision is now believed to confer no significant medical benefits, the majority of males are circumcised for non-religious reasons in the United States, the Philippines and South Korea. Circumcision rates amongst newborns are:

Australia 12% Canada 11% England 6% USA 65%

Dressing is the persistent self-positioning of a man's jewels to the same side of his trousers. A man is said to 'dress to the left' or 'dress to the right' if he predominantly falls to the left or right trouser leg. The best time to tell which side you're on is while sitting down. When making a suit (p. 61), some tailors assemble the crotch of the trousers asymmetrically to account for this bias. There are a number of theories to account for dressing, none of which have been substantiated: the direction of dress corresponds with left-/right-handedness; it is the side of the lower testicle (see *High ball*, opposite); it is a by-product of wearing trousers twisted at the waist.

Shoe size A number of features are said to predict the size of a man's privy parts, including: height, length of nose, distance between thumb and finger at 90° and shoe size (p. 55). A recently published study casts doubt on the last and most persistent of these theories, namely, that the size of the foot and penis correlate. (J. Shah & N. Christopher, *British Journal of Urology International*, **90**, 586 (2002).) The two urologists conclude: 'The median stretched penile length for the sampled population was 13 cm and the median UK shoe size was 9 (European 43). There was no statistically significant correlation between shoe size and stretched penile length.'

ON THE BALL

Zoe: How's the nuts?
Bloom: Off side. Curiously they are on the right. Heavier I suppose. One in a million my tailor, Mesias, says. James Joyce, *Ulysses*

High ball (For the cylindrical drinking vessel *highball*, see ☙Glasses, p. 20.) The Ancient Greeks were well aware that a man's testicles were not symmetrical, but that one—usually the left—descended lower than the other. This anatomical subtlety is borne out in their sculpture. Of 187 statues considered by the psychologist I. C. McManus, 51% show the left testicle to be lower and 22% the right, the remainder being of equal descent ('Right-left and the scrotum in Greek sculpture', *Laterality*, **9**, 189 (2004)). This correlates with modern-day observations. Chang et al. (*Journal of Anatomy*, **94**, 543 (1960)) found the left testicle to be lower in 62% of subjects and the right in 27%, the rest being indistinguishable. The reason for this bias to the left is not known, but Bloom's explanation above can be dismissed. It is widely accepted that, surprisingly, the right testicle tends to be both heavier and larger.

Blue balls Although sometimes dismissed as an old wives'—or rather husbands'—tale, blue balls is well recognized, if not fully understood or documented. It is a painful ache in the scrotum, caused by prolonged, significant sexual arousal, and affects many adolescent and mature men, though infrequently. While the pathophysiology is not understood, J. M. Chalett and L. T. Nerenberg conjecture that, in tandem with persistent pelvic venous dilation, 'testicular venous drainage is slowed, pressure builds and causes pain' ("'Blue Balls"', *Pediatrics*, **106**, 843 (2000)). The discomfort ceases on release or subsides on its own after one or two hours. Circumstantial evidence suggests that the name may derive from a blue tint in the scrotum caused by reduced circulation, de-oxygenated blood being darker than oxygenated.

Varicocele Generally painless and harmless, a varicocele is the enlargement of the blood vessels that drain blood from one of the testicles. As with varicose veins frequently found in women, a varicocele is caused by the malfunction of the one-way valves in the vessels. When the valves can no longer counteract the force of gravity, blood pools in the lower veins. The condition affects approximately 15% of men, the large majority of cases involving the left testicle, and feels like a soft testicular lump. There are usually no symptoms, although the varicocele may seem to disappear whilst lying down when the blood drains away from it.

There is an unstated code of behaviour in men's public loos which, while more instinctive than prescriptive, is surprisingly universal.

No pairing Unlike women, men visit the lavatory entirely for practical reasons, and it is suspect to immediately follow a friend to the loo.

No talking Terse conversation in the loo can take place before and after, but not during, use of the urinals.

No looking Eyes should be aimed straight ahead or down in concentration; glances towards your neighbour are very suggestive.

No touching Hands should be in front of you. A bump of the elbows can be deflated by a sober apology, but without turning the head.

URINAL OCCUPATION RULES

When faced with an array of urinals to choose from, which one should you take? The basic idea is that the distance between users should be maximized, at the same minimizing a newcomer's chance of getting too close. The latter makes the endmost urinals highly desirable. Never go between two men if it can be avoided. Below are sample situations for seven urinals, where ○ means vacant and 🚹 occupied, and the best strategy for each. (In order to write the exact solution below, we assume any man following you chooses a vacant urinal at random.)

1 2 3 4 5 6 7	*Optimal strategy*
○ ○ ○ ○ ○ ○ ○	1 and 7 are correct, and every man knows this.
🚹 ○ ○ ○ ○ ○ ○	7 is correct, but 6 is often picked to avoid showing paranoia.
🚹 ○ ○ ○ ○ ○ 🚹	Urinal 4 maximizes the distance from others.
🚹 ○ ○ 🚹 ○ 🚹 ○	7 promises at most 1 neighbour in the case of a newcomer.
🚹 ○ 🚹 🚹 ○ ○ 🚹	Only 6 is free of second-nearest neighbours.
🚹 ○ 🚹 🚹 ○ 🚹 🚹	An unpleasant scenario, but 2 is the lesser of two evils.
🚹 ○ ○ ○ ○ 🚹 ○	3 and 4 may seem identical, but 3 will on average be further from a newcomer ($E(3) = 0.650$, $E(4) = 0.656$ below).

☢ *For geeks* Let N be the total number of urinals, labelled from left to right by $k = 1, 2, \ldots, N$, of which $q + 1$ are vacant. Assume on average one new man approaches a random vacant urinal (without applying any strategy) during the typical period of occupation. As he may come in at any point after you, the average intersection of his and your occupation time is $1/2$. Further assume the interaction between men is repulsive with an inverse square law. Then the optimal unoccupied urinal k is the one which minimizes $E(k)$ below, which is composed of a weak repulsive uniform charge (first term) and a stronger repulsive charge at occupied sites (second term):

$$E(k) = \frac{1}{2q} \sum_{i=1, i\neq k}^{N} \frac{1}{(k-i)^2} + \frac{2q-1}{2q} \sum_{i\,\text{occupied}} \frac{1}{(k-i)^2}.$$

Sleep is one of the great neutralizers of life's injustices. Not because it provides a respite from life itself, but rather because it acts as a buffer period during which the unfortunate or the ambitious can gain an edge on others by *not* sleeping. There is, of course, a limit to how far sleep can be reduced without negative physiological effects. For most people, this cut-off is around five hours. A study of men who received four hours a night found signs of diminished ability to process carbohydrates after 16 nights. Severe sleep deprivation is likely to cause death. Experiments on rats have shown that total deprivation for several weeks results in an inability to regulate body temperature, even if sleep is reintroduced. Death from septic shock quickly follows.

Staying awake for extended periods of time, usually for prolonged industry, is usually achieved by (i) an increase of motivation or (ii) the use of stimulants. Sleep-deprived individuals asked to perform mental activity showed remarkable improvement if the incentive to perform well was increased sufficiently. The offer of a cash reward in proportion to achievement led subjects to perform as if they had been fully rested. This suggests that lack of sleep does not so much diminish our ability to concentrate, but rather raises our incentive threshold.

By far the most common stimulant is caffeine, found in the seeds and leaves of a number of trees and shrubs. The typical caffeine contents of various substances are shown below. The amount of caffeine in tea and coffee, the most common sources of the drug, depends significantly on leaf and bean variety, production and preparation. Note that the usual serving size varies from the 250 ml or 40 g used below.

Average daily UK intake (mg caff.)	280
Caffeine tablets	*mg caff./pill*
Vivarin	200
Stay Alert gum	100
No Doz	100
Pro Plus	50
Soft drinks	*mg caff./250 ml*
Red Bull	82.5
Jolt Cola	50.0
Mountain Dew	39.1
Diet Coke	32.8
Dr Pepper	29.6
Pepsi-Cola	26.4
Diet Pepsi-Cola	25.4
Coca-Cola	24.0

Lethal dose for 50% (mg caff.)	10,000
Coffee & tea	*mg caff./250 ml*
Coffee, brewed (typical)	140
Coffee, instant (typical)	100
Tea, black (typical)	85
Tea, fruit (Pickwick)	80
Tea, green (typical)	60
Coffee, decaffeinated (typical)	5
Chocolate	*mg caff./40 g*
Unsweetened choc. (typical)	35
Hershey's Special Dark	29.2
Semi-sweet chocolate (typical)	25
Milk chocolate (typical)	10
Hershey's Bar	9.4
Kit Kat	5.7

The most effective method of lifting weights—and by this is meant high-resistance anaerobic exercise for size and strength—is to use free weights instead of machines whenever possible. Of course, some exercises are difficult or impossible to perform without machines—leg curls, for instance. But free weights or the body's own weight should be used for most exercises. Part of the reason is that machines invariably lock the motion into a fixed path, negating the subconscious effort put into symmetry and balance. This means that the auxiliary muscles that keep the motion from wandering off course are neglected. The result is a body without tie-ins between muscle groups and left-right symmetry. As a practical advantage, free weights are universal in the sense that they can be done identically in any gym.

Weight training is usually organized as follows:

Session	Visit to the gym	2–6 times per week
Exercise	Focus on specific muscles, see opposite	6–12 per session
Set	Period of continuous exertion	3–5 per exercise
Rep	Repetition of the same movement	7–12 per set

Sessions may always incorporate the same exercises, or cycle through different major muscle groups: legs and abdominals one session, arms and shoulders the next, for example.

Standard Olympic bars have a solid 1-inch-diameter central segment and 2-inch-diameter ends for loading similarly sized metal plates. The bar itself weighs 20 kg. Plates are available in the various weights below. This binary system has the advantage that all resistance levels, from 20 to 97.5 kg in 2.5 kg intervals, can be symmetrically loaded with only two plates of each size. Despite being 44.1 lb, 20 kg plates are usually taken to be 45 lb for the purposes of reckoning. As a rule of thumb, a fit man should be able to bench-press his own weight.

Plate sizes (kg)	1.25	2.5	5	10	20
(lb)	2 .75	5.51	11.0	22.0	44.1

☢ *For geeks* The single-repetition maximum is the highest weight one can push, pull or lift. It can be calculated for any exercise from one's performance at a lower weight as follows. Let r be the maximum number of repetitions that can be done at some weight w and

$$C(r) = -0.00186r^2 + 0.0561r + 0.957.$$

Then $C(r) \times w$ is one's true single-repetition maximum. For example, if one can bench press 135 lb just 8 times, then, from the table below, one's maximum for a single repetition is 1.287×135 lb $= 173.7$ lb.

Reps r	2	3	4	5	6	7	8	9	10
$C(r)$	1.062	1.109	1.152	1.191	1.227	1.259	1.287	1.311	1.332

EXERCISES BY PRINCIPAL MUSCLE WORKED

Below are the 30 most classic lifting exercises. A moderate routine might be 3–4 sets per exercise, 8 exercises per session and 3 sessions per week; for intensive training, 10 exercises per session and 6 sessions per week. The 10 most essential exercises are marked ∗.

Biceps

∗	Standing barbell curls	A bent barbell works best. Keep the elbows fixed.
	Seated dumbbell curls	Rest elbow in hand, one arm at a time.
	Dumbbell curl on incline bench	Keep upper arms vertical with the floor.
	Chin-ups	With palms facing in and a close grip (see p. 16).

Triceps

∗	Tricep extensions	Use bent grip from overhead cable. Keep elbows fixed.
	French press	Lock elbows straight above, lower barbell to neck.
	Parallel bar dips	Isolates the triceps with body's own weight (see p. 16).

Forearms

∗	Wrist curls	With forearms flat on bench lift barbell with palms-up grip.
	Reverse wrist curls	Like wrist curls but with palms-down grip.

Chest

∗	Bench press	Wider grip for pectorals, closer grip for triceps.
	Incline press	Works upper pecs for armour-plated look.
	Bent-arm flyes	Lying on bench, lift dumbbells from sides to above chest.
	Machine flyes	Start with arms just over 180° apart. Good for definition.

Shoulders

∗	Military press	Aka shoulder press. In front of or behind neck.
	Dumbbell lateral raises	While standing, raise dumbbells to horizontal.
	Upright rows	While standing, lift barbell with close grip to chest.
	Bent-over cable laterals	With arms crossed, use two floor-level pulleys.

Calves

	Standing calf raises	Keep knees locked. Beware of back strains.
∗	Seated calf raises	Use heavy loads. Do not rock back and forth.
	Calf-extensions on leg press	Put balls of feet on lower edge of foot plate.

Thighs

	Leg press	Contract until legs are 70° or 80° at the knee.
∗	Squats	Foundation exercise for working the quadriceps.
∗	Leg curls	Isolates the back of the thighs.
	Leg extensions	Focuses on the front of the thigh and above the knee.

Abdominals

∗	Sit-ups	Performed on a decline adds considerable resistance.
	Crunches	Either lying on your back or with a vertical bench.
	Bent-knee leg raises	Lying on back, lift and contract legs.

Back (including lats)

∗	Wide-grip chins	With palms facing out. Also try behind neck.
	Bent-over rows	With back parallel to floor lift barbell to waist.
	Seated rows	Done with cable and T-bar with close grip.

James Bond (p. 144), often away from home for days at a time, exercised in his room in the mornings to rouse himself from self-pity or (more often) a hangover. A typical routine, described in Ian Fleming's *From Russia with Love*, includes '20 slow press-ups, enough straight-leg lifts to make his stomach muscles scream, 20 toe touches and finally arm and chest exercises combined with deep breathing until he is dizzy'. With a couple of sturdy chairs and a bar or broomstick one can do considerably more.

Press-ups The most versatile weights-free exercise of all. With the hands directly under the shoulders, the triceps are emphasized; a wider placement works the pectoral muscles. The difficulty can be increased by raising the feet off the ground, e.g., on the front of a chair or, higher still, the back of a chair. As the body approaches vertical (a handstand), this exercise approaches a military press with the body's own weight—not easy. Try to reach sets of 50.

Pull-ups One of the most natural and effective of all exercises, and the most difficult of those without weights. There are two kinds: hands facing in (also known as chin-ups), with a closer grip, and hands facing out, with a wider grip. Hands-in mainly works the biceps, then lats, and also expands the chest. Hands-out works the lats, then biceps. If you can do three sets of 12 in five minutes, rejoice.

Chair dips Excellent for isolating the triceps. Put two chairs back-to-back, just further apart than the width of your shoulders. Standing between them, put your hands on the chair backs and, raising your legs, rest your entire weight on the chairs. Lower yourself as much as possible, then extend the arms. This exercise will be difficult at first but should advance quickly. Aim for sets of 20.

Reverse bench (rows) Good for the back, similar in its effect to seated rows. Put two chairs back-to-back, four feet apart, and place a bar or broomstick across the backs of both. Lie on your back with your chest under the bar and grip it overhand, pulling yourself slowly to the top. The resistance can be increased by putting your feet on a chair. The back should not touch the floor between repetitions.

Triceps extensions Another focus on the triceps, but also the back and lats. Put two chairs front-to-front, three or four feet apart. Place your heels on the seat of one and your hands, behind your back, on the corners of the other. Lower yourself as far as you can and then fully extend the arms. Work towards sets of 30; if these become easy, put a couple of heavy books on your lap.

Bent-knee sit-ups Still one of the best exercises for the upper abdominals. Keep knees bent and fix your feet under, say, a sofa. If you can do 50 in one go, hold a couple of books against your chest.