

The Hidden Meaning in Those Letters and Numbers

Chuck Higgins, Ph.D.
Dept. Finance/CIS
Loyola Marymount Univ.
1 LMU Drive
Los Angeles, CA 90045-8385
USA

We all find number and letter codes around us. Many of these are both relevant and often easy to decode. Included herein are those most of us encounter: airport/ airline/airplane codes, alphabets, bonds, Braille, broadcast call letters, radio AM/FM, television, checks, corporations, credit cards, dates, highways, internet, license plates, measures, money, numbers, postal codes, postage stamps, railroads/trains, ships/boats, Social Security, stocks, telephone, temperature, time, and universal product codes. Not included herein are those that are field specific or important only to specialists. Thus not included are codes found in science, technology, special fields, and commerce; examples excluded include chemistry and physics, model numbers, ham radio and hobbies, expiration dates, and so on. All graphics herein are from Wikipedia or are mine. Thank you to Michelle Yeung and Zbigniew Przasnyski for their suggestions.

Airports/Airlines/Airplanes

ABC

Airport codes are three letter mnemonics (four letters instead for pilots), some with historic references (ORD for O’Hare Airport previously called Orchard Field and MSY for New Orleans’ Moisant Field); see www.skygod.com for a full history. In the U.S. there are rarely airport codes starting with K, N, or W. The codes for Canadian airports usually start with a Y, but the reverse may not be true (YUM for Yuma International for example). A recommended website for flights is www.airfare.com. Here’s a map of Europe with some city-wide codes shown for cities with multiple major airports (Berlin TXL SXF, London LHR LGW, Paris CDG ORY, Rome FCO, and Stockholm ARN):



XXX/ABC/DE

Airline companies have a three digit ticket prefix, a three letter International Civil Aviation Organization (ICAO) internal commercial code, and a two letter International Air Transport Association (IATA) public code; see: <http://www.azworldairports.com/indexes/p-alwb0.cfm>. Here are some common ones:

Prefix	ICAO	IATA	Airline
001	AAL	AA	American Airlines
005	COA	CO	Continental Airlines
006	DAL	DL	Delta Air Lines
014	ACA	AC	Air Canada
016	UAL	UA	United Airlines
020	GEC	LH	Lufthansa
027	ASA	AS	Alaska Airlines
037	USA	US	US Airways
042	VRG	RG	VARIG Brazilian Airlines
045	LAN	LA	LAN Airlines
047	TAP	TP	TAP-Air Portugal
052	RPA	RW	Republic Airlines
053	EIN	EI	Aer Lingus
055	AZA	AZ	Alitalia
057	AFR	AF	Air France
058	IAC	IC	Indian Airlines
074	KLM	KL	KLM
075	IBE	IB	Iberia
081	QFA	QF	Qantas Airways
082	BEL	SN	Brussels Airlines
086	ANZ	NZ	Air New Zealand
098	AIC	AI	Air India
105	FIN	AY	Finnair
114	ELY	LY	El Al Israel Airlines
117	SAS	SK	SAS Scandinavian Airlines Systems
125	BAW	BA	British Airways
131	JAL	JL	Japan Airlines
132	MXA	MX	Mexicana de Aviación
139	AMX	AM	Aeromexico
160	CPA	CX	Cathay Pacific Airways
173	HAL	HA	Hawaiian Airlines
180	KAL	KE	Korean Air
205	ANA	NH	All Nippon Airways
220	DLH	LH	Lufthansa
224	RYR	FR	Ryanair
235	THY	TK	Turkish Airlines
236	BMA	BD	bmi
257	AUA	OS	Austrian
268	AAV	G4	Allegiant Air
297	CAL	CI	China Airlines
332	TRS	FL	AirTran
487	NKS	NK	Spirit Airlines
526	SWA	WN	Southwest Airlines
687	AAH	KH	Aloha Air
724	SWR	LX	Swiss World
932	VIR	VS	Virgin Atlantic

(X)A

The nationality of an airplane is determined by its registration number or its flag insignia if it has one (it appears backward on the right side of the airplane consistent with the direction of flight). Airplanes have a registration letter and number; see:

http://en.wikipedia.org/wiki/Aircraft_registration#List_of_countries.2Fregions_and_their_registration_prefixes_and_patterns . Some common letter country codes follow:

4U	United Nations	LX	Luxembourg/NATO
4X	Israel	N	United States
9M	Malaysia	OE	Austria
A6	U. A. E.	OO	Belgium
B	China (both)	OY	Denmark
C	Canada	PH	Netherlands
CC	Chile	PP-PU	Brazil
CR-CS	Portugal	RA/RF	Russia
D	Germany	SE	Sweden
EC	Spain	SU	Egypt
EI	Ireland	TC	Turkey
F	France	TF	Iceland
G	United Kingdom	VH	Australia
HB	Switzerland	VT	India
HL	S. Korea	XA-XC	Mexico
I	Italy	ZK	New Zealand
JA	Japan	ZS-ZU	South Africa

Alphabets

Alphabets differ among languages. Notable is that the modern usage of computers and English in the travel industry has resurrected the original characters. Moreover, letters may be (or were) alphabetized separately in the native language including: **Æ, Á, CH, IJ, LL, Ø, and RR**. Often diacritical marks may be omitted for uppercase (majuscule) characters, namely: **Á, È, É, Î, Ï, and Ô**; this is less so for: **Ç, Ć, and Ñ**. The following letters are equivalent:

Á	AA	ß	SS
Ä, Æ	AE	Ü	UE
Ö, Ø	OE	ÿ	IJ

City names may differ from language to language especially in Europe; see:

[http://en.wikipedia.org/wiki/Names_of_European_cities_in_different_languages: A](http://en.wikipedia.org/wiki/Names_of_European_cities_in_different_languages)

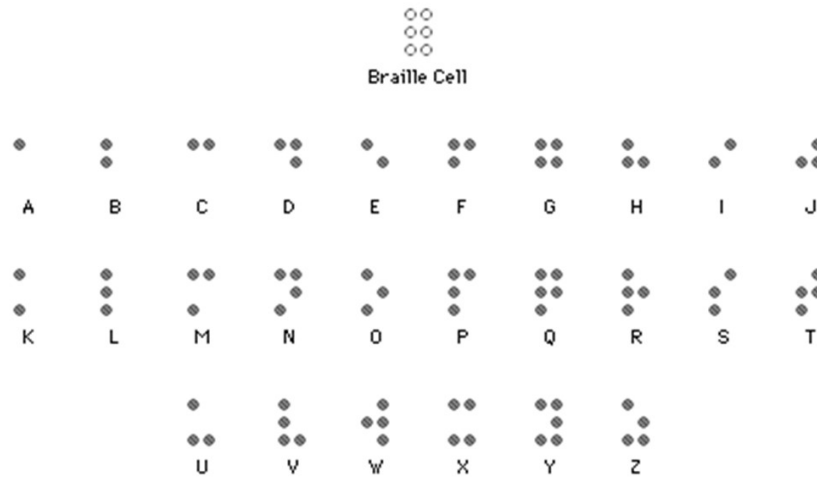
Bonds

A.XX/A(s or X/X) BC

U.S. bonds are debt instruments and are issued usually in principal face amounts of \$1,000 for corporate bonds and \$10,000 for government bonds with both priced in percentage points of face value so that 1 point is worth \$10 for a corporate bond and \$100 for a government bond. A basis point is 1/100th of 1 point or \$1 for a government bond. Corporate bonds trade in 1/8^{ths} or \$1.25 multiples; government bonds trade in 1/32^{nds} or \$3.125 multiples. The stated rate of interest may be expressed as a decimal (8.25 as **A.XX**) or fraction (8¼ as **A X/X**) followed by the last two digits of the year of maturity (**BC**); an **s** may precede the year if the interest rate is an integer (8s17 would be an 8 percent bond maturing in 2017). Bonds pay interest twice a year of one-half of the stated interest rate. Corporate bond interest is calculated in monthly then daily fractions with the 31st day (if extant) unpaid; the usage of a 360-day year is appropriate here. Short term notes generally do not pay interest and are instead sold at a discount from face value and are calculated with a 365-day year.

Braille

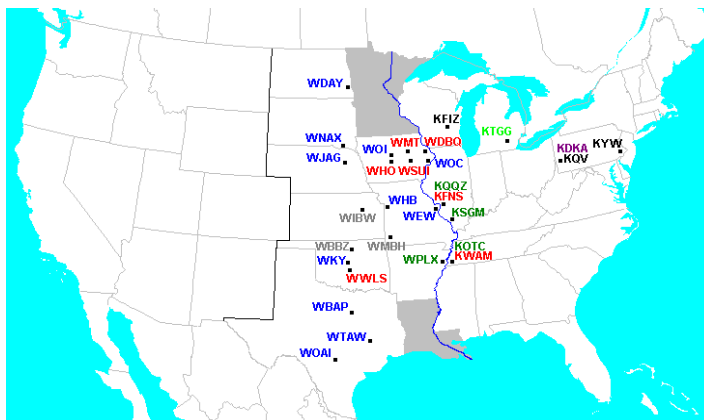
Braille is a tactile alphabet for the blind:



Broadcast Call Letters

KABC WABC CABC XEABC

North American broadcasters are required to have call letters starting with a **K** or **W** in the United States, **C** in Canada, and **X** in Mexico. In the U.S. and Canada broadcasting stations originally had three letter call signs and thus, if still existing, are older. Now they have four letters. Mexican stations usually are five letters starting with **XE**. In the U.S. the F.C.C. assigns **K** west of the Mississippi River and **W** to the east save: KDKA Pittsburgh, KYW Philadelphia, WACO Waco, WBAP & WFAA Dallas, WHB Kansas City, WHO Des Moines, and WOAI San Antonio. Here’s a map:



In the U.S., a station must identify itself every hour. It is the call sign immediately followed by the city of license (one may insert licensee or frequency). Australian stations start with a number. Other countries follow other conventions.

Broadcast Radio

(X)XX0 AM

AM radio frequencies in the United States are separated by 10 KHz, unlike some stations in other countries. There are some AM stations in the U.S. with a “clear channel” designation namely a 50,000 watt (class A) radio station with little interference from other class A radio stations operating at 1220 KHz and below or 1500 KHz and above (see <http://ac6v.com/clearam.htm>); local stations are often at 1230, 1240, 1340, 1400, 1450, and 1490 KHz. The frequencies ranged from 540 to 1600 KHz then, and ranges up to 1800 KHz now. On older model radio dials, the Civil Defense triangle can be seen at the 640 and 1240 KHz locations, but that usage has ceased.

(X)XX.A FM (-HDX)

FM stations in the U.S. are separated by .2 MHz (A) ranging from 88.1 to 107.9 MHz such that the last digit (A) is an odd number; this not always the case in other countries. The F.C.C. (Federal Communications Commission) internally designated them by channel numbers ranging in the 200s. Stations which have frequencies below 92.1 MHz (or the first 20 channels) are assigned to noncommercial broadcasters. The F.C.C. spaced the more powerful stations in the same city area by .8 MHz or by 4 channels, and spaced the less powerful stations in the same city area by .4 MHz or by 2 channels. Spaced in between these channels are other channels for other nearby cities in order to minimize interference. Digital FM is designated with HD or HD1/2/3 with usually two digital channels per one FM channel.

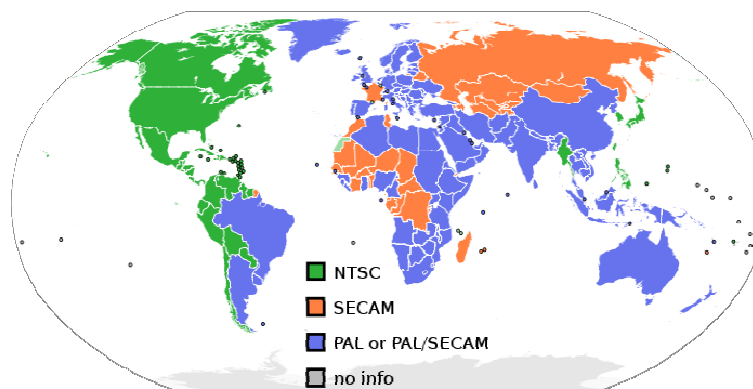
Broadcast Television

(X)X.(A) TV (-DT/LP)

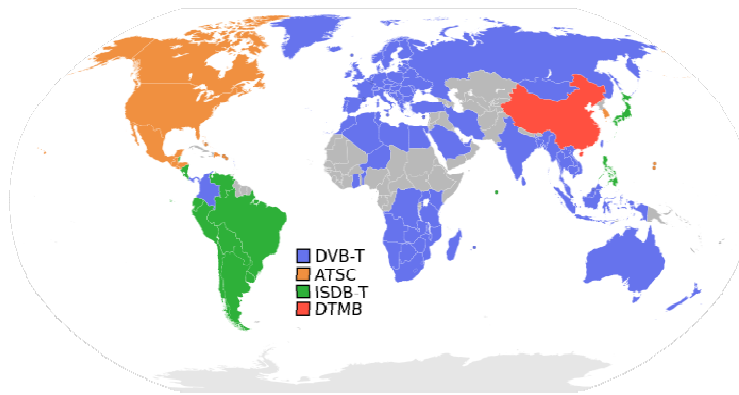
The television band in the U.S. had three sets of analog channels: lower VHF (Very High Frequency) channels 2 to 6 (just below the FM band), higher VHF channels 7 to 13 (above the FM band), and UHF (Ultra High Frequency) channels 14 to 68 (which formerly ranged to 83). Channel 1 was supposedly allocated to the military, but was of lower broadcast quality (lower channels require a longer length antenna) and is not used today. Channel 69 turned out to be in the same frequency range as the research frequencies used in radio astronomy and thus the F.C.C. decreased the UHF upper band range to channel 68. Digital TV used the same channel numbering but with different frequencies. TV broadcasters actually broadcast on a frequency band either slightly above or slightly below their assigned frequency so as not to interfere with same channels nearby, hence the fine tuning or automatic frequency controls (AFC) on some analog TV receivers. Analog TV is generally no longer broadcast in the U.S. Stations which broadcast digitally can broadcast up to 4 programs on one channel with a numeric extension (A) after a period and with a DT after their call letters. Those TV stations which are designated low power analog stations have a LP after their call sign (note that cable companies do not normally carry low power television stations).

The TV standard in the U.S. is NTSC (National Television System Committee now ATSC for digital) and is also used in Burma/Myanmar, Japan, Philippines, South Korea, and in the Americas save Argentina, Brazil, and Uruguay which use PAL (Phase Alternating Line now DVB-T for digital). PAL is used elsewhere save French speaking countries (except Algeria) and Russia and former Soviet republics (except Ukraine and Baltic countries) which use SECAM (Sequential Couleur Avec Memoire). There may be a proprietary digital code for each continent for DVD content.

Here's a map of analog TV:



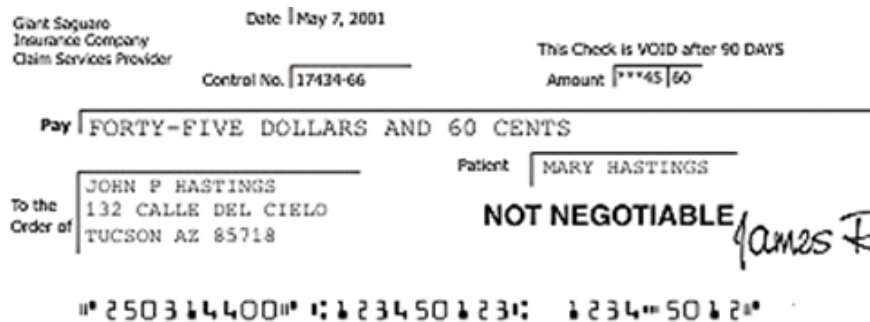
Here's a map of digital TV:



Checks

ABCDEFGHIJ XXXXXXXXXXXX (XXXXXX)

The first nine digits on a check are the ABA (American Banker’s Association) routing number which is usually bank branch specific followed by account number and maybe a check number. The numbers are printed in magnetic ink character recognition (MICR) format on a check.

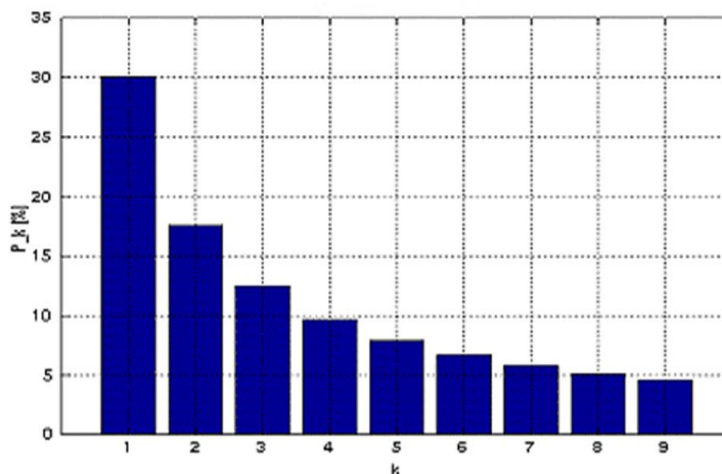


The sum of the routing number’s digits must agree with the following formula: the first, fourth, and seventh digits are added and multiplied by 3; the second, fifth, and eighth digits are added and multiplied by 7; and are added to the third, sixth, and ninth digits, or:

$$3(A+D+G) + 7(B+E+H) + (C+F+J) = 10X.$$

This sum must equal a multiple of 10, or it is invalid (like the example shown).

The second number is the account number and like other sequential account numbering finds the first digit more likely to be a lower number per Benford’s Law:



Corporations

The appellation after a corporate name (or before in the case of Oy for Finnish corporations) can indicate the type and country of the business or corporation:

AB	Swedish	Aktiebolag
AG	German	Aktiengesellschaft (a larger business)
BV	Belgian Dutch	Bekende Vlaming
GmbH	German	Gesellschaft mit Beschränkter Haftung
Inc.	American	Incorporated
LLC	British	Limited Liability Company
Ltd.	British, Japanese	Limited
NV	Dutch	Naamloze Vennootschap
PLC	British	Public Limited Company
Oy	Finnish	Osakeyhtio
SpA	Italian	Società Per Azioni
S.A.	French	Société Anonyme
	Portuguese	Sociedade Anónima
	Spanish	Sociedad Anónima

Credit Cards

AXXX XXXX XXXX XXXB

A sixteen digit credit card number is allocated to issuing firms by the first (**A**) digit: 3 for American Express (37) and Diners (38), 4 for Visa, 5 for Master Card, 6 for Discover, and 7 for Federal usage. The last digit is a check digit (**B**) which checks the internal validity of the number itself by a formula used by the issuing entity. There may be a secondary three digit number for authentication.

In the U.S. there're three major credit rating agencies: Equifax, Experian, and TransUnion; for consumer credit there is a scoring algorithm FICO (Fair Isaac Corporation). Generally scores range from 500 to 850.

Dates

11/17/08 = 17.11.08

Dates are generally in day, month, then year order internationally instead of the month, day, then year order as in the U.S. We use the Gregorian calendar adopted in 1582 by Pope Gregory XIII which dropped 10 days from the previous Julian calendar. It was adopted in England in 1752 dropping 11 days. The new calendar adopted the leap year every 4 years with an extra day on February 29, except for century change years save 1600 and 2000. Calendars in some countries start on Monday instead of Sunday.

Highways

(A)BB

The U.S. Interstate highway number system is organized with *even* numbers (**BB**) running *east* and *west*, and *odd* numbers running *north* and *south*. The lower numbers are in the west and south, and higher numbers in the east and north. The older U.S. Federal highway system used a similar system with the lower numbers instead in the east and north. The first digit (**A**) of a 3 digit Interstate highway indicates that, if even, that it is a loop (it returns to the highway system) or, if odd, that it is a spur (it does *not* return to the system). Exceptions include the I-238 connecting I-580 to I-680 in San Leandro and I-495 in New York (to eventually connect back to I-95 at the end of Long Island to Connecticut via a bridge).

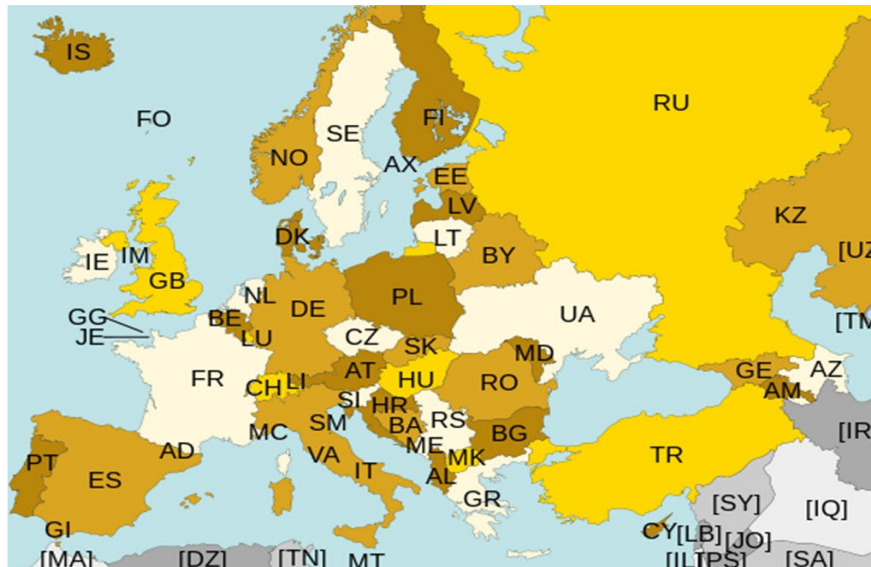
XX(X)

In Europe, the E and number designation indicates a trans-European highway as opposed to those starting with an A (*autoroute, autobahn, autostrada, autopista*) or those starting with other letters (such as an N, a national highway). The European system is similar to the U.S. Interstate system, save that lower numbers are in the north and that the three digit loops and spurs vary by the last or third digit instead of the first digit.

Internet

WWW.ABC.COM / - [AB ABC@DEF.COM](mailto:ABC@DEF.COM) / - [AB](#)

An internet address is recognized correctly as three mnemonics separated by two periods with usually the first comprised of www and the third as either a two letter **ISO 3166** country code (there're 249 of them; see http://en.wikipedia.org/wiki/ISO_3166-1) or three letter firm type of: com, gov, mil, net, or org with newer ones to come.

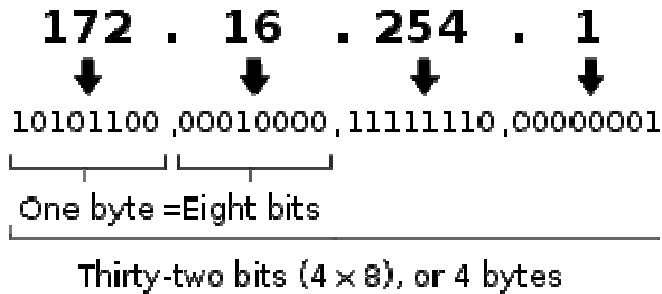


Two letter codes are also used in Canada, U.S., Italy, and Mexico:

AG Antigua & Barbuda/Aguascaliente	MT Malta/Montana/Matera
AL Albania/Alabama	NA Namibia/Nayrit
AR Argentina/Arkansas/Arezzo	NE Niger/Nebraska
AZ Azerbaijan/Arizona	NL Netherlands/Newfoundland/Nuevo León
BC -/British Columbia/Baja Calif. (Norte)	NU Niue/Nunavut/Nuoro
BS Bahamas/Baja Calif. Sur	OR -/Oregon/Oristano
CA Canada/California/Cagliari	PA Panama/Pennsylvania/Palermo
CH Switzerland/Chieti/Chihuahua	PE Peru/Prince Edward Is./Pescara
CL Chile/Colima	PR -/Puerto Rico/Parma
CM Cameroun/Campeche	PT Portugal/Pistoia
CO Colombia/Colorado/Como/Coahuila	RI -/Rhode Island/Rieti
CT -/Connecticut/Catania	RO Romania/Rovigo
FR France/Frosinone	SI Slovenia/Sinaloa
GA Gabon/Georgia [U.S. state]	SK Slovakia/Saskatchewan
GE Georgia [nation]/Genoa	SL Sierra Leone/San Luis Potosi
GR Greece/Grosseto/Guerrero	SO Somalia/Sondrio/Sonora
GT Guatemala/Guanajuato	SR Suriname/Syracuse[Siracusa]
IL Israel/Illinois	TL Timor-Leste/Tlaxcala
IN India/Indiana	TM Turkmenistan/Tamaulipas
KY Cayman Islands/Kentucky	TN -/Tennessee/Trento
LA Laos/Louisiana	TO Tonga/Turin[-o]
MA Morocco/Massachusetts	TR Turkey/Terni
MC Monaco/Macerata	TV Tuvalu/Treviso
ME Montenegro/Maine/Messina	VA Vatican/Virginia/Varese
MI -/Michigan/Milan[-o]/Michoacán	VE Venezuela/Venice[Venezia]/Veracruz
MN Mongolia/Minnesota/Mantua	VI -/Virgin Islands/Vicenza
MO Macao/Missouri/Modena/Morelos	VT -/Vermont/Viterbo
MS Montserrat/Mississippi/Massa	

An internet email address is correctly three mnemonics separated by @ then a period. The ISP (Internet Service Provider) address which is unique to each sender was recently expanded to a 32-bit code. It is a more accurate descriptor of the sender in that the internet address can be masked (either for continuity and/or fraud).

An IPv4 address (dotted-decimal notation)



One should note here that the last telegram was sent in 2006 and that while Morse code did add a character for the @ sign in 2000, it is no longer used. Interestingly Samuel Morse originally had a code book which numbered each word instead of a code for each letter. Regardless, SOS (Save Our Ship per some) is ●●● — — — ●●●.

License Plates

U.S. state license plates vary greatly. The California plate with six alphanumeric characters is older, and with seven characters is newer. If it has only one alphabetic character then it is a commercial plate, if three alphabetic characters then a personal plate. The oldest had the three alphabetic characters first (on a yellow background), then later stating with three numbers (on a blue background), and now currently with one number first followed by three alphabetic characters then three numbers (on a white or special background). Florida and Georgia plates show the county. Many states may require a front plate as well; some use tags keeping the same plate for a number of years.

In Europe, each country has its own system, some of which are quite easy to understand. In Spain, Italy, and Germany the first letter is an abbreviation of the location of automobile’s province or town. The Germans extend the system by having one letter for large cities (with consequently more numbers on a license plate) to having three letters for smaller towns (with fewer numbers on a license plate). In France the last two digits *used* to indicate the French governmental department so that Parisians often had plates which end with a 92 or a 95, the *Niçois* (inhabitants of Nice) with a 06, Corsicans with a letter, and so on.

Measures

U.S. measurement (as opposed to no longer used Imperial measurement) differs from metric measurement. Here are common conversions:

- 39.4 inches = 1 meter
- .62 miles = 1 kilometer
- 2.2 pounds = 1 kilogram
- 1.05 quarts = 1 liter
- 2.47 acres = 1 hectare

While fuel consumption in the U.S. is measured by miles per gallon (mpg), liters per 100 kilometers is used elsewhere and equals inversely 236/mpg (4 quarts equals 1 gallon).

Here are commonly reported measurements:

Type	Name	Range	Increment
Earthquake	Richter	1 to 10	$1000^{1/2} = 31.6$
Hurricane	Saffir-Simpson	1 to 5	approx. 20 mph
Sound	Decibel	1 to 191	$10 \log(\text{power}); 20 \log(\text{amplitude})$
Star bright	Magnitude	6 to 1	$100^{.2}$ or $10^{.4} = 2.51$
Tornado	Enhanced Fujita	0 to 5	20 mph to 30 mph
Wind	Beaufort	0 to 12	$.836 \times 10^{3/2}$ m/s

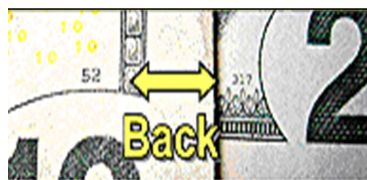
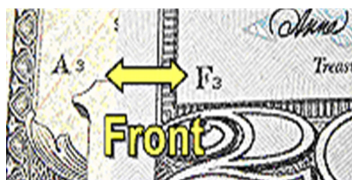
Money

(A)B 123456789 A B2

U.S. coins have the date minted, often with a mintmark. Currently the mintmark, if blank or a P, designates Philadelphia, D for Denver, and S for San Francisco. However, for some coins in 1965, 1966, and 1967 there were no mintmarks regardless of where the coin was minted; the U.S. Congress sought to minimize hoarding. Commemorative U.S. coins are currently issued in quarter (\$.25) denominations (first for states, then territories, and now for national parks) and one dollar denominations (U.S. presidents). For currency, the older bills have a Federal Reserve Bank district number and corresponding alphabetic character on each bill *and* in the serial number of the bill:

1 A	Boston	7 G	Chicago
2 B	New York	8 H	St. Louis
3 C	Philadelphia	9 I	Minneapolis
4 D	Cleveland	10 J	Kansas City, MO
5 E	Richmond	11 K	Dallas
6 F	Atlanta	12 L	San Francisco

There are also tinier plate numbers, on both sides of the bill, which must correspond to each other and to the bill's serial number by a secret formula:



AXXXXXXXXXXX

European coins are separately issued by each country in the monetary union; Finland (and soon the Netherlands) does not issue 1 or 2 cent euro coins. Euro commemorative coins are issued in 2€ dominations. Euro bank notes bear a serial letter and number with the letter designating the country. The entire serial number must conform to a check digit of 8. This is determined by the letter (numeric equivalent base 26) added to the sum of the digits; this sum's digits are added repeatedly and equals 8.

$$A + X_1 + X_2 + X_3 + X_4 + X_5 + X_6 + X_7 + X_8 + X_9 + X_{10} + X_{11} = SS: S_1 + S_2 = 8$$

An equivalent method is that the numeric sum's digits must add to the country's check sum code; see: http://en.wikipedia.org/wiki/Euro_banknotes#Serial_number and <http://www.ibiblio.org/theeuro/InformationWebsite.htm?http://www.ibiblio.org/theeuro/bnk.serialnumbers.htm> .

Here are the country serial code letters, check sum codes, and their countries:

Code	Check	Country		Code	Check	Country
D	4	Estonia	P	1		Netherlands
E	3	Slovakia		R	8	Luxembourg*
F	2	Malta		S	7	Italy
G	1	Cyprus		T	6	Ireland
H	9	Slovenia		U	5	France
J	7	United Kingdom*		V	4	Spain
K	6	Sweden*		W	3	Denmark*
L	5	Finland		X	2	Germany
M	4	Portugal		Y	1	Greece
N	3	Austria		Z	9	Belgium/Luxembourg

* Reserved for future use; Luxembourg used the Belgian franc

AAB

Exchange rates to another currency can be expressed as either per the foreign or domestic currency; they are reciprocals of each other. The following is a stylized cross rate table where the horizontal column headings are in ISO monetary codes and represent the cost of a foreign currency and the vertical row names are the countries and represent the per unit basis of computation.

	USD	CAD	GBP	CHF	EUR
U.S.	-	.909	.500	1.250	.667
Canada	1.100	-	.550	1.375	.733
U.K.	2.000	1.818	-	2.500	1.333
Switz.	.800	.727	.400	-	.533
Euro	1.500	1.364	.750	1.875	-

For money transfers and credit card purchases, the currency is designated by an *ISO 4217* three letter code with the first two letters (**AA**) for the country (using the same ISO country codes as on the internet) and the last letter (**B**) for the name of the currency (see http://en.wikipedia.org/wiki/ISO_4217). Thus **AUD**, **CAD**, **HKD**, and **USD** represent *A*ustralian, *C*anadian, *H*ong *K*ong, and *U.S.* dollars (\$ noting that the U.S. version may be doubled stroked per the U over the S), **GBP** for the *G*reat *B*ritain *p*ound (£), **CHF** for the Swiss (from the Latin *C*onfederatio *H*elvetica) franc (SFr), **MXP** then **MXN** for the *M*exican *p*eso replaced by the *n*uevo (new) peso (\$ after the amount), **TRL** then **TRY** for *T*urkish *l*ira later *y*eni (new) lira, and **EUR** for the euro (€).

The transfer of money may require a SWIFT (Society for Worldwide Interbank Financial Telecommunication [vs. Society for Wire Intercommunication Funds Transfer]) or BIC (Bank Identifier Code) code in addition to an IBAN (International Bank Account Number which is used outside Canada and the U.S.).

Numbers

U.S. and international nomenclature for large numbers may differ (especially outside financial references); a *billion* is a *milliard* and a *trillion* is a *billion* respectively. Often international counting starts with the thumb instead of the first finger whereas the ground floor is 1 in the U.S. and zero internationally. Notation may differ with the usage of commas instead of decimal points and vice versa (or blanks) so that 1,234.56 in U.S. is 1.234,56 or 1 234,56 internationally. By convention, years omit such notation (1234).

Scientific notation transforms 1.234×10^3 into 1,234; in computer notation it would be $1.234 * 10^3$ or its equivalent 1.234 E+3. Percentages are 100 times the original value.

Numbering systems may use other bases. Hexadecimal uses a base of 16 with A as 10 through F as 15. While $2 + 2$ equals 4 in base 10, it would be 10 in base 4, 11 in base 3, and 100 in base 2 (binary). Real numbers are found in the real world, whereas an imaginary number like i ($[-1]^{1/2}$) is found in complex numbers ($a+bx\dots$) and the trigonometric algebra of electronics. The Greeks used to think that all real numbers were rational (a fraction), but irrational numbers do exist such as $2^{1/2}$, e (2.71828...), and π (3.14159...). Prime numbers have no other factors and thus are useful for encryption; the SETI (Search for Extra Terrestrial Intelligence) used a message which had a length that was a product of two prime numbers suggesting a rectangular reformulation.

Ordinal numbers can be mathematically manipulated whereas Roman numerals are cardinal numbers and are used nominally where:

1 = I	5 = V
10 = X	50 = L
100 = C	500 = D
1000 = M	

Often if the Roman numeral is one character less than the next numeral which is a multiple of 5 then it is placed prior and subtracted. An example would be 1647 as MDCXLVII.

Travel reservations using a record locator may use six characters comprised of numbers and letters. These can be thought of as a base 36 cardinal numbering system allowing some 2,176,782,336 combinations. However, the letters I and O are often excluded per their similarity to the numbers 1 and 0 which would allow 34 characters and some 1,544,804,416 combinations. Likewise, for a license plate of say three letters and three numbers, there would be 13,824,000 combinations (20 times more if order is variable); for three letters and four numbers, there would be 138,240,000 combinations (35 times more if order is variable). A three character 26 letter coding for say airport codes, ICAO airline codes, broadcast stations in North America (after K, W, C, or XE), currency codes, money market mutual funds, or stock symbols of three letters would allow 17,576 combinations; a two character 26 letter code allows 676 combinations.

Arabic uses Hindu numerals while we ironically use Arabic numerals:

•	۱	۲	۳	۴	۵	۶	۷	۸	۹
0	1	2	3	4	5	6	7	8	9

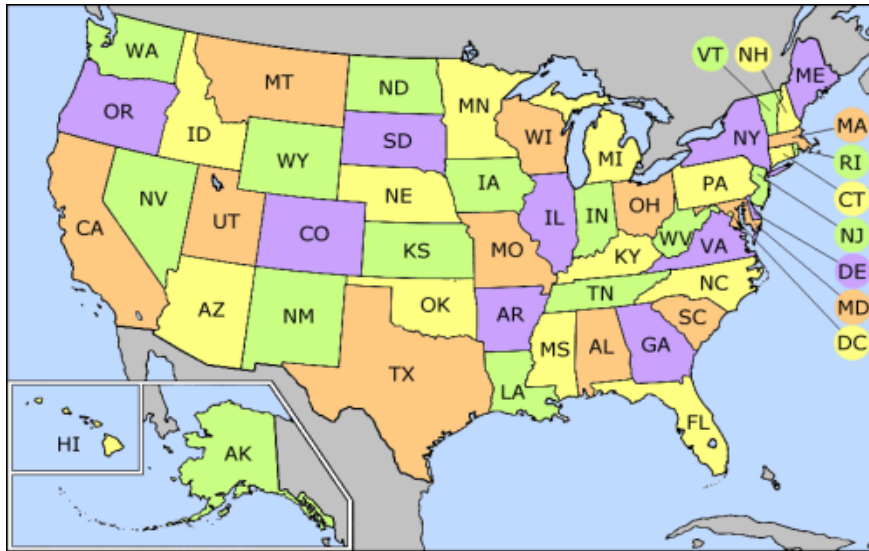
Albert Einstein observed that exponential compounding was the most powerful of equations. Growth at rate r compounds such that a future value equals $(1+r/p)^{tp}$ where t is time and p is the frequency of compounding. If p is one (yearly), then the time to double will satisfy rt equals 72 if r is a percentage. As the frequency of compounding p increases to infinity, then the future value will approach e^{rt} . In this instantaneous compounding case, the time to double shrinks and is approximated by rt equaling about 69 with r as a percentage.

In financial transactions, present values become relevant and equal the reciprocal of future values. A stream of like present values is called an annuity and if payments are at the end of the period equals $(1-1/[1+r]^t)/r$. Annuity computations are used frequently as a reciprocal in financing loans. When an annuity continues indefinitely, now called a perpetuity, it equals $1/r$.

Postal Codes

AB

A U.S. state abbreviation is followed properly by two spaces and a postal code:



Note these Mexican abbreviations: CO Coahuila, MI Michoacán, and MO Morelos.

Canadian province abbreviations are:

AB	Alberta	NU	Nunavut
BC	British Columbia	ON	Ontario
MB	Manitoba	PE	Prince Edward Island
NB	New Brunswick	QC*	Québec
NL*	Newfoundland & Labrador.	SE	Saskatchewan
NS	Nova Scotia	YT	Yukon
NT	Northwest Terr	*	(changed from NF & PQ)

Note these Mexican abbreviations: BC Baja California (Norte) and NL Nuevo León.

AAABB(-CCCC)

U.S. postal codes or Zip codes (Zoning Improvement Program) are arranged geographically with lower numbers in the east. A sorting center is associated with the first three digits (**AAA**). For those having differing place names, the next two digits (**BB**) are *often* arranged alphabetically. Thus 90210 is Beverly Hills and 90291 is Venice. For those postal Zip codes having the same place name, the next two digits often are the previous city zone numbers often issued chronologically. Other countries may use fewer numbers; in Canada and the U.K. they use six characters including letters.

The extra four numbers in Zip-plus (**CCCC**) are added to the five-digit Zip code and are for sorting down to block level. The nine digit Zip plus code is meant to be machine readable. The machine readable code adds a check digit(s). Each character is read in multiples of five strokes either a long or short. They are decoded by:

1	...ll	6	.ll.
2	..l.l	7	l...l
3	..ll.	8	l..l.
4	.l..l	9	l.l..
5	.l.l.	0	ll...

Note that there are always two long and three short strokes for each digit. Thus a corrupted or illegitimate coded digit would have either fewer or more strokes while noting that it is not a binary number.

There is no advantage (in fact a disadvantage) in a handwritten Zip-plus code (nine digits versus the five digit code) given that the *handwritten* address will be sorted, separated, then encoded with a Zip-plus machine readable bar code, and then sorted again!

Postage Stamps

On sheets of postage stamps, there may be a number often in a corner of the sheet. These are highly collectible and as a general rule, the perforations and edges of any stamp should/need not be separated. The stamps of the U.K. do not carry the name of the country but do carry a symbol of their King or Queen.

Railroads/Trains

XX(XX)

U.S. Amtrak and Canadian Via passenger trains are numbered so that lower numbered trains travel a farther distance. *Acela* trains are numbered in the 2000s. Even numbered trains travel east or south and odd numbered trains travel west or north.

In Ireland and United Kingdom, passenger trains do not have train numbers. On the continent, train numbers vary greatly with Dutch train numbers generally not being displayed. Internet guides are available at www.bahn.de and www.oebb.at for most European rail travel (except Portugal and Spain; see www.cp.pt and www.renfe.es). Lower train numbers are often (but not always) associated with major longer distant trains with the notable exceptions of 6000s and 9000s for *TGV* and *EuroStar* trains. There are numerous *InterCity*(-*é*) national trains and regional trains with the latter often having train numbers up to six or even eight digits.

AB(CD)

U.S. and Canadian equipment bear reporting marks of two to four letters. If it ends in X then the owner is not a railroad, if it ends in U then it is a container, and if it ends in Z then it is a truck trailer.

Shown below are modern railroad reporting marks which now omit ampersands (&) with the prior acquired railroads indented as the reporting marks may still be used:

AMTK	Amtrak
BCR	British Columbia (BC Rail)
BNSF	Burlington Northern Santa Fe
ATSF	Atchison, Topeka & (Santa Fe)
TP(&)W	Toledo, Peoria, & Western
BN	Burlington Northern
CB(&)Q	Chicago, (Burlington) & Quincy
GN	Great Northern
NP	Northern Pacific
SP(&)S	Spokane, Portland & Seattle
SLSF	St. Louis-San Francisco (Frisco)
CN/-A	Canadi(a/e)n National
CV	Central Vermont
DWP	Duluth, Winnipeg & Pacific
GTW	(Grand Trunk) Western
AA	Ann Arbor
DTI	Detroit, Toledo & Ironton
DTS	Detroit & Toledo Shore Line
ICG	Illinois Central Gulf
GM(&)O	Gulf, Mobile, & Ohio
IC	Illinois Central
WC	Wisconsin Central
GBW	Green Bay & Western
CP	Canadian Pacific
D(&)H	Delaware & Hudson
DSA	Duluth South Shore & Atlantic
SOO	Minneapolis, St. Paul & Sault Ste. Marie (Soo Line)
MILW	Chicago, (Milwaukee [Road]), St. Paul & Pacific

MNS	Minneapolis, Northfield & Southern
CSX/-TCSX	Transportation
B&O/C&O	Chessie System
B&O	Baltimore & Ohio
C&O	Chesapeake & Ohio
PM	Pere Marquette
WM	Western Maryland
P(&)LE	Pittsburgh & Lake Erie
RF(&)P	Richmond, Fredericksburg & Potomac
SBD	Seaboard System
AWP	Atlanta & West Point
CRR	Clinchfield
GA	Georgia
L(&)N	Louisville & Nashville
MON	Chicago, Indianapolis & Louisville (Monon)
NC	Nashville, Chattanooga & St. Louis
SCL	Seaboard Coastline
ACL	Atlantic Coast Line
P(&)N	Piedmont & Northern
SAL	Seaboard Air Line
FEC	Florida East Coast
FXE	Ferromex
GTIS	Guilford (Pan Am)
B(&)M	Boston & Maine
MEC	Maine Central
KCS	Kansas City Southern
MMA	Montreal, Maine & Atlantic
BAR	Bangor & Aroostook
NDM	Nacionales de Mexico
NS	Norfolk Southern
CR	Consolidated Rail (Conrail)
CNJ	Central of New Jersey
EL	Erie Lackawanna
DL	Delaware, (Lackawanna) & Western
ERIE	Erie
LV	Lehigh Valley
LIRR	Long Island Railroad
MRY	Monongahela
PC	Penn Central
NH	New York, (New Haven) & Hartford
NYC	New York Central
P&E	Peoria & Eastern
PRR	Pennsylvania
PRSL	Pennsylvania-Reading Seashore Lines
RDG	Reading
N(&)W	Norfolk & Western
ACY	Akron, Canton, & Youngstown
INT	Interstate
IT	Illinois Terminal
NKP	New York, Chicago & St. Louis (Nickel Plate)
NS	Norfolk Southern
PW(&)V	Pittsburgh & West Virginia
VGN	Virginian

WAB	Wabash
SOU	Southern
CG	Central of Georgia
S(&)A	Savannah & Atlanta
UP/-Y	Union Pacific
ARMN	Armour (refrigerator)
UPFE/PFE	Pacific Fruit Express
CNW	Chicago & Northwestern
CGW	Chicago Great Western
CMO	Chicago, St. Paul, Minneapolis & (Omaha [Road])
MSL	Minneapolis & St. Louis
RI	Chicago, (Rock Island) & Pacific
DRGW	Denver & (Rio Grande) Western
LASL	Los Angeles & Salt Lake
MKT	Missouri-Kansas-Texas (Katy)
MP	Missouri Pacific
C(&)EI	Chicago & Eastern Illinois
T(&)P	Texas & Pacific
SI	Spokane International
SP	Southern Pacific
SSW	St. Louis Southwestern (Cotton Belt)
T(&)NO	Texas & New Orleans
WP	Western Pacific
SN	Sacramento Northern
VTR	Vermont Ry.
RUT	Rutland

In Europe the rail country codes, rail reporting marks (UIC), and major trains are:

Code	Country	Major Railroad	Major Trains
A	Austria	ÖBB	RailJet, ICE
	Belarus	BŽD	
B	Belgium	SNCB/NMBS	EuroStar, Thalys, ICE, TGV
	Bosnia-Herz.	ŽBH	
	Bulgaria	BDŽ	
HR	Croatia	HŽ	
CZ	Czech	ČD	SuperCity
DK	Denmark	DSB	Lyn, ICE, Snabtbåg
	Estonia	EVR	
FIN	Finland	VR	Pendolino
F	France	SNCF	TGV, EuroStar, Thalys, ICE
D	Germany	DB	ICE, Thalys, RailJet, TGV
GB	Great Britain	BR/NR	EuroStar
	Greece	OSE/OSE	
H	Hungary	MAV	RailJet
IE	Ireland	IE	InterCity
I	Italy	FS	Alta Velocità, EuroStar Italia, Cisalpino, TGV
	Latvia	LDZ	
	Lithuania	LG	
L	Luxembourg	CFL	TGV
	Moldova	CF	
NL	Netherlands	NS	Thalys, Fyra, ICE
N	Norway	NSB	
PL	Poland	PKP	XX

P	Portugal	CP	Alfa
RO	Romania	(SN)CFR	
RUS	Russia	RŽD	
	Serbia	JŽ	
SK	Slovakia	ŽSR	
SLO	Slovenia	SŽ	ICS
E	Spain	RENFE	Ave,Altaria,Alvia,Avant,Alaris,EuroMed
S	Sweden	SJ	Snabbtåg (née X2000)
CH	Switzerland	SBB/CFF/FFS	Cisalpino,ICE,TGV,RailJet
	Ukraine	UZ	

NB: EuroCity international trains still exist across many countries.

Ships/Boats

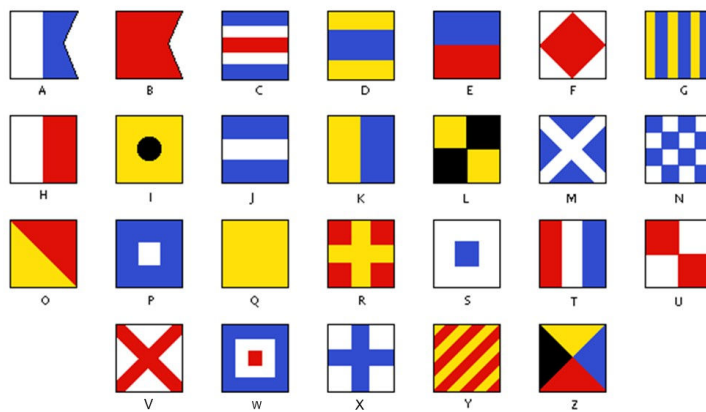
AB(CD)

Many know that a ship bearing *U.S.S.* is a U.S. Ship, and that *H.M.S.* is Her/His Majesty’s Ship and is associated with British Commonwealth countries (but see Sweden). However both of these may be expanded to denote the type of ship and in the case of H.M.S. may include a reference to the country. Some significant ones include:

Australia	HMAS	Mexico	ARM
Belgium	BNS	New Zealand	HMNZS
Canada	HMCS/NCSM	Norway	KNM/HNoMS
Denmark	KDM	Netherlands	HNLMS
France	FS	Portugal	NRP
Germany	FGS	Russia	RFS/PΦC
Greece	HS	Spain	SPS
India	INS	Sweden	HMS
Ireland	LE	U. K.	HMS+
Italy	ITS	U. S.	USS+

Others may be found at: <http://forum.vc.igg.com/viewthread.php?tid=21789> .

Maritime flags are:



In the U.S., boats are required to display a registration state code and number. The state code is often the same as the U.S. postal abbreviation with some exceptions (followed by their postal abbreviations):

CF/CA	California	MC/MI	Michigan
CL/CO	Colorado	MI/MO	Missouri
CM/MP	Northern Mariana Islands	NB/NE	Nebraska
DL/DE	Delaware	WN/WA	Washington
HA/HI	Hawaii	WS/WI	Wisconsin
KA/KS	Kansas		

AAA BB CCCC

Social Security numbers are issued in the United States for tax collection purposes and for retirement. Many do not know that if one is single and works one job that the person is entitled to 2 withholding exemptions; these are associated with W2 and W4 forms that employers use for gathering and reporting tax information.

Until recently, the first three digits (**AAA**) of a U.S. social security number represented the state of issuance with 0 being in the east and 6 being in the west. Digits in the second grouping (**BB**) are issued in odd numbers to 10 then even thereafter, then even numbers to 10, then odd thereafter. If the number started with a 700-728, then the number was formerly associated with a railroad worker. Social Security numbers are now being issued with other numbers as *some* states have used up their original allotment. If a similar appearing number starts with a 95, or other similar number with a 9, then it may be a California Board of Equalization number and/or a taxpayer identification number for entities other than individuals. .

Here are the states of issuance per the Social Security Administration:

001-003	New Hampshire	449-467	Texas
004-007	Maine	627-645	
008-009	Vermont	468-477	Minnesota
010-034	Massachusetts	478-485	Iowa
035-039	Rhode Island	486-500	Missouri
040-049	Connecticut	501-502	North Dakota
050-134	New York	503-504	South Dakota
135-158	New Jersey	505-508	Nebraska
159-211	Pennsylvania	509-515	Kansas
212-220	Maryland	516-517	Montana
221-222	Delaware	518-519	Idaho
223-231	Virginia	520	Wyoming
691-699		521-524	Colorado
232-236	West Virginia	650-653	
232	North Carolina	525/585	New Mexico
237-246		648-649	
681-690		526-527	Arizona
247-251	South Carolina	600-601	
654-658		764-765	
252-260	Georgia	528-529	Utah
667-675		646-647	
261-267	Florida	531-539	Washington
589-595		540-544	Oregon
766-772		545-573	California
268-302	Ohio	602-626	
303-317	Indiana	574	Alaska
318-361	Illinois	575-576	Hawaii
362-386	Michigan	750-751	
387-399	Wisconsin	577-579	District of Columbia
400-407	Kentucky	580	Virgin Islands
408-415	Tennessee	580-584	Puerto Rico
756-763		596-599	
416-424	Alabama	586	Guam
425-428	Mississippi	586	American Samoa
587-588		586	Philippine Islands
752-755		700-728	Railroad Board
429-432	Arkansas	729-733	Enumeration Entry
676-679			
433-439	Louisiana		
659-665			
440-448	Oklahoma		
530/680	Nevada		

Stocks

A(BC)/-DE

U.S. common equity shares or stocks trade now in decimals (formerly $1/8^{\text{ths}}$) in multiples of one cent (\$.01). Stock options (now with a new quotation system) represent 100 shares and trade usually in nickels (\$.05) and if over \$3 then dimes (\$.10); a number of options trade instead in pennies (\$.01) then nickels (\$.05) if over \$3; some index options always trade in pennies. Options expire the Sunday after the third Friday of a given month save those which expire after the end of a quarter.

Stocks have ticker symbols ranging from one to five characters. If stocks pay dividends then they generally pay them quarterly. If the stock has three or less characters **A(BC)**, then the shares are usually traded on the New York or American Stock Exchanges. Among the various stock exchanges around the world, the Stock Exchange in London does *not* properly include the name of the city of London in its title.

Here are U.S. securities which have a single letter stock symbol:

A Agilent Technologies	N NetSuite
B Barnes Group	O Realty Income Corp
C CitiGroup (formerly Chrysler)	P Pandora Media
D Dominion Resources	R Ryder System
E ENI ADR	S Sprint Nextel (formerly Sears)
F Ford Motor	T AT&T
G Genpact	V Visa
H Hyatt Hotels	W – (formerly Woolworth)
K Kellogg Company	X United States Steel
L Loews Corp. Holding	Y Allegheny Insurance
M Macy's Inc.	Z Zillow Cl A (formerly Zenith)

When the characters are four or five **ABCD(E)**, then the shares are generally traded over the counter which *may* be on the NASDAQ (National Association of Securities Dealers Automated Quotation) system.

Mutual funds trade in pennies (\$.01) and have a five letter symbol ending in **X**; if the mutual fund is a money market then the five letter symbol ends in **XX**. Mutual funds trade at the end of the trading day and are bought in dollar amounts, but sold in unit amounts. An Exchange Traded Fund (ETF) usually has three letters and trades like a stock. ETFs and mutual funds usually pay dividends monthly.

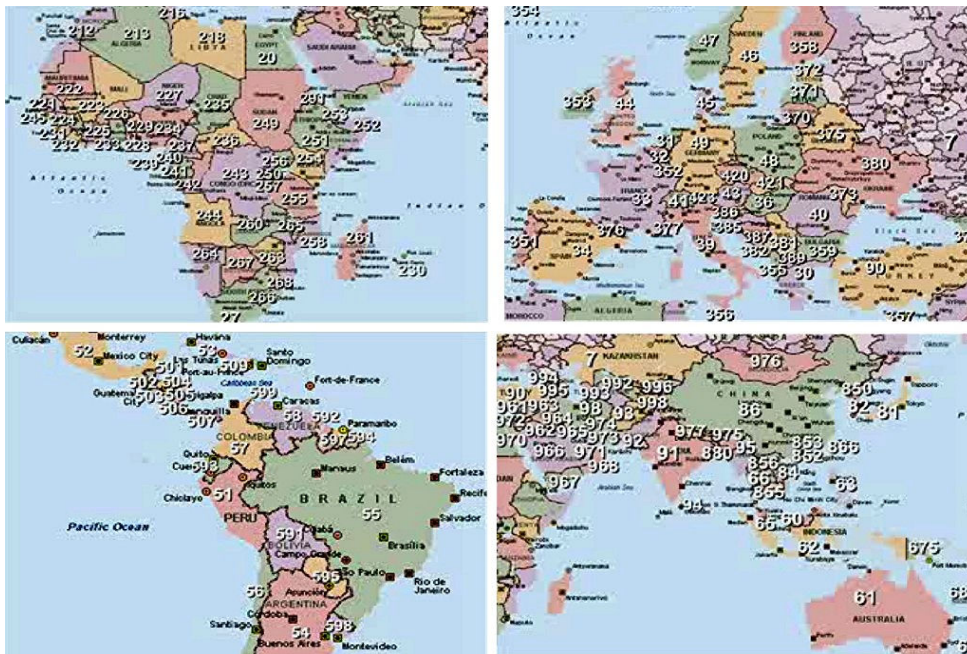
Telephone

(XX) XAB CCX DDXX

Except for Russia and North America, most countries have a two digit country code. While the country code for Canada and U.S. is 1 and often precedes a telephone number in parenthesis as a reminder to dial 1 to make a long distance call, it also serves as a country code reminder for foreign callers. If the country code is three digits, then the country is new or small. Note that East Germany's country code 37 was retired when Germany was unified (and thus changed their city dialing codes and postal codes). Foreign telephone numbers often start with a zero for their city access codes (otherwise similar to U.S. area codes in that they are internal to the same country), but the leading zero often is not included when dialing from abroad and preceded by the country code.

Country codes are arranged geographically:

1 North America	6 Southeast Asia/Pacific
2 Africa	7 Russia
3 Europe	8 East Asia/Marifat (satellite)
4 Europe	9 Southwest Asia
5 Latin America	



A U.S. telephone number has a three digit area code which indicates a large city if the second digit (A) is a 1, indicates a sparsely populated area if a 0, and indicates a newer area code if otherwise and/or if it is followed (B) by 1 or 0. The old rotary dial associated pulses to a digit (with 0 as ten pulses); touch tone dialing associates two tones with each number or # and * signs by the column and row of the touch pad. The # sign is called a number or pound (weight) sign in the U.S. but a hash sign elsewhere noting the British usage of the monetary pound sign (£). The * sign, while properly an asterisk, is called a star sign. By the way, Danish telephones have the lower numbers at the bottom of the number pad instead of the top.

The 809 area code had been assigned to the Caribbean and has been changed to various country codes (see above). The WATS (toll free) codes include 800, and the series 822 through 888 in multiples of 11. The prefix (the next three numbers after the area code) will be newer if either of the first two digits (CCX) contain a 1 or a 0 reflecting a previous time when letters (ABC through XYZ) were associated with the numbers 2 through 9. 700 and 900 area codes and 976 prefix numbers are CPC (toll) numbers. Here are some dial faces of old alphabetic telephone prefix mnemonics starting with 39, 37, 45, 47, 67, and 83:



U.S. telephone numbers historically often went from four digits to six digits which then became seven digits, and then became ten digits in some areas to include the area code. The dropping of the alphabetic mnemonics allowed the additional usage of the numbers 1 and 0 where mnemonics previously could not exist. Contrary to popular belief, the 555 prefix does exist, but only for billing and international access to the U.S and as an 800 type number. The 520 prefix is for high volume calling (phone contests for example) and 976 is a toll prefix for commercial use. There was a time when public phone booths used to start the last four digits (DDXX) with a 99.

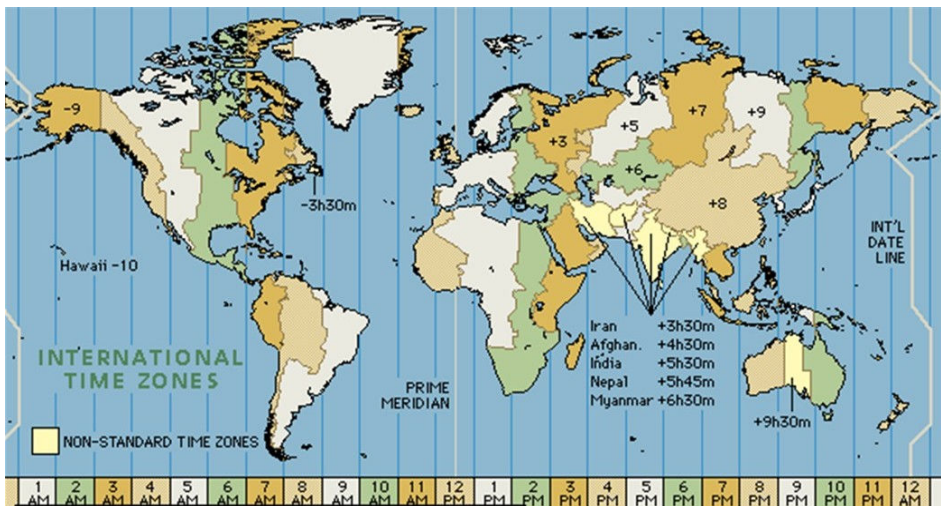
In France, telephone numbers went from eight to ten digits now including the first two digits associated with five regions in France plus another for cell phones.

Temperature
20°C = 68°F

The Celsius (C) temperature scale sets freezing water at 0 degrees and boiling water at 100 degrees while the Fahrenheit (F) scale sets these at 32 and 212 degrees respectively. To convert these use $F = 32 + 9/5C$ or $C = 5/9(F - 32)$. A shortcut is that 20 degrees Celsius equals 68 degrees Fahrenheit plus or minus 9 Fahrenheit degrees for each 5 Celsius degrees.

Time
3:00pm = 15:00

International time often uses the 24-hour clock so that 3:00pm is 15:00 with the addition of 12 for pm. There are 32 time zones with six being 30 minutes different (Afghanistan, central Australia, Burma/Myanmar, India, Iran, and Newfoundland), Nepal at 45 minutes, and noting that there are two sides of the International Date Line. Russia recently eliminated time zone differences of 1 hour so that now time zone changes there are now in 2 hour multiples. Some localities advance their time by one hour during their summer called Daylight (Saving) or Summer time. The dates for these time changes were recently revised to lengthen the number of weeks with some older electronics now making the changes on the wrong older dates.



Universal Product Codes (UPC)

ABABAB ABABAC

Universal Product Codes are comprised of twelve-digit number comprised of a six digit manufacturer's code, a five digit product code, and a check digit.



The check digit (C) equals the 3 times the sum of the odd digits (A's) and the sum of the even digits (B's) subtracted from the next multiple of ten, or:

$$C = 10X - 3 (A_1 + A_3 + A_5 + A_7 + A_9 + A_{11}) - (B_2 + B_4 + B_6 + B_8 + B_{10}).$$

If there is a leading zero in the manufacturer's or product codes, then it is suppressed. The bars can be read in either direction in that the second half of the bar code is up side down and is separated by a center separation bar. The width of the bars corresponds to:

Separator	1111	Start	11
0	3211 or 1123	5	1231 or 1321
1	2221 or 1222	6	1114 or 4111
2	2122 or 2212	7	1312 or 2131
3	1411 or 1141	8	1213 or 3121
4	1132 or 2311	9	3112 or 2113

Note that the sum of each of the encoded digit's bar code equals seven.