# Record of Important Things

If found, please return to:

Simply, people can no longer remember passwords good enough to reliably defend against dictionary attacks, and are much more secure if they choose a password too complicated to remember and then write it down. We're all good at securing small pieces of paper. I recommend that people write their passwords down on a small piece of paper, and keep it with their other valuable small pieces of paper: in their wallet.

Bruce Schneier

# Authentication credentials

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17. Secure passphrases	s with Diceware
24. Security questions	

Website	
Login or E-mail address	
Passwords used	Date
Notes	

Website	
Login or E-mail address	
Passwords used	Date

Website	
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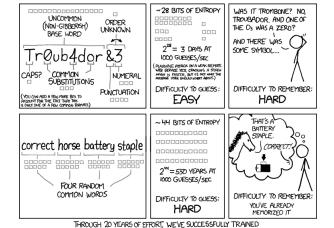
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# Secure passphrases with Diceware



EVERYONE TO USE PASSWORDS THAT ARE HARD FOR HUMANS TO REMEMBER, BUT EASY FOR COMPUTERS TO GUESS.

Comic by https://xkcd.com/ @()(8)

## What is a Diceware passphrase?

A passphrase is a bunch of words and characters that you type into your computer to let it know for sure that the person typing is you. Passphrases differ from passwords only in length.

Diceware is a method for picking passphrases which uses dice to select words at random from a special list. Each word in the list is preceded by a four digit number. All the digits are between one and six, allowing you to use the outcomes of four dice rolls to select a word from the list.

#### Directions

- 1 Decide how many words you want in your passphrase. A five-word passphrase provides a level of security much higher than the passwords most people use. For NSA-proof security, use seven words.
- 2 Roll all four dice at once and write the results down, reading from left to right, on a scrap of paper. Make as many of these four-digit groups as you want words in your passphrase.
- 3 Flip to the word list and look up the corresponding word next to each four-digit number.
- 4 The words you have found are your new passphrase!
- 5 Come up with a way to remember your phrase. It might be a story, mental picture, or sentence that will remind you of the phrase you generated.

## Example

Suppose you want a five-word passphrase. You will need  $5\times 4$  or 20 dice rolls. Let's say they come out as:

```
1 6 6 6 5 1 5 6 5 3 5 6 3 2 2 3 5 6 2 6
```

Write the results on a scrap of paper in groups of four:

1666

5 1 5 6

5 3 5 6

3 2 2 3

5626

You then look up each group of five rolls in the Diceware word list by finding the number in the list and writing down the word next to the number:

1666 cognitive

5156 poetic

 $5356\ ribbon$ 

3223 garlic

5626 smelliness

Your passphrase would then be:

 $cognitive\ poetic\ ribbon\ garlic\ smelliness$ 

This passphrase is one of the 3,656,158,440,062,976 ( $6^{20}$ ) alternatives that could have been chosen by this method.

1111	aardvark	1324	aquamarine	1541	buddhist	2154 cuticle
1112	abandoned	1325	arachnid	1542	buffalo	2155 cybernetic
1112	abbroviato	1226	arbitrato	1542	bullfrog	2156 evelict
1114	abdomon	1221	ardontly	1544	bunny	2161 cylinder
1115	- b b	1222	ardentry	1545	LL	2162
1116	abiding	1222	arena arena	1546	bussoy	2162 cyminiai
1110	abiding	1224	argument	1551	buzzard	2163 Cynicism
1121	abnormai	1334	aristocrat	1331	cabin	2164 Cypress
1122	abrasion	1335	armchair	1552	cactus	2165 cytoplasm
1123	absorbing	1336	aromatic	1553	cadillac	2166 dachshund
1124	abundant	1341	arrowhead	1554	cafeteria	2211 daffodil
1125	abyss	1342	arsonist	1555	cage	2212 dagger
1126	academy	1343	artichoke	1556	cahoots	2213 dairy
1131	accountant	1344	asbestos	1561	cajoling	2214 dalmatian
1132	acetone	1345	ascend	1562	cakewalk	2215 dandelion
1133	achiness	1346	aseptic	1563	calculator	2216 dartboard
1134	acid	1351	ashamed	1564	camera	2221 dastardly
1135	acoustics	1352	asinine	1565	canister	2222 datebook
1136	acquire	1353	asleen	1566	capsule	2223 daughter
1141	acrobat	1354	asocial	1611	carrot	2224 dawn
1142	actress	1355	asparagus	1612	cashow	2225 daytime
1142	nautonoss	1256	actropaut	1612	enthodynl	2226 daggler
1144	norogol	1261	astronaut	1614	caulediai	2220 dazziei 2221 danlar
1145	nosthotic	1262	n+lnc	1615	caucasian	2222 debrie
1140	- 60 Jit	1262		1616	caviai	2232 debits
1140	- G 4	1364	atmosphere	1601	ceasenre	2233 decai
1151	-fid	1304	atom	1621	cedar 1	2234 dedicate
1132	airaid	1303	atrocious	1022	cerery	2235 deepness
1153	aftershave	1366	attic	1623	cement	2236 defrost
1154	again	1411	atypical	1624	census	2241 degree
1155	agency	1412	auctioneer	1625	ceramics	2242 dehydrator
1156	aggressor	1413	auditorium	1626	cesspool	2243 deliverer
1161	aghast	1414	augmented	1631	chalkboard	2244 democrat
1162	agitate	1415	auspicious	1632	cheesecake	2245 dentist
1163	agnostic	1416	automobile	1633	chimney	2246 deodorant
1164	agonizing	1421	auxiliary	1634	chlorine	2251 depot
1165	agreeing	1422	avalanche	1635	chopsticks	2252 deranged
1166	aidless	1423	avenue	1636	chrome	2253 desktop
1211	aimlessly	1424	aviator	1641	chute	2254 detergent
1212	ajar	1425	avocado	1642	cilantro	2255 device
1212	a larmaloak	1426	DHIDRODOGG	1642	sinnamon	2256 dowtonity
1214	albatrace	1421	owbile	1644	airalo	2261 diamond
1214	alahamu	1422	awiirie	1645	cituanno	2262 dibe
1016	-16-16-	1432	awkwaru	1646	-iili	2202 dibs
1210	-1	1433	awning	1040	-l	2203 dictionary
1221	aigae	1434	awoke	1051	ciay	2204 dilluser
1222	allens	1435	axially	1652	ciergyman	2265 digit
1223	aikaiine	1436	azaiea	1653	ciipboard	2266 dilated
1224	almanac	1441	babbling	1654	clock	2311 dimple
1225	alongside	1442	backpack	1655	clubhouse	2312 dinnerware
1226	alphabet	1443	badass	1656	coathanger	2313 dioxide
1231	already	1444	bagpipe	1661	cobweb	2314 diploma
1232	also	1445	bakery	1662	coconut	2315 directory
1233	altitude	1446	balancing	1663	codeword	2316 dishcloth
1234	aluminum	1451	bamboo	1664	coexistent	2321 ditto
1235	always	1452	banana	1665	coffeecake	2322 dividers
1236	amazingly	1453	barracuda	1666	cognitive	2323 dizziness
1241	ambulance	1454	basket	2111	cohabitate	2324 doctor
1242	amendment	1455	bathrobe	2112	collarbone	2325 dodge
1243	amiable	1456	bazooka	2113	computer	2326 doll
1244	ammunition	1461	blade	2114	confetti	2331 dominoes
1245	amnesty	1462	blender	2115	conier	2332 donut
1246	amoeba	1463	blimp	2116	cornea	2333 doorstep
1251	amplifier	1464	blouse	2121	cosmetics	2334 dorsal
1252	amuser	1465	blurred	2122	cotton	2335 double
1252	annusei annusei	1466	bootward	2122	couch	2226 downstairs
1254	anagram anabor	1511	bohent	2123	couch	2241 dozed
1204	anchor	1510	bobcat	2124	coveriess	2041 dozed
1255	android	1512	body L	2120	coyote	2342 drainpipe
1256	anestnesia	1513	bogusness	2126	coziness	2343 dresser
1201	angeinsn	1514	ponemian	2131	crawnsn ,	2344 driitwood
1262	animai	1515	Doller	2132	crewmember	2345 droppings
1263	ankiet	1516	ponnet	2133	CT1D	2346 drum
1264	announcer	1521	Doots	2134	croissant	2351 dryer
1265	anonymous	1522	borough	2135	crumble	2352 dubiously
1266	answer	1523	bossiness	2136	crystal	2353 duckling
1311	antelope	1524	bottle	2141	cubical	2354 duffel
1312	anxiety	1525	bouquet	2142	cucumber	2355 dugout
1313	anyplace	1526	boxlike	2143	cuddly	2356 dumpster
			breath	2144	cufflink	2361 duplex
1314	aorta	1531				
1314	aorta apartment	1531	briefcase	2145	cuisine	2362 durable
1314 1315 1316	aorta apartment apnea	1531 1532 1533	briefcase broom	2145	cuisine culprit	2362 durable 2363 dustpan
1314 1315 1316 1321	aorta apartment apnea apostrophe	1531 1532 1533 1534	briefcase broom brushes	2145 2146 2151	cuisine culprit cup	2362 durable 2363 dustpan 2364 dutiful
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2411 dwelling	2624 evacuation	3241 gesture	3454 hygienist
2412 dwindling	2625 evergreen	3242 getture	3455 hypnotist
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2413 dynamite	2621 evolution	2244 gbouliably	2461 icopode
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2416 earlobe	2633 excerpt	3240 giddiness	3464 idti1
2421 easer	2034 exerciser	3231 girtshop	3464 Identical
2422 eavesdrop	2635 extoliate	3252 gigabyte	3465 idiocy
2423 ebook	2636 exhale	3253 gimmick	3466 idly
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2425 echoless	2642 exorcist	3255 giveaway	3512 ignition
2426 eclipse	2643 explode	3256 gizmo	3513 iguana
2431 ecosystem	2644 exquisite	3261 glasses	3514 illuminate
2432 ecstasy	2645 exterior	3262 gleeful	3515 imaging
2433 edged	2646 exuberant	3263 glisten	3516 imbecile
2434 editor	2651 fabric	3264 glove	3521 imitator
2435 educator	2652 factory	3265 glucose	3522 immigrant
2436 eelworm	2653 faded	3266 glycerin	3523 imprint
2441 eerie	2654 failsafe	3311 gnarly	3524 iodine
2442 effects	2655 falcon	3312 gnomish	3525 ionosphere
2443 eggnog	2656 family	3313 goatskin	3526 ipad
2444 egomaniac	2661 fanfare	3314 goggles	3531 iphone
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2462 elongated	3115 femur	3332 greyhound	3545 itinerary
2463 elsewhere	3116 fence	3333 grill	3546 itunes
2464 elusive	3121 ferret	3334 groundhog	3551 ivory
2465 elves	3122 festival	3335 grumbling	3552 jabbering
2466 emancipate	3123 fettuccine	3336 guacamole	3553 jackrabbit
2511 embroidery	3124 feudalist	3341 guerrilla	3554 jaguar
2512 emcee	3125 feverish	3342 guitar	3555 jailhouse
2513 emerald	3126 fiberglass	3343 gullible	3556 jalaneno
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2535 enlarged	3152 focus	3365 handgun	3622 jetski
2536 enormous	3153 foggy	3366 happiness	3623 jezebel
2541 enquirer	3154 folksong	3411 hardhat	3624 jiffy
2542 enrollment	3155 fondue	3412 hastily	3625 jigsaw
2543 ensemble	3156 footpath	3413 hatchling	3626 jingling
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4166 lemon	4423 myriad	4636 ought	5253 quesadilla
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4212 leonard	4425 myth	4642 ovation	5255 quote
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4235 lioness	4452 neither	4665 paprika	5322 register
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4246 llama	4463 neuron	5116 pebble	5333 renovator
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5465 scarf	6122 sulphur	6335 unpaved	6552 wholesaler
5466 scenario	6123 superstore	6336 unquenched	6553 wick
5511 schoolbook	6124 surfer	6341 unroll	6554 widow
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5551 shuttle	6164 tattoo	6421 urethane	6634 yard
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# Security questions

## Shouldn't I never write my password down?

In today's world, major corporations are hacked every week, and distributed cracking networks can break complex passwords in record time. It's safest to use a strong, unique password for each account you hold, but this makes memorization impractical.

Once, people were told not to write passwords down, ever, but the consensus among security professionals has evolved. You're better at protecting this book than corporations are at securing their password databases.

#### Can I just pick my own words from the list?

No. Humans are terrible at being unpredictable, and hackers are great at exploiting predictability. The primary reason that Diceware creates secure passwords is that you have no agency in the process.

#### Should I leave spaces between the words?

Yes. It makes your passphrase more secure, and easier to type.

# How many words should I use in my passphrase?

The most important accounts, such as email, e-commerce and financial sites, should use at least five words.

Encrypted drives storing sensitive personal and financial documents should use seven words.

Less critical accounts, like social media, can use three words provided the passwords are unique.

# My passphrase was rejected because it is too long, or because it lacks capitalization and numbers.

You may shorten words to no less than three letters without affecting the security of your passphrase. You may also replace words with their associated 4 digit number. You may *not* choose different words.

Capitalization adds a very small amount of security; if required, pick a memorable word to capitalize.

#### What if I lose this book?

The real purpose of this book is to provide you with the tools to generate strong, memorable passwords that are unbreakable by the world's most powerful computers. It need not be the only place that you record them.

## Are password managers like 1Password safe?

Yes, as long as the master password is strong & secure. For example, if Google Chrome is configured to store your password, make sure that you have a strong Google password, and don't leave your account logged in on computers or mobile devices that are not physically secure. The same is true of Safari and iCloud, Internet Explorer and Windows Live, etc.

#### Who invented Diceware?

Diceware was invented by Arnold G. Reinhold, a computer scientist in Cambridge, MA. It was first published to Usenet's *sci.crypt.research* on August 1<sup>st</sup>, 1995. For lots more information, visit https://goo.gl/xobzeV.

This book implements a simplified version developed by the Electronic Frontier Foundation (EFF) in 2016.

# What is the danger in reusing a password?

Imagine that you used the same password for an online clothing store, and your email provider. Months later, the clothing store is hacked and your password is stolen. The hackers login to your email and find correspondence from your bank. They use the bank website to reset your online banking password, and intercept the confirmation email. Next, they use the bank website to order checks in your name, initiate transfers, etc.

This story illustrates why the security of your email ranks above others in importance: for hackers, it is the gateway to all your accounts.

# How can I find out if my password has been stolen?

Visit haveibeenpwned.com, and type in your email address. This helpful site tracks the data leaks released by hackers, and maintains a database of email addresses hacked and what kind of data was stolen.

If your email tests positive, immediately change the password for the sites listed *and* any sites that might have shared the same password.

#### What is two-factor authentication?

Two-factor authentication enhances your password by sending a code to your phone or another device, which you must supply in order to be authorized. This ensures that even if someone has your password, they also need to have your phone.

It's a good idea to set up two-factor authentication on any account linked to your bank account or credit cards.

The US Government no longer recommends SMS for two-factor authentication, due to the ease with which text messages can be intercepted. Mobile apps such as Google Authenticator are more secure.

# What is phishing?

Phishing is when a hacker sends you an email message which appears to be from an organization you have a relationship with, but is actually a trap to make you give up your password.

Phishing emails typically warn you that something is wrong with your account, a delivery, or another kind of transaction, and urge you to open a document or log in via a link. They can be very realistic and insidious.

Always check the URL in any emailed links you click, and be sure that they take you to the site you expect.

## What is social engineering?

Social engineering is when a hacker contacts a company you do business with and pretends to be you. Often this means telling customer service that you have lost your password, and trying to convince the representative to change it or otherwise unlock your account.

The best protection against social engineering is to avoid easily-guessed security questions, such as your mother's maiden name. When asked for such information, generate a Diceware password instead.

#### How can I stay safe online?

Above all, practice good operational security (opsec). Be suspicious and careful online.

Minimize the number of accounts you open, and always choose the best account security available. Keep track of the accounts you open, close unused accounts, and change passwords on active accounts regularly. Prefer to shop with businesses that have strong online safeguards, and take advantage of identity protection and online shopping protection services offered by reputable financial institutions.

#### What to do if I've been hacked?

The resources at crashoverridenetwork.com and at staysafeonline.org are a good starting point. They provide tools to help determine whether you have been hacked and can help you to regain control over your online accounts.

# Record of Important Things (a)(1)(8)

Compiled & edited by Wade Brainerd

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XKCD comic from: https://xkcd.com/936/

Diceware by Arnold G. Reinhold from:

http://world.std.com/~reinhold/diceware.html

Diceware word list from:

https://www.eff.org/deeplinks/2016/07/new-wordlists-random-passphraseshttps://www.eff.org/files/2016/09/08/eff\_short\_wordlist\_2\_0.txt

The LATEX source code for this book is located at:

https://github.com/wadetb/dicebook