

## QUENCE - INSTRUCTIONS

(2025 Feb 14 version)

Quence is a password generator that makes strong, short, memorable passwords.  
To use it, you only need this document (including the two attached tables), and a six-sided die.  
Having two or four six-sided dice might make it easier.

Quence makes fake words like 'apetol', 'shults', 'phabid'...  
Each word is made from a half-word from the FIRST3 table plus a half-word from the LAST3 table.  
Each table is a 6×6 grid of blocks.  
Each block is a 6×6 grid of half-words.

1. Look at the FIRST3 table. Choose a random block by rolling the die for the row and then the column.  
Example: 1 2 --> row 1 and column 2 --> the block with 'abo' and 'cal'
2. Look at that block. Choose a random half-word by rolling the die twice in the same way.  
Example: 3 4 --> row 3 and column 4 --> 'ape'
3. Look at the LAST3 table. Repeat the same steps to choose a random half-word by rolling four more times.  
Example: 6 1 2 4 --> 'tol'
4. Put these half-words together to make a word.  
Example: 'apetol'  
If the word isn't possible (like 'oatnto'), you can throw out that word and start again.  
But don't be too picky. If you throw out more than about half the words you generate, your password may turn out slightly weaker than you expect. See below for details.
5. Repeat steps 1-4 to make as many words as you want.  
Three words is a reasonably strong password, four words is very strong.  
More than four is probably more than necessary for any practical application.  
See below for details.
6. Connect the words together to make a password.  
Example: capitalize and put periods between them --> Apetol.Shults.Phabid  
Example: just put them together --> apetolshultsphabid

### How many words for a strong password?

Each 6-letter word contributes about 20 bits of entropy. (Or precisely 20.68 bits.)  
So three words is a 60-bit password, which is considered moderately strong,  
and four words is an 80-bit password, which is considered very strong.  
Five words is a 100-bit password, which is extremely strong, and probably unnecessary for most uses.  
A page explaining the details, and explaining "bits of entropy," is coming soon.

### How many words can you throw out?

You can throw out any words you don't like.  
However, the "20.68 bits" number above assumes that all selections are absolutely random.  
Any amount of deliberate selection can reduce entropy.

If you want each word to still be 20 bits, you must keep at least 62% of the words you generate.  
In other words, if you generate 5 words and keep 3 of them, those 3 words are just about 20.00 bits each.

I find that 70%-85% of generated words are good pronounceable words - happily, this is more than 62%.  
Keeping only your favorite 70% will leave each word as 20.16 bits.  
Keeping only your favorite 50% will leave each word as 19.68 bits.  
Keeping only your favorite 25% will leave each word as 18.68 bits.

These numbers are hard-line calculations based on worst-case assumptions.  
In reality, you may be able to be more picky without as much reduction in password entropy.  
A page explaining the details, and explaining "bits of entropy," is coming soon.

# FIRST 3

|  |  |  |  |  |  |
|--|--|--|--|--|--|
| aba abb abd abe abi abl<br>agg agi ago agr ahe aid<br>ang ani ann ano ans ant<br>aug aus aut ava ave avi<br>bia bib bid big bil bin<br>bud buf bui bul bun bur | abo abr abs abu aca acc<br>aim air ala alb alc ale<br>anx any apa ape apo app<br>avo awa axi bab bac bad<br>bio bir bis bit bla ble<br>bus but buy cab cad cal | ace ach aci ack acq acr<br>alf alg ali alk all alm<br>apr aqu ara arb arc are<br>bag bai bak bal ban bap<br>bli blo blu boa bob bod<br>cam can cap car cas cat | act acu ada add ade adh<br>alo alp alr als alt alu<br>arg ari arm aro arr art<br>bar bas bat bay bea bec<br>boi bol bom bon boo bor<br>cau cav cea cel cem cen | adj adm ado adu adv aer<br>alw ama amb ame ami amm<br>asc ash asi ask asp ast<br>bed bee bef beg beh bei<br>bos bot bou bow box boy<br>cer cha che chi chl cho | aff afo afr aft aga age<br>amo amp ana anc and ane<br>ath atl atm ato att aud<br>bel ben ber bes bet bey<br>bra bre bri bro bru buc<br>chr chu cin cir cit civ |
| cla cle cli clo clu coa<br>cyc cyl dad dai dal dam<br>din dio dip dir dis div<br>dut dwe dyn eac eag ear<br>enf eng enh enj enl eno<br>eye fab fac fai fal fam | coc cod coe cof cog coh<br>dan dar das dat dau dav<br>doc doe dog doi dol dom<br>eas eat ech eco edg edi<br>enr ens ent env enz epi<br>fan far fas fat fau fav | coi col com con coo cop<br>day dea deb dec ded dee<br>don doo dor dos dot dou<br>edu edw eff egg egy eig<br>equ era ere eri ero err<br>fax fea feb fed fee fel | cor cos cot cou cov cow<br>def deg del dem den dep<br>dow doz dra dre dri dro<br>eit ela eld ele eli ell<br>esc esp ess est ete eth<br>fem fen fer fes fet fev | cra cre cri cro cru cry<br>der des det dev dia dic<br>dru dry dub duc due duk<br>elo els ema emb eme emi<br>eur eva eve evi evo exa<br>few fib fic fid fie fif | cub cul cup cur cus cut<br>did die dif dig dil dim<br>dul dum dun dup dur dus<br>emo emp ena enc end ene<br>exc exe exh exi exp ext<br>fig fil fin fir fis fit |
| fiv fix fla fle fli flo<br>gaz gea gen geo ger ges<br>gun guy hab had hai hal<br>hoo hop hor hos hot hou<br>int inv ion iow ira ire<br>jun jur jus kan kar kat | flu fly foc fol fon foo<br>get gif gil gir giv gla<br>ham han hap har has hat<br>how hug hum hun hur hus<br>iri iro irr isa isl iso<br>kee kel ken kep ker key | for fos fou fra fre fri<br>gle gli glo glu goa god<br>hau hav haw hay haz hea<br>hyd hyp ice ide ign ill<br>isr iss ita ite its jac<br>kid kil kin kis kit kne | fro fru fue ful fun fur<br>goe goi gol gon goo gor<br>hei hel hem hen her hes<br>ima imm imp ina inc ind<br>jam jan jea jef jen jer<br>kni kno kon kor lab lac | fus fut gai gal gam gan<br>gos got gov gra gre gri<br>het hid hig hil him hin<br>ine inf ing inh ini inj<br>jes jim job joh joi jon<br>lad lag lai lak lam lan | gap gar gas gat gau gav<br>gro gru gua gue gui gul<br>hir his hit hol hom hon<br>inl inn ino inp inq ins<br>jos jou joy jud jul jum<br>lap lar las lat lau law |
| lay lea lec led lee lef<br>lor los lot lou lov low<br>mel mem men mer mes met<br>nai nam nan nap nar nas<br>nuc num nur nut oak oat<br>org ori orn ort osc ost | leg lei len leo les let<br>loy luc lum lun lut lyi<br>mex mic mid mig mil min<br>nat nav nea nec nee neg<br>obe obj obl obs obt obv<br>oth ott oug our out ove | lev lew lia lib lic lie<br>lym mac mad mag mah mai<br>mir mis mit mix mob mod<br>nei nel neo ner nes net<br>occ oce oct odd off oft<br>owe owi own oxf oxi oxy | lif lig lik lil lim lin<br>maj mak mal mam man map<br>moi mol mom mon moo mor<br>neu nev new nex nic nin<br>ohi oil old oli omi onc<br>pac pad pag pai pal pan | lip liq lis lit liv loa<br>mar mas mat mau max may<br>mos mot mou mov muc mul<br>nit nob nod noi nom non<br>one onl ont ope opi opp<br>pap par pas pat pau pav | lob loc lod log lon loo<br>mcc mcg mea mec med mee<br>mun mur mus mut mys myt<br>nor nos not nou nov now<br>opt ora orb orc ord ore<br>pay pea pec ped pee pel |
| pen peo pep per pes pet<br>pou pov pow pra pre pri<br>reb rec red ree ref reg<br>rol rom roo ros rot rou<br>sci sco scr scu sea sec<br>six siz ske ski sky sla | pha phe phi pho phr phy<br>pro pru psy pub pul pum<br>reh rei rej rel rem ren<br>row roy rub rud rui rul<br>sed see seg sei sel sem<br>sle sli slo slu sma sme | pia pic pie pig pil pin<br>pun pup pur pus put pyr<br>reo rep req res ret rev<br>rum run rur rus rut sab<br>sen sep seq ser ses set<br>smi smo sna sno soa soc | pio pip pis pit pla ple<br>qua que qui quo rab rac<br>rew rhe rho rhy rib ric<br>sac sad saf sag sai sak<br>sev sew sha she shi sho<br>sod sof soi sol som son | plo plu poc poe poi pol<br>rad rag rai ral ram ran<br>rid rig rin rip ris rit<br>sal sam san sar sat sau<br>shr shu sic sid sie sig<br>soo sop sor sou sov spa | pon poo pop por pos pot<br>rap rar rat raw ray rea<br>riv roa rob roc rod rog<br>sav saw say sca sce sch<br>sil sim sin sir sis sit<br>spe sph spi spl spo spr |
| spu squ sta ste sti sto<br>tap tar tas tau tax tay<br>tok tol tom ton too top<br>unm unn unp unr uns unt<br>vib vic vid vie vig vil<br>wes wet wha whe whi who | str stu sty sub suc sud<br>tea tec tee tel tem ten<br>tor tot tou tow tox tra<br>unu unw upo upp ups upw<br>vin vio vir vis vit viv<br>why wic wid wif wil win | suf sug sui sul sum sun<br>ter tes tex tha the thi<br>tre tri tro tru try tub<br>urb urg uri usa use usi<br>voc voi vol von vot vul<br>wir wis wit wol wom won | sup sur sus swa swe swi<br>tho thr thu thy tic tid<br>tum tun tur twe twi two<br>usu uti utt vac val van<br>wag wai wak wal wan war<br>woo wor wou wra wre wri | swo sym syn syr sys tab<br>tie tig til tim tin tip<br>typ ult una unb unc und<br>var vas vec veg veh vei<br>was wat wav way wea web<br>wro yar yea yel yes yet | tac tai tak tal tam tan<br>tir tis tit tob tod tog<br>une unf unh uni unk unl<br>vel ven ver ves vet via<br>wed wee wei wel wen wer<br>yie yor you zea zer zon |

# LAST 3

|  |  |  |  |  |  |
|--|--|--|--|--|--|
| abs aby ace ach ack act<br>alf ali alk all alm alo<br>ari ark arl arm arn arp<br>aws aya ays aze azy bad<br>bow box boy bra bre bts<br>cky cle cob col com con | acy ada add ade ado ads<br>als alt aly ama ame ami<br>arr ars art ary asa ase<br>bag bal ban bar bat bay<br>bus but buy cal can cap<br>cow cox cre cro cry cta | ady ael afe aff aft age<br>amp ams amy ana and ane<br>ash ask asm asp ass ast<br>bby bec bed bee bel ben<br>car cas cat cay cca cco<br>cts cue cum cup cur cus | ago ags aho aic aid aii<br>ang ani ank ann ano ans<br>asy ata ate ath ati ato<br>ber bes bet bey bia bic<br>ced cel cer ces che chi<br>cut dad dae dal dam dan | ail aim ain air ais ait<br>ant any ape aph app aps<br>ats att aty aud aul aus<br>bid big bin bis bit ble<br>cho chs cht chy cia cid<br>dar das day dds ddy dea | aka ake aks ala ald ale<br>apt apy ara arc ard are<br>aux ava ave avy awa awn<br>bly bob bol bon bor bot<br>cil cin cis cit cke cks<br>ded del dem den deo der |
| des dex dge dia dic did<br>eap ear eas eat eau ebt<br>ein eir eit eks ela eld<br>erd ere erg eri erk erm<br>fan far fat fax fed fee<br>get ggs ghs ght gia gic | die din dio dis dit dix<br>eby ece ech eck ect eda<br>ele elf eli ell elm elp<br>ern ero ers ert ery esa<br>fer few ffs fic fig fin<br>gid gie gin gle gly gma | dle dly dog dom don dor<br>ede edo eds edy eed eef<br>els elt ely ema eme emi<br>ese esh esk ess est esy<br>fit fix fle fly for fox<br>gne gns god gon gor gos | dos dow dox dra dro dry<br>eek eel eem een eep eer<br>emn ems emy ena end ene<br>eta ete eth eto ets ett<br>fth fts fty ful fun fur<br>got gro gry gst gth gue | dst dth due dum dus ead<br>ees eet eff efs eft ege<br>eng enn ens ent eny eof<br>ety eum eur eus eva eve<br>gal gan gap gar gas gay<br>gun gus guy had hai hal | eaf eah eak eal eam ean<br>egg ego egs egy eid eil<br>eon eph eps ept era erb<br>evy ews ext eye eys eze<br>ged gee gel gen ger ges<br>ham han hap har has hat |
| haw hay hea hed hee hel<br>hty hua hur hus hut hyl<br>ife iff ift ify ige igh<br>ior ios iot ipe ips ipt<br>jan jet jim job joe jor<br>lea led lee leg lel lem | hem hen her hes het hew<br>iac iah ial iam ian iar<br>ign igs ike ila ild ile<br>ira ird ire irl irm iro<br>joy kay ked kee kel ken<br>len leo ler les let lew | hey hia hic hie him hin<br>ias iat ibe ica ice ich<br>ilk ill ilm ils ilt ily<br>irs irt iry isa isc ise<br>ker kes ket key kie kim<br>lex ley lhi lia lic lid | hio hip his hit hly hms<br>ick ico ics ict icy ida<br>ima imb ime ims ina inc<br>ish isk ism iss ist ita<br>kin kle kly kyo lab lad<br>lie lim lin lio lip lis | hod hoe hol hom hon hop<br>ide ids idy ied ief iel<br>ind ine ing ini ink inn<br>ite ith ito its itt ity<br>lae lag lah lam lan lap<br>lit lks lla lle lli llo | hor hot hou how hth hts<br>ien ier ies iet ieu iew<br>ino ins int iny iod ion<br>itz ium ius iva ive ize<br>lar las lat law lay lds<br>lls lly lms log lon lop |
| lor los lot low loy lph<br>men mer mes met mia mic<br>nct ncy nda nde ndi ndo<br>nor nos not now nry nse<br>oem oes oet off ofs oft<br>ona ond one ong oni ons | lps lry lse lsh lso lst<br>mid min mis mit mix mly<br>nds ndy nea ned nee nel<br>nst nta nte nth nti nto<br>ogs ogy ohn oic oid oil<br>ont ony ood oof ook ool | lta lth lts lty lub lue<br>mma mme mmy mns mom mon<br>nen ner nes net new ney<br>nts nty nue num nus nut<br>oin oir ois oit oke oks<br>oom oon oop oor oot ope | lum lus lux lve lyn mac<br>mor mos mph mps mpt mud<br>nga nge ngo ngs nia nic<br>nyl nza nze oad oak oal<br>ola old ole olf oli olk<br>ops opt opy ora ord ore | mad mal man map mar mas<br>mum mus nah nal nam nan<br>nie nin nio nis nit nks<br>oam oan oat obe obs och<br>oll olm oln olo ols olt<br>ori ork orm orn oro orp | mat max may mbs med mel<br>nar nas nat nay nce nch<br>nly nna nne nny nol non<br>ock oda odd ode ods ody<br>oly oma omb ome oms omy<br>ors ort ory osa ose osh |
| oss ost ota ote oth oto<br>pet pha phs phy pia pic<br>ran rap rar ras rat raw<br>ril rim rin rio rip ris<br>rst rsy rta rte rth rto<br>sfy sha she shi sia sic | ots ott oud oul oun oup<br>pid pig pil pin pit ple<br>ray rbs rby rce rch rcy<br>rit rix rke rks rld rls<br>rts rty rtz rue rug rum<br>sie sil sin sir sis sit | our ous out ova ove owa<br>ply pon por pot ppi ppy<br>rds rdy rea red ree ref<br>rly rma rms rmy rne rns<br>run rus rve sad sal sam<br>six ska ski sks sky sle | owd owe owl own ows oxy<br>pra pro pse psy pth pts<br>reg rel rem ren rer res<br>rnt rod roe rol rom ron<br>san sar sas sat saw say<br>sly sma sms sol som son | oyd oys pal pan par pat<br>pty pub pur pus put que<br>ret rev rew rey rge rgh<br>rop ror ros rot row roy<br>sch sco sea sec sed see<br>sor ssa sse ssy sta ste | pay ped pel pen per pes<br>rab rad rag rah ral ram<br>rgo rgy ria ric rid rie<br>rps rra rre rry rse rsh<br>sel sen ser ses set sey<br>sto sts sty sub sue sum |
| sun sus tah tal tan tar<br>tis tle tly tol tom ton<br>uds udy ued uel uer ues<br>ung unk uns unt uor ups<br>ves vet vey via vic vid<br>xed xes xic xis xon xth | tas tat tax tay tch tcy<br>too top tor tos tra tre<br>uet uff uge ugh ugs uid<br>upt upy ura urd ure urg<br>vie vil vin vis vit viz<br>xts xty yal yan ybe yce | tea ted tee tel tem ten<br>tro try tta tte tti tto<br>uin uis uit uke ula uld<br>uri urn urs urt ury use<br>von vor wal wan war was<br>yde yed yee yer yes yet | tep ter tes tex tha the<br>tts tty tue tum tur tus<br>ule ulf uli ulk ull ulp<br>ush uss ust usy ute uth<br>way web wed wel wen wer<br>yle yme yne yon yor you | thm tho ths thy tia tic<br>two ual uan uba ube ubs<br>uls ult uly uma umb ume<br>uto uts uty uum uys val<br>wes wet who why win wis<br>ype ypt yst yte yth zed | tie til tim tin tio tip<br>ubt uce uch uck uct ude<br>umn ump ums una und une<br>van vas ved vel ven ver<br>wit wly wns won wth xas<br>zen zer zes zil zle zon |