



BIP 39 Seed Phrase

	3-letter dice roll	4-letter dice roll	5-letter dice roll	6-letter dice roll	Seed Word
1)	7	F	G		TELL
2)	1	3	C		ALWAYS
3)	2	C	B		DEFENSE
4)	8	9	D		VICTORY
5)	1	1	E		ADULT
6)	5	0	F		LUNELV
7)	4	1	8		GLIDE
8)	5	7	4		MODEL
9)	5	9	D		NECK
10)	4	F	F		LEND
11)		E	A		RUBBLE
12)		R	G		CYCLE
13)		9	E		BECAUSE
14)		1	D		ADMIT
15)		C	1		RETURN
16)		3	D		SHIP
17)		B	4		WALK
18)		E			LEMON
19)		B			END

KEYSA AND D++

ROLL YOUR OWN 24 WORD BITCOIN SEED PHRASE OFFLINE

WHY ROLL YOUR OWN SEED?



Strong Entropy: It safeguards against weak entropy that could potentially be exploited in the future.



Trust Minimized: It ensures robust entropy, eliminating the need to trust the RNG (Random Number Generator).



Enhanced Security: Generating your seed offline reduces reliance on hardware or software wallets that could be compromised.



Control: You maintain complete ownership of your private keys, eliminating any risk of a third-party having knowledge of your key.



Privacy: No digital footprint is created.



Educational Value: It deepens your understanding of Bitcoin's cryptography.

MATERIALS NEEDED

VISIT: [ENTROPY.PAGE/DICE](https://entropy.page/dice)



Dice: x1 Octal (8-sided) die, x2 Hex (16-sided) dice



BIP39 Worksheet (Printed out from QR link on page 49)



BIP39 Word List (Printed out from QR link on page 49)



Signing Device: Cold Card, Seed Signer, Jade or Passport (Needed to calculate the checksum/24th word offline)



Pen

Cup to roll the dice in

Hard, flat surface, in a room free of all electronics

IMPORTANT NOTES



Read through this whole guide before you start.



I highly recommend doing a complete practice run, carefully following all the instructions.



When you are ready to do it 'for real', be sure to **follow all the instructions on the following page** to ensure maximum security.

PREPARATION



Make sure you're in a room without any **electronics (aside from the signing device)** and draw the shades so no one can see in.



Switch on the lights if needed.



Since you are doing the proof-of-work to roll your own seed, **you want to maximize security and privacy** while doing so.



Let anyone else in the house know that **you need to be undisturbed** for an hour, ideally locking the door to prevent anyone accidentally coming in with a phone on.



Ensure you have a **hard surface for rolling the dice**—an empty box with a flat bottom can be helpful.



Check that you **have all the materials ready and with you** in the room.



Use a cup to shake the three dice.



Throw them down on the table or in the box.



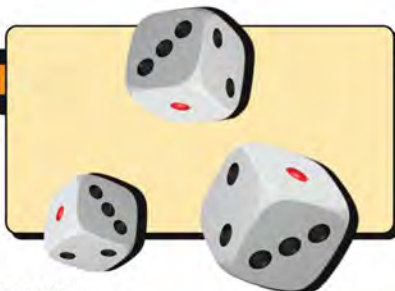
Carefully place them in a row, **with the octal one on the left side.**



The order of the next two doesn't matter.



Don't worry if they roll to a different number as you place them.





BIP 39 Seed Phrase

	8-sided dice roll	16-sided dice roll	16-sided dice roll	Seed Word
1)	7	F	6	
2)				
3)				
4)				
5)				
6)				
7)				
8)				
9)				
10)				
11)				
12)				
13)				
14)				
15)				
16)				
17)				
18)				
19)				
20)				
21)				
22)				
23)				
24) 8 sided dice roll:				Checksum



Write the numbers and letters shown on the dice in the boxes on Line 1 of the BIP 39 Seed Phrase Worksheet.

Make sure your writing is **legible**!

Continue the process until you get to the 24th word (the checksum).

Roll only the octal die one time, and enter the number in the box on the left.

Take a look at the **BIP 39 Dictionary**.

Note how **each section is a different color**, depending on the first number.

This will make it easier to find your words.

20)	4	4	F	
21)	2	7	5	
22)	0	B	3	
23)	8	1	A	
24) 8 sided dice roll:	4			Checksum



BIP 39 Dictionary

1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	0	1	2	3	4	5	6	7	8	9						
abandon	about	account	accuse	achieve	across	act	action	add	address	adjust	advance	advice	advise	affair	afford	afraid	again	against	age	agree	aim	air	alarm	alive	all	allow	almost	alone	along	already	also	although	always	am	an	and	angel	anger	angry	animal	answer	antenna	anxiety	any	apart	apart	apart	apart	apart	apart

Using the word list, **write the 23 words corresponding to each dice roll** on the BIP 39 Seed Phrase Worksheet.

Leave the 24th word blank for now.

BIP 39 Seed Phrase

	8-sided dice roll	16-sided dice roll	16-sided dice roll	Seed Word
1)				
2)				
3)				
4)				
5)				
6)				
7)				
8)				
9)				
10)				
11)				
12)				
13)				
14)				
15)				
16)				
17)				
18)				
19)				
20)				
21)				
22)				
23)				
				Checksum
24)	8 sided dice roll:			

BIP 39 SEED PHRASE WORKSHEET

3E8 fringe	3E8 fringe	3E8 fringe
galaxy	3F8 gallery	3F9 game
genius	408 genre	409 gentl
glass	418 glide	419 glimp
gossip	428 govern	429 gown
group	438 grow	439 grun

BIP 39 Seed Phrase			
	8-sided dice roll	16-sided dice roll	16-sided dice roll
1)	7	F	G
2)	1	3	C
3)	2	C	B
4)	8	9	D
5)	1	1	E
6)	5	0	F
7)	4	1	8
8)	5	7	4
9)	5	9	D
10)	4	F	F
11)	E	A	L

Seed Word

TELL
ALWAYS
DEFENSE
VICTORY
ADULT
LONELY
GLIDE
MODEL
NECK
LEND

Checksum24[illegible]

**GET YOUR OWN
WORKSHEET**

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943	2944	2945	2946	2947	2948	2949	2950	2951	2952	2953	2954	2955	2956	2957	2958	2959	2960	2961	2962	2963	2964	2965	2966	2967	2968	2969	2970	2971	2972	2973	2974	2975	2976	2977	2978	2979	2980	2981	2982	2983	2984	2985	2986	2987	2988	2989	2990	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GET YOUR
DICTIONARY

GET YOUR OWN DICTIONARY



CALCULATE THE 24TH WORD CHECKSUM

Instructions follow for calculating the final word of your Seed Phrase using each of the following signing devices:

FOUNDATION PASSPORT



BLOCKSTREAM JADE



COLD CARD

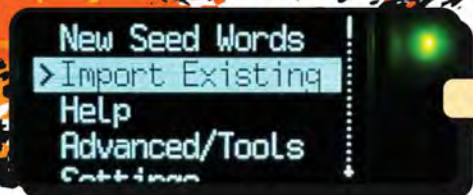


SEED SIGNER



NOTE

There will be some differences in the process on each device.



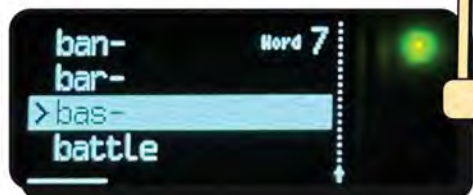
Set up your Cold Card with a secure pin code.



Select > Import Existing

Select > 24 Words

Enter the 23 words from the worksheet.



COLD CARD

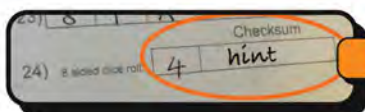
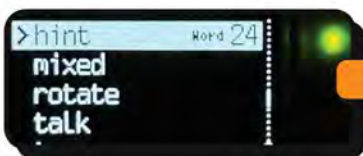


After entering 23 words, 8 options will be shown for the 24th word.

Write down the one corresponding to the number you rolled for line 24

For this example, 'hint' was the fourth word.

Add this last word to your Worksheet on Line 24.



COLD CARD

Address Explorer
Secure Logout
> Advanced/Tools
Settings

Enable HSM
User Management
> Danger Zone

Debug Functions
> Seed Functions
I Am Developer.
Perform Selftest
Set High Master

Once you have selected the 24th word, you will want to view your seed words to confirm you entered them correctly.

Select:
> Advanced/Tools
> Danger Zone
> Seed Functions
> View Seed Words
> Accept and check your words are correct

> View Seed Words
Seed XOR
Destroy Seed
Lock Down Seed

Are you SURE ?!?

The next screen will show the seed words (and



SEED SIGNER

Power on your Seed Signer.

Select > Tools

Select > Calc 12th/24th word

Select > 24 words

SEED SIGNER

Enter your 23 words

Once these are entered, the **Build Final Word** screen will appear.

Select a method to calculate the checksum.

For this tutorial, we'll use 'Coin flip entropy'.

Flip a coin 3 times and enter the results.





SEED SIGNER

When the final word is calculated, write it on **Line 24** of your Worksheet.

Click **Next > Load Seed**.

Note down the Fingerprint and click **Done**.

Since Seed Signer is stateless, it will forget your seed when powered off.

When you re-enter your seed in the future, you can confirm it is correct by checking the fingerprint matches.



SEED SIGNER

Time to confirm you entered your seed word correctly.

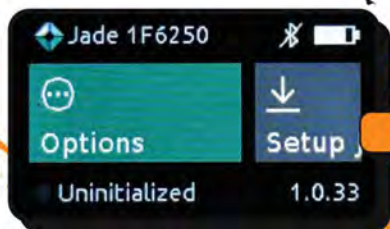
Select > **Backup Seed**

Select > **View Seed Words**

Select > **I Understand**

Go through and check the words against your Worksheet.





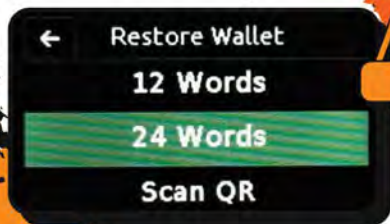
BLOCKSTREAM JADE

Power on your Jade.

Select > **Options**

Select > **Temporary Signer**

Select > **24 words**



BLOCKSTREAM JADE

Enter the 23 words from your Worksheet.

Select > **Calculate** for the Final 24th Word

Scroll L/R to select the word that matches the number you entered on Line 24.

Note: Any of the 8 words offered will work as the checksum (24th word).

Insert word 23



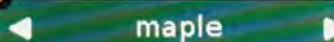
Final Word ?

Enter existing word or display possible options?

Existing **Calculate**

Recover Wallet

Select word 24



BLOCKSTREAM JADE

Select > **No** for Export.

Select > **QR** for Connection to return to the Home Screen.

Note down the **Master Fingerprint** shown in the bottom right corner.

Power off the device. Power it on and repeat the whole process.

Check the master fingerprint matches the one you wrote down, to verify your seed phrase.

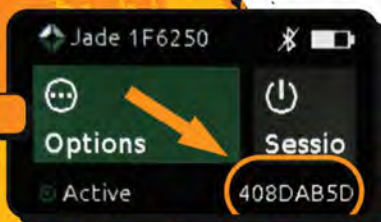
Export recovery phrase as a CompactSeedQR?

No **Yes**

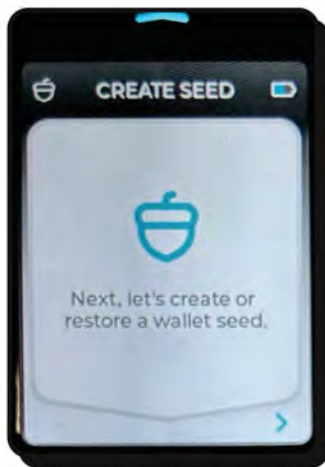
Select Connection

USB

QR



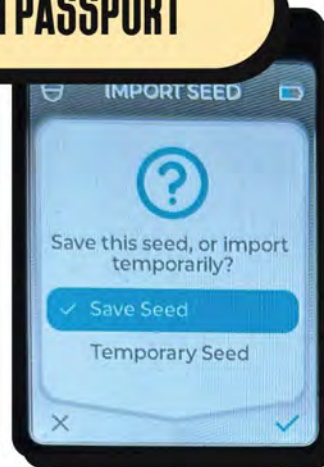
FOUNDATION PASSPORT



Power on your device



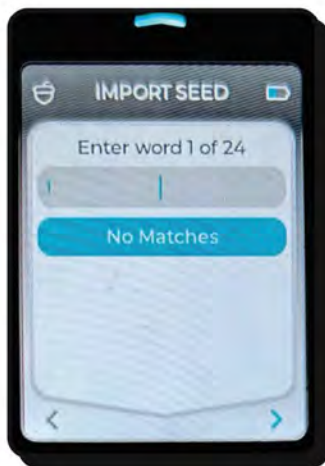
Select > **Import Seed**



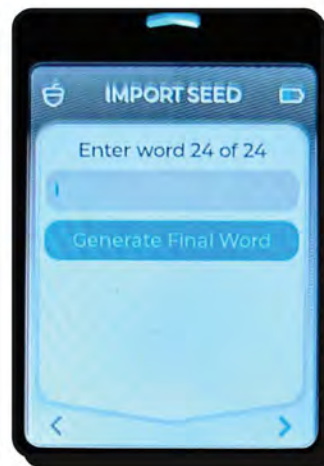
Select > **Save Seed or Temporary Seed ***



Select > **24 words**



Enter the 23 words from your Worksheet



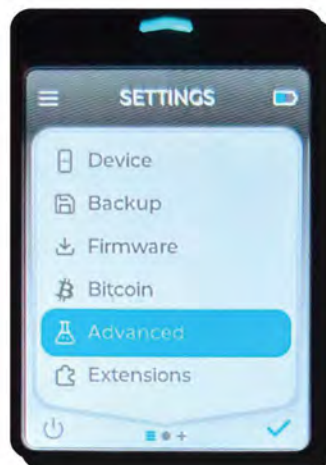
Select > **Generate Final Word**



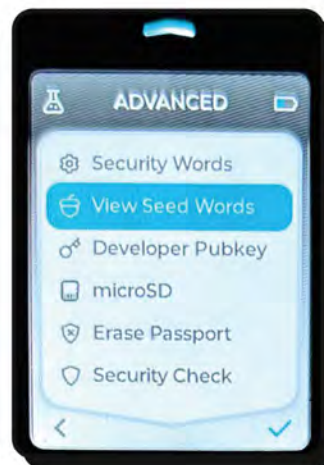
Select > **Import and Save Seed**



Backup to microSD



Settings > **Advanced**



Select > **View Seed Words & verify they are correct**

AND THAT'S IT!

CONGRATULATIONS

YOU JUST ROLLED YOUR OWN SEED PHRASE OFFLINE!



* Select **Temporary Seed** if you already have a seed in your Passport & just want to calculate a checksum for a new seed.

IMMEDIATE NEXT STEPS

Make a copy so you have **two backups**.

Put clear packing tape over each one.

SECURELY HIDE EACH COPY SEPARATELY!

REMEMBER

In bitcoin, possession is 10/10ths of the law! **Whoever has your Seed Phrase has access to your bitcoin!** Secure it very very well!
As always > Don't Trust, **Verify** > DYOR Do Your Own Research

FINALLY

Buy 2 metal plates and stamp your seed in them for ultimate durability & protection from the elements. **Hide separately and securely!**

READ



FURTHER RESOURCES



BY GREG WALKER



BY D++



BY IAN COLEMAN



BY JAMESON LOPP

WHY DOES ONE OCTAL & TWO HEX DICE CREATE A SEED WORD?

A bitcoin Private Key contains **256 bits** of entropy.

Each word in a Seed Phrase is **11 bits**.

An **octal die** offers **3 bits** of entropy, since 8 is 2 to the power of 3, as in $2 \times 2 \times 2 = 8$

A **hex die** offer **4 bits** of entropy, since 16 is 2 to the power of 4, as in $2 \times 2 \times 2 \times 2 = 16$.

So one octal + two hex dice throws is:

3 bits + 4 bits + 4 bits = 11 bits of entropy = One Seed Word.

**SIMPLEST
BITCOIN
EDU**

KEYSA

Author of "The Simplest Bitcoin
Book Ever Written"



@SimplestBTCBook



D++

Bitcoin Professor Software
Engineer Revolutionary Cypherpunk



@D_plus__plus

