Lord Urlik's Rune Finder's Guide, v2.0-pdf

Revision History
v2.0-pdf, Apr 25, 2004. Completely revised section on chests based on game code explanations by Jarulf. Added a section on strategies. Minor edits and additions to text.
v1.0-pdf, Apr 15, 2004. Initial release of pdf version.

> *Note: The pdf version of the guide is significantly condensed. It will not show any of the step-by-step calculations I have done or any of the statistics regarding comparisons of areas. See the Excel version for the math!*

Applicability
This guide is intended for Diablo II LoD Expansion, patch 1.10 final only.

What is this guide about?
The purpose of this guide is very simply to help your characters be more effective in their rune finding efforts.

Why did I create this guide?
To be perfectly honest, I was motivated to create a Rune Finder's Guide out of frustration in trying to find accurate sources for rune drop information. I'm sure that many of you have felt the same frustration; especially after patch 1.10 was released and introduced all those uber new runewords. In addition, a kindred rune-fanatic named Uzziah held a Rune Race which truly got me started on working out some drop chance numbers on my own… and it just kept growing and growing. Eventually, I worked out the math for every rune-dropping source in the game. Then I did a lot of testing with modded files to confirm certain drop behaviors from objects as well as "counting" tests in order to determine the average number of rune drops per area "clear". Revision 2.0 came to be after Thrugg steered me over to a post by Jarulf, in which Jarulf writes about how objects drop items with references to relevant snippets of actual game code.

Why is this guide *the definitive source* for rune drop information?
It is, because I don't hide anything from you at all. You can see all the calculations on the appropriate tabs. I'm quite confident the math is correct. But if you want to check it for yourself, feel free.

Contents

Acknowledgments
Jarulf - for explaining how the game drops items, how treasure classes work, how to calculate drop chances, and especially how several Objects work.
Thrugg - for clarifying the No Drop weight equation for higher “Players X” settings and for pointing out some of the finer details of calculating the Countess's rune drops.
Uzziah - for organizing a Rune Race which inspired the creation of this guide.
MattIs - for pointing out that one's rune drop productivity while area clearing is likely to be optimal at lower rather than higher "Players X" settings.
RTB - for giving me the password into the Dimension of Numbers.
and especially…
Jenny - for tolerating many of my late night test sessions.

Strategies and Tactics

How does one legitimately get hold of some decent runes?

Let me count the ways…

1. Trade with some lucky bastards who already have the runes you want.
2. Run Hell Countess over and over and cube her drops as high as possible.
3. Run character after character after character to the hell mode Hell Forge Quest.
4. Repeatedly clear areas in the game where the average number of rune drops per time spent is high (e.g. Hell Cows).
5. Thieve from Sparkly Chests and/or Special Chests over and over with a teleporting character.

I'll comment on each Strategy…

Trading
A lot of folks favor this method it seems. But I have to ask them some questions… Somebody burnt their eyeballs out and crippled their wrist to find those high level runes. Are they really going to be that eager to give them up? Can there be very many on the market? How do you know the rune is genuine? Runes don't get the fingerprinting that Doc Tenshi came up with to hamper cheaters and item dupers... Maybe I'm being too much of a purist, but in my book a high level rune just isn't the same if it isn't authentic. If you use this strategy, I recommend dealing with only the most trusted players.

There's nothing quite as satisfying as finding a good rune on your own.

Hell Countess ad infinitum
Hell Countess is the best source for runes up to Ist. But she's on the bottom level of that nasty tower. For best efficiency, a teleporting Sorc is ideal. My Blizz Sorc keeps a slight distance and TK's the CI+FI Countess while the Merc does the dirty work with his massive poker. I recommend grabbing ALL rune drops and cubing them up. I really don't think it will slow you that much. Yes, even pick up those El's! For reference, in an average of 896 Hell Countess runs at Players 1, you will be able to cube up an Ist with her rune drops, assuming you also have the required gems. Yes really! And it only takes 512 Ists to make a Zod… For Ist and below, she is by far the best source. Do her! If you have the stamina, within about 4000 runs (on average) you should be able to cube up to an Ohm.

Hell Forge Rushing
Although I have doubts, you may discover that you can be more productive at finding high level runes by rushing a steady stream of new characters to the hell mode Hell Forge Quest. To me, this approach defeats the purpose of playing as a "Rune Hunter" character. I also have a strong suspicion that if you were to compare ratios of net total rune value per play-hour invested, Rune Hunting would beat Hell Forge Questing's pants off. I could be wrong. Perhaps we have the makings of a new type of contest to answer this question once and for all? The top end for hell mode Hell Forge seems to be a Gul. You need 256 of those to cube a Zod. Trouble is, the hell mode Hell Forge won't be dropping you a Gul for each new character you bring to it. On average, you may only get a Gul 5% of the time (assumption). That brings us to about 5000 or so new characters that you need to take all the way to hell mode Hell Forge. Yikes!

Area Clearing
This strategy follows the basic law of averages. More monsters means more drops which means more runes. Start with monsters which have the highest chance to drop runes among all their drops. Then look for areas where there are tons of monsters, preferably crowded together, and let the carnage ensue. Obviously, the more of a killing machine your character is the better. Lightning Javazon's, Multishot Bowazon's, Windy Druids, Blizzard Sorcs… take your pick. Try to run at the highest Players X setting you can manage without a significant reduction in your clearing speed. This is important because if you aren't paying attention to this metric, you may end up spending more time to earn less runes. Kinda like working more hours for less money, LOL. Nobody wants to do that!

I contend that the best place for the area clearing strategy is the secret Cow Level (more on this later). Find your average clearing time over say 3-4 runs at Players 1. Then try a few runs at Players 2, a few at Players 3, and so on. Calculate the average time to clear for each Players setting. Plug these times into Table B below and you'll discover the optimal Players X setting. The same procedure can be used for other areas too. But for highest accuracy, I first need to provide you the appropriate "Scale Factors". Unfortunately, I don't have them all figured out yet, as this is a rather arduous process (see Area Counts sheet in the Excel version for more info).

I would like to thank ***MattIs*** for first pointing out the sensitive relationship between the “Players X” setting and rune drop productivity. ***Thrugg*** expanded on this and created a handy efficiency table for the Cow level based on hitpoint scaling rather than the actual clear times. This is Table A, below. It is likely that the result of P2 probably won't be any different in Table B for all but the most powerful characters.

I put some hypothetical numbers in the "Average Time to Clear" column in Table B for illustrative purposes only.

Table A

Players X	Runes17 drops per kill from Hell Cow	Hitpoints (or damage req'd to kill)	Runes17 drops per Hitpoint/A	Productivity (normalized to P1)
1	0.002019	A	0.002019	1.0000
2	0.003297	1.5*A	0.002198	**1.0887**
3	0.004090	2.0*A	0.002045	1.0129
4	0.004615	2.5*A	0.001846	0.9143
5	0.004895	3.0*A	0.001632	0.8082
6	0.005128	3.5*A	0.001465	0.7257
7	0.005211	4.0*A	0.001303	0.6452
8	0.005296	4.5*A	0.001177	0.5829

Note: In creating Table A, I didn't know how many hitpoints Cows typically have, so I let "A" represent it.

The conclusion here is that unless your character is doing enough damage to kill a group of Cows with one "attack" at Players 2 or 3, the most efficient setting for collecting rune drops is Players 2.

plug in your average times to clear here ↓

Table B

Players X	Scale Factor for Cow Level only	Average Time to Clear (seconds)	Productivity (normalized to P1)
1	1.0000	600	1.0000
2	1.6330	680	1.4409
3	2.0258	820	**1.4823**
4	2.2858	1060	1.2938
5	2.4245	1290	1.1277
6	2.5399	1705	0.8938
7	2.5810	2050	0.7554
8	2.6231	2400	0.6558

← **Select your highest number from here to determine the best Players X setting**

Now as for objects…that's a different story. Objects don't hit back and they don't become any harder to pop at higher players settings. Thus, it's in your best interest as a smart Rune Hunter to pop them all at nothing less than Players 8. Clear the level, raise the Players setting to 8, then go back and pop the objects. The No_Drop chance is calculated when the object is popped, not when spawning the level. Incidentally, I believe the same is true when a monster is killed but I haven't verified this.

Thieving the Sparkly and Special Chests
This is a strategy best handled by a fast-casting (63% fast cast or higher), non-ES, high defense Sorceress. Bringing along a strong Merc for a meat shield is essential. It would help even more if she fortified the meat shield with other summonables too (from item bonuses). Set the Players to 8, TP to a Sparkly or Special Chest in a "known" location as fast as you can. Do not engage any monsters! Pop the Chest, hit the Alt key to see what dropped, then get the hell outta there!

If you happened to spot a good rune drop, go back and snatch it up or show off your pride and honor and fight for your prize!

You can do a lot of runs in a short time with this strategy. My Blizz Sorc ran Meph's center chest (a Special Chest) about once every 20 seconds 100 times over with no deaths. Budgeting 15 minutes of each play-hour for replenishing blue pots, keys, cubing, etc, that comes to about 18 runes per hour for a Sparkly Chest (or 9 for a Special Chest). Say you collect 100 runes per week (about 5.5 play-hours) in this manner from Bonesaw's Sparkly Chest (at P8)… There is a 16% chance that at least one rune will be Ist thru Zod. Sweet!

Best Single Sources to Find Specific Top 10 Runes

	Color Code
Best Overall =	
Best Monster =	
Best 1st Kill =	

Single Sources (Hell Mode)	**PlayersX Setting**	**Chance to Drop per Kill**				
		Zod r33	**Cham r32**	**Jah r31**	**Ber r30**	**Sur r29**
Extraordinary Monsters						
Blood Raven	4 thru 8					
Griswold	1 thru 8					
Smith	1 thru 8					
Countess	1					
Countess	4 thru 8					
Andarielq - first kill	5 thru 8					
Andariel	4 thru 8					
Summoner	4 thru 8					
Radament	4 thru 8				0.000249%	0.000374%
Durielq - first kill	5 thru 8				0.000544%	0.000815%
Duriel	4 thru 8				0.000249%	0.000374%
Council Member	4 thru 8		0.000114%	0.000171%	0.000199%	0.000299%
Mephistoq - first kill	3 thru 8		0.000149%	0.000224%	0.000261%	0.000391%
Mephisto	3 thru 8		0.000126%	0.000189%	0.000221%	0.000331%
Izual	4 thru 8		**0.000167%**	**0.000250%**	**0.000292%**	**0.000437%**
Haphesto	4 thru 8	**0.000048%**	**0.000167%**	**0.000250%**	**0.000292%**	**0.000437%**
CS Superuniques (3)	1 thru 8	0.000017%	0.000059%	0.000088%	0.000103%	0.000154%
Diabloq - first kill	3 thru 8	0.000043%	0.000149%	0.000224%	0.000261%	0.000391%
Diablo	3 thru 8	0.000036%	0.000126%	0.000189%	0.000221%	0.000331%
Act 5 Superuniques (10)	1 thru 8	0.000017%	0.000059%	0.000088%	0.000103%	0.000154%
Nihlathak	4 thru 8	**0.000048%**	**0.000167%**	**0.000250%**	**0.000292%**	**0.000437%**
Baal's Minions (5)	1 thru 8	0.000004%	0.000014%	0.000021%	0.000024%	0.000036%
Baalq - first kill	3 thru 8	0.000043%	0.000149%	0.000224%	0.000261%	0.000391%
Baal	3 thru 8	0.000036%	0.000126%	0.000189%	0.000221%	0.000331%
Unique in lvl 78+ area	1 thru 8	0.000008%	0.000029%	0.000044%	0.000051%	0.000077%
Champion in lvl 79+ area	1 thru 8	0.000004%	0.000014%	0.000021%	0.000024%	0.000036%
Cow King	1 thru 8	0.000014%	0.000049%	0.000073%	0.000086%	0.000129%
Ordinary Monsters						
Wraith in lvl 81+ area	8	0.000017%	0.000059%	0.000088%	0.000103%	0.000154%
Cow	8	0.000006%	0.000022%	0.000034%	0.000039%	0.000059%
Melee/Cast/Missle*	8	0.000004%	0.000015%	0.000022%	0.000026%	0.000039%
Quill in lvl 85 area	8				0.000053%	0.000080%
Swarm in lvl 74+ area	8				0.000025%	0.000037%
Flying Scimitar	8					

Note*: Zod capable Cast and Missle monsters start spawning in level 81 areas, while Zod capable Melee monsters start spawning in level 82 areas.

For Runes Ist and below, Hell Countess - at Players 1 - is by far the best source.

Single Sources (Hell Mode)	**PlayersX Setting**	**Chance to Drop per Kill**				
		Lo r28	**Ohm r27**	**Vex r26**	**Gul r25**	**Ist r24**
Extraordinary Monsters						
Blood Raven	4 thru 8			0.000893%	0.001339%	0.001561%
Griswold	1 thru 8			0.000157%	0.000236%	0.000275%
Smith	1 thru 8			0.000157%	0.000236%	0.000275%
Countess	1	0.000312%	0.000468%	0.000546%	0.000819%	**0.074436%**
Countess	4 thru 8	0.000436%	0.000654%	0.000762%	0.001144%	0.040976%
Andarielq - first kill	5 thru 8	0.001141%	0.001712%	0.001996%	0.002994%	0.003490%
Andariel	4 thru 8	0.000523%	0.000785%	0.000915%	0.001372%	0.001600%
Summoner	4 thru 8	**0.000581%**	**0.000872%**	**0.001017%**	**0.001525%**	0.001777%
Radament	4 thru 8	0.000436%	0.000654%	0.000762%	0.001143%	0.001333%
Durielq - first kill	5 thru 8	0.000951%	0.001426%	0.001663%	0.002495%	0.002908%
Duriel	4 thru 8	0.000436%	0.000654%	0.000762%	0.001143%	0.001333%
Council Member	4 thru 8	0.000349%	0.000523%	0.000610%	0.000915%	0.001066%
Mephistoq - first kill	3 thru 8	0.000456%	0.000685%	0.000798%	0.001197%	0.001396%
Mephisto	3 thru 8	0.000386%	0.000579%	0.000675%	0.001013%	0.001181%
Izual	4 thru 8	0.000510%	0.000765%	0.000892%	0.001339%	0.001560%
Haphesto	4 thru 8	0.000510%	0.000765%	0.000892%	0.001339%	0.001560%
CS Superuniques (3)	1 thru 8	0.000180%	0.000270%	0.000315%	0.000472%	0.000550%
Diabloq - first kill	3 thru 8	0.000456%	0.000685%	0.000798%	0.001197%	0.001396%
Diablo	3 thru 8	0.000386%	0.000579%	0.000675%	0.001013%	0.001181%
Act 5 Superuniques (10)	1 thru 8	0.000180%	0.000270%	0.000315%	0.000472%	0.000550%
Nihlathak	4 thru 8	0.000510%	0.000765%	0.000892%	0.001339%	0.001560%
Baal's Minions (5)	1 thru 8	0.000042%	0.000063%	0.000073%	0.000110%	0.000128%
Baalq - first kill	3 thru 8	0.000456%	0.000685%	0.000798%	0.001197%	0.001396%
Baal	3 thru 8	0.000386%	0.000579%	0.000675%	0.001013%	0.001181%
Unique in lvl 78+ area	1 thru 8	0.000090%	0.000135%	0.000157%	0.000236%	0.000275%
Champion in lvl 79+ area	1 thru 8	0.000042%	0.000063%	0.000073%	0.000110%	0.000128%
Cow King	1 thru 8	0.000150%	0.000225%	0.000262%	0.000393%	0.000459%
Ordinary Monsters						
Wraith in lvl 81+ area	8	0.000180%	0.000270%	0.000315%	0.000472%	0.000550%
Cow	8	0.000069%	0.000103%	0.000120%	0.000180%	0.000210%
Melee/Cast/Missle*	8	0.000046%	0.000069%	0.000080%	0.000120%	0.000140%
Quill in lvl 85 area	8	0.000093%	0.000139%	0.000163%	0.000244%	0.000284%
Swarm in lvl 74+ area	8	0.000044%	0.000065%	0.000076%	0.000114%	0.000133%
Flying Scimitar	8	0.000069%	0.000103%	0.000120%	0.000180%	0.000210%

Note*: Zod capable Cast and Missle monsters start spawning in level 81 areas, while Zod capable Melee monsters start spawning in level 82 areas.

For Runes Ist and below, Hell Countess - at Players 1 - is by far the best source.

Single Sources (Hell Mode) **Objects (Chest TC)**	**PlayersX Setting**	**Chance to Drop per Kill**				
		Zod r33	**Cham r32**	**Jah r31**	**Ber r30**	**Sur r29**
Ordinary Objects**						
Act 5 (H) Type I & II	8	0.000018%	0.000062%	0.000093%	0.000109%	0.000163%
Act 5 (H) Type I - L	8	0.000047%	0.000166%	0.000249%	0.000290%	0.000435%
Act 5 (H) Type III	8	0.000024%	0.000083%	0.000124%	0.000145%	0.000217%
Act 5 (H) Type IV	8	0.000005%	0.000017%	0.000026%	0.000030%	0.000046%
Super Objects**						
Act 5 (H) Spl Chest	8	0.000071%	0.000249%	0.000373%	0.000435%	0.000652%
Act 5 (H) Spl Chest - L	8	0.000095%	0.000331%	0.000497%	0.000580%	0.000870%
Act 5 (H) Sprkl Chest***	8	**0.000160%**	**0.000562%**	**0.000842%**	**0.000983%**	**0.001474%**
Single Sources (Hell Mode) **Objects (Chest TC)**	**PlayersX Setting**	**Chance to Drop per Kill**				
		Lo r28	**Ohm r27**	**Vex r26**	**Gul r25**	**Ist r24**
Ordinary Objects**						
Act 5 (H) Type I & II	8	0.000190%	0.000285%	0.000333%	0.000499%	0.000581%
Act 5 (H) Type I - L	8	0.000507%	0.000761%	0.000887%	0.001330%	0.001551%
Act 5 (H) Type III	8	0.000254%	0.000380%	0.000443%	0.000665%	0.000775%
Act 5 (H) Type IV	8	0.000053%	0.000080%	0.000093%	0.000140%	0.000163%
Super Objects**	8					
Act 5 (H) Spl Chest	8	0.000761%	0.001141%	0.001330%	0.001996%	0.002326%
Act 5 (H) Spl Chest - L	8	0.001014%	0.001521%	0.001774%	0.002661%	0.003101%
Act 5 (H) Sprkl Chest***	8	**0.001719%**	**0.002579%**	**0.003007%**	**0.004510%**	0.005257%

Note**: Ordinary Objects and Super Objects are fully defined in the text. The rune drop chances shown are the averages.

Note***: Although they too "sparkle", the Quest Chests in Act 2 and Act 3 behave like a Type I Object, as far as rune drops are concerned.

Although it offers the best chance in the game, an Act 5 (H) Sparkly Chest (popped at P8) would require 625,000 runs on average before you see a Zod. Kind of depressing ain't it?
I wish you the best of luck. :D

Best Areas to Find Specific Top 10 Runes

So… you're probably all wondering…

"Where are the best areas in the game to invest my precious time - killing monsters and looting their chests over and over and over again - in order to find some high level runes?"

Well… sadly… no ***one*** area will selectively pump out ***only*** high level runes.

For any given rune that drops, there is a ridiculously small chance that it will be high level. In fact, the chance for Ist thru Zod is only 0.1589%. See the section on "Rune Ratios" for a chart.

Now, that we have cleared that up... The answer is really quite simple. The best area is the one where your character can find the most runes in the shortest amount of time. It's preferred though not essential (depending on your rune goals) that your chosen area be one with sources able to drop up to Zod.

I can't help your character on killing speed. That will depend on his/her class, gear, and skills (not to mention the aplomb of the driver). But, I can help on which areas will drop the most runes (on average).

That can be reduced to a math problem by simply counting the number of "different" rune sources in the area, then multiplying each by the corresponding chance for that source to drop runes and summing it all together. By repeating this process a number of times, one can obtain a mean and standard deviation for the number of runes that will drop in a specific area.

Regretfully, I was unable to complete all of the areas I would have liked for this release of the guide, but I think I chose some pretty good ones to focus on.

You can see the details of all my tests (so far) on the Tab labeled "Area Counts" in the Excel version of the guide. Here is a summary of the results:

Area	Average # of Rune Drops per Clear at Players 8	Std Dev.	# of Clears
Sewers Level 2 (Act 3)	0.3892	0.0378	10
Ancient Tunnels	0.6602	0.0279	5
Travincal	0.8478	-	1
River of Flame	1.4043	0.2072	5
Arcane Sanctuary	4.5355	-	1
Moo Moo Farm	3.2267	0.0139	3

The "ranking" of areas will be the same regardless of players setting. Also, remember that the highest ratio of rune drops per time spent is your goal, not simply the highest average number of rune drops alone.

Best Area to Clear for Finding *Zod* = Hell Cows

There it is folks. :) Good luck!

Probably the best thing about Cows is that they aren't immune to anything. They are 50% resistant to Physical, Fire, Lightning, and Cold and 33% resistant to Magic and Poison.

> *"What I do after entering the Red Portal is teleport across the field until I hit a wall, then with my back to the wall I go crazy on those Moo Moo's! Tee hee." - Snow Bunny.*

How does the River of Flame compare to Cows? As you can see, not even close… even when wraiths come out to play (which isn't more than 20-25% of the time, btw).

I have a strong suspicion that WSK won't come close either, based on lower wraith count and lower over-all monster count.

Although more tests are required to prove it, the only area in the game that may have a higher rune drop average is Arcane's Sanctuary. Unfortunately, only Uniques and Champions in this area can drop up to Zod. Ordinary monsters (including wraiths) can drop up to Cham. All those Special Chests at the end of the false paths to the Summoner can only drop up to Lo. The Summoner himself is the best single source for Gul thru Lo (not counting the 1st time you kill Andy). Lo is his top end as well. But aside from all this, there are two pesky problems with Arcane's, both of which hurt your clearing time.

1. The layout of Arcane's is frustrating to navigate -- there are just so many turns and narrow pathways… You will kill slower as a result.

2. When fighting wraiths, be certain that they are hovering over "ground" when you kill them. If they die while hovering in space (or over lava in RoF), whatever they would have dropped is lost to the inky depths.

Another area that may be of interest is Sewers L2. This is a level 85 area and it consistently has three Special Chests on the menu! With a teleporting character, you can reach it very fast and quickly kill any resistance in there. Unfortunately, the Special Chests in there can only drop runes up to Ber. But I'm not complaining too loudly 'bout that… Hehehe.

Some other areas with potentially high averages:

- Maggot Lair L1-L3
- Great Marsh
- Flayer Jungle
- Durance 2
- Wilderness areas of Act 5 (Bloody Foothills, Frigid Highlands, Arreat Plateau, and Frozen Tundra).

I single out these areas mainly because of mass quantities of monsters and chests. And there's always the confirmed presence of Super Objects (plural, if you catch my drift).

I think one of the best aspects to the area clearing strategy of rune finding is that your character doesn't have to futz with donning all that anemic MF gear, LOL. When hunting for runes, MF is not a factor. Kill proficiency and knowing where to go for the best chances are the only things between you and grabbing a Zod.

I offer up this guide to provide you the knowledge. Now it's up to you to load up on battle gear and wreak havoc!

To all you HC Players out there, especially the meleer's: **BE CAREFUL!**

Objects (Chest TC)

There are several different inanimate objects in the game (and some animated ones) that can drop from the Chest TC (with a chance for Runes). In one of his recent posts, ***Jarulf*** did an excellent job of explaining how several of these objects are initialized and operate. Based on the contents of Objects.txt and my own tests, I have expounded on his explanations. To simply things, I have grouped those objects that have identical rune drop behavior, even though they may differ in other ways.

First, we need to define a couple things: ***desired quality*** and a ***magical+ test***.

Jarulf writes:

> *"A Chest TC drop will use normal calculations to determine the quality of the item. But it can also have as a parameter a desired quality. If it has a desired quality, any item generated will get (if possible) that quality. If it can't get the desired quality, it can be of a failed quality (e.g. rare instead of unique) or if it is an item that can't be magical (such as a rune or potion) it will be of normal quality.*
>
> *"A test for magical+, will check if the FIRST item generated from a Chest TC drop (excluding No_Drop) is of quality: magic, rare, set or unique. Items that can't have magical properties such as runes, potions, gems, keys, etc. are, as already mentioned, considered of normal quality."*

Super Objects

- Sparkly Chests
- Special Chests

Both have rather complicated drop behavior… I'll introduce the simpler objects first and then come back to these.

Type I Ordinary Objects

These objects use OperateFn 4. They have a chance to be locked and a chance to spawn a monster. If unlocked, there is a 75% chance to make a single Chest TC drop (up to 4 items) with no desired quality (MF is applied normally). If locked, they will always make two Chest TC drops (up to 8 items) with no desired quality. The chance to be locked is (monlvl1/2 + 8)% and the chance to spawn a monster is (monlvl1/8 + 5)%, where monlvl1 (from levels.txt) corresponds to each area on the map regardless of difficulty level. I created Table C below to serve as a quick reference. These are: Caskets in Arcane's and all "true" ordinary Chests (anything that looks like a Chest except Quest-Chests, Special Chests, and Sparkly Chests).

Type II Ordinary Objects
These objects use OperateFn 4, but are not lockable. They have a 75% chance to make a single Chest TC drop with no desired quality. These objects also have a chance to spawn a monster, just like Type I Ordinary Objects. These are: Tombs in WSK or in Nil's Temple, Some Rat Nests, some Hidden Stashes in Act5, some Barrels in Act5, Animated Skull-and-Rock Piles, Hidden Stashes in any of the Icy Cave areas, Dead Barbarians in Act5, Dead Persons in Act 5, Burial Chests in Act 5, Object1 and Object2 in Nil's Temple (I have no idea what these are), and Object1 in Snowy Areas (?) of Act5.

Type III Ordinary Objects
Most of these objects use OperateFn 14, which means they make a single Chest TC drop with no desired quality. These are: Crates, Rogue Corpses (of all types), Guard Corpses (of all types), most Hidden Stashes, Skull Piles, Jugs, Skeleton Corpses, Hollow Logs, Loose Rocks, Loose Boulders, Coffins, Stashes, Pillars, Cocoons, Tristram Bodies, some Rat Nests, Corpses of Villagers, Goo Piles, Harem Beds, Hung Skeletons, Bone Chests, Hell Fire Braziers, and Piles-of-Skulls-and-Rocks and some Barrels in Act 5 outdoor areas...
Note: there is a 33.3% chance that the Goo Piles in the Sand Maggot Lair will have a poison trap.

The remaining Type III Ordinary Objects use OperateFn 1 which means they make a single Chest TC drop with no desired quality and they have an 18.08% chance to spawn a monster. These are: Caskets (all areas except Arcane's), Sarcophaguses, and Act 1 Beds.

Type IV Ordinary Objects
All but one of these objects use OperateFn 3, which means they have a 21% chance to make a single Chest TC drop with no desired quality. These are: Urns, Large Urns, Baskets (in dungeons), Dead Bodies in Kurast Sewers, Jars, Rock Piles (in dungeons), and Trapped Souls.

Barrels (Act1-4) use OperateFn 5, which means they have a 21% chance to make a single Chest TC drop with no desired quality and an 18.08% chance to spawn a monster. Exploding Barrels never drop anything. No surprise there.

That's it for the Objects that are verified to have a chance to drop runes!

For reference, bookshelves use OperateFn 26, which means they either drop TP or ID scrolls or books, but never any runes or other items.

Kudos to ***Jarulf***, for his discovery and explanations of a number of Object functions.

Objects that use un-deciphered Functions
Armor and Weapon Racks (obviously these would never drop runes), Burning Trapped Souls (found in Act 4), Stashes in Act 3 Jungles, Evil Urns, Quest Chests (Act 2 and 3), Tainted Sun Altar, Gidbinn Cauldron, and Hellforge Quest. These all have not been fully deciphered yet as far as I know.

It's well known that the Hellforge Quest drops 3 gems and 1 rune. In hell mode, quite often it is a nice rune. Anecdotal evidence from several players suggests that a Gul rune is the highest possible in hell mode. I do not know the actual chances for Guls (or other runes) from the Hellforge Quest, but I will try to glean this info straight from the corresponding Operate function and include it in the next revision of the guide.

Table C - chance for Object Traps or Being Locked in each Area

Level Name **Act I**	**Monlvl1**	**Trap Chance** (most all Objects)	**Locked Chance** (Type I & Super Objects and Quest-Chests only)
Blood Moor	1	5.13%	8.50%
DoE (Cave L1 after quest)	1	5.13%	8.50%
Cold Plains	2	5.25%	9.00%
Cave Level 1&2	2	5.25%	9.00%
Burial Grounds	3	5.38%	9.50%
Crypt	3	5.38%	9.50%
Mausoleum	3	5.38%	9.50%
Stony Field	4	5.50%	10.00%
Underground Passage L1&2	4	5.50%	10.00%
Tristram	6	5.75%	11.00%
Dark Wood	5	5.63%	10.50%
Black Marsh	6	5.75%	11.00%
Hole Level 1&2	5	5.63%	10.50%
Tower Cellar Level 1-5	7	5.88%	11.50%
Tamoe Highland	8	6.00%	12.00%
Pit Level 1&2	7	5.88%	11.50%
Monastery Gate	8	6.00%	12.00%
Outer Cloister	9	6.13%	12.50%
Barracks	9	6.13%	12.50%
Jail Level 1-3	10	6.25%	13.00%
Inner Cloister	10	6.25%	13.00%
Cathedral	11	6.38%	13.50%
Catacombs Level 1&2	11	6.38%	13.50%
Catacombs Level 3&4	12	6.50%	14.00%
Moo Moo Farm	28	8.50%	22.00%
Act 2			
LG Sewers Level 1&2	13	6.63%	14.50%
LG Sewers Level 3	14	6.75%	15.00%
Rocky Waste	14	6.75%	15.00%
Stony Tomb Level 1&2	12	6.50%	14.00%
Dry Hills	15	6.88%	15.50%
Halls of the Dead Level 1	12	6.50%	14.00%
Halls of the Dead Level 2&3	13	6.63%	14.50%
Far Oasis	16	7.00%	16.00%
Maggot Lair Level 1-3	17	7.13%	16.50%
Lost City	17	7.13%	16.50%
Ancient Tunnels	17	7.13%	16.50%
Valley of Snakes	18	7.25%	17.00%
Claw Viper Temple Level 1&2	14	6.75%	15.00%
Harem Level 2	13	6.63%	14.50%
Palace Cellar Level 1-3	13	6.63%	14.50%
Arcane Sanctuary	14	6.75%	15.00%

Canyon of the Magi	16	7.00%	16.00%
Tal Rasha's Tomb (each of 7)	17	7.13%	16.50%
Duriel's Lair	17	7.13%	16.50%
Act 3			
Spider Forest	21	7.63%	18.50%
Arachnid Lair	21	7.63%	18.50%
Spider Cavern	21	7.63%	18.50%
Great Marsh	21	7.63%	18.50%
Flayer Jungle	22	7.75%	19.00%
Swampy Pit Level 1-3	21	7.63%	18.50%
Flayer Dungeon Level 1-3	22	7.75%	19.00%
Lower Kurast	22	7.75%	19.00%
Kurast Bazaar	22	7.75%	19.00%
Ruined Temple	23	7.88%	19.50%
Disused Fane	23	7.88%	19.50%
Kurast Sewers Level 1	23	7.88%	19.50%
Kurast Sewers Level 2	24	8.00%	20.00%
Upper Kurast	23	7.88%	19.50%
Forgotten Reliquary	23	7.88%	19.50%
Forgotten Temple	24	8.00%	20.00%
Kurast Causeway	24	8.00%	20.00%
Ruined Fane	24	8.00%	20.00%
Disused Reliquary	24	8.00%	20.00%
Travincal	24	8.00%	20.00%
Durance of Hate Level 1-3	25	8.13%	20.50%
Act 4			
Outer Steppes	26	8.25%	21.00%
Plains of Despair	26	8.25%	21.00%
City of the Damned	27	8.38%	21.50%
River of Flame	27	8.38%	21.50%
Chaos Sanctum	28	8.50%	22.00%
Act 5			
Bloody Foothills	24	8.00%	20.00%
Frigid Highlands	25	8.13%	20.50%
Abaddon (Hell1)	39	9.88%	27.50%
Arreat Plateau	26	8.25%	21.00%
Pit of Acheron (Hell2)	39	9.88%	27.50%
Crystalline Passage	29	8.63%	22.50%
Frozen River	29	8.63%	22.50%
Nihlathak's Temple	32	9.00%	24.00%
Halls of Anguish	33	9.13%	24.50%
Halls of Pain	34	9.25%	25.00%
Halls of Vaught	36	9.50%	26.00%
Glacial Trail	29	8.63%	22.50%
Drifter Cavern	29	8.63%	22.50%
Frozen Tundra	27	8.38%	21.50%
Infernal Pit (Hell3)	39	9.88%	27.50%
Ancients' Way	29	8.63%	22.50%

Icy Cellar	29	8.63%	22.50%
Arreat Summit	27	8.38%	21.50%
Worldstone Keep Level 1	39	9.88%	27.50%
Worldstone Keep Level 2	40	10.00%	28.00%
Worldstone Keep Level 3	42	10.25%	29.00%
Throne of Destruction	43	10.38%	29.50%

Objects are tied to the Act in which they are located for determining drops.

Since we are concerned with rune drops…

- Act 1 (H) Objects can drop up to Vex (r26).
- Act 2 (H) Objects can drop up to Lo (r28).
- Act 3 (H) Objects can drop up to Ber (r30).
- Act 4 (H) Objects can drop up to Cham (r32).
- Act 5 (H) Objects can drop up to Zod (r33).

Objects in Level 85 areas, such as The Pit and The Mausoleum are not upgraded to a higher TC as monsters are. They still only drop as Act 1 Objects. Objects in The Moo Moo Farm drop as Act 1 Objects, also.

For reference, items that drop from objects will inherit the level of the area that the object is located in. Act 5 (H) Objects located in level 85 areas are in fact capable of dropping up to TC87 equipment; the chance is just very small. The game code does not cap the quality level for equipment drops from objects at TC66 as I had previously thought. Drop testing has verified this.

A somewhat cheesy but effective tactic…

Drop testing has verified that it's not necessary to use a Players 8 setting before entering the area the object is located in to gain the benefit of a very low chance for No Drop. After clearing an area at a manageable Players setting, you can raise it to Players 8 and then run around and pop all the objects.

Okay, easy part is over… let's talk about those Super Objects.

Sparkly Chests (Super Object)

The following explanation is paraphrased from a post by ***Jarulf***...

For a Sparkly Chest, the game picks from 6 weighted options for how it will drop as follows:

Option 1 (2% chance). The game will make a Chest TC drop cycle (up to 4 item drops) with a desired quality of unique. If the drop cycle fails a magical+ test, it will make another Chest TC drop cycle with a desired quality of unique. If that cycle also fails a magical+ test, the game will make more drop cycles according to option 6. Note that option 1 can generate up to 6 unique items if it fails plus up to an additional 16 unique items from option 6. Gasp!

Option 2 (4% chance). The game will make a Chest TC drop cycle with a desired quality of set. If the drop cycle fails a magical+ test, it will make another Chest TC drop cycle with a desired quality of set. If that cycle also fails a magical+ test, the game will make more drop cycles according to option 6.

Option 3 (6% chance). The game will make a Chest TC drop cycle with a desired quality of rare. If the drop cycle fails a magical+ test, it will make another Chest TC drop cycle with a desired quality of rare. If that cycle also fails a magical+ test, the game will make more drop cycles according to option 6.

Option 4 (20% chance). The game will make up to 10 Chest TC drop cycles with a desired quality of magic. As soon as 3 of them pass a magical+ test, the 10 attempts are aborted.

Option 5 (30% chance). The game will make up to 10 Chest TC drop cycles with a desired quality of magic. As soon as 2 of them pass a magical+ test, the 10 attempts are aborted. Then, as long as the number of failed magical+ tests is 6 or less, it will then make a single Chest TC drop cycle with no desired quality, followed by a number of gold drops equaling 6 minus the number of failed magical+ tests.

Option 6 (38% chance). The game will make up to 10 Chest TC drop cycles with a desired quality of magic. As soon as 1 of them passes a magical+ test, the 10 attempts are aborted. It will then make a number of Chest TC drop cycles with no desired quality equaling 4 minus the number of failed magical+ tests done so far. Next it makes 5 gold drops, 2 heal potion drops and 2 mana potion drops.

Note: A Sparkly Chest works the same whether it is locked or not.

Special Chests (Super Object) vs. Type I Ordinary Objects

The following explanation is paraphrased from a post by ***Jarulf***...

First, the game will check if the chest is locked, and if so, unlock it if you have a key or are an assassin. Second, the game sets the number of drop cycles from the appropriate Chest TC to 2 if locked (up to 8 item drops), otherwise to 1 (up to 4 item drops). Next, the game tests for a flag in the initialization routine. Special

Chests always have this flag set. If it is set, there is a 5% chance that the game will make the desired quality of the drops rare, otherwise (95% chance) the desired quality will be magic. If the flag is not set there is no desired quality and the game will pick quality normally, applying MF and so on (Type I Ordinary Objects). After that, the game will make a random chance to drop at all. 75% of the time it will drop. The other 25% of the time, it will only drop if the flag is set or if the chest was locked. Next, the game will make either 1 or 2 actual Chest TC drop cycles (depending on if it is locked or not), with a possible desired quality as mentioned above. If the object is a Special Chest AND none of the previous Chest TC drop cycles (1 or 2) passed a magical+ test, it will make up to 10 more Chest TC drop cycles with a possible desired quality as mentioned above. As soon as 1 of them passes a magical+ test, the 10 attempts are aborted.

> *Note: Empirical evidence suggests that most Special Chests stay that way and remain in the same place on the map; however, some may intermittently switch to behaving like a Type 1 Ordinary Object from run to run (I observed this in the Maggot Lair). I believe this behavior is related to the initialization flag that Jarulf discovered. The conditions for how and when the flag is set need to be investigated further.*

Quest Chests (pseudo-Type I Ordinary Object)

It may sparkle like a Sparkly Chest, but a Quest Chest uses different operate and initialize functions and is actually rather ordinary. ***Jarulf*** didn't post about how any of the Act2 and Act 3 Quest Chest functions work, so I am basing their drop behavior on empirical evidence and drop tests. Quest Chests behave like Type 1 Ordinary Objects in that they can drop up to 8 items if locked or 4 if not. Then they drop a random number of additional gold piles (there seems to be an upper limit of 10), plus the quest item of course. The important thing is that as far as runes are concerned, they behave like a Type I Ordinary Object.

Where are all the Super Objects !?!

I'm fairly sure that ***every*** "off-shoot" area contains a Sparkly Chest. Cave L2, Underground Passage L2, Pit L2, Mausoleum, Crypt, Stony Tombs L2, Ancient Tunnels, Icy Cellar, and all 3 red portals to Hell in the outer areas of Act 5, to name some confirmed sightings. Some other locales with a Sparkly Chest are: Bonesaw's Platform on the Glacial Trail, Snappy's Hideout, and some serpent surrounded islands in the Great Marsh and Flayer Jungle, among others...

The deceivingly ordinary-looking Special Chests can always be found in: the Crypt, the Maggot Lair, at the end of the false paths in Arcane's, in the false Tal

Rasha Tombs, in Sewers L2 (Act 3), a couple spots in Upper Kurast, and of course the ever popular center chest behind Meph, among other musty and sunless places.

These Super Objects can be run over and over. They have a better chance (on average over several runs) to drop runes than any single monster (except Hell Countess up to Ist).

Don't pass over ***any*** objects in Act 5 (H)! They just might contain a *Zod*.

"To dream the impossible dream…" (voice of Luciano Pavarotti)

> *Note: All the lovely calculations related to rune drop chances from objects are shown in the Excel version of the guide.*

Rune Drop Averages for all Single Sources

Based on the calculations shown in the Excel version of the guide, the following rune drop averages for all single sources were determined.

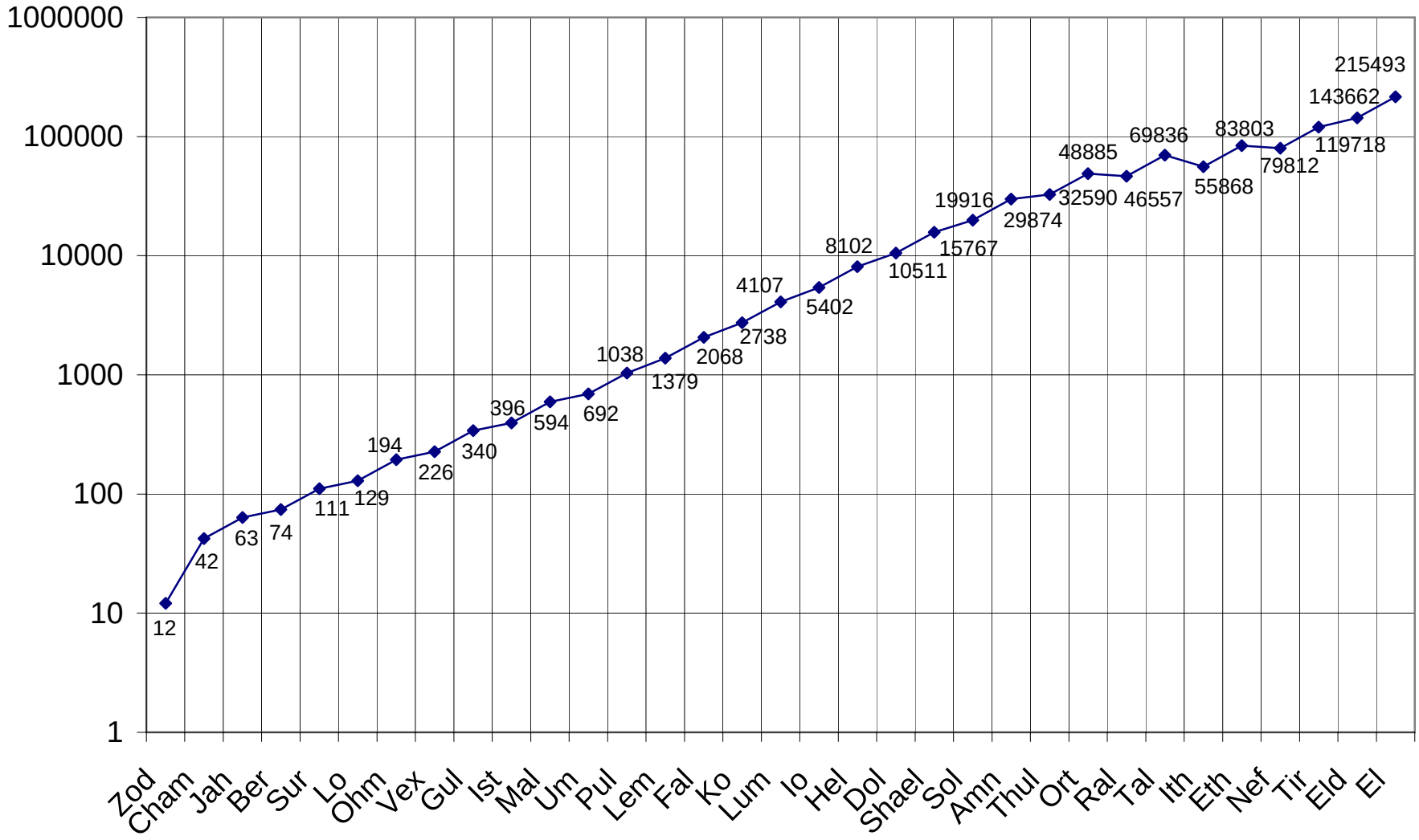
Source	Mean # of Runes per Kill (at P8 - unless noted otherwise)	
Melee/Cast/Missle	0.003531	
Wraiths	0.013896	
Cows	0.005296	
Quills	0.007179	
Swarms	0.003365	
Flying Scimitars	0.005296	
Champs	0.003231	
Uniques	0.006948	
Superuniques	0.013896	
Council Member	0.026923	
Specials		
Countess	1.877672	**← at Players 1**
Smith or Griswold	0.006948	
Radament	0.033654	
Summoner	0.044872	
Haph, Nihls, Izzy, or BR	0.039400	
Baal's Minions (5)	0.003231	
Cow King	0.011580	
Act bosses		
Andariel	0.040385	
Duriel	0.033654	
Meph, Diablo, or Baal	0.029822	
Objects (Chest TC)		
Type I & II	0.014685	
Type I - Locked	0.039161	
Type III	0.019580	
Type IV	0.004112	
Special Chest	0.058741	
Special Chest - Locked	0.078322	
Sparkly Chest	0.132755	

The number of monsters, chests, etc. does not scale up with "Players X" setting. However, the mean quantity of rune drops for each kill does scale up for most monster types (and all object types), since the chance for no-drop is driven to zero. Remember that the highest ratio of rune drops per time spent is your goal, not simply the highest average number of rune drops alone.

Snow Bunny

To download the Excel version, point your browser to:
http://www.flightsofsplendor.com/diabloII/Urlik's_RFG_v2.xls

Specific Runes for every 1 Million Runes Dropped



Rune Chance for any Rune Dropped
(by Zod capable source)