

Lucky Forest

Kansas K.A.R. 111-23-4 (v43 synth) · eInstant Cert Pack v1

Issued: 2026-05-15T21:45:39.669411Z · Authority: Multi.Bingo iLottery RGS
Signing key: Ed25519 · ID d651f1b9f793f40d

Math validation

Pool size	1,000,000
RTP @ unit denom	88.0000%
Top prize (max denom)	\$30,000,000
Bonus engine	generic_bonus

1. Game specification (Kansas K.A.R. 111-23-4 (v43 synth))

Lucky Forest is an instant lottery game governed by Kansas K.A.R. 111-23-4 (v43 synth). Finite-pool model with 1,000,000 shares per pool. The bit-exact payable below has been imported from the K.A.R. (j) odds table.

Prize formula: $\text{prize_cents} = \text{multiplier} \times \text{denom_cents} \times \text{tickets_purchased}$

2. Paytable (13 tiers)

Multiplier	Count in pool	Odds (1 in)
x300000	1	1,000,000.00
x30000	1	1,000,000.00
x6000	4	250,000.00
x1500	19	52,631.58
x250	116	8,620.69
x100	464	2,155.17
x50	928	1,077.59
x25	2,320	431.03
x10	6,960	143.68
x5	13,920	71.84
x2	34,800	28.74
x1	58,000	17.24
x0.5	101,800	9.82

3. Pool architecture

Each pool consists of 1,000,000 shares. Pool generation: RGS service `multibingo-rng:9443` provides the server seed (RNG_STRICT=true, no local fallback). Paytable counts written into array, shuffled with `mulberry32(SHA-256(server_seed))` Fisher-Yates. Pool audit_hash chained via Ed25519 signature. Tickets consumed sequentially; outcome = multiplier at position in shuffled array.

4. Audit chain (K.A.R. h)

Daily Merkle root signed with Ed25519 (key ID `d651f1b9f793f40d`). Leaves = ticket_hash + pool_hash. Persisted in WORM-locked PG row + audit blob to disk (S3 Object Lock in prod). Each day's row stores `prev_root_sha256` forming a hash chain.

5. Verifier endpoints

```
GET /api/ilottery/games/LUCKY_FOREST/paytable
GET /api/ilottery/games/LUCKY_FOREST/config?jur=GLI-SANDBOX
POST /api/ilottery/games/LUCKY_FOREST/open-pool
POST /api/ilottery/games/LUCKY_FOREST/play
POST /api/ilottery/vector/replay (game_code=LUCKY_FOREST)
GET /api/ilottery/verify/:ticket_id
GET /api/ilottery/merkle/proof/:ticket_id
GET /api/ilottery/audit/public-key
```

6. Test vectors v1

URL: https://kobowlotto.com/mathforge/ilottery/gdd/lucky_forest/vectors_v1.json
600 vectors × 5 denoms = 3,000 prize data points (6 tiers × 100 each).

7. Operator Ed25519 public key

```
-----BEGIN PUBLIC KEY-----
MCowBQYDK2VwAyEAU2k0zXnm09QHduKLSEQYUAFeACAEOTUceEuiRGLSiXs=
-----END PUBLIC KEY-----
```