

Kansas Cashout

Kansas K.A.R. 111-23-33 · eInstant Cert Pack v1

Issued: 2026-05-15T21:45:39.317539Z · Authority: Multi.Bingo iLottery RGS
Signing key: Ed25519 · ID d651f1b9f793f40d

Math validation

Pool size	5,000,000
RTP @ unit denom	59.5630%
Top prize (max denom)	\$300,000
Bonus engine	generic_bonus

1. Game specification (Kansas K.A.R. 111-23-33)

Kansas Cashout is an instant lottery game governed by Kansas K.A.R. 111-23-33. Finite-pool model with 5,000,000 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 (70 tiers)

Multiplier	Count in pool	Odds (1 in)
×50000.0	1	5,000,000.00
×5000.0	1	5,000,000.00
×1000.0	2	2,500,000.00
×500.0	5	1,000,000.00
×495.0	5	1,000,000.00
×490.0	10	500,000.00
×480.0	10	500,000.00
×470.0	10	500,000.00
×460.0	10	500,000.00
×450.0	10	500,000.00
×445.0	10	500,000.00
×440.0	10	500,000.00
×435.0	10	500,000.00
×430.0	10	500,000.00
×420.0	10	500,000.00
×410.0	10	500,000.00
×400.0	50	100,000.00
×390.0	50	100,000.00
×380.0	50	100,000.00
×370.0	50	100,000.00
×360.0	50	100,000.00
×350.0	50	100,000.00
×340.0	50	100,000.00
×330.0	50	100,000.00
×320.0	150	33,333.33
... (45 more)		

3. Pool architecture

Each pool consists of 5,000,000 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/KANSAS_CASHOUT/paytable
GET /api/ilottery/games/KANSAS_CASHOUT/config?jur=GLI-SANDBOX
POST /api/ilottery/games/KANSAS_CASHOUT/open-pool
POST /api/ilottery/games/KANSAS_CASHOUT/play
POST /api/ilottery/vector/replay (game_code=KANSAS_CASHOUT)
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/kansas_cashout/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-----
```