

Black Diamond Club

Kansas K.A.R. 111-23-20 · eInstant Cert Pack v1

Issued: 2026-05-15T21:45:35.193675Z · Authority: Multi.Bingo iLottery RGS
Signing key: Ed25519 · ID d651f1b9f793f40d

Math validation

Pool size	10,000,000
RTP @ unit denom	88.0000%
Top prize (max denom)	\$240,000
Bonus engine	none

1. Game specification (Kansas K.A.R. 111-23-20)

Black Diamond Club is an instant lottery game governed by Kansas K.A.R. 111-23-20. Finite-pool model with 10,000,000 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 (95 tiers)

Multiplier	Count in pool	Odds (1 in)
x12000.0	5	2,000,000.00
x6000.0	2	5,000,000.00
x5000.0	2	5,000,000.00
x4000.0	3	3,333,333.33
x3200.0	1	10,000,000.00
x3000.0	2	5,000,000.00
x2700.0	1	10,000,000.00
x2500.0	2	5,000,000.00
x2300.0	1	10,000,000.00
x2200.0	4	2,500,000.00
x2100.0	1	10,000,000.00
x2000.0	10	1,000,000.00
x1700.0	1	10,000,000.00
x1500.0	2	5,000,000.00
x1400.0	1	10,000,000.00
x1200.0	3	3,333,333.33
x1150.0	1	10,000,000.00
x1100.0	2	5,000,000.00
x1050.0	1	10,000,000.00
x1000.0	12	833,333.33
x950.0	1	10,000,000.00
x900.0	1	10,000,000.00
x800.0	3	3,333,333.33
x700.0	2	5,000,000.00
x600.0	6	1,666,666.67
... (70 more)		

3. Pool architecture

Each pool consists of 10,000,000 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/BLACK_DIAMOND_CLUB/paytable
GET /api/ilottery/games/BLACK_DIAMOND_CLUB/config?jur=GLI-SANDBOX
POST /api/ilottery/games/BLACK_DIAMOND_CLUB/open-pool
POST /api/ilottery/games/BLACK_DIAMOND_CLUB/play
POST /api/ilottery/vector/replay (game_code=BLACK_DIAMOND_CLUB)
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/black_diamond_club/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-----
```