SUPPLEMENTARY MATERIAL

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Investigation of kinetic energy of .308 projectiles of different masses

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This supplementary material contains the raw measurements and unit conversions, derived acceleration calculations, ANOVA outputs, an additional derived-data figure and the detailed reloading procedure supporting the published article. The risk assessment and participant documentation are retained as confidential project and editorial records and are not included.

Supplementary Table S1. Raw data and unit conversions

	220 gr		200 gr		185 gr		168 gr		155 gr	
	Imperial	Metric	Imperial	Metric	Imperial	Metric	Imperial	Metric	Imperial	Metric
Mass	220	14.25576	200	12.95978	185	11.98780	168	10.88622	155	10.04383
Trial 1	2450.5	746.9124	2537.6	773.4605	2517.0	767.1816	2583.9	787.5727	2675.0	815.3400
Trial 2	2461.9	750.3871	2540.1	774.2225	2560.0	780.2880	2637.8	804.0014	2635.5	803.3004
Trial 3	2435.3	742.2794	2518.5	767.6388	2558.3	779.7698	2598.6	792.0533	2649.7	807.6286
Trial 4	2436.0	742.4928	2544.9	775.6855	2535.6	772.8509	2629.6	801.5021	2646.8	806.7446
Trial 5			2521.9	768.6751	2559.7	780.1966	2621.7	799.0942	2640.2	804.7330
Average	2445.9	745.5179	2532.6	771.9365	2546.1	776.0574	2614.3	796.8447	2649.4	807.5493

Imperial values are projectile mass in grams or velocity in feet per second. Metric values are projectile mass in grams or velocity in metres per second.

Supplementary Table S2. ANOVA for velocity versus mass

Source of variation	SS	df	MS	F	p-value	F_{crit}
Between groups	1.034840×10^4	4	2.587100×10^3	96.74092	2.343792×10^{-12}	2.895107
Within groups	5.081086×10^2	19	2.674256×10^1			
Total	1.085651×10^4	23				

ANOVA statistical test for muzzle velocity (m/s) versus projectile mass (kg).

Supplementary Table S3. ANOVA for kinetic energy versus mass

Source of variation	SS	df	MS	F	p-value	F_{crit}
Between groups	1.487636×10^6	4	3.719090×10^5	168.7801	1.465494×10^{-14}	2.895107
Within groups	4.186673×10^4	19	2.203512×10^3			
Total	1.529503×10^6	23				

ANOVA statistical test for projectile kinetic energy (J) versus projectile mass (kg).

Supplementary Table S4. Average acceleration versus mass

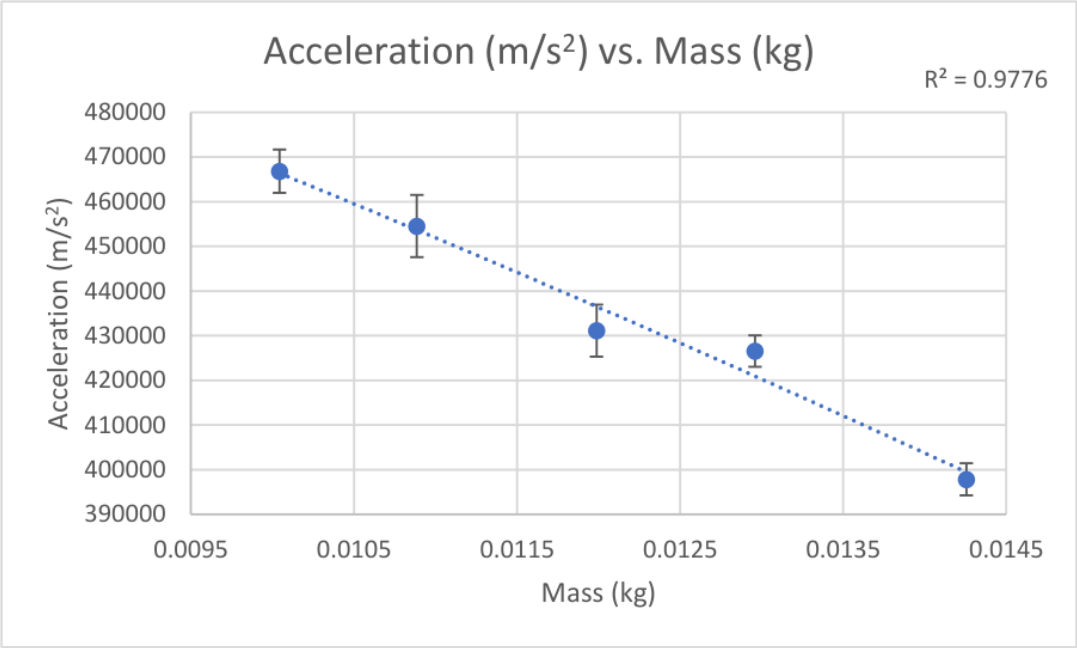
Mass (gr)	Mass (kg)	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Average
220	0.01425576	399340.1	403064.3	394401.4	394628.2		397858.5
200	0.01295978	428232.7	429076.9	421810.5	430700.1	422950.2	426554.1
185	0.01198780	421308.2	435826.3	435247.7	427558.0	435724.2	431132.9
168	0.01088622	444002.0	462718.9	449068.3	459846.5	457087.7	454544.7
155	0.01004383	475862.1	461912.3	466903.3	465881.8	463561.3	466824.2

Average projectile acceleration (m/s^2) versus projectile mass, assuming a barrel travel length of 0.6985 m.

Supplementary Table S5. ANOVA for acceleration versus mass

Source of variation	SS	df	MS	F	p-value	F_{crit}
Between groups	1.283234×10^{10}	4	3.208086×10^9	94.82958	2.805423×10^{-12}	2.895107
Within groups	6.427702×10^8	19	3.383001×10^7			
Total	1.347511×10^{10}	23				

ANOVA statistical test for average projectile acceleration (m/s^2) versus projectile mass (kg).



Supplementary Figure S1. Average acceleration versus mass. Relationship between average projectile acceleration (m/s^2) and projectile mass (kg). Group sample sizes were $n = 4$ for 220 gr and $n = 5$ for all other projectile masses.

Supplementary Table S6. ANOVA for time in barrel versus mass

Source of variation	SS	df	MS	F	p-value	F_{crit}
Between groups	5.539643×10^{-8}	4	1.384911×10^{-8}	100.4061	1.675771×10^{-12}	2.895107
Within groups	2.620686×10^{-9}	19	1.379309×10^{-10}			
Total	5.801712×10^{-8}	23				

ANOVA statistical test for projectile time in the barrel (s) versus projectile mass (kg).

SUPPLEMENTARY METHODS S1

Reloading procedure

Twenty five once-fired .308 brass cases were de-primed. Cases were lubricated using Hornady case wax and resized using a Wilson full-length resizing die. Lubrication was removed with a rag, and new primers were installed using a hand priming tool.

Forty grains of ADI AR2208 smokeless rifle powder were measured using an Ohaus Precision Standard electronic balance within an acceptable range of ±0.02 gr and poured into each case. Each projectile described in the Methodology was placed into the case and seated using a Foster micrometre seating die and an RCBS single-stage reloading press.