



Arrow Deceleration

Kinetic Energy Delivery Devise. (K.E.D.D)

- P.S.E. Xpedite

Arrows.

- Deer Crossing Hunter 300/.006

Tips – Ethics.

- 100gr
- 200gr

Fletchings.

- Tacvane matrix 2.25

Fletching degree.

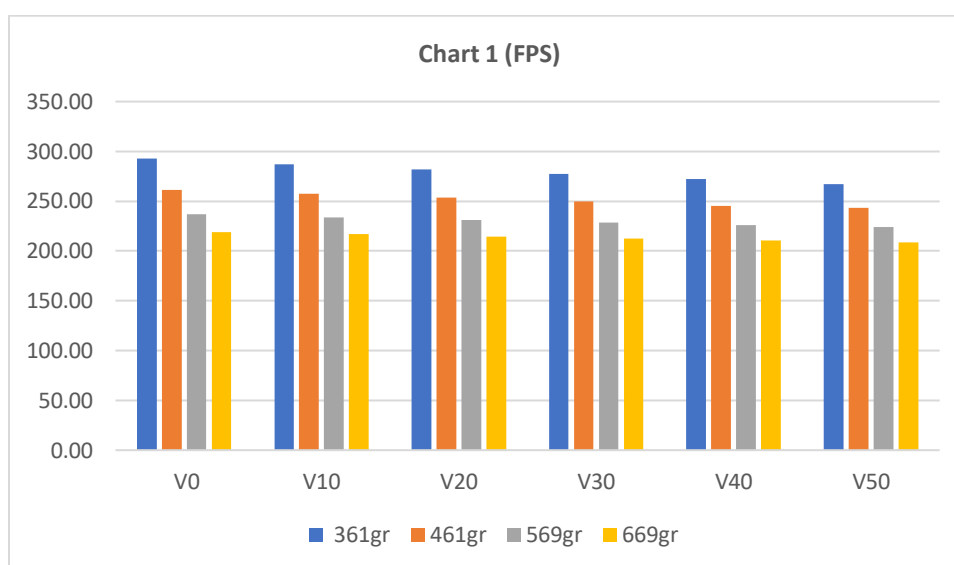
- offset 2°

Total arrow weight. (Weight tube used for arrows 569gr and 669gr)

- 361gr
- 461gr
- 569gr
- 669gr

Table 1 shows the velocity of the four arrows at the K.E.D.D. and every 10 yards out to 50 yards. Then we show the total loss from V0 to V50. As you can see, as the mass of the arrow increases, the velocity loss at distance decreases. We are looking at the variance column of the ANOVA. It's easy to see the variance decreasing as we get a longer distance.

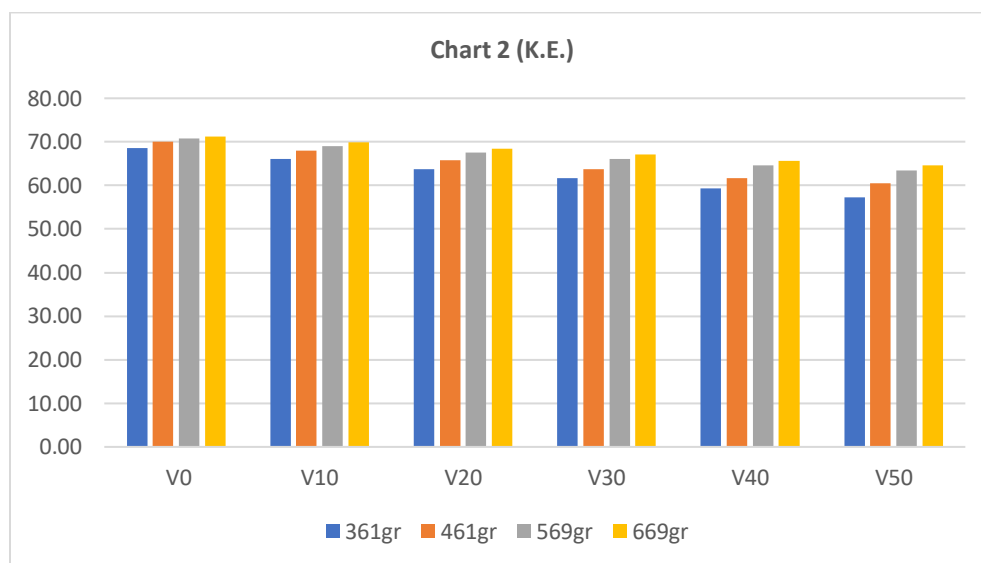
Table 1								
FPS AVG.	V0	V10	V20	V30	V40	V50	Total Loss (V0-V50)	Diff. %
361gr	292.50	287.17	282.00	277.33	272.00	267.17	25.33	-8.66%
461gr	261.50	257.67	253.50	249.50	245.50	243.17	18.33	-7.01%
569gr	236.67	233.83	231.33	228.83	226.17	224.17	12.50	-5.28%
669gr	219.00	217.00	214.67	212.50	210.33	208.67	10.33	-4.72%



ANOVA: Single Factor						
SUMMARY	FPS AVG.					
Groups	Count	Sum	Average	Variance		
V0	4	1009.67	252.4175	1017.937		
V10	4	995.67	248.9175	928.7398		
V20	4	981.5	245.375	849.1551		
V30	4	968.16	242.04	782.7171		
V40	4	954	238.5	705.6093		
V50	4	943.18	235.795	636.5625		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	792.7534	5	158.5507	0.193326	0.961155	2.772853
Within Groups	14762.16	18	820.1202			
Total	15554.92	23				

Table 2 looks at the kinetic energy between the mass of the arrow and at yardages. As you can see, as mass increases, kinetic energy loss is decreased at a distance

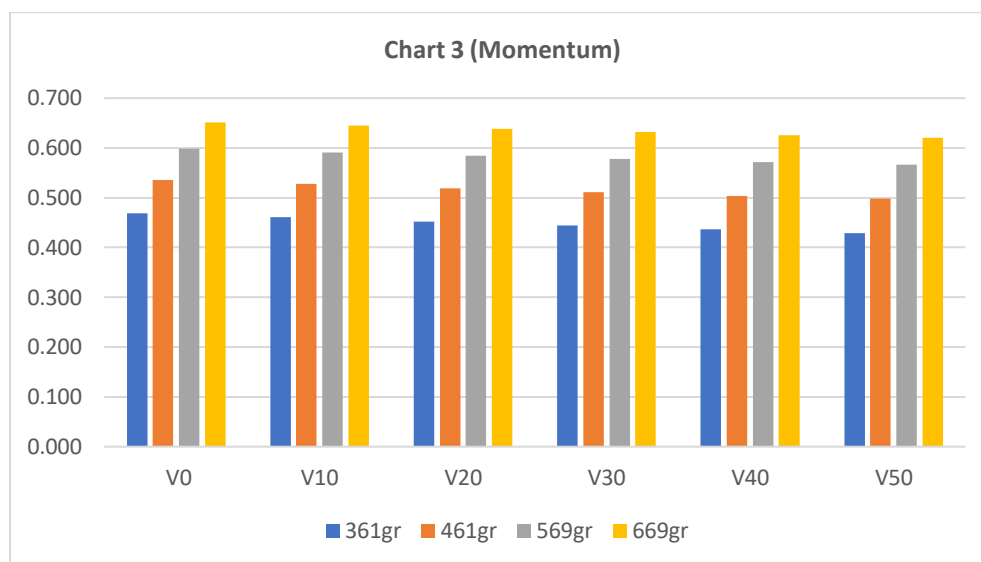
Table 2								
K.E. A.V.G.	V0	V10	V20	V30	V40	V50	Total Loss (V0-V50)	Diff. %
361gr	68.57	66.09	63.73	61.64	59.29	57.21	11.36	-16.57%
461gr	69.99	67.95	65.77	63.71	61.68	60.52	9.47	-13.53%
569gr	70.76	69.07	67.60	66.15	64.62	63.48	7.28	-10.28%
669gr	71.23	69.94	68.44	67.07	65.70	64.67	6.56	-9.21%



ANOVA: Single Factor						
SUMMARY	K.E. A.V.G.					
<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>		
V0	4	280.5441	70.13602	1.355748		
V10	4	273.0498	68.26245	2.754123		
V20	4	265.547	66.38676	4.373484		
V30	4	258.5645	64.64112	6.006895		
V40	4	251.2998	62.82496	8.424543		
V50	4	245.8766	61.46915	11.12215		
ANOVA						
<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	215.8596	5	43.17191	7.610304	0.000537	2.772853
Within Groups	102.1108	18	5.672824			
Total	317.9704	23				

Table 3 looks at momentum. Here we see that same as kinetic energy as we increase mass momentum increases. We can see as mass is increased, the amount of momentum loss is decreased at a distance.

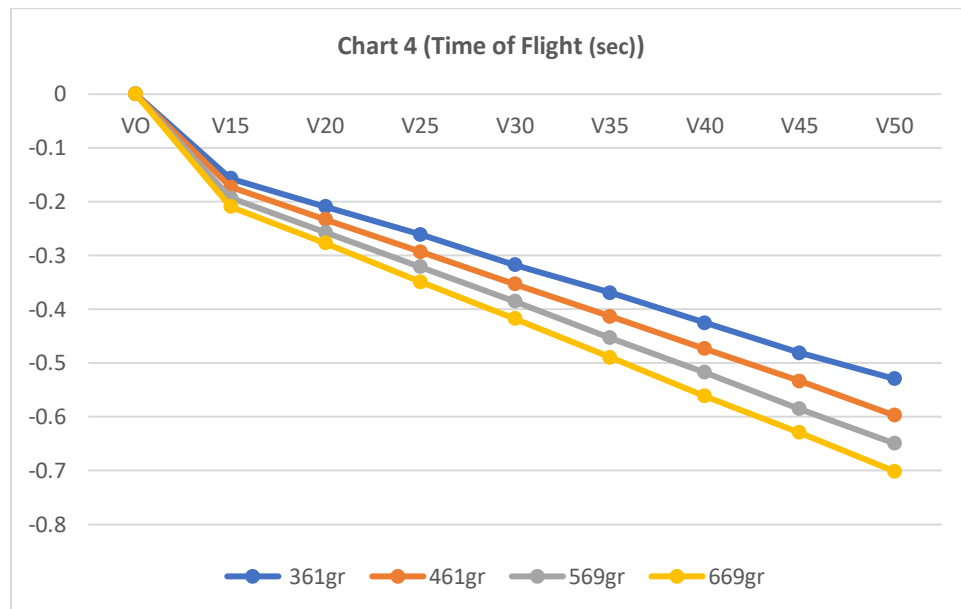
Table 3								
Momentum A.V.G.	V0	V10	V20	V30	V40	V50	Total Loss (V0-V50)	Diff. %
361gr	0.469	0.460	0.452	0.445	0.436	0.428	0.041	-8.66%
461gr	0.535	0.528	0.519	0.511	0.503	0.498	0.038	-7.01%
569gr	0.598	0.591	0.585	0.578	0.572	0.567	0.032	-5.28%
669gr	0.651	0.645	0.638	0.631	0.625	0.620	0.031	-4.72%



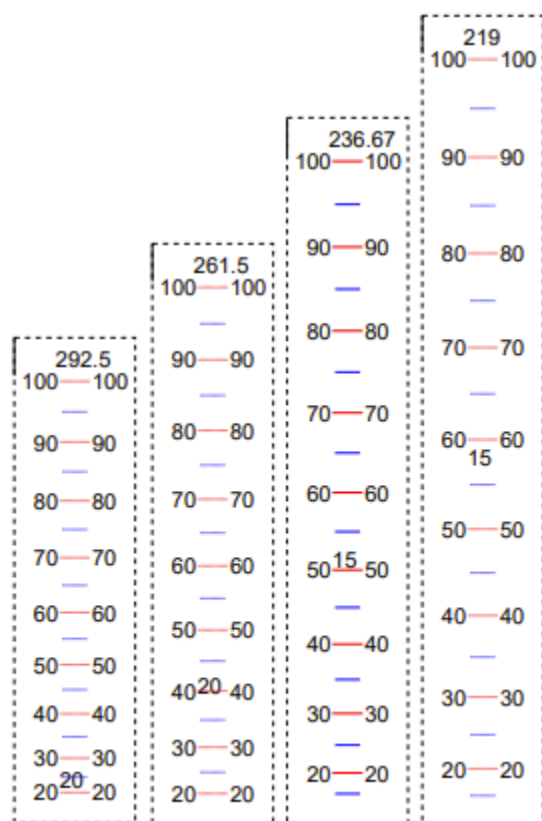
ANOVA: Single Factor						
SUMMARY	Momentum A.V.G.					
Groups	Count	Sum	Average	Variance		
V0	4	2.253287	0.563322	0.006189		
V10	4	2.22378	0.555945	0.00636		
V20	4	2.193711	0.548428	0.006493		
V30	4	2.165268	0.541317	0.006598		
V40	4	2.135362	0.53384	0.006762		
V50	4	2.112861	0.528215	0.006941		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.003547	5	0.000709	0.108201	0.989075	2.772853
Within Groups	0.118029	18	0.006557			
Total	0.121577	23				

Table 4 is what we look at to start putting it all together. Time of flight is trajectory. Here is where we have to decide if the flight time loss is worth the extra arrow mass vs. the amount of kinetic energy loss.

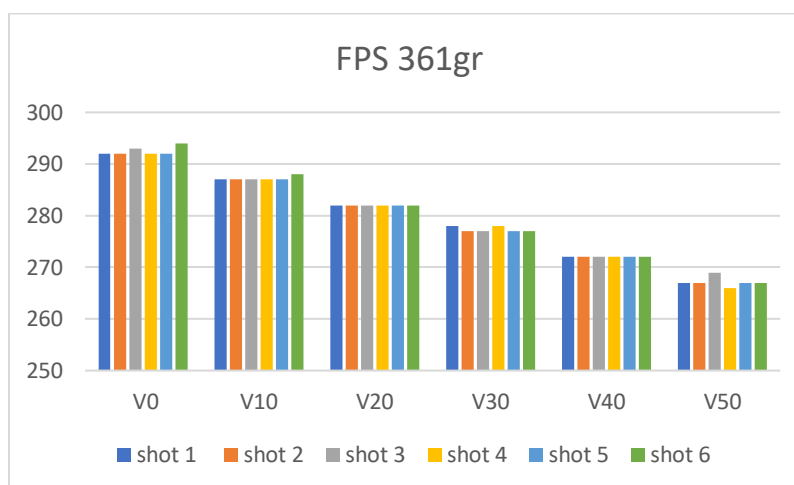
Table 4									
Time of Flight (sec)	VO	V15	V20	V25	V30	V35	V40	V45	V50
361gr	0	-0.157	-0.209	-0.261	-0.317	-0.369	-0.425	-0.481	-0.529
461gr	0	-0.173	-0.233	-0.293	-0.353	-0.413	-0.473	-0.533	-0.597
569gr	0	-0.193	-0.257	-0.321	-0.385	-0.453	-0.517	-0.585	-0.649
669gr	0	-0.209	-0.277	-0.349	-0.417	-0.489	-0.561	-0.629	-0.701



Here are the sight tapes looking at the FPS per arrow. As you can see there is a good bit of difference.



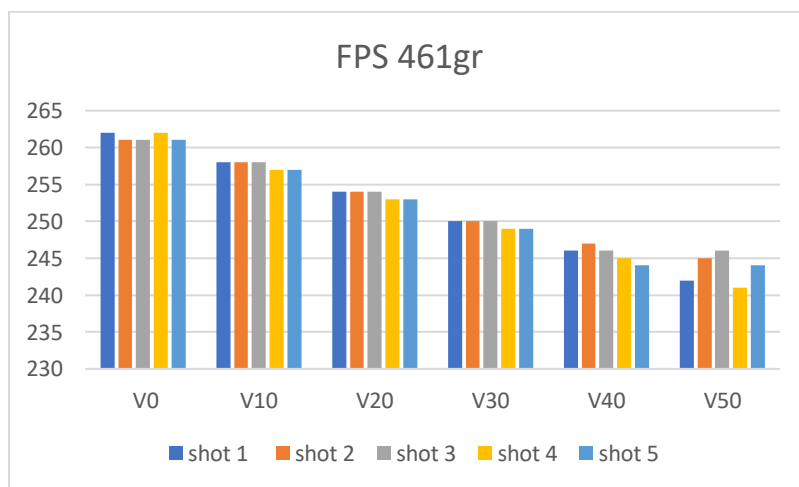
361gr						
FPS	V0	V10	V20	V30	V40	V50
shot 1	292	287	282	278	272	267
shot 2	292	287	282	277	272	267
shot 3	293	287	282	277	272	269
shot 4	292	287	282	278	272	266
shot 5	292	287	282	277	272	267
shot 6	294	288	282	277	272	267



Anova: Single Factor						
SUMMARY						
Groups	Count	Sum	Average	Variance		
V0	6	1755	292.5	0.7		
V10	6	1723	287.16667	0.1666667		
V20	6	1692	282	0		
V30	6	1664	277.33333	0.2666667		
V40	6	1632	272	0		
V50	6	1603	267.16667	0.9666667		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	2681.1389	5	536.22778	1532.0794	3.61174E-35	2.533555
Within Groups	10.5	30	0.35			
Total	2691.6389	35				

Anova: Single Factor					
SUMMARY					
Groups	Count	Sum	Average	Variance	
shot 1 361gr	6	1678	279.6667	86.66667	
shot 2 361gr	6	1677	279.5	87.5	
shot 3 361gr	6	1680	280	83.2	
shot 4 361gr	6	1677	279.5	91.9	
shot 5 361gr	6	1677	279.5	87.5	
shot 6 361gr	6	1680	280	101.2	
ANOVA					
Source of Variation	SS	df	MS	F	P-value
Between Groups	1.805556	5	0.361111	0.004028	0.99999658
Within Groups	2689.833	30	89.66111		
Total	2691.639	35			
					<i>F crit</i>
					2.533555

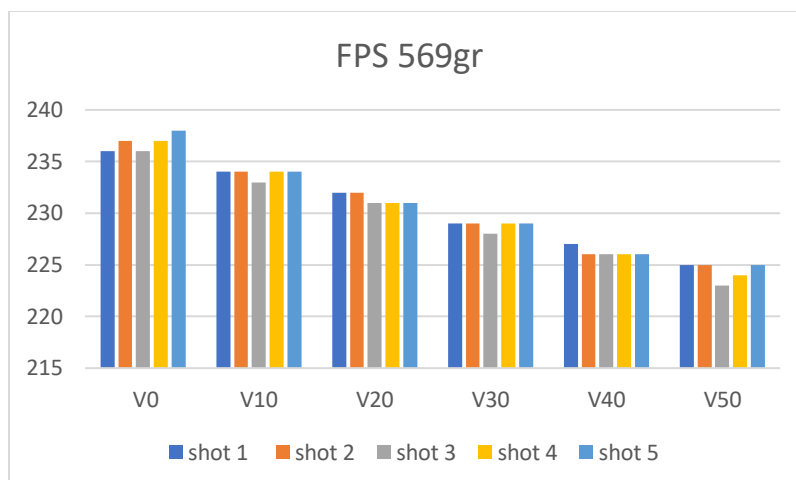
461gr						
FPS	V0	V10	V20	V30	V40	V50
shot 1	262	258	254	250	246	242
shot 2	261	258	254	250	247	245
shot 3	261	258	254	250	246	246
shot 4	262	257	253	249	245	241
shot 5	261	257	253	249	244	244
shot 6	262	258	253	249	245	241



Anova: Single Factor						
SUMMARY						
Groups	Count	Sum	Average	Variance		
V0	6	1569	261.5	0.3		
V10	6	1546	257.6667	0.266667		
V20	6	1521	253.5	0.3		
V30	6	1497	249.5	0.3		
V40	6	1473	245.5	1.1		
V50	6	1459	243.1667	4.566667		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1505.472	5	301.0944	264.3756	7.44E-24	2.533555
Within Groups	34.16667	30	1.138889			
Total	1539.639	35				

Anova: Single Factor						
SUMMARY						
Groups	Count	Sum	Average	Variance		
shot 1	6	1512	252	56		
shot 2	6	1515	252.5	39.5		
shot 3	6	1515	252.5	39.1		
shot 4	6	1507	251.1667	60.16667		
shot 5	6	1508	251.3333	48.26667		
shot 6	6	1508	251.3333	62.66667		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	11.13889	5	2.227778	0.043725	0.998776	2.533555
Within Groups	1528.5	30	50.95			
Total	1539.639	35				

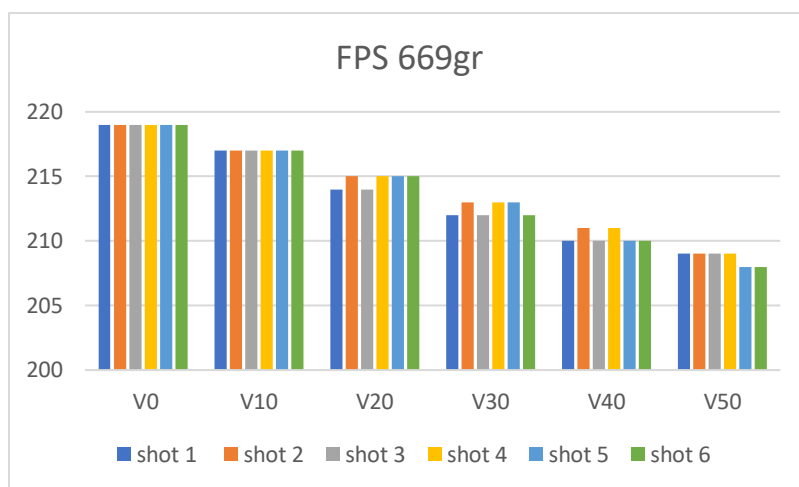
569gr						
FPS	V0	V10	V20	V30	V40	V50
shot 1	236	234	232	229	227	225
shot 2	237	234	232	229	226	225
shot 3	236	233	231	228	226	223
shot 4	237	234	231	229	226	224
shot 5	238	234	231	229	226	225
shot 6	236	234	231	229	226	223



Anova: Single Factor						
SUMMARY						
Groups	Count	Sum	Average	Variance		
V0	6	1420	236.6667	0.666667		
V10	6	1403	233.8333	0.166667		
V20	6	1388	231.3333	0.266667		
V30	6	1373	228.8333	0.166667		
V40	6	1357	226.1667	0.166667		
V50	6	1345	224.1667	0.966667		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	665	5	133	332.5	2.57E-25	2.533555
Within Groups	12	30	0.4			
Total	677	35				

Anova: Single Factor						
SUMMARY						
<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>		
shot 1	6	1383	230.5	17.9		
shot 2	6	1383	230.5	21.9		
shot 3	6	1377	229.5	22.7		
shot 4	6	1381	230.1667	23.76667		
shot 5	6	1383	230.5	24.3		
shot 6	6	1379	229.8333	23.76667		
ANOVA						
<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	5.333333	5	1.066667	0.047643	0.998495	2.533555
Within Groups	671.6667	30	22.38889			
Total	677	35				

669gr						
FPS	V0	V10	V20	V30	V40	V50
shot 1	219	217	214	212	210	209
shot 2	219	217	215	213	211	209
shot 3	219	217	214	212	210	209
shot 4	219	217	215	213	211	209
shot 5	219	217	215	213	210	208
shot 6	219	217	215	212	210	208



Anova: Single Factor						
SUMMARY						
Groups	Count	Sum	Average	Variance		
V0	6	1314	219	0		
V10	6	1302	217	0		
V20	6	1288	214.66667	0.2666667		
V30	6	1275	212.5	0.3		
V40	6	1262	210.33333	0.2666667		
V50	6	1252	208.66667	0.2666667		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	468.13889	5	93.627778	510.69697	4.56157E-28	2.5335545
Within Groups	5.5	30	0.1833333			
Total	473.63889	35				

Anova: Single Factor						
SUMMARY						
Groups	Count	Sum	Average	Variance		
shot 1	6	1281	213.5	15.5		
shot 2	6	1284	214	14		
shot 3	6	1281	213.5	15.5		
shot 4	6	1284	214	14		
shot 5	6	1282	213.6667	17.46667		
shot 6	6	1281	213.5	17.9		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1.805556	5	0.361111	0.02296	0.99974472	2.533555
Within Groups	471.8333	30	15.72778			
Total	473.6389	35				