Table 1

Annual Number of Births to Avonworth School District Residents by Municipality and Year: 1990-2017[1]

Year Sum/5-Yr. Period Ave./5-Yr. Period Change	Ben Avon Borough	Ben Avon Heights Borough	Emsworth Borough	Kilbuck Township	Ohio Township	Total
1990	38	5	30	10	36	119
1991	32	8	42	8	35	125
1992	27	6	40	7	36	106
1993	34	4	44	9	40	131
1994	26	10	35	8	27	106
1995	21	9	31	11	26	98
1996	26	4	37	8	39	114
1997	22	11	23	8	34	98
1998	26	7	22	6	29	90
1999	36	5	24	10	31	106
2000	33	6	26	6	43	114
2001	28	7	34	8	52	129
2002	41	4	33	11	41	130
2003	29	12	33	10	49	133
2004	23	2	24	7	47	103
2005	33	5	27	10	41	116
2006	19	6	33	9	55	122
2007	28	5	30	7	68	138
2008+	19	2	27	10	51	109
2009	25	3	30	6	65	129
2010	28	2	17	6	77	130
2011	22	2	25	3	86	138
2012	27	4	22	6	90	149
2013	22	1	33	5	79	140
2014	32	3	32	6	93	166
2015	30	3	18	5	71	127
2016	19	4	29	7	87	146
2017	13	5	30	3	92	143
∑ 1990-1994	157	33	191	42	164	587
∑ 1995-1999	131	36	137	43	159	506
∑ 2000-2004	154	31	150	42	232	609
∑ 2005-2009	124	21	147	42	280	614
∑ 2010-2014	131	12	129	26	425	723
∑ 2013-2017	116	16	142	26	422	722
Average/Year						
1990-1994	***31.4***	6.6	***38.2***	8.4	32.8	117.4
1995-1999	26.2	7.2	27.4	***8.6***	31.4	101.3
2000-2004	30.8	6.2	30.0	8.4	46.4	121.8
2005-2009	24.8	4.2	29.4	8.4	56.0	122.8
2010-2014	26.2	2.4	25.8	5.2	***85.0***	***144.6***
2013-2017	23.2	3.2	28.4	5.2	***84.4***	***144.4***

[1] Sources: Allegheny County Health Department (1990-2016); Pennsylvania Department of Health (2017); Note that the last row in the bottom 2 quadrants of Table 1 pertain to the last 5 years.

Table 2

Number of Births by Age of Mother and Year for Avonworth School District Residents[1]

	15-19	20-24	25-29	30-34	35-39	40-44	45+	∑
1990-1994								
∑	19	70	194	199	94	11	0	587
% of ∑	.032	.119	**.330**	**.339**	.160	.019	0	
Avg/Yr	3.8	14.0	38.8	39.8	18.8	2.2	0	117.4
1995-1999								
∑	6	38	136	215	102	9	0	506
% of ∑	.012	.075	**.269**	**,423**	.202	.018	0	
Avg/Yr	1.2	7.6	27.2	43.0	20.4	1.8	0	101.2
2000-2004								
∑	14	34	150	234	153	23	1	609
% of ∑	.023	.056	**.246**	**.384**	.251	.038	.002	
Avg/Yr	2.8	6.8	30.0	46.8	30.6	4.6	0.2	121.8
2005-2009								
∑	16	47	170	220	128	32	0	613
% of ∑	.026	.077	**.277**	**.359**	.209	.052	0	
Avg/Yr	3.2	9.6	34.0	44.0	25.6	6.4	0	122.6
2010-2014								
∑	6	55	187	305	145	25	0	723
% of ∑	.008	,076	**.259**	**.422**	.201	.035	0	
Avg/Yr	1.2	11.0	37.4	61.0	29.0	5.0	0	***144.6***
2015-2016								
∑	2	18	55	139	59	4	0	277
% of ∑	.007	.065	***.199***	***.502***	***.213***	.014	0	
Avg/Yr	1.0	9.0	27.5	69.5	29.5	2.0	0	***138.5***
%Δ[2]	-.025	-.054	-.131	+.163	+.053	-.005		
	-.21			+.21				

[1] · Source: Pennsylvania Department of Health

[2] %Δ from 1990-95 to 2015-16

Table 3

Total Fertility Rate for the United States: 1917-2016•

1917	3.33	1942	2.63	1967	2.56	1992	2.05
1918	3.31	1943	2.72	1968	2.46	1993	2.02
1919	3.07	1944	2.57	1969	2.46	1994	2.00
1920	3.26	1945	2.49	1970	2.48	1995	1.98
1921	3.33	[illegible]	2.94	1971	2.27	1996	1.98
1922	3.11	[illegible]	3.27	1972	2.01	1997	1.97
1923	3.10	[illegible]	3.11	1973	1.88	1998	2.00
1924	3.12	[illegible]	3.11	1974	1.84	1999	2.01
1925	3.01	[illegible]	3.09	1975	1.77	2000	2.06
1926	2.90	[illegible]	3.27	1976	1.74	2001	2.03
1927	2.82	[illegible]	3.36	1977	1.79	2002	2.01
1928	2.66	[illegible]	3.42	1978	1.76	2003	2.04
1929	2.53	[illegible]	3.54	1979	1.81	2004	2.05
1930	2.53	[illegible]	3.58	1980	1.84	2005	2.05
1931	2.40	[illegible]	3.69	1981	1.81	2006	2.10
1932	2.32	[illegible]	3.77	1982	1.83	2007	2.12
1933	2.17	[illegible]	3.70	1983	1.80	2008	2.07
1934	2.23	[illegible]	3.71	1984	1.81	2009	2.00
1935	2.19	[illegible]	3.65	1985	1.84	2010	1.93
1936	2.15	[illegible]	3.62	1986	1.84	2011	1.89
1937	2.17	[illegible]	3.46	1987	1.87	2012	1,88
1938	2.22	[illegible]	3.32	1988	1.93	2013	1.86
1939	2.17	[illegible]	3.19	1989	2.01	2014	1.86
1940	2.30	[illegible]	2.91	1990	2.08	2015	1.84
1941	2.40	1966	2.72	1991	2.06	2016	1.82

• Data Sources:

(1) 1917-39 "Trends in Fertility in the United States," U.S. Dept. of Health, Education and Welfare, 1977, Table 13, DHEW Pub #78-1906;

(2) 1940-1980 Vital Statistics of the United States, Vol. 1, Natality, 2003. Table 1-7.

(3) 1980-2007 "Births: Final Data for 2007" National Vital Statistics Reports, Vol. 58, No. 24, August 2010, Table 4 (Department of Health and Human Services).

(4) 2008-2010 National Vital Statistics Reports, Vol. 61, No.1, August 2012.

(5) 2011-2016 National Vital Statistical Reports, Vol. 67, No.1, January 2018.

Table 4

Total Fertility Rate· for the United States— White and White (non-Hispanic): 1970-2016

	ALL	White (including Hispanic)	White (non-Hispanic)	Hispanic		ALL	White (including Hispanic)	White (non-Hispanic)	Hispanic
1970	2.5	2.4			1990	2.1	2.0	1.9	3.0
1971	2.3	2.2			1991	2.1	2.0	1.8	3.0
1972	2.0	1.9			1992	2.1	2.0	1.8	3.0
1973	1.9	1.8			1993	2.0	2.0	1.8	2.9
1974	1.8	1.7			1994	2.0	2.0	1.8	2.8
1975	1.7	1.7			1995	2.0	2.0	1.8	2.8
1976	1.7	1.7			1996	2.0	2.0	1.8	2.8
1977	1.8	1.7			1997	2.0	2.0	1.8	2.7
1978	1.7	1.7			1998	2.1	2.0	1.8	2.7
1979	1.8	1.7			1999	2.1	2.1	1.8	2.6
1980	1.8	1.8			2000	2.1	2.1	1.9	2.7
1981	1.8	1.7			2001	2.0	2.0	1.8	2.7
1982	1.8	1.8			2002	2.0	2.0	1.8	2.7
1983	1.8	1.7			2003	2.0	2.1	1.9	2.7
1984	1.8	1.7			2004	2.0	2.1	1.8	2.8
1985	1.8	1.8			2005	2.1	2.1	1.8	2.8
1986	1.8	1.8			2006	2.1	2.1	1.9	2.9
1987	1.9	1.9			2007	2.1	2.1	1.9	2.9
1988	1.9	1.9			2008	2.1	2.1	1.9	2.7
1989	2.0	1.9			2009	2.0	2.0	1.8	2.5
					2010	1.9	2.0	1.8	2.4
					2011	1.9	1.9	1.8	2.2
					2012	1.9	1.9	1.8	2.2
					2013	1.9	1.9	1.8	2.2
					2014	1.9	1.9	1.8	2.1
					2015	1.8	1.9	1.7	2.1
					2016	1.8	NA	1.7	2.1

· The Total Fertility Rate is the average expected total number of children that a woman will have under the current age-specific fertility rates.

Table 5[1]

Shifts in Age Cohorts of Females in the United States in Pennsylvania and Allegheny County: 1990-2010

	United States			Pennsylvania			Allegheny County		
	1990[2]	2000	2010	1990	2000	2010	1990	2000	2010
0-4	8962	9365	9882	387926	355356	356322	41156	34721	31110
5-9	8837	10026	9959	383947	403701	369276	39193	38610	31588
10-14	8347	10008	10097	368709	420247	385924	36073	40548	33460
15-19	8651	9829	10736	402320	417294	442601	40160	39916	39221
20-24	9345	9276	10572	432692	373203	432260	47352	37861	45020
25-29	10617	9583	10466	503220	366399	388958	53801	38593	42309
30-34	10986	10189	9966	466320	417281	364911	59283	43097	36047
35-39	10061	11388	10138	418201	482595	384115	54269	49714	34921
40-44	8924	11313	10497	337594	504367	429693	47016	54439	39203

Change by Age Cohort Across Time[3]

	United States		Pennsylvania		Allegheny County	
	x(2000)-x(1990)	x(2010)-x(2000)	x(2000)-x(1990)	x(2010)-x(2000)	x(2000)-x(1990)	x(2010)-x(2000)
0-4	+403k (+4.5%)	+517k (+5.5%)	-32570 (-8.4%)	+966 (+0.3%)	-6435(-15.6%)	-3611 (-10.4%)
5-9	+1189k(+13.5%)	-67k (-0.7%)	+19754 (+5.1%)	-34425 (-8.5%)	-583(-1.5%)	-7022 (-18.2%)
10-14	+1661k(+19.9%)	+89k (+0.9%)	+51538(+14.0%)	-34323 (-8.2%)	+4475(+12.4%)	-7088 (-17.5%)
15-19	+1178k +13.6%)	+907k (+9.3%)	+14974 (+3.7%)	+25307 (+6.1%)	-244(-0.6%)	-695 (-1.7%)
20-24	-69k (-0.7%)	+1296k(+14.0%)	-59489 (-13.7%)	+59057 (+15.8%)	-9491(-20.0%)	+7159 (+18.9%)
25-29	-1034k (-9.7%)	+883k (+9.2%)	-136821 (-27.2%)	+22559 (+6.2%)	-15208(-28.3%)	+3716 (+9.6%)
30-34	-797k (-7.3%)	-223k (-2.3%)	-49039 (-10.5%)	-52370 (-12.6%)	-16186(-27.3%)	-7050 (-16.4%)
35-39	+1327k(+13.2%)	-1250k (-11.0%)	+64394 (+15.4%)	-98480 (-20.4%)	-4555(-8.4%)	-14793(-29.8%)
40-44	+2389k(+26.8%)	-816k (-7.2%)	+166773 (+49.4%)	-74674 (-14.8%)	+7423(+15.8%)	-15236 (-28.0%)

[1] Sources: (1) 1990, 2000 and 2010 Data: U.S Census Bureau, Decennial Census

[2] In thousands e.g., 8,962 is 8,962,000 or 8.962 million

[3] Cross-Sectionally by Period; in other words, change (Δ) in age group x in 1990 vs. 2000 for the same age group x

Table 6

Age Structural Change Process Across Time by Major Type of Population Cohort and Five-Year Increments in Time – 1990-2020

Type of Cohort[+]	1990	1995	2000	2005	2010	2015	2020
EB_3	<10	<10	<10	10-14	15-19	20-24	25-29
EB_2	<10	<10	10-14	15-19	20-24	25-29	30-34
EB_1	<10	10-14	15-19	20-24	25-29	30-34	35-39
bb_2	10-14	15-19	20-24	25-29	30-34	35-39	40-44
bb_1	15-19	20-24	25-29	30-34	35-39	40-44	45+
TC	20-24	25-29	30-34	35-39	40-44	45+	45+
BB_4	25-29	30-34	35-39	40-44	45+	45+	45+
BB_3	30-34	35-39	40-44	45+	45+	45+	45+
BB_2	35-39	40-44	45+	45+	45+	45+	45+
BB_1	40-44	45+	45+	45+	45+	45+	45+

[+] EB: Echol Boom, bb: baby bust, TC: Transition cohort between the baby boom and baby bust cohorts; BB: Baby Boom.
Also note that $BB_4 > TC > bb_1 > bb_2$.

Table 7

Population Distribution and Change via Cohort Replacement for the Reproductive Female Population in the Avonworth School District: 2000-2015[1]

Age Cohort	Female Population		
	2000	2010	2015
15-19	239	259	161
20-24	169	241	287
25-29	244	351	337
30-34	357	378	470
35-39	**416**	389	343
40-44	**447**	381	414

Age Cohort	2000→2010	2010→2015
	Population Distribution Change via "Replacement" by Younger Cohorts	Population Distribution Change via "Replacement" by Younger Cohorts
15-19	+20 [-9]	-98 [-141]
20-24	+72 [-71]	+46 [+28]
25-29	+107 [+112]	-14 [+96]
30-34	+21 [+209]	+92 [+119]
35-39	-27 [+145]	-46 [-35]
40-44	**-66** [+24]	+33 [+25]

Age Cohort	2000→2010	2010→2015
	Percentage Change in Population Distribution via "Replacement" by Younger Cohorts	Percentage Change in Population Distribution via "Replacement" by Younger Cohorts
15-19	+8% [-3%]	***-38%*** [-47%]
20-24	***+43%*** [-23%]	**+19%** [+11%]
25-29	***+44%*** [+47%]	***-4%*** [+40%]
30-34	+6% [+124%]	***+24%*** [+34%]
35-39	**-6%** [+59%]	-12% [-9%]
40-44	-15% [+7%]	+9% [+6%]

[1] Data are from US decennial censuses in 2000 and 2010; and from the yearly ACS census for 2015—the 5-yr. estimate; shaded cells indicate baby bust age cohorts—Transition cohort, baby bust cohort #1 and baby bust cohort #2, respectively.

Table 8

Evidence of Net In-Migration of Families with Preschool Children by Municipality and Overall School District: 2005-09 and 2010-14

Panel A 1995-99				
Municipalities	**Column A 2000 Census Children < 5 Yrs. Of Age**	**Column B Births 1995-99**	**Column C Net In-Migration (Preschoolers) Δ (A-B)**	**Column D Avg. No. of New Children per Year of Age (0-4)**
Ben Avon Borough	145	131	+14	+2.8
Ben Avon Hts Boro	33	36	-3	-0.6
Emsworth Borough	133	137	-4	-0.8
Kilbuck Township	38	43	-5	-1.0
Ohio Township	194	159	+35 (+22%)	+7.0
TOTAL	**543**	**506**	**+37 (+7%)**	**+7.4 (+7)**

Panel B 2005-09				
Municipalities	**Column A 2010 Census Children < 5 Yrs. Of Age**	**Column B Births 2005-09**	**Column C Net In-Migration (Preschoolers) Δ (A-B)**	**Column D Avg. No. of New Children per Year of Age (0-4)**
Ben Avon Borough	118	124	-6	-1.2
Ben Avon Hts Boro	20	21	-1	-0.2
Emsworth Borough	148	147	+1	+0.2
Kilbuck Township	29	42	-13	-2.6
Ohio Township	356	280	+76 (+27%)	+15.2
TOTAL	**671**	**614**	**+57 (+9%)**	**+11.4 (+11)**

Panel C 2010-14				
Municipalities	**Column A 2015 Census[1] Children < 5 Yrs. Of Age**	**Column B Births 2010-14**	**Column C Net In-Migration (Preschoolers) Δ (A-B)**	**Column D Avg. No. of New Children per Year of Age (0-4)**
Ben Avon Borough	120	131	-11	-2.2
Ben Avon Hts Boro	15	12	+3	+0.6
Emsworth Borough	100	129	-29	-5.8
Kilbuck Township	28	26	+2	+0.4
Ohio Township	513	425	+88 (+21%)	+17.6
TOTAL	**776**	**723**	**+53 (+7%)**	**+10.6 (+11)**

[1] American Community Survey (ACS)

Table 9

Overall Net Migration for the Avonworth School District Using Baseline "Replacement" of Grade 12 Students in Year t-1 by Kindergarten Students in Year t: 2009-2018

	A	B	C	D	E	F
	K_t	$G12_{t-1}$	Δ_1 without migration[5]	Total Student Population$_t$	Δ_2[6]	Net Migration[7]
t= 2009-10	116	102	+14	1,409	+6	-8
2010-11	116	87	+29	1,443	+34	+5
2011-12	148	102	+46	1,494	+51	+5
2012-13	123	102	+21	1,508	+14	-7
2013-14	141	95	+46	1,545	+37	-9
2014-15	134	107	+27	1,570	+25	-2
2015-16	148	83	+65	1,612	+42	-23
2016-17	128	95	+33	1,673	+61	+28
2017-18	138	124	+14	1,686	+13	-1
2018-19	166	101	+65	1,797	+111	+46
Last 10 years: $\sum$ 2009-2018			+360 (+156)		+394 (+142)	+34 (-14)
Last 5 years: $\sum$ 2014-2018			+204		+252	+48

[5] $\Delta_1 = K_t - G12_{t-1}$, i.e., assuming the counterfactual case of "what if" no one migrated; rather there was only G12 students exiting via graduation and K students entering. Thus the "net migration" pertains to year t-1.

[6] Δ_2=Student Population$_t$ – Student Population$_{t-1}$; in 2008 the total student population was 1,403.

[7] Net migration is (Δ_2-Δ_1) where Δ_2 is the change in actual or observed total students and Δ_1 is the counterfactual "what if" case depicting would happen to the total student population with no migration—in or out. Thus, the difference (Δ_2 - Δ_1) is net migration.

Table 9A

"Net Migration at the Primary Level: 2009-2018

		K_t	$G2_{t-1}$	Δ_1 without migration[c]	Total Student Population$_t$	Δ_2[d]	Net Migration[e]
t=	2009-10	116	122	-6	352	-4	+2
	2010-11	116	108	+8	365	+13	+5
	2011-12	148	131	+17	390	+25	+8
	2012-13	123	125	-2	370	-20	-18
	2013-14	141	110	+31	402	+32	+1
	2014-15	134	141	-7	391	-11	-4
	2015-16	148	125	+23	403	+12	-11
	2016-17	128	130	-2	414	+11	+13
	2017-18	138	131	+7	426	+12	+5
	2018-19	166	155	+11	453	+27	+16
Last 10 years: $\sum$ 2009-2018				80 (+48)		+97 (+46)	+17 (-2)
Last 5 years: $\sum$ 2014-2018				+32		+51	+19

[c] $\Delta_1 = K_{t1} - G2_{t-1}$

[d] Δ_2= Primary Student Population$_t$ – Primary Student Population$_{t-1}$; in 2008 the total Primary (K-G2) student population was 356.

[e] The basic equation for net migration is (Δ_2-Δ_1); that is, the actual change in primary student population minus what it would have been without migration, i.e., replacing the G2 population at t-1 who move up to the elementary school by t with the new entrants at K in t and with all other grades having all students staying and moving up one grade. The difference (Δ_2 - Δ_1) is the net migration that occurred.

Table 9B

"Net Migration at the Elementary Level: 2009-2018

		$G2_{t-1}$	$G6_{t-1}$	Δ_1 without migration[s]	Total Student Population$_t$	Δ_2[t]	Net Migration[u]
t=	2009-10	122	92	+30	444	+37	+7
	2010-11	108	94	+14	466	+22	+8
	2011-12	131	126	+5	477	+11	+6
	2012-13	125	105	+20	505	+28	+8
	2013-14	110	133	-23	489	-16	+7
	2014-15	141	113	+28	525	+36	+8
	2015-16	125	132	-7	514	-11	-4
	2016-17	130	129	+1	522	+8	+7
	2017-18	131	114	+17	553	+31	+14
	2018-19	155	153	+2	575	+22	+20
Last 10 years: $\sum$ 2009-2018				+87 (+46)	+168 (+82)		+81 (+36)
Last 5 years: $\sum$ 2014-2018				+41	+86		+45

[s] $\Delta_1 = G2_{t-1} - G6_{t-1}$

[t] Δ_2=Elementary Student Population$_t$ – Elementary Student Population$_{t-1}$; in 2008 the total Elementary (G3-G6) student population was 407.

[u] The basic equation for net migration is (Δ_2-Δ_1); that is, the actual change in elementary student population minus what it would have been without migration, i.e., replacing the G6 population at t-1 who move up to the intermediate school by t with the new entrants at G3 in t-1 and with all other grades having all students staying and moving up one grade. The difference (Δ_2 - Δ_1) is the net migration that occurred.

Table 9C

"Net Migration at the Middle School Level: 2009-2018

	$G6_{t-1}$	$G8_{t-1}$	Δ_1 without migration[c]	Total Student Population$_t$	Δ_2[d]	Net Migration[e]
t= 2009-10	92	101	-9	213	-10	-1
2010-11	94	121	-27	186	-28	-1
2011-12	126	88	+38	222	+37	-1
2012-13	105	95	+10	234	+12	+2
2013-14	133	130	+3	232	-2	-5
2014-15	113	101	+12	249	+17	+5
2015-16	132	135	=-3	244	-5	-2
2016-17	129	113	+16	265	+21	+5
2017-18	114	133	-19	242	-23	-4
2018-19	153	126	+27	271	+29	+2
Last 10 years: $\sum$ 2009-2018			+48 (+15)	+48 (+9)		0 (-6)
Last 5 years: $\sum$ 2014-2018			+33	+39		+6

[c] $\Delta_1 = G6_{t-1} - G8_{t-1}$

[d] Δ_2= Middle Student Population$_t$ – Middle School Student Population$_{t-1}$; in 2008 the total Middle School (G7-G8) student population was 223.

[e] The basic equation for net migration is (Δ_2-Δ_1); that is, the actual change in middle school student population minus what it would have been without migration, i.e., replacing the G8 population at t-1 who move up to the high school by t with the new entrants at G7 in t-1 and with all other grades having all students staying and moving up one grade. The difference (Δ_2 - Δ_1) is the net migration that occurred.

Table 9D

"Net Migration at the High School Level: 2009-2018

	$G8_{t-1}$	$G12_{t-1}$	Δ_1 without migration[c]	Total Student Population$_t$	Δ_2[b]	Net Migration[a]
t= 2009-10	101	102	-1	400	-17	-16
2010-11	121	87	+34	427	+27	-7
2011-12	88	102	-14	405	-22	-8
2012-13	95	102	-7	399	-6	+1
2013-14	130	95	+35	422	+23	-12
2014-15	101	107	-6	405	-27	-11
2015-16	135	83	+52	451	+46	-6
2016-17	113	95	+8	472	+21	+3
2017-18	133	124	+9	465	-7	-16
2018-19	126	101	+25	498	+33	+8
Last 10 years: $\sum$ 2009-2018			+145 (+47)	+81 (+5)		-64 (-42)
(-42)Last 5 years: $\sum$ 2014-2018			+98	+76		-22

[c] $\Delta_1 = G8_{t-1} - G\backslash 12_{t-1}$

[b] Δ_2= High School Student Population$_t$ – High School Student Population$_{t-1}$; in 2008 the total High School (G9-G12) student population was 417.

[a] The basic equation for net migration is (Δ_2-Δ_1); that is, the actual change in high school student population minus what it would have been without migration, i.e., replacing the G12 population at t-1 who graduate by t with the new entrants at G9 in t-1 and with all other grades having all students staying and moving up one grade. The difference (Δ_2 - Δ_1) is the net migration that occurred.

Table 10

Summary of E3 and NM by Educational Level and Overall—Last 5 Years, Prior 5 Years and Decade Overall: 2009-2018

	NM			E3			Enrollment Δ		
Educational Level	Last 5 Yrs	Prior 5 Yrs	10 Years	Last 5 Yrs	Prior 5 Yrs	10 Years	Last 5 Yrs	Prior 5 Yrs	10 Years
Primary	+19	-2	+17	+32	+48	**+80**	+51	+46	**+97**
Elementary	+45	+36	**+81**	+41	+46	+87	**+86**	**+82**	**+168**
Middle School	+6	-6	0	+33	+15	+48	+39	+9	+48
High School	-22	-20	-42	+98	+47	**+145**	**+76**	+5	+82
Total	**+48**	**-14**	**+34**	**+204**	**+156**	**+360**	**+252**	**+142**	**+394**

Table 11

Avonworth School District
Retention Ratios 2002-2017[§]
Four Year Averages

	2002-2005	2006-2009	2010-2013	2014-2017
K→G1	1.099	1.000	.958	1.024
G1→G2	.958	1.013	1.018	1.018
G2→G3	1.043	.993	1.043	1.018
G3→G4	1.015	1.047	.994	1.011
G4→G5	1.009	1.007	.992	1.019
G5→G6	1.032	.984	1.030	1.021
G6→G7	1.012	1.028	.998	1.008
G7→G8	1.007	.986	1.004	.994
G8→G9	.998	.998	.986	.986
G9→G10	1.014	1.022	1.019	.985
G10→G11	.978	.963	.971	1.006
G11→G12	.955	.952	.951	1.000
$B_{t-5}\rightarrow K_t$	.938	.957	1.099	***1.043***

[§] Data for the retention ratios for 2014-2017 included student populations for 2014-2018—the beginning school year enrollment; similarly data for the years 2010-2013 included student populations for 2010-2014 while that for 2006-2009 used the beginning of school year enrollment in 2006-2010; and data for the retention ratios for 2002-2005 included student populations for 2002-2006—the beginning of school year enrollment. For the Birth to Kindergarten ratio, we use four year averages for (.75 x Birth at t-5) + (.25 x Birth at t-6 and Kindergarten enrollment at t; eg., the 2010-2013 header for B→K here refers to the K enrollments in 2011-2014 and births from 2005-2009, while the header for 2014-2017 refers to the most recent K enrollments in 2015-2018 and births from 2009-2013.

Table 12

Avonworth School District
Cumulative B→K and Retention Ratios 2002-2017
Four-Year Averages

	2002-2005	2006-2009	2010-2013	2014-2017
K→G1	1.031	.957	1.053	1.068
G1→G2	.988	.969	1.072	1.087
G2→G3	1.030	.963	1.118	1.107
G3→G4	1.045	1.008	1.111	1.119
G4→G5	1.055	1.015	1.102	1.140
G5→G6	1.089	.999	1.135	1.164
G6→G7	1.102	1.027	1.133	1.174
G7→G8	1.109	1.022	1.138	1.166
G8→G9	1.107	1.020	1.122	1.150
G9→G10	1.122	1.033	1.143	1.133
G10→G11	1.098	.994	1.110	1.140
G11→G12	1.048	.947	1.056	1.140
$B_{t-5/t-6} \rightarrow K_t$	.938	.957	1.099	***1.043***

Table 13

Total Student Enrollment in the Avonworth School District by Year and Level: 1990-2018

School Yr.	Primary	Elementary	Middle	High School	Total
1990	240	285	121	275	921
1991	275	326	136	283	1,020
1992	311	347	163	297	1,118
1993	319	367	164	305	1,155
1994	347	412	184	327	1,270
1995	301 (+61)	444 (+159)	201 (+80)	350 (+75)	1,296 (+375)
1996	310	445	188	381	1,324
1997	284	446	206	386	1,322
1998	265	434	210	387	1,296
1999	285	411	240	407	1,343
2000	279 (-22)	499 (+55)	249 (+48)	408 (+58)	1,435 (+139)
2001	296	377	210	444	1,327
2002	285	407	210	456	1,358
2003	298	411	204	443	1,356
2004	284	419	205	444	1,352
2005	296 (+17)	412 (-87)	204 (-45)	425 (+17)	1,337 (-98)
2006	339	407	216	409	1,371
2007	323	416	209	412	1,360
2008	356	407	223	417	**1,403**
2009	352	444	213	400	1,409
2010	365 (+69)	466 (+54)	185 (-19)	427 (+2)	1,443 (+106)
2011	390	477	222	405	1,494
2012	370	505	234	399	1,508
2013	402	489	232	422	**1,545**
2014	391	525	249	405	1,570
2015	403 (+38)	514 (+48)	244 (+59)	451 (+24)	1,612 (+169)
2016	414	522	265	472	1,673
2017	426	553	242	465	1,686
2018	453 (+50)[1]	575 (+61)	271 (+27)	498 (+47)	**1,797** (+185)
Ave. Number of Students/Year					
1990-1994	298.4	347.4	153.6	297.4	1,096.8
1995-1999	289.0	***436.0***	***209.0***	***382.2***	1,316.2
2000-2004	288.4	402.8	213.8	***439.0***	1,344.0
2005-2009	***333.2***	417.2	213.0	412.6	1,376.0
2010-2014	***383.6***	***492.4***	224.4	411.6	1,512.0
2015-2018	***424.0***	***541.0***	**255.5**	***471.5***	1,692.0

[1] The numbers in parentheses in 2018 pertain to the last 3 years; all other numbers in parenthesis pertain to 5-year enrollment changes.

Table 14

Overall Alternative Schooling by Type of Alternative

Yr.	Home Schooled	Cyber Charter	Private/Parochial	Σ
2010	NA	***47***	214	261
2011	NA	39	224	263
2012	NA	35	217	252
2013	NA	35	169	204
2014	NA	39	***240***	***279***
2015	NA	37	219	256
2016	NA	30	203	233
2017	NA	37	208	245
2018	NA	39	200	239

Table 15

PANEL A: PRIVATE/PAROCHIAL STUDENTS BY YEAR & LEVEL					
Yr.	Primary (K-G2)	Elementary (G3-G6)	Middle (G7-G8)	High School (G9-G12)	Σ
2010	54	65	32	63	214
2011	47	***76***	23	78	224
2012	57	58	24	78	217
2013	41	40	24	64	169
2014	***58***	62	***37***	83	***240***
2015	52	59	34	74	219
2016	37	54	30	82	203
2017	35	53	27	***93***	208
2018	35	53	22	90	200
2018 -2010	-19	-12	-10	+27	-14

PANEL B: CHARTER/CYBER CHARTER STUDENTS BY YEAR & LEVEL					
Yr.	Primary (K-G2)	Elementary (G3-G6)	Middle (G7-G8)	High School (G9-G12)	Σ
2010	4	10	4	***29***	***47***
2011	4	8	3	24	39
2012	1	***7***	6	21	35
2013	3	3	***12***	17	35
2014	3	10	6	20	39
2015	3	***12***	5	17	37
2016	2	6	5	17	30
2017	5	9	4	19	37
2018	***6***	5	5	23	39
2018 -2010	+2	-5	+1	-6	-8

Table 16

New Housing Development by Year and Type of Housing in Ohio Township: 2010-2018

Panel 1: Number of New Homes Including TOA[1]				
Year	Single Family Dwellings	Townhome Units	Duplex Units	Σ Total
2010	82	34	18	134
2011	32	29	0	61
2012	46	11	0	57
2013	38 (24)	0	12 (12)	50 (36)
2014	101 (73)	0	8 (8)	109 (81)
2015	104 (52)	0	20 (20)	124 (72)
2016	100 (38)	0	16 (16)	116 (54)
2017	98 (50)	0	14 (14)	112 (64)
2018[2]	63 (37)	0	4 (4)	67 (41)
Total	664	74	92	830
Ave. #/Yr	74	8	10	92

Panel 2: Number of New Homes without TOA				
Year	Single Family Dwellings	Townhome Units	Duplex Units	Σ Total
2010	82	34	18	134
2011	32	29	0	61
2012	46	11	0	57
2013	14	0	0	14
2014	28	0	0	28
2015	52	0	0	52
2016	62	0	0	62
2017	48	0	0	48
2018[2]	26	0	0	26
Total	390	74	18	482
Ave. #/Yr	43	8	2	54

[1] TOA: Traditions of America (age 55 & over) homes in parentheses; numbers without parentheses include TOA homes

[2] through Nov. 2018

Table 17

Avonworth School District Forecasts per Grade: 2019-2028 Fertility/Aging/Embedded Growth Scenario with Current Retention and Birth to Kindergarten Ratios and Current Fertility Levels [Scenario I]·

	K	G1	G2	Total PS	G3	G4	G5	G6	Total ES	G7	G8	Total MS	G9	G10	G11	G12	Total HS	Total K - G12
2018	166	148	129	453	156	142	141	136	575	153	118	271	125	126	118	129	498	1,797
2019	167	170	151	488	131	158	145	144	578	137	152	289	116	123	127	118	484	1,839
2020	143	171	173	487	154	132	161	148	595	145	136	281	150	114	124	127	515	1,878
2021	148	146	174	468	176	156	135	164	631	149	144	293	134	148	115	124	521	1,913
2022	150	152	149	451	177	178	159	138	652	165	148	313	142	132	149	115	538	1,954
2023	152	154	155	461	152	179	181	162	674	139	164	303	146	140	133	149	568	2,006
2024	152	156	157	465	158	154	182	185	679	163	138	301	162	144	141	133	580	2,025
2025	152	156	159	467	160	160	157	186	663	186	162	348	136	160	145	141	582	2,060
2026	152	156	159	467	162	162	163	160	647	187	185	372	160	134	161	145	600	2,086
2027	152	156	159	467	162	164	165	166	657	161	186	347	182	158	135	161	636	2,107
2028	152	156	159	467	162	164	167	168	661	167	160	327	183	179	159	135	656	2,111

	2018	2023	2028	Δ2023-2018	Δ2028-2023	Δ2028-2018	Peak	Δ from 2018
K-G2	453	461	467	+8 (+2%)	+6 (+1%)	+14 (+3%)	488	+35
G3-G6	575	674	661	+99 (+17%)	-13 (-2%)	+86 (+15%)	679	+104
G7-G8	271	303	327	+32 (+12%)	+24 (+8%)	+56 (+21%)	372	+101
G9-G12	498	568	656	+70 (+14%)	+88 (+15%)	+158 (+32%)	656	+158
Total	1,797	2,006	2,111	+209 (+12%)	+105 (+5%)	+314 (+17%)	2,111	+314

· This scenario uses the following parameters: (1) Baseline four-year retention ratios (2014-2017), as shown in Table 11; (2) Birth at t-5 to K enrollment ratio of 1.043; this is derived as follows: (a) a baseline .75 (t-5 Births) + .25 (t-6 Births) for births in years 2010-2013 and 2015-2018 K enrollments. For years 2019-2022, observed births in 2013-2017 in the Avonworth School District were used. For years 2023-2028, the average number of births for 2014-2017 was used (146); see Table 1 for individual years..

Table 18

Avonworth School District Forecasts per Grade: 2019-2028 Fertility/Aging/Embedded Growth Scenario with Current Retention Ratios, Current Fertility Levels and Oscillating Biennial Birth to Kindergarten Ratios [Scenario II]·

	K	G1	G2	Total PS	G3	G4	G5	G6	Total ES	G7	G8	Total MS	G9	G10	G11	G12	Total HS	Total K → G12
2018	166	148	129	453	156	142	141	136	575	153	118	271	125	126	118	129	498	1,797
2019	149	170	151	470	131	158	145	144	578	137	152	289	116	123	127	118	484	1,821
2020	160	153	173	486	154	132	161	148	595	145	136	281	150	114	124	127	515	1,877
2021	133	164	156	453	176	156	135	164	631	149	144	293	134	148	115	124	521	1,898
2022	168	136	167	471	159	178	159	138	634	165	148	313	142	132	149	115	538	1,956
2023	136	172	138	446	170	161	181	162	674	139	164	303	146	140	133	149	568	1,991
2024	171	139	175	485	140	172	164	185	661	163	138	301	162	144	141	133	580	2,027
2025	136	175	142	453	178	142	175	167	662	186	162	348	136	160	145	141	582	2,045
2026	171	139	178	488	145	180	145	179	649	168	185	353	160	134	161	145	600	2,090
2027	136	175	142	453	181	147	183	148	659	180	167	347	182	158	135	161	636	2,095
2028	171	139	178	488	145	183	150	187	665	149	179	328	165	179	159	135	638	2,119

	2018	2023	2028	Δ2023-2018	Δ2028-2023	Δ2028-2018	Peak	Δ from 2018
K→G2	453	446	488	-7 (-2%	+42 (+9%)	+35 (+8%)	488	+35
G3→G6	575	674	665	+99 (+17%)	-9 (-1%)	+90 (+16%)	674	+99
G7→G8	271	303	328	+32 (+12%)	+25 (+9%)	+57 (+21%)	353	+82
G9→G12	498	568	638	+70 (+14%)	+70 (+12%)	+140 (+28%)	638	+148
Total	1,797	1.991	2.119	+194 (+12%)	+128 (+6%)	+322 (+18%)	2,119	+322

· This scenario uses the following parameters: (1) Baseline four-year retention ratios (2014-2017), as shown in Table 11; (2) Birth at t-5 to K enrollment ratio of 1.043 is the average 4-year baseline; this is derived as follows: (a) a baseline .75 (t-5 Births) + .25 (t-6 Births) for births in years 2010-2013 and 2015-2018 K enrollments. Here, however, we are using the lowest single year B→K ratio for the most current 4 years (.934), followed by the highest single year B→K ratio for the most current 4 years (1.169), then repeating until all 10 projection years are accounted for—in effect oscillating from low to high to low, etc. For years 2019-2022, observed births in 2013-2017 in the Avonworth School District were used. For years 2023-2028, the average number of births for 2010-2014 was used (146); see Table 1.

Table 19

Avonworth School District Forecasts per Grade: 2019-2028 Fertility/Aging/Embedded Growth Scenario with Current Retention and Birth to Kindergarten Ratios, Current Fertility Levels and Additional pre-K Net In-Migration [Scenario III]·

	K	G1	G2	Total PS	G3	G4	G5	G6	Total ES	G7	G8	Total MS	G9	G10	G11	G12	Total HS	Total K - G12
2018	166	148	129	453	156	142	141	136	575	153	118	271	125	126	118	129	498	1,797
2019	172	170	151	497	131	158	145	144	578	137	152	289	116	123	127	118	484	1,844
2020	148	176	173	484	154	132	161	148	595	145	136	281	150	114	124	127	515	1,888
2021	153	152	179	467	176	156	135	164	631	149	144	293	134	148	115	124	521	1,929
2022	155	157	155	476	182	178	159	138	657	165	148	313	142	132	149	115	538	1,975
2023	157	159	160	480	158	184	181	162	685	139	164	303	146	140	133	149	568	2,032
2024	157	161	`62	482	163	160	187	185	695	163	138	301	162	144	141	133	580	2,056
2025	157	161	164	482	165	165	163	191	684	186	162	348	136	160	145	141	582	2,096
2026	157	161	164	482	167	167	168	166	668	193	185	378	160	134	161	145	600	2,128
2027	157	161	164	482	167	169	170	172	678	167	192	359	182	158	135	161	636	2,155
2028	157	161	164	482	167	169	172	174	682	173	166	339	183	179	159	135	656	2,165

	2018	2023	2028	Δ2023-2018	Δ2028-2023	Δ2028-2018	Peak	Δ from 2018
K-G2	453	476	482	+23 (+5%)	+6 (+1%)	+29 (+6%)	497	+44
G3-G6	575	685	682	+110 (+19%)	-3 (0%)	+107 (+19%)	695	+117
G7-G8	271	303	339	+32 (+12%)	+36 (+12%)	+68 (+13%)	378	+107
G9-G12	498	568	662	+70 (+14%)	+94 (+17%)	+164 (+33%)	662	+164
Total	1,797	2,032	2,165	+235 (+13%)	+133 (+7%)	+368 (+20%)	2,165	+368

· This scenario uses the following parameters: (1) Baseline four-year retention ratios (2014-2017), as shown in Table 11; (2) Birth at t-5 to K enrollment ratio of 1.043; this is derived as follows: (a) a baseline .75 (t-5 Births) + .25 (t-6 Births) for births in years 2010-2013 and 2015-2018 K enrollments. For years 2019-2022, observed births in 2013-2017 in the Avonworth School District were used. For years 2023-2028, the average number of births for 2014-2017 was used (146); see Table 1 for individual years; also. 5 additional pre-K children were assumed to move into the district per year, increasing the K class by 5 above the 1.043 B→K ratio. See text for details.

Table 20

Avonworth School District Forecasts per Grade: 2019-2028 Fertility/Aging/Embedded Growth Scenario with Current Retention and Birth to Kindergarten Ratios and Higher Fertility Levels [Scenario IV]·

	K	G1	G2	Total PS	G3	G4	G5	G6	Total ES	G7	G8	Total MS	G9	G10	G11	G12	Total HS	Total K - G12
2018	166	148	129	453	156	142	141	136	575	153	118	271	125	126	118	129	498	1,797
2019	167	170	151	488	131	158	145	144	578	137	152	289	116	123	127	118	484	1,839
2020	143	171	173	487	154	132	161	148	595	145	136	281	150	114	124	127	515	1,878
2021	148	146	174	468	176	156	135	164	631	149	144	293	134	148	115	124	521	1,913
2022	150	152	149	451	177	178	159	138	652	165	148	313	142	132	149	115	538	1,954
2023	163	154	155	472	152	179	181	162	674	139	164	303	146	140	133	149	568	2,017
2024	163	167	157	487	158	154	182	185	679	163	138	301	162	144	141	133	580	2,047
2025	163	167	170	500	160	160	157	186	663	186	162	348	136	160	145	141	582	2,093
2026	163	167	170	500	173	162	163	160	658	187	185	372	160	134	161	145	600	2,130
2027	163	167	170	500	173	175	165	166	679	161	186	347	182	158	135	161	636	2,162
2028	163	167	170	500	173	175	178	168	694	167	160	327	183	179	159	135	656	2,177

	2018	2023	2028	Δ2023-2018	Δ2028-2023	Δ2028-2018	Peak	Δ from 2018
K-G2	453	472	500	+19 (+4%)	+28 (+6%)	+47 (+10%)	500	+47
G3-G6	575	674	694	+99 (+17%)	+20 (+3%)	+119 (+21%)	694	+119
G7-G8	271	303	327	+32 (+12%)	+24 (+8%)	+56 (+21%)	372	+101
G9-G12	498	568	656	+70 (+14%)	+88 (+15%)	+158 (+32%)	656	+158
Total	1,797	2,017	2,177	+220 (+12%)	+160 (+8%)	+380 (+21%)	2,177	+380

· This scenario uses the following parameters: (1) Baseline four-year retention ratios (2014-2017), as shown in Table 11; (2) Birth at t-5 to K enrollment ratio of 1.043; this is derived as follows: (a) a baseline .75 (t-5 Births) + .25 (t-6 Births) for births in years 2010-2013 and 2015-2018 K enrollments. For years 2019-2022, observed births in 2013-2017 in the Avonworth School District were used. For years 2023-2028, an increase of 10 births above the average number of births for 2014-2017 (146) was used: (156); see Table 1 for individual years.

Table 21

Avonworth School District Forecasts per Grade: 2019-2028 Fertility/Aging/Embedded Growth Scenario with Current Retention and Birth to Kindergarten Ratios and Lower Fertility Levels [Scenario V]·

	K	G1	G2	Total PS	G3	G4	G5	G6	Total ES	G7	G8	Total MS	G9	G10	G11	G12	Total HS	Total K - G12
2018	166	148	129	453	156	142	141	136	575	153	118	271	125	126	118	129	498	1,797
2019	167	170	151	488	131	158	145	144	578	137	152	289	116	123	127	118	484	1,839
2020	143	171	173	487	154	132	161	148	595	145	136	281	150	114	124	127	515	1,878
2021	148	146	174	468	176	156	135	164	631	149	144	293	134	148	115	124	521	1,913
2022	150	152	149	451	177	178	159	138	652	165	148	313	142	132	149	115	538	1,954
2023	142	154	155	451	152	179	181	162	674	139	164	303	146	140	133	149	568	1,996
2024	142	145	157	444	158	154	182	185	679	163	138	301	162	144	141	133	580	2,004
2025	142	145	148	435	160	160	157	186	663	186	162	348	136	160	145	141	582	2,028
2026	142	145	148	435	151	162	163	160	636	187	185	372	160	134	161	145	600	2,043
2027	142	145	148	435	151	153	165	166	635	161	186	347	182	158	135	161	636	2,053
2028	142	145	148	435	151	153	156	168	628	167	160	327	183	179	159	135	656	2,046

	2018	2023	2028	Δ2023-2018	Δ2028-2023	Δ2028-2018	Peak	Δ from 2018
K-G2	453	451	435	-16 (-4%)	-16 (-4%)	-18 (-4%)	488	+35
G3-G6	575	674	628	+99 (+17%)	-46 (-7%)	+53 (+9%)	679	+104
G7-G8	271	303	327	+32 (+12%)	+24 (+8%)	+56 (+21%)	372	+101
G9-G12	498	568	656	+70 (+14%)	+88 (+15%)	+158 (+32%)	656	+158
Total	1,797	1,996	2,046	+199 (+11%)	+50 (+3%)	+249 (+14%)	2,046	+249

· This scenario uses the following parameters: (1) Baseline four-year retention ratios (2014-2017), as shown in Table 11; (2) Birth at t-5 to K enrollment ratio of 1.043; this is derived as follows: (a) a baseline .75 (t-5 Births) + .25 (t-6 Births) for births in years 2010-2013 and 2015-2018 K enrollments. For years 2019-2022, observed births in 2013-2017 in the Avonworth School District were used. For years 2023-2028, a decrease of 10 births below the average number of births for 2014-2017 was used: (136); see Table 1 for individual years.