

Solar Position and Insolation Values for 48° North Latitude

Date	Solar Time		Solar Position		BTUH/ft² Total Insolation on Surfaces ^a							
			Alt.	Azm.	Normal ^b	Horiz.	South Facing Surface Angle with Horiz.					
	a.m.	p.m.					38	48	58	68	90	
January 21	8	4	3.5	54.6	37	4	17	19	21	22	22	22
	9	3	11.0	42.6	185	46	120	132	140	145	139	
	10	2	16.9	29.4	239	83	190	206	216	220	206	
	11	1	20.7	15.1	261	107	231	249	260	263	243	
	12		22.0	0.0	267	115	245	264	275	278	255	
	Surface daily totals					1710	1360	1478	1550	1578	1478	
February 21	7	5	2.4	72.2	12	1	3	4	4	4	4	
	8	4	11.6	60.5	188	49	95	102	105	106	96	
	9	3	19.7	47.7	251	100	178	187	191	190	167	
	10	2	26.2	33.3	278	139	240	251	255	251	217	
	11	1	30.5	17.2	290	165	278	290	294	288	247	
	12		32.0	0.0	293	173	291	304	307	301	258	
	Surface daily totals					2330	1880	1972	2024	1978	1720	
March 21	7	5	10.0	78.7	153	37	49	49	47	45	35	
	8	4	19.5	66.8	236	96	131	132	129	122	96	
	9	3	28.2	53.4	270	147	205	207	203	193	152	
	10	2	35.4	37.8	287	187	263	266	261	248	195	
	11	1	40.3	19.8	295	212	300	303	297	283	223	
	12		42.0	0.0	298	220	312	315	309	294	232	
	Surface daily totals					2780	2208	2228	2182	2074	1632	

April 21	6	6	8.6	97.8	108	27	13	9	8	7	5	
	7	5	18.6	86.7	205	85	76	69	59	48	21	
	8	4	28.5	74.9	247	142	149	141	129	113	69	
	9	3	37.8	61.2	268	191	216	208	194	174	115	
	10	2	45.8	44.6	280	228	268	260	245	223	152	
	11	1	51.5	24.0	286	252	301	294	278	254	177	
	12		53.6	0.0	288	260	313	305	289	264	185	
	Surface daily totals					3076	2106	2358	2266	2114	1902	1262
	May 21	5	7	5.2	114.3	41	9	4	4	4	3	2
		6	6	14.7	103.7	162	61	27	16	15	13	10
		7	5	24.6	93.0	219	118	89	75	60	43	13
		8	4	34.7	81.6	248	171	156	142	123	101	45
9		3	44.3	68.3	264	217	217	202	182	156	86	
10		2	53.0	51.3	274	252	265	251	229	200	120	
11		1	59.5	28.6	279	274	296	281	258	228	141	
12			62.0	0.0	280	281	306	292	269	238	149	
Surface daily totals					3254	2482	2418	2234	2010	1728	982	
June 21		5	7	7.9	116.5	77	21	9	9	8	7	5
		6	6	17.2	106.2	172	74	33	19	18	16	12
		7	5	27.0	95.8	220	129	93	77	59	39	15
	8	4	37.1	84.6	246	181	157	140	119	95	35	
	9	3	46.9	71.6	261	225	216	198	175	147	74	
	10	2	55.8	54.8	269	259	262	244	220	189	105	
	11	1	62.7	31.2	274	280	291	273	248	216	126	
	12		65.5	0.0	275	287	301	283	258	225	133	
	Surface daily totals					3312	2626	2420	2204	1950	1644	874
	(continued)											

October 21	10	2	35.4	37.8	269	181	251	254	248	236	185
	11	1	40.3	19.8	278	205	287	289	284	269	212
	12		42.0	0.0	280	213	299	302	296	283	221
	Surface daily totals				2568	1522	2102	2118	2070	1966	1546
	7	5	2.0	71.9	4	0	1	1	1	1	1
	8	4	11.2	60.2	165	44	86	91	95	95	87
November 21	9	3	19.3	47.4	233	94	167	176	180	178	157
	10	2	25.7	33.1	262	133	228	239	242	239	207
	11	1	30.0	17.1	274	157	266	277	281	276	237
	12		31.5	0.0	278	166	279	291	294	288	247
	Surface daily totals				2154	1022	1774	1860	1890	1866	1626
	8	4	3.6	54.7	36	5	17	19	21	22	22
December 21	9	3	11.2	42.7	179	46	117	129	137	141	135
	10	2	17.1	29.5	233	83	186	202	212	215	201
	11	1	20.9	15.1	255	107	227	245	255	258	238
	12		22.2	0.0	261	115	241	259	270	272	250
	Surface daily totals				1668	596	1336	1448	1518	1544	1442
	9	3	8.0	40.9	140	27	87	98	105	110	109
	10	2	13.6	28.2	214	63	164	180	192	197	190
	11	1	17.3	14.4	242	86	207	226	239	244	231
	12		18.6	0.0	250	94	222	241	254	260	244
	Surface daily totals				1444	446	1136	1250	1326	1364	1304

Source: Kreider, J.F. and Kreith, F., *Solar Heating and Cooling*, revised 1st edn., Hemisphere Publ. Corp., Washington, DC, 1977.

^a 1 Btu/h · ft² = 3.152 W/m². Ground reflection not included on normal or horizontal surfaces.

^b Normal insolation does not include diffuse component.