under basement and garage floors and 32 F adjoining basement walls. Estimate infiltration by crack method, assuming average wind velocity to be 12.5 mph during December, January and February. No wall, ceiling or roof insulation is to be figured in this problem, but all first and second floor windows are to have storm sash. The building is constructed as follows (transmission coefficients (U) in parentheses):

Walls: Brick veneer, building paper, wood sheathing, studding, metal lath and plaster (0.28). Walls of dormer over garage, same except wood siding in place of brick veneer (0.26).

Attic Walls: Brick veneer, building paper, wood sheathing on studding (0.42).

Basement Walls: 10 in. concrete (0.10).

Roof: Asphalt shingles on wood sheathing on rafters (0.53).

Ceiling (Second floor): Metal lath and plaster (0.69).

Windows: Double-hung wood windows with storm sash (0.45). Steel casement sash in basement (1.13).

Floor (Bedroom D): Maple finish flooring on yellow pine sub-flooring; metal lath and plaster ceiling below (0.25).

Floor (Basement and Garage): 4 in. stone concrete on 3 in. cinder concrete (0.10).

Solution: The calculations for this problem are given in Table 4, and a summary of the results in Table 5. The values in column F of Table 4 were obtained by multiplying together the figures in columns C, D and E. The heat losses are calculated to the nearest 10 Btu. See reference notes for Table 4 for further explanation of data.

TABLE 5. SUMMARY OF HEAT LOSSES OF UNINSULATED RESIDENCE

Heat losses given in Btu per hour

ROOM OR SPACE	WALLS	CEILING AND ROOF	FLOOR	GLASS AND DOOR	INFILTRATION	TOTALS
Bedroom A	5330	6660	.....	1440	1010	14,440
Bedroom B	3490	4400	.....	1440	1010	10,340
Bedroom C	2560	3300	.....	970	500	7,330
Bedroom D	2650	3300	960	720	500	8,130
Bathroom 1	670	1510	.....	500	500	3,180
Bathroom 2	1770	960	310	320	420	3,780
Living Room	7260	.....	.....	1800	1120	10,180
Dining Room	3720	.....	.....	3880	870	8,470
Kitchen	2850	.....	.....	950	760	4,560
Lavette	3000	.....	.....	1100	530	4,630
Entrance Hall	870	2490	.....	640	560	4,560
Garage	−1030[a]	.....	−1550[b]	3410	2700	3,530
Recreation	840	.....	570	720	490	2,620
Totals	33,980	22,620	290	17,890	10,970	85,750
Percentages	39.6	26.4	0.3	20.9	12.8	100.0

[a]Wall heat loss of 2110 Btu minus wall heat gain of 3140 Btu.
[b]Heat gains; 960, 310 and 280 Btu.

Attention is called to the summary of heat losses (Table 5) of the uninsulated residence (Fig. 2). As storm windows are used in this instance the *glass* and *door* transmission heat losses of 20.9 per cent are relatively small. The infiltration losses (12.8 per cent) are also comparatively small in this case because the storm windows serve substantially the same purpose as weatherstripping. In this problem, the wall, ceiling and floor transmission losses comprise 66.3 per cent of the total. If the building is insulated, the relative heat loss percentages will materially change. (See Example 6 and Table 6.)

Example 6. Calculate the heat loss of residence shown in Fig. 2 based on the same conditions as in Example 5 but insulated throughout as shown on the following page (coefficients in parentheses).

Walls: Brick veneer, $^{25}/_{32}$ in. insulation board sheathing, studding, 1 in. insulation board lath and plaster (0.13). Walls of dormer over garage same except wood siding in place of brick veneer (0.12).

Attic Walls: Brick veneer, $^{25}/_{32}$ in. insulation board sheathing on studding (0.28).

Walls Adjoining Garage: Plaster on 1 in. insulation board, studding, metal lath and plaster (0.18).

Basement Walls (Recreation Room): 10 in. concrete (0.10).

Roof: Asphalt shingles on wood sheathing on rafters (0.53).

Ceiling (Second floor): 1 in. insulation board and plaster; ½ in. insulation board on top of ceiling joists (0.15).

Windows: Same as Example 5.

Floor (Bedroom D): Maple finish flooring on yellow pine sub-flooring; ½ in. insulation board and plaster ceiling below (0.18).

Solution: The procedure for calculating the heat losses is similar to that for Example 5. A summary of the results is given in Table 6.

TABLE 6. SUMMARY OF HEAT LOSSES OF INSULATED RESIDENCE

Heat losses given in Btu per hour

ROOM OR SPACE	WALLS	CEILING AND ROOF	FLOOR	GLASS AND DOOR	INFILTRATION	TOTALS
Bedroom A	2670	2370	.....	1440	1010	7,490
Bedroom B	1750	1570	.....	1440	1010	5,770
Bedroom C	1280	1170	.....	970	500	3,920
Bedroom D	1320	1170	690	720	500	4,400
Bathroom 1	340	540	.....	500	500	1,880
Bathroom 2	820	340	220	320	420	2,120
Living Room	3580	.....	.....	1800	1120	6,500
Dining Room	1860	.....	.....	3880	870	6,610
Kitchen	1400	.....	.....	950	760	3,110
Lavette	1460	.....	.....	1100	530	3,090
Entrance Hall	440	850	.....	640	560	2,490
Garage	−400[a]	.....	−1190[b]	3410	2700	4,520
Recreation	840	.....	570	720	490	2,620
Totals	17,360	8,010	290	17,890	10,970	54,520
Percentages	31.9	14.7	0.5	32.8	20.1	100.0

[a]Wall heat loss of 1050 Btu minus wall heat gains of 590, 320 and 540 Btu.
[b]Heat gains; 690, 220 and 280 Btu.