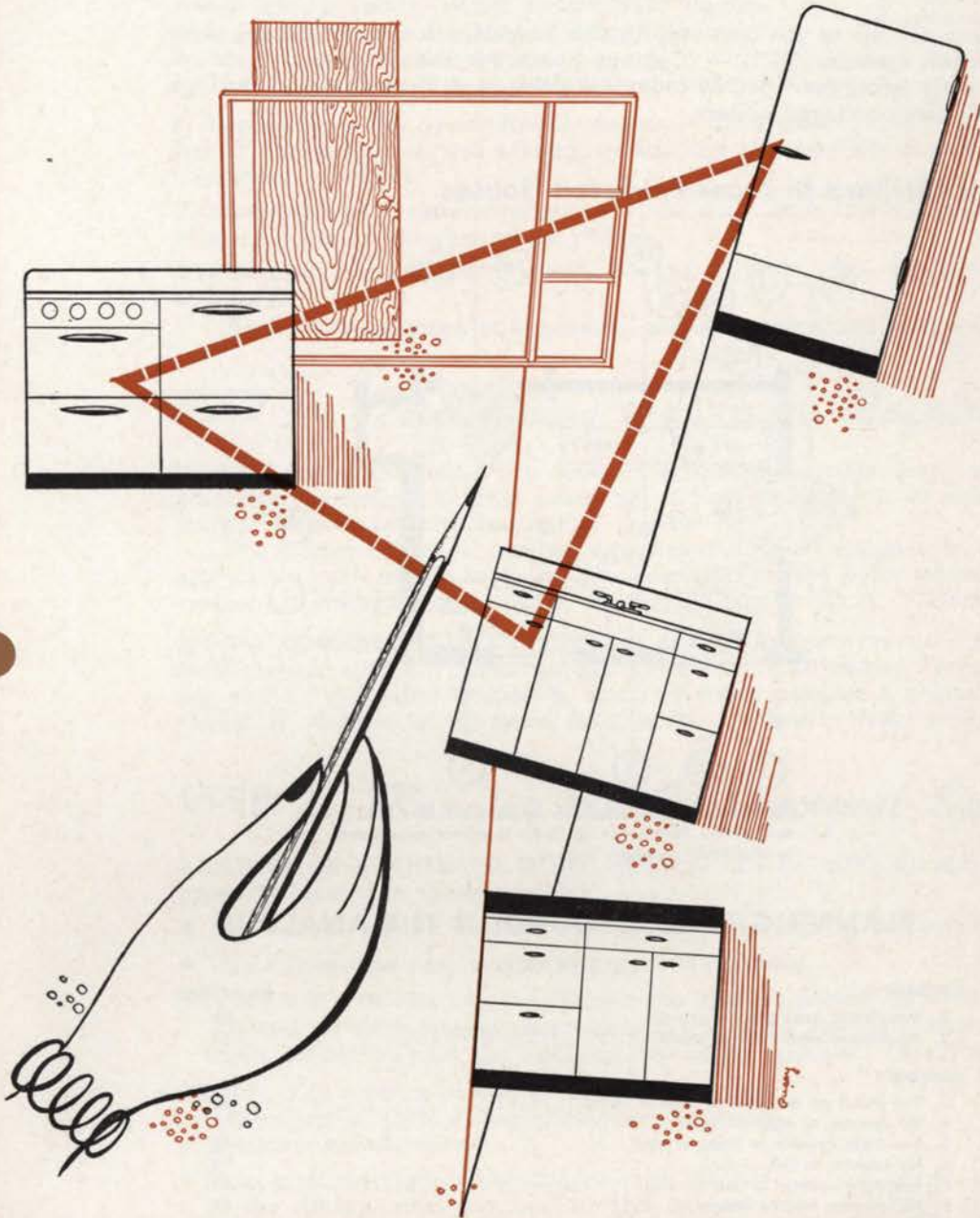


KITCHEN

PLANNING STANDARDS



ISSUED BY THE SMALL HOMES COUNCIL

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MATERIAL IN THIS CIRCULAR BY ELIZABETH M. RANNEY

Consultants: Helen E. McCullough and W. H. Scheick

Editor: M. H. Kennedy

NEED FOR KITCHEN DESIGN STANDARDS

The purpose of this circular is to provide standards for designing and judging plans for moderate-cost kitchens using factory-made equipment. In this study, "kitchen" refers to an area containing the appliances, storage cabinets, counters and work area necessary to prepare meals. The kitchen may be a room in itself — or part of a room.

This publication results from a cooperative investigation* to determine kitchen and laundry design standards for the small basementless house. To form a sound basis for these standards, two types of information were needed: 1) space requirements for storage cabinets and equipment, and for the worker; 2) knowledge of how kitchen planning principles established to date are being used in actual house plans.

Cabinet space requirements were set up as the first step in this investigation, and findings were published in the Small Homes Council circular C5.31 — "Cabinet Space for the Kitchen."

Data on kitchen facilities commonly being provided in today's small homes were obtained through a Small Homes Council analysis of mass-produced houses.

Analysis of Kitchens in Mass-Produced Houses

Plans of mass-produced houses, typical of today's small homes, were chosen for study since each plan was to be reproduced many times — the end result being thousands of homes. The plans were limited to basementless designs since they represent the tightest space condition.

Kitchens of 103 plans were analyzed to identify good and bad features. The standards of judgment were those recommended by the SHC storage study, by other research, or by architectural design handbooks. These standards are outlined on the pages which follow.

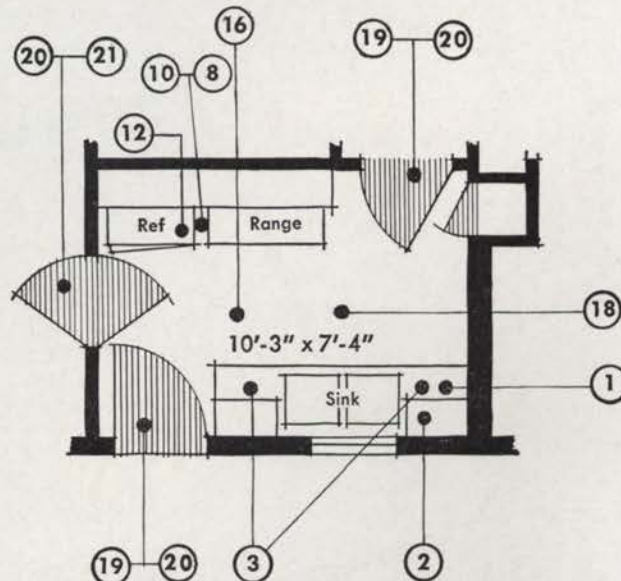
The analysis showed that kitchens in small houses are generally inadequate and poorly arranged. In the plans analyzed:

- Storage space, particularly in base cabinets, was insufficient.
- Too little counter was provided.
- The assembly of equipment in most cases was poorly planned.
- The rooms themselves were not well planned.

In some cases, an acceptable kitchen could have been made in the same room by a simple rearrangement of equipment. However, in a majority of the plans, the errors were due to faulty architectural planning, such as the size and shape of the room, its location in the house plan — errors which would require major structural revisions to correct.

At the right is a list of planning faults noted in the 103 kitchen plans, together with the number of times they occurred.

* Conducted by the Small Homes Council and the Agricultural Experiment Station under a research grant made to the University of Illinois by Hotpoint Inc.



Faults found in kitchen of house plan No. 2E-13, one of the 103 plans studied. Numbers correspond to the fault numbers below.

PLANNING FAULTS FOUND IN THE ANALYSIS

(103 PLANS)

	No. of Plans
STORAGE	
1. Insufficient base cabinet storage.....	92
2. Insufficient wall cabinet storage.....	77
ASSEMBLY	
3. Too small an amount of counter (total).....	67
4. No counter to right of sink.....	7
5. Too little counter to right of sink.....	48
6. No counter to left of sink.....	14
7. Too little counter to left of sink.....	47
8. No counter beside range.....	61
9. Too little counter beside range.....	12
10. No counter beside refrigerator.....	56
11. Too little counter beside refrigerator.....	25
12. Refrigerator door swing (wrong direction).....	50
13. Distance between refrigerator and sink too great or small.....	37
14. Distance between sink and range too great or small.....	38
15. Distance between range and refrigerator too great or small.....	30
16. Insufficient space in front of cabinets and appliances.....	41
ARCHITECTURAL SPACE	
17. Insufficient window area.....	57
18. Traffic through work area.....	59
19. Corner doors that waste wall space which could be used for cabinets.....	54
20. Too many doors.....	28
21. Doors which interfere with use of cabinets, or with each other.....	40
22. No room to add cabinets and counters needed to meet requirements.....	54

DESIGNING A KITCHEN

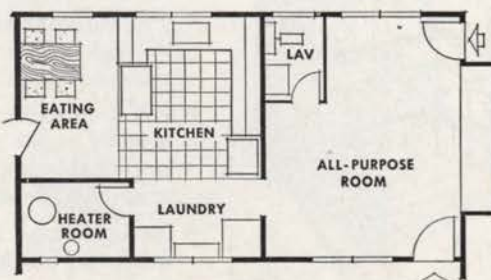
The results of the SHC analysis of mass-produced houses furnished undeniable evidence as to the need for kitchen planning standards which apply especially to small houses.

Unless basic principles of kitchen planning are followed, the efficiency of the homemaker is seriously handicapped. Once a house is built and equipment installed, the correction of errors becomes costly and is often structurally impossible; therefore careful studies should be made before any construction begins.

There are three steps in designing a kitchen:

1. **Determining the Space Requirements** — the amount of storage space and counter required by a family for preparing and serving meals, and the consideration of space, if any, needed for related household activities.
2. **Planning the Architectural Space** — the floor area, windows, doors, traffic pattern, and the relation of the kitchen to the rest of the house.
3. **Planning for Efficient Operation** — the location and relationship of appliances, cabinets and counters.

Each of these steps is important, and all three must be coordinated in a successful kitchen plan.



In this plan, the kitchen is not a room in itself but part of a housework area.

STEP 1: *Determining the Space Requirements*

STORAGE REQUIREMENTS: The amount of cabinet storage space needed is the first consideration in planning a kitchen. Cabinet needs depend on the number of food items, utensils and dishes to be stored; these vary with individual families.

For efficient storage, kitchen supplies should be assigned to work centers. This method of storage allows *each article to be readily accessible at the point where it is first used*. For a detailed discussion of storage requirements, see SHC Circular C5.31, "Cabinet Space for the Kitchen."*

SPECIAL CONSIDERATIONS: Individual family preferences determine whether the housework area shall include such equipment as utility cabinet, dishwasher, freezer, etc., or space for eating, washing, sewing and other activities. Each of these requires a certain amount and type of space which should be planned at the same time as the kitchen in order to utilize available space efficiently.

STEP 2: *Planning the Architectural Space*

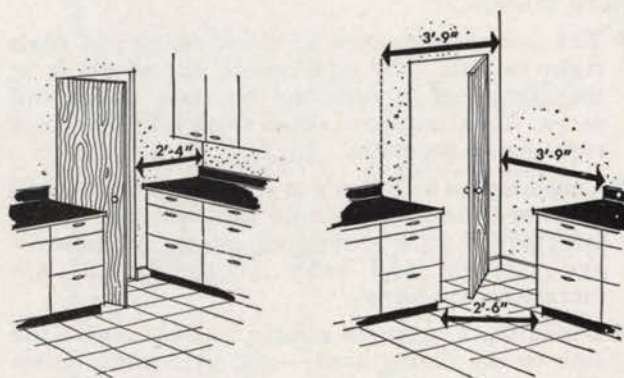
RELATION OF KITCHEN TO OTHER ROOMS: To be efficient and convenient, the kitchen must be properly located in the house plan.

- The kitchen should connect directly with the dining and service areas.
- There should be easy access to the front entrance.
- If there are children in the family, the kitchen should be located so that play areas are in view.

Avoid an arrangement that makes the kitchen the main thoroughfare to the rest of the house; traffic should by-pass the working area of the kitchen. (See Page 5.)

DOORS: The number of doors, their location and the direction of their swing affect the efficiency of a kitchen arrangement.

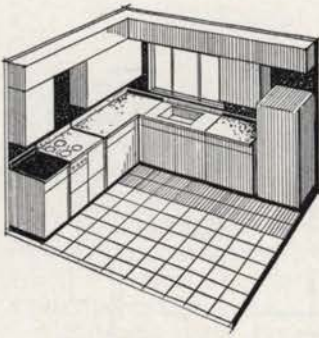
- Most kitchens require two doors — one leading to the dining area and one to the outdoors (either directly, through a utility room, or via a grade service entrance). In good plans, a third door is seldom required. Unnecessary doors break up the assembly of equipment, waste valuable space, and confuse the traffic pattern.
- Locate door openings so that they do not interfere with arrangement of kitchen equipment.
- Avoid door swings which conflict with the use of appliances or cabinets, or with other doors.



Doors in this location, if properly swung, do not interfere with the use of equipment.

Doors in corners take up wall space which could be better utilized for cabinets.

* In the pages which follow, kitchens using limited-minimum requirements are called "limited" kitchens; limited-ample or liberal-minimum requirements, "medium" kitchens; and liberal-ample requirements, "liberal" kitchens.



Large, well-placed windows insure well-lighted counters.



Four feet of wall space is unavailable when a kitchen assembly turns a corner.

WINDOWS: The house plan determines the location and amount of outside wall available for windows.

- The number and placement of windows in the kitchen affect the amount of wall space usable for wall cabinets. Have as many windows as possible without reducing the required amount of wall cabinets.
- FHA minimum property requirements specify that the window area should equal 10 per cent of the floor area of the room. More daylighting than this is desirable. Wherever possible, increase the window area to at least 15 or 20 per cent.
- At least one stretch of work counter should be directly lighted by a window, but means of controlling direct sunlight should be provided.
- The placement of the sink in relation to a window is optional. Many women prefer the sink under a window. Installation against an interior partition may cost less.
- Windows above the range are not recommended for reasons of safety and ease in housekeeping.

SIZE AND SHAPE: Shapes and sizes of kitchens vary widely. The primary requirement for every kitchen plan is that there be sufficient wall space for installation of appliances and all the necessary cabinets and counters. Jogs or projections in walls should be avoided.

- The minimum amount of wall, exclusive of doors, required for base cabinets and appliances in a kitchen having "liberal" storage facilities is 20 linear feet; that for a "medium" kitchen, 17'-6"; and for a "limited" kitchen, 15'-0". To counteract the loss of wall space in corners (see sketch), 4 feet must be added to these totals every time the assembly of cabinets, appliances, and counters turns a corner.
- If less than "medium" storage requirements are used, wall space should be sufficient to allow the addition of more cabinets later. "Liberal" storage is most desirable.
- Sometimes the kitchen plan is affected by certain fixed dimensions imposed by the plan or structure of the house. For example, the location of a heater room, or a load-bearing partition, may establish the maximum width or length of the kitchen. This means that cabinets, counters and appliances must be arranged to make the best possible use of the space available. It is a poor house plan that does not permit a good kitchen arrangement.

STEP 3: *Planning for Efficient Operation*

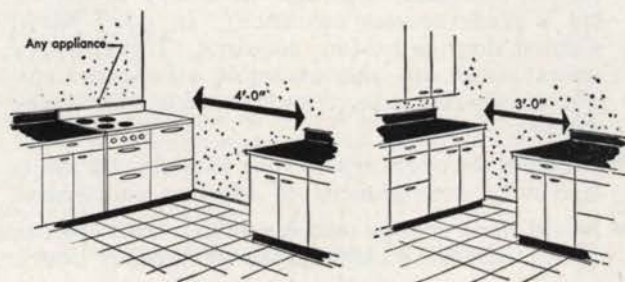
The limitations imposed by family needs and architectural features determine only the general outline of the kitchen. Several variable factors play an important part in forming the final plan and in determining the efficiency of the kitchen.

LOCATION OF CABINETS AND APPLIANCES: The distribution of cabinets and appliances in a kitchen depends largely upon the location of work centers.

- The normal sequence of work centers is from right to left. The mix center, therefore, is at the right and is followed by sink, range and serve. This sequence saves work motions for a right-handed person.
- Centers may be taken out of sequence, reversed or even isolated. A single isolated unit is satisfactory if it is a complete center (with storage cabinets and work counters), and not merely an appliance.
- Dinnerware cabinets should be near either the sink or the dining area — and preferably accessible to both.

CLEARANCES: Adequate space must be provided in front of cabinets and appliances for passage-ways and work area (free floor space needed for work processes). For general planning purposes:

- The recommended distance between cabinets or appliances opposite each other is 4'-0". This distance is sufficient for two workers.
- The clearance between cabinets at right angles to each other but separated by a door or work area, should be at least 3'-0" (standard door width plus minimum casing); the clearance for appliances in this position, 4'-0".



Recommended Clearances

COUNTER SPACE: The amount of counter depends on: 1) base cabinet requirements and 2) functions of food preparation. Both factors must be satisfied. Provide enough counter to fulfill whichever requirement is the higher.

Minimum amounts of counters, based on cabinet requirements, are set forth in SHC circular, C5.31, "Cabinet Space for the Kitchen."

Minimum amounts of counters required for various functions are:

- 15 inches beside the refrigerator for setting out articles taken from it.
- 36 inches at the right of the sink bowl for stacking dishes prior to washing.
- 30 inches at the left of the sink bowl for draining and drying dishes. (This counter is not necessary if there is a dishwasher unit.)
- 24 inches beside or near the range for setting out serving dishes or dinner plates. (This does not include the 15 or 18 inches of counter usually provided by a standard-sized range.)
- 36 inches at some point in the assembly for mixing and for food preparation. (This may be supplied by a table.)

In a continuous assembly, some counter may be counted for more than one of the above functions; however, this multiple use should never reduce the amount of counter to such a point that recommended base cabinet requirements are cut.

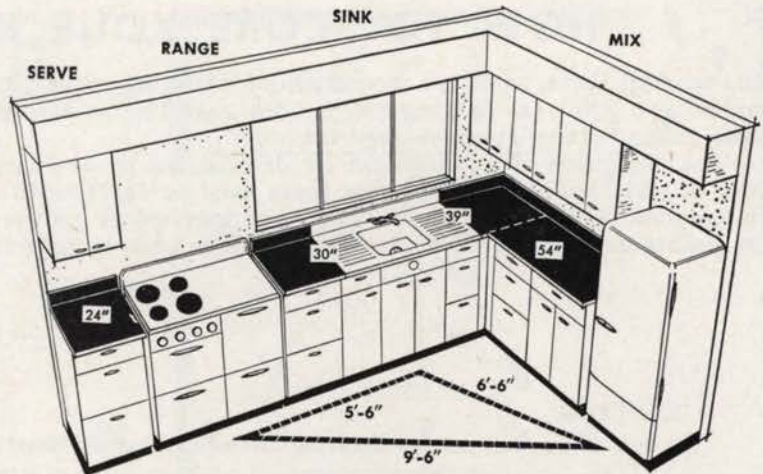
SPACE ALLOWANCE FOR APPLIANCES: In planning the assembly, allowance must be made for the over-all space occupied by appliances.

Usually 36" is allowed for the refrigerator and 42" for the range. These widths will accommodate the largest appliances commonly used in a small home, plus necessary margins needed for installation and use. The sink should fit tightly against adjacent counters.

WHAT TYPE OF ASSEMBLY?

The location of windows and doors is the most important factor in determining the way appliances, counters and cabinets should be assembled in a kitchen. Whether this assembly of kitchen equipment will be in the shape of a corridor, "L," "U" or broken-"U" depends also on the width or length of the room, and the relation of the kitchen to other activities, such as dining. No one type of kitchen assembly—whatever its size or shape—will fit the requirements of every home.

The actual "type" of assembly ("L," "U," etc.) is much less important than adequate provision for storage and counters, proper clearances, and distances between appliances.

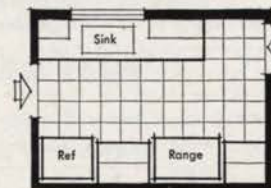


The kitchen above has well-defined centers arranged in normal sequence. Enough counter is provided to meet minimums needed for the various functions of food preparation as well as for storage requirements. The sum of the distances between appliances is 21'-6".

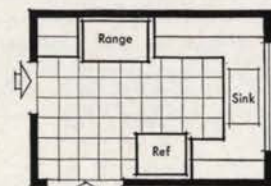
DISTANCES BETWEEN APPLIANCES: The distance between any two appliances is usually determined by the counter and storage requirements or by the necessary clearance between opposite rows of cabinets. Too small a distance between appliances indicates that there is not enough counter; too great a distance means that the proportion or the size of the room results in uneconomical use of space. Below are recommended limits, as measured from the center fronts of the appliances:

- Between refrigerator and sink—4 to 7 feet.
- Between sink and range—4 to 6 feet. (Research to date indicates that this is the most frequently traveled path in practically all kitchens.)
- Between range and refrigerator—4 to 9 feet.
- The sum of the above distances should not exceed 22 feet.

One measure of the efficiency of a kitchen is the "work triangle" formed by the three paths between the appliances. Traffic through this triangle interferes with meal preparation and should be avoided.



Corridor Assembly



"U" Assembly

The two plans sketched here show how an area 8' x 11' can be used either as a corridor-type or "U"-type kitchen, depending on the relationship of doors and windows. Both kitchens have "medium" storage requirements.

HOW TO SCORE YOUR KITCHEN PLAN

This scoring sheet, based on recommended planning principles, has been devised by the Small Homes Council as a guide for judging kitchen designs. The standards are adaptable to any kitchen in a small house using factory-made storage cabinets.

The efficiency of a design can be determined by evaluating the various parts of the kitchen. In order to make fair judgments, two facts must be recognized: (1) that some planning faults are more serious than others, and (2) that one error may either reduce or increase the seriousness of another. The points assigned to each factor below have been weighted accordingly. (See notes on Page 7.)

PART I

Find Your Score From the Tables at Left, and Enter Points Here

Points

A. STORAGE

1. Total base cabinet *frontage* (including undersink cabinet and range*) _____ feet.

Base Frontage	below 8'-6"	8'-6" to 10'-11"	11'-0" to 13'-6"	over 13'-6"
Points	0	20	25	20

BONUS If you have less than 8½-ft. base frontage, but sufficient space is available to add cabinets to bring the total up to 8½ feet, score 5 points.

2. Total wall cabinet *frontage*, including dinnerware _____ feet. (Do not include cabinets over the refrigerator or over the range.)

Wall Frontage	below 5'-0"	5'-0" to 6'-11"	7'-0" to 8'-5"	8'-6" to 14'-0"	over 14'-0"
Points	0	10	20	25	20

BONUS If you have less than 7-ft. frontage, and there is room to add cabinets to bring the total up to 7 feet, score an additional 5 points.

B. COUNTER

1. Length of continuous counter adjacent to the refrigerator _____ feet.

No. feet	below 1'-3"	1'-3" or more
Points	0	4

2. Length of continuous counter to right of sink bowl† _____ feet.

No. feet	below 2'-6"	2'-6" to 2'-11"	3'-0" or more
Points	0	3	4

3. Length of continuous counter to left of sink bowl† _____ feet.

No. feet	below 2'-0"	2'-0" to 2'-5"	2'-6" or more
Points	0	3	4

4. Length of continuous counter adjacent to the range _____ feet.

No. feet	below 1'-6"	1'-6" to 1'-11"	2'-0" or more
Points	0	1	4

5. Length of continuous counter for mixing at any point in kitchen _____ feet.

No. feet	below 3'-0"	3'-0" or more
Points	0	4

BONUS If counter is less than 3 feet but a table is conveniently located for mixing, score 4 points.

6. Total amount of counter in kitchen _____ feet.

No. feet	below 6'-6"	6'-6" to 7'-5"	7'-6" to 8'-5"	8'-6" or more
Points	0	3	7	10

C. DISTANCES BETWEEN APPLIANCES (Work Triangle)**

1. Distance between center front of sink and center front of range _____ feet.

No. feet	below 3'-0"	3'-0" to 3'-11"	4'-0" to 6'-0"	6'-1" to 8'-0"	over 8'-0"
Points	0	2	5	2	0

2. Distance between center front of sink and center front of refrigerator _____ feet.

No. feet	below 3'-0"	3'-0" to 3'-11"	4'-0" to 7'-0"	7'-1" to 9'-0"	over 9'-0"
Points	0	2	5	2	0

3. Distance between center front of range and center front of refrigerator _____ feet.

No. feet	below 4'-0"	4'-0" to 9'-0"	9'-1" to 11'-0"	over 11'-0"
Points	0	5	2	0

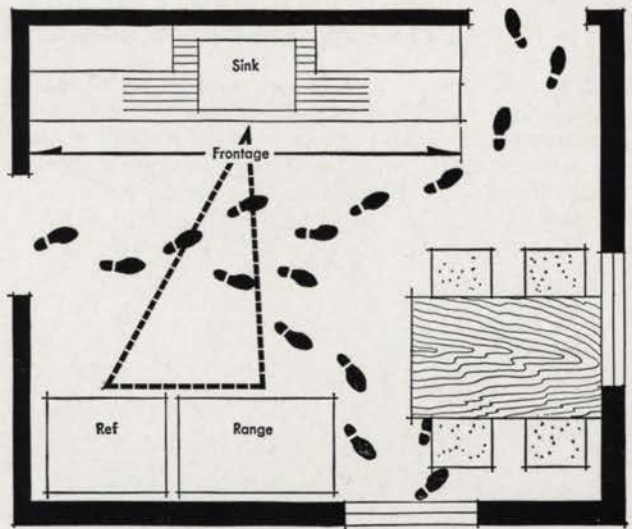
4. Sum of the distances between the three appliances (work triangle) _____ feet.**

No. feet	below 12'-0"	12'-0" to 20'-0"	20'-1" to 22'-0"	over 22'-0"
Points	0	5	2	0

TOTAL SCORE FOR PART I _____

* Include only the storage section of the range and only if this section has a 2-shelf or 2-drawer storage section, 15 to 18 inches wide.
† Assuming kitchen assembly is based on a right-handed sequence and dishwashing is done by hand.

** A separate oven is not considered in the work triangle because the number of trips to the oven is negligible (5 per cent) compared with trips to the three major appliances. See Small Homes Council Circular C5.33 — "Separate Ovens."



Refrigerator door may be hinged on either the left or right side, but it should open onto an adjacent counter. See 2 below.

Use your house plans in scoring your kitchen. The plan above shows how cabinet frontage is obtained. Draw in the work triangle (distances between appliances) to see whether traffic crosses the triangle.

PART II

The features below are undesirable, thus the score must be subtracted from that of Part I.

1. If there is less than 42 inches of wall cabinets within 6 feet of the center front of the sink, subtract 10 points. _____
2. If there is no counter next to the opening side of the refrigerator door, subtract 5 points. _____
3. If there is no counter adjacent to at least one side of the range, subtract 5 points. _____
4. If there is no counter or drainboard on one side of sink bowl, subtract 10 points; if there is no counter or drainboard at either side, subtract 25 points. _____
5. If all three of the appliances—sink, range, refrigerator (together with their adjacent counters and cabinets)—are isolated from each other, subtract 10 points. _____
6. If the clearance between any cabinets or appliances opposite each other is less than 4'-0", subtract 5 points. _____
7. If there are cabinets (not continuous) against two adjacent walls, and the traffic clearance between them is less than 3'-0", subtract 5 points for each instance of this. _____
8. If dining table and chairs in the kitchen project into the working area (free floor area) or interfere with recommended clearances (see No. 6 and No. 7 above), subtract 5 points. _____
9. If traffic through the kitchen crosses the work triangle, subtract 5 points. _____
10. If there are more than two doors in the kitchen (this does not include closet doors), subtract 2 points for the third door; 10 points for each door over three. _____
11. For each door that swings against the front of a cabinet or appliance, subtract 10 points. _____
12. If the total window area (width times height—if no height is indicated, assume 42 inches) is not more than 10% of the total floor area of the kitchen, subtract 10 points. _____
13. If neither the sink nor a stretch of counter is lighted directly by a window, subtract 10 points. _____
14. If cabinets extend into a corner alongside the end of the range or the refrigerator, subtract 10 points. _____
15. If there is an indirect route from the kitchen to the dining area, subtract 5 points; to the service area, 2 points. _____
16. When an actual kitchen is being scored instead of a plan, subtract an additional 10 points if the wall cabinets are more than 15 inches above the counters of the base cabinets and the top shelf of the wall cabinets is higher than 72 inches from the floor. _____

TOTAL SCORE FOR PART II _____

Subtract Part II score from
Part I score

FINAL SCORE _____

Research

Storage requirements are based upon research conducted by the Small Homes Council; requirements for architectural features and the assembly of equipment are based upon previous research, analysis, and general standards of good practice.

Research included studies by:

Mary Koll Heiner and Helen E. McCullough, Cornell University, on functional kitchen storage in custom-made cabinets.

Helen E. McCullough, University of Illinois, on storage requirements.

M. E. Mundel and others, Purdue University, on distances and trips between major equipment.

Maud Wilson, Oregon State College, on space requirements for counters and work areas.

Rating: below 50 — extremely poor
50–65 — poor
65–80 — fair
80–90 — good
90–100 — excellent

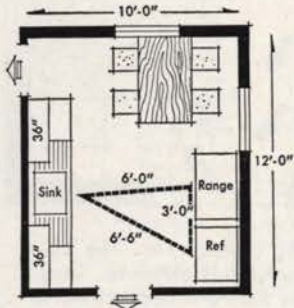
NOTES: 1. A score of 100 does not indicate perfection . . . i.e., distances between appliances sometimes produce a lower score for liberal kitchens than for medium kitchens which are smaller. The liberal kitchens, however, are more desirable because they have more storage space.

2. The maximum score which can be obtained using minimum storage requirements is 90 points.

THE KITCHEN SCORE — HOW TO USE IT

The two kitchen plans illustrated show how the scoring sheet may be used to plan good kitchens. Both plans occupy the same space (10' x 12'), bear the same relationship to doors and windows, have practically the same equipment, and have provisions for eating. The difference between them lies in the amount and arrangement of storage cabinets and counters, the available space being used to better advantage in Plan B than in Plan A.

PLAN A



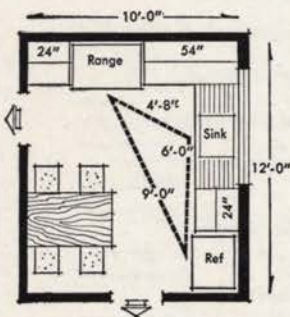
PART I		PART II	
A - 1.	20	1.	0
2.	10	2.	5
B - 1.	0	3.	5
2.	4	4.	0
3.	4	5.	0
4.	0	6.	0
5.	4	7.	0
6.	3	8.	5
C - 1.	5	9.	5
2.	5	10.	0
3.	0	11.	0
4.	5	12.	0
TOTAL	60	13.	10
		14.	0
		15.	0
		TOTAL	30

FINAL SCORE 30

PLAN A: This kitchen illustrates a common type of kitchen plan. The sink unit and the adjoining cabinets furnish all the storage and counter for the kitchen. The range and the refrigerator are placed together, apart from the rest of the equipment.

The individual faults which cause this kitchen to rate "extremely poor" can be determined by examining the score for this plan. Outstanding faults include: 1) insufficient cabinet storage, 2) lack of counter beside the range and refrigerator, 3) traffic through work area, 4) poor location of windows, and 5) interference of the dining arrangement with the work area.

PLAN B



PART I		PART II	
A - 1.	25	1.	0
2.	25	2.	0
B - 1.	4	3.	0
2.	4	4.	0
3.	4	5.	0
4.	4	6.	0
5.	4	7.	0
6.	10	8.	0
C - 1.	5	9.	0
2.	5	10.	0
3.	5	11.	0
4.	5	12.	0
TOTAL	100	13.	0
		14.	0
		15.	0
		TOTAL	0

FINAL SCORE 100

PLAN B: This is the same room as in Plan A with planning faults corrected. Base and wall cabinets have been added to bring the total storage up to SHC recommendations for limited supplies in ample space ("medium" kitchen). These cabinets increase the amount of surface available for counter. The counters have been distributed so as to provide the recommended amount at each work center, and to maintain the proper distances between appliances. The sink has been re-located to produce a better assembly.

In order to accommodate the cabinets, the location of the corner door has been changed.

By combining the windows into one large area, the wall space available for cabinets is increased.

The plan at the left shows the above kitchen (Plan B) incorporated into a 24' x 36' basement-less house. The general arrangement of space is typical of many low- or moderate-cost homes. Although the house itself is small, there is a generous kitchen-laundry-utility area. All the cabinets shown do not have to be installed at the time of construction, but space should be allowed for their addition at a later time.

The traffic patterns by-pass the work area — they do not intrude on the triangular path of movement among the three major appliances, nor do they interfere with the use of laundry equipment.

The dining space in the kitchen allows a clearance of 2'-3" between the table and the wall. This is adequate to permit chairs to be pulled back easily. Door swings are planned to avoid interference with furniture and equipment.

As part of this investigation into kitchen design standards, the Small Homes Council has prepared a technical publication, "Handbook of Kitchen Design," which includes 30 sheets of kitchen plans. This publication is available for \$2.00.

