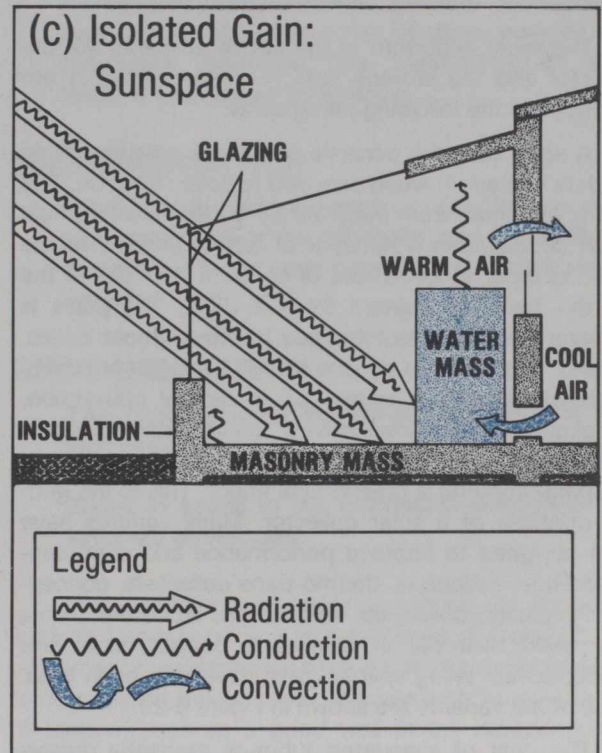
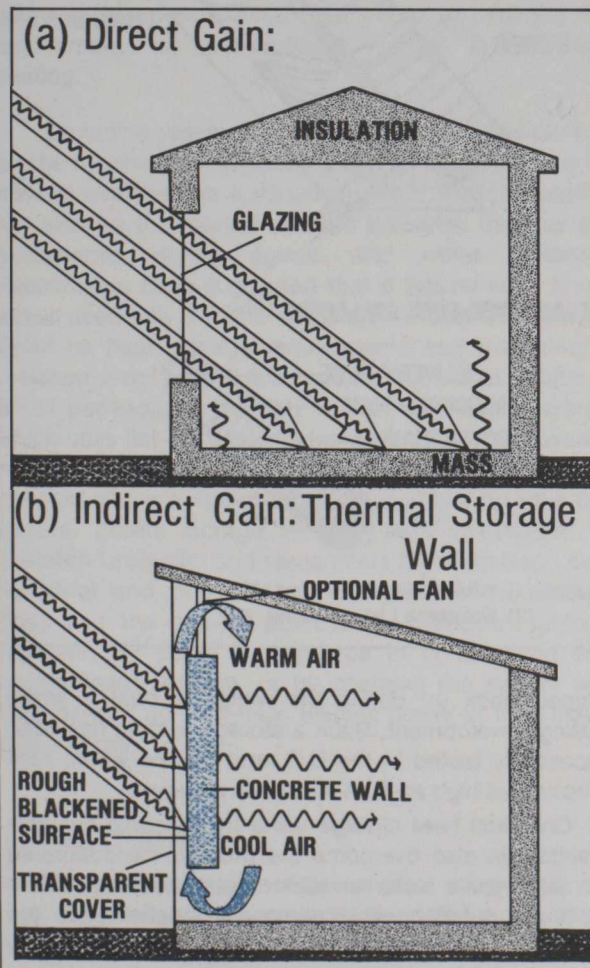


Passive Solar Heating

Direct gain is the most commonly used form of passive solar system. It utilizes the sunlight entering a building directly through the windows and careful design can maximize the heat gained directly in this way. South-facing windows admit the most solar radiation (in the northern hemisphere), consequently passive solar buildings are designed with the largest window area facing south. An overhanging roof on this side admits sunlight in the winter when the sun is low in the sky, and blocks out unwanted solar radiation in summer when the sun is high. Since the solar radiation is both collected and stored within the living space, adequate thermal mass (heat storage capacity) must be provided in the interior of the building to minimize temperature fluctuations — heat absorbed during the day is available at night to warm the building. The required thermal mass

Figure 6-28: APPROACHES TO PASSIVE SOLAR HEATING



Source: After Anderson and Riordan, 1976, p. 14, 121, 234.

can take such forms as concrete floors or walls, masonry block walls, slate floors, stone fireplaces or double layers of drywall. Any of these features built into a house will act as a storage unit for the solar system and the distinguishing feature of all of these passive solar components is that they are an integral part of the building itself.

In systems employing indirect gain, a heat absorbing material is placed directly behind the windows in the path of the sunlight. Such a thermal storage wall can be made of concrete, stone, brick or containers of water, and vents at the top and bottom of the wall allow the convective circulation of warm air into the room. The wall absorbs heat during the day and radiates warmth at night.

The third method of using passive solar energy for space heating is through isolated gain. In this system a structure is built onto a house to capture solar energy and the captured heat circulates through the living space by convection. The most common example of such a structure is a solar greenhouse, which often uses water drums as the heat storage medium. This method of utilizing passive solar heating is most suitable for retrofit onto existing buildings.