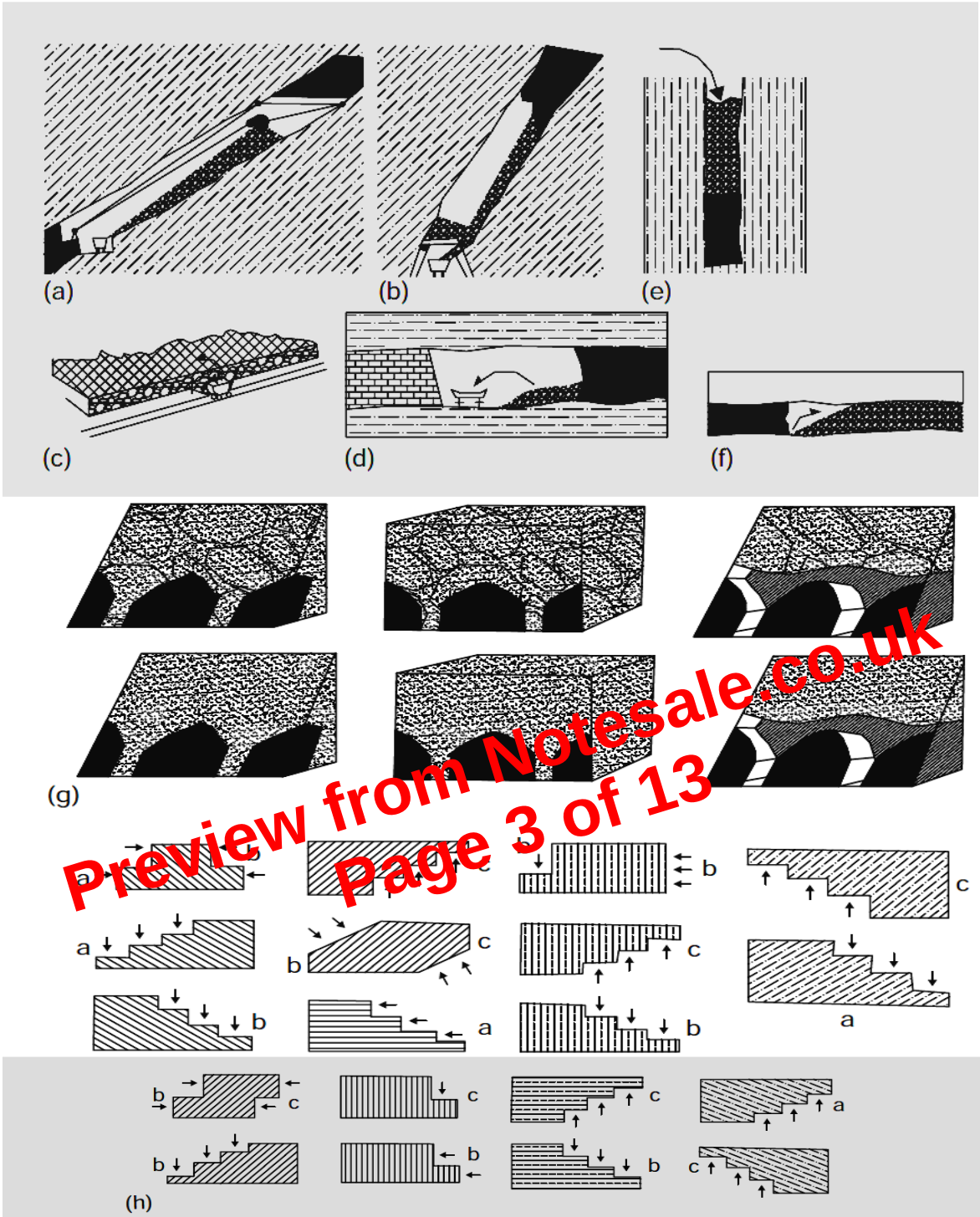

Figure 16.1 Influence of dip during stoping. With increase in dip loading and transportation of the broken muck becomes easier ((a) and (b)). The back-filling is perfect in steep dips (e), and not very tight in flat dips (f). (g) In non-coherent steeply dipping mining can be carried out by caving, and workers are not endangered by the type of deposit. (h) Influence of direction of cleats during mining. If mining is carried as marked *a* – it is not correct; if mined as marked *b* – it is fair; but when mining is carried as marked *c* – it is the best.

Geological disturbance means presence of any one of them or combination of more than one of structures such as fault, folds, joints, fissures, dykes etc. These structures usually require extra care in terms of strata stability, water seepage, gas leakage etc. making the mining process sometimes more tedious and slow. Presence of such structures usually result into higher costs and decline in productivity. Given a choice to select a geologically disturbed area with the one with minimum disturbances, one should prefer the later one.

When choosing a mining method the strike direction and the direction in which the fissures are penetrating the deposit should be examined. The fissures running parallel to strike can be mined by overhand or underhand stoping. Of course, the ore transportation is difficult in underhand mining. If the transverse fissures, which run almost parallel to the dip, penetrate deposit, it should be mined adopting breast stoping.
Figures 16.1(a) and (b) illustrate that nature of deposit to give way is more pronounced in steeply dipping deposits than the flat once. Weaker deposits are worked in slices or strips. The working faces need support in such cases. After mining the strips or slices, the worked out space should be either backfilled, or caving of the roof (back) should be allowed.
In figure 16.1(h) influence of direction of cleats on mining has been illustrated. If mining carried out as shown in figures marked *a*, it is incorrect in relation to cleats' orientation. In figures marked *b*, cleats assist mining to a fair degree, but it is the best if mining can be carried out, as marked *c* in figures.
This may be noted that *dip, thickness and strata stability* (ore and country rock) are the main geological and mining factors without which it might be impossible to select a safe and efficient mining system/method.

Degree of mechanization and output required
Mechanization means performing the underground operations using machines. The capacity of a machine is usually related to its size. Therefore, it is advantageous to select the largest units possible, having into account the aspects of flexibility, excavation and access size.
Use of higher bucket capacity LHDs, multi boom jumbos, large capacity dumpers and trucks in large underground mines is not uncommon. The types of the equipment that are available in mines can be grouped in the following manner:

- Conventional pusherleg drills, rocker shovels, loco haulage and blasthole drills of 50–60 mm. dia. form degree-1 mechanization.
- Degree-2 mechanization means use of jumbos, trackless equipment such as LHDs (1 cu. yd. capacity or more) low profile dumpers and small capacity trucks.
Drilling in stopes is by the same drills as in degree-1 mechanization.
- Degree-3 mechanization has the same set of machines as in degree-2, except that the drilling (for stoping) is by the down-the-hole drills capable of drilling holes of 150–200 mm. dia. of _40 m length.

In some situation the production requirements or the market demands select a mining method. Higher output warrants selection of bulk mining methods for which use of equipment of higher capacity and heavy duty becomes essential. The various sets of equipment used for this purpose are costly and require a huge sum of capital investment, and if not effectively utilized, leads to low productivity and higher overall costs.