

3-20 Determine the indices for the directions in the cubic unit cell shown in Figure 3-32.

Solution: A: $0,0,1 - 1,0,0 = -1,0,1 = [\bar{1}01]$

B: $1,0,1 - \frac{1}{2},1,0 = \frac{1}{2},-1,1 = [\bar{1}22]$

C: $1,0,0 - 0,\frac{1}{2},1 = 1,-\frac{1}{2},-1 = [\bar{2}34]$

D: $0,1,\frac{1}{2} - 0,0,0 = 0,1,\frac{1}{2} = [021]$

3-22 Determine the indices for the planes in the cubic unit cell shown in Figure 3-34.

Solution:

A : $x = -1 \quad 1/x = -1 \quad x \cdot 3 = -3$
 $y = \frac{1}{2} \quad 1/y = 2 \quad y \cdot 3 = 6$
 $z = \frac{1}{3} \quad 1/z = 3 \quad z \cdot 3 = 1$
 $(\bar{3}61)$ (origin at $1,0,0$)

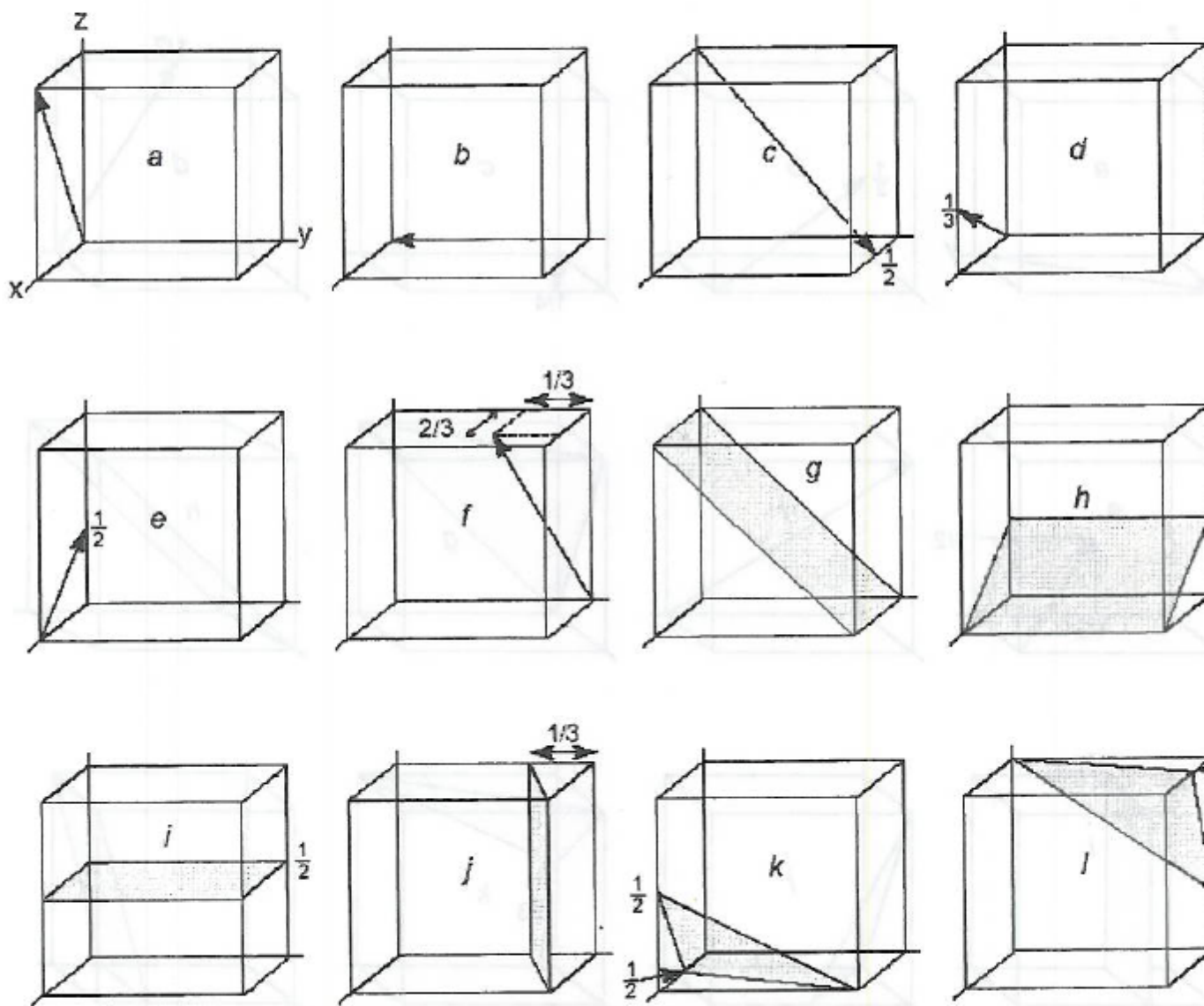
B : $x = 1 \quad 1/x = 1 \quad x \cdot 3 = 3$
 $y = -\frac{3}{4} \quad 1/y = -\frac{4}{3} \quad y \cdot 3 = -4$
 $z = \infty \quad 1/z = 0 \quad z \cdot 3 = 0$
 $(3\bar{4}0)$ (origin at $0,1,0$)

C : $x = 2 \quad 1/x = \frac{1}{2} \quad x \cdot 6 = 3$
 $y = \frac{3}{2} \quad 1/y = \frac{2}{3} \quad y \cdot 6 = 4$
 $z = 1 \quad 1/z = 1 \quad z \cdot 6 = 6$
 (346)

3-23 Sketch the following planes and directions within a cubic unit cell.

- | | | | | | |
|------------|------------------|------------------|------------|------------------|------------------|
| a. $[101]$ | b. $[0\bar{1}0]$ | c. $[12\bar{2}]$ | d. $[301]$ | e. $[\bar{2}01]$ | f. $[2\bar{1}3]$ |
| g. (011) | h. (102) | i. (002) | j. (130) | k. (212) | l. (312) |

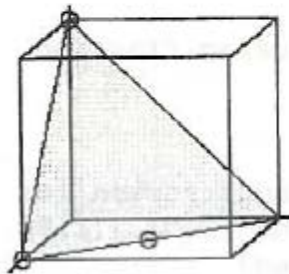
Solution:



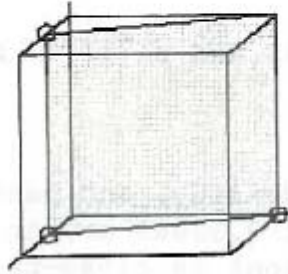
3-29 Determine the Miller indices of the plane that passes through three points having the following coordinates.

- a. $0,0,1$; $1,0,0$; and $\frac{1}{2}, \frac{1}{2}, 0$
- b. $\frac{1}{2}, 0, 1$; $\frac{1}{2}, 0, 0$; and $0, 1, 0$
- c. $1, 0, 0$; $0, 1, \frac{1}{2}$; and $1, \frac{1}{2}, \frac{1}{4}$
- d. $1, 0, 0$; $0, 0, \frac{1}{4}$; and $\frac{1}{2}, 1, 0$

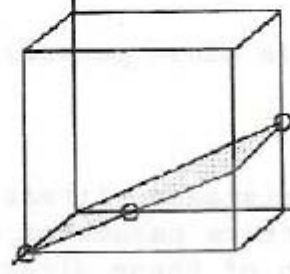
Solution:



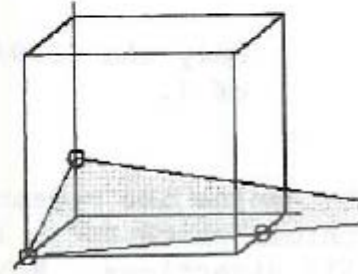
(a) (111)



(b) (210)



(c) $(0\bar{1}2)$



(d) (218)