# A Book of Abstract Algebra | (2nd Edition)

Chapter AB, Problem 1E

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## Problem

*Prove that the following are true for any integers a, b, and c:*

If $a|b$ and $b|c$, then $a|c$.

## Step-by-step solution

**Step 1** of 2

**Objective:-**

The objective is to prove $if\ a|b\ \ and\ \ b|c,\ then\ \ a|c.$

Comment

**Step 2** of 2

Proof:-

Let suppose $a \mid b \ \ and \ \ b \mid c.$

Then there exist number *k* and *l* such that:-

$$b = ka \qquad .....(1)$$

$$c = lb \qquad .....(2)$$

Let us put the value of *b* in the equation (2).

$$c = l(ka)$$

$$c = a(kl)$$

Thus, *a* is a factor of $a(kl)$ that is a factor of *c*. Hence, *a* divides *c* that is $a \mid c$.

Proved

Comment