

## TMUA 2021 Paper 2 Q4

Consider the following claim about positive integers  $a$ ,  $b$  and  $c$ :

if  $a$  is a factor of  $bc$ , then  $a$  is a factor of  $b$  or  $a$  is a factor of  $c$

Which of the following provide(s) a counterexample to this claim?

I  $a = 5, b = 10, c = 20$

II  $a = 8, b = 4, c = 4$

III  $a = 6, b = 7, c = 12$

A none of them

B I only

C II only

D III only

E I and II only

F I and III only

G II and III only

H I, II and III

In example I,  $bc = 200$

$a = 5$  is a factor of 200

$a$  is also a factor of  $b = 10$  and of  $c = 20$

so this does not provide a counterexample

(note: we take "or" to be the inclusive or, as specified in the TMUA specification)

In example II,  $bc = 16$

$a = 8$  is a factor of 16

$a$  is not a factor of 4

so this does provide a counterexample

In example III,  $bc = 84$

$a = 6$  is a factor of 12

so this does not provide a counterexample

Therefore the correct answer is option C.