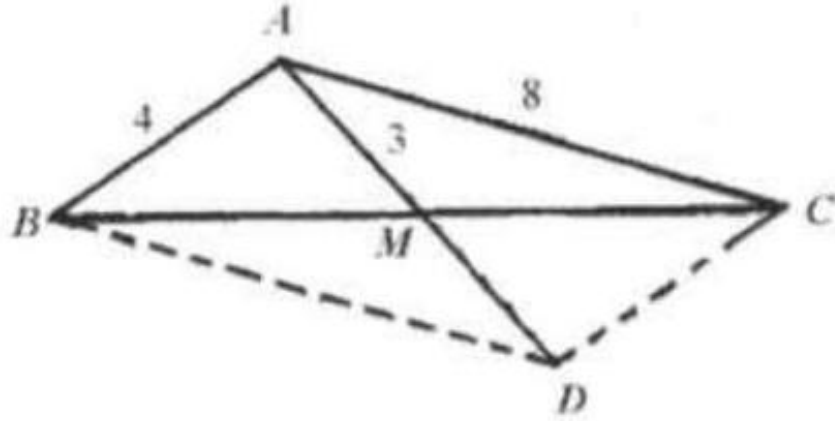
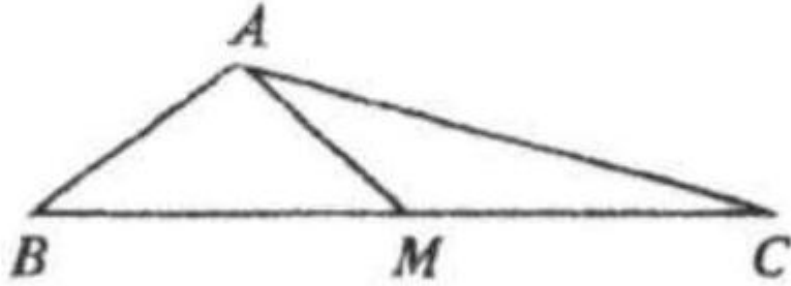


## Example 7

(1975 AMC) In the adjoining figure triangle  $ABC$  is such that  $AB = 4$  and  $AC = 8$ . If  $M$  is the midpoint of  $BC$  and  $AM = 3$ , what is the length of  $BC$  ?

- (A)  $2\sqrt{26}$
- (B)  $2\sqrt{31}$
- (C) 9
- (D)  $4 + 2\sqrt{13}$
- (E) not enough information given to solve the problem



Solution: (B).

Extend  $AM$  to  $D$  such that  $AM = MD$ . Connect  $BD$  and  $CD$ .  $ABDC$  is a parallelogram.

We know that the sum of the squares of the sides of a parallelogram is equal to the sum of the squares of its diagonals.

Applying this to the parallelogram having  $AB$  and  $AC$  as adjacent sides yields

$$AD^2 + BC^2 = AB^2 + CD^2 + AC^2 + BD^2 \Rightarrow AD^2 + BC^2 = 2(AB^2 + AC^2)$$

$$BC^2 = 2(4^2 + 8^2) - 6^2 = 124. \quad BC = 2\sqrt{31}.$$