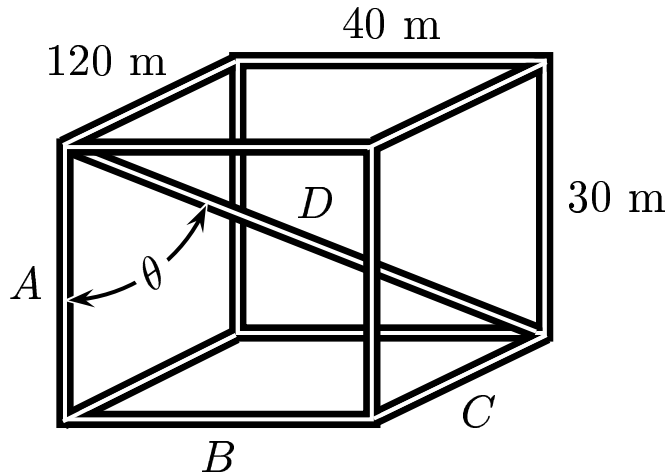


$Work = (Force\ parallel\ to\ displacement) (Displacement)$ .



Consider a rectangular parallel piped (block) with sides  $A = 30$  m,  $B = 40$  m, and  $C = 120$  m, as shown in the figure below.

What is the angle  $\theta$  between the body diagonal  $D$  and the front-left edge  $A$  of the block?

- A)  $\theta \approx 68^\circ$
- B)  $\theta \approx 71^\circ$
- C)  $\theta \approx 74^\circ$
- D)  $\theta \approx 77^\circ$
- E)  $\theta \approx 80^\circ$

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Note :  $\|\vec{A}\| = \sqrt{A^2} = A = 30$  m ,  
 $\|\vec{D}\| = \sqrt{A^2 + B^2 + C^2}$   
 $= 10\sqrt{3^2 + 4^2 + 12^2} = 130$  m ,  
 $\vec{A} \cdot \vec{D} = A \hat{i} \cdot (A \hat{i} + B \hat{j} + C \hat{k})$   
 $= A^2 = (30 \text{ m})^2 = 900$  m , and  
 $\vec{A} \cdot \vec{D} = \|\vec{A}\| \|\vec{D}\| \cos \theta$  , so  
 $\theta = \arccos \left[ \frac{\vec{A} \cdot \vec{D}}{\|\vec{A}\| \|\vec{D}\|} \right]$   
 $= \arccos \left[ \frac{(900 \text{ m})}{(30 \text{ m}) (130 \text{ m})} \right]$   
 $= \arccos [0.230769]$   
 $= 76.6576^\circ$  .

Answer **D**.