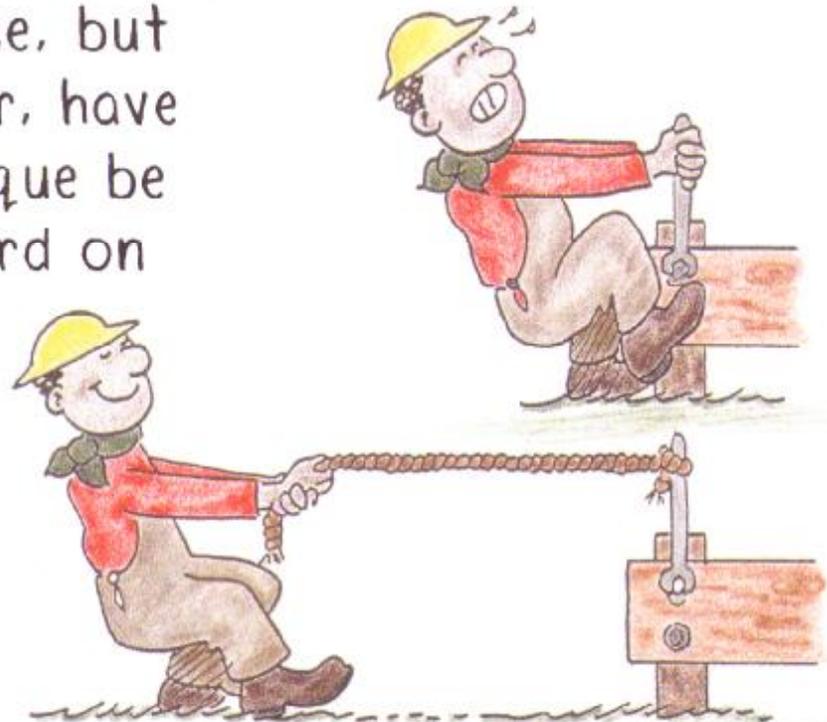


NEXT-TIME QUESTION

CONCEPTUAL Physics

James finds it difficult to muster enough torque to turn the stubborn bolt with the wrench. He wishes he had a pipe handy to effectively lengthen the wrench handle, but doesn't. He does, however, have a piece of rope. Will torque be increased if he pulls as hard on the rope as shown?



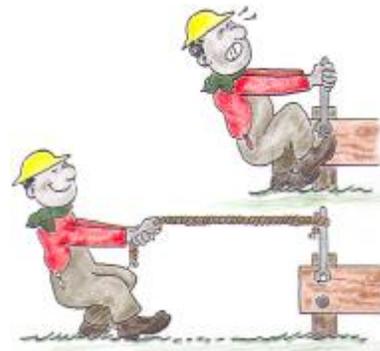
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Answer:

The torque will be the same because the lever-arm distance is the same in both cases. The lever arm is not the distance between axis of turning and the point of application of the force, but the distance from the turning axis to "line of action" of the applied force. Note the line of action, and hence the lever arm, is the same in both cases. A pipe that extends the length of the wrench handle puts the line of action farther from the turning axis—the rope does not.

