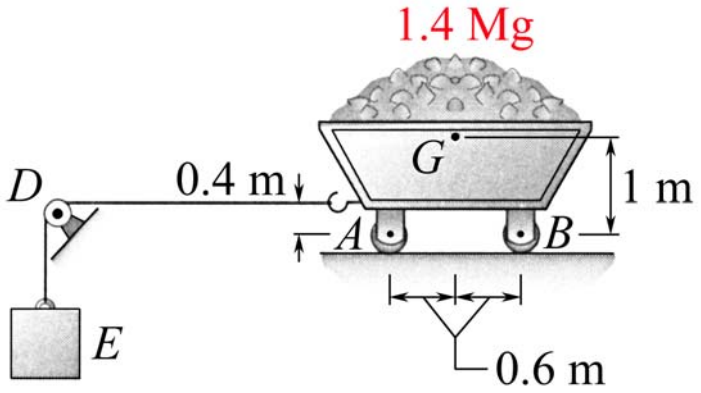
MEEG 2013 Quiz #6.m21.082

1. ② Including a sketch, describe the *vectors* to be shown on the *effective-force diagram* for a rigid body in plane motion.

2. ⑧ The 1.4-Mg coal car with load is being towed by the counterweight *E* as shown. If the mass of the counterweight is 100 kg, determine (*a*) the acceleration **a** of the coal car, (*b*) the tension *F* in the cable, (*c*) the corresponding reactions **A** and **B** at *A* and *B*.



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1. Sketch: ① Suppose that a rigid body in plane motion has a mass *m*, an angular acceleration $\boldsymbol{\alpha}$, a mass center *G* accelerating with $\bar{\mathbf{a}}$, and a moment of inertia $\bar{I}$ about its central axis. Then, the *effective-force diagram* for this body has (*a*) an effective force vector $m\bar{\mathbf{a}}$ acting through *G*, (*b*) an effective moment vector $\bar{I}\boldsymbol{\alpha}$ acting about *G*. ①

2. FBD = EFD for coal cart ① FBD = EFD for counterweight *E* ①

$\mathbf{a} = 0.654$ m/s² ← ① $F = 915.6$ $F = 916$ N ①

$A_y = 6409.2$ $\mathbf{A} = 6.41$ kN ↑ ② $B_y = 7324.8$ $\mathbf{B} = 7.32$ kN ↑ ②