11

Force $\vec{F} = (2.0\hat{\imath} - 3.0\hat{\jmath})$ N

acts on an object of mass

$m = 3.0$ kg

as it moves $\vec{d} = (-4.0\hat{\imath} + 3.0\hat{\jmath})$ m

The work done on the object is, in general

$$W = \int \vec{F} \cdot d\vec{x}$$

but because the force is constant, and motion is in a straight line,

$$W = \vec{F} \cdot \vec{d} = (2.0\text{ N})(-4.0\text{ m}) - (3.0\text{ N})(3.0\text{ m})$$

$$= -8\text{ J} - 9\text{ J} = -17\text{ J}$$

Option (4) is correct.

12.

A car is initially moving with velocity

$v_i = -3.0\ m/s$

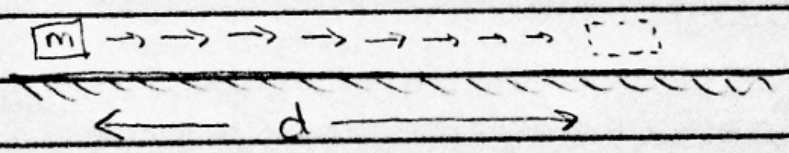
But starting at time $t = 0\ s$, it experiences a constant acceleration in the negative direction.

→ velocity constantly decreases with time

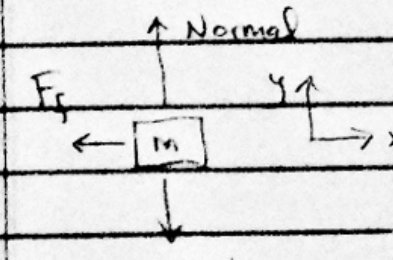
→ car moves faster and faster, always in negative direction

Option ① is correct.

13.



A block of mass m slides a distance d across a surface with coefficient of friction μ_K before coming to rest.



force	x	y
gravity	0	$-mg$
normal	0	$+F_N$
friction	$-\mu_K F_N$	0
total	ma_x	$ma_y = 0$

$\rightarrow ma_x = -\mu_K mg$

13 continued

$$a_x = -\mu_k g$$

$$v_f^2 - v_i^2 = 2 a_x d$$

$$0 - v_i^2 = 2(-\mu_k g) d$$

$$v_i^2 = 2 \mu_k g d$$

$$\rightarrow v_i = \sqrt{2 \mu_k g d}$$

Option (4) is correct