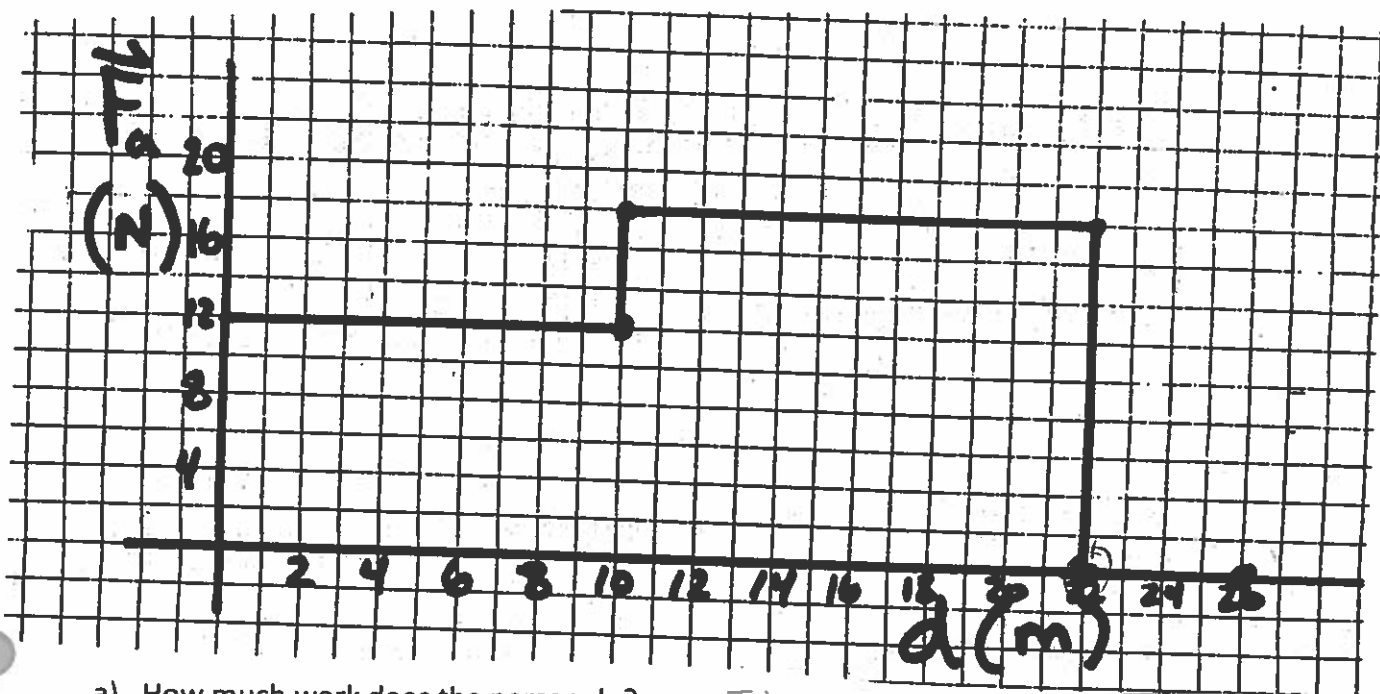


KEY

Midterm Practice #1

The graph below shows applied force vs distance for a person pushing a 2 kg box on level ground. From 0 to 10 m it moves at 3 m/s.



- a) How much work does the person do? $w = Fd = 120 + (12 \times 18) = \boxed{336 \text{ J}}$
- b) Determine μ_k . $F_{app} = F_f$ (not net force) $\therefore 12 = \mu(19.6)$
- c) How much net work is done from 10 to 22 m? $\rightarrow \mu = .612$
 $F_{app} - F_f = 6 \text{ N} / w = Fd = 6 \times 12 = \boxed{72 \text{ J}}$
- d) Find v_f after 22 m.
 $F_{net} = ma \quad a = 3 \text{ m/s}^2 \rightarrow$ use kinematics $v = 9 \text{ m/s}$
- e) Find v_f after 26 m.
 $a = -6 \text{ m/s}^2$ use kinematics $\rightarrow v = 5.74 \text{ m/s}$
- f) Find power generated by the person from 10 to 22 m if they are 60% efficient.
 $P = \frac{w}{t} = \frac{216}{2} = 108 = 60\% \text{ eff} \therefore \frac{108}{.6} = \boxed{180 \text{ W}}$
- g) Find impulse from 10 to 22 m.
 $P = m\Delta v = 2(6) = \boxed{12 \text{ kg m/s}}$
- h) If the person stopped pushing the box at 26 ~~seconds~~ 22 meters, how long would it take the box to stop moving?



$v = 9 \text{ m/s}$

$v_f = 0$

$v_i = 9$

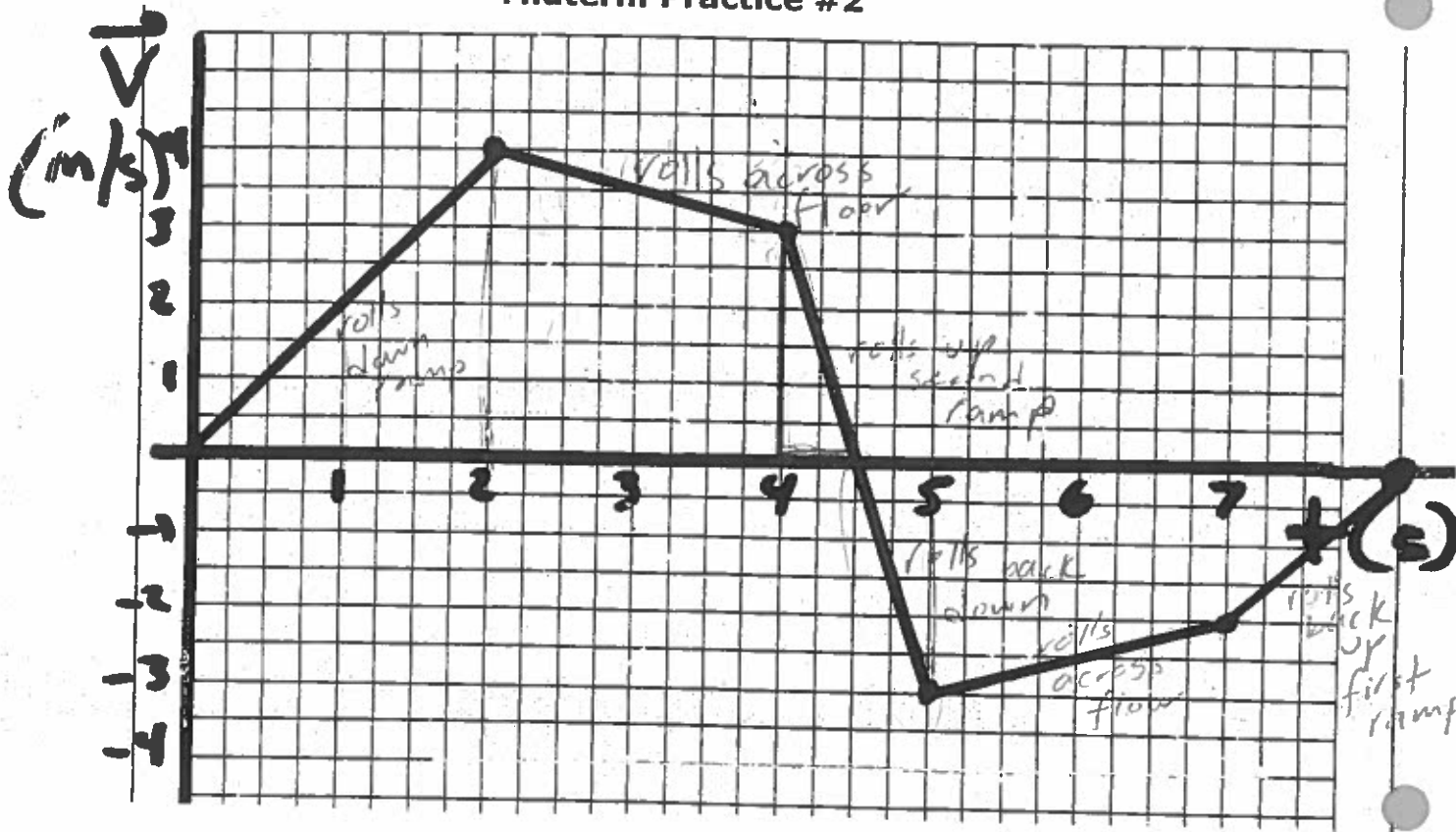
$d = ?$

$a = -6$

$t = ?$

Use kinematics...

Midterm Practice #2



Scenario: A 1 kg ball rolls down a ramp.

1) Describe a plausible scenario for what happens next – label the graph.

2) Find F_{net} on the ball as it rolls down the ramp.

see graph.

$$a = 2 \text{ m/s}^2 \quad F_{\text{net}} = ma = (1)(2) = \boxed{2 \text{ N}}$$

3) Find W_{net} done on the ball as it rolls down the ramp.

$$W = Fd = 2(4 \text{ m}) = \boxed{8 \text{ J}}$$

4) Find F_f on the floor.

causes neg. acceleration

$$F_{\text{net}} = F_f = ma = 1(1.5)$$

5) Find μ_k on the floor.

$$F_f = \mu F_N \Rightarrow 0.5 = \mu(9.8) \quad \mu = \boxed{.051}$$

6) How far does the ball travel along the second ramp?

$$.75 \text{ m up} + .75 \text{ m down}$$

7) Determine P_{out} of ball as it rolls down the second ramp.

$$P = \frac{W}{t} \quad P = \frac{F_d}{t} = \frac{mad}{t} = \frac{1(-6)(.75)}{.5} = \boxed{9 \text{ W}}$$

8) Find impulse on ball along floor.

$$\begin{aligned} p &= m \Delta v \\ &= (1)(-1) \\ &= -1 \text{ kg m/s} \end{aligned}$$