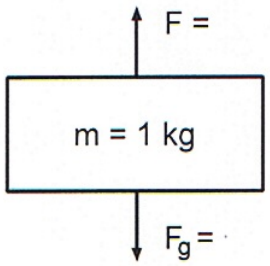
Each of the following free body diagrams represents a different problem. From the given data, solve for the missing quantities. Complete solutions for each problem should be shown (use a separate sheet if necessary). {Use g = 10 m/s²}

1)



$F_g = mg = (1)(10)$

$F_g = 10N[d]$ ✓

$a = 2.0\ m/s^2 \Downarrow$

$F_{net} = ma = 2N[d]$ ✓

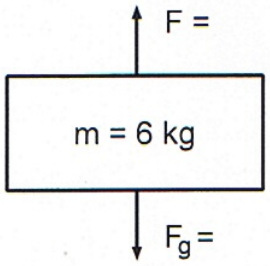
$F_{net} = F_1 + F_2$

$2[d] = F + 10[d]$

$2[d] - 10[d] = F$

$F = 8N[u]$ //

2)



$F_g = mg = 60N[d]$ ✓

$a = 3.0\ m/s^2 \Uparrow$

$F_{net} = ma = 18N[u]$ ✓

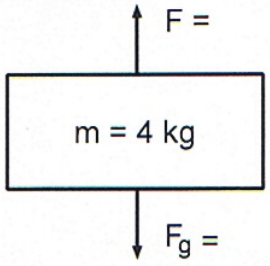
$18[u] = F + 60[d]$

$18[u] - 60[d] = F$

$18[u] + 60[u] = F$

$F = 78N[u]$ //

3)



$F_g = mg = 40N[d]$ ✓

$a = 2.0\ m/s^2 \Downarrow$

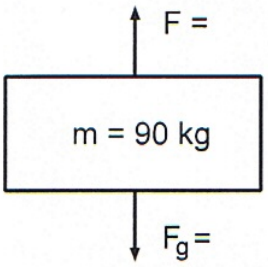
$F_{net} = ma = 8N[d]$ ✓

$8[d] = F + 40[d]$

$-32[d] = F$

$F = 32N[u]$ //

4)



$F_g = 900N[d]$ ✓

$a = 0.5\ m/s^2 \Downarrow$

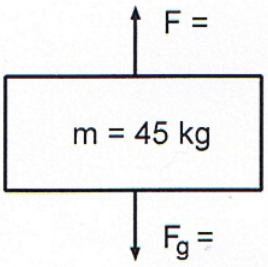
$F_{net} = 45N[d]$ ✓

$45[d] = F + 900[d]$

$45[d] - 900[d]$

$F = 855N[u]$ //

5)



$F_g = 450N[d]$ ✓

$a = 1.0\ m/s^2 \Uparrow$

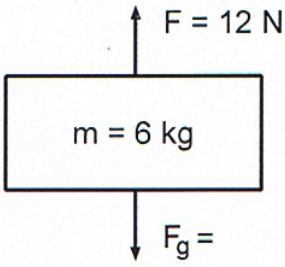
$F_{net} = 45N[u]$ ✓

$45[u] = F + 450[d]$

$45[u] - 450[d]$

$F = 495N[u]$ //

6)



$F_g = 60N[d]$ ✓

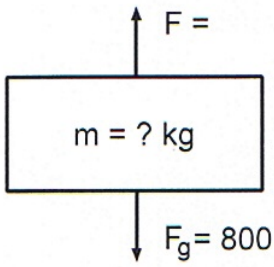
$F_{net} = 12[u] + 60[d]$

$F_{net} = 48N[d]$ ✓

$a = \frac{F_{net}}{m} = \frac{48N[d]}{6kg}$ //

$a = 8.0\ m/s^2[d]$

7)



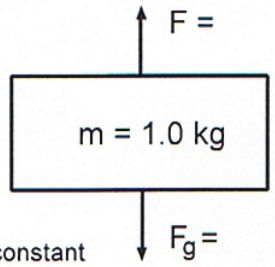
$m = \frac{F_g}{g}$ $m = 80\ kg$ ✓

$a = 1.0\ m/s^2 \downarrow$

$F_{net} = 80\ N\ [d]$ ✓

$F = 720\ N\ [u]$ ✓ $80\ [d] = F + 800\ [d]$

8)



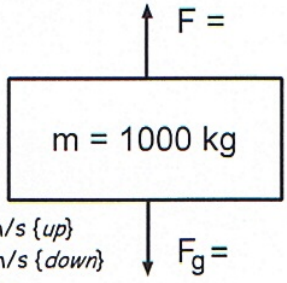
$F_g = 10\ N\ [d]$ ✓

$a = 0$ (if v is constant) ✓

$F_{net} = 0$ (cuz $a = 0$) ✓

$F = 10\ N\ [u]$ ✓ * forces are balanced!

9)



$v_1 = 2\ m/s\ \{up\}$
$v_2 = 2\ m/s\ \{down\}$
$\Delta t = 4.0\ s$

$a = \frac{v_2 - v_1}{t} = \frac{2\ [d] - 2\ [u]}{4}$

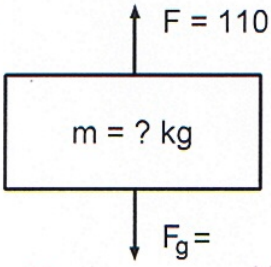
$a = 1.0\ m/s^2\ [d]$ ✓

$F_g = 10000\ N\ [d]$ ✓

$F_{net} = 1000\ N\ [d]$ ✓

$F = 9000\ N\ [u]$ ✓

10)



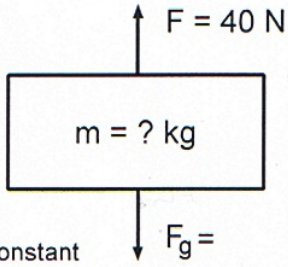
* difficult question!!

$a = 1.0\ m/s^2\ \{up\}$

$F_g = mg$ ✓ $F_g = 100\ N\ [d]$ ✓
$= 10m\ [d]$

$F_{net} = F_1 + F_2$
$1m\ [u] = 110\ [u] + 10m\ [d]$ ✓
$1m\ [u] - 10m\ [d] = 110\ [u]$
$11m\ [u] = 110\ [u]$ ✓
$m = 10kg$ ✓
$F_{net} = 10N\ [u]$ ✓

11)



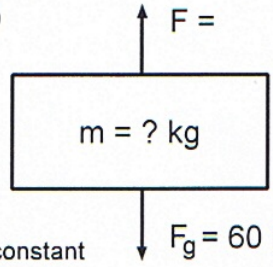
$a = 0$ ✓

$F_{net} = 0$ ✓

$F_g = 40N$ ✓ forces are balanced

$m = 4.0kg$ ✓ F_g/g

12)



$a = 0$ ✓

$F = 60\ N\ [u]$ ✓ forces are balanced

$F_{net} = 0$ ✓ forces ar

$m = 6.0\ kg$ ✓ F_g/g