Consider right as positive

$m_V = ?$ $\quad m_G = 4.5\times10^2$ kg
$\vec{v}_V = -45$ m/s $\quad \vec{v}_G = 1.4\times10^3$ m/s
$\vec{p}_V = ?$ $\quad \vec{p}_G = 6.3\times10^5$ kg·m/s

$\vec{p}_{after} = \vec{p}_{before} = 0$
$\vec{p}_{after} = \vec{p}_V + \vec{p}_G = 0$
$\vec{p}_V = -6.3\times10^5$ kg·m/s

$$m_V = \frac{\vec{p}_V}{\vec{v}_V} = \frac{-6.3\times10^5 \text{ kg·m/s}}{-45 \text{ m/s}} = 1.4\times10^4 \text{ kg}$$

9. before collision

$m = 7.0$ kg
$v = 0$
$p = 0$
$\vec{p}_{before} = 0$

after collision

Consider right as positive

$m_B = 5.0$ kg $\quad m_A = 2.0$ kg
$\vec{v}_B = ?$ $\quad \vec{v}_A = 10.0$ m/s
$\vec{p}_B = ?$ $\quad \vec{p}_A = 20.0$ kg·m/s

$\vec{p}_{after} = \vec{p}_{before} = 0$
$\vec{p}_{after} = \vec{p}_A + \vec{p}_B = 0$
$\vec{p}_B = -20.0$ kg·m/s

$$\vec{v}_B = \frac{\vec{p}_B}{m_B} = \frac{-20.0 \text{ kg·m/s}}{5.0 \text{ kg}} = 4.0 \text{ m/s left}$$

10. before collision

Consider north as positive

$m_T = 1.02\times10^4$ kg
$\vec{v}_T = 15$ m/s
$\vec{p}_T = 1.53\times10^5$ kg·m/s

$m_C = 1.02\times10^3$ kg
$\vec{v}_C = -25$ m/s
$\vec{p}_C = -2.55\times10^4$ kg·m/s
$\therefore \vec{p}_{before} = \vec{p}_T + \vec{p}_C = 1.28\times10^5$ kg·m/s

after collision

$m = 1.12\times10^4$ kg
$\vec{v} = ?$
$\vec{p} = \vec{p}_{after} = 1.28\times10^5$ kg·m/s

$$\vec{v} = \frac{\vec{p}}{m} = \frac{1.28\times10^5 \text{ kg·m/s}}{1.12\times10^4 \text{ kg}} = 11 \text{ m/s north}$$

11. a) before collision

Consider right as positive

$m_1 = 225$ g
$\vec{v}_1 = 30.0$ cm/s
$\vec{p}_1 = 6.75\times10^3$ g·cm/s

$m_2 = 125$ g
$\vec{v}_2 = 10.0$ cm/s
$\vec{p}_2 = 1.25\times10^3$ g·cm/s

$\therefore \vec{p}_{before} = \vec{p}_1 + \vec{p}_2 = 8.00\times10^3$ g·cm/s

after collision

$m_1 = 225$ g $\quad m_2 = 125$ g
$\vec{v}_1' = ?$ $\quad \vec{v}_2' = 24$ cm/s
$\vec{p}_1' = ?$ $\quad \vec{p}_2' = 3.00\times10^3$ g·cm/s

$\vec{p}_{sys(after)} = \vec{p}_{sys(before)} = 8.00\times10^3$ g·cm/s
$\vec{p}_1' = 5.00\times10^3$ g·cm/s

$$\vec{v}_1' = \frac{\vec{p}_1'}{m} = \frac{5.00\times10^3 \text{ g·cm/s}}{225 \text{ g}} = 22.2 \text{ cm/s right}$$

