11. (4) $F = V\left(\frac{dm}{dt}\right) = 3 \times 2 = 6N$

12. (2) Force on M_1 = Force on $M_2 \Rightarrow a_1 = \frac{m_2 a_2}{m_1}$

13. (3) $F = \frac{dp}{dt}$

14. (2) $F = \frac{2mu}{t} = 16000\,N$

15. (4) Conservation of linear momentum gives $m_1 v_1 + m_2 v_2 = 0$

$m_1 v_1 = -m_2 v_2 \Rightarrow v_1 = \frac{-m_2 v_2}{m_1}$ $\qquad$ $m_1 = 10g = \left(\frac{10}{1000}\right)kg$

Given, $m_1 = 1kg$ and $v_2 = -5\,m/s$ $\therefore$ Velocity of muzzle,

$v_1 = \frac{+1 \times 5}{10/1000} = 500\,m/s$

16. (1) $\vec{F}_1 + \vec{F}_2 + \vec{F}_3 = 0 \Rightarrow \vec{F}_1 + \vec{F}_2 = -\vec{F}_3$

When $\vec{F}_3$ is removed

Net force $\vec{F}_R = \vec{F}_1 + \vec{F}_2$; $\vec{a} = \frac{\vec{F}_R}{m} = \frac{\vec{F}_1 + \vec{F}_2}{m}$

$\vec{a} = \frac{-\vec{F}_3}{m} \Rightarrow |\vec{a}| = \frac{F_3}{m}$

17. (4) $V = \sqrt{2as}; V = \sqrt{2\left(\frac{F}{m}\right)s} = (2F)^{1/2}\left(\frac{s}{m}\right)^{1/2}; V \propto \frac{1}{\sqrt{m}}$

18. (4) Δp = area under F - t graph = $\frac{1}{2} \times 2 \times 6 - (2 \times 3) + 3 \times 4 = 12\,kgm/s$

19. (1) $I = \Delta P\left(along\ x - axis\right)$

20. (4) Case (1)
$(P_x)_i$ = mu; P_y(initial) = 0
$(P_x)_f$ = f = –mu; P_y(final) = 0
Impulse = ΔP = –2mu (along x –axis) $\qquad$ Impulse = 0 along y–axis
parallaly in case (2)
$(P_x)_i$ = mu cos30°; $(P_y)_i$ = –mu sin30°
$(P_x)_f$ = f = –mu cos30°; $(P_y)_f$ = –mu sin30°
$\therefore$ Impulse = –2mu cos 30°(along x-axis)
Impulse = 0 (along y–axis)
Force and impulse are in the same direction the force on wall due to the ball is normal to the wall along positive x–direction in both (1) & (2) case.