Newton's Laws Assignment SOLUTIONS

1.
a) 5320 – 5211 = 109 N to the right
b) $W = mg \therefore m = \frac{W}{g} = \frac{10388}{9.8} = 1060\,\text{kg}$
c) $a = \frac{F}{m} = \frac{109}{1060} = 0.1028\,\text{ms}^{-2}$ to the right

2.
a) It is the same. (The inertia of an object is the same no matter what its speed is).
b) Friction makes it easier to slow things down (as it is a force which opposes motion).

3. Weight depends on the magnitude of gravity, whereas mass will not change in different locations

4. $a = \frac{F}{m}$ the Earth has so much mass that its acceleration is tiny.

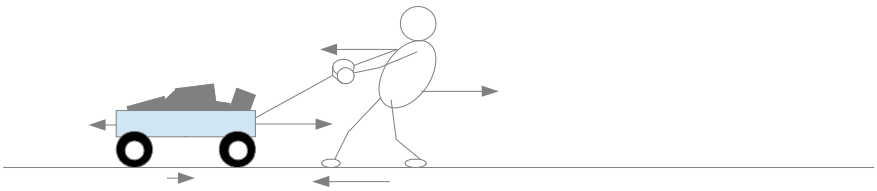
5.
a) The same as his weight i.e. W = mg = 78 ×9.8 = 760 N (2 s.f.)
b) Opening the parachute reduces the terminal speed as more friction is present.

6. An object continues in its state of motion unless an unbalanced force acts on it.

7.
a) 15.42 N
b) 0 N
c) Greater, since the crate is moving faster and friction is proportional to speed.

8. Same magnitude, opposite direction.

9.
a)



b) Josie pushes ground, ground pushes Josie
Josie pulls cart, cart pulls Josie
Cart pushes (drags on) ground, ground pushes (drags on) cart

c) Forces on cart: ← and → so net force → therefore accelerates right
Forces on Josie: ← and → so net force 0 therefore no acceleration

d) Left

e) Net force is 428 – 50 = 378 N
Mass is 112 kg
$a = \frac{F}{m} = \frac{378}{112} = 3.4\,\text{ms}^{-2}$ (2 s.f.)

10. The force due to gravity (weight) is proportional to mass (W = mg), so heavier objects have more force due to gravity. The acceleration is inversely proportional to mass $\left(a = \frac{F}{m}\right)$, so heavier objects need more force to experience the same acceleration (they have more inertia).