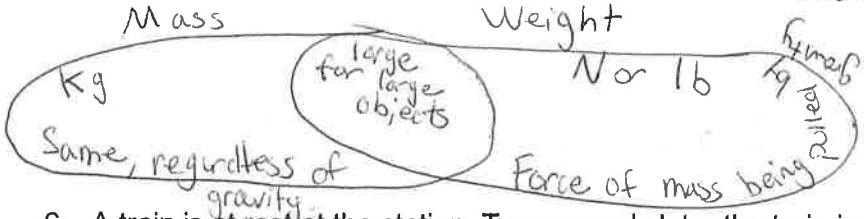
Chapter 2,3,4 Test Review Key

1. State Newton's first law. Law of inertia. An object at rest stays at rest and an object in motion stays in motion unless acted upon.
2. State Newton's second law F=ma
The acceleration is directly proportional to net force. Acceleration is inversely proportional to mass.
3. Explain using newton's law why it is important to put a baby in a car seat.
In a wreck the baby would try to stay in motion. The car seat stops this.
4. You are pulling on a box with a force of 40 N right and your brother is pushing the box 25 N right. Draw the free body diagram (a picture representing the object and the forces on the object). What is the net force on that object?

Net force: since both forces are right we add them.
Net force = 65N right

5. Compare and contrast mass and weight. Draw a venn diagram.



6. A train is at rest at the station. Two seconds later the train is traveling 30 m/s. What is the acceleration of the train. Write the equation used to solve this problem and the answer.
$V_0 = 0 m/s \quad V_f = 30 m/s \quad a = \frac{V_f - V_i}{t} = \frac{30 m/s - 0 m/s}{2s} = 15 m/s^2$
7. A puppy has a velocity of 5 m/s left 3 seconds later the puppy's velocity is 3 m/s right. What has changed? circle all that apply:
(direction), ~~speed~~, (velocity), acceleration, mass, weight
maybe?
8. What does a positive velocity mean?
The object is moving forward.
9. What does a negative acceleration mean?
The object is slowing down.
10. When an object is dropped on earth why does it accelerate? How fast?
It is pulled by gravity. It accelerates at $10 m/s^2$
11. A baseball is thrown horizontally at 45 m/s. The ball slows down at a rate of 5m/s2. How long is the ball in the air before coming to rest?

$V_f = V_0 + at \quad 0 = 45 + \frac{-10 m/s^2}{5}(t) \quad \frac{-45}{-5} = \frac{-10}{-5}(t) \quad t = 9s$

12. A pile driver drops from a height of 35 meters before landing on a piling. What is the speed of the driver when it hit the piling?
height = displacement
drops = gravity is acceleration
$x = v_0 t + \frac{1}{2} a t^2 \quad 35m = 0 m/s t + \frac{1}{2}(10 m/s^2)t^2$
$35m = 5 m/s^2 t^2 \quad t = \sqrt{7} s$
$V_f = V_0 + (10)(\sqrt{7})$
$V_f = 70 m/s$

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13. A car starts from rest and accelerates uniformly over a time of 5.21 seconds for a distance of 110 m. Determine the acceleration of the car.

$a = \frac{x}{t}$ $a = \frac{110\ m}{5.21\ s} = 21.1\ m/s^2$

Drop = $V_o = 0$

14. Upton Chuck is riding the Giant Drop at Great America. If Upton free falls for 2.60 seconds, what will be his final velocity and how far will he fall?

$V_f = V_o + at$ $V_f = 0 + 10m/s^2(2.60s) = 26\ m/s$

$x = V_o t + \frac{1}{2}at^2$ $x = 0t + \frac{1}{2}(10m/s^2)(2.60s)^2 = 33.8\ m$

15. Determine the accelerations that result when a 12-N net force is applied to a 3-kg object and then to a 6-kg object.

$F = ma$ $F = 12\ N$ $m = 3kg$ $\frac{12\ N}{3kg} = \frac{3kg(a)}{3kg}$ $a = 4\ m/s^2$

$F = 12\ N$ $m = 6kg$ $\frac{12\ N}{6kg} = \frac{6kg(a)}{6kg}$ $a = 2\ m/s^2$

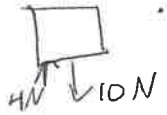
16. A net force of 15 N is exerted on an encyclopedia to cause it to accelerate at a rate of 5 m/s^2. Determine the mass of the encyclopedia.

$F = ma$ $\frac{15\ N}{5\ m/s^2} = \frac{m(5\ m/s^2)}{5\ m/s^2}$ $m = 3kg$

17. Compared to a 1 kg block of solid iron a 2 kg block of solid iron has twice as much a. Inertia b. Mass c. volume d. All of the above

Inertia: a resistance to change
ie. how much force required to make a change

18. A 10N falling object encounters 4N of air resistance. The net force on the object is



Net force: opposite directions so subtract
10N - 4N = 6N down

19. What is the weight of a 6.75 kg box?

Weight = $F_{grav} = mg = 6.75\ kg\ (10m/s^2) = 67.5\ N$

20. A snake travels 15 meters in 4.5 seconds. What is the speed of the snake?

$Speed = \frac{distance}{time} = \frac{15\ m}{4.5s} = 3.33\ m/s$