

Physics Fall Final Review

CONCEPTUAL PHYSICS

Directions: Answer the following questions based on in-class notes, worksheets, and your Physics book.

Equations:

Velocity: $v = \frac{d}{t}$ rearrange and get $d = v \cdot t$ or $t = \frac{d}{v}$

acceleration: $\bar{a} = \frac{\Delta v}{\Delta t}$

Misc. motions equations: $v = v_0 + at$

Free Fall equations: $v = v_0 + gt$ $t = \sqrt{\frac{2d}{g}}$ $d = \frac{1}{2}gt^2$

Newton' second law: $F = m \cdot a$ rearrange and get $a = \frac{F}{m}$ or $m = \frac{F}{a}$

Momentum: $p = m \cdot v$ $v = \frac{p}{m}$ $m = \frac{p}{v}$ $p_{before} = p_{after}$

QUESTIONS:

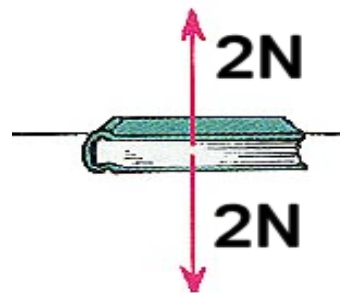
1. Give the units for the following quantities and tell me whether they are a vector or scalar quantity.

Quantity	Units	Vector or Scalar
Distance		
Speed		
Time		
Velocity		
Mass		
Acceleration		
Force		

2. What two things does a **vector** tell us?
3. What one thing does a **scalar** quantity tell us?
4. What is the difference between **speed** and **velocity**?
5. Give me a situation when an object can have constant speed but not constant velocity.
6. What is a **force**?

7. What is **net force**?

8. Diagram the following on the diagram to the right:
- a. Force of gravity
 - b. Support or Normal Force
 - c. What is the net force?



9. The **force of gravity** is also known as _____
10. Calculate the **resultant vector** for the following vectors (draw a diagram of each)
- a. **300 Newtons down** and **100 Newtons up**
 - b. **125 Newtons pushing** a crate with **50 Newtons of friction**.
 - c. An airplanes groundspeed when is it flying at **600 km/hr** with a **100 km/hr** headwind.

d. An airplane's groundspeed when it is flying at **550 km/hr** with a **75 km/hr** tailwind.

11. What is **friction**? Which way does it always act in relation to the motion of an object? (*draw a diagram and label*)

12. What is **Newton's First Law of Motion**?

13. What is the difference between **mass** and **weight**?

14. What is the difference between **average speed** and **instantaneous speed**?

15. What is the definition of **acceleration**?

16. What is the value of the **acceleration of gravity (g) on Earth**?

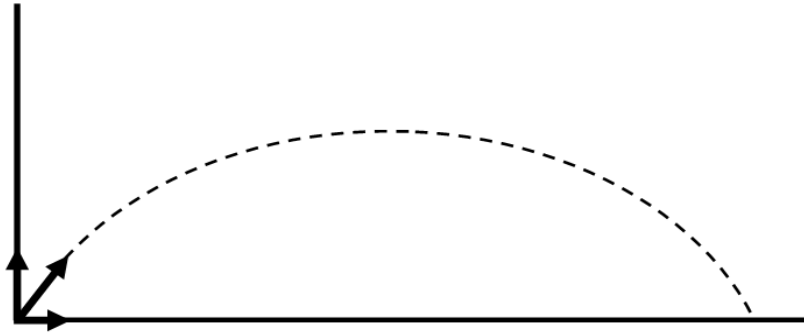
17. What is **free fall**?

18. If you throw an object straight up and it **takes 2.5 seconds** to return to you, how long did it take to get to the top? (*Hint: Same from the top of its path back down to you*)

19. If you throw a rock straight up at **7 m/s**, what will its speed be when you catch it again?

20. What is a **projectile**?

21. Label and diagram below showing the terms and values: **range**, **minimum vertical velocity**, **maximum vertical velocity**, **trajectory**



22. What force causes a projectile to fall short of its idealized path?

23. What **is Newton's Second Law**? Show the equation that summarizes the law.

24. What is meant by **directly proportional**?

25. What is meant by **inversely proportional**?

26. How is **acceleration** and **Force** related? How about **acceleration** and **mass**?

27. What is required to accelerate an object?

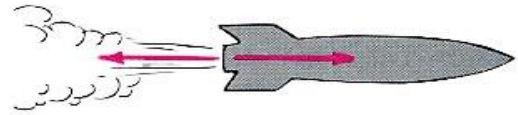
28. What **is terminal velocity** or speed?

29. What is the **net force** acting on an object that has reached terminal velocity? (draw a diagram and label)

30. What is the **acceleration** of an object that has reached terminal velocity?

31. What is **Newton's Third Law**?

32. Label **action** force and **reaction** force in the diagram to the right.



33. How can you compare the two forces in the diagram to the right? How about the acceleration of the gun compared to the bullet? Use $F=ma$ to explain



a. **Forces-**

b. **Accelerations-**

Word Problems: Show all of your work. Remember.....

1. Show what you are given and what you are trying to solve for
2. Show equation by itself
3. Show your work
4. Give answer with correct units

1. A car travels at a constant speed of 12 m/s for 10 seconds. How **far** did it go?

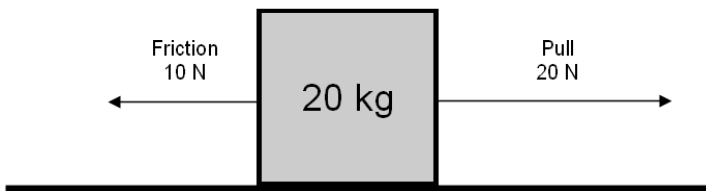
2. How much **time** will it take to walk 400 meters at a constant speed of 2 m/s?

3. You drop an object off the top of a 30 meter tall building. It falls freely and hits the ground 4 seconds later. What is the **average speed** of the object as it fell?

4. You drop a rock off the top of a tall cliff. How **fast** is it traveling 3.5 seconds later?

5. You drop a 4.0 kg rock from a height of 25.0 meters above the ground. How **long** will it take to hit the ground?

6. According to the figure below, what is the **acceleration** of the block?



7. A net force of 80 Newtons is used to push a car about 25 meters. The car's acceleration is 1.0 m/s^2 . What is the **mass** of the car?

8. You kick a 0.4 kg stationary ball with a force of 10 Newtons. What is the **force** on your foot?

9. If you have a weight of -1000 Newtons, and are standing on the ground. What is the **force** that the Earth is pushing back up on you? What is the net force?

Support force =

Net force =

10. A 6.5 kg object is moving with a velocity of 5.0 m/s. What is its **momentum**?

11. What is the **speed** of a 23 kg rock with a momentum of 46 kg•m/s?

12. What is the **mass** of an object that is traveling at 2.0 m/s with a momentum of 250 kg•m/s?

13. When these two freight cars of different mass collide and couple, what will be their resultant **velocity**?

