

Nov. 12

1. Molly is investigating the change in motion of an object. She kicks a soccer ball three different times. Molly changes the force of her kick each time and uses a device to measure the force. The data she collected are shown in the table.

Force of Kick (N)	Distance Traveled (m)
150	31
200	39
270	47

1. Identify the independent variable Force
2. Identify the dependent variable Distance

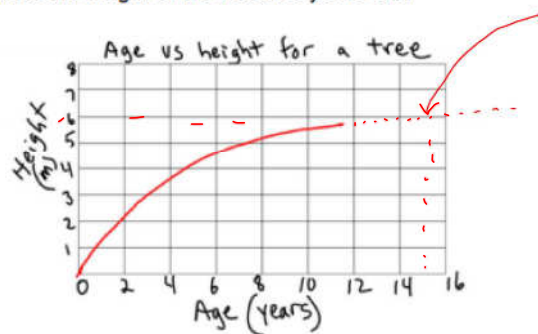
The distance depends on how hard you kick the <sup>(end)</sup> Ball.

3. What would be the height of the tree below when it is 15 years old?

6 m

4. What is the height of the tree at 3 years old?

3 m

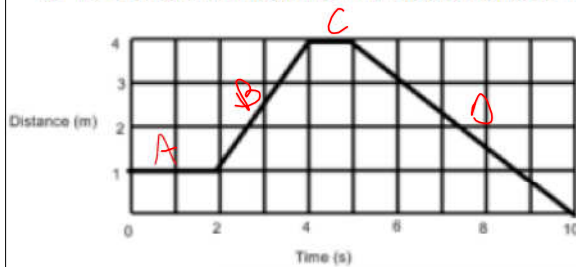


5. What is it called when you predict from **outside** of the measured data set? extrapolation
6. What is it called when you predict from **inside** of the measured data set? Interpolation
7. Why is interpolation considered to be more reliable than extrapolation?

Interpolation is an estimate made between other <sup>Real</sup> points.

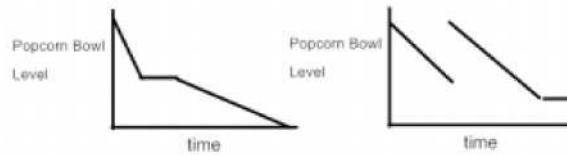
Extrapolation is a prediction and you hope the graph goes the way you predict.

8. Describe the motion of the student that is walking the following graph, like we did in the hall.



- stood still at 1m for 2sec
- moving from 1m to 4m in 2 sec.
- waited at 4m for 1sec.
- walked from 4m back to wall in 5sec

9. What might be happening in the following popcorn graphs?



10. What is the equation for Newton's 2<sup>nd</sup> Law of Motion?

$$A = \frac{F_{net}}{m}$$

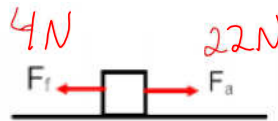
11. Joseph is riding his bicycle and accelerates from being stopped. If the mass that is on the bike doubles, what happens to his acceleration the next time he does this?

$$2 \frac{F}{m} = \frac{A}{2} \quad \text{half}$$

12. Name the following:  $F_a$  Force applied,  $F_f$  Force of friction,  $F_{net}$  net Force

13. What is the acceleration of the box?

$F_a = 22N$     $F_f = 4N$    Mass = 8 kg



$$F_{net} = 18N$$

$$A = \frac{F_{net}}{m} = \frac{18N}{8kg} = 2.25 \frac{m}{s^2}$$

$$N = \frac{kg \cdot m}{s^2} = \frac{kg}{s^2}$$

14. Describe Static Friction

15. Describe Kinetic Friction

16. Why is kinetic friction less than static friction? Rougher  $\rightarrow$  more F  
more pressure - more F

17. What factors affect friction, and how?  
 a. Texture/Roughness    b. Pressure between surfaces  
 c. Types of Materials (Rubber  $\rightarrow$  loads of friction, Glass)

18. How can friction be reduced? a. Decrease pressure    b. smooth surfaces  
 c. change the materials    d. add a lubricant, change to rolling

19. Name four possible Lubricants  
 a. water    b. Grease  
 c. oil    d. WD-40, Teflon

20. How does a bearing reduce friction?  
change sliding friction to rolling friction

21. What is the equation for finding the Force of Friction? (it's so fun).  

$$F_f = \mu N$$

21. What is the equation for finding the Force of Friction? (it's so fun).  $F_f = \mu N$

22. How much friction is there when the coefficient of friction is .34 and the weight is 14 N?  

$$F_f = .34 (14N) = \boxed{4.76 N}$$

23. What is the equation for Acceleration that includes time and velocity?  

$$a = \frac{v_f - v_o}{\Delta t}$$

24. When a car hits a tree, what effect does increasing  $\Delta t$  have on acceleration?

25. Other than  $\Delta t$ , how else could you minimize the acceleration of a car hitting a tree?

26. If your speed increased steadily from 14 mph to 17 mph in the first second, and then from 17 mph to 20 mph in the 2nd second, then what was your acceleration? (with units) \_\_\_\_\_

**Dimensional Analysis** (conversion problems) Show all steps! Include all units!

27. How many cups are in 1.3 gallons? \_\_\_\_\_

28. Convert  $55 \frac{\text{miles}}{\text{Hour}}$  to  $\frac{\text{ft}}{\text{sec}}$  \_\_\_\_\_