Physics 11 – All Concept Review (2018 Curriculum)

Trigonometry Practice

1. The angle of elevation of a summit from the bottom of the ski lift at Snow Bowl is 33^{o}. If a skier rides 1000 m on this lift to the summit, what is the vertical distance between the bottom of the lift and the summit?

2. Jordan's kite has a string 40 m long and is flying 27 m above the spool of string. Find the angle of elevation of the kite.

3. A pendulum 40 cm long is moved 30^{o} from the vertical. How high is the lower end of the pendulum lifted from its starting point?

Velocity and Acceleration

4. How long does it take a car travelling 45 km/h to travel 100 m?

5. How far does a skateboarder travel in 22 seconds if her average velocity is 12 m/s?

6. A shopping cart moves from a point 3 m west of a light post and ends up 18 m east of the light post in 2.5 seconds. Find its average speed.

7. A rally car sets out on a 100 km race. At the halfway point (50 km), her pit crew radios that she has averaged only 80 km/h. How fast must she drive over the remaining distance in order to average 100 km/h for the entire race?

8. A supersonic jet travels once around the earth at an average speed of 1.6×10^{3} km/h. Its orbital radius is 6.5×10^{3} km. How many hours does the trip take?

9. A sprinter starts from a complete stop and reaches a speed of 12 m/s in 4.25 seconds. What is their acceleration?

10. A car starts from a complete stop and accelerates at 15 m/s for 3 seconds. What is its top speed?

11. I f a snowboarder is moving at 8 m/s how long will it take them to reach 36 m/s if their rate of acceleration is 3.5 m/s?

Projectile Motion

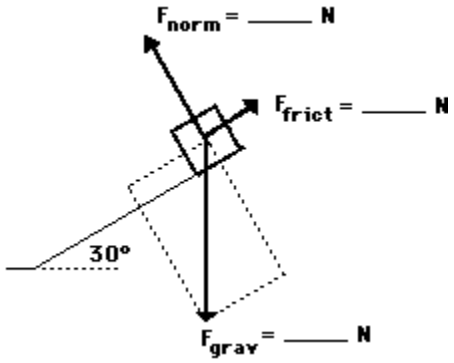
12. A ball is thrown vertically upward. The ball is 3 m above the ground and travelling at 15 m/s the moment it is released. It reaches some maximum height and then falls to the ground.
    a. What is the maximum height above the ground that the ball reaches?
    b. What is the impact velocity of the ball when it hits the ground?
    c. At what time (s) does the ball have a speed of 13 m/s?

13. An object is launched at a velocity of 20 m/s in a direction making an angle of 25° upward with the horizontal.
    a) What is the maximum height reached by the object?
    b) What is the total flight time (between launch and touching the ground) of the object?
    c) What is the horizontal range (maximum x above ground) of the object?
    d) What is the magnitude of the velocity of the object just before it hits the ground?

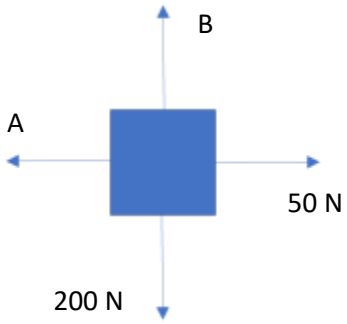
Forces

14. A PSII learner stretches an elastic band with a spring constant of 50.0 N/m by 15 cm. How much force are they applying? (Hooke's Law)

15. A 100 kg box is sliding down a frictional surface at a constant speed of 0.2 m/s. The incline angle is 30^0. Analyze the diagram and fill in the blanks for normal force, friction force, and gravitational force.



16. A free-body diagram is shown below. The net force is known. However, the magnitudes of two of the forces are not known. Analyze the situation and determine the magnitude of the missing forces, A and B.



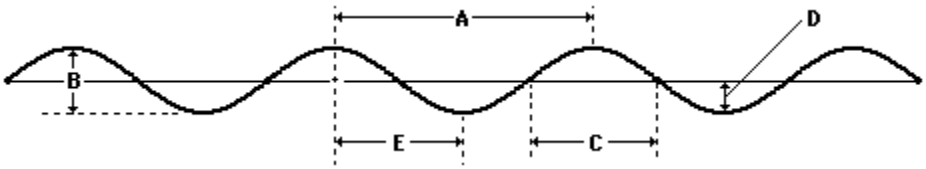
F_{NET} = 0 N

17. The Batmobile exerts a force of 8.5 x 10^3 N east, while friction pulls back on it with a force of 1500 N. If it has a mass of 1250 kg, what is its acceleration?

18. a. What is your mass (kg)?
    b. What is your weight on the moon? (F=ma)
    c. What is your weight on Jupiter?

Waves

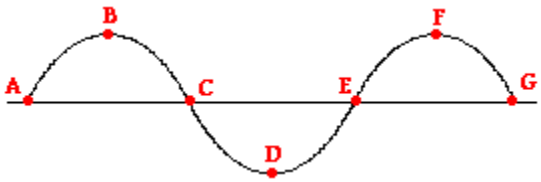
19. Consider the diagram below in order to answer questions a and b.



a. The wavelength of the wave in the diagram above is given by letter _____.

b. The amplitude of the wave in the diagram above is given by letter _____.

20. Indicate the interval that represents one full wavelength.



a. A to C
b. B to D
c. A to G
d. C to G

Work, Energy, Power

21. Rank these four objects in increasing order of potential energy, beginning with the smallest.

Object A	Object B	Object C	Object D
m = 5.0 kg	m = 10.0 kg	m = 1.0 kg	m = 5.0 kg
v = 4.0 m/s	v = 2.0 m/s	v = 5.0 m/s	v = 2.0 m/s
h = 2.0 m	h = 3.00 m	h = 5.0 m	h = 4.0 m

22. Before beginning its initial descent, a roller coaster car is always pulled up the first hill to a high initial height. Work is done on the car (usually by a chain) to achieve this initial height. A coaster designer is considering three different incline angles at which to drag the 2000-kg car train to the top of the 60-meter high hill. In each case, the force applied to the car will be applied parallel to the hill. Her critical question is: <u>which angle would require the most work?</u> Analyze the data, determine the work done in each case, and answer this critical question.

	Angle	Force	Distance	Work (J)
a.	35 deg	1.12×10^4 N	105 m	
b.	45 deg	1.39×10^4 N	84.9 m	
c.	55 deg	1.61×10^4 N	73.2 m	

23. Two physics students, Kennadie and Josh, are lifting weights at home during the social distancing phase of the COVID 19 pandemic. Josh lifts the 100 kg barbell in a bench press 10 times in one minute; Kennadie lifts the 100 kg barbell in a bench press 10 times in 20 seconds.

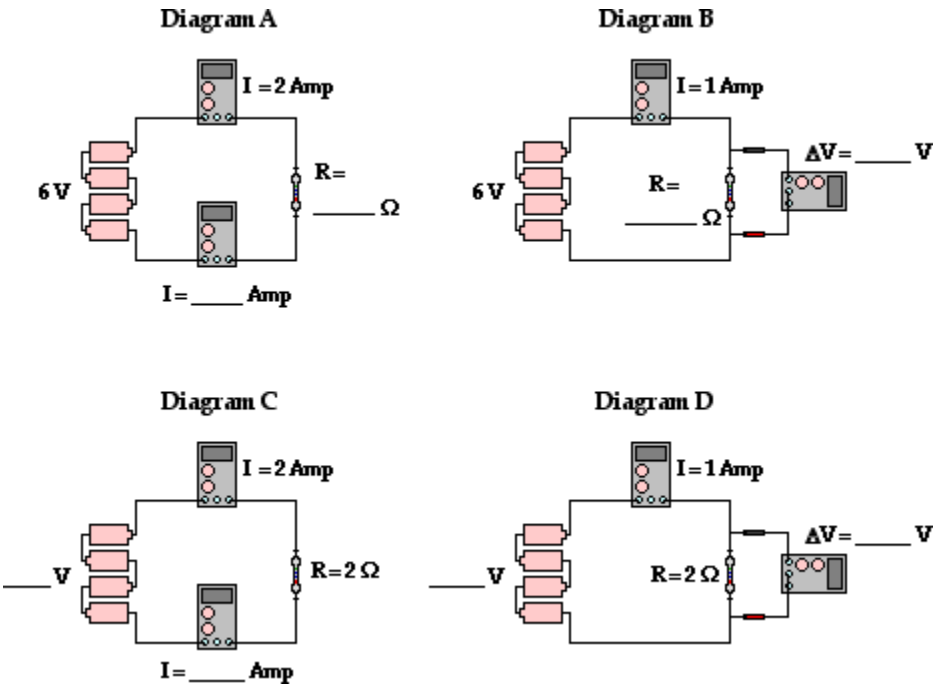
    Which student does the most work? _____

    Which student delivers the most power? _____

    Explain.

Electric circuits

24. Use the Ohm's law equation to determine the missing values in the following circuits.



Graphing

#. Create a displacement vs. time graph for some real or fictional data.

a. What is the slope of the best fit line? (slope = rise/run)
b. What is this slope measuring?