Name _____ Period ____ February 7, 2022

Force PhET Simulation

Open PhET.colorado.edu. From the "Simulations" dropdown, select "Forces and Motion: Basics." Select "Net Force." Select "Sum of Forces," "Values," and "Speed" in the box at top, right. Answer the questions and fill in the table.

Speed = $\frac{distance}{time}$ Time = distance ÷ speed Distance = speed × time

Momentum = mass × speed Acceleration = $\frac{final\ speed - begin\ speed}{time}$ Force = mass × acceleration

_____ 1. With what force does the large figure pull?

_____ 2. With what force does the medium-sized figure pull?

_____ 3. With what force does the small figure pull?

_____ 4. What is the sum of the forces when one large figure is pulling against one large red figure?

_____ 5. What is the sum of the forces when one large blue figure is pulling against one large red figure?

_____ 6. What is the sum of the forces when one large blue figure is pulling against the large and the medium red figures? (Give magnitude and direction.)

_____ 7. What is the sum of the forces when one medium blue figure is pulling against the two small red figures? (Give magnitude and direction.)

Motion: Along the bottom of the page, select "Motion." Select "Forces," "Values," "Masses," and "Speed" in the box at top, right.

_____ 8. What is the mass of the wooden crate on the wheeled car on the tracks? (Enter in the table below.)

_____ 9. What is the speed of the wheeled car and one crate if pushed with 50 N of force for five seconds? (Enter in the table below.)

_____ 10. What is the speed of the wheeled car and one crate if pushed with 50 N of force for ten seconds? (Enter in the table below.)

_____ 11. What is the speed of the wheeled car and one crate if pushed with 50 N of force for fifteen seconds? (Enter in the table below.)

_____ 12. What is the speed of the wheeled car and two crates if pushed with 50 N of force for five seconds? (Enter in the table below.)

_____ 13. What is the speed of the wheeled car and two crates if pushed with 50 N of force for ten seconds? (Enter in the table below.)

_____ 14. What is the speed of the wheeled car and two crates if pushed with 50 N of force for fifteen seconds? (Enter in the table below.)

_____ 15. What is the speed of the wheeled car and two crates if pushed with 100 N of force for ten seconds? (Enter in the table below.)

_____ 16. What is the speed of the wheeled car and two crates if pushed with 150 N of force for ten seconds? (Enter in the table below.)

_____ 17. What is the speed of the wheeled car and two crates if pushed with 200 N of force for ten seconds? (Enter in the table below.)

_____ 18. What is the speed of the wheeled car and two crates if pushed with 250 N of force for ten seconds? (Enter in the table below.)

_____ 19. What is the speed of the wheeled car and the refrigerator if pushed with 50 N of force for ten seconds? (Enter in the table below.)

_____ 20. What is the speed of the wheeled car and the little girl if pushed with 50 N of force for ten seconds? (Enter in the table below.)

_____ 21. What is the speed of the wheeled car and the man if pushed with 50 N of force for ten seconds? (Enter in the table below.)

_____ 22. What is the speed of the wheeled car and the trash can if pushed with 50 N of force for ten seconds? (Enter in the table below.)

_____ 23. What is the speed of the wheeled car and the unknown wrapped present if pushed with 50 N of force for ten seconds? (Enter in the table below.)

Object	Mass	Force Exerted	Time of Force	$Speed_{begin}$	$Speed_{final}$	Acceleration
Crate		50 N	5 sec			
Crate		50 N	10 sec			
Crate		50 N	15 sec			
2 crates		50 N	5 sec			
2 crates		50 N	10 sec			
2 crates		50 N	15 sec			
2 crates		100 N	10 sec			
2 crates		150 N	10 sec			
2 crates		200 N	10 sec			
2 crates		250 N	10 sec			
Girl		100 N	10 sec			
Man		100 N	10 sec			
Trash can		100 N	10 sec			
Wrapped		100 N	10 sec			

_____ 24. Estimate the mass of the unknown wrapped present based upon its acceleration - comparing it to the knowns.

Friction: Along the bottom of the page, select "Friction." Select "Forces," "Sum of Forces," "Values," "Masses," and "Speed" in the box at top, right. Notice the crate no longer has wheels. Leave the friction slider where it starts, in the middle.

Object	Mass	Force Exerted	Force of Friction	Net Force	$Speed_b$	$Speed_f$	Time	$\vec{a}$
Crate		150 N					10 sec	
2 Crates		300 N					10 sec	
Refriger		500 N					10 sec	
Girl		150 N					10 sec	
Man		250 N					10 sec	
Trash		300 N					10 sec	
Unknown		150 N					10 sec	

Acceleration: Along the bottom of the page, select "Acceleration." Select "Forces," "Sum of Forces," "Values," "Masses," "Speed," and "Acceleration." Adjust the friction slider to "None."

Object	Mass	Force Exerted	$Speed_b$	$Speed_f$	Time	$\vec{a}$
Crate		100 N			10 sec	
2 Crates		100 N			10 sec	
Refriger		100 N			10 sec	
Girl		100 N			10 sec	
Man		100 N			10 sec	
Water		100 N			10 sec	