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FULL NAME .... DUE DATE ....

SCIENCE CLASS .... TEACHER ....

Combined Sciences: Physics Homework/Extension Sheet T2pt1.5

1. Newton's 3rd Law of motion states that...

(1 mark)

☐ **A:** The force required to cause acceleration is proportional to mass

☐ **B:** For every action there is an equal and opposite reaction

☐ **C:** Resultant forces cause acceleration

☐ **D:** Objects at rest remain at rest

2. What is the mass of an object that has a weight of 100 N on Earth?
gravitational field strength = 10 N/kg

(1 mark)

☐ **A:** 10 kg

☐ **B:** 1000 kg

☐ **C:** 0.01 kg

☐ **D:** 100 g

3. What resultant force would be required to accelerate a 1.5 kg ball by 3.4 m/s^2?

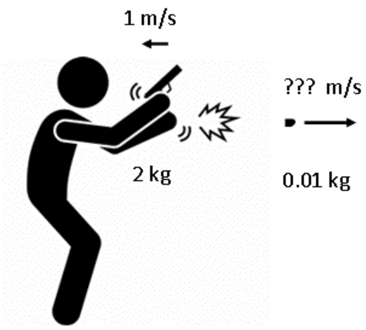
(1 mark)

☐ **A:** 4.90 N

☐ **B:** 2.26 N

☐ **C:** 0.44 N

☐ **D:** 5.10 N



4. A handgun and bullet are stationary inside a person's hands.
When the trigger is squeezed a 0.01 kg bullet exits the barrel and the handgun recoils with a velocity of 1 m/s.
The mass of the handgun is 2 kg.
(i) Calculate the momentum of the handgun

(2 marks)

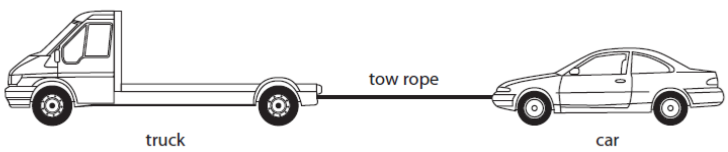
momentum of the handgun = ... kgm/s

(ii) Use the law of conservation of momentum to calculate what the velocity of the bullet must be as it exits the barrel of the gun.

(3 marks)

velocity of the bullet = ... m/s

5. A tow rope is attached between a truck and a stationary car. The car has a weight of 15 000 N. The tow rope can withstand a tension of 10 000 N before breaking.



Discuss whether this rope could be strong enough to tow the car with the truck.

(2 marks)

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	distance travelled = average speed × time	
	acceleration = change in velocity ÷ time taken	$a = \frac{(v-u)}{t}$
	force = mass × acceleration	$F = m \times a$
	weight = mass × gravitational field strength	$W = m \times g$
HT	**momentum = mass × velocity**	$\boldsymbol{p = m \times v}$
	change in gravitational potential energy = mass × gravitational field strength × change in vertical height	$\Delta GPE = m \times g \times \Delta h$
	kinetic energy = 1/2 × mass × (speed)^2	$KE = \frac{1}{2} \times m \times v^2$
	efficiency = $\frac{(\text{useful energy transferred by the device})}{(\text{total energy supplied to the device})}$	
	wave speed = frequency × wavelength	$v = f \times \lambda$
	wave speed = distance ÷ time	$v = \frac{x}{t}$
	work done = force × distance moved in the direction of the force	$E = F \times d$
	power = work done ÷ time taken	$P = \frac{E}{t}$
	energy transferred = charge moved × potential difference	$E = Q \times V$
	charge = current × time	$Q = I \times t$
	potential difference = current × resistance	$V = I \times R$
	power = energy transferred ÷ time taken	$P = \frac{E}{t}$
	electrical power = current × potential difference	$P = I \times V$
	electrical power = (current)^2 × resistance	$P = I^2 \times R$
	density = mass ÷ volume	$\rho = \frac{m}{V}$

	force exerted on a spring = spring constant × extension	$F = k \times x$
	(final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance	$v^2 - u^2 = 2 \times a \times x$
HT	**force = change in momentum ÷ time**	$\boldsymbol{F = \frac{(mv - mu)}{t}}$
	energy transferred = current × potential difference × time	$E = I \times V \times t$
HT	**force on a conductor at right angles to a magnetic field carrying a current = magnetic flux density × current × length**	$\boldsymbol{F = B \times I \times l}$
	For transformers with 100% efficiency, potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil	$V_P \times I_P = V_S \times I_S$
	change in thermal energy = mass × specific heat capacity × change in temperature	$\Delta Q = m \times c \times \Delta\theta$
	thermal energy for a change of state = mass × specific latent heat	$Q = m \times L$
	energy transferred in stretching = 0.5 × spring constant × (extension)^2	$E = \frac{1}{2} \times k \times x^2$

Metric prefixes

how to convert	abbreviation	prefix
x 1000 ↓	**T**	tera-
x 1000 ↓	**G**	giga-
x 1000 ↓	**M**	mega-
x 1000 ↓	**k**	kilo-
	no prefix	
÷ 1000 ↑	**m**	milli-
÷ 1000 ↑	**µ**	micro-
÷ 1000 ↑	**n**	nano-
÷ 1000 ↑	**p**	pico-

Time

how to convert	abbreviation	Unit of time
x 7 ↓	**wk**	week
x 24 ↓	**d**	day
x 60 ↓	**h or hr**	hour
x 60 ↓	**min**	minute
	s, seconds	
÷ 1000 ↑	**ms**	millisecond
÷ 1000 ↑	**µs**	microsecond
÷ 1000 ↑	**ns**	nanosecond
÷ 1000 ↑	**ps**	picosecond