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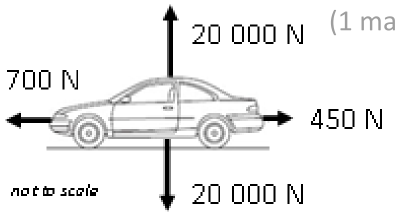
FULL NAME .... DUE DATE ....

SCIENCE CLASS .... TEACHER ....

Combined Sciences: Physics Homework/Extension Sheet T2pt1.4

1. What is the resultant force acting on the car shown in the diagram?

(1 mark)



- ☐ **A:** 1150 N left
- ☐ **B:** 250 N left
- ☐ **C:** 250 N right
- ☐ **D:** 1150 N right

2. What force is required to accelerate a 10 kg mass by 1.5 m/s²?

(2 marks)

- ☐ **A:** 6.7 N
- ☐ **B:** 8.5 N
- ☐ **C:** 0.15 N
- ☐ **D:** 15 N

3. A speed of 15 km/s is the same as which of these?

(1 mark)

- ☐ **A:** 150 m/s
- ☐ **B:** 15000 m/s
- ☐ **C:** 0.15 m/s
- ☐ **D:** 0.0015 m/s

4. (a) An apple with a mass of 150 g is being pulled towards the centre of the Earth due to gravity.
Calculate the force pulling the apple downwards.

use $W = m \times g$

gravitational field strength at the surface of the Earth = 10 N/kg

Force pulling the apple downwards = ... N

(b) When Neil Armstrong walked on the Moon in 1969 his total mass, including spacesuit, was 158 kg.
When Neil Armstrong walked on the Moon his weight pressing down on the surface was 254 N.
Use this information to calculate the gravitational field strength at the surface of the Moon.
Give your answer to two significant figures.

(2 marks)

gravitational field strength on the Moon = ... N/kg

5. A student gets angry and punches a wall as hard as they can.
Their fist exerts a force of 2500 N pushing the wall right.
Use Newton's 3rd law of motion to explain why the student's hand gets injured.

(3 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 × $(\text{speed})^2$	$KE = \frac{1}{2} \times m \times v^2$
	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 = $(\text{current})^2$ × resistance	$P = I^2 \times R$
	density = mass ÷ volume	$\rho = \frac{m}{V}$

	force exerted on a spring = spring constant × extension	$F = k \times x$
	$(\text{final velocity})^2 - (\text{initial velocity})^2$ = 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 × $(\text{extension})^2$	$E = \frac{1}{2} \times k \times x^2$

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