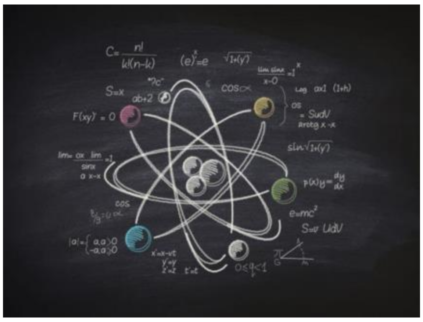
Physics core essential knowledge for the Year 10 internal assessment

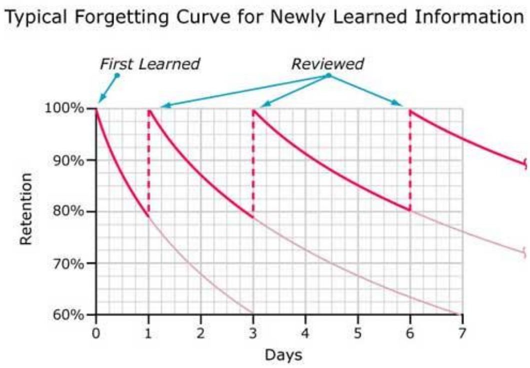


Student name: ____________________ Class: ______________

<u>Science code of success</u>

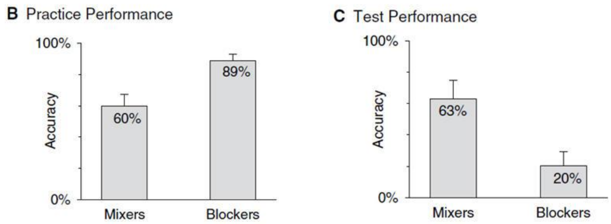
In order to be successful, we need to work together and support each other. The code of success is designed to share with you the things that need to happen for you to be successful. Success is not based on intelligence. Success is based on hard work, practice and repetition, learning from mistakes and a desire to be the best you can.

Core knowledge is a crucial part of your science studies. Students that have a good recall of their core knowledge have a greater chance of success in science.
This booklet contains the core knowledge that you must learn during the next two years of your studies. There is also a Carousel Learning study Pack that you can use to practice your core knowledge.



To help students learning and remember these facts the following strategies are recommended:
a) *Regular quizzing* - Three 15-20 minute sessions a week would help greatly.
b) *Spacing* – leaving time between each sessions will allow students to forget information. This forgetting and relearning strengthens the recall of information.

c) *Interleaving* – cover a different topic in each revision session helps to strengthen a student's memory of the core knowledge.



Parents/carers if you are able to support your child with the learning of this material then that is a great help. You can quiz them by asking them the questions within the book. The answers have been included to support the use of this booklet.
Remember that your success in science is your responsibility. Your success will be based on how hard you work.

Topic	Sub-topics & BBC Bitesize links	
T2: Forces and motion	Vector & scalar quantities	Motion BBC Bitesize sample exam questions
	Speed calculation	Newton's second law, F=ma
	Calculating acceleration	
	Resultant forces	Velocity-time graphs
	F=ma core practical	Miss Mac video
T3: Conservation of Energy	Energy stores	BBC Bitesize sample exam questions Energy
	Waste energy & efficiency	
	Gravitational Potential Energy and Kinetic energy calculations	
T4: Waves	Wave types	Waves BBC Bitesize sample exam questions
	Waves core practical	Miss Mac video

Essential core knowledge questions for the year 10 Easter exam

All these questions are available as a study pack on Carousel Learning. You can follow the link on the Year 10 page of Google Classroom or follow the QR code here, but you need to be logged into your ALF account to be able to do that. Once you are in Carousel Learning all you need to do is enter your name and you can start practicing straight away.

#	QUESTION	ANSWER
1	What does 'give your answer to two significant figures' mean?	Round the final answer up or down so that you are only writing down two numerals, ignoring any zeros that come at the front. (e.g. 20, 37 and 0.0054)
2	What does 'give your answer to an appropriate number of significant figures' mean?	Round the final answer up or down so that you are writing down the same number of numerals as the value used in your calculation that had the fewest numerals. (e.g. 30.77 ÷ 12 = 2.6 because '12' was written to two significant figures.)
3	What does 'give your answer to two decimal places' mean?	Round the final answer up or down so that there are exactly two numerals written after the decimal point. (e.g. 20.22, 37.00 and 0.01)
4	Put these prefixes for values smaller than 1 in order from largest to smallest: micro (μ), milli (m), nano (n)	milli (m) is 1000x bigger than micro (μ) which is 1000x bigger than nano (n)
5	Put these prefixes for values larger than 1 in order from smallest to largest: kilo (k), giga (G), mega (M), tera (T).	kilo (k) is 1000x smaller than mega (M) which is 1000x smaller than giga (G) which is 1000x smaller than tera (T)
6	State the phrase that describes the relationship between two variables if they make a straight line on a graph when plotted against each other.	Directly proportional accept They have a doubling relationship
7	State the name given to the variable in an investigation that is changed or allowed to change so that its effect on another variable can be investigated.	the Independent variable
8	State the name given to the variable in an investigation that is measured to see if it is affected by changes in another variable.	the Dependent variable
9	State the name given to the variables in an investigation that are kept the same each time to make sure that they could not be causing any changes in the results.	Control variables
10	State the equation that shows the relationship between distance, time and speed.	s = d ÷ t or speed = distance ÷ time
11	Which measurement has the standard unit m?	distance accept d accept displacement or x, accept wavelength or λ, accept change in height or Δh
12	Which measurement has the standard unit s?	time accept t
13	Which measurement has the standard unit m/s?	velocity accept v or u accept speed or s accept wavespeed
14	How many seconds (s) are in one minute (min)?	60 seconds per minute
15	How many minutes (s) are in one hour (h)?	60 minutes per hour
16	How many metres (m) are in one kilometre (km)?	1000 metres per kilometre accept 1×10^3

17	What is a typical speed for a walking person?	1.4 m/s (on average)
18	What is a typical speed for a cyclist?	6 m/s (on average)
19	What is a typical speed for a car in a built up area (such as outside a school)?	10.5 m/s (on average)
20	What is a typical speed for a car on a motorway?	31 m/s (on average)
21	How is a vector quantity different from a scalar quantity?	vectors include direction as well as magnitude (scalar only has magnitude)
22	What does 'magnitude' mean?	How big something is.
23	How is displacement different from distance?	Displacement is a measure of the straight-line distance from a start point and end point. Displacement is a vector (it includes direction and can be negative)
24	How is velocity different from distance?	Velocity is a measure of speed relative to a stated direction. Velocity is a vector (it includes direction and can be negative)
25	Which measurement has the standard unit m/s^2?	Acceleration accept a
26	State the equation that shows the relationship between changes in velocity, time and acceleration.	**a = (v - u) ÷ t** **or (final velocity - initial velocity) ÷ time** **or change in velocity ÷ time**
27	Which measurement has the standard unit N?	**Force** **accept F** **also accept weight or W**
28	What does 'resultant force' mean?	A single force that describes the outcome of multiple forces acting on an object. (e.g. 200 N acting left and 150 N acting right would mean a resultant force of 50 N acting left)
29	How must the forces acting on an object compare to cause an object to be not accelerating/moving at constant velocity.	(forces must be) balanced. or resultant force must be zero.
30	How must the forces acting on an object compare to cause an object to be accelerating/changing velocity.	(forces must be) unbalanced. or resultant force must be larger than zero.
31	What does Newton's first law of motion state	The velocity of an object will only change if there is a resultant force acting on it.
32	State the equation that shows the relationship between gravitational field strength, mass and weight.	W = m x g or weight = mass x gravitational field strength accept 'gravity' in place of gravitational field strength
33	State the standard unit for weight.	N or Newtons
34	Which measurement has the standard unit N/kg?	Gravitational field strength accept g
35	State the value for gravitational field strength at the surface of the Earth.	10 N/kg or m/s^2
36	How many grams (g) are in one kilogram (kg)?	1000 grams per kilogram accept 1×10^3
37	State the equation that shows the relationship between mass, force and acceleration.	F = m × a Force (N) = mass (kg) x acceleration (m/s^2)
38	What does Newton's second law of motion state?	The acceleration of an object increases if the resultant force on it increases, and decreases if the mass of the object increases. accept F = m × a accept F = (mv - mu) ÷ t
39	In what situation would a scientist use a computerised method, such as a light gate, to measure time rather than a stopwatch?	If the time being measured was close to or smaller than human reaction time (roughly 0.25 s)
40	In an investigation involving a trolley moving down a ramp, what is the most likely reason for tilting the ramp?	To compensate for friction. accept So that weight balances friction. DO NOT ACCEPT to get rid of friction.

41	In an investigation involving a trolley being pulled down a ramp by hanging masses, what is the most likely reason for masses being moved from the hook to the trolley (or vice versa)?	To keep the total mass of the system constant (while changing the force pulling the trolley)
42	Convert 5 minutes into seconds.	300 s
43	Convert 5500 m into km	5.5 km
44	Convert 30.5 km into metres.	30 500 m
45	If a ball takes 3 s to fly 9 m, what was the average speed of the ball?	3 s is t 9 m is d s = d ÷ t s = 9 ÷ 3 s = 3 m/s
46	What is the equation for calculating distance using time and speed?	d = s x t or distance = speed x time
47	How far will a bee fly in 40 seconds if its average speed is 6.7 m/s?	40 s is t 6.7 m/s is s s = d ÷ t 6.7 = d ÷ 40 6.7 x 40 = d = 268 m
48	The average speed of a car on a motorway is 31 m/s. How long will it take the car to travel 50 m? Give your answer to three significant figures.	31 m/s is s 50 m is d s = d ÷ t 31 = 50 ÷ t 31 x t = 50 t = 50 ÷ 31 = 1.61 s
49	A trolley is set up so that on top of it is a 12 cm long card that will interrupt the beam of light in a light gate when the trolley passes underneath. What is the speed of the trolley if the light gate measures that it takes 0.48 s for this to happen?	12 cm ÷ 100 = 0.12 m is d 0.48 s is t s = d ÷ t s = 0.12 ÷ 0.48 s = 0.25 m/s
50	Calculate the acceleration of a car that takes 8 seconds to go from 10 m/s to 26 m/s.	8 s is t 10 m/s is u 26 m/s is v a = (v - u) ÷ t a = (26 - 10) ÷ 8 = 2 m/s²
51	Calculate the change in velocity over 5 seconds for a rocket accelerating away from the earth at 20 m/s².	5 s is t 20 m/s² is a a = (v - u) ÷ t 20 = (v - u) ÷ 5 20 x 5 = (v - u) = 100 m/s
52	A cyclist was travelling at 6 m/s as they approached some traffic lights. 5 seconds later they were stopped at the light. Calculate the acceleration of the cyclist.	6 m/s is u stopped = 0 m/s is v 5 s is t a = (v - u) ÷ t a = (0 - 6) ÷ 5 = -1.2 m/s²
53	A formula 1 car sets off from the starting grid with a constant acceleration of 10.3 m/s². How long will it be until the car is travelling at 26 m/s? Give your answer to 3 significant figures.	sets off from starting grid = 0 m/s is u 10.3 m/s² is a 26 m/s is v a = (v - u) ÷ t 10.3 = (26 - 0) ÷ t 10.3 x t = 26 t = 26 ÷ 10.3 = 2.52 s
54	One of the peregrine falcons that lives in Norwich cathedral is flying towards the ground at 8 m/s when it closes its wings and goes in to a dive. It experiences a constant acceleration of 10 m/s². How fast will it be travelling after 2.5 seconds?	8 m/s is u 10 m/s² is a 2.5 s is t a = (v - u) ÷ t 10 = (v - 8) ÷ 2.5 10 x 2.5 = v - 8 25 = v - 8 25 + 8 = v = 33 m/s

55	A trolley with a 10 cm wide interrupt card attached to the top is pulled through two light gates. It passes through the first light gate with a velocity of 0.6 m/s and through the second with a velocity of 1.3 m/s. The card took 0.48 s to travel between the gates. What was the average acceleration of the trolley?	(10 cm is d but we don't need that) 0.6 m/s is u 1.3 m/s is v 0.48 s is t $a = (v - u) \div t$ $a = (1.3 - 0.6) \div 0.48$ $a = 0.7 \div 0.48 = 1.46$ m/s^2
56	At the start of a race a car generates a thrust of 250 N. The car experiences friction of 10 N and air resistance of 90 N. Calculate the resultant force acting on the car.	250 - (10 + 90) = 150 N
57	Five seconds after accelerating off the start line of a race, the resistive forces acting on a car become equal to the forward thrust. Explain what happens to the velocity of the car.	velocity is constant. because there is no resultant force to cause acceleration.
58	A box is sat stationary on a table. Describe the action and reaction forces acting on the box.	action is the weight of the box. reaction is the upwards push of the table top against the box.
59	Convert 250 g into kg	250 ÷ 1000 = 0.25 kg
60	Convert 1500 g into kg	1500 ÷ 1000 = 1.5 kg
61	What force is required to accelerate a mass of 30 kg to 5 m/s^2?	30 kg is m 5 m/s^2 is a F = m x a F = 30 x 5 = 150 F = 150 N
62	What force is required to accelerate a mass of 30 g to 5 m/s^2?	30 g ÷ 1000 = 0.03 g is m 5 m/s^2 is a F = m x a F = 0.03 x 5 = 0.15 F = 0.15 N
63	What force is required to slow down a car that weighs 2000 kg at a rate of -15 m/s^2?	2000 kg is m -15 m/s^2 is a F = m x a F = 2000 x -15 = -30 000 F =30 000 N
64	A firework rocket with a mass of 25 g launches due to a resultant force of 1.5 N. What was its acceleration?	25 g ÷ 1000 = 0.025 kg is m 1.5 N is F F = m x a 1.5 = 0.025 x a divide both sides of the equation by 0.025... 1.5 ÷ 0.025 = a = 60 a = 60 m/s^2
65	A firework rocket with a mass of 15 g launches due to a resultant force of 0.5 N. What was its acceleration?	15 g ÷ 1000 = 0.015 kg is m 0.5 N is F F = m x a 0.5 = 0.015 x a divide both sides of the equation by 0.015... 0.5 ÷ 0.015 = a = 33.3333333 a = 33.3 m/s^2
66	A firework rocket accelerates at a rate of 40 m/s^2 when a resultant force of 1.2 N is applied to it. What is the mass of the rocket?	40 m/s^2 is a 1.2 N is F F = m x a 1.2 = m x 40 divide both sides of the equation by 40... 1.2 ÷ 40 = m = 0.03 m = 0.03 kg or 30 g
67	Describe the motion of an object when a distance-time graph is a straight line.	Constant velocity accept not accelerating
68	Describe the motion of an object when a distance-time graph is a flat horizontal line.	Stationary accept constant velocity of 0 m/s

69	Describe the motion of an object when a distance-time graph is a curved line.	Changing velocity accept accelerating
70	Describe how to calculate the gradient of a straight line on a graph.	• Mark two points anywhere on the line. • Find the values on the Y (vertical axis) and X (horizontal axis) that line up with each point. • Calculate difference between Y values of the first and second points. • Calculate difference between X values of the first and second points. • Gradient = change in Y values ÷ change in X values. accept gradient = $\Delta y \div \Delta x$
71	Describe how to calculate the velocity of an object from its distance-time graph.	Calculate the gradient (of the line)
72	Describe the motion of an object when a velocity-time graph is a straight line.	Changing velocity accept accelerating
73	Describe the motion of an object when a distance-time graph is a flat horizontal line.	Constant velocity accept not accelerating
74	Describe how to calculate the acceleration of an object from its velocity-time graph.	Calculate the gradient (of the line)
75	Describe how to calculate the distance travelled by an object from its velocity-time graph.	Calculate the area under the graph
76	State the equation that shows the relationship between distance, acceleration, initial velocity and final velocity.	$v^2 - u^2 = 2 \times a \times x$ accept final velocity squared (m/s) - initial velocity squared (m/s) = 2 × acceleration (m/s^2) × distance (m)
77	An athlete accelerates from the start line of a 100 m race at a constant rate of 0.9 m/s^2. Calculate the velocity of the athlete when they are 40 m from the start line.	0.9 m/s^2 is acceleration 40 m is displacement starting velocity was 0 m/s $v^2 - u^2 = 2 \times a \times x$ $v^2 - 0^2 = 2 \times 0.9 \times 40$ $v^2 = 72$ $v = \sqrt{72} = 8.5$ m/s
78	A dog is running at 5 m/s and accelerates at 2 m/s^2 over a distance of 12 m. Calculate the new velocity of the dog.	5 m/s is initial velocity 2 m/s^2 is acceleration 12 m is displacement $v^2 - u^2 = 2 \times a \times x$ $v^2 - 5^2 = 2 \times 2 \times 12$ $v^2 - 25 = 48$ $v^2 = 73$ $v = \sqrt{73} = 8.5$ m/s
79	A cruise ship travels 2500 m in the time taken to accelerate from 1.0 m/s to 6.0 m/s. Calculate the average acceleration of the cruise ship over this time.	2500 m is displacement 1.0 m/s is initial velocity 6.0 m/s is final velocity $v^2 - u^2 = 2 \times a \times x$ $6^2 - 1^2 = 2 \times a \times 2500$ $36 - 1 = 5000 \times a$ $35 \div 5000 = a$ $a = 0.007$ m/s^2 or 7×10^{-3}
80	A bungee jumper waits at the top of a bridge. The jumper accelerates from a speed of 0 m/s to a speed of 30 m/s before the bungee rope slows them. The acceleration of the jumper is 10 m/s^2. Calculate the distance travelled by the bungee jumper while they are accelerating.	0 m/s is intial velocity 30 m/s is final velocity 10 m/s^2 is acceleration $v^2 - u^2 = 2 \times a \times x$ $30^2 - 0^2 = 2 \times 10 \times x$ $900 = 20 \times x$ $900 \div 20 = x$ $x = 45$ m

81	A bungee jumper is falling at a speed of 25 m/s when their bungee rope slows them with a constant deceleration of -11 m/s^2. Calculate the distance travelled by the bungee jumper before the bungee reaches maximum extension.	25 m/s is intial velocity 0 m/s is final velocity (when the bungee is at maximum extension) -11 m/s^2 is acceleration $v^2 - u^2 = 2 \times a \times x$ $0^2 - 25^2 = 2 \times -11 \times x$ $-625 = -22 \times x$ $-625 \div -22 = x$ x = 28 m
82	A rocket starts from rest and accelerates into the sky, reaching a height of 110 m before it starts to slow down. If the maximum velocity of the rocket was 66 m/s, what was its acceleration?	0 m/s is intial velocity (at rest) 110 m is displacement 66 m/s is final velocity $v^2 - u^2 = 2 \times a \times x$ $66^2 - 0^2 = 2 \times a \times 110$ $4356 = 220 \times a$ $4356 \div 220 = a$ a = 19.8 m/s^2
83	Name at least three forms of stored energy	(Any three from...) Kinetic energy (or KE), heat (or thermal or internal), gravitational potential energy (or GPE), chemical, elastic potential, nuclear. Also accept magnetic or electrostatic
84	Name at least two pathways through which energy can be transferred	(Any two from...) • Mechanical/by contact forces causing objects to move • Radiation/by waves (such as light or infrared (thermal) radiation) • Electrical/by electrical current (when there is a potential difference) • Heating/by particles moving (including conduction or the results of chemical reactions or electrical currents)
85	Which measurement has the standard unit J?	Energy accept E accept any named form of energy accept work done
86	What does the law of conservation of energy state?	The total energy before an energy transfer is equal to the total energy after. accept Total input energy = Total output energies accept Energy cannot be created or destroyed
87	Describe the shift between energy stores that happens when an object is is falling towards the Earth.	GPE → KE or gravitational potential energy is transferred to a store of kinetic energy ignore kinetic energy stored in the object is shifted to a store of thermal energy in the air particles they collide with.
88	Describe the shift between energy stores that happens when fuel is burning.	Chemical → thermal or chemical energy is transferred to a store of thermal energy in the fuel and the surroundings ignore thermal energy is dissipated to the surroundings
89	Describe the shift between energy stores that happens when a spring is being stretched.	KE → Elastic potential or kinetic energy is transferred to a store of elastic potential energy ignore kinetic energy stored is shifted to a store of thermal energy in the spring
90	Describe the shift between energy stores that happens when a car's brakes are activated.	KE → Thermal or Kinetic energy stored in the moving car is transferred to a store of thermal energy in the brake disks/pads/brakes ignore thermal energy is dissipated to the surroundings

91	Describe the shift between energy stores that happens when a moving object collides with an obstacle.	KE → Thermal (+ sound) or Kinetic energy stored in the moving object is transferred to a store of thermal energy in the faster moving particles of the object and obstacle ignore thermal energy is dissipated to the surroundings
92	What word, often used to describe thermal energy transfers, means 'spread out into the surroundings'?	dissipated
93	State the equation that shows the relationship between efficiency, total energy supplied to a device and useful energy transferred by the device.	Efficiency = useful ÷ total input
94	Suggest how unwanted energy transfers can be reduced in a device that has lots of moving parts.	Apply oil/lubrication (to reduce friction)
95	State the three ways by which thermal energy transfers.	• Conduction (particles colliding with their neighbours); • Convection (pockets of less dense particles in a fluid floating upwards); • Radiation (as infra-red waves)
96	Describe what affects how quickly thermal energy transfers through the walls of a house.	• Thickness (of the walls) • (thermal conductivity of) The material the walls are made of accept Whether there is an air gap/cavity wall/insulation inside the wall accept Temperature difference between each side of the wall
97	State the equation that shows the relationship between gravitational potential energy/GPE, mass, height and gravitational field strength.	$\Delta GPE = m \times g \times \Delta h$ or (change in) gravitational potential energy (J) = mass (kg) x gravitational field strength (N/kg) x change in height (m)
98	State the equation that shows the relationship between kinetic energy, mass and velocity.	$KE = \frac{1}{2} \times m \times v^2$ or Kinetic energy (J) = 0.5 x mass (kg) x velocity squared (m/s)
99	Convert 20 kJ to J.	20 000
100	Convert 20 J to kJ.	0.02 kJ
101	Describe the shift between energy stores that is happening while a sky diver is falling towards the Earth.	Gravitational potential energy stored in the skydiver is shifted to a store of kinetic energy in the skydiver. accept GPE → KE accept kinetic energy stored in skydiver is shifted to a store of thermal energy in the air particles they collide with.
102	Describe the shift between energy stores that is happening while a lit candle is burning.	Chemical energy stored in the candle is shifted to a store of thermal energy in the candle and the surroundings. accept Chemical → Thermal
103	Describe the shift between energy stores that is happening while the string of a bow is being pulled back to get it ready to shoot an arrow.	Kinetic energy stored in the moving bow is shifted to a store of elastic potential energy in the bow. accept Kinetic → Elastic potential
104	Describe the shift between energy stores that causes a car to slow down when the brake pads are pressed to the brake disks on the car's wheels.	Kinetic energy stored in the moving car is shifted to a store of thermal energy in the brakes (and dissipated to the surroundings). accept Kinetic → Thermal
105	Calculate the efficiency of a lightbulb that transfers 100 J of electrical energy into 90 J of light energy and 10 J of waste thermal energy.	100 J is input 90 J is useful Efficiency = useful ÷ input Efficiency = 90 ÷ 100 = 0.9 or 90 %
106	An electric motor has an efficiency of 67 %. How much useful energy will come out of it if 25 kJ of electrical energy is put in?	67 % = 0.67 is efficiency 25 kJ = 25 000 J is input Efficiency = useful ÷ input 0.67 = useful ÷ 25 000 [x25 000] 0.67 x 25 000 = 16 750 J or 16.75 kJ

107	Calculate the efficiency of a lightbulb if 12 J of heat energy dissipates to the surroundings when 40 J of electrical energy is supplied to it.	12 J is waste energy 40 J is input useful = input - waste = 40 -12 = 28 Efficiency = useful ÷ input Efficiency = 28 ÷ 40 = 0.7 or 70 %
108	If an object with a mass of 25 kg is raised 22 m above the ground how much gravitational potential energy will it gain?	25 kg is mass 22 m is change in height $\Delta GPE = m \times g \times \Delta h$ $\Delta GPE = 25 \times 10 \times 22$ $\Delta GPE = 5500$ J or 5.5 kJ
109	If an object that is raised 22 m above the ground gains 4250 J of gravitational potential energy what is the mass of the object?	22 m is change in height 4250 J is change in GPE $\Delta GPE = m \times g \times \Delta h$ $4250 = m \times 10 \times 22$ $4250 = m \times 220$ $4250 \div 220 = m = 19$ kg
110	An object with a mass of 25 kg gained 10 kJ of gravitational potential energy when it is lifted above the ground. How high was the object lifted?	25 kg is mass 10 kJ x 1000 = 10 000 J is GPE $\Delta GPE = m \times g \times \Delta h$ $10\ 000 = 25 \times 10 \times \Delta h$ $10\ 000 = 250 \times \Delta h$ $10\ 000 \div 250 = \Delta h = 40$ m
111	What is the minimum amount of energy that a 70 kg rock climber will need to use to lift themselves 12 m up the face of a cliff? Give your answer in kJ.	70 kg is mass 12 m is change in height $\Delta GPE = m \times g \times \Delta h$ $\Delta GPE = 70 \times 10 \times 12$ $\Delta GPE = 8400$ J 8400 J ÷ 1000 = 8.4 kJ
112	An amateur golfer hits a 42 g gold ball with their biggest club, accelerating the ball to 51 m/s. Calculate the amount of energy transferred to the ball.	42 g ÷ 1000 = 0.042 kg is mass 51 m/s is velocity $KE = ½ \times m \times v^2$ $KE = ½ \times 0.042 \times 51^2$ KE = 55 J
113	Calculate the mass of a wind turbine blade whose kinetic energy store is 1.2 MJ when it is moving at 6 m/s.	1.2 MJ × 1000 × 1000 = 1 200 000 J is KE 6 m/s is velocity $1\ 200\ 000 = ½ \times m \times 6^2$ $1\ 200\ 000 = 18 \times m$ 1 200 000 ÷ 18 = 67 000 kg (to 2 significant figures)
114	Show that the kinetic energy of a 1500 kg car travelling at 31 m/s is roughly 700 kJ.	1500 kg is mass 31 m/s is velocity $KE = ½ \times m \times v^2$ $KE = ½ \times 1500 \times 31^2$ KE = 720 000 J (to 2 significant figures) 720 000 J ÷ 1000 = 720 kJ
115	The speed of a tennis ball dropped from the roof of the school was measured at 12 m/s just before it hit the floor. If the ball had a mass of 0.06 kg, how much gravitational potential energy did the ball lose at it fell? (ignore the effects of air resistance)	12 m/s is velocity 0.06 kg is mass ΔGPE is equal to gain in KE for a falling object $KE = ½ \times m \times v^2$ $KE = ½ \times 0.06 \times 12^2$ KE = 4.3 J
116	Which of the following can waves transfer? Energy, Matter, Information.	Energy and information
117	Describe how to tell that a wave is a longitudinal wave (as opposed to a transverse wave)	(in a longitudinal wave) oscillations are in the same direction as the wave's travel accept parallel to the wave's travel accept vibrations for oscillations
118	Describe how to tell that a wave is a transvers wave (as opposed to a longitudinal wave)	(in a transverse wave) oscillations are perpendicular to the wave's travel accept 'at right angles' to the wave's travel accept vibrations for oscillations

119	Name an example of a longitudinal wave	**sound** **or seismic P-waves**
120	What is a typical speed for a sound wave in air?	330 m/s (in air)
121	Name at least two examples of transverse waves	water any electromagnetic wave (gamma, xray, ultraviolet, (visible) light, infrared, microwave, radio waves) Seismic S-waves
122	What does 'wavelength (of a wave)' mean?	The distance over which the shape of a wave repeats. accept the distance between two idental parts of a wave. accept peak to peak or trough to trough.
123	What does 'amplitude (of a wave)' mean?	The maximum distance between the top or bottom of a wave and the rest position. accept half the distance from peak to trough. do NOT accept the height of the wave.
124	What does 'frequency (of a wave)' mean?	The number of waves passing a point each second. accept waves per second.
125	What does 'period (of a wave)' mean?	The time it takes for one complete wave to pass a point.
126	Which measurement has the standard unit Hz?	Frequency accept f
127	State the equation that shows the relationship between wavespeed, distance and time.	v = x ÷ t wavespeed (m/s) = distance (m) ÷ time (s)
128	State the equation that shows the relationship between wavespeed, frequency and wavelength.	v = f x λ wavespeed (m/s) = frequency (Hz) x wavelength (m)
129	Describe how to determine the frequency of a water wave.	Start timing. Count the number of waves passing a fixed point. Stop timing and counting at the same time. Divide number of waves counted by time taken.
130	The sound of an explosion travels 850 m in 2.5 seconds. Calculate the velocity of the sound wave.	850 m is distance 2.5 seconds is time v = x ÷ t v = 850 ÷ 2.5 v = 320 m/s
131	The speed of light in a vacuum is 3.0 x 10^8 m/s. If it takes 1.28 s for light to travel from the moon to the Earth, what is the distance between the two? Give your answer in kilometres.	3.0 x 10^8 m/s is wavespeed 1.28 s is time v = x ÷ t 3.0 x 10^8 = x ÷ 1.28 [x 1.28] 3.0 x 10^8 x 1.28 = 384 000 000 m = 384 000 km
132	The wavelength of a sound wave is 0.028 m. If the speed of sound in air is 330 m/s, what is the frequency of the wave? State your answer to two significant figures.	0.028 m is λ 330 m/s is v v = f x λ 330 = f x 0.028 [÷ 0.028] 330 ÷ 0.028 = 12000 Hz or 12 kHz