YEAR 9 PHYSICS WEEK 4 HOMEWORK 2 ANSWER QUESTIONS 1 TO 10 BEHIND YOUR EXERCISE BOOK OR ON THE PAPER ITSELF. TITLE YOUR WORK APPROPRIATELY AND UNDERLINE IT.

1 Some students collect some drops of water from a leaking tap.

The students measure the volume of the water they collect.

State the term for the equipment that is suitable for measuring the volume accurately.

......[1]

2 The diagram shows a coil of wire.



(not to scale)

A student measures the length of the coil using a ruler. His measurement is 3.8 cm.

There are 20 turns of wire in the coil. The student uses his measurement to calculate the average thickness of the wire.

(a) Show that the average thickness of the wire is about 0.2 cm.

	average thickness of wire = cm	[2]
(b)	The student's measurement of 3.8 cm is inaccurate.	
	Suggest one reason why the measurement is inaccurate.	
		[1]
	[Tota	al: 3]

3 Some students observe drops of water falling from a tap that leaks, as shown in the diagram.



The students measure the time for 50 drops to fall from the tap. The time for 50 drops to fall is 20 s.

Calculate the average time between two drops falling.

average time = s [2]

[Total: 2]

4 A student is measuring the time period (the time for one complete oscillation) of a pendulum.

The student uses a stopwatch to measure the time taken for 50 periods of a pendulum. The diagram shows the time taken on the stopwatch.



Calculate the time for one period of the pendulum. Give your answer to 3 significant figures.

time for one period = s [3]

[Total: 3]

5 Four students P, Q, R and S each attempt to measure the time period (the time for one complete oscillation) of a pendulum. The arrows in the diagram show the movements of the pendulum that each student times.



State the student who has chosen the correct movement for one period of a pendulum.

student

[1]

[Total: 1]

6 A device has a light-emitting diode (LED) that flashes briefly at regular intervals.

Describe how to determine accurately the average time for each interval, using a stopwatch.

[4]

[Total: 4]

7 A student uses a stopwatch in a timing experiment.

The diagram shows the stopwatch readings.



Calculate the time interval between the two readings.

time interval = s [2]

[Total: 2]

8 A student measures the displacement of a pendulum bob from its rest position. The displacement is 16.5 cm, as shown in the diagram.



State the displacement in millimetres.

displacement = mm [1]

[Total: 1]

9 The diagram shows the top view of a rectangular paddling pool of constant depth. The pool is filled with sea water.



State a suitable instrument for measuring the dimensions given in the diagram.

......[1]

[Total: 1]

10 The diagram shows the top view of a rectangular paddling pool of constant depth. The pool is filled with sea water.



(a) The volume of the sea water in the pool is 264 m^3 .

Calculate the depth of the pool.

depth =[3]

(b) The mass of the sea water in the pool is 2.70×10^5 kg.

Calculate the density of the sea water. Give your answer to 3 significant figures.

(c) Calculate the pressure due to the sea water at the bottom of the pool.

[Total: 7]

YEAR 9 PHYSICS WEEK 4 WEEKEND ASSIGNMENT ANSWER QUESTIONS 11 TO 40 BEHIND YOUR EXERCISE BOOK OR ON THE PAPER ITSELF. TITLE YOUR WORK APPROPRIATELY AND UNDERLINE IT.

11 The diagrams show a wheelbarrow and the dimensions of its wheel.



Complete the table to show the diameter of the wheel and axle in metres.

	measurement	measurement in metres
diameter of wheel	35 cm	
diameter of axle	25 mm	

[Total: 2]

- **12** A bottle contains some oil.
 - (a) The mass of the oil and the bottle is 678 g. The mass of the empty bottle is 318 g.

Calculate the mass of the oil.

mass = g [1]

(b) Some of the oil from (a) is poured into measuring cylinder A. The rest of the oil is poured into measuring cylinder B, as shown in the diagram.



(i) State the volume of oil in measuring cylinder B, as shown in the diagram.

volume = cm³ [1]

(ii) Calculate the total volume of oil.

volume = cm³ [1]

(iii) Calculate the density of the oil.

density =g/cm³ [3]

[Total: 6]

13 The diagram shows a simple pendulum swinging backwards and forwards between P and Q. One complete oscillation of the pendulum is when the bob swings from P to Q and then back to P.



A student starts two stopwatches at the same time while the pendulum bob is swinging.

The student stops one stopwatch when the pendulum bob is at P. He stops the other stopwatch when the pendulum bob next is at Q.

The diagram shows the readings on the stopwatches.



(a) Use the readings on the two stopwatches to determine the time for one complete oscillation of the pendulum.

time = s [2]

(b) The method used by the student does not give an accurate value for one complete oscillation of the pendulum.

Describe how the student could obtain an accurate value for one complete oscillation of the pendulum.

14 A load is attached to a spring, as shown in the diagram. Two arrows indicate the vertical forces acting on the load. The spring and the load are stationary.



State the name of the force acting vertically downwards.

[1	1]	l
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[Total: 1]

[Total: 6]

15 The diagram shows a large tank containing water. The tank leaks. Drops of water fall from the tank. The drops hit the ground at a regular rate.



(a) A student measures the time interval between two drops of water hitting the ground. She uses a stopwatch and repeats the procedure three times. The diagram shows each stopwatch reading.



On the line below each stopwatch, state the time readings shown, in seconds. [1]

(b) Calculate the average time interval between two drops of water hitting the ground.

average time = s [2]

[Total: 3]

16 A long spring is fixed at one end, as shown in the diagram. The spring is moved towards and away from the fixed end, repeatedly. The compressions and rarefactions on the spring at a particular time can be seen.



wavelength = cm [1]

[Total: 3]

17 The diagram shows a raft floating on water.



A force of 20000 N acts on the raft in the direction of the arrow shown in the diagram.

(a) State the name given to the force shown in the diagram.

......[1]

(b) Calculate the mass of the raft.

mass =kg [3]

[Total: 4]

18 A student is studying elephants. The diagram shows an elephant.



(a) The student measures the elephant and records the values, as shown in the table.

Complete the table by adding a suitable unit for each measurement. Choose the units from those shown in the box.

m ²	kg	cm	mm ²	g	m	cm ²	mg	mm

measurements	value	unit
mass of elephant	4000	
height of elephant	3.0	
average area of an elephant's foot	0.125	

- (b) Using information from the table in (a):
 - (i) calculate the weight of the elephant

[2]

(ii) calculate the pressure the elephant exerts on the ground when it is standing on four feet. Include a unit.

pressure =[4]

[Total: 9]

19 A student has a piece of metal that has an irregular shape. The weight of the metal is 3.0 N.

Calculate the mass of the metal.

mass = kg [2]

[Total: 2]

20 A student is using some 50 g masses as loads to stretch a spring.

Calculate the weight of one 50 g mass.

weight of 50 g mass = N [3]

[Total: 3]

21 A model train is travelling along part of a model railway track.

The graph is a speed-time graph for this model train as it travels along part of the track.



Determine the total distance travelled by the train on this part of the track.

distance = m [4]

[Total: 4]

22 This question is about measuring the speed of sound in air.

A student stands in front of a large wall. She hits a drum and hears an echo. The diagram shows the position of the student and the wall.



(a) (i) State the name of a piece of equipment for measuring the distance from the student to the wall.

......[1]

(ii) Explain how sound forms an echo.

.....[1]

(b) The student hits her drum repeatedly once per second. She walks away from the wall and listens for the echo. When the student is 170 m from the wall she hears the echo from one beat of the drum at the same time as the next beat of the drum.

Use this information to determine the speed of sound. State the unit.

speed =[4]

[Total: 6]

23 A model train moves along a track passing through two model stations. Students analyse the motion of the train. They start a digital timer as the train starts to move. They record the time that it enters Station A and the time it enters Station B.

The diagram shows the time on entering Station A and the time on entering Station B.



Calculate the time taken from the train entering Station A to the train entering Station B. State your answer in seconds.

time taken =s [1]

[Total: 1]

24 The diagram shows a wooden raft. The raft is made from 8 logs.

The logs are all of the same type of wood.



The average mass of each log is 65.0 kg.

Calculate the total weight of the raft.

total weight of the raft =N [3]

[Total: 3]

25 A student watches a car race around a track. He uses a stopwatch to measure the time for the car to make one lap of the track.

The student forgets to reset the stopwatch at the start of the race. The diagram shows the time on the stopwatch at the start and the time after going around the track once.



Calculate the time the car takes to go around the track once, in seconds.

time =s [2]

[Total: 2]

- **26** A rectangular container has a base of dimensions 0.12 m × 0.16 m. The container is filled with a liquid. The mass of the liquid in the container is 4.8 kg.
 - (a) Calculate
 - (i) the weight of liquid in the container,

weight =[1]

(ii) the pressure due to the liquid on the base of the container.

(b) Explain why the total pressure on the base of the container is greater than the value calculated in (a)(ii).

.....[1]

(c) The depth of liquid in the container is 0.32 m.

Calculate the density of the liquid.

[Total: 6]

27 The diagram shows a hollow metal cylinder containing air, floating in the sea.



(a) The density of the metal used to make the cylinder is greater than the density of seawater.

Explain why the cylinder floats.

.....[1]

(b) The cylinder has a length of 1.8 m. It floats with 1.2 m submerged in the sea. The bottom of the cylinder has an area of cross-section of 0.80 m².

The densit	y of seawater is	1020 kg/m^3 .
		· · J

Calculate the force exerted on the bottom of the cylinder due to the depth of the seawater.

28 A spring is suspended from the edge of a bench, as shown in diagram **A**.



With no load on the spring, the pin points to 19.7 cm on the metre rule, as shown in diagram **A**. When a load of 6.0 N is attached to the spring, the pin points to 43.9 cm, as shown in diagram **B**.

(a) Calculate the extension of this spring for a load of 6.0 N.

extension = cm [1]

(b) Describe how a student could use the equipment in diagram A to obtain accurate readings for a load-extension graph for this spring.

[2] [Total: 3]

29 The diagram shows a glass vase used for displaying flowers.



- (a) The mass of the glass is 450 g. The volume of glass in the vase is 145 cm^3 .
 - (i) Calculate the density of the glass.

density = \dots g/cm³ [3]

(ii) Calculate the weight of the glass.

weight = N [3]

[Total: 6]

30 The diagram shows a cylinder made from copper of density 9000 kg/m^3 .



The volume of the cylinder is 75 cm^3 .

(a) Calculate the mass of the cylinder.

(b) The gravitational field strength is 10 N/kg.

(i) Calculate the weight of the cylinder.

[Total: 5]

31 All the sides of a plastic cube are 8.0 cm long. The diagram shows the cube, (not to scale).



The mass of the cube is 0.44 kg.

(a) Explain what is meant by mass.

......[1]

(b) (i) Calculate the density of the plastic from which the cube is made.

(ii) In a laboratory on the Moon, the plastic cube is held stationary, using a clamp, in a beaker of the oil of density 850 kg/m^3 .

The arrangement is shown in the diagram.



The lower face of the cube is 3.0 cm below the surface of the oil.

Use your answer to (c)(i) to calculate the pressure due to the oil on the lower face of the cube.

[Total: 8]

32 A pendulum is swinging. Five students each measure the time it takes to swing through ten complete swings.

Three students measure the time as 17.2 s. Another student measures it as 16.9 s, and the fifth student measures it as 17.0 s.

What is the average period of the pendulum?

A 1.69s **B** 1.70s **C** 1.71s **D** 1.72s

[1]

[Total: 1]

- **33** Which expression is used to find gravitational field strength *g*?
 - A mass x density
 - B mass ÷ weight
 - **C** weight x mass
 - D weight ÷ mass

[1]

[Total: 1]

34 A student determines the average speed of a bubble rising through a liquid at constant speed.When the student starts the stopwatch the bubble is at position P.

After 2.0 s the bubble is at position Q.



What is the speed of the bubble between P and Q?

A 3.2 cm/s **B** 3.7 cm/s **C** 6.4 cm/s **D** 7.4 cm/s

[1]

[Total: 1]

- 35 In which pair are both quantities measured in newtons?
 - A force and pressure
 - B force and weight
 - C mass and pressure
 - **D** mass and weight

[1]

[Total: 1]

36 The diagram shows students about to start a 50.0 m swimming race.



(a) The length of the pool is 50.0 m.

Name a suitable piece of equipment that could be used to measure the length of the pool.

......[1]

(b) The race starts and the students swim to the end of the 50.0 m pool.

The diagram shows the times recorded on the stop watches for the winner and the swimmer in second place.



(i) Determine the time taken by the winner to swim 50.0 m. Use information from the diagram.

(ii) Calculate the average speed of the winner.

average speed = m/s [2]

(iii) Calculate the time difference between the winner and the swimmer in second place.

time difference = s [1]

[Total: 5]

37 A pipe drips water into an empty glass jar. A student takes measurements to find how fast the water is rising up the jar. The diagram shows the arrangement.



(a) The student measures the depth of the water every minute.

State the two pieces of equipment that she uses.

- 1.
- (b) The student records her observations in a table. She then plots a graph using the axes shown.



(i) On the grid, label both axes with title and unit.

[2]

(ii) The water rises up the jar at a constant rate.

Draw a line on the grid to show the student's graph. Start the line from the time when the jar is empty. [2]

(c) A puddle of water forms on the ground. The average depth of the water is 2.5 mm.

Determine the average depth of the water in m.

depth = m [2]

[Total: 8]

38 (a) The walls of a room are to be painted.

A tin of paint has a total mass of 7000 g and a volume of 5000 cm³.

The empty tin has a mass of 500 g.

(i) Determine the mass of the paint.

mass of paint = g [1]

(ii) Calculate the density of the paint. Include the unit.

density =	. [3]
The painter drops a brush into the tin of paint. The brush floats.	
Suggest why the brush floats.	
	[1]
[Tot]	al: 5]

39 The diagram shows a tyre hanging from the branch of a tree.

(b)



(a) The mass of the tyre is 15 kg.

Calculate its weight.

weight of tyre = N [2]

(b) The weight of the tyre exerts a moment on the branch, about point P where the branch joins the tree.

(i)	Explain what is meant by the term <i>moment</i> .
	[1]
(ii)	A child sits on the tyre. The weight of the child and tyre together is 425 N. Calculate the moment of this force about point P. Use information given in the diagram. Include the unit.
	moment =[4]
(iii)	A heavier child wants to sit on the tyre. Describe how the tyre position should be adjusted so that the moment is the same as in (b)(ii) .
	[1]
	[Total: 8]

40 A student measures a book.

(a) He measures the length of the book, as shown in the diagram.



The student records his measurements.

length of book = $19.9 \,\mathrm{cm}$

His measurement is not accurate.

Describe two ways that the student can improve the accuracy of his measurement.



(b) The book contains 200 thin sheets of paper. The student wants to find the average (mean) thickness of a sheet of paper in the book.

Describe how he can determine such a small distance using only a ruler.

[3]

(c) The book has a mass of $400 \, g$.

Calculate the weight of the book. Include the unit.

weight =[4]

[Total: 9]