Name_____

Aldenham School

Science Department

13+ Exam - Physics

SAMPLE PAPER

20 Minutes

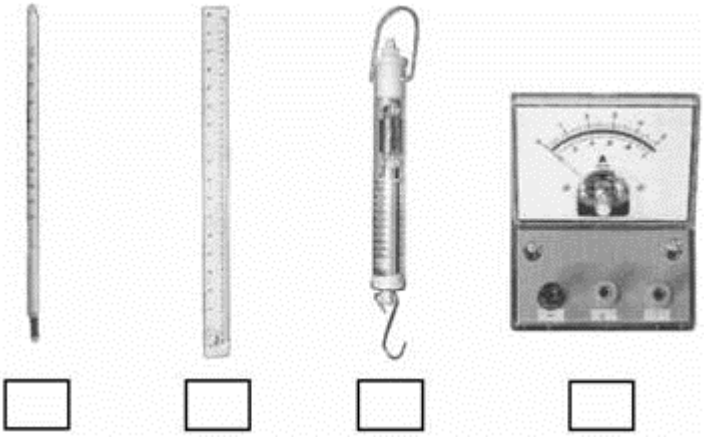
26 Marks

Q1. Lee blew across the top of paper tubes to make sounds.

He investigated how changing the length of a tube affects the pitch of the sound.

(a) What equipment could he use to measure the length of the tubes?

Tick the correct box.



1 mark

(b) The photograph below shows the different lengths of tubes Lee used.

Suggest **one** way his test might **not** have been fair.

.....

.....

1 mark

(c) Lee made a prediction.

Which of these statements is a prediction?
Tick the correct box.

The tubes were made of paper. ☐

The pitch of the sound is how high or low it is. ☐

The longer tube will make a lower sound. ☐

The sound is caused by the vibration of air. ☐

1 mark

(d) Lee blew across the ends of 3 different lengths of tube and compared the pitch of the sound produced.

His results5 are shown below.

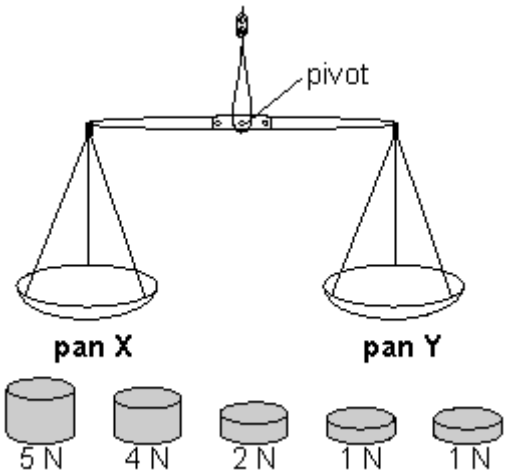
Length of the tube, in cm	*pitch of the sound*
5	*high*
25	*medium*
50	*low*

Which length of tube made the sound with the highest pitch?

..... cm

1 mark
Maximum 4 marks

Q2. Ellie has a set of scales and some weights as shown below.



Ellie puts two weights in pan X and one weight in pan Y. The scales balance.

(a) Which weights could be in pans X and Y?

pan X: ..... and .....

pan Y: .....

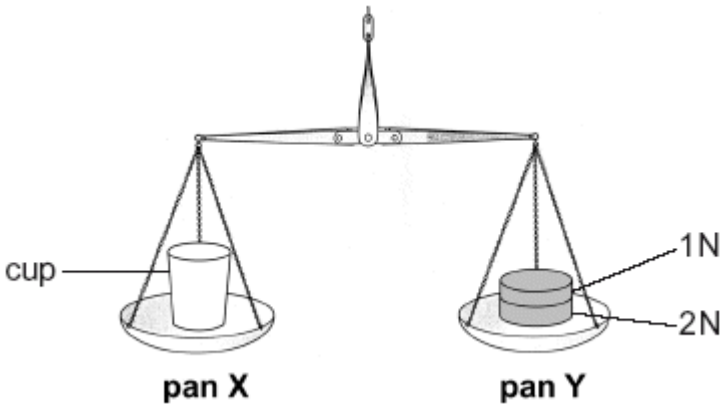
1 mark

(b) Ellie removes all the weights from the scales.
She then puts a cup on pan X.
In which direction will pan Y move?

.....

1 mark

(c) She puts weights into pan Y so the scales balance.

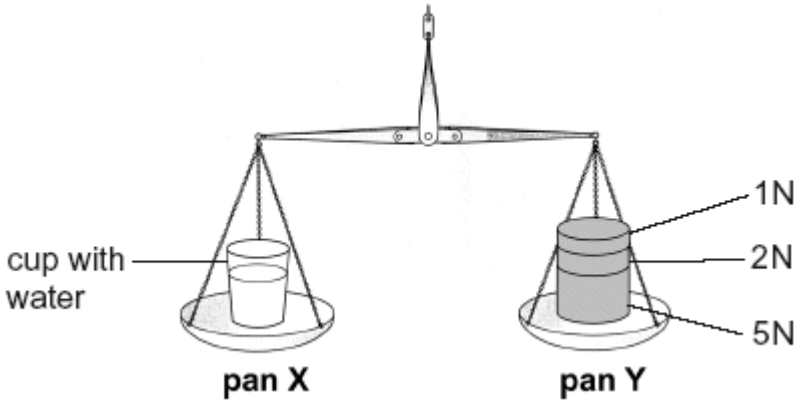


How much does the cup weigh?

..... N

1 mark

(d) Ellie puts some water in the cup.
She then adds some more weights to pan Y to make the scales balance.



(i) How much do the cup **and** water weigh?

..... N

1 mark

(ii) How much does the water weigh?

..... N

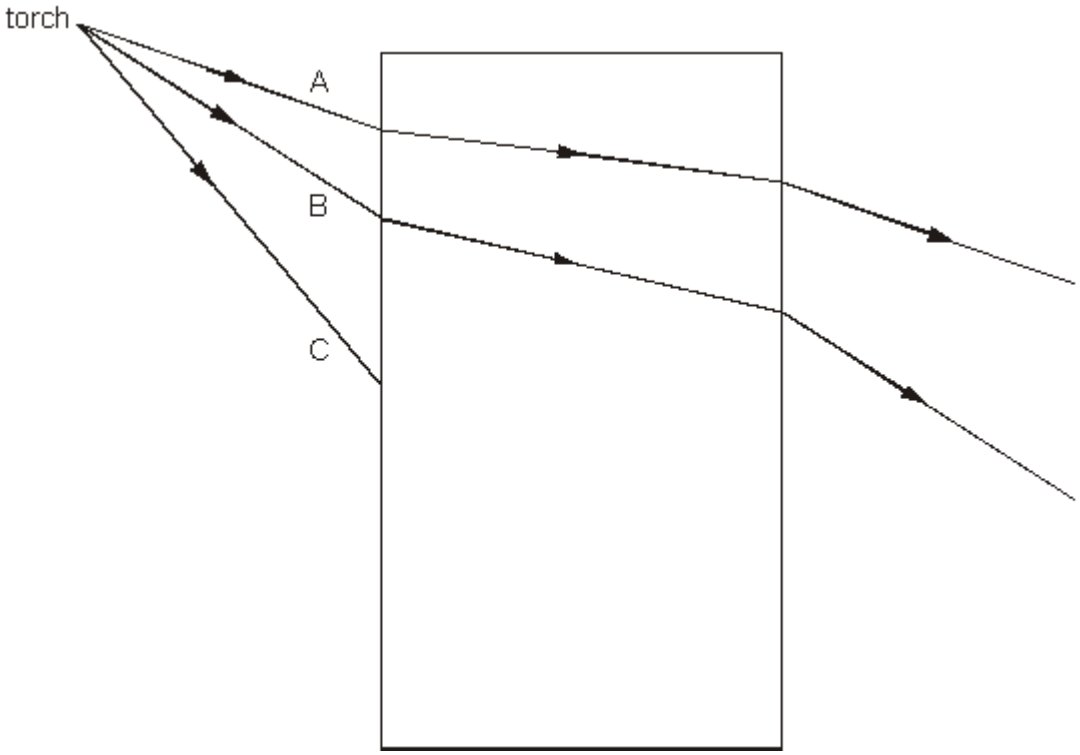
1 mark
maximum 5 marks

Q3. (a) When light travels from air to glass, it changes direction.
What is the name of this effect?

.....

1 mark

(b) The diagram below shows three rays of light A, B and C striking a glass block.



The paths of A and B have been drawn.

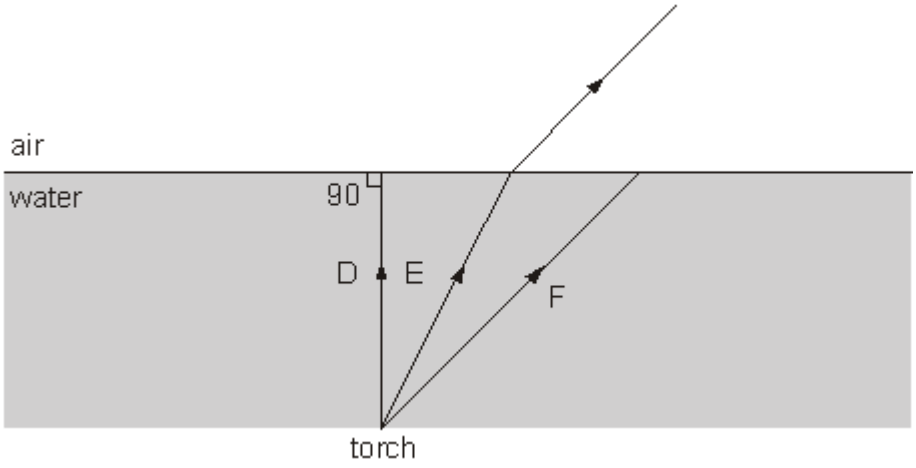
Continue ray C to show its path through the block and out the other side.
Use a ruler.

2 marks

(c) The diagram below shows three rays of light, D, E and F, from a torch placed under water.

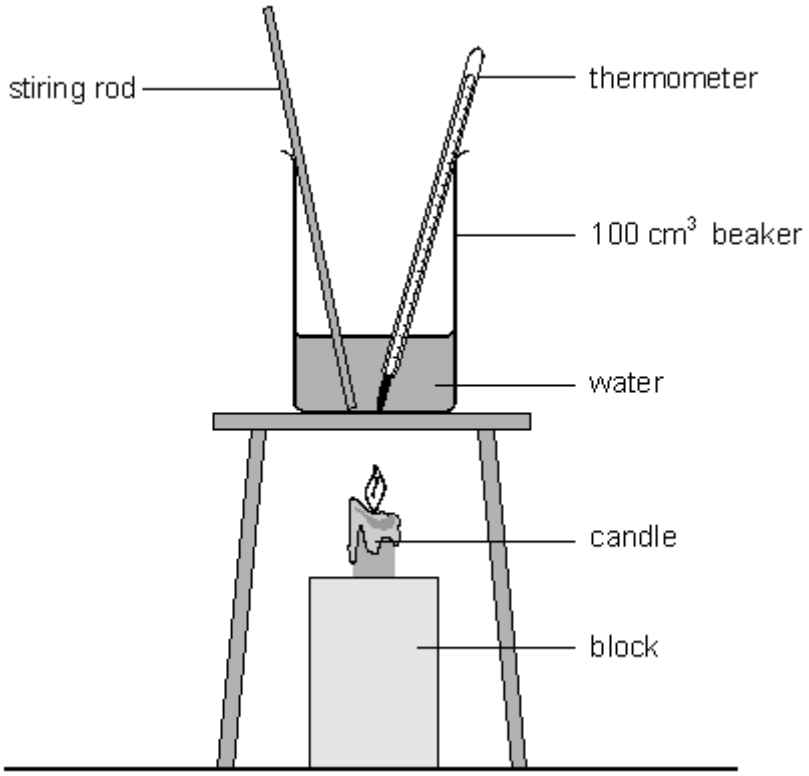
The path of ray E is shown as it leaves the water and enters the air.

Continue the paths of D and F as they pass through the air.
Use a ruler.



2 marks
maximum 5 marks

Q4. Luke investigated the heating of water. He predicted that the rise in temperature would depend on the volume of water.
The diagram shows the apparatus he used.



Luke recorded his results in a table as shown below.

beaker	volume of water, in cm^3	temperature at start, in °C	temperature after 2 minutes, in °C
A	25	18	30
B	50	18	24
C	75	18	22

(a) Why did Luke need to know the temperature of the water at the beginning and at the end of the experiment?

.....

.....

1 mark

(b) Did Luke's results support his prediction? Explain your answer.

.....

.....

1 mark

(c) Luke stirred the water during the experiment. How did this make his results more reliable?

.....

.....

1 mark

(d) Which of the following statements about the energy transferred to the beakers is correct?
Tick the correct box.

Much more energy went into beaker 'A' because its temperature increased the most.	☐
The same amount of energy went into all three beakers.	☐
Beaker 'C' received the most energy because there was more water to heat.	☐

1 mark

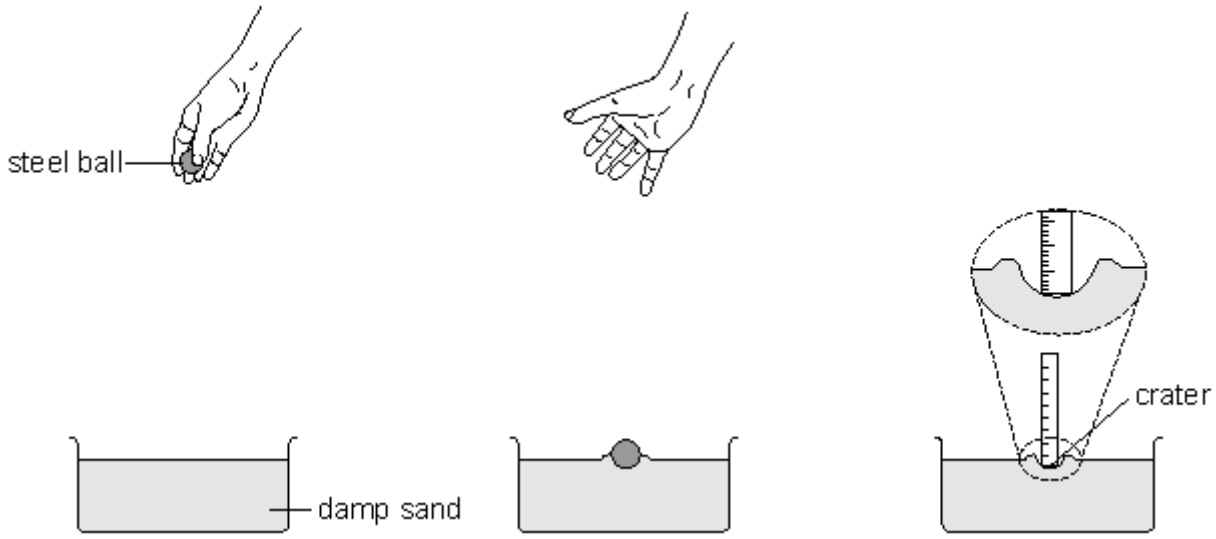
(e) After a time, all three beakers cooled down to room temperature.
What happened to the thermal energy in the beakers as they cooled down?

.....

.....

1 mark
Maximum 5 marks

Q5. Jack and Aneesa dropped a steel ball into trays of damp sand.
They measured the depth of the craters made by the steel ball.



not to scale

Their results are shown in the table below.

height the ball was dropped from (cm)	depth of crater (cm)		
	Jack's results		Aneesa's results
10	1.1	1.2	0.8
20	1.4	1.5	1.4
30	1.6	1.6	1.5
40	1.8	1.7	1.8
50	2.0	2.1	2.1

(a) Use information in the table to answer the questions below.

(i) What was the independent variable that Jack and Aneesa changed in their investigation?

.....

1 mark

(ii) Why was Jack's investigation better than Aneesa's?

.....

1 mark

(b) Look at the results in the table.
What is the relationship between the height the ball was dropped from and the depth of the crater?

.....

.....

1 mark

(c) Aneesa said that they made sure the investigation was fair.

Suggest **two** variables they must have kept the same to make their investigation fair.

1 .....

2 .....

2 marks

(d) (i) Jack removed the steel ball using his fingers. Then he measured the depth of the crater.
Aneesa said he should use a magnet instead of his fingers.

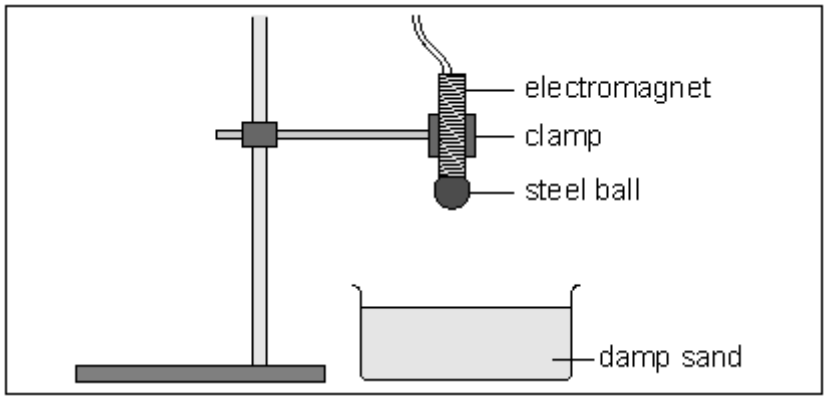
Explain why using a magnet to remove the ball would improve the investigation.

.....

.....

1 mark

(ii) Jack said that the ball could be dropped using an electromagnet instead of dropping it by hand.



Explain why this would improve the investigation.

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1 mark
maximum 7 marks