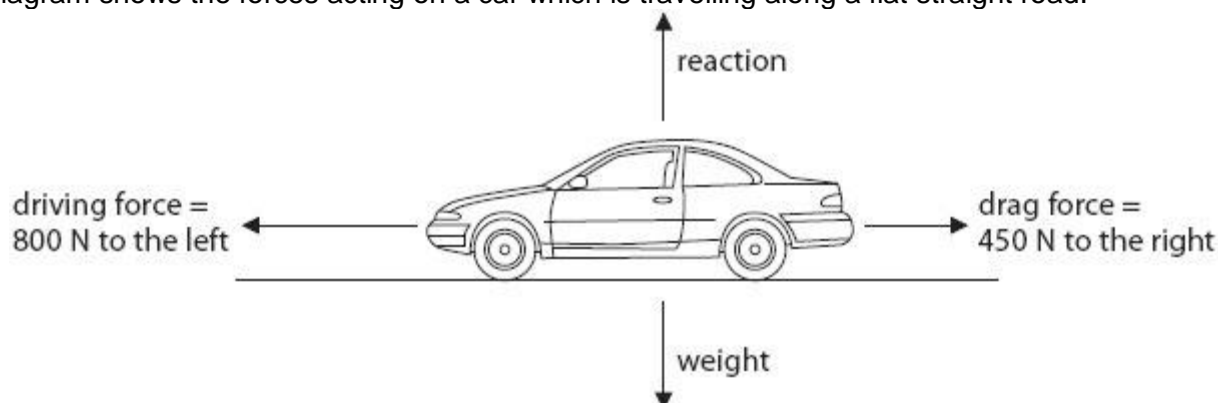**Name of the Student**:_____

Max. **Marks : 15 Marks**   **Time : 15 Minutes**

Q1.

The diagram shows the forces acting on a car which is travelling along a flat straight road.

reaction

driving force =
800 N to the left

drag force =
450 N to the right

weight

(a) (i) The size of the resultant force on the car is 350 N.
          In which direction is the resultant force acting?
Put a cross (■) in the box next to your answer.

(1)

☒   **A**   down ↓

☒   **B**   to the left ←

☒   **C**   to the right →

☒   **D**   up ↑

(ii) Complete the sentence by putting a cross (■) in the box next to your answer.

   The car is

(1)

☒   **A**   accelerating

☒   **B**   decelerating

☒   **C**   moving at a constant speed

☒   **D**   not moving

(2)

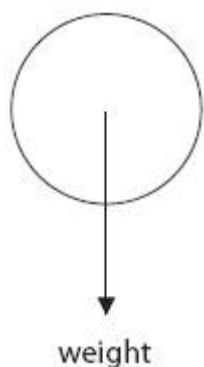(iii) The mass of the car is 625 kg.
    Calculate the weight of the car.
    gravitational field strength = 10N/kg

(2)

....
(b) Forces also act on objects when they fall through the air.
    There are two forces acting on this ball as it falls through the air.

The weight is shown on the diagram.

weight

(i) Draw and label an arrow on the diagram to show the other force acting on the ball.

(2)

(ii) Use words from the box to complete the sentences.

(2)

| balanced   changing   greater   smaller   zero |

After a short time the ball falls at a steady speed.

The forces acting on the ball are now ....

The acceleration of the ball is now ....

(Total for Question is 8 marks)

Q2.

Some questions must be answered with a cross in a box (☒). If you change your mind about an answer, put a line through the box (☒) and then mark your new answer with a cross (☒).

A student carries out an investigation to show how pressure varies with depth in water.

A pressure sensor is attached to a rule.

The rule and pressure sensor are lowered into the water in a tank, as shown in Figure 8.
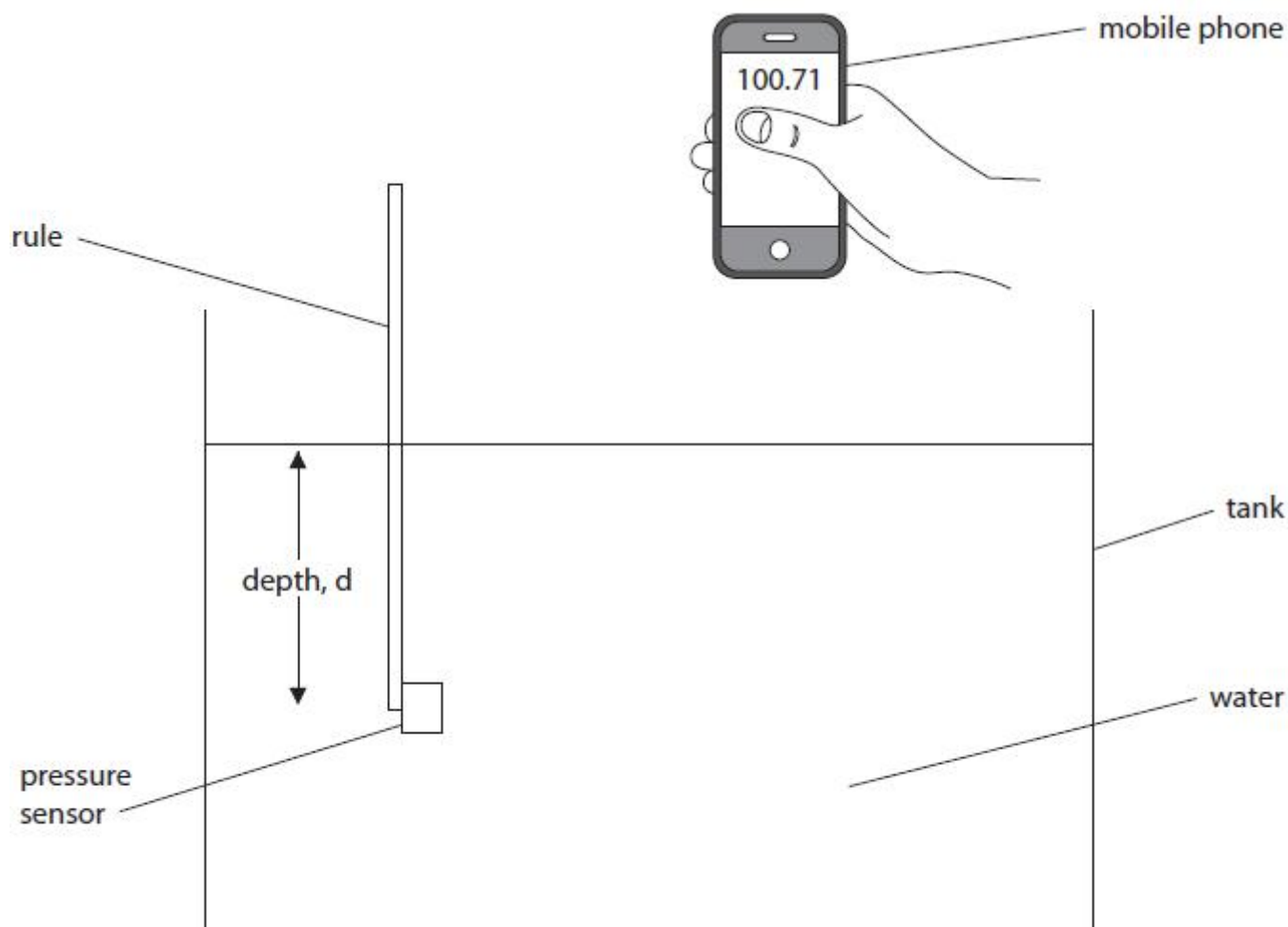
Figure 8

The depth of the pressure sensor below the surface of the water is read from the scale on the rule.

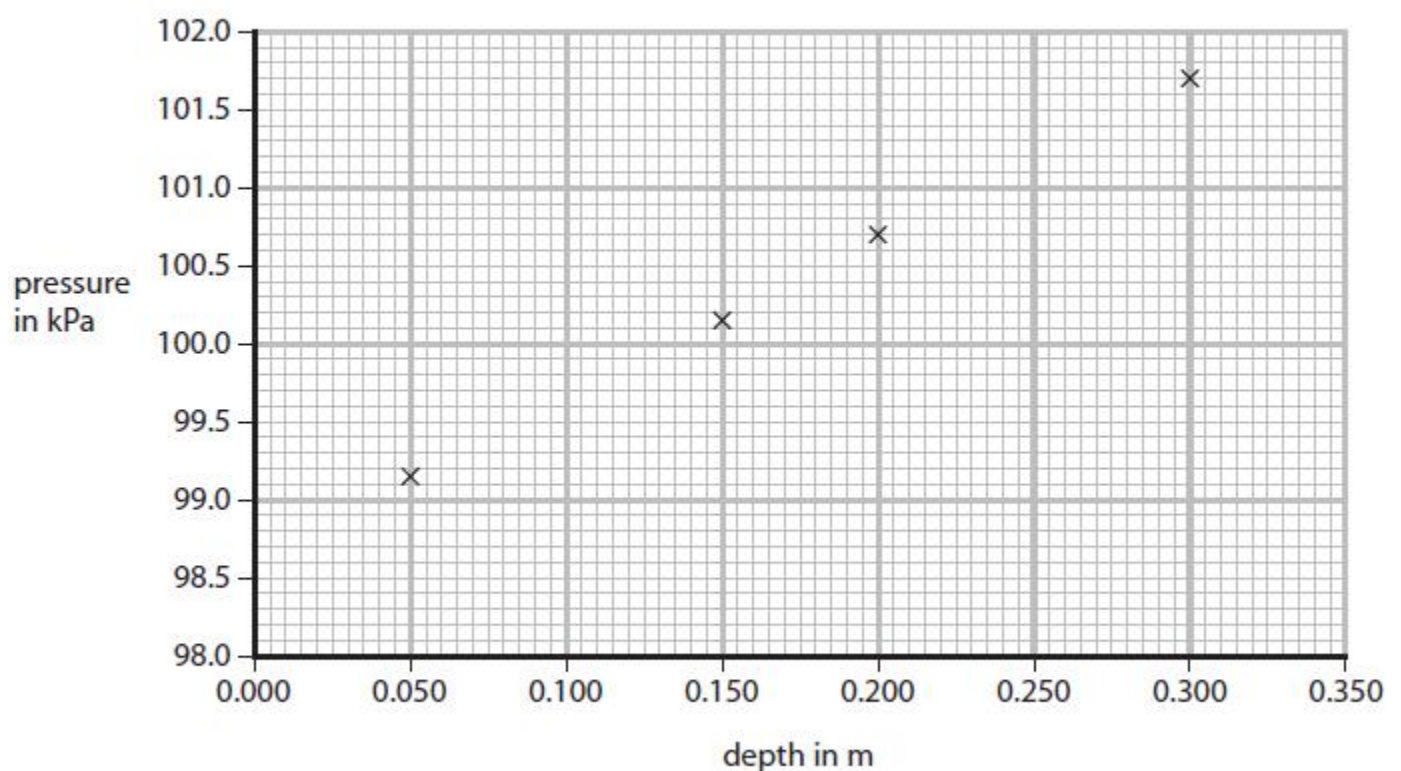The pressure is displayed on the student's mobile phone which receives a signal from the pressure sensor.

Figure 9 gives some of the readings.

depth in m	pressure in kPa
0.050	99.15
0.100	99.70
0.150	100.15
0.200	100.70
0.250	101.15
0.300	101.70

Figure 9

Figure 10 shows a graph with some of the results plotted, but two of the points are missing.

Figure 10

(i) Plot the two missing points on the graph.

(2)

(ii) Draw a line of best fit through the points on the graph.

(1)

(iii) Which of the following equations represents the variation of pressure with depth of water below the surface?

☒ **A** $y = ax^2 + b$
☒ **B** $y = mx$
☒ **C** $Y = mc - x$
☒ **D** $y = mx + c$

(iv) Use the graph in Figure 10 to predict the pressure at the surface of the water.

(1)

pressure at the surface of the sea water = ... kPa

(Total for question = 5 marks)

Q3.

A student is interested in the way that submarines are controlled.

She has several regular wooden blocks, a set of weights and a tank of water. Wood floats in water.

The student plans to immerse the wooden blocks fully in the water and investigate the relationship between the upthrust and the weight of water displaced.

Describe how she should determine **one** of the variables in this investigation.

(2)

....

....

....

....

(Total for question = 2 marks)