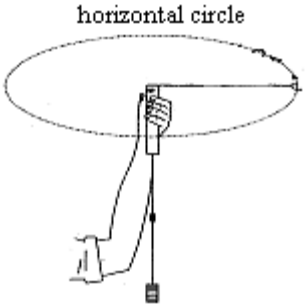
Physics Stage 3: Practical Exam 3A

Name: _____ (35 marks)

Question One:



Three students were investigation circular motion in a similar manner to the investigation you carried out earlier this year. They swung a weight around in a horizontal circle with a known radius and collected the results below:

mass of stopper = 0.0320 kg
average time for 20 turns = 8.80 s
radius of swing = 0.600m
mass hanging from fishing line = 0.400 kg

a. Calculate the weight of the mass supplying the gravitational force. (2 marks)

b. Calculate the centripetal force on the stopper. (4 marks)

c. Compare the weight of the mass with the centripetal force on the stopper. What do these results show and does this agree with the expected result? Explain. (3 marks)

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d. Often, when this experiment is performed, the string holding the stopper is not exactly horizontal. How does this affect the experiment? Explain. (3 marks)

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Question Two

In this experiment, an aluminium strip is firstly swung backwards and forwards until it stops (figure 1). The bar takes 19 seconds to stop. Two strong magnets are then placed so that the strip can now swing between them (figures 2 and 3). The bar now takes 7 seconds to stop. Explain the difference in time taken to stop. (4 marks)

Figure 1

Figure 2

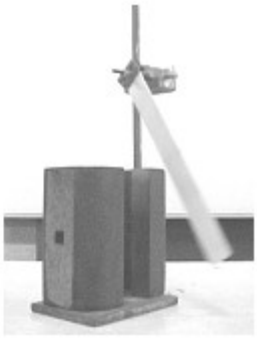
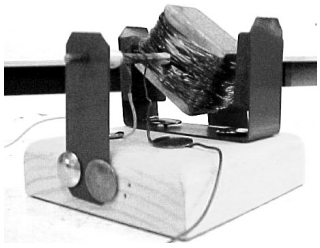


Figure 3

Question Three

This device is a simple DC motor. Give three ways in which you could increase the speed of this motor. (3 marks).



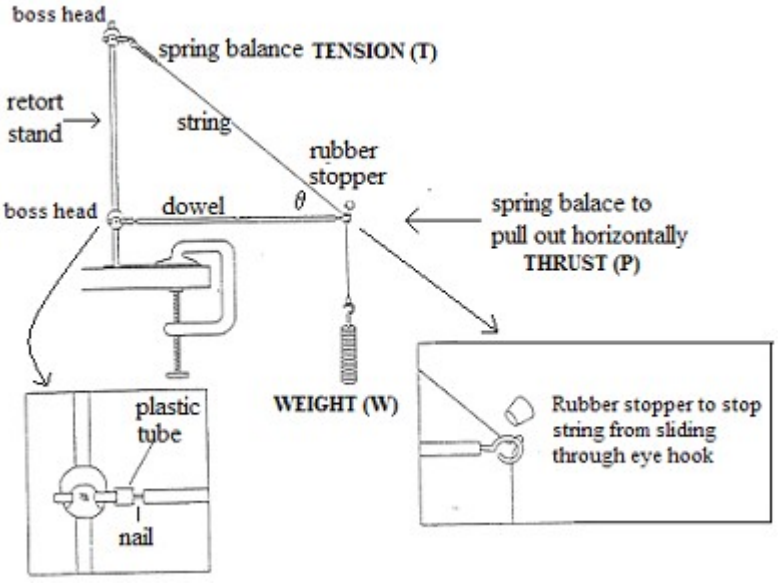
a. _____

b. _____

c. _____

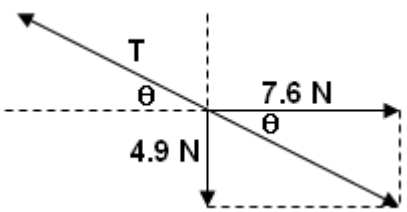
Question Four

In an activity to investigation resolution of forces, you set up the apparatus as shown.



a. The weight of the beam in this experiment was ignored. Was this reasonable and does this mean the beam has no effect on the experiment? Explain. (3 marks)

b. The data from one student's results was W = 4.9 N and P = 7.6 N however he forgot to record the angle. Assuming his set-up was very accurate, determine the tension in the string and the angle between the beam and the string. (3 marks)



$T = \sqrt{(4.9^2 + 7.6^2)}$

$= 9.0$ N

$\theta = \text{Tan}^{-1}(4.9 \div 7.6)$

$= 33^0$

Question Five

A student was investigating how the magnetic force on a current-carrying conductor at right angles to a magnetic field depended on the current and magnetic flux density.

He set up the experiment and measured the current in the solenoid and the current in the current-carrying conductor. His results are shown below. He then calculated the magnetic flux density.

Current in solenoid (A)	**Current in current-carrying conductor (A)**	**Magnetic Flux Density x 10^{-3} (T)**
0.50	1.881	2.21
1.20	1.335	3.11
1.85	1.034	4.01
2.30	0.920	4.49
3.00	0.766	5.42

a. On the graph paper provided, draw a graph of magnetic flux density vs current in solenoid. (5 marks)

b. What relationship is shown by the graph? (2 marks

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c. Using the graph, calculate the gradient of the graph in the space below. (3 marks)