

1 In this experiment, you will investigate the phase difference between the oscillations of two mass–spring systems.

(a) • Assemble the apparatus as shown in Fig. 1.1.

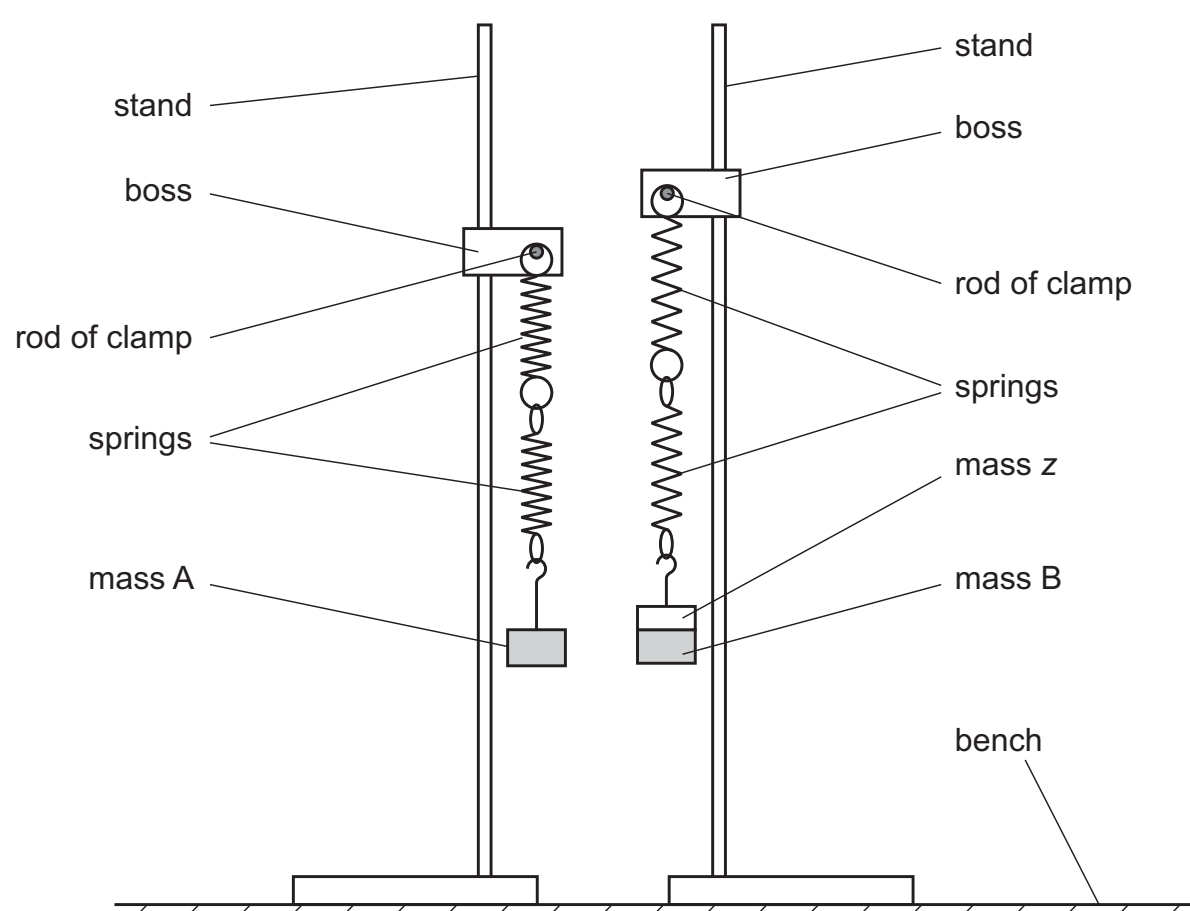


Fig. 1.1

- Mass A and mass B are each 200g.
- Add a mass z of 40g to mass B.

Record the value of z.

z = g

- M is given by $M = 200\text{g} + z$.

Calculate M.

M = g

- Pull both A and B down a short distance and release them together. Observe the oscillations. A and B initially oscillate in phase (both moving up and down together), then their oscillations go out of phase and then become in phase again.
- The time from A and B oscillating in phase to the next time they oscillate in phase is P.

Measure and record P.

P = [2]

(b) Change z and determine P. Repeat until you have six sets of values of z and P.

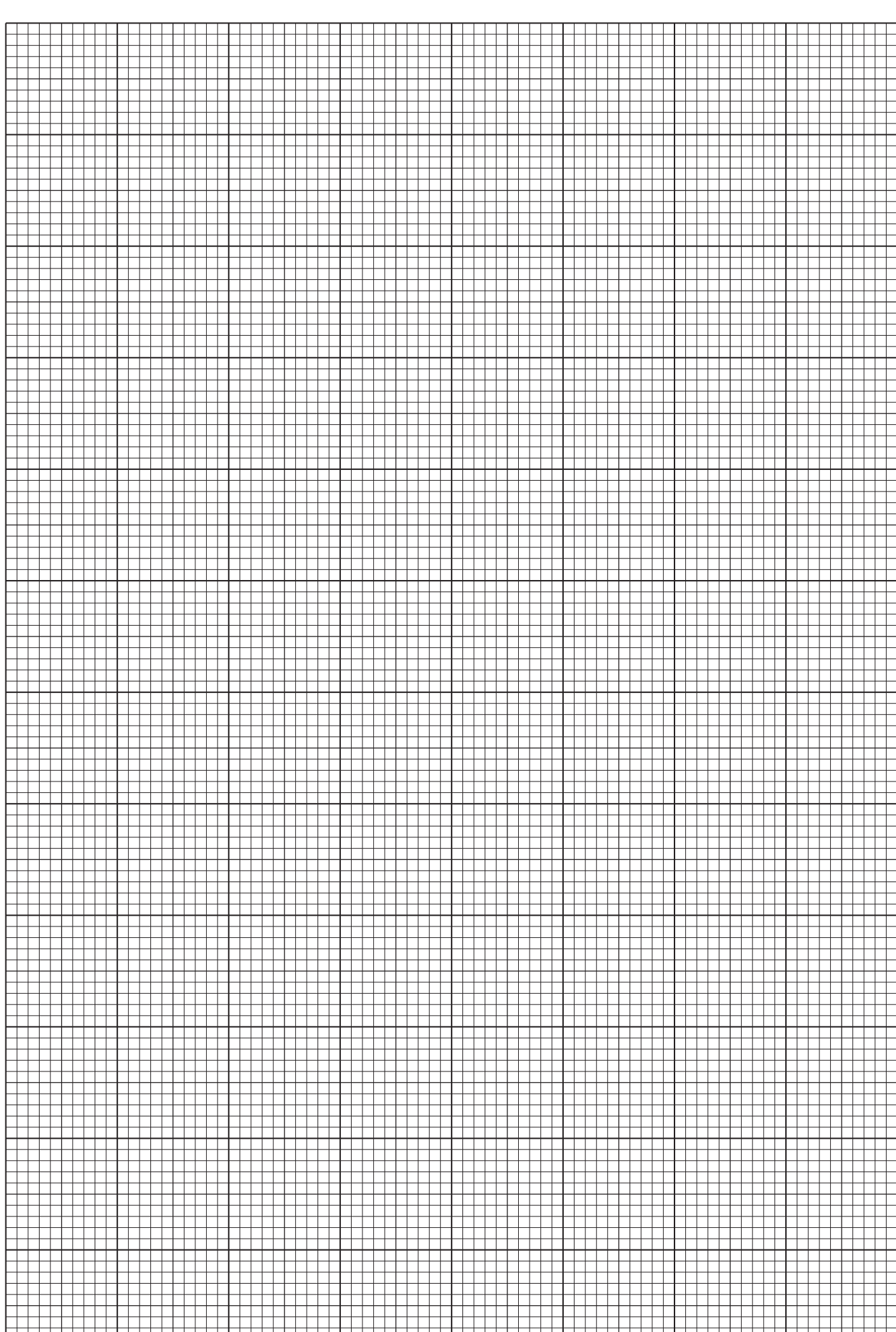
Record your results in a table. Include values of M, $\frac{1}{\sqrt{M}}$ and $\frac{1}{P}$ in your table.

[10]

(iii) Determine the gradient and y-intercept of this line.

gradient =

y-intercept = [2]



(d) It is suggested that the quantities P and M are related by the equation

$$\frac{1}{P} = \frac{a}{\sqrt{M}} + b$$

where a and b are constants.

Use your answers in (c)(iii) to determine the values of a and b. Give appropriate units.

a =

b = [2]

[Total: 20]

You may not need to use all of the materials provided.