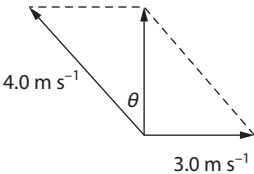
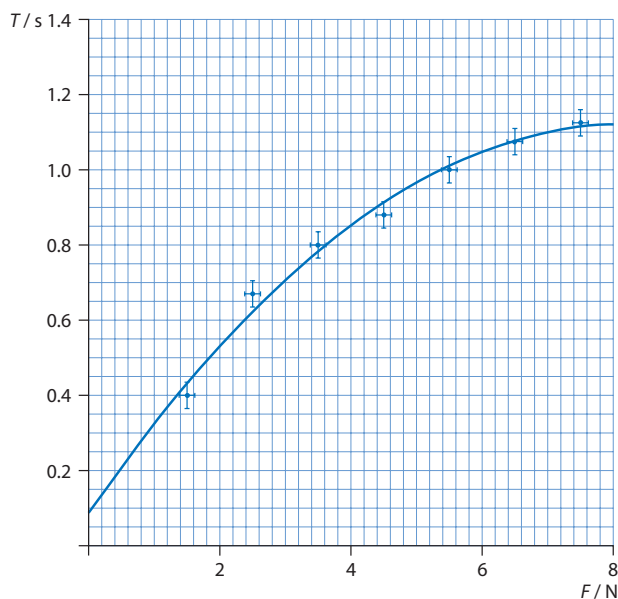


Answers to exam-style questions

Topic 1

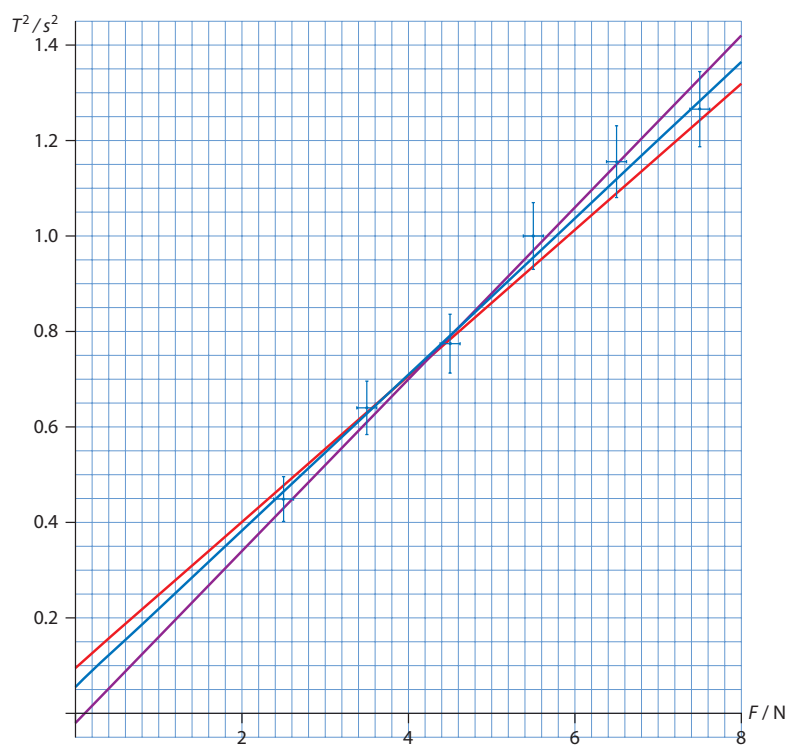
Where appropriate, 1 ✓ = 1 mark

- 1 B
2 A
3 D
4 B
5 A
6 D
7 C
8 A
9 C
10 A
- 11 Use a smaller heavier ball. ✓
In order to minimise the effect of air resistance. ✓
Let the ball drop from various heights. ✓
In order to draw a graph of height versus time and get the acceleration through the gradient of the graph. ✓
If a stopwatch is to be used measure the time for each height many times and get an average. ✓
In order to get a more accurate value for the time. ✓
- 12 a It will take $\frac{30}{4.0} = 7.5$ s to get across. ✓
And he will move $3.0 \times 7.5 = 22.5 \approx 22$ m to the right of P. ✓
- b Correct diagram. ✓
 $\sin \theta = \frac{3.0}{4.0} = 0.75$ ✓
 $\theta = \sin^{-1} 0.75 = 48.6^\circ$ ✓
- 
- The diagram shows a velocity triangle. A solid line representing the resultant velocity is labeled 4.0 m s^{-1} . A horizontal solid line representing the horizontal component is labeled 3.0 m s^{-1} . A dashed vertical line connects the tip of the horizontal component to the tip of the resultant, forming a right-angled triangle. The angle between the horizontal component and the resultant is labeled θ .
- c The woman moves across with a speed of $\sqrt{4.0^2 - 3.0^2} = 2.6458 \text{ m s}^{-1}$. ✓
So she will take a time of $\frac{30}{2.6458} = 11.3 \approx 11$ s, so will be longer than the man. ✓
- 13 a Smooth curve. ✓
Through all the error bars. ✓



- b** The vertical intercept is about 0.1 s. ✓
- c** For T to be proportional to F requires a straight line graph through the origin. ✓
And here neither of these conditions are satisfied. ✓
- d** The uncertainty in T is about ± 0.035 s. ✓

$$\frac{\Delta T^2}{T^2} = 2 \frac{\Delta T}{T} \Rightarrow \Delta T^2 = 2T\Delta T$$
Hence $\Delta T^2 = \pm 2 \times 1.0 \times 0.035 = \pm 0.07 \text{ s}^2$ ✓
- e** Correct plotting of points. ✓
Correct error bars and lines of maximum and minimum slope. ✓
Line of best-fit is straight and within uncertainties passes through origin. ✓
Hence claim is correct. ✓



- f** Slope of line of best fit $0.164 \text{ s}^2 \text{ N}^{-1}$. ✓
Max/min slopes $0.153 \text{ s}^2 \text{ N}^{-1}$ and $0.180 \text{ s}^2 \text{ N}^{-1}$ so uncertainty is $0.0135 \approx 0.01 \text{ s}^2 \text{ N}^{-1}$. ✓
So $(0.164 \pm 0.001) \text{ s}^2 \text{ N}^{-1}$. ✓