Task A - Solutions

1 15 N **2** 1.5 $\mathrm{m\,s^{-2}}$

3 1.2 $\mathrm{m\,s^{-2}}$ **4** 712.5 N

5 **a** $\boldsymbol{a} = (1.8\mathbf{i} + 3.6\mathbf{j})\,\mathrm{m\,s^{-2}}$ **b** $\boldsymbol{a} = \begin{pmatrix} 1.5 \\ 2.5 \end{pmatrix}\mathrm{m\,s^{-2}}$

c $\boldsymbol{a} = 0.28\,\mathrm{m\,s^{-2}}$ **d** $\boldsymbol{a} = (2\mathbf{i} + 1.25\mathbf{j})\,\mathrm{m\,s^{-2}}$

e $\boldsymbol{a} = (60\mathbf{i} + 84\mathbf{j})\,\mathrm{m\,s^{-2}}$

6 3900 N

7 **a** $R = 98\mathrm{N},\ a = 9\mathrm{m\,s^{-2}}$ **b** $R = 196\mathrm{N},\ X = 30\mathrm{N}$

8 0.7 $\mathrm{m\,s^{-2}}$

9 $m = 14$ kg

10 **a** 3.75 $\mathrm{m\,s^{-2}}$ **b** 8 s **c** 120 m

Task B - Solutions

1 $m = 2800$ kg **2** 202.5 N

3 30 m **4** 53000 N

5 **a** 25 N **b** 550 N (to 2 sf)

c The resistance to motion (wind etc.) will decrease as she slows down, so the actual braking force will be higher than the answer in **b**.)

6 $m = \frac{32}{7}$ and $p = \frac{42}{25}$

7 **a** 2400 N

b The acceleration will not be constant over this time because the resistance to motion will decrease as the parachutist slows down.

8 2000 kg

9 **a** 49 N **b** 0.95 s (to 2 sf) **c** 1.9 $\mathrm{m\,s^{-1}}$ (to 2 sf)

10 $a = 6$ and $b = 8$

3.75 $\mathrm{m\,s^{-2}}$

11 $x = -13$ or $x = 4$ **12** $m = 20$ kg, $R = 200$ N