

Force Diagrams and Acceleration

Find any missing forces, masses and accelerations in each of the diagrams.

(a)	(b)	(c)	(d)
<p>Diagram (a) shows a 4 kg mass with a horizontal acceleration of 2 ms^{-2}. A horizontal force of 20 N acts to the right. A vertical force of $4g \text{ N}$ acts upwards. A vertical force of $4g \text{ N}$ acts downwards. A horizontal force of 12 N acts to the left. The mass is also subject to its weight ($4g \text{ N}$) and normal force ($4g \text{ N}$).</p>	<p>Diagram (b) shows a 3 kg mass with a horizontal acceleration of 4 ms^{-2}. A horizontal force of 15 N acts to the left. A vertical force of $3g \text{ N}$ acts upwards. A vertical force of $3g \text{ N}$ acts downwards. A horizontal force of 3 N acts to the right. The mass is also subject to its weight ($3g \text{ N}$) and normal force ($3g \text{ N}$).</p>	<p>Diagram (c) shows a 6 kg mass with a horizontal acceleration of 2 ms^{-2}. A horizontal force of 21 N acts to the left. A vertical force of $6g \text{ N}$ acts upwards. A vertical force of $6g \text{ N}$ acts downwards. A horizontal force of 9 N acts to the right. The mass is also subject to its weight ($6g \text{ N}$) and normal force ($6g \text{ N}$).</p>	<p>Diagram (d) shows a 3.5 kg mass with a horizontal acceleration of 6 ms^{-2}. A horizontal force of 19 N acts to the left. A vertical force of $3.5g \text{ N}$ acts upwards. A vertical force of $3.5g \text{ N}$ acts downwards. A horizontal force of 40 N acts to the right. The mass is also subject to its weight ($3.5g \text{ N}$) and normal force ($3.5g \text{ N}$).</p>
(e)	(f)	(g)	(h)
<p>Diagram (e) shows a 2 kg mass with a horizontal acceleration of 7 ms^{-2}. A horizontal force of 60 N acts to the right. A vertical force of $2g \text{ N}$ acts upwards. A vertical force of $2g \text{ N}$ acts downwards. A horizontal force of 12 N acts to the left. The mass is also subject to its weight ($2g \text{ N}$) and normal force ($2g \text{ N}$).</p>	<p>Diagram (f) shows an 8 kg mass with a horizontal acceleration of 3.5 ms^{-2}. A horizontal force of 28 N acts to the right. A vertical force of $8g \text{ N}$ acts upwards. A vertical force of $8g \text{ N}$ acts downwards. A horizontal force of 7 N acts to the left. The mass is also subject to its weight ($8g \text{ N}$) and normal force ($8g \text{ N}$).</p>	<p>Diagram (g) shows a 2 kg mass with a vertical acceleration of 3 ms^{-2}. A vertical force of 13.6 N acts upwards. A vertical force of $2g \text{ N}$ acts downwards. The mass is also subject to its weight ($2g \text{ N}$) and normal force ($2g \text{ N}$).</p>	<p>Diagram (h) shows a 4 kg mass with a vertical acceleration of 8.2 ms^{-2}. A vertical force of 72 N acts upwards. A vertical force of $4g \text{ N}$ acts downwards. The mass is also subject to its weight ($4g \text{ N}$) and normal force ($4g \text{ N}$).</p>
(i)	(j)	(k)	(l)
<p>Diagram (i) shows a 12 kg mass with a vertical acceleration of 0.5 ms^{-2}. A vertical force of 50 N acts upwards. A vertical force of $12g \text{ N}$ acts downwards. The mass is also subject to its weight ($12g \text{ N}$) and normal force ($12g \text{ N}$).</p>	<p>Diagram (j) shows a 4 kg mass with a vertical acceleration of 2.25 ms^{-2}. A vertical force of 33.2 N acts upwards. A vertical force of $4g \text{ N}$ acts downwards. A vertical force of 15 N acts upwards. The mass is also subject to its weight ($4g \text{ N}$) and normal force (15 N).</p>	<p>Diagram (k) shows a 20 kg mass with a vertical acceleration of 8 ms^{-2}. A vertical force of 36 N acts upwards. A vertical force of $20g \text{ N}$ acts downwards. The mass is also subject to its weight ($20g \text{ N}$) and normal force ($20g \text{ N}$).</p>	<p>Diagram (l) shows a 4.5 kg mass with a vertical acceleration of 2.4 ms^{-2}. A vertical force of 35.4 N acts upwards. A vertical force of $4.5g \text{ N}$ acts downwards. A vertical force of 2.1 N acts upwards. The mass is also subject to its weight ($4.5g \text{ N}$) and normal force (2.1 N).</p>