

Balanced and Unbalanced Forces

Instructions: the force diagrams are scaled diagrams. Label the forces, tick the correct boxes, then calculate the missing forces and the resultant force on the object. Use $g = 10 \text{ N/kg}$.

Label the forces		Tick the correct boxes & calculate the weight	Calculate the other forces, then the resultant force (including direction)
1		☐ Balanced force ☐ Unbalanced force ☐ Change in velocity	Resultant force = _____ N _____ _____ Weight = _____ N
2	label the two forces	☐ Balanced force ☐ Unbalanced force ☐ Change in velocity	Resultant force = _____ N _____ _____ Weight = _____ N
3	draw and label the forces	☐ Balanced force ☐ Unbalanced force ☐ Change in velocity	Resultant force = _____ N _____ _____ Weight = _____ N
4	your own example	☐ Balanced force ☐ Unbalanced force ☐ Change in velocity	Resultant force = _____ N _____ _____ Weight = _____ N
5	your own example	☐ Balanced force ☐ Unbalanced force ☐ Change in velocity	Resultant force = _____ N _____ _____ Weight = _____ N
6	your own example	☐ Balanced force ☐ Unbalanced force ☐ Change in velocity	Resultant force = _____ N _____ _____ Weight = _____ N

Formula to Calculate Weight	Example

Newton's First Law

resultant force = 0 N

resultant force

zero

balanced

stationary

constant velocity

straight line

DRAW AN EXAMPLE

Newton's Second Law

resultant force $\neq$ 0 N

resultant force

not zero

unbalanced

accelerates

change in velocity

speed

direction

DRAW AN EXAMPLE

Newton's Second Law — in Words	... in Symbols

Which Law Is Acting?

arrow length = size of the force

1

car on a straight, level road

LAW ☐ N1L ☐ N2L

VELOCITY ☐ constant ☐ changing

CHANGES ☐ speed ☐ direction

☐ neither

2

van on a straight, level road

LAW ☐ N1L ☐ N2L

VELOCITY ☐ constant ☐ changing

CHANGES ☐ speed ☐ direction

☐ neither

3

car on a bend at a steady 12 m/s (from above)

LAW ☐ N1L ☐ N2L

VELOCITY ☐ constant ☐ changing

CHANGES ☐ speed ☐ direction

☐ neither

4

skydiver falling at terminal velocity

LAW ☐ N1L ☐ N2L

VELOCITY ☐ constant ☐ changing

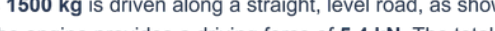
CHANGES ☐ speed ☐ direction

☐ neither

Example — Write Your Own $F = ma$ Question		<i>include a mass, a force and a unit</i>
YOUR QUESTION	WORKING & ANSWER	
_____	_____	
_____	_____	

Exam-Style Question

A car of mass **1500 kg** is driven along a straight, level road, as shown in Figure 1. The engine provides a driving force of **5.4 kN**. The total resistive force on the car is **1.65 kN**.



mass = 1500 kg

resistive force = 1.65 kN driving force = 5.4 kN

Figure 1 — not to scale

[5 marks]

(a) Calculate the resultant force on the car. Give your answer in newtons. **[2]**

(b) Calculate the acceleration of the car. **[3]**
