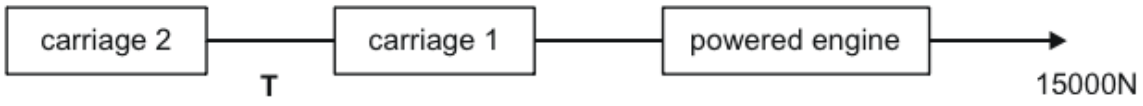
2009

3 Shortly after opening her parachute, a free-fall parachutist of mass 60kg experiences the forces shown in the diagram.

Which line in the table gives the size and direction of the acceleration of the parachutist at this instance?

	size of acceleration (m/s^2)	direction of acceleration
A	5.0	downwards
B	10.0	downwards
C	5.0	upwards
D	10.0	upwards
E	0.0	-

23 A train consists of a powered engine pulling two unpowered carriages.



The engine has a mass of 20000kg, and each carriage has a mass of 5000kg. When the engine accelerates from rest it develops a thrust (driving force) of 15000N as shown.

Ignoring resistive forces, what is the tension (pulling force) **T** in the coupling between carriage 1 and carriage 2?

A 2500N

B 3750N

C 5000N

D 7500N

E 15000N

2011

15 A bullet of mass 50g is fired from a rifle with a velocity of 300m/s. It hits a bank of earth and after travelling 60cm into the bank comes to rest.

What is the average stopping force of the earth in the bank on the bullet?

A 37.5N

B 3.75×10^3N

C 3.75×10^4N

D 3.75×10^6N

2012

11 The diagrams show, not to scale, three different situations in which a force *F* acts. Also shown in each case is a distance *d*.

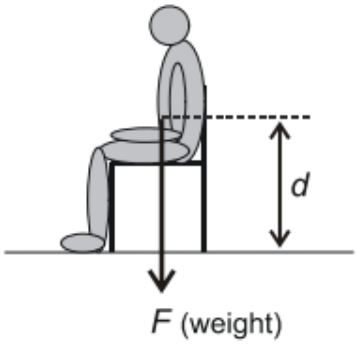


Diagram 1:
Person sitting on a chair

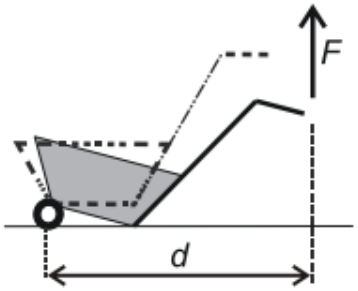


Diagram 2:
Wheelbarrow being lifted

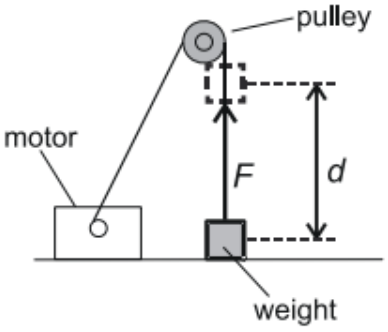


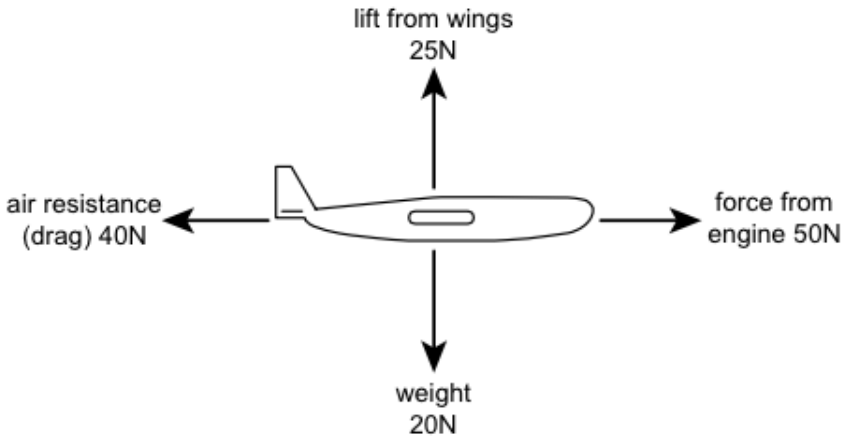
Diagram 3:
Weight being lifted by a motor

Which line in the table shows whether or not work is being done by force *F* in each situation and, if so, whether the work done is equal to *F* x *d*?

	Work being done by force *F*?	**Work done = *F* x *d*?**
A	only in diagrams 1 and 2	only in diagram 1
B	only in diagrams 1 and 2	only in diagram 2
C	only in diagrams 2 and 3	only in diagram 2
D	only in diagrams 2 and 3	only in diagram 3
E	in diagrams 1, 2 and 3	only in diagrams 1 and 2
F	in diagrams 1, 2 and 3	only in diagrams 2 and 3
G	only in diagrams 1 and 3	only in diagram 1
H	only in diagrams 1 and 3	only in diagram 3

2015

15 The diagram shows the only four forces acting on a model aircraft of mass 2.0 kg whilst flying.



Which line in the table states the horizontal and vertical accelerations of the aircraft at this instant?

	Horizontal acceleration	*Vertical acceleration*
A	5.0 m/s^2 to the right	2.5 m/s^2 upwards
B	5.0 m/s^2 to the right	10 m/s^2 downwards
C	5.0 m/s^2 to the right	zero
D	25 m/s^2 to the right	10 m/s^2 downwards
E	25 m/s^2 to the right	2.5 m/s^2 upwards
F	25 m/s^2 to the right	zero
G	zero	2.5 m/s^2 upwards
H	zero	10 m/s^2 downwards

2016

8 The mean mass of a group of N people is 75 kg.

Jim, Karen and Leroy join this group, without anyone leaving; the new mean mass is 78 kg.

The mean mass of Jim, Karen and Leroy is 90 kg.

What is the value of N?

A 4

B 12

C 15

D 30

E 48

F 90