a

Complete the following sentence:
A vector quantity has a m_____ and a d_____ whereas a scalar quantities only has a m_____.

Place a tick in the correct column to show whether the following are vector or scalar quantities. The first one has been done for you.

Quantity	Vector	Scalar
Force		
Speed		
Distance		
Velocity		
Displacement		

b

Forces can be contact or non contact. For each one, give an example.

Contact:

_____

Non-contact:

_____

c

Explain the difference between mass and weight.

Mass: _____

Weight: _____

Unit of mass: _____

Unit of weight: _____

Name the apparatus used to determine an objects weight.

_____

d

State the equation that can be used to determine the weight of an object.

_____

Calculate the weight of an object on the moon if its mass is 3kg. The gravitational field strength on the moon is 1.6N/kg.

_____

_____

_____

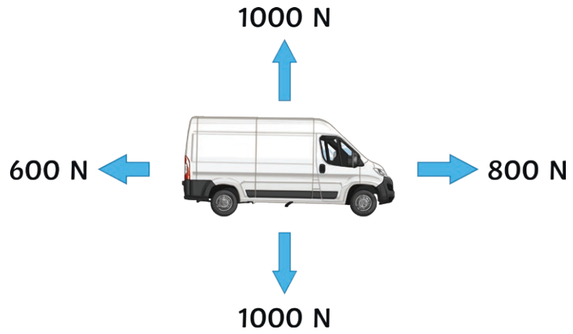
_____

Explain the effect on an object's weight if its mass was doubled.

_____

e

Calculate the resultant forces acting on the van below.



Horizontal force: _____

Vertical force: _____

On a force diagram, what two things do the arrows show?

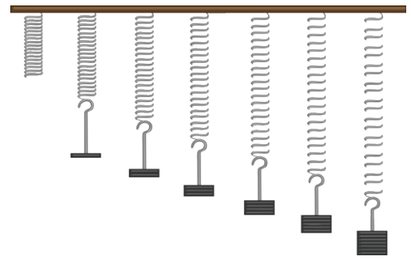
_____

f

Complete the sentences below.

Elastic deformation occurs when a force has been applied to a spring and it r_____ to its original shape. I_____ d_____ occurs when the spring does not return to its original shape.

g



Students placed masses, one at a time, on a spring and measured its extension. They collected the following results.

Force (N)	0	1	2	3	4	5
Length of Spring (cm)	3	5	7	9	11	17
Extension (cm)	0	2	4	6	8	14

Plot a force/extension graph for the data shown above. Remember to include a line of best fit.

Mark the limit of proportionality on your graph.

State the equation that links force, spring constant and extension.

_____

a

Define work done.

State the equation that links work done, force and distance.

Write the units for...

work done: _____

force: _____

distance: _____

A lorry travels 200m when the brakes are applied with a force of 600N. Calculate the work done to stop the lorry.

Calculate the force if 3000J of energy is required to move a box of books a distance of 150cm.

b

Draw lines to match the methods of transportation with their average speeds.

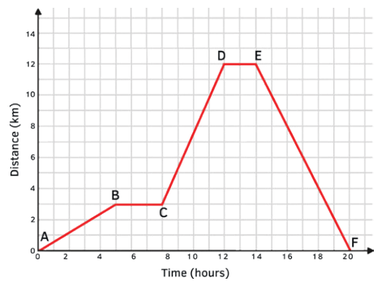
car	1.5m/s
walking	55m/s
train	3m/s
running	25m/s

State three factors that could affect a person's walking speed.

1. _____
2. _____
3. _____

c

The graph below is a distance/time graph of a person travelling from home to the supermarket and home again.



Where on the graph is the person stationary?

Between points A and E, where is the speed the fastest? Explain you answer.

A car increases its velocity from 5m/s to 12m/s in a time of 10 seconds. Calculate its acceleration. Remember to include all units.

d

Explain the term deceleration.

A coach travels at an average speed of 30mph for 20 minutes. How far has it travelled in that time?

e

Stopping distance is calculated by adding thinking distance and braking distance.

Thinking distance is affected by:

s_____;

r_____ t_____.

Braking distance is affected by:

t_____;

r_____ conditions.

f

Are the following forces balanced or unbalanced?

An ornament knocked off a window sill.

A football as it rolls towards a goal.

g

Describe an experiment to determine whether your reaction time is faster with your right or left hand.

Key words: ruler, partner, repeats

h

Describe the effect of friction on a moving object.

State two ways in which friction on a moving object can be overcome.

i

What is terminal velocity?

Terminal velocity depends on two things:

s_____

a_____

j

A car is travelling along a busy road. As it approaches a roundabout, the driver applies the brakes.

If the road is icy, how will this affect the braking distance? Explain your answer.

k

State the equation that links force, mass and acceleration.

Rearrange the equation you have given above to calculate acceleration.

Calculate the force acting on an object with a mass of 15kg and acceleration of 4m/s^2.

Calculate the mass of an object, if it has a force of 2000N and its acceleration is 50m/s^2.

l

State whether the following statements are true or false. If a statement is false, please write the correct statement.

The resultant force on an object is the overall force acting on it.

The larger the resultant force on an object the more it accelerates.

Newton's third law states that when two objects interact, the forces they exert on each other are in the same direction.

If the resultant force on an object is zero, then the object must be stationary.

a

Complete the following sentence:
A vector quantity has a m**agnitude** and a d**irection** whereas a scalar quantities only has a m**agnitude**.

Place a tick in the correct column to show whether the following are vector or scalar quantities. The first one has been done for you.

Quantity	Vector	Scalar
Force	✓	
Speed		✓
Distance		✓
Velocity	✓	
Displacement	✓	

b

Forces can be contact or non contact. For each one, give an example.

Contact:
friction, air resistance, tension, normal

Non-contact:
magnetic, gravitational, electrostatic

c

Explain the difference between mass and weight.

Mass: **the amount of stuff in an object.**

Weight: **the force acting on an object due to gravity.**

Unit of mass: **kg**

Unit of weight: **N**

Name the apparatus used to determine an objects weight.
newton meter

d

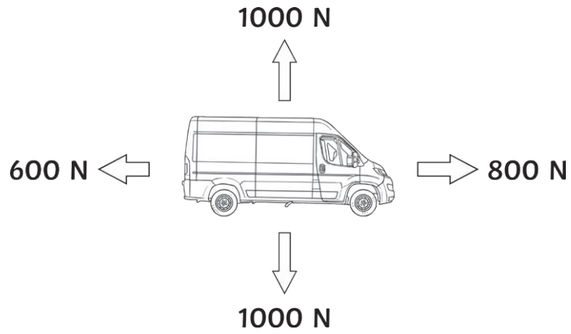
State the equation that can be used to determine the weight of an object.
weight = mass × gravitational field strength

Calculate the weight of an object on the moon if its mass is 3kg. The gravitational field strength on the moon is 1.6N/kg.
weight = 3 × 1.6
= 4.8N

Explain the effect on an object's weight if its mass was doubled.
The weight would also be doubled.

e

Calculate the resultant forces acting on the van below.



Horizontal force: **800 – 600 = 200N**

Vertical force: **1000 – 1000 = 0N**

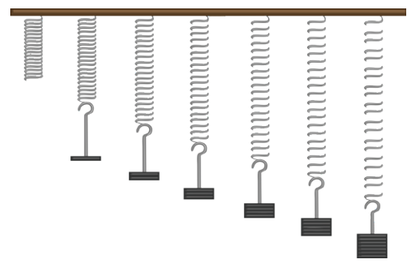
On a force diagram, what two things do the arrows show?
Direction of force and relative size.

f

Complete the sentences below.

Elastic deformation occurs when a force has been applied to a spring and it r**eturns** to its original shape. I**nelastic** d**eformation** occurs when the spring does not return to its original shape.

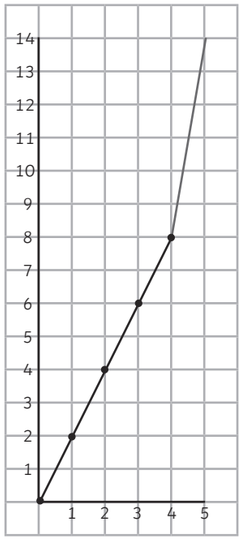
g



Students placed masses, one at a time, on a spring and measured its extension. They collected the following results.

Force (N)	0	1	2	3	4	5
Length of Spring (cm)	3	5	7	9	11	17
Extension (cm)	0	2	4	6	8	14

Plot a force/extension graph for the data shown above. Remember to include a line of best fit.



Mark the limit of proportionality on your graph.

State the equation that links force, spring constant and extension.

force = spring constant × extension

a

Define work done.
This occurs when a force moves an object for a distance.

State the equation that links work done, force and distance.
work done = force × distance

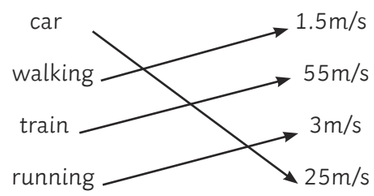
Write the units for...
work done: **joules**
force: **newtons**
distance: **metres**

A lorry travels 200m when the brakes are applied with a force of 600N. Calculate the work done to stop the lorry.
work done = force × distance
= 600 × 200
= 120 000J

Calculate the force if 3000J of energy is required to move a box of books a distance of 150cm.
Convert cm to m: 150cm = 1.5m
Rearrange formula:
force = work done ÷ distance
= 3000 ÷ 1.5
= 2000N

b

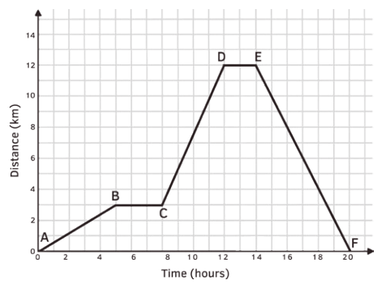
Draw lines to match the methods of transportation with their average speeds.



State three factors that could affect a person's walking speed.
1. **age**
2. **fitness**
3. **terrain**

c

The graph below is a distance/time graph of a person travelling from home to the supermarket and home again.



Where on the graph is the person stationary?
B-C and D-E

Between points A and E, where is the speed the fastest? Explain you answer.
C-D because it is the steepest part of the graph.

A car increases its velocity from 5m/s to 12m/s in a time of 10 seconds. Calculate its acceleration. Remember to include all units.
acceleration = change in velocity ÷ time
= (12 – 5) ÷ 10
= 7 ÷ 10
0.7m/s

d

Explain the term deceleration.
Negative acceleration, when something is slowing down.

A coach travels at an average speed of 30mph for 20 minutes. How far has it travelled in that time?
10 miles

e

Stopping distance is calculated by adding thinking distance and braking distance.
Thinking distance is affected by:
s**peed**;
r**eaction** t**ime**.

Braking distance is affected by:
t**yres**;
r**oad** conditions.

f

Are the following forces balanced or unbalanced?

An ornament knocked off a window sill.
unbalanced

A football as it rolls towards a goal.
unbalanced

g

Describe an experiment to determine whether your reaction time is faster with your right or left hand.
Key words: ruler, partner, repeats
Work with a partner.
Person A places their forearm on the table so that their right hand is hanging over the edge of the table.
Person B places a ruler vertically between Person A's thumb and first finger, with the 0cm end of the ruler pointing downwards. The thumb and first finger should be as far apart as possible.
Person B should place the 0cm mark level with the top of Person A's thumb and drop the ruler without telling them.
Person A catches the ruler as quickly as possible.
Reading from the top of the thumb, record how many cms it took to catch.
Repeat 9 more times with the right hand.
Repeat experiment with the left hand.

h

Describe the effect of friction on a moving object.
It slows it down.

State two ways in which friction on a moving object can be overcome.
Using a lubricant.
Make the object more streamlined.
Smoother surfaces.

i

What is terminal velocity?
When an object is falling at a steady speed.

Terminal velocity depends on two things:
shape
area

j

A car is travelling along a busy road. As it approaches a roundabout, the driver applies the brakes.
If the road is icy, how will this affect the braking distance? Explain your answer.
Less friction, therefore it will take longer to stop.

k

State the equation that links force, mass and acceleration.
force = mass × acceleration

Rearrange the equation you have given above to calculate acceleration.
acceleration = force ÷ mass

Calculate the force acting on an object with a mass of 15kg and acceleration of 4m/s^2.
F = ma 15 × 4 60N

Calculate the mass of an object, if it has a force of 2000N and its acceleration is 50m/s^2.
mass = force ÷ acceleration
= 2000 ÷ 50
= 40kg

l

State whether the following statements are true or false. If a statement is false, please write the correct statement.

The resultant force on an object is the overall force acting on it.
True

The larger the resultant force on an object the more it accelerates.
True

Newton's third law states that when two objects interact, the forces they exert on each other are in the same direction.
False. The forces act in opposite direction.

If the resultant force on an object is zero, then the object must be stationary.
False. It could be travelling at a constant speed.