Questions

Q1.

Use words from the box to complete the sentences below.

direction	energy	mass	size

(2)

Vectors have size and ..... .

Scalars have only ..... .

(Total for question = 2 marks)

Q2.

The mass of a car is 1200 kg.

Calculate the resultant force on the car required to produce an acceleration of 0.8 m/s^2.

(2)

resultant force = ...N

Q3.

A car with a mass of 1800 kg is accelerating at 1.2 m/s^2.

Calculate the force used to accelerate the car.

Use the equation

force = mass × acceleration

(2)

force = ... N

(Total for question = 2 marks)

Q4.

A car with a mass of 1800 kg is accelerating at 1.2 m/s^2.

Calculate the force used to accelerate the car.

Use the equation

force = mass × acceleration

(2)

force = ... N

(Total for question = 2 marks)

Q5.

This table shows data about two other cars.

car	mass	time taken to reach 30 m/s from rest
family car	1400 kg	10 s
sports car	600 kg	5 s

The owner of the family car claims that although the sports car has greater acceleration, it produces a smaller accelerating force than his family car.

Explain how these figures support his claim.

(2)

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.....

.....

Q6.

A car is travelling along a level road.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

When the velocity of the car is constant, the force of friction on it is

(1)

☒ **A** zero

☒ **B** greater than the driving force

☒ **C** smaller than the driving force

☒ **D** the same size as the driving force

(ii) The car now accelerates in a straight line.
Its average acceleration is 12 m/s^2.

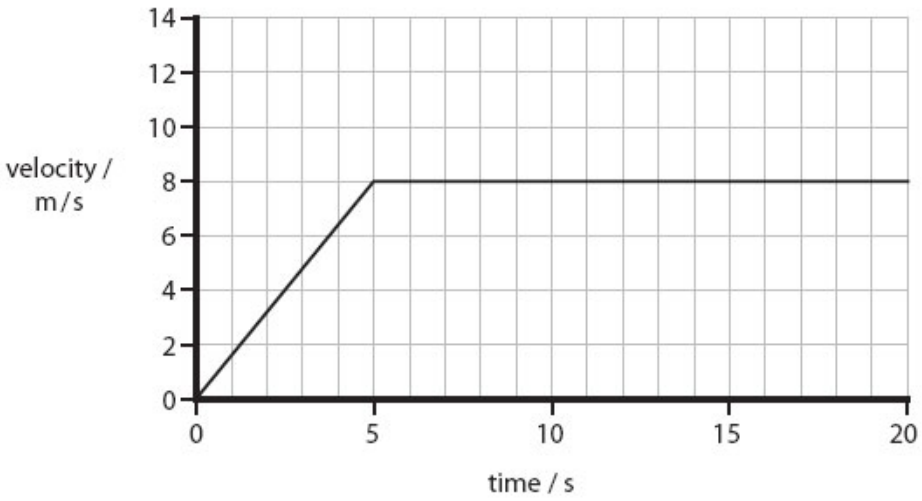
Calculate the increase in velocity of the car in 4.0 s.

(3)

speed = ...m/s

Q7.

Here is the velocity-time graph for a car for the first 20 s of a journey.



(i) Calculate the change in velocity of the car during the first 5 s.

(1)

change in velocity = ...m/s

(ii) Calculate the acceleration of the car during the first 5 s.

(2)

acceleration = ...m/s^2

(iii) State the size of the resultant force between 10 s and 15 s

(1)

resultant force = ...N

Q8.

A toy car has a mass of 0.10 kg.
The toy car accelerates at 2.0 m/s^2.

Calculate the force producing this acceleration.
State the unit.

Use the equation

$F = m \times a$

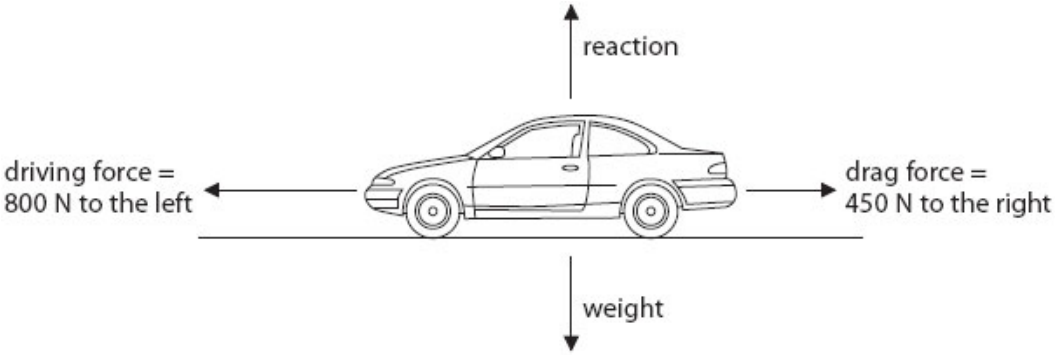
(3)

force = ... unit = ...

(Total for question = 3 marks)

Q9.

The diagram shows the forces acting on a car which is travelling along a flat straight road.



(a) (i) The size of the resultant force on the car is 350 N.

In which direction is the resultant force acting?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** down ↓

☒ **B** to the left ←

☒ **C** to the right →

☒ **D** up ↑

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The car is

(1)

☒ **A** accelerating

☒ **B** decelerating

☒ **C** moving at a constant speed

☒ **D** not moving

(2)

(iii) The mass of the car is 625 kg.

Calculate the weight of the car.

gravitational field strength = 10N/kg

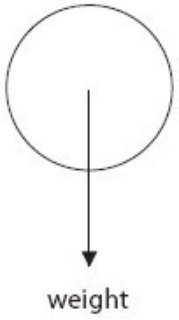
(2)

weight of car = ...N

(b) Forces also act on objects when they fall through the air.

There are two forces acting on this ball as it falls through the air.

The weight is shown on the diagram.



(i) Draw and label an arrow on the diagram to show the other force acting on the ball.

(2)

(ii) Use words from the box to complete the sentences.

(2)

balanced	changing	greater	smaller	zero

After a short time the ball falls at a steady speed.

The forces acting on the ball are now .....**.**

The acceleration of the ball is now .....**.**

(Total for Question is 8 marks)

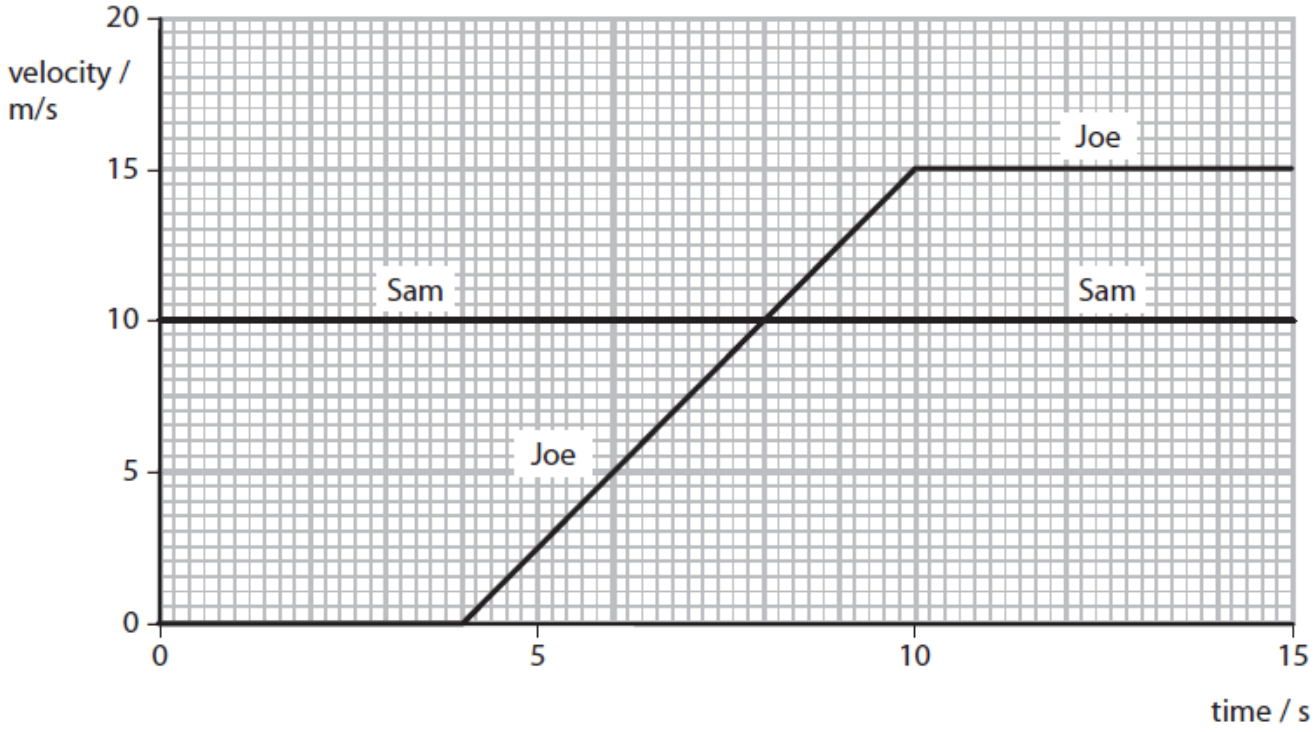
Q10.

Sam and Joe are on their bikes. They are on a flat, straight road.

(a) Joe is stationary when Sam rides past at a constant velocity of 10 m/s.

Joe waits for 4 s and then follows Sam.

This is a velocity/time graph of their motion.



(i) How far did Sam travel during these 15 s?

distance = velocity × time

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** 1.5 m

☒ **B** 10 m

☒ **C** 100 m

☒ **D** 150 m

(ii) At which of these times is the resultant force on Joe bigger than the resultant force on Sam?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** at 3 s

☒ **B** at 7 s

☒ **C** at 11 s

☒ **D** at 15 s

(iii) For how many seconds was Joe accelerating?

(1)

number of seconds = ... s

(iv) Calculate Joe's acceleration during this time.

(2)

Joe's acceleration = ... m/s^2

(b) The diagram shows the horizontal forces acting on Joe at one point while he is accelerating.

(i) Calculate the size of the resultant horizontal force acting on Joe and his bike.

(2)

size of resultant force = ... N

(ii) The total mass of Joe, his heavy bag, and his bike is 55 kg.

Calculate the total weight.

Gravitational field strength, g = 10 N/kg

(1)

total weight = ... N

(c) On another day, Joe is riding the same bike on the same piece of road.

This time he does not have the heavy bag on his back.

He finds that it is easier to accelerate.

Explain why Joe finds it easier to accelerate.

(2)

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.....

(Total for Question = 10 marks)