1 The London Eye is one of the largest observation wheels in the world.

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The passengers ride in capsules. Each capsule moves in a circular path and accelerates.

(a) Explain how the wheel can move at a steady speed and the capsules accelerate at the same time.

....

....

....

(2)

(b) In which direction is the resultant force on each capsule?

....

(1)

(c)   The designers of the London Eye had to consider **three** factors which affect the resultant force described in part (b).

Two factors that increase the resultant force are:

- an increase in the speed of rotation

- an increase in the total mass of the wheel, the capsules and the passengers.

Name the other factor that affects the resultant force and state what effect it has on the resultant force.
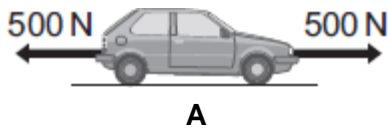
....

....
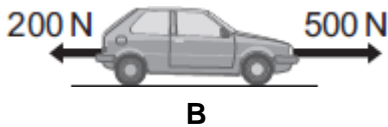
(1)
(Total 4 marks)

2   (a)   The diagrams, **A**, **B** and **C**, show the horizontal forces acting on a **moving** car.

Draw a line to link each diagram to the description of the car's motion at the moment when the forces act.
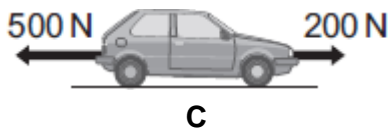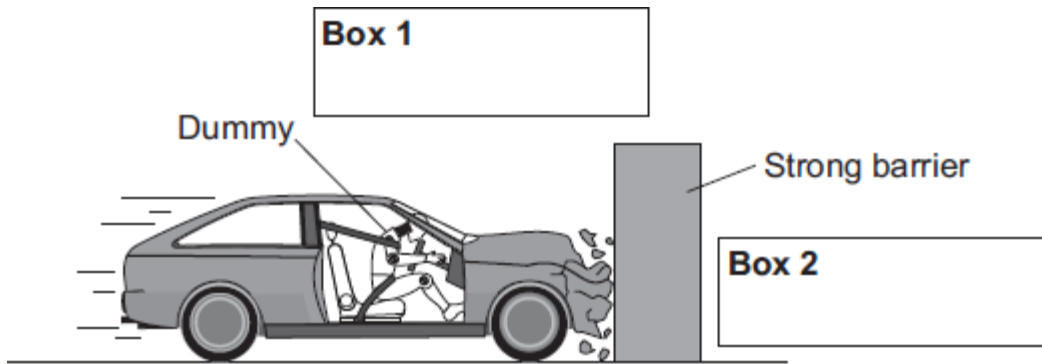
Draw only **three** lines.

| stationary |

| 500 N ← [car] → 500 N |
| **A** |

| constant speed |

| 200 N ← [car] → 500 N |
| **B** |

| slowing down |

| 500 N ← [car] → 200 N |
| **C** |

| accelerating forwards |

(3)

(b)   The front crumple zone of a car is tested at a road traffic laboratory. This is done by using a remote control device to drive the car into a strong barrier. Electronic sensors are attached to a dummy inside the car.

(i)   Draw an arrow in **Box 1** to show the direction of the force that the car exerts on the barrier.

(1)

(ii) Draw an arrow in **Box 2** to show the direction of the force that the barrier exerts on the car.

(1)

(iii) Complete the following by drawing a ring around the correct line in the box.

The car exerts a force of 5000 N on the barrier. The barrier does not move. The force

exerted by the barrier on the car will be | more than |
                                              | equal to | 5000 N.
                                              | less than |

(1)

(iv) Which **one** of the following gives the most likely reason for attaching electronic sensors to the dummy?

Put a tick (✓) in the box next to your answer.

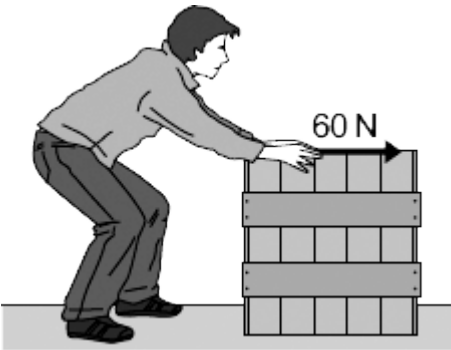To measure the speed of the car just before the impact.

To measure the forces exerted on the dummy during the impact.

To measure the distance the car travels during the impact.

(1)
(Total 7 marks)

3 The diagram shows a worker using a constant force of 60 N to push a crate across the floor.

My Revision Notes AQA GCSE Physics for A* – C,
Steve Witney, © Philip Allan UK

(a) The crate moves at a constant speed in a straight line

(i) Draw an arrow on the diagram to show the direction of the friction force acting on the moving crate.

(1)

(ii) State the size of the friction force acting on the moving crate.

.... N

Give the reason for your answer.

....

....

(2)

(b) Calculate the work done by the worker to push the crate 28 metres.

Show clearly how you work out your answer and give the unit.

Choose the unit from the list below.

joule   **newton**   **watt**

....

....

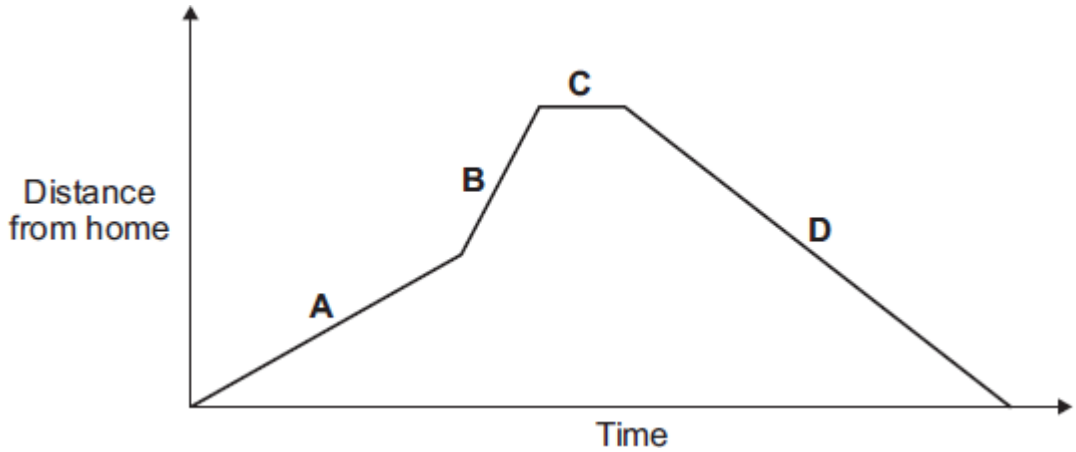Work done = ...

(3)
(Total 6 marks)

4

(a)   A person takes their dog for a walk.

The graph shows how the distance from their home changes with time.

Which part of the graph, **A**, **B**, **C** or **D**, shows them walking the fastest?

Write your answer in the box. ☐

Give the reason for your answer.

....

....

(2)

(b)   During the walk, both the speed and the velocity of the person and the dog change.

How is *velocity* different from *speed*?

....

....

(1)
(Total 3 marks)

Mark schemes

1   (a)   any **two** from:

- (acceleration occurs when) the direction (of each capsule) changes

- velocity has direction

- acceleration is (rate of) change of velocity

            2

   (b)   to(wards) the centre (of the wheel)

            1

   (c)   the greater the radius / diameter / circumference (of the wheel) the smaller the (resultant) force (required)

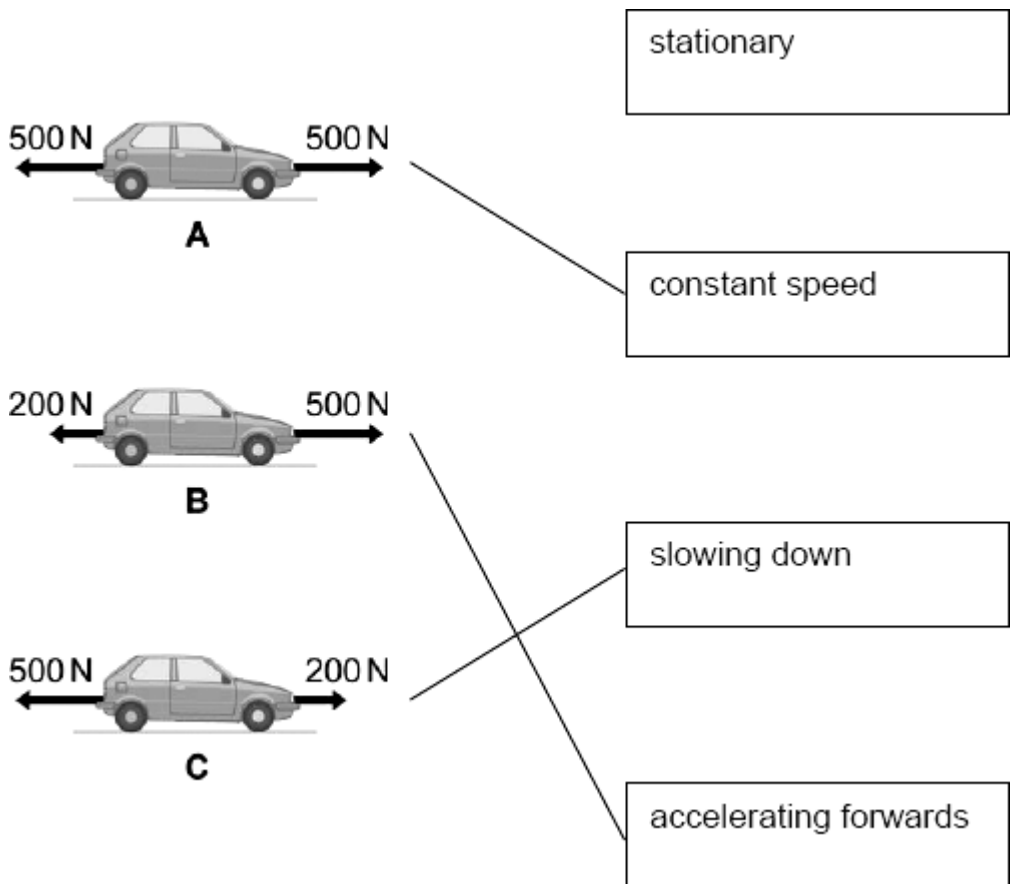> *accept 'the size' for radius*
> *both parts required for the mark*

            1

                [4]

2   (a)   *3 lines drawn*
all correct
allow 1 mark for each correct line
if two or more lines are drawn from any diagram then all these lines are incorrect

            3

(b)   (i)   horizontal arrow to the right

           judge by eye

           accept an arrow drawn outside the box if it is labelled correctly

                  1

      (ii)   horizontal arrow to the left

           judge by eye

           accept an arrow drawn outside the box if it is labelled correctly

                  1

      (iii)   equal to

                  1

      (iv)   to measure the forces exerted on the dummy during the impact

                  1

                  [7]

3   (a)   (i)   horizontal arrow pointing to the left

           judge by eye

           drawn anywhere on the diagram

               1

      (ii)   60 (N)

               1

           (at steady speed) resultant force must be zero

           accept forces must balance/are equal

           accept no acceleration

           *do **not** accept constant speed*

               1

     (b)   1680

           *allow **1** mark for correct substitution, ie 60 x 28 provided no subsequent step shown*

               2

       joule

           accept J

           do not accept j

               1

                  [6]

4   (a)   **B**

           reason only scores if B is chosen

               1

gradient / slope is the steepest / steeper

answers must be comparative

accept steepest line

ignore greatest speed

1

(b)   (velocity includes) direction

'it' refers to velocity

1

[3]