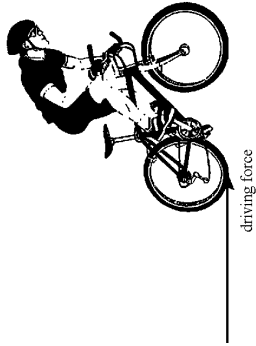


Forces & Motion Homework

Target grade

1. Two forces that act on a moving cyclist are the driving force and the resistive force.
 (a) The diagram shows a cyclist.



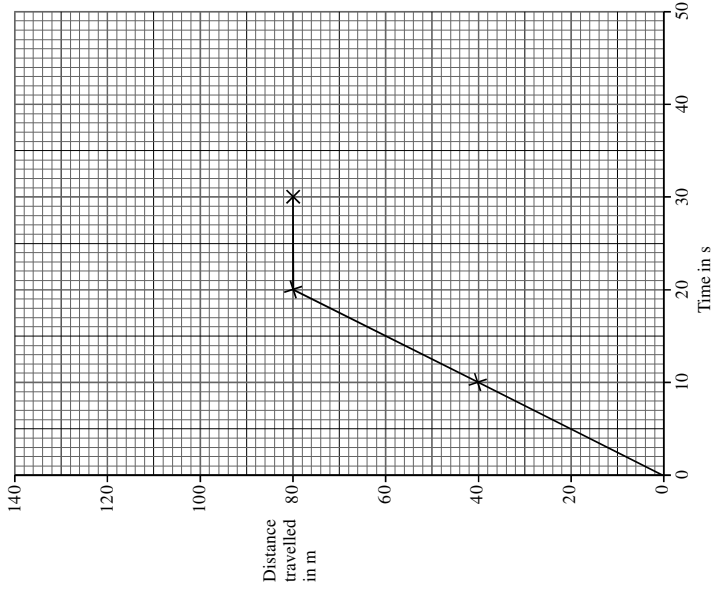
- (i) Add an arrow to show the direction of the resistive force. (1)
- (ii) The cyclist is speeding up. Which is the correct statement about these two forces?
 A The driving force is **greater** than the resistive force.
 B The driving force is **smaller** than the resistive force.
 C The driving force is the **same** as the resistive force.

Write the correct answer (A, B or C) in the box. (1)

- (b) The table shows how the distance travelled by a cyclist changes with time.

Distance travelled (m)	0	40	80	80	110	140
Time (s)	0	10	20	30	40	50

Some of these points have been plotted on the graph.



- (i) Complete the graph. (2)
- (ii) Between which TWO times shown on the graph was the cyclist not moving?
 Between.....s ands (1)

(iii) Between which TWO times shown on the graph did the cyclist have the greatest speed?

Between.....s ands

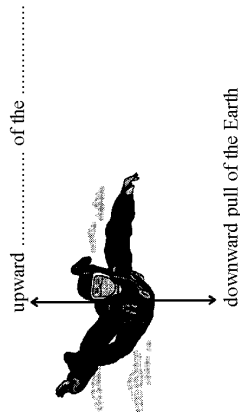
Explain your answer.

(1)

(Total 7 marks)

(1)

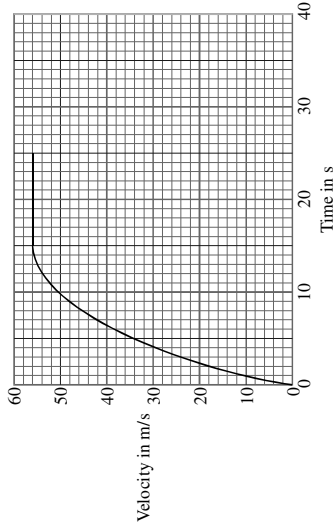
2. A skydiver jumps out of an aircraft. The diagram shows the two forces acting on the skydiver.



(a) Complete the label on the upward arrow.

(2)

(b) The graph shows how her velocity changes before she opens her parachute.



What is the skydiver's terminal velocity?

..... m/s

(1)

(c) What is the relationship between the two forces on the skydiver,

(i) before she reaches terminal velocity;

.....

(ii) when she is travelling at terminal velocity?

.....

(d) The skydiver opens her parachute 25 s after leaving the aircraft. She reaches a new terminal velocity ten seconds later.

(i) Add a line to the graph to show how her velocity changes after she opens her parachute.

(2)

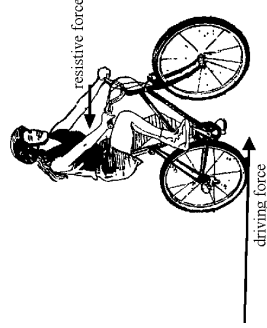
(ii) Explain why her velocity changes in this way.

.....

(Total 10 marks)

(3)

3. The diagram shows the horizontal forces acting on a cyclist while she is accelerating.



(a) Explain how the unbalanced force acting on the cyclist changes as she accelerates and then cycles at a constant speed.

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(b) Some racing cycles have lightweight frames. Why is it an advantage for the cycle to have a lightweight frame?

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(c) (i) A cyclist and her cycle have a total mass of 85 kg. Calculate the combined kinetic energy of the cyclist and cycle when travelling at a speed of 12 m/s.

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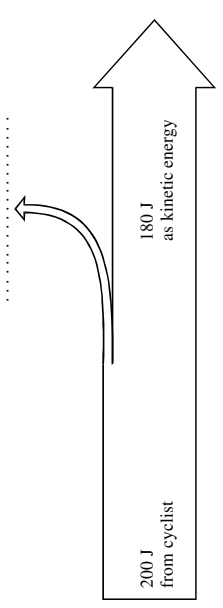
(ii) The kinetic energy of the cyclist and cycle increases at an average rate of 180 joules per second. Calculate the time it takes to gain this energy.

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(d) The diagram shows the energy flow through the cycle during the first second that the cyclist is accelerating.



(i) Complete the diagram by labelling the top arrow. (1)

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(ii) Calculate the efficiency of the cycle. (3)

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(iii) When the cyclist is travelling at constant speed, the kinetic energy is constant although the cyclist is still producing 200 J/s. Where does the energy go? (1)

.....

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(Total 15 marks)

Total	=	/32
29-32	A*	
26-28	A	
23-25	B	
16-22	C	
11-15	D	
8-10	E	