

Name of the Student: _____

Max. Marks : 21 Marks

Time : 21 Minutes

Mark Schemes

Q1.

(a) (i) friction

1

(ii) air resistance

accept drag

friction is insufficient

1

(iii) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5, and apply a 'best-fit' approach to the marking.

0 marks

No relevant content.

Level 1 (1–2 marks)

There is an attempt to explain in terms of forces A and B why the velocity of the cyclist changes between any two points

or

a description of how the velocity changes between any two points.

Level 2 (3–4 marks)

There is an explanation in terms of forces A and B of how the velocity changes between X and Y and between Y and Z

or

a complete description of how the velocity changes from X to Z.

or

an explanation and description of velocity change for either X to Y or Y to Z

Level 3 (5–6 marks)

There is a clear explanation in terms of forces A and B of how the velocity changes between X and Z

and

a description of the change in velocity between X and Z.

examples of the points made in the response

extra information

X to Y

- at X force A is greater than force B
- cyclist accelerates
- and velocity increases
- as cyclist moves toward Y, force B (air resistance) increases (with increasing velocity)

- resultant force decreases
- cyclist continues to accelerate but at a smaller value
- so velocity continues to increase but at a lower rate

Y to Z

- from Y to Z force B (air resistance) increases
- acceleration decreases
- force B becomes equal to force A
- resultant force is now zero
- acceleration becomes zero
- velocity increases until...
- cyclist travels at constant / terminal velocity

accept speed for velocity throughout

6

(b) (i) 3360

allow 1 mark for correct substitution,

ie 140×24 provided no subsequent step

accept 3400 for 2 marks if correct substitution is shown

2

joule / J

*do **not** accept j*

*do **not** accept Nm*

1

(ii) decreases

accept an alternative word / description for decrease

do not accept slows down

1

temperature

accept thermal energy

accept heat

1

[13]

Q2.

(a) gravitational / gravity / weight

*do **not** accept gravitational potential*

1

(b) accelerating

accept speed / velocity increases

1

the distance between the drops increases

1

but the time between the drops is the same

accept the time between drops is (always) 5 seconds

accept the drops fall at the same rate

1

(c) (i) any **one** from:

- speed / velocity

- (condition of) brakes / road surface / tyres
- weather (conditions)
accept specific examples, eg wet / icy roads
accept mass / weight of car friction is insufficient
reference to any factor affecting thinking distance negates this answer

1

(ii) 75 000

*allow **1** mark for correct substitution, ie 3000×25 provided no subsequent step shown*

***or** allow **1** mark for an answer 75*

***or** allow **2** marks for*

75 k(+ incorrect unit), eg 75 kN

2

joules / J

*do **not** accept j*

*an answer 75 kJ gains **3** marks*

for full marks the unit and numerical answer must be consistent

1

[8]