

Name:

Edexcel Style

Combined Science GCSE

Motion and Forces Test

(Levels 4–9)

Date:

Time allowed: 50mins

Question	Links to Student Progress Sheet	Score	Total marks Available
1	2.1, 2.4		6
2	2.12		10
3	2.7		6
4	2.11, 2.21		6
5	2.28, 2.29		6
6	2.24		5
7	2.15		6
8	2.8		5
Total			50

Score	Estimated Grade
47 – 50	9
40 – 46	8
33 – 39	7
28 – 32	6
24 – 27	5
20 – 23	4
0 – 19	U

Please be aware that these grade boundaries are Twinkl's own, and may not be in-line with Edexcel's own.

Area for Improvement:

1. (a) What is the difference between a scalar quantity and a vector quantity?

(2)

(b) Place a ✓ in the correct place to state whether the example is a vector or scalar quantity.

(4)

Example	Scalar Quantity	Vector Quantity
speed		
mass		
velocity		
acceleration		

(Total for Question 1 = 6 marks)

2. (a) Draw a line to match the method of transport with its typical speed.

(4)

wind	5.5m/s
cycling	1.4m/s
walking	5-20m/s
running	3m/s

(b) The speeds shown above are average speeds.

State two factors that can cause the speed of a jogger to vary over the course of a run.

(2)

(c) State the equation that links speed with distance and time. You must include all units.

(1)

(d) Rearrange your equation above to state the equation that would enable distance to be calculated.

(1)

(e) A van travels 75m in 6 seconds.

Calculate the speed of the van.

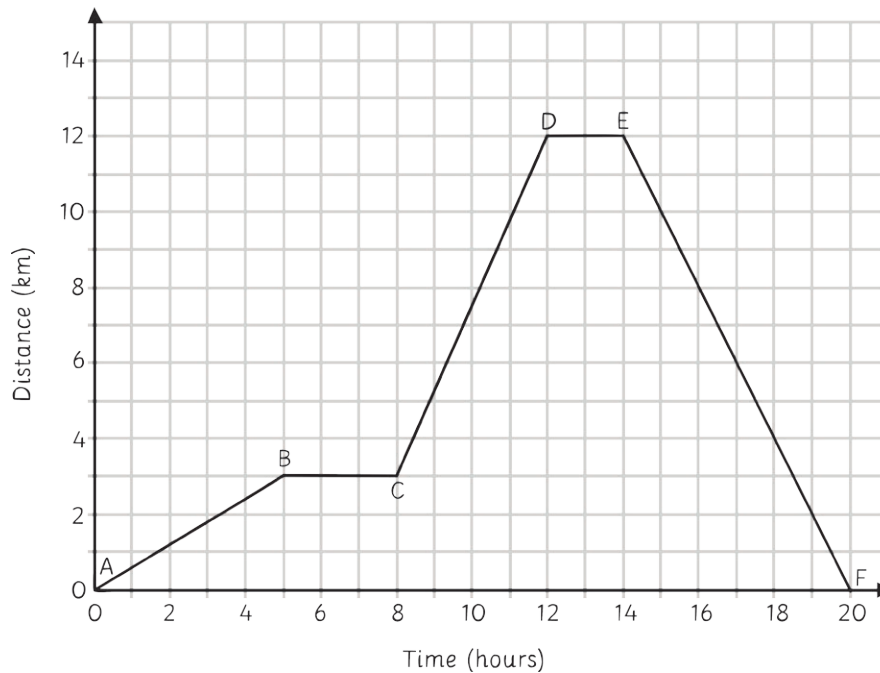
(1)

- (f) If the average speed of a car is 15m/s , how long does it take to travel the same distance as the van?

(1)

(Total for Question 2 = 10 marks)

3. The distance/time graph below shows how far something has travelled.



Using the information from the graph:

(a) Describe what is happening between points A- B.

(1)

(b) For how long is the object stationary?

(1)

(c) Describe what is happening between points E-F.

(1)

(d) Calculate the speed of the object between points C-D.

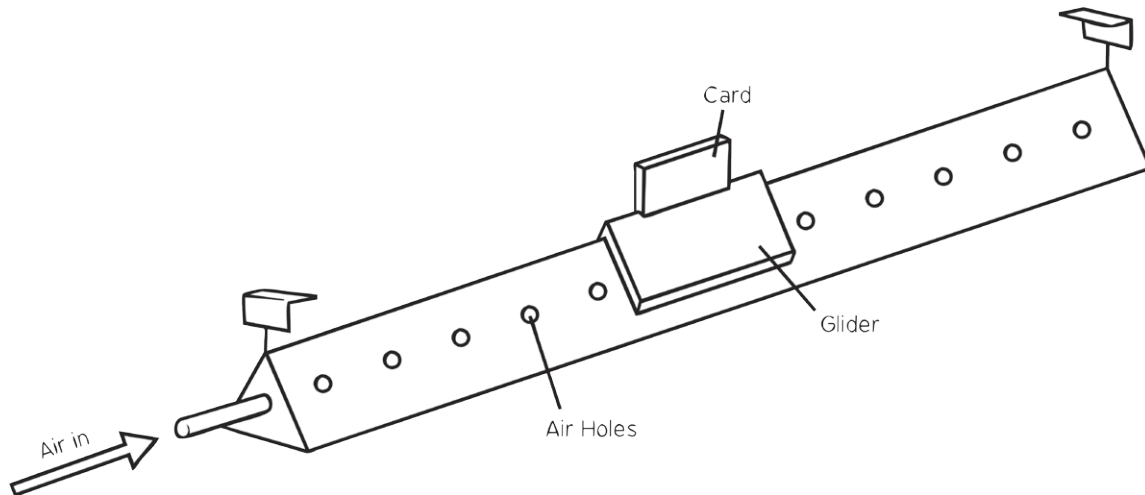
(2)

(e) On the graph above, sketch a line to show the object getting faster between 0 hours and 12 hours.

(1)

(Total for Question 3 = 6 marks)

4. Motion can be investigated using an air track as shown below.

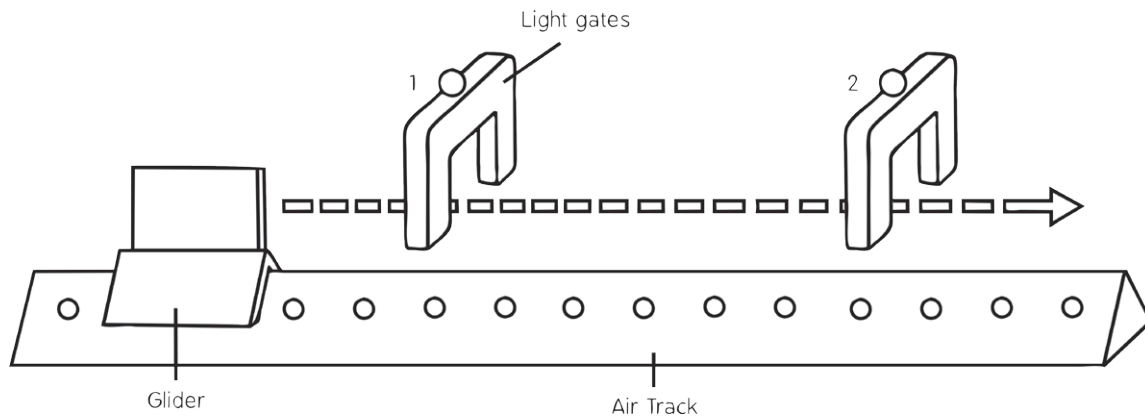


A glider floats on the cushion of air blown through the small holes in the track.

(a) How does the air cushion affect the glider?

(2)

Light gates are attached to the track as shown below and a data logger attached to record results.



- (b) The card has a length of 6.5cm and it takes 270 ms to move through the first gate. The glider moves at a constant speed.

Calculate, to two decimal places, the average speed as the glider moves through the light gate.

(2)

- (c) How long does it take for the glider to go through the second gate?

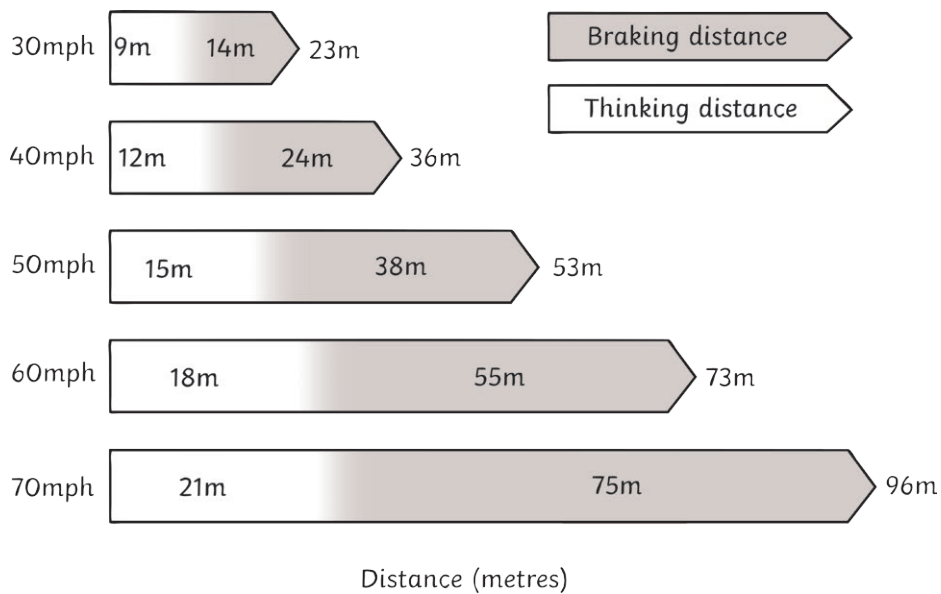
(2)

(Total for Question 4 = 6 marks)

5. (a) State two factors that affect the braking distance and two factors that affect thinking distance when getting a car to stop.

(4)

- (b) The Highway Code contains information about stopping distances when travelling at different speeds as shown below.



A car has to make an emergency stop when the driver sees a child playing in the road. The driver applies the brakes as quickly as possible. It takes the car 39m to stop and it travels a distance of 25m after the brakes have been applied.

Calculate the driver's thinking distance.

(2)

(Total for Question 5 = 6 marks)

6. (a) Define the term 'momentum'.

(1)

(b) State the equation that links momentum, mass and velocity.

To gain full marks, you must include all units.

(2)

(c) A child has a mass of 54kg and a momentum of 150kg/s.

What is her velocity? Give your answer to two decimal places.

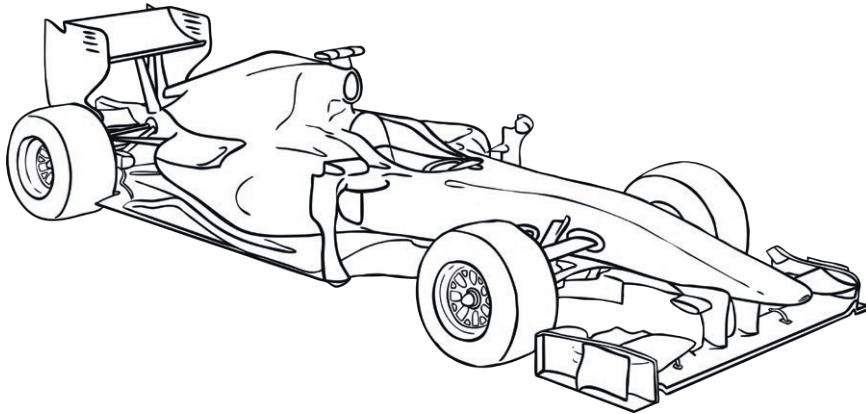
(2)

(Total for Question 6 = 5 marks)

7. (a) What is the formula that describes Newton's second law?

(1)

(b) A Formula One racing car has a mass of 702kg, including the driver, but not fuel.



What force must the car's engine supply if it has an acceleration of 14.2m/s^2 ?

(2)

(c) Using some of the words from the box below, complete the paragraph.

(3)

resultant	speed	mass	acceleration	direction	centripetal
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Velocity has both a _____ and _____. If an object is travelling in a circle, it will be changing both its direction and its velocity and there will be a _____ force. The force that keeps something moving in a circle is known as _____ force.

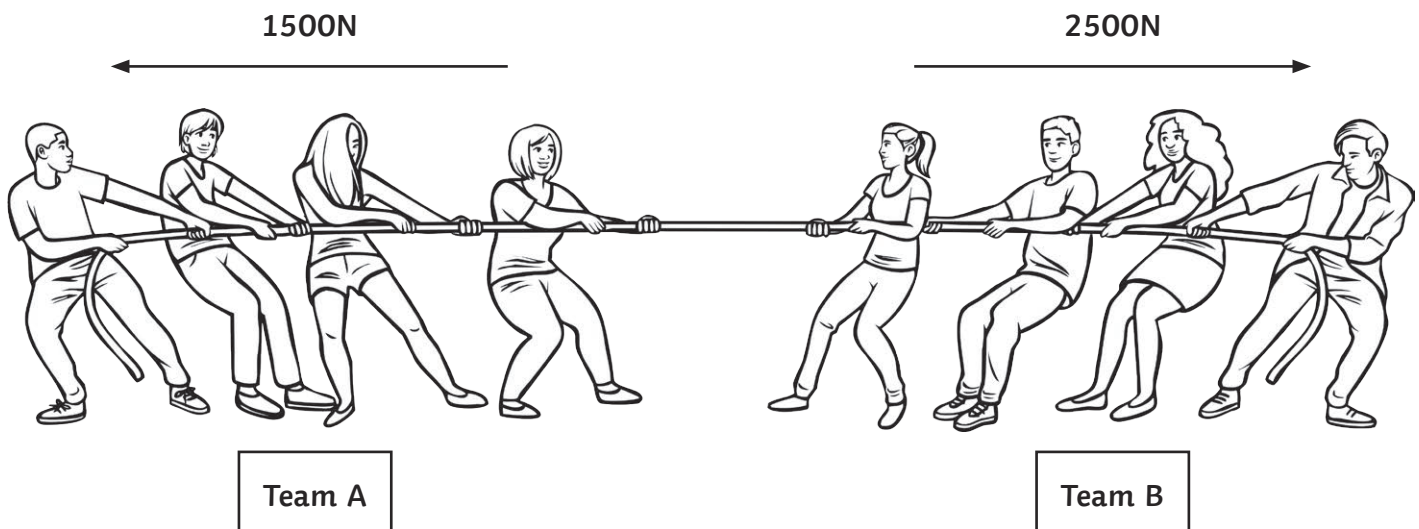
(Total for Question 7 = 6 marks)

8. (a) A dog accelerates from rest to a speed of 15m/s in 5 seconds.

Calculate its acceleration, showing your working and including units.

(3)

- (b) The diagram shows some of the forces exerted by tug of war teams.



- (i) Calculate the size of the resultant force acting on Team A.

(1)

- (ii) Which team will win?

Explain your answer.

(1)

(Total for Question 8 = 5 marks)

TOTAL FOR PAPER = 50 MARKS