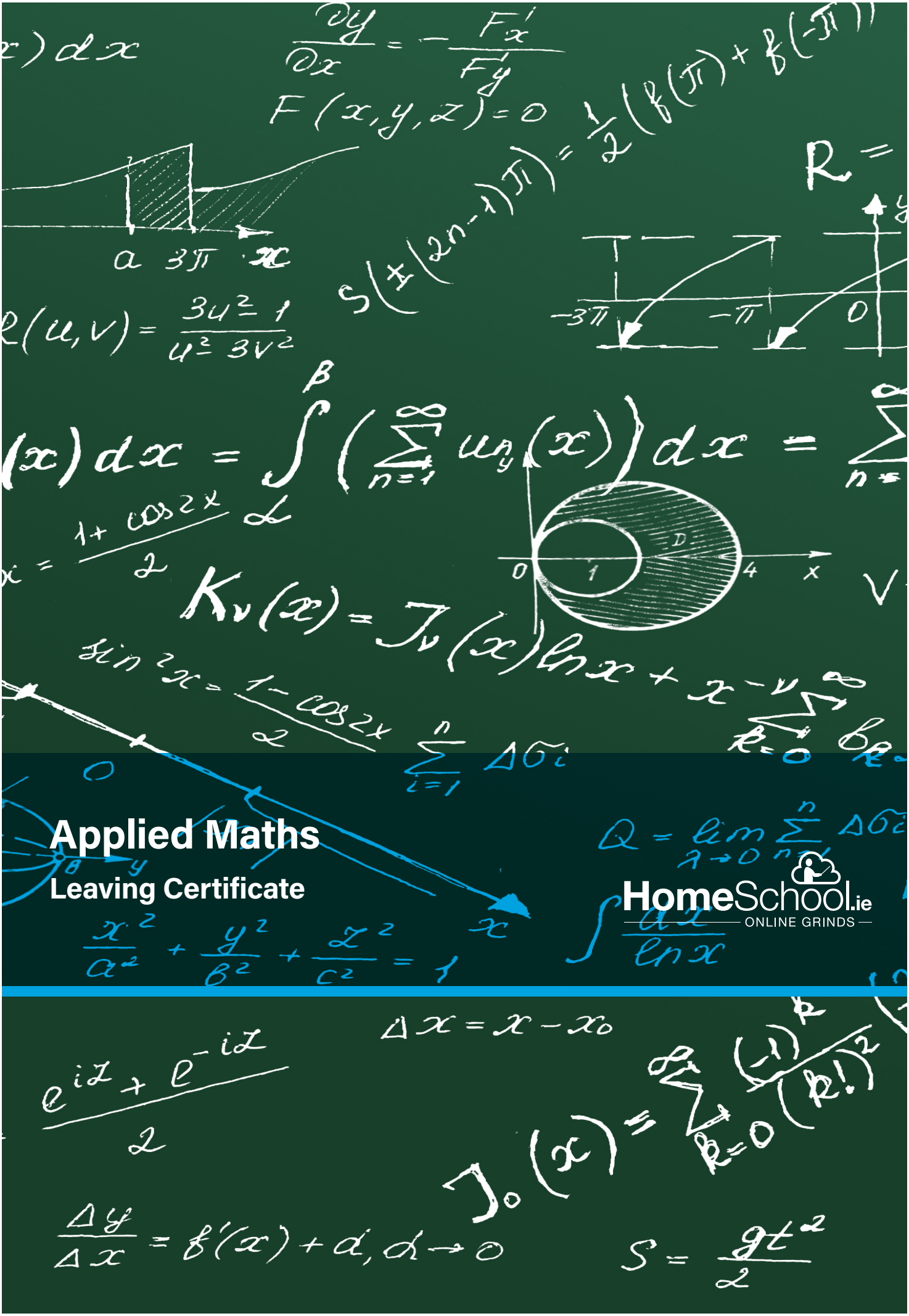


Applied Maths

Leaving Certificate

HomeSchool.ie
ONLINE GRINDS

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Subject: Applied Maths

Lesson 1: Linear Motion 1

Key Points about the subject

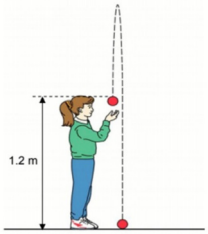
1. New Syllabus introduced in 2021 with the first leaving cert examination in June 2023.
2. Both Written Exam (80%) and Practical component (20%) make up final grade.
3. There are 10 questions on the paper and you must answer 8. (Need to cover all areas of the syllabus)
4. Modelling project is released in January and needs to be completed in class under supervision of your teacher.

Log tables Link: Microsoft Word - Formula book Dec 2014 (examinations.ie)

Topic 1: Linear Motion:

Linear motion is motion of an object in 1 Dimension only. This could be Horizontal or Vertical.





We will investigate and use the following measurements to help model problems and predict outcomes.

Term	Standard unit	Symbol	Definition
Displacement	Metres (m)	s	Distance from a particular point.
Velocity	Metres per second (m/s)	u (initial velocity) v (final velocity)	The speed of an object in a given direction.
Acceleration	Metres per second squared (m/s2)	a	The change in an objects speed
Time	Seconds	t	The time for an event to take place

Equations of Motion:

The equations of motion are the **Tools** we use to solve problems. We need to be able to pick the right tool for the right problem. The examples in the video will go through what each variable (letter) in the formula means and how we use them.

Equations of Motion

$$v = u + at$$

$$S = ut + \tfrac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

u = initial Velocity

v = final velocity

s = Displacement

a = acceleration

t = time taken

Question 1: (From Presentation)

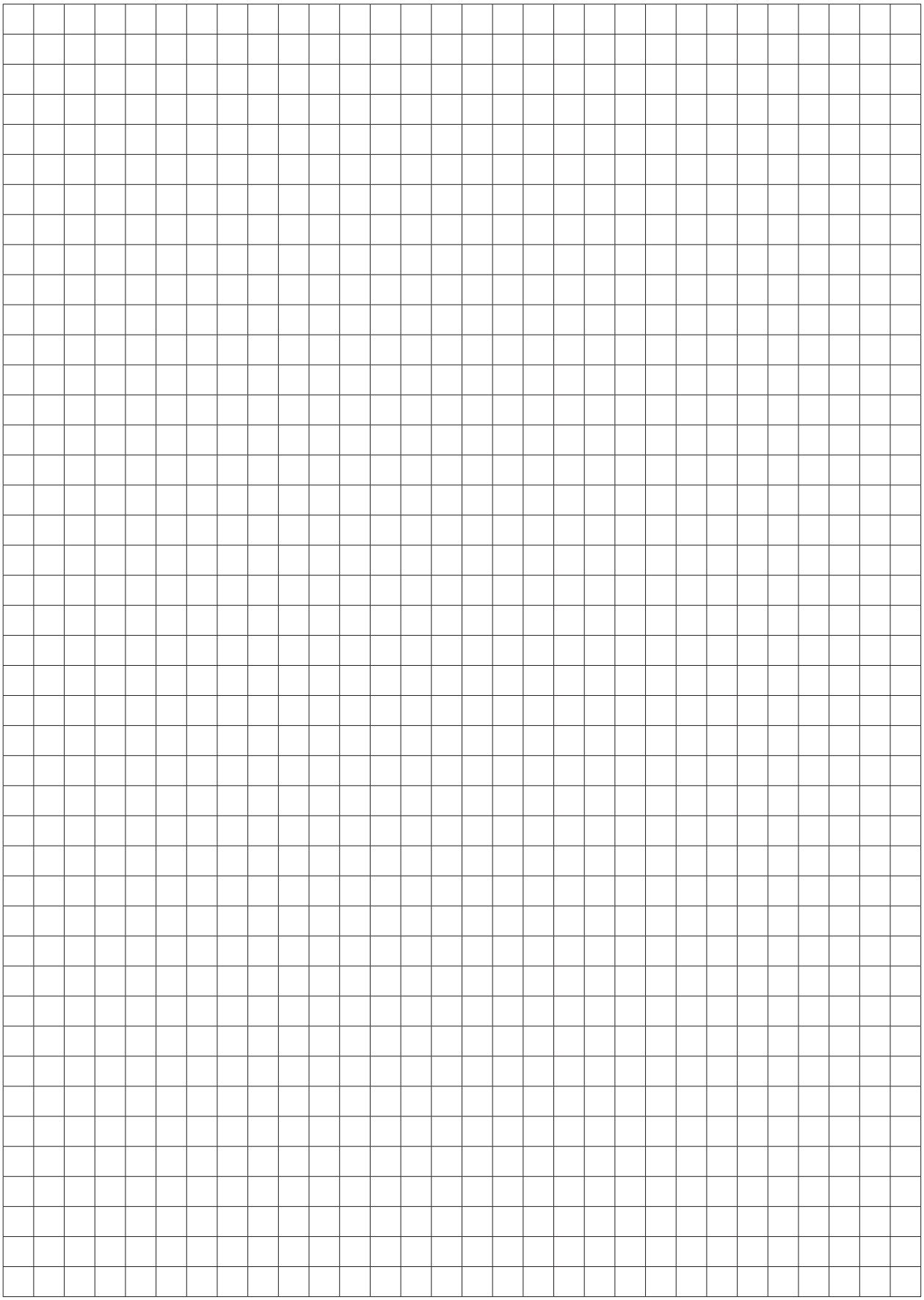
A boat decelerates uniformly from 17 m/s to 7m/s. It travels a distance of 60 metres in this time. Find the rate of deceleration.

Question 2: (From Presentation)

A car passes a person with a speed of 3 m/s and then accelerates uniformly at $2m/s^2$ and a distance of 300 metres. What is the rate of acceleration and the time taken?

Question 3: (From Presentation)

A car accelerates from a speed of 50m/s to a speed of 70m/s. During this time the car covers a distance of 300 metres. What is the rate of acceleration and the time taken?



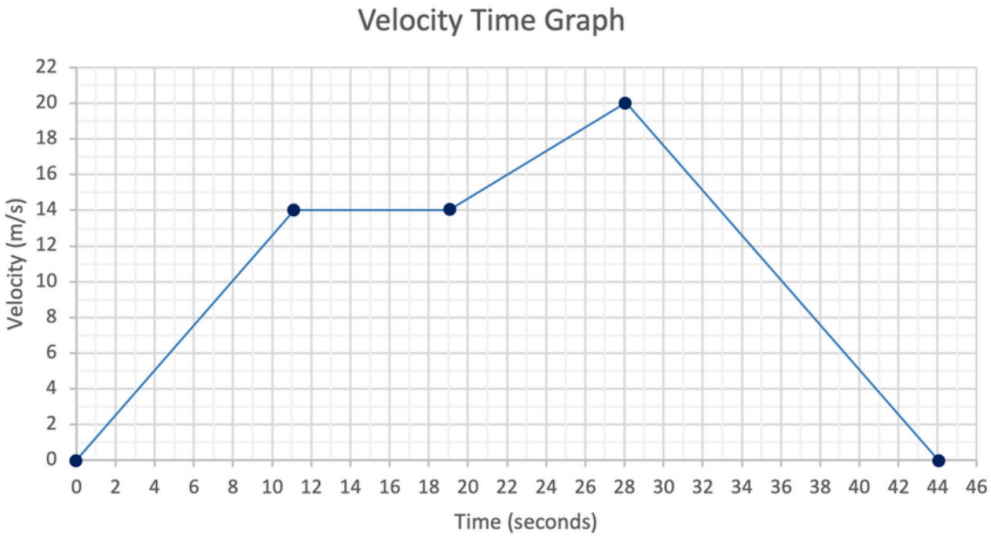
Question 4: (From Presentation)

A cyclist is travelling on a straight road at a speed of 5 m/s. When she passes a point X she starts to accelerate at a speed of $0.6 m/s^2$. How long will it take for her to cover a distance of 103.2 metres?

Hint at end of notes if needed.

Splitting questions into parts (different Accelerations or points in an event)
Velocity time graphs (From Presentation):

- A graph of the velocity of an object as time passes can be useful for visualising and solving problems.
- The velocity is always on the y axis and time is on the x axis.
- A useful rule of velocity time graphs is that the area under the graph is equal to the displacement travelled by the object.



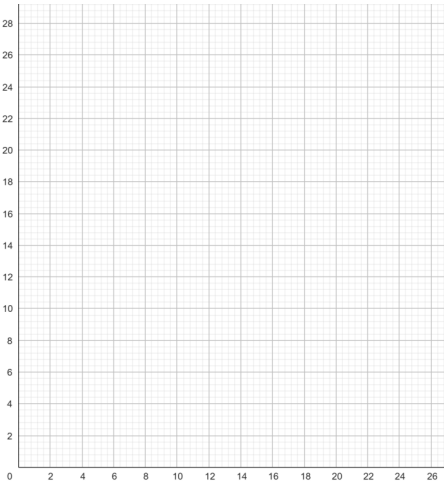
Question 5: (From Presentation)

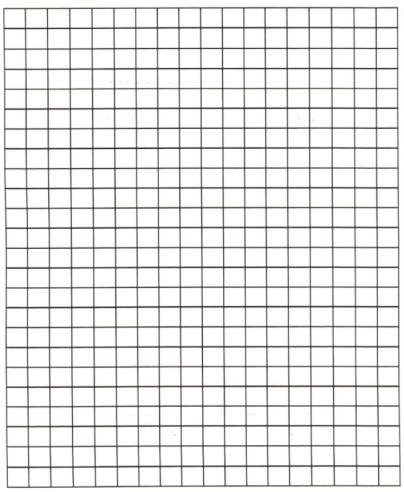
Two points on a road are marked A and D. When a car passes point A it is travelling at a velocity of 13 m/s and continues at this speed for 9 seconds. The car then accelerates for 5 seconds to a speed of 28 m/s. Finally the car breaks and decelerates back to rest at point D. The car covers 98 metres while it is slowing down.

i. Draw a velocity time graph for the problem.

ii. Find the acceleration and deceleration.

iii. (Find the distance from point A to point D.



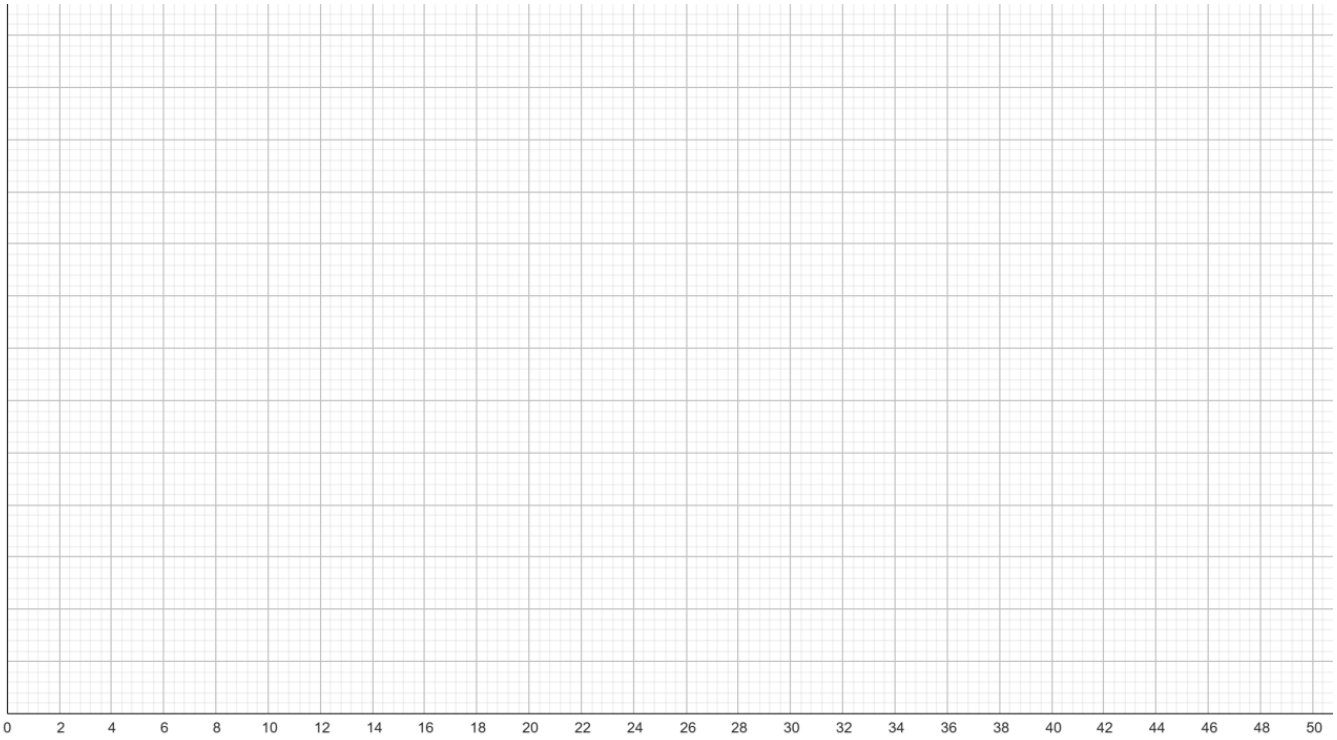


Question 6: (From Presentation Homework Question)

A boat starting from rest at point X accelerates for 10 seconds, travels at a uniform speed for 32 seconds and decelerates for 6 seconds to be at rest again at point Y.

i. Draw a velocity time graph representing this information.

ii. If the distance between X and Y is 1km find the maximum speed reached and the distance travelled in each section.



Question 7: (Additional Question)

A cyclists journey is 350 metres and it takes him 18 seconds complete it. Starting from rest he accelerates to a speed of 25m/s. He then stays at this speed for the rest of the journey.

How long is the cyclist spending accelerating?

Question 8: (Additional Question 2018 OL Exam paper Question 1)

The points P and Q lie on a straight level road.

A car passes P with a speed of 5 m s^{-1} and accelerates uniformly for

7 seconds to a speed of 26 m s^{-1}.

It then travels a distance of 234 metres at a constant speed of 26 m s^{-1}.

Finally, the car decelerates uniformly to rest at Q.

The car travels 52 metres while decelerating.

Find

i. The acceleration

ii. IPQI 1, the distnce from P to Q

iii. The average speed of the car as it travels from P to Q.

A motor-cyclist takes k seconds to travel from P to Q.

The motor-cyclist starts from rest at P and accelerates uniformly to a maximum speed of 30 m s^{-1}.

She then decelerates uniformly to rest at Q.

iv. Draw a speed-time graph of the motion of the motor-cyclist as she travels from P to Q.

v. Find the value of k.

Additional help

Question 4 Hint: You can solve this by using the second equation of motion and solving a quadratic equation or you can use the 3rd equation of motion to find the final velocity and then use that in the first equation of motion to find the time taken. Answer time = 12 seconds.

Question 7 Hint: Draw out a rough graph of the motion of the object. You should end up with a Triangle and the a rectangle (the part where the velocity is constant). The total time for the event is 18 seconds. If you have the time for the acceleration as x seconds and then the constant speed part will have a time of 18 – x seconds. Then try and find x by using the areas are equal to the distance. Answer acceleration is 8 seconds.