Oxford Cambridge and RSA

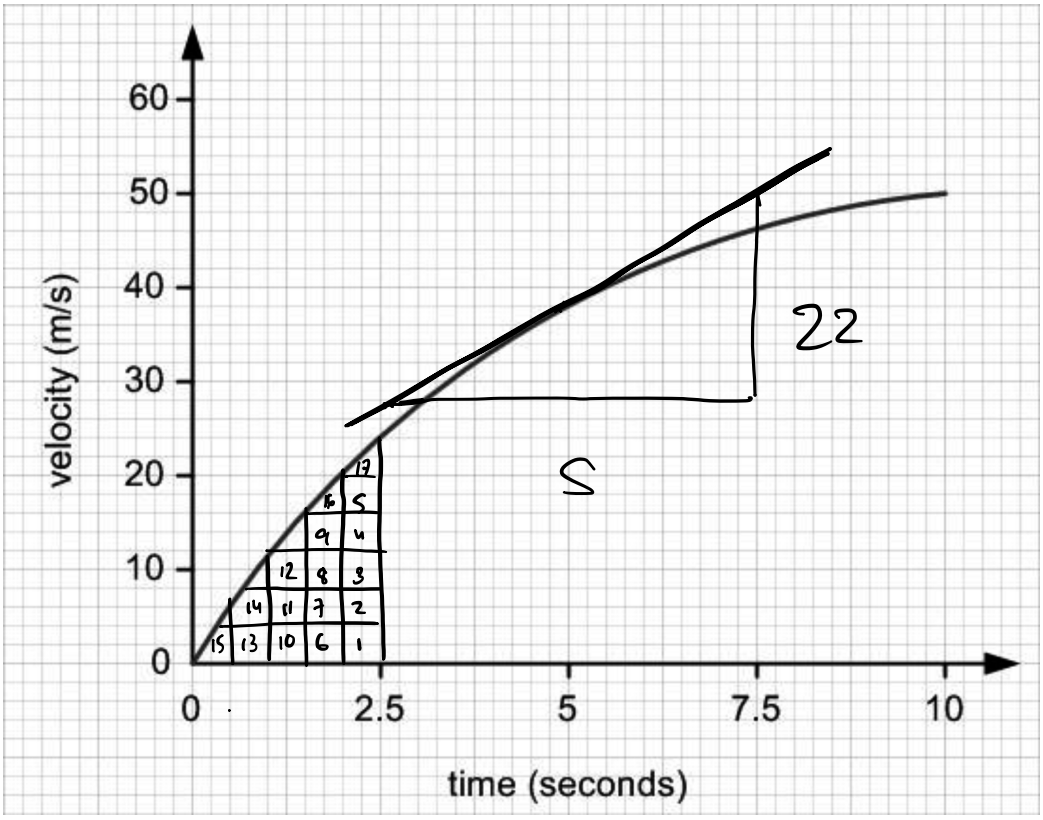
GCSE Physics A (Gateway)

J249/03 Physics A P1-P4 and P9 (Higher Tier)

Question Set 24

24 A free-fall skydiver falls from a plane and reaches terminal velocity after 15 seconds.

Look at the graph of her motion.



(a) Use the graph to find the acceleration at 5 seconds.

$\frac{22}{5} = 4.4$

Answer = 4.4 m / s^2

[3]

(b) Use the graph to find the distance travelled between 0 and 2.5 seconds.

17 squares

1 square $= \frac{2.5}{5} \times 4 = 2$

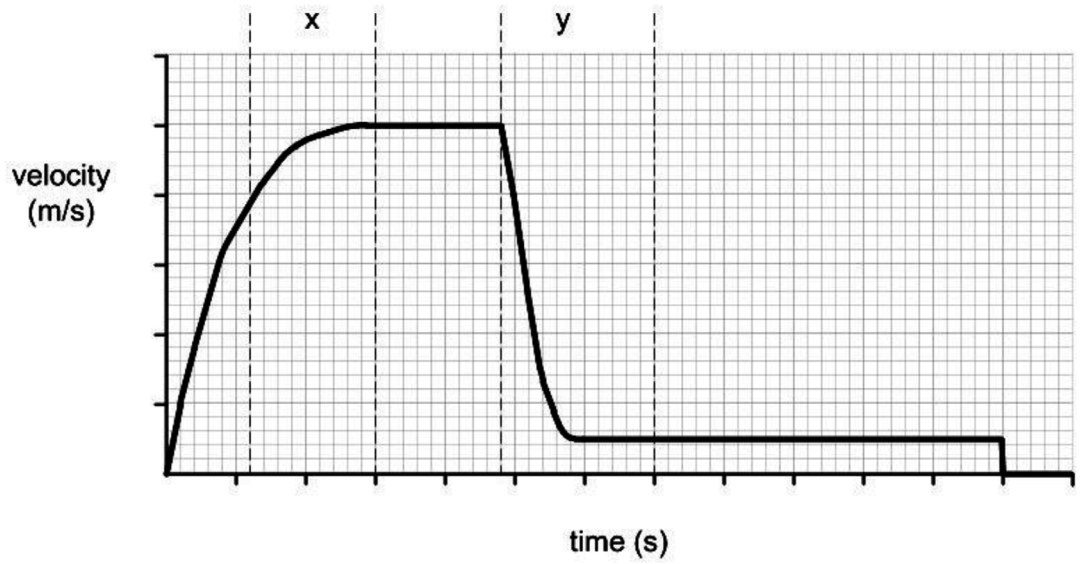
$17 \times 2 = 34$

Answer = 34 m

[2]

(c) A skydiver jumps from an aeroplane, falls towards the ground, opens her parachute and falls safely to Earth.

Look at the graph of the velocity of the skydiver as she falls.



Look at these regions of the graph:

- **x**
- **y**

Use ideas about forces to explain the motion during **x** and **y**.

[6]

Total Marks for Question Set 24: 11

At X: as time increases, speed increases and therefore the diver is accelerating however this is a less steep gradient so she isn't accelerating as much, because as speed increases so does air resistance. She then plateaus when air resistance equals her weight and she's moving at a terminal velocity.

At Y: As time goes on her speed decreases as air resistance is greater than her weight as her parachute opens, she is decelerating here; she then plateaus and reaches a new terminal velocity where acceleration is 0.