

SMART EXAM RESOURCES

SUBJECT: PHYSICS

TOPIC: SPEED-TIME

SET-2-QP-MS

- 1 An aeroplane accelerates along a horizontal runway before take-off. The aeroplane accelerates for 35 s. The speed of the aeroplane when it takes off is 72 m/s.

Fig. 1.1 shows how the speed of the aeroplane varies between time $t = 0$ and $t = 35$ s.

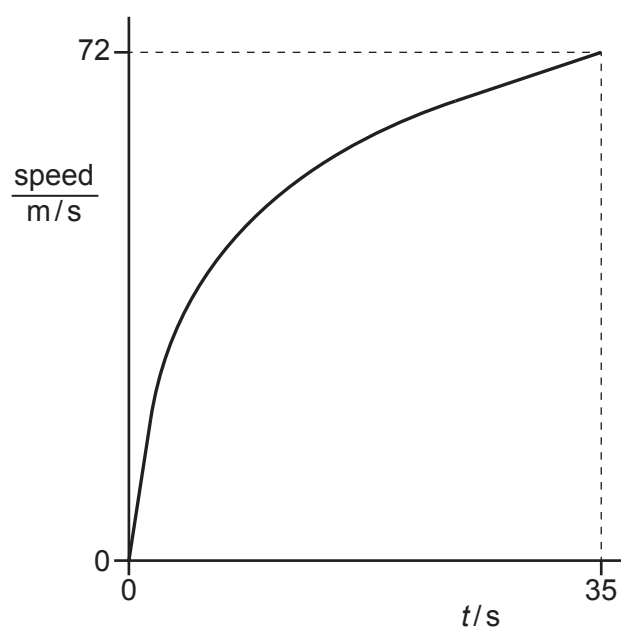


Fig. 1.1

- (a) Define acceleration.

.....
..... [1]

- (b) (i) Calculate the average acceleration of the aeroplane between $t = 0$ and $t = 35$ s.

acceleration = [1]

MARK SCHEME:

(a)	change of velocity per unit time or $\frac{v - u}{t}$	B1
(b)(i)	$(72 / 35 \Rightarrow) 2.1 \text{ m / s}^2$	A1

2 An aeroplane accelerates along a horizontal runway before take-off. The aeroplane accelerates for 35 s. The speed of the aeroplane when it takes off is 72 m/s.

Fig. 1.1 shows how the speed of the aeroplane varies between time $t = 0$ and $t = 35$ s.

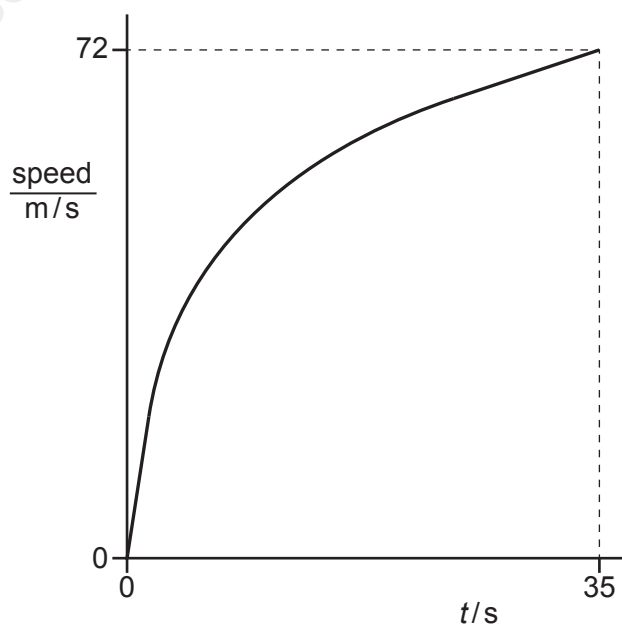


Fig. 1.1

(a) Define acceleration.

.....
 [1]

(b) (i) Calculate the average acceleration of the aeroplane between $t = 0$ and $t = 35$ s.

acceleration = [1]

(ii) The combined mass of the aeroplane, its passengers and its fuel on take-off is 1.1×10^5 kg.

Calculate the average resultant force on the aeroplane between $t = 0$ and $t = 35$ s.

force = [2]

- (iii) The force provided by the engines of the aeroplane is constant.

Give **one** possible explanation for the change in acceleration of the aeroplane between $t = 0$ and $t = 35$ s.

.....
..... [1]

- (iv) On Fig. 1.2, sketch a graph to show how the acceleration of the aircraft varies between $t = 0$ and $t = 35$ s.

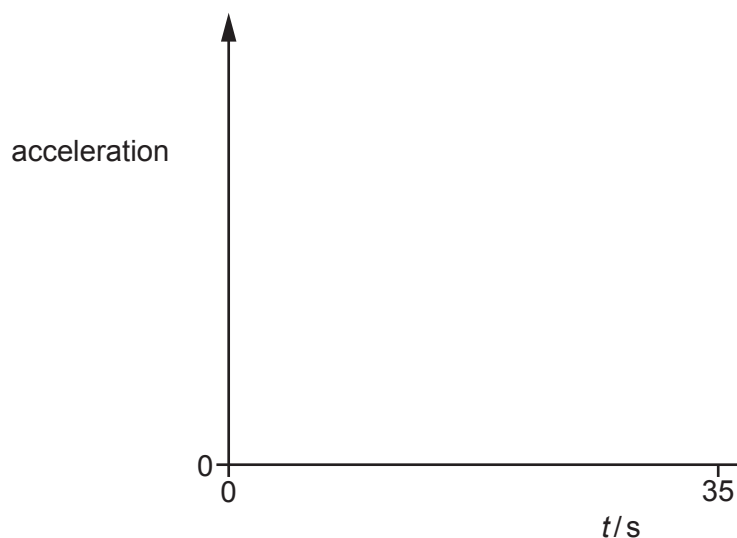


Fig. 1.2

[3]

[Total: 8]

MARK SCHEME:

(a)	change of velocity per unit time or $\frac{v - u}{t}$	B1
(b)(i)	$(72 / 35 =) 2.1 \text{ m / s}^2$	A1
(b)(ii)	230 000 N OR 230 kN	A2
	$F = ma$ OR $(F =) ma$ OR $110\,000 \times 2.1$	C1
(b)(iii)	any one from: <ul style="list-style-type: none"> (increase / change in) air resistance (increase / change in) wind 	B1
(b)(iv)	any three from: <ul style="list-style-type: none"> initial acceleration highest value AND horizontal line curved or straight line downwards curved or straight line downwards AND line not reaching zero by 35 s horizontal line before and up to 35 s. 	B3