Second Year Assignment Test 12 Version O

1. Find general solutions to the differential equations $\cos^2 x \frac{dy}{dx} = y^2 \sin^2 x$. Give your answers in the form $y = f(x)$

2. A fighter jet training programme takes only the top 2.5% of candidates on a test. Given that the scores can be modelled using a normal distribution with mean 80 and standard deviation 4, find the score necessary to get on the programme.

3. At time *t* seconds, a particle P has position vector **r** m with respect to a fixed origin O, where

$$r = 4t^2\boldsymbol{i} + (24t - 3t^2)\boldsymbol{j}, \quad t \geq 0$$

a) Find the speed of P when $t = 2$

b) Show that the acceleration of P is a constant and find the magnitude of this acceleration.

Second Year Assignment Test 12 Version P

1. Find general solutions to the differential equations $\cos^2 x \frac{dy}{dx} = \frac{1}{2}y^2 \sin^2 x$. Give your answers in the form $y = f(x)$

2. A fighter jet training programme takes only the top 3% of candidates on a test. Given that the scores can be modelled using a normal distribution with mean 80 and standard deviation 4, find the score necessary to get on the programme.

3. At time *t* seconds, a particle P has position vector **r** m with respect to a fixed origin O, where

$$r = 8t^2\boldsymbol{i} + (48t - 6t^2)\boldsymbol{j}, \quad t \geq 0$$

a) Find the speed of P when $t = 2$

b) Show that the acceleration of P is a constant and find the magnitude of this acceleration.

Second Year Assignment Test 12 Version Q

1. Find general solutions to the differential equations $\cos^2 x \frac{dy}{dx} = \frac{1}{3} y^2 \sin^2 x$. Give your answers in the form $y = f(x)$

2. A fighter jet training programme takes only the top 1.5% of candidates on a test. Given that the scores can be modelled using a normal distribution with mean 80 and standard deviation 4, find the score necessary to get on the programme.

3. At time *t* seconds, a particle P has position vector **r** m with respect to a fixed origin O, where

$$r = 28t^2\boldsymbol{i} + (168t - 21t^2)\boldsymbol{j}, \quad t \geq 0$$

a) Find the speed of P when $t = 2$

b) Show that the acceleration of P is a constant and find the magnitude of this acceleration.

Second Year Assignment Test 12 Version R

1. Find general solutions to the differential equations $\cos^2 x \frac{dy}{dx} = \frac{1}{a} y^2 \sin^2 x$. Give your answers in the form $y = f(x)$

2. A fighter jet training programme takes only the top 0.5% of candidates on a test. Given that the scores can be modelled using a normal distribution with mean 80 and standard deviation 4, find the score necessary to get on the programme.

3. At time *t* seconds, a particle P has position vector **r** m with respect to a fixed origin O, where

$$r = 2t^2\boldsymbol{i} - (12t - 1.5t^2)\boldsymbol{j}, \quad t \geq 0$$

a) Find the speed of P when $t = 2$

b) Show that the acceleration of P is a constant and find the magnitude of this acceleration.

Answers version O

1 $y = \frac{-1}{\tan x - x + c}$

2. 87.8

3. a) $20\ ms^{-1}$ b) $10\ ms^{-2}$

Answers version P

1 $y = \frac{-2}{\tan x - x + c}$

2. 87.5

3. a) $40\ ms^{-1}$ b) $20\ ms^{-2}$

Answers version Q

1 $y = \frac{-3}{\tan x - x + c}$

2. 88.7

3. a) $140\ ms^{-1}$ b) $70\ ms^{-2}$

Answers version R

1 $y = \frac{-a}{\tan x - x + c}$

2. 90.3

3. a) $10\ ms^{-1}$ b) $5\ ms^{-2}$