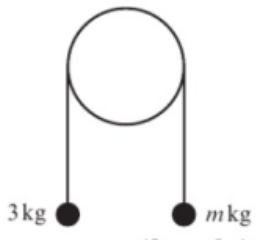
Second Year Assignment Test 13 Version O

1. A particle P moves in a straight line in such a way that at time t seconds its velocity **v** ms^{-1} is given by

$$\mathbf{v}=\begin{cases} t\sqrt{14+2t^2} & 0 \le t \le 5 \\ \frac{1000}{t^2} & t > 5 \end{cases}$$

When t = 0, P is at the point O. Calculate the displacement of P from O when
a) t = 5 b) t = 6

2. Two particles have masses 3 kg and m kg, where m < 3. They are attached to the ends of a light inextensible string. The string passes over a smooth fixed pulley. The particles are held in position with the string taut and the hanging parts of the string vertical, as shown. The particles are then released from rest. The initial acceleration of each particle has magnitude $\frac{3}{7}g$. Find:



a) the tension in the string immediately after the particles are released

b) the value of m

3. A single observation, x, is taken from a binomial distribution B(20, p) and a value of 10 is obtained. Use this observation to test $H_0: p = 0.3$ against $H_1: p > 0.3$ using a 5% significance level.

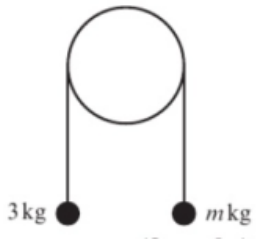
Second Year Assignment Test 13 Version P

1. A particle P moves in a straight line in such a way that at time t seconds its velocity **v** ms^{-1} is given by

$$\mathbf{v}=\begin{cases}2t\sqrt{14+2t^2} & 0\le t\le 5\\ \frac{1000}{t^2} & t>5\end{cases}$$

When t = 0, P is at the point O. Calculate the displacement of P from O when
a) t = 5 b) t = 6

2. Two particles have masses 3 kg and m kg, where m < 3. They are attached to the ends of a light inextensible string. The string passes over a smooth fixed pulley. The particles are held in position with the string taut and the hanging parts of the string vertical, as shown. The particles are then released from rest. The initial acceleration of each particle has magnitude $\frac{2}{7}g$. Find:



a) the tension in the string immediately after the particles are released

b) the value of m

3. A single observation, x, is taken from a binomial distribution B(20, p) and a value of 11 is obtained. Use this observation to test $H_0: p = 0.3$ against $H_1: p > 0.3$ using a 5% significance level.

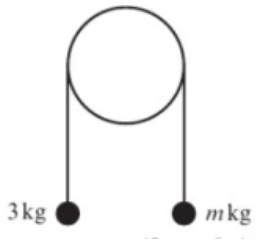
Second Year Assignment Test 13 Version Q

1. A particle P moves in a straight line in such a way that at time t seconds its velocity **v** ms^{-1} is given by

$$\mathbf{v}=\begin{cases} 3t\sqrt{14+2t^2} & 0 \le t \le 5 \\ \frac{1000}{t^2} & t > 5 \end{cases}$$

When t = 0, P is at the point O. Calculate the displacement of P from O when
a) t = 5 b) t = 6

2. Two particles have masses 3 kg and m kg, where m < 3. They are attached to the ends of a light inextensible string. The string passes over a smooth fixed pulley. The particles are held in position with the string taut and the hanging parts of the string vertical, as shown. The particles are then released from rest. The initial acceleration of each particle has magnitude $\frac{1}{7}g$. Find:



a) the tension in the string immediately after the particles are released

b) the value of m

3. A single observation, x, is taken from a binomial distribution B(20, p) and a value of 9 is obtained. Use this observation to test $H_0: p = 0.3$ against $H_1: p > 0.3$ using a 5% significance level.

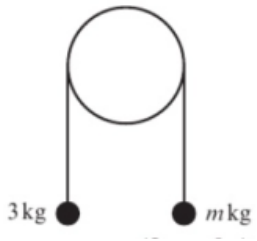
Second Year Assignment Test 13 Version R

1. A particle P moves in a straight line in such a way that at time t seconds its velocity **v** ms^{-1} is given by

$$\mathbf{v}=\begin{cases}4t\sqrt{14+2t^2} & 0\le t\le 5\\ \frac{1000}{t^2} & t>5\end{cases}$$

When t = 0, P is at the point O. Calculate the displacement of P from O when
a) t = 5 b) t = 6

2. Two particles have masses 3 kg and m kg, where m < 3. They are attached to the ends of a light inextensible string. The string passes over a smooth fixed pulley. The particles are held in position with the string taut and the hanging parts of the string vertical, as shown. The particles are then released from rest. The initial acceleration of each particle has magnitude $\frac{4}{7}g$. Find:



a) the tension in the string immediately after the particles are released

b) the value of m

3. A single observation, x, is taken from a binomial distribution B(20, p) and a value of 8 is obtained. Use this observation to test $H_0: p = 0.3$ against $H_1: p > 0.3$ using a 5% significance level.

Answers Version O

1 a) 76.6 m (3 s.f.) b) 110 m (3 s.f.)

2. a) $16.8\ \ N\ \ = \frac{12g}{7}$

b) $m = 1.2$

3) 0.0479 < 0.05 There is sufficient evidence to reject H_0 so p > 0.3

$p(X \geq 10) = 1 - p(X \leq 9) = 1 - 0.9521 = 0.0479$

Answers Version P

1 a) 153.3 m (3 s.f.) b) 187 m (3 s.f.)

2. a) $21\ \ N = \frac{15g}{7}$

b) $m = \frac{5}{3}$

3) 0.017 < 0.05 There is sufficient evidence to reject H_0 so p > 0.3

$p(X \geq 11) = 1 - p(X \leq 10) = 1 - 0.9828 = 0.0172$

Answers Version Q

1 a) 229.8 m (3 s.f.) b) 263 m (3 s.f.)

2. a) $25.2\ N\ \ = \frac{18g}{7}$

b) $m = 2.25$

3) 0.113 > 0.05 There is not sufficient evidence to reject H_0 so p = 0.3

$p(X \geq 9) = 1 - p(X \leq 8) = 1 - 0.887 = 0.113$

Answers Version R

1 a) 306.6 m (3 s.f.) b) 340 m (3 s.f.)

2. a) $12.6\ \ N\ \ = \frac{9g}{7}$

b) $m = \frac{9}{11}$

3) 0.227 > 0.05 There is not sufficient evidence to reject 0 so p = 0.3

$p(X \geq 8) = 1 - p(X \leq 7) = 1 - 0.773 = 0.227$