

# Mark Scheme (Results)

## Summer 2010

GCE

GCE Mechanics M1 (6677/01)

Edexcel is one of the leading examining and awarding bodies in the UK and throughout the world. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers.

Through a network of UK and overseas offices, Edexcel's centres receive the support they need to help them deliver their education and training programmes to learners.

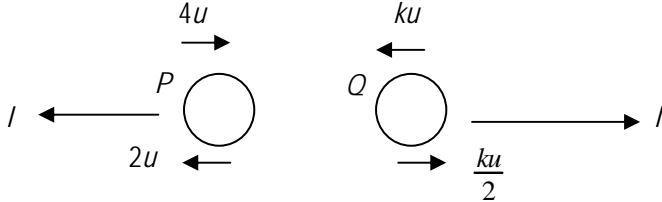
For further information, please call our GCE line on 0844 576 0025, our GCSE team on 0844 576 0027, or visit our website at [www.edexcel.com](http://www.edexcel.com).

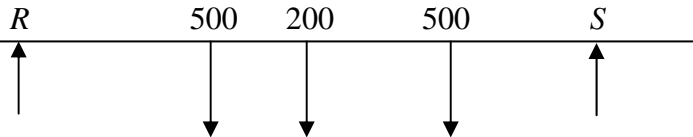
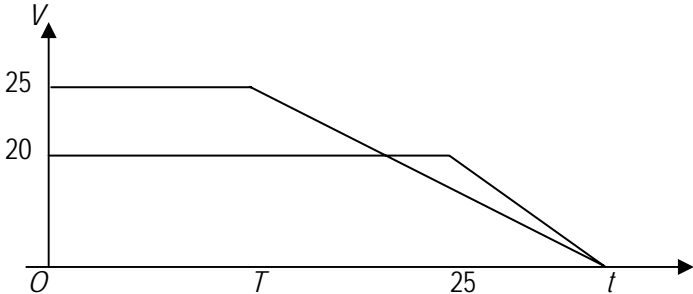
If you have any subject specific questions about the content of this Mark Scheme that require the help of a subject specialist, you may find our **Ask The Expert** email service helpful.

Ask The Expert can be accessed online at the following link:

<http://www.edexcel.com/Aboutus/contact-us/>

Summer 2010  
Mechanics M1 6677  
Mark Scheme

| Question Number | Scheme   | Marks                                      |
|-----------------|--|--|
| Q1              | $(-4\mathbf{i} - 7\mathbf{j}) = \mathbf{r} + 4(-3\mathbf{i} + 2\mathbf{j})$ $\mathbf{r} = (8\mathbf{i} - 15\mathbf{j})$ $ \mathbf{r}  = \sqrt{8^2 + (-15)^2} = 17 \text{ m}$ | M1 A1<br>A1<br>M1 A1 ft<br>[5]             |
| Q2 (a)          |  $4mu - 3mku = -2mu + 3mk \frac{u}{2}$ $k = \frac{4}{3}$                                    | M1 A1<br>M1 A1cso (4)                      |
| (b)             | For P, $I = m(2u - -4u)$<br>$= 6mu$<br><b>OR</b> For Q, $I = 3m(\frac{ku}{2} - -ku)$   | M1 A1<br>A1 (3)<br>(M1A1)<br>[7]           |
| Q3              | $(\rightarrow) 100\cos 30 = F$<br>$F = 0.5 R \text{ seen}$<br>$(\downarrow) mg + 100\cos 60 = R$<br>$m = 13 \text{ kg or } 12.6 \text{ kg}$                                  | M1 A1<br>A1 (B1)<br>M1 A1<br>DM1 A1<br>[7] |

| Question Number | Scheme  | Marks   |
|-----------------|---|---|
| Q4              |  <p> <math>M(B),</math><br/> <math>500x + 500.2x + 200x3 = Rx5 + Sx1</math> (or any valid moments equation)<br/> <math>(\downarrow) R + S = 500 + 500 + 200 = 1200</math> (or a moments equation)<br/>                     solving for <math>x; x = 1.2</math> m                 </p> | <p>M1 A1 A1</p> <p>M1 A1</p> <p>M1 A1 cso</p> <p>[7]</p>              |
| Q5 (a)          |  <p>Shape (both)<br/>Cross<br/>Meet on <math>t</math>-axis<br/>Figures 25,20,T,25</p>   | <p>B1<br/>B1<br/>B1<br/>B1</p> <p>(4)</p>                             |
| (b)             | <p>For Q: <math>20\left(\frac{t+25}{2}\right) = 800</math><br/> <math>t = 55</math></p> <p>For P: <math>25\left(\frac{T+55}{2}\right) = 800</math><br/>                     solving for T: <math>T = 9</math></p>   | <p>M1 A1</p> <p>DM1 A1</p> <p>M1 A1</p> <p>DM1 A1 (8)</p> <p>[12]</p> |

| Question Number | Scheme   | Marks                             |
|-----------------|--|-----------------------------------|
| Q6 (a)          | $(\uparrow)v^2 = u^2 + 2as$<br>$0 = 14.7^2 - 2 \times 9.8 \times s$<br>$s = 11.025$ (or 11 or 11.0 or 11.03) m<br>Height is 60 m or 60.0 m <b>ft</b> | M1A1<br>A1<br>A1ft (4)            |
| (b)             | $(\downarrow)v^2 = u^2 + 2as$<br>$v^2 = (-14.7)^2 + 2 \times 9.8 \times 49$<br>$v = 34.3$ or $34 \text{ m s}^{-1}$                                   | M1 A1<br>A1 (3)                   |
| (c)             | $(\downarrow)v = u + at$ <b>OR</b> $(\downarrow)s = ut + \frac{1}{2}at^2$<br>$34.3 = -14.7 + 9.8t$ $49 = -14.7t + 4.9t^2$<br>$t = 5$ $t = 5$         | M1 A1<br>A1 (3)<br><b>[10]</b>    |
| Q7 (a)          | $F = \frac{1}{3}R$<br>$(\uparrow) R \cos \alpha - F \sin \alpha = 0.4g$<br>$R = \frac{2}{3}g = 6.53$ or $6.5$  | B1<br>M1 A1<br>M1 A1 (5)          |
| (b)             | $(\rightarrow)P - F \cos \alpha - R \sin \alpha = 0$<br>$P = \frac{26}{45}g = 5.66$ or $5.7$   | M1 A2<br>M1 A1 (5)<br><b>[10]</b> |

| Question Number         | Scheme   | Marks   |
|-------------------------|--|---|
| Q8 (a)<br>Mark together | $(\downarrow)0.4g - T = 0.4a$<br>$(\uparrow)T - 0.3g = 0.3a$<br>solving for $T$<br>$T = 3.36 \text{ or } 3.4 \text{ or } 12g/35 \text{ (N)}$   | M1 A1<br>M1 A1<br>DM1<br>A1 (6)   |
| (b)                     | $0.4g - 0.3g = 0.7a$<br>$a = 1.4 \text{ m s}^{-2}, g/7$  | DM1<br>A1 (2)   |
| (c)                     | $(\uparrow)v = u + at$<br>$v = 0.5 \times 1.4$<br>$= 0.7$<br><br>$(\uparrow)s = ut + \frac{1}{2}at^2$<br>$s = 0.5 \times 1.4 \times 0.5^2$<br>$= 0.175$<br><br>$(\downarrow)s = ut + \frac{1}{2}at^2$<br>$1.175 = -0.7t + 4.9t^2$<br>$4.9t^2 - 0.7t - 1.175 = 0$<br>$t = \frac{0.7 \pm \sqrt{0.7^2 + 19.6 \times 1.175}}{9.8}$<br>$= 0.5663 \text{..or } - \dots$<br><br>Ans 0.57 or 0.566 s | M1<br>A1 ft on $a$<br><br>M1<br>A1 ft on $a$<br><br>DM1 A1 ft<br><br>DM1 A1 cao<br><br>A1 cao (9)<br>[17] |



Further copies of this publication are available from  
Edexcel Publications, Adamsway, Mansfield, Notts, NG18 4FN

Telephone 01623 467467

Fax 01623 450481

Email [publications@linneydirect.com](mailto:publications@linneydirect.com)

Order Code UA024469 Summer 2010

For more information on Edexcel qualifications, please visit [www.edexcel.com/quals](http://www.edexcel.com/quals)

Edexcel Limited. Registered in England and Wales no.4496750

Registered Office: One90 High Holborn, London, WC1V 7BH