

UNIVERSITY OF MALTA JUNIOR COLLEGE

DEPARTMENT OF MATHEMATICS

APPLIED MATHS INTERMEDIATE LEVEL

End-of-Year Exam – ANSWER SHEET – JUNE 2018

1. (b) $|\mathbf{Q}| = 15.62\text{N}$, \mathbf{Q} makes an angle of 93.67° with \mathbf{P} .
2. (a) $\mathbf{r}_1 = 4\mathbf{i} + \mathbf{j} + \lambda(3\mathbf{i} + 3\mathbf{j})$, $\mathbf{r}_2 = \mathbf{i} + 2\mathbf{j} + \mu(3\mathbf{i} + 4\mathbf{j})$.
(b) $(-11, -14)$.
(c) $\mathbf{F} = 9\mathbf{i} + 11\mathbf{j}$, $\mathbf{r} = -11\mathbf{i} - 14\mathbf{j} + \gamma(9\mathbf{i} + 11\mathbf{j})$.
3. (a) $F = 91.22\text{N}$, $\theta = 82.94^\circ$. (b) $Fr = 272\text{N}$, $\mu = 0.34$.
4. (b) $T = 2W$.
5. (a) $\frac{4\sqrt{3}W}{3}$, $\frac{4\sqrt{3}W}{3}$. (b) $2W$ at 30° with the horizontal plane.
6. (a) $T_1 = \frac{4mg(x-l)}{l}$, $T_2 = \frac{4mg(3l-x)}{l}$ (b) $\frac{17l}{8}$.
where x is the distance below A where
the particle rests in equilibrium.
7. (b) $\frac{5}{3}\text{m/s}^2$, 1300N . (c) $\frac{1}{3}\text{m/s}^2$. (d) tension of 100N .
8. (a) 4.9m/s^2 . (b) 2.754N . (c) 4.583N at 33.69° to the vertical.
9. (a) $\frac{1}{4}$. (b) $\frac{3l}{2}$.
10. (a) 20.1N at 5.71° to AB acting at 8m along BA produced.
(b) Resultant has same magnitude and direction, $G = 10\text{Nm}$ in the sense ABC.