

Answers to Exam #4A – (2003; Theme: Indiana Jones)

1a) $a = 134 \text{ cm/s}^2$

1b) $\vec{v}_{I/T} = (4\hat{i} - 9\hat{j})\text{km/hr}$

1c) $\vec{v}_M = (-2\hat{i} + 3.464\hat{j})\text{m/s}$

1d) $v_{\text{ave}} = 0$

1e) $v_{\text{ave}} = 1.333 \text{ m/s}$

1f) $s = 6.28 \text{ m/s}$

1g) $a = 39.48 \text{ m/s}^2$

1h) $m = 1.732$

1i) $T = 1.555 \text{ s}$

1j) $k = 16.333 \text{ N/m}$

1k) Positive: CD DE

Negative: GH HI

1l) 1. DE

2. AB

3. EF

4. BC

5. FG

6. CD

1m) Strong, Weak, Gravity, Electromagnetic

2a) $v_0 = 275.84 \text{ m/s}$

2b) $H = 288\text{m}$

2c) $v_f = 265.4 \text{ m/s}$

3a) 0.9 rad/s

3b) 1.745 s

4a) $m_{\text{max}} = 0.25$

4b) $m_{\text{rocks}} = 14 \text{ kg}$

4c) $a = 1.448 \text{ m/s}^2$

4d) $v_{\text{bottom}} = 5.105 \text{ m/s}$

5a) $I_1 = 303.015 \text{ kgm}^2$

5b) $I_2 = 1.2 \text{ kgm}^2$

5c) $I_3 = 8.2667917 \text{ kgm}^2$

5d) $I_{\text{total}} = 337.282 \text{ kgm}^2$

6a) $R = 3.83 \times 10^8 \text{ m}$

6b) $T_2 = 9.652 \text{ days} = 833933 \text{ s}$

6c) $L = 2.872 \times 10^{34} \text{ kgm}^2/\text{s}$

7a) $|\vec{v}_f| = 25.50 \text{ km/hr}$

7b) fraction lost = 0.527

8a) $a = \frac{5}{14} \frac{F}{m} = 0.0357 \text{ m/s}^2$

8b) $f = \frac{9}{14} F = 64.29 \text{ N}$

Extra Credit:

a) The Well Of Souls

b) The Staff of Ra

c) Indiana