

تمارين

حل تمارين الوحدة الخامسة الطاقة الحركية والشغل

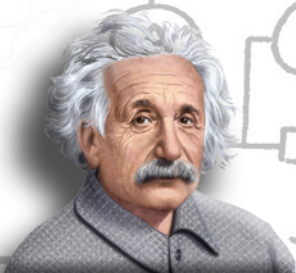
حادي عشر متقدم

إعداد الأستاذ/ رامي عبد الفتاح

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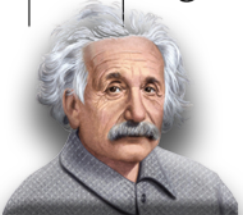
قناة التليجرام

@einstien_gulf_in_physics

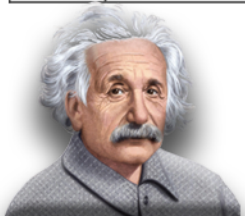


سلسلة أينشتاين الخليج

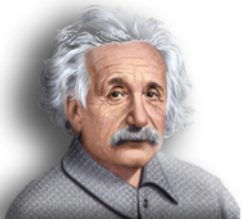
5.1	$W = F r = m a r \equiv k g \cdot \frac{m}{s^2} \cdot m = k g \cdot \frac{m^2}{s^2}$	c
5.2	$W = m g h = 800 \times 2.0 = 1600 j$ الشغل في حال عدم وجود قوة احتكاك $W_k = 1600 - 3200 = -1600j$ $W_k = F_k r \quad \therefore F_{net} = \frac{W}{r} = \frac{-1600}{4.0} = -400N$	d
5.3	$P = \frac{E}{t} = \frac{\frac{1}{2} m v^2}{t} = \frac{\frac{1}{2} m v^2}{\frac{x}{v}} = \frac{\frac{1}{2} m v^3}{x} = \frac{1}{2} \frac{m}{x} v^3 = \frac{1}{2} k v^3$	a
5.4	$P = F v_{avg} = m a v_{avg} = 1500 \times \left(\frac{25-0.0}{7.0}\right) \times \left(\frac{25+0.0}{2}\right) = \frac{66964.28}{746} = 89.7 hp$	d
5.5	$P = \frac{W}{t} = \frac{F r}{t} = \frac{m a r}{t} = \frac{k g \frac{m}{s^2} m}{s} = k g \cdot m^2 / s^3$	a
5.6	$W = m g h = 75.0 \times 9.81 \times 10.0 = 7357.5 j$	e
5.7	$W_k = F_k r = (0.70 \times 150 \times 9.81) \times 12.3 = 12669.6 j$	c
5.8	$W = m g (h_1 + h_2 + h_3 + h_4 + h_5 + h_6 + h_7 + h_8)$ $W = 1.8 \times 9.81 (0.0 + 0.046 + 0.092 + 0.138 + 0.184 + 0.230 + 0.276 + 0.322) = 22.74 j$	h
5.9	$W = \int_{x=0}^{x=0.50} F(x) dx = \int_{x=0}^{x=0.50} 120 x(x) dx = \left[\frac{120x^2}{2}\right] = 60(0.50)^2 = 15j$	h
5.10	عندما يتحرك المظلي بسرعة ثابتة يكون الشغل الكلي عليه يساوي الصفر لذتك شغل الجاذبية يساوي في المقدار ويعاكس في الاتجاه شغل مقاومة الهواء .	c
5.11	الشخص يمسك الصندوق ويؤثر عليه بقوة راسية لأعلى عكس الوزن ويتحرك أفقيا لذلك يكون اتجاه القوة عمودي على اتجاه الإزاحة ويساوي الشغل المبذول صفرا .	e
5.12	من تعريف الشغل فانه يكون سالبا عندما تنتقل الطاقة من الجسم .	c
5.13	نظرية الشغل والطاقة الحركية تم إثبات أنها تعادل قانون نيوتن الثاني	h
5.14	عندما تتحرك البنت صعودا يكون اتجاه الإزاحة معاكس للجاذبية وبالتالي الشغل سالب	a
5.15	الشغل يساوي التغير في طاقة الحركة للجسم , وعندما تكون محصلة الشغل صفر هذا يعني أن طاقة حركة الجسم ثابتة , وبالتالي العجلة التي يتحرك بها الجسم تساوي الصفر وهذا يشير إلى أن محصلة القوى المؤثرة في الجسم تساوي الصفر .	
5.16	بإهمال قوة الاحتكاك تتحول الطاقة الابتدائية التي يمتلكها كل منهما في البداية إلى طاقة حركة من المعادلة يتضح ان السرعة النهائية تعتمد فقط على الارتفاع $m g h = \frac{1}{2} m v^2 \quad v = \sqrt{2 g h}$	



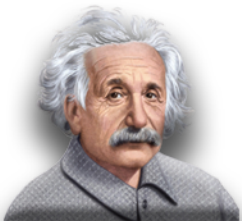
	الذي بدا الجسم منه , وبالتالي يصل أحمد وسلطان إلى الأرض في نفس الزمن وبنفس السرعة
5.17	تؤثر الأرض على القمر بقوة تكون متعامدة على اتجاه سرعة القمر وعلى مساره لذلك لا تبذل شغل
5.18	$\frac{\frac{1}{2}m(v_2^2-v_1^2)}{\frac{1}{2}m(v_2^2-v_1^2)} = \frac{Fd_1}{Fd_2} \quad \frac{(0.0-v_1^2)}{(0.0-(2v_1)^2)} = \frac{v_1^2}{4v_1^2} = \frac{d_1}{d_2} \quad \therefore d_2 = 4d_1$
5.19	$K_a = \frac{1}{2} m v^2 = 0.5 \times 10.0 \times (30.0)^2 = 4500 = 4.50 \times 10^3 j$ $K_b = \frac{1}{2} m v^2 = 0.5 \times 0.100 \times (60.0)^2 = 180 = 1.80 \times 10^2 j$ $K_a = \frac{1}{2} m v^2 = 0.5 \times 0.020 \times (300)^2 = 900 = 9.00 \times 10^2 j$
5.20	$K = \frac{1}{2} m v^2 = 0.5 \times 1900 \times \left(\frac{100 \times 1000}{3600}\right)^2 = 733.24.7 = 7.33 \times 10^5 j$
5.21	$K_{\text{مفقود}} = 2 \times \left(\frac{1}{2} m v^2\right) = 7000 \times \left(\frac{90.0 \times 1000}{3600}\right)^2 = 4375000 = 4.38 \times 10^6 j$
5.22	$K_1 = \frac{1}{2} m v^2 = 0.5 \times 1500 \times (15.0)^2 = 168750 = 1.69 \times 10^5 j$ $K_2 = \frac{1}{2} m v^2 = 0.5 \times 1500 \times (30.0)^2 = 675000 = 6.75 \times 10^5 j$ $K_2 = 4 K_1 \quad \text{if : } v_2 = 2v_1$
5.23	$v = \sqrt{\frac{2K}{m}} = \sqrt{\frac{2.0 \times 14400}{200}} = 12.0 \text{ m/s}$
5.24	$K_1 = \frac{1}{2} K_2 \quad \frac{1}{2} 2m v_1^2 = \frac{1}{2} \left(\frac{1}{2} m v_2^2\right) \quad \therefore v_1^2 = \frac{1}{4} v_2^2$ $K_1' = K_2' \quad \therefore \frac{1}{2} 2m (v_1 + 5.0)^2 = \frac{1}{2} m (v_2 + 5.0)^2$ $(v_1 + 5.0)^2 = \frac{1}{2} (v_2 + 5.0)^2 \quad \therefore v_1 + 5.0 = \frac{1}{\sqrt{2}} \times (v_2 + 5.0)$ $v_1 + 5.0 = \frac{1}{\sqrt{2}} \times ((2v_1) + 5.0)$ $\sqrt{2}v_1 + 5.0\sqrt{2} = 2v_1 + 5.0 \quad \therefore v_1 = \frac{5.0-5.0\sqrt{2}}{\sqrt{2}-2.0} = 3.5 \text{ m/s}$ $v_2 = 2v_1 = 2 \times 2.54 = 7.1 \text{ m/s}$
5.25	$K_{\text{top}} = \frac{1}{2} m v^2 = 0.5 \times 20.1 \times (27.3 \cos 46.9)^2 = 3496.88 = 3.5 \times 10^3 j$
5.26	$W = F r \cos \alpha = 12.0 \times 5.00 \cos 0.00 = 60.0 j$
5.27	$v_{1y} = \sqrt{0.0 - 2.0 \times 9.81 \times (-7.25)} = 11.93 \text{ m/s}$

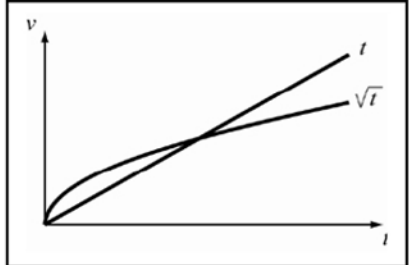


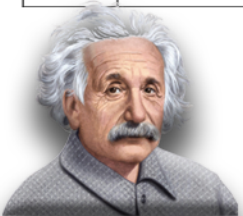
	$v_{1f} = \sqrt{(28.4)^2 + (-11.93)^2} = 30.8 \text{ m/s}$ $v_{2f} = \sqrt{(28.4)^2 - 2.0 \times 9.81 \times (-7.25)} = 30.8 \text{ m/s}$ <p>هذه النتيجة تشير إلى أن الكرتين تصلان الأرض بنفس السرعة لأن طاقة حركتهما الابتدائية نفسها وشغل الجاذبية عليهما هو نفسه لذلك ستصلان الأرض بنفس السرعة .</p>
5.28	$W_{ext} = -W_k = -F_k r \cos \alpha = -180.0 \times 4.00 \times \cos 180 = 720 \text{ j}$
5.29	$W = F r \cos \alpha = m g h = 2.00 \times 9.81 \times 0.400 = 7.85 \text{ j}$
5.30	$W_p = F_p r \cos \alpha = 200.0 \times 4.00 \cos 0.00 = 800.0 \text{ j}$ $W_k = F_k r \cos \alpha = 150.0 \times 4.00 \cos 180 = -600.0 \text{ j}$ $W_{net} = F_{net} r \cos \alpha = (200.0 - 150.0) \times 4.00 \cos 0.00 = 200.0 \text{ j}$
5.31	$W = F r \cos \alpha = 25.0 \times 25.0 \cos 30.0 = 541 \text{ j}$
5.32	$h = (3.0) - (3.0 \cos 33.6) = 0.501 \text{ m}$ $W = K - K_0 \quad \therefore m g h = \frac{1}{2} m v^2$ $v = \sqrt{2 g h} = \sqrt{2 \times 9.81 \times 0.501} = 3.14 \text{ m/s}$
5.33	$W = \sum F r = (4.79 \times 4.25) - (3.79 \times 3.69) - (2.09 \times 2.45) = 1.25 \text{ j}$
5.34	$h_1 = (3.50) - (3.50 \cos 35.0) = 0.633 \text{ m}$ $h_2 = (3.50) - (3.50 \cos 15.0) = 0.119 \text{ m}$ $W = K - K_0 \quad \therefore m g h = \frac{1}{2} m v^2$ $v = \sqrt{2 g h} = \sqrt{2 \times 9.81 \times (0.633 - 0.119)} = 3.17 \text{ m/s}$
5.35	$a = \frac{v_f^2 - v_i^2}{2 \Delta x} = \frac{13.7^2 - 0.0}{2 \times 24.4} = 3.85 \text{ m/s}^2$ $a = \frac{m g \sin \theta - F_k}{m} = \frac{m g \sin \theta - \mu_k m g \cos \theta}{m} = g \sin \theta - \mu_k g \cos \theta$ $\mu_k = \frac{g \sin \theta - a}{g \cos \theta} = \frac{9.81 \sin 30 - 3.85}{9.81 \cos 30} = 0.124$
5.36	$E = m g h \quad \therefore h = \frac{E}{m g} = \frac{6.2 \times 10^{-21}}{(4.7 \times 10^{-26})(9.81)} = 13446.98 \text{ m}$ $\frac{h}{R_E} = \frac{13446.98}{6.38 \times 10^6} \times 100 = 0.211\%$ $v_o = \sqrt{\frac{2K_o}{m}} = \sqrt{\frac{2 \times 6.2 \times 10^{-21}}{4.7 \times 10^{-26}}} = 513.6 \text{ m/s}$



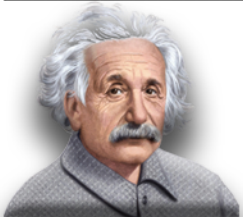
5.37	$\frac{1}{2} m (v_f^2 - v_i^2)_1 = F_k r = \frac{1}{2} m (v_f^2 - v_i^2)_2$ $(v_f^2 - v_i^2)_1 = (v_f^2 - v_i^2)_2 \quad \therefore (130^2 - 153^2)_1 = (v_f^2 - 92^2)_2$ $v_{2f} = \sqrt{(130^2 - 153^2) + (92^2)} = 44 \text{ m/s}$
5.38	$W = \int_{0.0}^{4.0} F(x) dx = \int_{0.0}^{4.0} (3.00 + 0.500x) dx$ $W = \int_{0.0}^{4.0} (3.00 + 0.500x) dx = 3.00x + \frac{0.500x^2}{2}$ $W = (3.00 \times 4.0) + \frac{0.500 \times 4.0^2}{2} = 16.0 \text{ J}$
5.39	$W = \int_{0.730}^{1.35} F(x) dx = \int_{0.730}^{1.35} (-kx^4) dx$ $W = \int_{0.730}^{1.35} \left[\frac{-kx^5}{5} \right] = \left[\frac{-20.3 \times 1.35^5}{5} \right] - \left[\frac{-20.3 \times 0.730^5}{5} \right] = -17.4 \text{ J}$
3.40	$W = \Delta K = 0.0$ $P = \frac{W}{t} = 0.0 \quad \therefore P = \vec{F} \cdot \vec{v} = m \vec{a} \cdot \vec{v} = 0.0$ <p>$\vec{a} \cdot \vec{v} = 0.0$ المتجهان السرعة والعجلة متعامدان</p>
5.41	$W = \int_{2.00}^{6.00} F(x) dx = \int_{2.00}^{6.00} (5x^3) dx$ $W = \left[\frac{5x^4}{4} \right]_{2.00}^{6.00} = \left[\frac{5 \times 6.0^4}{4} \right] - \left[\frac{5 \times 2.0^4}{4} \right] = 1600 \text{ J}$ $W = \frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2 = \frac{1}{2} \times 1.00 (v_f^2 - (2.0)^2) = 1600$ $v_f = \sqrt{2 \times 1600 + 4.0} = 56.6 \text{ m/s}$
5.42	$W_s = -\frac{1}{2} k x^2 \quad \therefore x = \sqrt{\frac{2W}{k}} = \sqrt{\frac{2 \times 25.0}{440.}} = 0.337 \text{ m} = 33.7 \text{ cm}$
5.43	$W_s = -\frac{1}{2} k x^2 \quad \therefore k = -\frac{2W}{x^2} = -\frac{2 \times (-30.0)}{0.05^2} = 24000 = 2.4 \times 10^4 \text{ N/m}$
5.44	$\frac{W_1}{W_2} = \frac{\left(-\frac{1}{2} k x^2\right)_1}{\left(-\frac{1}{2} k x^2\right)_2} = 1$
5.45	$\frac{1}{2} k x^2 = \frac{1}{2} m v^2 \quad \therefore v = \sqrt{\frac{k x^2}{m}} = \sqrt{\frac{238.5 \times 0.231^2}{0.0413}} = 17.6 \text{ m/s}$
5.46	$P = F v = \mu_k m g v = 0.195 \times 202.3 \times 9.81 \times 1.785 = 690.77 \text{ W}$



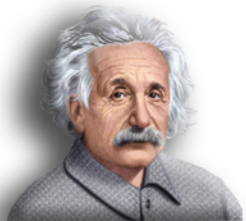
5.47	$P = F v = \mu_k m g v \quad \therefore v = \frac{P}{\mu_k m g} = \frac{1.060 \times 746}{0.115 \times 204.7 \times 9.81} = 3.4 \text{ m/s}$
5.48	$P = F v = (6.00 \times 10^3) \times 12.0 = \frac{72000 \text{ W}}{746} = 96.5 \text{ hp}$
5.49	$P = \frac{K-K_0}{\Delta t} = \frac{\frac{1}{2}m(v_f^2-v_i^2)}{\Delta t} = \frac{\frac{1}{2} \times 1214.5(0.0^2-27.9^2)}{0.236} = 2.0 \times 10^6 \text{ W}$
5.50	$P = F v \quad \therefore F = \frac{P}{v} = \frac{40.0 \times 746}{15.0} = 1989.3 \cong 1990 \text{ N}$
5.51	$P = \frac{K-K_0}{\Delta t} = \frac{\frac{1}{2}m(v_f^2-v_i^2)}{\Delta t} = \frac{\frac{1}{2} \times 942.4(v_f^2-0.0^2)}{4.55} = 140.5 \times 746 \text{ W}$ $v = \sqrt{\frac{2 \times 4.55 \times 140.5 \times 746}{942.4}} = 31.8 \text{ m/s}$
5.52	$P = 2 m g \sin \theta \quad v = 2 \times 75 \times 9.81 \times (\sin 7.0) \times 5.0 = 896.65 \cong 0.9 \text{ kW}$
5.53	$W = F_D r = (0.500 \times 8.90^2) \times 840.5 = 33288 \cong 3.33 \times 10^4 \text{ J}$
5.54	$P = \frac{K-K_0}{\Delta t} = \frac{\frac{1}{2}m(v_f^2-v_i^2)}{\Delta t}$ $\therefore v_1 = \sqrt{\frac{2 P \Delta t}{m}} = \sqrt{\frac{2 P}{m}} \times \sqrt{t}$ $v_2 = at$  <p>برسم العلاقة بين السرعة والزمن للسيارتين نلاحظ أن السيارة الأولى تأخذ الشكل المنحني والتي تتقدم في البداية ولكن بعد فترة من الزمن يتقاطع الخطان وهذا يعني ان السيارة الثانية لحقت بالأولى</p> $x = \int_0^t v dt \quad x_1 = \sqrt{\frac{2P}{m_1}} \int_0^t t^{1/2} dt = \sqrt{\frac{2P}{m_1}} \left(\frac{2}{3}\right) t^{3/2}$ $x_2 = a \int_0^t t dt = \frac{1}{2} a t^2 \quad \therefore x_0 = x_1 = x_2 \quad \therefore \sqrt{\frac{2P}{m_1}} \left(\frac{2}{3}\right) t^{3/2} = \frac{1}{2} a t^2$ $\therefore \sqrt{\frac{2P}{m_1}} \left(\frac{4}{3a}\right) = t^{1/2} \quad \therefore t = \frac{2P}{m_1} \left(\frac{4}{3a}\right)^2 = \frac{32P}{9m_1 a}$ $x_0 = x_2 = \frac{1}{2} a t^2 = \frac{1}{2} a \left(\frac{32P}{9m_1 a}\right)^2 = \frac{512P^2}{81m_1^2 a^3}$ $P = \sqrt{\frac{81m_1^2 a^3 x_0}{512}} = m_1 \sqrt{\frac{81 a^3 x_0}{512}} = 1000 \sqrt{\frac{81 \times 12^3 \times 402}{512}} = \frac{331507 \text{ W}}{746} = 444 \text{ hp}$
5.55	$W = m g h = 472.5 \times 9.81 \times 1.967 = 9117.48 \cong 9.12 \text{ kJ}$
5.56	$W = m g h = 6.00 \times 9.81 \times 0.200 = 11.8 \text{ J}$



5.57	$P = F v = (14.0 \times 10^3) \times 3.00 = \frac{42000 W}{746} = 56.3 hp$
5.58	$P = \frac{\frac{1}{2}m(v_f^2 - v_i^2)}{\Delta t} = \frac{\frac{1}{2} \times 7.30(14.0^2 - 0.0^2)}{2.00} = 357.7 \approx 360 W$
5.59	$P = \frac{\frac{1}{2}m(v_f^2 - v_i^2)}{\Delta t} = \frac{\frac{1}{2} \times 1200(25.0^2 - 0.0^2)}{8.00} = \frac{46875 W}{746} = 62.8 hp$
5.60	$W = \frac{1}{2}m(v_f^2 - v_i^2) = \frac{1}{2} \times 1250(0.0^2 - 29.2^2) = -532900 j = -533 KJ$
5.61	$W = \frac{1}{2}m(v_f^2 - v_i^2) = F r$ $v = \sqrt{\frac{2 F r}{m}} = \sqrt{\frac{2 \times 110 \times 0.780}{0.0880}} = 44.2 m/s$
5.62	$W = m g h = -3.40 \times 9.81 \times 0.470 = -15.676 = -16.0 j$ $P = F v = m g v = 3.40 \times 9.81 \times 0.270 = 9.00 W$
5.63	$\Delta x = \frac{1.35}{\sin 28} = 2.88 m$ $a = -g \sin \theta = -9.81 \sin 28 = -4.61 m/s^2$ $v_f^2 = v_i^2 + 2a \Delta x$ $\therefore v_i = \sqrt{2 \Delta x} = \sqrt{2 \times 4.61 \times 2.88} = 5.15 m/s$
5.64	$W = m g h$ $\therefore h = \frac{W}{m g} = \frac{115}{0.325 \times 9.81} = 36.1 m$
5.65	$W = F r$ $\therefore F = \frac{W}{r} = \frac{7.00 \times 10^4}{2.80 \times 10^3} = 25.0 N$
5.66	$W = \frac{1}{2}m(v_f^2 - v_i^2) = F_{air} r$ $\therefore F_{air} = \frac{\frac{1}{2}m(v_f^2 - v_i^2)}{r} = \frac{0.5 \times 0.250 \times \left[\left(\frac{90}{100} \times 26.4 \right)^2 - (26.4)^2 \right]}{15.0} = -1.103 N$
5.67	$a_{شاحنة} = \frac{\Delta v}{\Delta t} = \frac{25.3 - 0.0}{22.9} = 1.104 m/s^2$ $a_{max} = \frac{F_k}{m_{أسمنت}} = \frac{0.372 \times 1143.5 \times 9.81}{1143.5} = 3.649 m/s^2$ عجلة الشاحنة اقل من العجلة القصوى التي ينزلق عندها الأسمنت لذلك لا يتحرك $W = \Delta K = \frac{1}{2}m(v_f^2 - v_i^2) = \frac{1}{2} \times 1143.5 \times (25.3^2 - 0.0) = 365971.5 j = 366 kj$
5.68	$P = F v = m a v = 1000 \times \frac{25.0 - 19.4}{6.00} \times 22.2 = 20720 W = 20.7 KW$
5.69	$\sum F \cdot r = \frac{1}{2}m(v_f^2 - v_i^2)$ $[(300 + 300 \cos 40) - (200 \cos 30)] \times 100 = \frac{1}{2} \times 125(v_f^2 - 0.0)$



	$v_f = \sqrt{\frac{2 \times [(300 + 300 \cos 40) - (200 \cos 30)] \times 100}{125}} = 28.6 \text{ m/s}$
5.70	$F = m g \sin \theta = 1000.0 \times 9.81 \times \sin 5.00 = 854.99 \cong 855 \text{ N}$ $P = Fv = 855 \times 25.0 = 21374.9 \text{ W} = 21.0 \text{ KW}$
5.71	$m g h = \frac{1}{2} m (v_f^2 - v_i^2) \quad \therefore h = \frac{(v_f^2 - v_i^2)}{2g} = \frac{(3.0^2 - 0.0)}{2 \times 9.81} = 0.459 \text{ m}$ $\theta = \cos^{-1} \left(\frac{2.50 - 0.459}{2.50} \right) = 35.3$
5.72	$W = m g h = 65.0 \times 9.81 \times (3900 - 2200) = 1084005 \cong 1.1 \times 10^6 \text{ J}$ $P = \frac{W}{\Delta t} = \frac{1084005}{5.0 \times 60 \times 60} = 60.22 \text{ W}$ $E_{in} = \frac{E_{out}}{eff} = \frac{1084005}{0.15} = 7226700 \cong 7.2 \times 10^6 \text{ J}$
5.73	$W = \int_{0.810}^{1.39} F(x) dx = \int_{0.810}^{1.39} (-cx^3) dx$ $W = \int_{0.810}^{1.39} \left[\frac{-cx^4}{4} \right] = \left[\frac{(-19.1 \times 1.39^4)}{4} \right] - \left[\frac{(-19.1 \times 0.810^4)}{4} \right] = -15.77 \text{ J}$
5.74	$k = \frac{F}{x} = \frac{63.5}{0.0435} = 1459.77 \text{ N/m}$ $W = \frac{1}{2} k x_f^2 - \frac{1}{2} k x_i^2 = \frac{1}{2} \times \left(\frac{63.5}{0.0435} \right) \times (0.0815^2 - 0.0435^2) = 3.47 \text{ J}$
5.75	$P = Fv = (Kv^2) v = \left(\frac{1}{2} c_d A \rho \right) v^3$ $= 0.5 \times 0.333 \times 3.25 \times 1.15 \times (26.8)^3 = \frac{11978.4 \text{ W}}{746} = 16.1 \text{ hp}$
5.76	$W = \int_{1.093}^{4.429} F(x) dx = \int_{1.093}^{4.429} (Ax^6) dx$ $\Delta K = W = \int_{1.093}^{4.429} \left[\frac{Ax^7}{7} \right] = \left[\frac{11.45 \times 4.429^7}{7} \right] - \left[\frac{11.45 \times 1.093^7}{7} \right] = 54679.3 \cong 5.47 \times 10^4 \text{ J}$
5.77	$W = \int_{1.105}^x F(x) dx = \int_{1.105}^x (Ax^6) dx$ $\Delta K = W = \int_{1.105}^x \left[\frac{Ax^7}{7} \right] = \left[\frac{13.75 x^7}{7} \right] - \left[\frac{13.75 \times 1.105^7}{7} \right] = 5.662 \times 10^3 \text{ J}$ $= \left[\frac{55}{28} x^7 \right] - [3.95] = 5.662 \times 10^3 \text{ J} \quad \therefore x = \sqrt[7]{\frac{(5.662 \times 10^3) + 3.95}{55}} = 3.121 \text{ m}$
5.78	$W = \int_{x_0}^{3.313} F(x) dx = \int_{x_0}^{3.313} (Ax^6) dx$



$$\Delta K = W = \int_{x_0}^{3.313} \left[\frac{Ax^7}{7} \right] = \left[\frac{16.05 \times 3.313^7}{7} \right] - \left[\frac{16.05 \times x_0^7}{7} \right] = 5.662 \times 10^4 \text{ J}$$

$$= [10044.47] - \left[\frac{321}{140} x_0^7 \right] = 5.662 \times 10^4 \text{ J}$$

$$\therefore x = \sqrt[7]{(10044.47 - 5.662 \times 10^4) \times \frac{140}{321}} = -4.12 \text{ m}$$

$$5.79 \quad P = F v = \mu_k N v = \mu_k m g v = \frac{0.1337 \times 537.3 \times 9.81 \times 3.333}{746} = 3.14 \text{ hp}$$

$$5.80 \quad P = F v = \mu_k N v = \mu_k m g v \quad \therefore \mu_k = \frac{P}{m g v} = \frac{2.666 \times 746}{540.3 \times 9.81 \times 2.561} = 0.1465$$

$$5.81 \quad P = F v = \mu_k N v = \mu_k m g v \quad \therefore m = \frac{P}{\mu_k g v} = \frac{3.182 \times 746}{0.1595 \times 9.81 \times 2.791} = 543.6 \text{ kg}$$

$$5.82 \quad \frac{1}{2} k x^2 = \mu_k m g d \quad \therefore d = \frac{k x^2}{2 \mu_k m g} = \frac{15.19 \times 0.2311^2}{2 \times 0.02221 \times 0.170 \times 9.81} = 10.95 \text{ m}$$

$x = 10.95115667 - 0.2311 = 10.72 \text{ m}$ بطرح مسافة تمدد الزنبرك

$$5.83 \quad \frac{1}{2} k x^2 = \mu_k m g d \quad \mu_k = \frac{k x^2}{2 m g d} = \frac{17.49 \times 0.2331^2}{2 \times 0.170 \times 9.81 \times 12.13} = 0.023$$

$$5.84 \quad P = \frac{W}{\Delta t} = \frac{m g h}{\Delta t} = \frac{75.0 \times 9.81 \times 45.0}{52.0} = 636.7 \text{ W}$$

$$5.85 \quad P = \frac{W}{\Delta t} = \frac{m g h}{\Delta t} \quad \therefore \Delta t = \frac{m g h}{P} = \frac{75.0 \times 9.81 \times 45.0}{725} = 45.7 \text{ m}$$

$$5.86 \quad P = \frac{W}{\Delta t} = \frac{m g h}{\Delta t} \quad \therefore h = \frac{P \Delta t}{m g} = \frac{815 \times 52.0}{75.0 \times 9.81} = 57.6 \text{ m}$$

*** تم بفضل الله ونعمته ***

