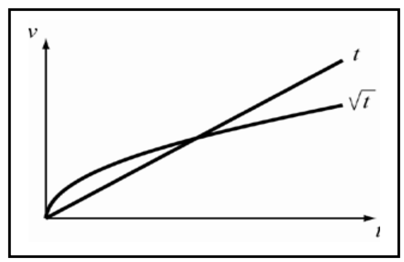
حل تمارين الوحدة الخامسة الطاقة الحركية والشغل والقدرة 2018/2017 م

5.1	$W = F\,r = m\,a\,r \equiv kg\,.\frac{m}{s^2}.m = kg\,.\frac{m^2}{s^2}$	c
5.2	الشغل في حال عدم وجود قوة احتكاك $W = m\,g\,h = 800 \times 2.0 = 1600\,j$ $W_k = 1600 - 3200 = -1600j$ $W_k = F_k\,r \quad \therefore F_{net} = \frac{W}{r} = \frac{-1600}{4.0} = -400N$	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	$P = \frac{W}{t} = \frac{Fr}{t} = \frac{m\,a\,r}{t} = \frac{kg\,\frac{m}{s^2}\,m}{s} = kg\,.m^2/s^3$	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	$W = m\,g\,(h_1 + h_2 + h_3 + h_4 + h_5 + h_6 + h_7 + h_8)$ $W = 1.8 \times 9.81\ (0.0 + 0.046 + 0.092 + 0.138 + 0.184 + 0.230 +$ $0.276 + 0.322) = 22.74\,j$	b
5.9	$W = \int_{x=0}^{x=0.50} F(x)dx = \int_{x=0}^{x=0.50} 120\,x(x)dx = \left[\frac{120x^2}{2}\right] = 60(0.50)^2 = 15j$	b
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	b
5.14	عندما تتحرك البنت صعودا يكون اتجاه الازاحة 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	$\frac{\frac{1}{2}m\ (v_2^2-v_1^2)}{\frac{1}{2}m\ (v_2'^2-v_1'^2)}=\frac{Fd_1}{Fd_2}$ $\frac{(0.0-v_1^2)}{(0.0-(2v_1)^2)}=\frac{v_1^2}{4v_1^2}=\frac{d_1}{d_2}$ $\therefore d_2=4d_1$
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	$K=\frac{1}{2}\ m\ v^2=0.5\times 1900\times\left(\frac{100\times1000}{3600}\right)^2=733.24.7=7.33\times 10^5\ j$
5.21	$K_{\text{مفقود}}=2\times\left(\frac{1}{2}\ m\ v^2\right)=7000\times\left(\frac{90.0\times1000}{3600}\right)^2=4375000=4.38\times 10^6\ j$
5.22	$K_1=\frac{1}{2}\ m\ v^2=0.5\times 1500\times(15.0)^2=168750=1.69\times 10^5\ j$ $K_2=\frac{1}{2}\ m\ v^2=0.5\times 1500\times(30.0)^2=675000=6.75\times 10^5\ j$ $K_2=4\ K_1$ $if:v_2=2v_1$
5.23	$v=\sqrt{\frac{2\ K}{m}}=\sqrt{\frac{2.0\times14400}{200}}=12.0\ m/s$
5.24	$K_1=\frac{1}{2}K_2$ $\frac{1}{2}\ 2m\ {v_1}^2=\frac{1}{2}\left(\frac{1}{2}\ m\ {v_2}^2\right)$ $\therefore v_1^2=\frac{1}{4}v_2^2$ ${K_1}'={K_2}'$ $\therefore$ $\frac{1}{2}\ 2m\ (v_1+5.0)^2=\frac{1}{2}\ m\ (v_2+5.0)^2$ $(v_1+5.0)^2=\frac{1}{2}\ (v_2+5.0)^2$ $\therefore$ $v_1+5.0=\frac{1}{\sqrt{2}}\times(\ v_2+5.0)$ $v_1+5.0=\frac{1}{\sqrt{2}}\times\ ((2v_1)+5.0)$ $\sqrt{2}v_1+5.0\sqrt{2}=\ 2v_1+5.0$ $\therefore v_1=\frac{5.0-5.0\sqrt{2}}{\sqrt{2}-2.0}=3.5\ m/s$ $v_2=2v_1=2\times 2.54=7.1\ m/s$
5.25	$K_{top}=\frac{1}{2}\ m\ v^2=0.5\times 20.1\times(27.3\ cos46.9)^2=3496.88=3.5\times 10^3\ j$
5.26	$W=F\ r\ \ cos\ \alpha=12.0\times 5.00\ cos\ 0.00=60.0\ j$
5.27	$v_{1y}=\sqrt{0.0-2.0\times 9.81\times(-7.25)}=11.93\ m/s$

	$v_{1f} = \sqrt{(28.4)^2 + (-11.93)^2} = 30.8\ m/s$ $v_{2f} = \sqrt{(28.4)^2 - 2.0 \times 9.81 \times (-7.25)} = 30.8\ m/s$ هذه النتيجة تشير إلى أن الكرتين تصلان الأرض بنفس السرعة لأن طاقة حركتيهما الابتدائية نفسها وشغل الجاذبية عليهما هو نفسه لذلك ستصلان الأرض بنفس السرعة .
5.28	$W_{ext} = -W_k = -F_k\, r\, c0s\alpha = -180. \times 4.00 \times cos180 = 720\ j$
5.29	$W = F\, r\ \cos\alpha = m\, g\, h = 2.00 \times 9.81 \times 0.400 = 7.85\ j$
5.30	$W_p = F_p\, r\ \cos\alpha = 200.0 \times 4.00\ \cos 0.00 = 800.0\ j$ $W_k = F_k\, r\ \cos\alpha = 150.0 \times 4.00\ \cos 180 = -600.0\ j$ $W_{net} = F_{net}\, r\ \cos\alpha = (200.0 - 150.0) \times 4.00\ \cos 0.00 = 200.0\ j$
5.31	$W = F\, r\ \cos\alpha = 25.0 \times 25.0\ \cos 30.0 = 541\ j$
5.32	$h = (3.0) - (3.0 cos33.6) = 0.501\ m$ $W = K - K_O \qquad \therefore m\, g\, h = \frac{1}{2}\, m\, v^2$ $v = \sqrt{2\, g\, h} = \sqrt{2 \times 9.81 \times 0.501} = 3.14\ m/s$
5.33	$W = \sum F\, r = (4.79 \times 4.25) - (3.79 \times 3.69) - (2.09 \times 2.45) = 1.25 j$
5.34	$h_1 = (3.50) - (3.50 cos35.0) = 0.633\ m$ $h_2 = (3.50) - (3.50 cos15.0) = 0.119\ m$ $W = K - K_O \qquad \therefore m\, g\, h = \frac{1}{2}\, m\, v^2$ $v = \sqrt{2\, g\, h} = \sqrt{2 \times 9.81 \times (0.633 - 0.119)} = 3.17\ m/s$
5.35	$a = \frac{v_f^2 - v_i^2}{2\Delta x} = \frac{13.7^2 - 0.0}{2 \times 24.4} = 3.85\ m/s^2$ $a = \frac{m\, g\, sin\theta - F_K}{m} = \frac{m\, g\, sin\theta - \mu_K m\, g\, cos\theta}{m} = g\, sin\theta - \mu_K\, g\, cos\theta$ $\mu_K = \frac{g\, sin\theta - a}{g\, cos\theta} = \frac{9.81\ sin30 - 3.85}{9.81\ cos30} = 0.124$
5.36	$E = m\, g\, h \qquad \therefore h = \frac{E}{m\, g} = \frac{6.2 \times 10^{-21}}{(4.7 \times 10^{-26})(9.81)} = 13446.98\ m$ $\frac{h}{R_E} = \frac{13446.98}{6.38 \times 10^6} \times 100 = 0.211\%$ $v_o = \sqrt{\frac{2K_o}{m}} = \sqrt{\frac{2 \times 6.2 \times 10^{-21}}{4.7 \times 10^{-26}}} = 513.6\ m/s$

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

5.47	$P = F\,v = \mu_k\,m\,g\,v \qquad \therefore v = \frac{P}{\mu_k\,m\,g} = \frac{1.060\times746}{0.115\times204.7\times9.81} = 3.4\ m/s$
5.48	$P = F\,v = (6.00\times10^3)\times12.0 = \frac{72000\ W}{746} = 96.5\ hp$
5.49	$P = \frac{K-K_0}{\Delta t} = \frac{\frac{1}{2}m(v_f^2-v_i^2)}{\Delta t} = \frac{\frac{1}{2}\times1214.5(0.0^2-27.9^2)}{0.236} = 2.0\times10^6\ W$
5.50	$P = F\,v \qquad \therefore F = \frac{P}{v} = \frac{40.0\times746}{15.0} = 1989.3 \cong 1990N$
5.51	$P = \frac{K-K_0}{\Delta t} = \frac{\frac{1}{2}m(v_f^2-v_i^2)}{\Delta t} = \frac{\frac{1}{2}\times942.4(v_f^2-0.0^2)}{4.55} = 140.5\times746W$ $v = \sqrt{\frac{2\times4.55\times140.5\times746}{942.4}} = 31.8\ m/s$
5.52	$P = 2\,m\,g\,sin\theta\ \ v = 2\times75\times9.81\times(sin7.0)\times5.0 = 896.65 \cong 0.9kW$
5.53	$W = F_D\,r\ = (0.500\times8.90^2)\times840.5 = 33288 \cong 3.33\times10^4 j$
5.54	$P = \frac{K-K_0}{\Delta t} = \frac{\frac{1}{2}m(v_f^2-v_i^2)}{\Delta t}$  $\therefore\ v_1 = \sqrt{\frac{2\,P\,\Delta t}{m}} = \sqrt{\frac{2\,P}{m}}\times\sqrt{t}$ $v_2 = at$ ***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*** $x = \int_0^t v\,dt \qquad x_1 = \sqrt{\frac{2\,P}{m_1}}\int_0^t t^{1/2}\,dt = \sqrt{\frac{2\,P}{m_1}}\ (\frac{2}{3})t^{3/2}$ $x_2 = a\int_0^t t\,dt = \frac{1}{2}\,a\,t^2 \qquad \therefore x_o = x_1 = x_2 \qquad \therefore \sqrt{\frac{2\,P}{m_1}}\left(\frac{2}{3}\right)t^{3/2} = \frac{1}{2}\,a\,t^2$ $\therefore \sqrt{\frac{2\,P}{m_1}}\left(\frac{4}{3a}\right) = \ t^{1/2} \qquad \therefore t = \frac{2\,P}{m_1}\left(\frac{4}{3a}\right)^2 = \frac{32P}{9m_1\,a}$ $x_o = x_2 = \frac{1}{2}\,a\,t^2 = \frac{1}{2}\,a\,(\frac{32P}{9m_1\,a})^2 = \frac{512P^2}{81m_1^2\,a^3}$ $P = \sqrt{\frac{81m_1^2\,a^3\,x_o}{512}} = m_1\sqrt{\frac{81\,a^3\,x_o}{512}} = 1000\sqrt{\frac{81\times12^3\times402}{512}} = \frac{331507W}{746} = 444\ hp$
5.55	$W = m\,g\,h = 472.5\times9.81\times1.967 = 9117.48 \cong 9.12kj$
5.56	$W = m\,g\,h = 6.00\times9.81\times0.200 = 11.8j$

5.57	$P = F\,v = (14.0 \times 10^3) \times 3.00 = \frac{42000\ W}{746} = 56.3\ hp$
5.58	$P = \frac{\frac{1}{2}m(v_f^2 - v_i^2)}{\Delta t} = \frac{\frac{1}{2} \times 7.30(14.0^2 - 0.0^2)}{2.00} = 357.7 \cong 360\ W$
5.59	$P = \frac{\frac{1}{2}m(v_f^2 - v_i^2)}{\Delta t} = \frac{\frac{1}{2} \times 1200(25.0^2 - 0.0^2)}{8.00} = \frac{46875\ W}{746} = 62.8hp$
5.60	$W = \frac{1}{2}m(v_f^2 - v_i^2) = \frac{1}{2} \times 1250(0.0^2 - 29.2^2) = -532900j = -533Kj$
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	$\Delta x = \frac{1.35}{sin28} = 2.88\ m$ $\quad a = -g\ sin\theta = -9.81sin28 = -4.61\ m/s^2$ $v_f^2 = v_i^2 + 2a\,\Delta x$ $\quad \therefore v_i = \sqrt{2\ \Delta x} = \sqrt{2 \times 4.61 \times 2.88} = 5.15\ m/s$
5.64	$W = m\,g\,h$ $\quad \therefore h = \frac{W}{m\,g} = \frac{115}{0.325 \times 9.81} = 36.1\ m$
5.65	$W = F\,r$ $\quad \therefore F = \frac{W}{r} = \frac{7.00 \times 10^4}{2.80 \times 10^3} = 25.0\ N$
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	$a_{\text{شاحنة}} = \frac{\Delta v}{\Delta t} = \frac{25.3 - 0.0}{22.9} = 1.104\ m/s^2$ $a_{max} = \frac{F_k}{m_{\text{أسمنت}}} = \frac{0.372 \times 1143.5 \times 9.81}{1143.5} = 3.649\ m/s^2$ عجلة الشاحنة اقل من العجلة القصوى التي ينزلق عندها الأسمنت لذلك لا يتحرك $W = \Delta K = \frac{1}{2}m(v_f^2 - v_i^2) = \frac{1}{2} \times 1143.5 \times (25.3^2 - 0.0) = 365971.5j = 366kj$
5.68	$P = F\,v = m\,a\,v = 1000 \times \frac{25.0 - 19.4}{6.00} \times 22.2 = 20720\ W = 20.7KW$
5.69	$\sum F\,.\,r = \frac{1}{2}m(v_f^2 - v_i^2)$ $[(300 + 300cos40) - (200cos30)] \times 100 = \frac{1}{2} \times 125(v_f^2 - 0.0)$

	$v_f = \sqrt{\frac{2\times[(300+300cos40)-(200cos30)]\times100}{125}} = 28.6\ m/s$
5.70	$F = m\ g\ sin\theta = 1000.0 \times 9.81 \times sin5.00 = 854.99 \cong 855N$ $P = Fv = 855 \times 25.0 = 21374.9W = 21.0KW$
5.71	$m\ gh = \frac{1}{2}m(v_f^2 - v_i^2) \quad \therefore h = \frac{(v_f^2-v_i^2)}{2g} = \frac{(3.0^2-0.0)}{2\times9.81} = 0.459\ m$ $\theta = cos^{-1}\left(\frac{2.50-0.459}{2.50}\right) = 35.3$
5.72	$W = m\ g\ h = 65.0 \times 9.81 \times (3900 - 2200) = 1084005 \cong 1.1 \times 10^6 j$ $P = \frac{W}{\Delta t} = \frac{1084005}{5.0\times60\times60} = 60.22\ W$ $E_{in} = \frac{E_{out}}{eff} = \frac{1084005}{0.15} = 7226700 \cong 7.2 \times 10^6\ j$
5.73	$W = \int_{0.810}^{1.39} F(x)dx = \int_{0.810}^{1.39}(-cx^3)dx$ $W = {}_{0.810}^{1.39}\left[\frac{(-cx^4)}{4}\right] = \left[\frac{(-19.1\times1.39^4)}{4}\right] - \left[\frac{(-19.1\times0.810^4)}{4}\right] = -15.77j$
5.74	$k = \frac{F}{x} = \frac{63.5}{0.0435} = 1459.77\ N/m$ $W = \frac{1}{2}\ k\ x_f^2 - \frac{1}{2}\ k\ x_i^2 = \frac{1}{2} \times \left(\frac{63.5}{0.0435}\right) \times (0.0815^2 - 0.0435^2) = 3.47\ j$
5.75	$P = Fv = (Kv^2)\ v = \left(\frac{1}{2}c_d\ A\ \rho\right) v^3$ $= 0.5 \times 0.333 \times 3.25 \times 1.15 \times (26.8) = \frac{11978.4W}{746} = 16.1\ hp$
5.76	$W = \int_{1.093}^{4.429} F(x)dx = \int_{1.093}^{4.429}(Ax^6)dx$ $\Delta K = W = {}_{1.093}^{4.429}\left[\frac{Ax^7}{7}\right] = \left[\frac{11.45\times4.429^7}{7}\right] - \left[\frac{11.45\times1.093^7}{7}\right] = 54679.3 \cong 5.47 \times 10^4 j$
5.77	$W = \int_{1.105}^{x} F(x)dx = \int_{1.105}^{x}(Ax^6)dx$ $\Delta K = W = {}_{1.105}^{x}\left[\frac{Ax^7}{7}\right] = \left[\frac{13.75\ x^7}{7}\right] - \left[\frac{13.75\times1.105^7}{7}\right] = 5.662 \times 10^3 j$ $= \left[\frac{55}{28}x^7\right] - [3.95] = 5.662 \times 10^3 j \qquad \therefore x = \sqrt[7]{\frac{[(5.662\times10^3)+3.95]\times28}{55}} = 3.121m$
5.78	$W = \int_{x_o}^{3.313} F(x)dx = \int_{x_o}^{3.313}(Ax^6)dx$

	$\Delta K = W = \left.\left[\frac{Ax^7}{7}\right]\right\|_{x_o}^{3.313} = \left[\frac{16.05\times 3.313^7}{7}\right] - \left[\frac{16.05\times {x_o}^7}{7}\right] = 5.662\times 10^4 j$ $= [10044.47] - \left[\frac{321}{140}{x_o}^7\right] = 5.662\times 10^4\, j$ $\therefore x = \sqrt[7]{(10044.47 - 5.662\times 10^4\,)\times\frac{140}{321}} = -4.12m$
5.79	$P = F\,v = \mu_k\,N\,v = \mu_k\,m\,g\,v = \frac{0.1337\times 537.3\times 9.81\times 3.333}{746} = 3.14hp$
5.80	$P = F\,v = \mu_k\,N\,v = \mu_k\,m\,g\,v \quad \therefore \mu_k = \frac{P}{m\,g\,v} = \frac{2.666\times 746}{540.3\times 9.81\times 2.561} = 0.1465$
5.81	$P = F\,v = \mu_k\,N\,v = \mu_k\,m\,g\,v \quad \therefore m = \frac{P}{\mu_k\,g\,v} = \frac{3.182\times 746}{0.1595\times 9.81\times 2.791} = 543.6\,kg$
5.82	$\frac{1}{2}k\,x^2 = \mu_k\,m\,g\,d \quad \therefore d = \frac{k\,x^2}{2\mu_k\,m\,g} = \frac{15.19\times 0.2311^2}{2\times 0.02221\times 0.170\times 9.81} = 10.95\,m$ $x = 10.95115667 - 0.2311 = 10.72\,m$ بطرح مسافة تمدد الزنبرك
5.83	$\frac{1}{2}k\,x^2 = \mu_k\,m\,g\,d \quad \mu_k = \frac{k\,x^2}{2m\,g\,d} = \frac{17.49\times 0.2331^2}{2\times 0.170\times 9.81\times 12.13} = 0.023$
5.84	$P = \frac{W}{\Delta t} = \frac{m\,g\,h}{\Delta t} = \frac{75.0\times 9.81\times 45.0}{52.0} = 636.7\,W$
5.85	$P = \frac{W}{\Delta t} = \frac{m\,g\,h}{\Delta t} \quad \therefore \Delta t = \frac{m\,g\,h}{P} = \frac{75.0\times 9.81\times 45.0}{725} = 45.7\,m$
5.86	$P = \frac{W}{\Delta t} = \frac{m\,g\,h}{\Delta t} \quad \therefore h = \frac{P\,\Delta t}{m\,g} = \frac{815\times 52.0}{75.0\times 9.81} = 57.6\,m$
	*** تم بفضل الله ونعمته ***

Edited by Abood