(1) $(\Delta v)(\Delta t) = \Delta d$

B $(v_f - 0)(4.4\,s) = 120\ ft$

$v_f = 27.\overline{27} \approx \boxed{27.3\ \frac{ft}{s}}$

(2) $|\theta| = |30\cdot h - 5.5\cdot m|$

A $= |60 - 176|$

$= \boxed{116^\circ}$

(3) $366_{10} = X_6$

D

$6^2\overline{)366}$ → 1, 216, 150 $\quad 6^2\overline{)150}$ → 4, 144, 6 $\quad 6^1\overline{)6}$ → 1, 6, 0 $\quad 6^0\overline{)0}$ → 0, 0, 0

$X = \boxed{1410}$

(4) Area $= \pi ab \quad b = 2.7\times10^{9} \quad e = \frac{c}{a} = 0.81$

$c^2 + b^2 = a^2$

$(ea)^2 + b^2 = a^2$

$b^2 = a^2(1-e^2)$

$a = \frac{b}{\sqrt{1-e^2}} \Rightarrow \text{Area} = \frac{\pi b^2}{\sqrt{1-e^2}} = \boxed{3.9\times10^{19}}$

(5) Consider a cross section. The radius
C has length 1 meter. Two radii at
90° create a side of $\sqrt{2}$ meters

(6) $E = MC^2$

E $= (1\,kg)(2.99\times10^{8}\ \frac{m}{s})^2$

$= \boxed{8.94\times10^{16}\ \text{Joules}}$

(7) $_7P_4 = \frac{7!}{(7-4)!} = 7\cdot6\cdot5\cdot4 = \boxed{840}$ "words"

(8) A $k = \frac{\sin(52^\circ)}{\sin(31.3^\circ)} = \boxed{1.52}$

(9) 2 equations yield 2 non-parallel planes, intersecting in a line of solutions.

∴ $\boxed{\text{infinite solutions}}$

(10) $\frac{\csc(t)\cos(2t)}{(\sin^2 t + \sin t\cdot\cos t)(1+\cot^2 t)}$

C

$= \frac{\cancel{\frac{1}{\sin t}}(\cos^2 t - \sin^2 t)}{\cancel{\sin t}(\sin t + \cos t)(\cancel{\frac{1}{\sin t}})^{\cancel{2}}}$

$= \frac{\cancel{(\sin t + \cos t)}(-\sin t + \cos t)}{\cancel{(\sin t + \cos t)}}$

$= \boxed{\cos t - \sin t}$

(11) $2001 = a^1 b^1 c^1$

E $2001^2 = a^2 b^2 c^2$

# of factors of $2001^2 = (2+1)(2+1)(2+1) = \boxed{27}$

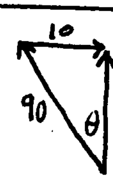
(12) vector quantities have magnitude & direct

D II, V : (mass, energy) have no directio

III: (speed) is the magnitude of the velocity v

∴ $\boxed{\text{I, IV, VI}}$ have magnitude & directio

(13)



A $\theta = \sin^{-1}\left(\frac{10}{90}\right) \approx \boxed{6.4^\circ \text{ west of no}}$

(14) $\sin\theta = \frac{m}{4}, \quad 0^\circ \le \theta \le 90^\circ$

D

$m = 0, 1, 2, 3, 4$ (each θ is easily found)

$\boxed{5}$ ordered pairs (m, θ)

(15) $y_3 = y_1 + y_2$

B $= 10\sin(\omega t) + 8\sin(\omega t + 30^\circ)$

$= 10\sin(\omega t) + 8\sin(\omega t)\cos 30^\circ + 8\cos(\omega t)\sin 3$

$= (10 + 4\sqrt{3})\sin(\omega t) + 4\cos(\omega t)$

$|y_3| = \sqrt{(10+4\sqrt{3})^2 + 4^2} \approx 17.4$

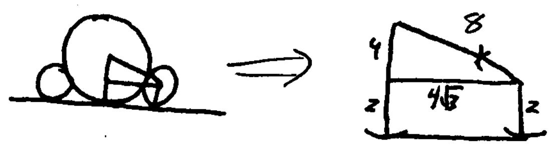
(16) Impossible scores greater than zero:

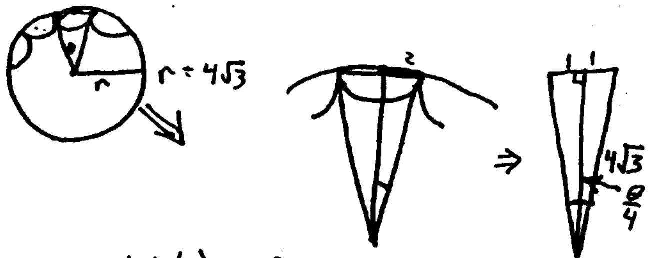
E

9.75, 9.5, 9.25, 8.75, 8.5, 8.25, 7.5, 7.25, 7.75, 6.5, 6.25, $\boxed{5.25}$

(17)

B





$\sin^{-1}\left(\frac{1}{4\sqrt{3}}\right) = \frac{\theta}{4}$

$\theta = 4\sin^{-1}\left(\frac{1}{4\sqrt{3}}\right)$

# of baseballs $= \dfrac{360°}{4\sin^{-1}\left(\frac{1}{4\sqrt{3}}\right)} = \boxed{10}$

(18) B

$F = \left(6.67\times10^{-11}\,\frac{N\,\cancel{m^2}}{\cancel{kg^2}}\right)\dfrac{(70.3\,\cancel{kg})(54.4\,\cancel{kg})}{(.01\,\cancel{m})^2} = \boxed{.00255\,N}$

(19) D

$\left(\frac{75\,\cancel{mi}}{\cancel{hr}}\right)\left(\frac{5280\,\cancel{ft}}{\cancel{mi}}\right)\left(\frac{12\,\cancel{in}}{\cancel{ft}}\right)\left(\frac{\cancel{circumference}}{30\pi\,\cancel{in}}\right)\left(\frac{2\pi\text{ rad}}{\cancel{circumference}}\right)\left(\frac{\cancel{1hr}}{3600\,sec}\right) = \boxed{88\,\frac{rad}{sec}}$

(20) B

$V_{orig} = \frac{4}{3}\pi(12)^3$, $V_{final} = \frac{4}{3}\pi(10)^3$

% remaining $= \dfrac{\frac{4}{3}\pi 10^3}{\frac{4}{3}\pi 12^3} \times 100 = 57.9\%$

% lost $= 100\% - 57.9\% = \boxed{42.1\%}$

(21) C

1, 1, 2, 3, 5, 8, 13, . . .

$1+1+2 = 5-1$

$1+1+2+3 = 8-1$

$1+1+2+3+5 = 13-1$ and so on...

$\therefore$ sum of first n terms $= \boxed{t \quad -1}$

(22) A

$1600 = \dfrac{n(2+(n-1)2)}{2}$

$n = 40$

The 40^{th} odd is 79.

(23) B

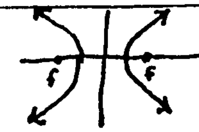
$r = \pm\sqrt{\sec(2\theta)}$

$r^2 = \sec(2\theta)$

$r^2\cos(2\theta) = 1$

$r^2\cos^2\theta - r^2\sin\theta = 1$

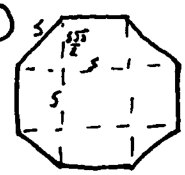
$\frac{x^2}{1^2} - \frac{y^2}{1^2} = 1$



$\text{distance}^2 = |1^2+1^2|$

$\text{distance} = \pm\sqrt{2}$

(24) C



4(triangles) + 4(rectangles) + 1 s

$4\left(\frac{1}{2}\left(\frac{s\sqrt{2}}{2}\right)^2\right) + 4\left(s\cdot\frac{s\sqrt{2}}{2}\right) + 1\cdot$

$s^2 + 2s^2\sqrt{2} + s^2$

area $= \boxed{2s^2(1+\sqrt{2})}$

(25) $\boxed{45°}$ D

(26) B

$x = 1 - \frac{1}{4} + \frac{1}{16} - \ldots \qquad y = \frac{1}{2} - \frac{1}{8} + \frac{1}{32} - \ldots$

$(x,y) = \left(\frac{1}{1+\frac{1}{4}}, \frac{\frac{1}{2}}{1+\frac{1}{4}}\right) = \left(\frac{4}{5}, \right.$

distance $= \sqrt{\left(\frac{4}{5}\right)^2 + \left(\frac{2}{5}\right)^2} = \boxed{\frac{2\sqrt{5}}{5}}$

(27) A

$\lim\limits_{h\to0} \dfrac{e^{(x+h)} - e^x}{h} = \boxed{e^x}$

(28) A

$P_{max}(t) = 100e^{1.63\cdot1} \approx \boxed{510 \text{ flies}}$

at $(0.139t) = \frac{\pi}{2} \approx \boxed{11.3 \text{ days}}$

(29) D

$\dfrac{1}{[A_0]/2} = k\cdot t_{1/2} + \dfrac{1}{[A_0]}$

$\dfrac{2}{[A_0]} - \dfrac{1}{[A_0]} = k t_{1/2}$

$t_{1/2} = \boxed{\dfrac{1}{k[A_0]}}$

(30) A

$d^2 = 12^2 + 16^2 - 2\cdot12\cdot16\cos$

$d^2 = 208$

$d = 4\sqrt{13}$ meters