1) m original line $= -4$
[C] m new line $= \frac{1}{4}$
$y-5=\frac{1}{4}(x-4)$, $x=0$, $y=\frac{1}{4}x+4$
y ∩ at $(0,4)$ answer 4

2) $y=x^2-6x+9$, $y=(x-3)^2$
[B] center at $(3,0)$, latus rectum $=4$,
length from center to focus $=1$
focus at $(3,\frac{1}{4})$, $3+\frac{1}{4}=\frac{13}{4}$

3.) Same directions $(4,2,-4)$ but
[B] length 1, length $(4,2,-4)=6$
Divide all terms by 6. $(\frac{4}{6},\frac{2}{6},-\frac{4}{6})$
$=(\frac{2}{3},\frac{1}{3},-\frac{2}{3})$

4) $r^2=2\sec(2\theta)$ & $r^2=x^2+y^2$,
[C] $\sin^2\theta=\frac{y^2}{r^2}$, $r^2=2\frac{1}{\cos 2\theta}=$
$\frac{1}{1-2\sin^2\theta}=r^2\frac{1}{1-2\frac{y^2}{r^2}}=r^2$;
$1=r^2-\frac{2y^2}{r^2}\cdot r^2$, $1=x^2+y^2-2y^2$,
$1=x^2-y^2$; hyperbola

5.) Try $(x-2)^2+(y-1)^2=40$, plug in
[D] 3 points
$(8-2)^2+(3-1)^2=40$ ✓
$(4-2)^2+(-5-1)^2=40$ ✓
$(-4-2)^2+(-1-1)^2=40$ ✓
$x^2-4x+4+y^2-2y+1=40$
$x^2+y^2-4x-2y=35$

6.) $\cos t=\frac{x}{y}$, $\sin t=\frac{y}{3}$.
[A] $\cos^2 t+\sin^2 t=1$
$(\frac{x}{4})^2+(\frac{y}{3})^2=1$; $\frac{x^2}{16}+\frac{y^2}{9}=1$
Area $=\sqrt{16}\sqrt{9}\,\pi=12\pi$

7) $\tan 2\theta=\frac{3}{8-2}=\frac{1}{2}$, $2\theta=26.6$
[B] $\theta=13.3$

8) distance from $ax+by+c=0$ to $(5,2)$ & $(1,4$
[D] $\left|\frac{5a+2b+c}{\sqrt{a^2+b^2}}\right|=\left|\frac{a+4b+c}{\sqrt{a^2+b^2}}\right|$ going through
$(\frac{5+1}{2},\frac{4+2}{2})$ or $(3,3)$
Look of ⊥ bisector
$m=\frac{-1}{\frac{4-2}{1-5}}=2$ $y-3=2(x-3)$
$y=2x-3$

9) Find distance from point to
[C] center of circle, subtract the radius
of the circle $(x-4)^2+(y-6)^2=16+36-44=$
center $(4,6)$ $r=\sqrt{8}$, to distance from
$(-2,-1)$ to $(4,6)=\sqrt{85}$,
so $\sqrt{85}-\sqrt{8}\approx 6.39$

10) $\sin\theta=\frac{|\vec{A}\times\vec{B}|}{|\vec{A}||\vec{B}|}$, $|\vec{A}|=\sqrt{3^2+4^2}=5$
[B] $|\vec{B}|=\sqrt{24^2+7^2}=25$
$\vec{A}\times\vec{B}=\begin{vmatrix}\vec{i}&\vec{j}&\vec{k}\\3&-4&0\\24&-7&0\end{vmatrix}$, $\vec{k}(-21+96)=75$
$|\vec{A}\times\vec{B}|=75$, $\frac{75}{5\cdot 25}=\frac{3}{5}$

11.) i) PD $=\pi$ yes
[A] ii) Amp $=\sqrt{6^2+14^2}=13.4$ NO
iii) $6\cdot\cos(2\cdot\frac{\pi}{2})+12(\sin 2\cdot\frac{\pi}{2})=-6$ yes

12. graph is ... an even
and an odd which is not even NO.

12) $\frac{k}{a+b\cos\theta}$ eccentricity $=|\frac{b}{a}|=\frac{5}{3}>1$
[D] hyperbola

13) $m_1 = 9, m_2 = \frac{1}{2}$,
[C] $\tan\theta = \frac{9-\frac{1}{2}}{1+9\cdot\frac{1}{2}} = \frac{17}{11} \approx 57d$

14) centroid of Δ is
[B] $\left(\frac{2+7+9}{3}, \frac{4+-3+5}{3}\right) = (6,2) = 12$

15) $x^2+y^2-6x+8y=15$
[C] $(x-3)^2+(y-4)^2=40$
centr $(3,-4)$

16) $\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}$, $b>a>1$, $h>k>1$
[B]
only i, iii true

17) Centr $\left(\frac{-\frac{1}{2}}{-\frac{1}{2}}, -1\right) = (1,-1)$
[D] parabola $\left(\frac{-\frac{1}{2}}{-\frac{1}{2}}, -1\right) = (1,-1)$
foldd at $\left(1, -1-\frac{1}{|1|}\right) = (1,-2)$
distance from point $(1,-2)$
& line $3x-4y-1=0$
$\frac{3\cdot 1-4\cdot -2-1}{\sqrt{3^2+4^2}} = 2$

18) $\frac{(x-5)(x-2)\cdot}{x(x-5)(x-1)}$, hole at $(5, \frac{3}{20})$ (i) ✓
[B] 1 horizasym (ii) ✓
1 real 0 (iii) ✗
2 vertasym (iv) ✗
1 slant 3 (v) ✗

19) $\frac{8}{x} = \frac{x}{2}$, $x=4$
[B] $PQ=8$, $PR=4$, $QS=6$
(18)

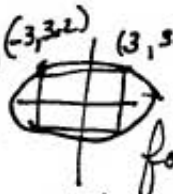
20) $V = \frac{1}{6}\begin{vmatrix} 0&0&0&1 \\ 2&0&-1&1 \\ 12&8&-4&1 \\ -8&2&9&1 \end{vmatrix} = \frac{-1}{6}\begin{vmatrix} 2&0&-1 \\ 12&8&-4 \\ -8&2&9 \end{vmatrix} = 12$
[A]

21) Sum of slopes of asymptotes to a hyperbola is $a+(-a)=0$
[E]

22) $y=-ax^2+bx+c$, pts $(4,192)$, $(8,0)$
[D] end centr $(0,c)$. $\frac{-b}{2a}=0$, $b=0$
$y=-ax^2+c$
plug in pts $-16a+c=192$, $-64a+c=0$,
$a=4$, $c=256$

23) Area is $|\vec{a}\times\vec{b}|$
[C] $\begin{vmatrix} \vec{i}&\vec{j}&\vec{k} \\ 3&2&-2 \\ -6&8&6 \end{vmatrix} = 46$

24) Convert both points to rectangular
[D] $(3\cos\frac{2\pi}{3}, 3\sin\frac{2\pi}{3}, -5) =$
$(-3/2, \frac{3\sqrt{3}}{2}, -5)$
$(6\cos\frac{\pi}{6}, \sin\frac{4}{3}, 6\sin\frac{\pi}{6}, \sin\frac{\pi}{3}, 6\cos\frac{\pi}{3}) = (\frac{9}{2}, \frac{3\sqrt{3}}{2}, 3)$
distance $= 10$

25) 

[C] $\frac{x^2}{25}+\frac{y^2}{16}=1$
foci $(3,0),(-3,0)$
endpts of LA $(3,\pm 3.2)$
length rect $= 6$
width rect $= (3.2)(2) = 6.4$
$6(6.4) = 38.4 = \frac{192}{5}$

26) $y = 4\sin\theta$
[E] $m=0$


27) A: $R = \frac{abc}{4A} = \frac{231}{2\sqrt{360}}$
[A] B: $r = \frac{\text{Area}}{\text{semip}} = \frac{\sqrt{360}}{12}$
$\frac{r}{R} = \frac{\frac{\sqrt{360}}{12}}{\frac{231}{2\sqrt{360}}}$

28) $AB = (4-1, 2-3, 5-2) = (3, -1, 3)$

[C] $AC = (3-1, 3-3, 1-2) = (2, 0, -1)$

$AD = (3-1, 1-3, -1-2) = (2, -2, -3)$

Volume $= \text{abs}\begin{vmatrix} 3 & -1 & 3 \\ 2 & 0 & -1 \\ 2 & -2 & -3 \end{vmatrix} = |-22| = 22$

29) $r = 2\cos\theta$

[A] i) rose with 4 petals, NO

ii) yes, one fun $(0, \pi)$, YES

iii) not symmetric about polar axis, NO

30) distance from $1+i$ to $4-3i = 5$

[B] distance from $3-7i$ to $4-3i = \sqrt{17}$

distance from 0 to $4-3i = 5$

distance from $8-6i$ to $4-3i = 5$

$3-7i$