Theta Individual solutions:
1.B -16+32+3+2=21
2. A

r	t	d
r	3/2	3r/2
0	1/2	0
4r/5	t	4rt/5
	t+2	

$r\left(t-1\right)=\frac{3r}{2}+\frac{4rt}{5}\to t-1=\frac{3}{2}+\frac{4t}{5}$ We want t+2-3= $\frac{23}{2}$. $\frac{r}{d}=\frac{r}{rt}=\frac{1}{t}\to\frac{2}{23}$
$t=\frac{25}{2}$

3. D- $xy+y=x\to y=\frac{x}{x+1}\to x+1+\frac{1}{x+1}-\frac{x^2}{x+1}=\frac{\left(x+1\right)^2-x^2+1}{x+1}=\frac{2+2x}{x+1}=2$
4.B-Draw a picture and call the side of the square 1.Set up similar triangles:
$\frac{1}{2}b=k\to y=\frac{y+1}{2k+1}\to 2ky+y=y+1\to y=\frac{1}{2k}\to\frac{1}{\frac{1}{4k}}=4k$

5.A- $x=9k\to\left(9k\right)^2+9k+1=7\to 81k^2+9k-6=0\to\frac{-b}{a}=\frac{-9}{81}$
6.A-Find the slope of the segment and then get the negative reciprocal since they are perpendicular. Als get the midpoint and then put together your equation:
$\frac{9--3}{-3-7}=\frac{-6}{5}\to m=\frac{5}{6}\to 5x-6y=C\to\frac{7-3}{2},\frac{-3+9}{2}\to\left(2,3\right)\to 5x-6y=-8$
7.C-Square both sides and then see what happens when you look at the left side real component and compare to the right side real component!! $a-b+2i\sqrt{ab}=9+4i\sqrt{5}\to a-b=9$
8.A- $\frac{\sqrt{x}-\sqrt{y}}{\frac{1}{\sqrt{x}}-\frac{1}{\sqrt{y}}}=\frac{\sqrt{xy}\left(\sqrt{x}-\sqrt{y}\right)}{\sqrt{y}-\sqrt{x}}=-\sqrt{xy}$
9.C- $a=\frac{24}{b}\to\frac{24c}{b}=48\to\frac{c}{b}=2\to c=2b\to 2b^2=72\to b=6,a=4,c=12$
10.C- Draw a picture!! The figure you are trying to find the area of is a square. If you extend the sides of the octagon you can turn it into a square. These extended pieces have side lengths of $\frac{\sqrt{2}}{2}$ .This also creates right triangles where the hypotenuse is the side of the square.
$\left(\frac{\sqrt{2}}{2}\right)^2+\left(1+\frac{\sqrt{2}}{2}\right)^2=S^2$
$\frac{1}{2}+1+\sqrt{2}+\frac{1}{2}=S^2=2+\sqrt{2}$

11.D- Draw picture such that the vertex will be the lowest point (0,4). $4p(y-4)=x^2$ plug in (40,24). 4p equals 80. Plug in 30 for X and solve for Y. Y equals $\frac{61}{4}\rightarrow D$

12.B- $x^3(3x+7)-(3x+7)=(x^3-1)(3x+7)=(x-1)(x^2+x+1)(3x+7)\rightarrow 1 and \frac{-7}{3}$

13.C $9(x^2-2x+1)-4(y^2-4y+4)=-29-16+9\rightarrow 9(x-1)^2-4(y-2)^2=-36$

$\frac{(y-2)^2}{9}-\frac{(x-1)^2}{4}=1\rightarrow center=(1,2)\rightarrow c^2=9+4\rightarrow c=\sqrt{13}$

Go up and down root 13 from center to get C

14.A- $\frac{2\pi r_1}{8}=\frac{\pi r_1}{4}=\frac{2\pi r_2}{12}\rightarrow\frac{r_1}{4}=\frac{r_2}{6}\rightarrow\frac{r_1}{r_2}=\frac{2}{3}\rightarrow A=\frac{4}{9}$

15.A- ${}_9C_3(x^6)\left(\frac{-3}{x^2}\right)^3=84x^6(-27)=-2268$

16.C- $\frac{1}{D}=\frac{1}{-9+2k}\begin{pmatrix}-3 & -k\\ 2 & 3\end{pmatrix}=\begin{pmatrix}3 & k\\ -2 & -3\end{pmatrix}$

$\frac{-3}{2k-9}=3\rightarrow 6k-27=-3\rightarrow 6k=24\rightarrow k=4$

17.E-Set denominator to be greater than zero and you get: $(x+3)^2>0\rightarrow x\neq -3$

18.D- Treat the 3 classes as one class and then you have 5 places they can go instead of 7. There are 3! ways these classes can be arranged and still be different so the answer is 5(3!)=30

19.D-Draw a picture. You get 240/360 of a circle with the full radius of 2 working. You also get two 60 degree sectors of radius 1. This gives: $\frac{2}{3}(4\pi)+\frac{1}{3}\pi=3\pi$

20.C- $y=x(x^4-5x^2-36)=x(x^2-9)(x^2+4)=x(x-3)(x+3)(x^2+4)$: 3 times!!

21.C- rewrite the 2nd sequence in terms of the first:

$a_1+100d+a_2+100d+a_3+100d+...+a_{100}+100d=200$

Subtract the two equations and you get: $100(100d)=100\rightarrow 100d=1\rightarrow d=\frac{1}{100}$

22.B-Draw yourself a picture. You will create 3 right triangles. Two smaller ones and the original bigger one. Call the pieces where they hit the midpoints b, b, a, and a. This gives 2 equations that can be solved:

$$(2a)^2+b^2=19^2$$
$$a^2+(2b)^2=22^2\rightarrow 5(a^2+b^2)=19^2+22^2\rightarrow a^2+b^2=169$$

This makes XY=13 which is half of ZU which is therefore 26

23.B- If the 3rd and the 11th are the same then so is the first and 13th. This means 13 terms so the exponent is 12:Therefore ${}_{12}C_5(L)^5(-U)^7=-792$

24.C- $\left(\dfrac{\dfrac{Z}{X}-\dfrac{Z}{Y}}{\dfrac{Z^2}{X^2}-\dfrac{Z^2}{Y^2}}\right)^{-1}=\left(\dfrac{ZXY\left(Y-X\right)}{Z^2\left(Y^2-X^2\right)}\right)^{-1}=\left(\dfrac{XY}{Z\left(Y+X\right)}\right)^{-1}=\dfrac{ZX+ZY}{XY}$

25.C- $f^{-1}\left(2\right)=1\rightarrow g^{-1}\left(1\right)\rightarrow 1=2x-6\rightarrow 7=2x\rightarrow x=\dfrac{7}{2}$

$m=3\rightarrow(-2,5)\rightarrow y=3x+b\rightarrow y=3x+11$

26.A- $0=3x+11\rightarrow x=\dfrac{-11}{3}$

27.B-Draw a picture. Draw perpendicular segments from the tangent points to the respective centers. Connect the center of the smaller circle to a point on the tangent segment of the bigger circle such that a rectangle is created with side length 3. This creates a rectangle but also a right triangle with 13 as the hypotenuse and 5 as the short side. This makes the side of the rectangle 12 that we are looking for.

$\left(\log x\right)\left(log5\right)+\log 4-\log 100=0$

28.B $\left(\log x\right)\left(log5\right)+\log\dfrac{1}{25}=0\rightarrow\left(\log x\right)\left(log5\right)-2\log 5=0$ -

$\log x-2=0\rightarrow\log x=2\rightarrow x=100$

$sum=-m=2a+2b\rightarrow m=2k$

$product=m=ab$

29.B- $product=n=4ab\rightarrow n=4m$

$\dfrac{\dfrac{m}{2}}{4m}=\dfrac{1}{8}$

30.C- $\dfrac{100}{2}\left(100+1\right)=101(25)\left(2\right)r=perfect\ square\rightarrow r=202\rightarrow 4$