1. C
2. C
3. C
4. C
5. D
6. B
7. D
8. D
9. A
10. B
11. C
12. B
13. A
14. D
15. E
16. C
17. D
18. B
19. B
20. C
21. A
22. E
23. C
24. D
25. E
26. D
27. C
28. A
29. B
30. C

1. C Cannot have repeated x-coordinates
2. C Since the sum is even one of the primes must be 2. That leaves the other 2 summing to 22. Could have 3,19,2 or 5,17,2 or 11,11,2. The first 2 can be arranged 6 ways each and the last one can be arranged 3 ways for a total of 15
3. C $\begin{pmatrix} 1 & 0 & 3 \\ 2 & 4 & -1 \\ 1 & 4 & 2 \end{pmatrix} \bullet \begin{pmatrix} 1 & 1 & 6 \\ 4 & 2 & 3 \\ 5 & 3 & 2 \end{pmatrix} = \begin{pmatrix} 16 & 10 & 12 \\ 13 & 7 & 22 \\ 27 & 15 & 22 \end{pmatrix}$
$\begin{vmatrix} 8 & 5 & 6 \\ 13 & 7 & 22 \\ 14 & 8 & 0 \end{vmatrix}(2) = (4)\begin{vmatrix} 8 & 5 & 6 \\ 13 & 7 & 22 \\ 7 & 4 & 0 \end{vmatrix} = 4\left[7(110-42)-4(176-78)\right]$
$4(7 \bullet 68 - 4 \bullet 98) = 336$
4. C $\dfrac{A + B\sqrt{5} + (C - 4\sqrt{5})i}{-29} = \dfrac{2}{1 + i + \sqrt{5}} \bullet \dfrac{1 + \sqrt{5} - i}{1 + \sqrt{5} - i} = \dfrac{2 + 2\sqrt{5} - 2i}{7 + 2\sqrt{5}} \bullet \dfrac{7 - 2\sqrt{5}}{7 - 2\sqrt{5}}$
$\frac{14-4\sqrt{5}+14\sqrt{5}-20+(-14+4\sqrt{5})i}{29} = \frac{6-10\sqrt{5}+(14-6-10+4\sqrt{5})i}{-29} \to 6 - 10 + 14 = 10$
5. D $\dfrac{6}{1-\dfrac{2}{3}} = 18 \to 18 \bullet 2 - 6 = 30 \to 30 \bullet 3 = 90$
6. B If you use some synthetic division off of your P/Q list you get roots of 7,4,3,-1 so the answer is 7+4-1=10
7. D Make them parallel. $\dfrac{L}{24} = \dfrac{20}{U} \to U = \dfrac{480}{L}$
8. D The differences are 6 then 2 so we can take 10 minute increments as our units and go backwards twice with a common ratio of 3 to get 54 but we need to add the 20 to get 74
9. A Since inverses are reflections over the line y=x all we need to do is switch the x and y coordinates to fill in the rest of the chart and we will get 2+1=3

x	0	1	2	3	4	5	
g(x)	5	3	0	2	1	4	8
$g^{-1}(x)$	2	4	3	1	5	0	8

10. B $\dfrac{12x}{100} + \dfrac{9x}{100} + \dfrac{8(25,000 - 3x)}{100} = 1850$
$-3x = 185000 - 200000 \to 3x = 15000 \to = 5000$
11. C If you draw a picture and use power of the point you will see that the perimeter is twice the sum of the bases. We know the median of the trapezoid is 10 which is the average of the bases. So, our answer is 4 times 10 which equals 40
12. B Draw yourself a good picture. Call angles A and B, “x”. That makes angle DCB “2x”. Triangle DCB is isosceles so the other 2 angles must be “90-x”. This means x + 90 -x =90

13. A $2x+9+x+1+2\sqrt{2x^2+11x+9}=x+4$

$-2x-6=2\sqrt{2x^2+11x+9}\to -x-3=\sqrt{2x^2+11x+9}$ both are extraneous so no

$x^2+6x+9=2x^2+11x+9\to x^2+5x=0\to x=-5,0$

solutions

14. D Need to know your Pythagorean triplets. You have 7, 24,,25 and 15,20,25. X and Y can be switched so you get 4 answers in each quadrant plus the 4 quadrantals for a total of 20.

15. E Classic Venn diagram question. $(45+34+15-20-7-6-2)=59\to 41$ is the number of people not included in any of the three.

16. C Triangle inequality problem $32<\frac{W}{2}<62\to 64<W<124\to 65\le W\le 123\to 59$

17. D We have 2 arcs of 180+74 =254. 360-254 leaves 106. The 2 intercepted arcs can be called x and 106-x. The average of the differences equals the angle formed by the secants. 2x-106=56. 2x=162 so x=81

18. B Draw the picture and you see you get a cylinder with a hole in it. Find the total volume and subtract out the hole. $\pi\left(4^2-1^2\right)\bullet 6=90\pi$

19. B Complete the square $(x+1)^2-20$. All integers -5 to 3 inclusive which is a total of 9

20. C $\frac{1}{\sqrt[3]{L^2}-\sqrt[3]{LU^2}+\sqrt[3]{U^4}}\bullet\frac{\sqrt[3]{L}+\sqrt[3]{U^2}}{\sqrt[3]{L}+\sqrt[3]{U^2}}=\frac{\sqrt[3]{L}+\sqrt[3]{U^2}}{L+U^2}$

21. A $\frac{1}{2}(20+30)h=300\to h=12\to\frac{2}{3}=\frac{\frac{24}{5}}{\frac{36}{5}}\to$ The areas of STK and ARK are 240/5 and 540/5. That sums to 156. That leaves 144 for the sum of the other 2 triangles which have the same area so our triangle has area of 72

22. E $\frac{4}{3}\bullet\frac{1}{4}\bullet k=1\to k=3$ Going from 100% to 300% is a 200% increase

23. C The extremes are (36,0) and (0,24). You can think of this as an arithmetic sequence problem or slope problem. When L goes down by 3 U goes up by 2. A total of 13 points will satisfy

24. D $\frac{1}{2}\log_2 k-3\log_{k^2}2=1\to\frac{1}{2}\log_2 k-\frac{3}{2}\log_k 2=1$

$\log_2 k-3\log_k 2-2=0\to\log_2 k-\frac{3}{\log_2 k}-2=0$

$(\log_2 k)^2-2\log_2 k-3=0\to(\log_2 k-3)(\log_2 k+1)=0\to 8\bullet\frac{1}{2}=4$

25. E $\frac{k+3}{k-1}-\frac{k+5}{k+2}<0\to\frac{k^2+5k+6-\left(k^2+4k-5\right)}{(k-1)(k+2)}<0$

$\frac{k+11}{(k-1)(k+2)}<0\to(-\infty,-11)\cup(-2,1)$

26. D Must be on the p/q list. Cannot make 6

27. C $|k|^2 - \sqrt{k^2} - 6 = 0 \rightarrow (|k|-3)(|k|+2) = 0 \rightarrow k = \pm 3$

28. A Scale factor is ¾ so scale factor of volume is 27/64. $\frac{1}{3} \bullet 6^2 \bullet 4 = 48 \rightarrow \frac{27}{64} \bullet 48 = \frac{81}{4}$

29. B 7 into 365 leaves a remainder of 1. You need to pick up 7 days with 1 each year plus an extra for each leap year. Answer 2029.

30. C $\frac{1}{9}(x+16) = \frac{4x}{33} \rightarrow 11(x+16) = 12x \rightarrow x = 176$