1. C Only two. 1,2,3,5,6 and 1,2,3,4,7
2. D Triangle Inequality: 14L+1>3L+4 11L>3 L>3/11
3. A Graph it and you get a right triangle in Q3 with a base of 2 and a height of 2 and unbounded region from $x \le -2$.
4. C $3^{5k} \bullet 3^{-4k} \ge 3^{2k^2-6} \to k \ge 2k^2 - 6 \to 2k^2 - k - 6 \le 0$

   $(2k+3)(k-2) \le 0 \to \left[\frac{-3}{2}, 2\right] \to 0,1,2$ so a total of 3
5. A $y^2 - 6y + 9 = -8x - 25 + 9 \to (y-3)^2 = -8(x+2)$

   $V = (-2,3) \to p = -2 \to x = 0$
6. A This is a vertical hyperbola so Y-squared is positive and x-squared is negative. We are centered at the origin and 2a=4 so a=2. $c = \sqrt{7}, a^2 = 4, b^2 = 3 \to \frac{y^2}{4} - \frac{x^2}{3} = 1$
7. B $f(n) = \prod_{j=3}^{n} \log_{j-1} j = \frac{\log 3}{\log 2} \bullet \frac{\log 4}{\log 3} \bullet \frac{\log 5}{\log 4} \bullet \ldots \frac{\log n}{\log(n-1)} = \log_2 n$

   $\sum_{k=2}^{10} f\left(2^k\right) = 2 + 3 + \ldots 10 = 54$
8. B Drsaw an altitude for the parallelogram down from D. It has a length of 3 so the area is 48. Call the smaller base of the trapezoid B. We get:

   $48 = \frac{1}{2}\left(8 - \frac{B}{2}\right)(16 + B) \to B = 8$
9. B $M + 3R = 14$

   $M + 3L = 16$ so the average is 4

   $M + 3U = 18 \to 3(M + R + L + U) = 48 \to (M + R + L + U) = 16$
10. B $\frac{8}{k-1} - k - 1 < 0 \to \frac{8 - k^2 + 1}{k-1} < 0 \frac{-(k-3)(k+3)}{k-1} < 0$

    $(-3,1) \cup (3,5) \to \frac{6}{10} \to 60\%$
11. C $\frac{4\pi \bullet 9}{2\pi \bullet \frac{1}{4}} = 72$
12. A $\frac{R}{R+1} + \frac{2R+1}{R^2+R} = 6 \to R^2 + 2R + 1 = 6R^2 + 6R$

    $5R^2 + 4R - 1 = 0 \to R = \frac{1}{5} \to \frac{\frac{1}{5} + \frac{7}{5}}{6} = \frac{4}{15}$
13. A $(1+i)(1+i) = 2i \to (2i)^6 (1+i) = -64(1+i) \to -64 - 64 = -128$
14. E $y = \sqrt{-\left(x^2 - 6x + 9\right)} = \sqrt{-(x-3)^2}$. This is a point (3,0) so the answer is 3

15. A -6-5-2+3=-10
16. D The base can be 2 raised to any factor of 20. Those are 1,2,4,5,10,20 so there are 6
17. D The common difference must be a common factor of 63 and 175 since 256-81=175 and 144-81=63. The common factor is 7 s 25+1=26
18. B They could both get 0,1,2, or 3 tails $\frac{1}{8}\bullet\frac{1}{8}+\frac{3}{8}\bullet\frac{3}{8}+\frac{3}{8}\bullet\frac{3}{8}+\frac{1}{8}\bullet\frac{1}{8}=\frac{20}{64}=\frac{5}{16}$
19. A Ratio of the areas is 16/9 so the ratio of the lengths is 4/3. The triangles share an altitude so the area of each is 4/3 of 18 which is 24 so 18+32+24+24=98
20. D $\left(2^8+1\right)\left(2^4-1\right)\left(2^4+1\right)=3\bullet5\bullet17\bullet257\rightarrow15,17,51,85\rightarrow4$
21. C $\frac{\sin 45}{9}=\frac{8}{9(MA)}\rightarrow MA=8\sqrt{2}\rightarrow\left(8\sqrt{2}\right)^2=128\rightarrow1+2+8=11$. You could also draw an altitude and work it that way.
22. C Draw a good picture. LUO and LZO are 30-60-90 triangles. LO= $\frac{\sqrt{3}}{2}$ .ZLA is also a 30-60-90 with ZL=1/2. This makes ZA=1/4 and LA= $\frac{\sqrt{3}}{4}$. The area is $\frac{1}{2}\bullet\frac{\sqrt{3}}{4}\bullet\frac{1}{4}=\frac{\sqrt{3}}{32}$
23. A $k=2x^2-12x+16\rightarrow2x^2-12x+16-k=0$

    $D=0=144-4\bullet2(16-k)\rightarrow k=-2$
24. D Classic Venn diagram question. Draw your 3 circles and call x all 3. 400-164=236. 39+51+x=236-117=119 so x =29
25. E September has 30 days. October 2 is first Monday so 5th Monday of October is 10/30
26. D $N+D+Q=20$

    $5N+10D+25Q=335$

    $N+2D+5Q=67$

    $D+4Q=47\rightarrow25N+5D+10Q=275\rightarrow5N+D+2Q=55$

    $9D+23Q=280\rightarrow Q=11$
27. C Draw a big picture. Call angles UFL and LUF "y". Call WUZ and ZUW both "x". If we work around the triangle we get x+y=135. The angle we want is 180-135 so answer is 45
28. D Draw a segment from the center of circle X to segment QY to create a rectangle with dimensions of 20 by 5. This creates a right triangle with legs of 20 and 3. We want the hypotenuse so $\sqrt{400+9}=\sqrt{409}$
29. C Check endpoints and vertex. Complete the square to get $\sqrt{-16\left(t^2-3t+\frac{9}{4}\right)+38}$ If you plug in 0 you get 2 and the vertex gives you 38 but if you plug in 4 and take the absolute value you get 62 which is the answer
30. D The diameters are 22,24, and 26. That makes the radii 11,12, and 13. We want $4\pi r^2=4\pi(121+144+169)=1736\pi$