1. $y=1$ to $y=49$ so 49 ordered pairs   B

2. $\dfrac{180-y}{180-x}=\dfrac{9}{8} \to \dfrac{90-y}{90-x}=\dfrac{3}{2}$

   $9(180-x)=8(180-y) \to 3(90-x)=2(90-y)$ C

   $180=9x-8y$

   $90=3x-2y \to x=60 \to y=45 \to x+y=105$

3. $3-2-5-6=-10$ A

4. $x^2+8x+16+y^2-2y+1=8+16+1$

   $(x+4)^2+(y-1)^2=25 \to ctr(-4,1)$

   tangent segment: $\sqrt{7^2+6^2}=\sqrt{85} \to 85-25=A^2 \to A=2\sqrt{15}$ B

5. $\dfrac{T}{n}=20 \to \dfrac{T+25}{n+1}=21 \to T=20n$

   $\dfrac{20n+25}{n+1}=21 \to n=4 \to T=80$ 3 quarters and one nickel, so no dimes.   E(0)

6. $x=2y \to x+y=6+2x \to y=-6 \to x=-12$ E(-12)

7. $\dfrac{1}{2}+\dfrac{1}{2}\bullet\dfrac{5}{6}\bullet\dfrac{1}{2}+...=\dfrac{\frac{1}{2}}{1-\frac{5}{12}}=\dfrac{\frac{1}{2}}{\frac{7}{12}}=\dfrac{6}{7}$ D

8. This would be integers from -2018 to 2019 inclusive. That is a total of 4038   D

9. The second term is 2019*(-x^3)^2018*(3x^2)   D

10. 113 and 13 is the best you can do so answer is 100   C

11. $\dfrac{100}{3}+40=\dfrac{220}{3}\rightarrow\dfrac{220}{3}\div 2=\dfrac{110}{3}$ B

12. $M+A+T=1\rightarrow M+T=\dfrac{2}{3}\rightarrow A+T=\dfrac{1}{2}$ B

$A=\dfrac{1}{3}\rightarrow M=\dfrac{1}{2}\rightarrow M+A=\dfrac{5}{6}\rightarrow\dfrac{5}{6}t=1\rightarrow t=\dfrac{6}{5}$

13. Draw a picture. Call angles ZLF=x and ZUF=x also. Call angles ZWF and ZFW=y. Then angle of interest is y-x. Angle ZFL=150-x. So 150-x+y+y-x=180. 2y-2x=30. y-x=15   C

14. Draw the picture and you get a square with diagonal of length 8 and therefore a side length of $4\sqrt{2}$. Therefore the area is 32   C

15. $\dfrac{P}{AS^2}=\dfrac{1}{1\bullet 16^2}=\dfrac{36}{9S^2}\rightarrow S^2=4\bullet 16^2\rightarrow S=32$ B

16. $\dfrac{7-5}{6--2}=\dfrac{1}{4}\rightarrow midpo\operatorname{int}=(2,6)\rightarrow y=-4x+14$

$\dfrac{7-5}{6-8}=-1\rightarrow midpo\operatorname{int}=(7,6)\,y=x-1$ D

$(3,2)\rightarrow 3+2=5$

17. $5^6-2^6=\left(5^3-2^3\right)\left(5^3+2^3\right)=117\bullet 133$ C

$3^2\bullet 13\bullet 7\bullet 19\rightarrow 19$

18. $k^4+2k^2+4=12\rightarrow k^4+2k^2-8=0$ A

$\left(k^2+4\right)\left(k^2-2\right)=0\rightarrow(2,0)$

$$\frac{2(x+3)-2(x-2)+(x-2)(x+3)}{(x-2)(x+3)} \geq 0$$

19. $\dfrac{2x+6-2x+4+x^2+x-6}{(x-2)(x+3)} \geq 0 \rightarrow \dfrac{x^2+x+4}{(x-2)(x+3)} \geq 0$ D

     $-3,-2,-1,0,1,2 \rightarrow 6$

20. $3 \bullet 2 \bullet 5 \bullet 4 \bullet 3 \bullet 2 \bullet 7 \bullet 6 \bullet 5 \bullet 4 \bullet 3 \bullet 2 = 3^4 \bullet 2^8 \bullet 5^2 \bullet 7$ C

     $1,2,3,4,6,12 \rightarrow 6$

     $L(Z+U) = 44 \rightarrow U(Z+L) = 23 \rightarrow Z+L = 23 \rightarrow U = 1$

21. $44 = 1 \bullet 44, 4 \bullet 11, 2 \bullet 22 \rightarrow L = 22 \rightarrow Z+1 = 2 \rightarrow L = 2 \rightarrow Z+1 = 22$ B

     $(1,22,1)(21,2,1) \rightarrow 2$

22. $\textit{scale factor} = \dfrac{1}{6} \rightarrow \textit{area} = \dfrac{1}{36} \rightarrow \dfrac{540}{36} = 15$ A

23. $180 \bullet 11 = 1980 \rightarrow 180 \bullet 12 = 2160 \rightarrow n-2 = 12 \rightarrow n = 14$ B

24. $L - U = 10^{-2019}(10-2) = 8\left(10^{-2019}\right)$ B

25. If you draw a picture. We know tangent segments are congruent. If we call WL=x, then so is WJ=x. If we call UF=y then JF=y. This leaves our triangle with sides 30-x, 30-y, and x+y. Add those up and you get 60   A

26. If you draw a picture oyu see triangle KLr is a right traingle so side KR equals 17. The centroid is where the medias meet. They meet in the ration of 2:1 so Fr=17/3   B

27. $\dfrac{3^{\log_9 360}}{3^{\log_{81} 100}} = 3^{\log_9 360 - \log_{81} 100} = 3^{\log_9 360 - \log_9 10} = 3^{\log_9 36} = 3^{\log_3 6} = 6$ B

28. $\dfrac{1}{12} - \dfrac{1}{40} - \dfrac{1}{20} + \dfrac{1}{360} = \dfrac{30-9-18+1}{360} = \dfrac{4}{360} \rightarrow 360$ C

29. . Find slope: $\dfrac{\frac{4}{5}}{\frac{-3}{4}} = \dfrac{-16}{15}$. Put in standard form; $16x + 15y = C$. Plug in point to solve for C and

you get $16x + 15y = 12$. $15 + 16 + 12 = 43$ D

30.
$$8 = 2g(2) + g(-2)$$
$$-8 = -2g(-2) + g(2) \rightarrow 8 = 5g(2) \rightarrow g(2) = \frac{8}{5}$$
         A

Answers:

1. B

2. C
3. A
4. B
5. E(0)
6. E(-12)
7. D
8. D
9. D
10. C
11. B
12. B
13. C
14. C
15. B
16. D
17. C
18. A
19. D
20. C
21. B
22. A
23. B
24. B
25. A
26. B
27. B
28. C
29. D
30. A