1. Solve for k if $11(3k+7)=6-(k-3)$. $33k+77=9-k$, $34k=-68$, $k=-2$

(A) -2 (B) $-\frac{37}{17}$ (C) $-\frac{17}{8}$ (D) $-\frac{37}{16}$ (E) $-\frac{17}{9}$

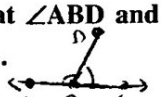
2. At Joey's in Wichita Falls, we ordered three fajita plates for \$11.75 each, one barbacoa plate for \$8.75 and 4 glasses of lemonade for \$2.25 each. The tax rate was 8.125%, and we paid with three \$20 bills and a \$5 bill. I told the waiter to keep the extra as a tip. How much was his tip? $65-1.08125(3\times11.75+8.75+4\times2.$

(A) \$12.00 (B) \$9.27 (C) \$6.67 (D) \$7.69 (E) \$8.03

3. Caroline drives to work every weekday morning. For the first week in January, her daily average speeds were 35.6 mph, 42.3 mph, 28.7 mph, 37.2 mph and 40.6 mph. What was the average speed for the week on her commute? (nearest tenth) $5/(35.6^{-1}+42.3^{-1}+28.7^{-1}+37.2^{-1}+40.6^{-1})$

(A) 36.9 mph (B) 36.2 mph (C) 36.6 mph (D) 36.7 mph (E) 36.3 mph

4. Given that $\angle ABD$ and $\angle CBD$ form a linear pair, $m\angle ABD=(x^2+1)^\circ$ and $m\angle CBD=(5x+3)^\circ$, find $m\angle CBD$.



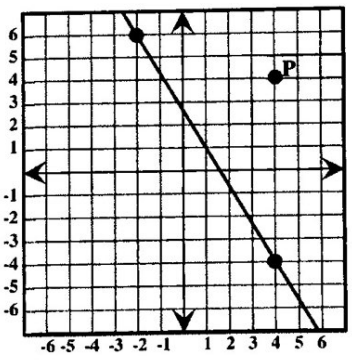
$x^2+1+5x+3=180$, $x=\{11,-16\}$, $m\angle CBD=(5(11)+3)^\circ$, $m\angle CBD=58^\circ$

(A) 11° (B) 122° (C) 118° (D) 58° (E) 62°

5. Consider the statements "If a shape is a rectangle, then it is a quadrilateral" and "If a shape is not a quadrilateral, then it is not a rectangle". The second statement is the _____ of the first statement. If rectangle → quad. If Not quad → Not rectangle

(A) Transpose (B) Converse (C) Contrapositive (D) Antithesis (E) Inverse

6. Consider the line $y=f(x)$ shown on the right. What point on $y=f(x)$ is closest to point P?



(A) $(1,1)$

(B) $\left(\frac{7}{16},2\right)$

(C) $\left(\frac{5}{9},\frac{17}{9}\right)$

(D) $\left(\frac{7}{16},\frac{17}{8}\right)$

(E) $\left(\frac{8}{17},\frac{32}{17}\right)$

$m_{\text{line}}=-\frac{5}{3}$, $y+4=-\frac{5}{3}(x-4)$, $y=-\frac{5}{3}x+\frac{8}{3}$

$m_P=\frac{3}{5}x$, $y_P-4=\frac{3}{5}(x-4)$, $y_P=\frac{3}{5}x+\frac{8}{5}$

$y=y_P$, $-\frac{5}{3}x+\frac{8}{3}=\frac{3}{5}x+\frac{8}{5}$, $\frac{16}{15}=\frac{34}{15}x$, $\frac{8}{17}=x$

$y_P=\frac{3}{5}\left(\frac{8}{17}\right)+\frac{8}{5}=\frac{24}{85}+\frac{8}{5}$, $y_P=\frac{160}{85}=\frac{32}{17}$

7. If $\frac{x+6}{x^2-13x+42}-\frac{x-7}{x^2-36}=\frac{ax^2+bx+c}{dx^4+ex^3+fx^2+gx+h}$, then $\frac{a+b+c}{d+e+f+g+h}=$_____. $\frac{1+6}{1-13+42}-\frac{1-7}{1-36}=\frac{13}{210}$

(A) $-\frac{1}{14}$ (B) $\frac{13}{210}$ (C) $\frac{13}{14}$ (D) $\frac{14}{211}$ (E) $-\frac{15}{211}$

8. Two consecutive angles in an octagon are supplementary. The other six angles are congruent. What is the measure of one of the six congruent angles?

(A) 60° (B) 90° (C) 150° (D) 120° (E) 135°

Degrees $=180(n-2)=180(8-2)=1080^\circ$ $\frac{1080-180}{6}$

$\left|-2\frac{1}{5}-7\frac{3}{10}\right|\cdot\frac{3}{5}+\left(-2\frac{1}{5}\right)$

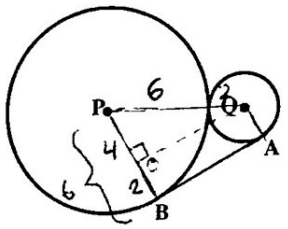
9. Find the number that is $\frac{3}{5}$ of the way from $-2\frac{1}{5}$ to $7\frac{3}{10}$.

(A) $1\frac{3}{5}$ (B) $3\frac{3}{5}$ (C) $3\frac{2}{5}$ (D) $3\frac{1}{2}$ (E) $3\frac{3}{10}$

10. Circles P and Q have radii 6 and 2 and are tangent to each other. Find the length of the common external tangent $\overline{AB}$. (nearest tenth)

(A) 6.9
(B) 7.1
(C) 7.7
(D) 8.9
(E) 9.6

$\overline{AB} \parallel \overline{PQ}$
$(\overline{PC})^2 + (\overline{QC})^2 = (PQ)^2$
$4^2 + \overline{QC}^2 = 8^2$
$\overline{QC} = \sqrt{8^2-4^2}$



11. Find the perimeter of the polygon shown on the right. (nearest tenth)

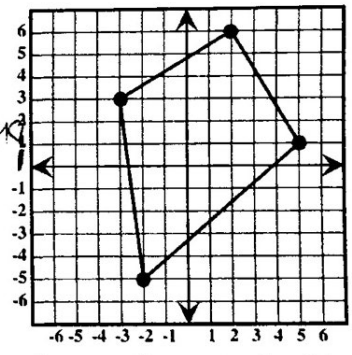
(A) 29.2
(B) 28.9
(C) 28.6
(D) 28.1
(E) 27.7

(2,6) (-3,3) $\sqrt{34}$ (-2,-5) $\sqrt{89}$ (5,1) $\sqrt{85}$ (2,6) $\sqrt{34}$

12. Find the area of the polygon shown on the right.

(A) 46.5
(B) 47
(C) 47.5
(D) 48
(E) 48.5

POLY AREA
$A_{max} = (5--3)(6--5) = 88$
$A = A_{max} - \frac{1}{2}(8\cdot1+7\cdot6+3\cdot5+3\cdot5)$



26 5 -2 -5 -3 9 26
$\frac{1}{2}(47-49)=-1$
2-25-6-18
30-2+18=26

$s(t+\frac{1}{6})=56$ $(s+8)t=56$
I. $st+\frac{1}{6}s=56$
II $st+8t=56$

$st+\frac{1}{6}s = st+8t$
$\frac{1}{6}s = 8t$
$s = 48t$

II. $(48t)t+8t=56$
$48t^2+8t-56=0$
$8(6t^2+t-7)=0$
$8(6t+7)(t-1)=0$
$t=1$ hr.

13. Laurie commutes 56 miles one-way to work. The trip to work takes 10 minutes longer than the return. Her average speed on the return trip is 8 mph faster. How long does it take her to get home?

(A) 60 min (B) 66 min (C) 48 min (D) 50 min (E) 70 min

14. Erica deposited \$5,500 into an account earning 3.85% compounded quarterly and \$7,800 into an account earning 4.25% compounded monthly. If she makes no further deposits, after how many years will her combined balance reach her goal of \$25,000? (nearest quarter year)

(A) 13 years (B) 13.75 years (C) 14.25 years (D) 15.25 years (E) 15.5 years

15. The tires on Jon's new Jeep have a diameter of 101 cm. When he is traveling 55 mph, what is the angular velocity of the wheels in revolutions per minute? (nearest whole number)

(A) 450 rpm (B) 465 rpm (C) 471 rpm (D) 479 rpm (E) 486 rpm

$14.\ 5500\left(1+\frac{.0385}{4}\right)^{4t}+7800\left(1+\frac{.0425}{12}\right)^{12t}=25000$

$15.\ \frac{55\text{ mi.}}{\text{hr.}}\cdot\frac{1\text{ hr.}}{60\text{ min.}}\cdot\frac{1\text{ mi.}}{5280\text{ ft.}}\cdot\frac{12\text{ in.}}{1\text{ ft.}}\cdot\frac{2.54\text{ cm}}{1\text{ in.}}\cdot\frac{1\text{ rev}}{101\pi\text{ cm}}$

$\frac{x^2}{64}+\frac{(0.8x-1)^2}{36}=1$ $36x^2+64(.64x^2-1.6x+1)=2304$

$78.96x^2-102.4x+64=2304$

16. The graph of ellipse $\frac{x^2}{64}+\frac{y^2}{36}=1$ and the line $y=0.8x-1$ intersect at points A and B. Find AB. (nearest tenth)

(A) 12.2 (B) 13.9 (C) 14.1 (D) 14.7 (E) 15.1

17. Let $g(x)$ be the inverse of $f(x)=6x\sqrt{2x}$. Find the smallest positive integer value of x such that $g(x)>3$. $x=6y\sqrt{2y}$ $x=\sqrt{72y^3}$ $\left(\frac{x^2}{72}\right)^{1/3}=y$ $\left(\frac{x^2}{72}\right)^{1/3}>3$

(A) 40 (B) 42 (C) 44 (D) 45 (E) 47

18. The population of the Dallas-Ft Worth metro area grew from approximately 866,000 in 1950 to 6,488,000 in 2022. What was the average annual growth rate for the population of the DFW metro area during that 72-year period? (nearest tenth of a percent) ~~$A=P+Prt$~~ $866000(1+r)^{72}=6488000$

(A) 3.1% (B) 9.0% (C) 8.7% (D) 2.8% (E) 3.5%

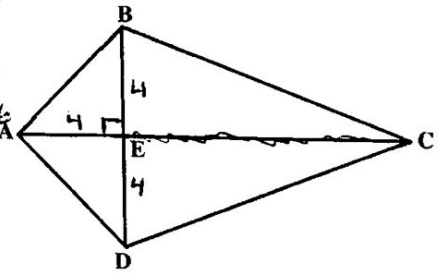
19. The graph of $f(x)=\frac{x^2-2x}{x^2-4}$ has _____ asymptotes. HA: $\left(\frac{1x^2}{1x^2}=1\right)$ VA: $x=-2$ $\frac{x(x-2)}{(x+2)(x-2)}=\frac{x}{x+2}$ BOS $x=2$

(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

20. To play in a charity tournament, student council decides to form a basketball team with 10 players. In how many ways can they choose a team from a council of 9 girls and 6 boys if the team must have at least 6 girls? $\sum_{x=6}^{9}({}_9C_x \cdot {}_6C_{10-x})$

(A) 2121 (B) 1980 (C) 5580 (D) 3690 (E) 1260

21. Given that AE = BE = DE = 4 cm and that the area of kite ABCD is 56 cm^2, find EC.



(A) 7 cm (B) 14 cm (C) 10 cm (D) 12 cm (E) 8 cm

$A=\frac{1}{2}(\overline{BD})(\overline{AC})$ $56=\frac{1}{2}(8)(4+\overline{EC})$ $14=4+\overline{EC}$

$A_{ABD}=\frac{1}{2}(8)(4)=16$ $A_{BCD}=\frac{1}{2}(8)(\overline{EC})=56-16$ $4\overline{EC}=40$

22. In a survey of 42 academic UIL team members, 24 liked to drink water on trips while 32 liked soda. If 6 students didn't like either, how many students liked both? $42-6=36$ liking either A B $A\cup B$ $A\cap B$ $24+32=36+x$

(A) 12 (B) 26 (C) 20 (D) 36 (E) 18

23. Train A is traveling north out of Boston at a rate of 85 mph, and Train B is traveling east out of Boston at a rate of 92 mph. How fast is the distance between trains A and B changing when they are 15 mi and 53 mi out of Boston respectively? (nearest mile per hour) dy/dt dx/dt y x

(A) 105 mph (B) 112 mph (C) 128 mph (D) 137 mph (E) 177 mph

Solve for d: $x^2+y^2=d^2$ $\sqrt{53^2+15^2}=d\approx 55.1$

$(x^2+y^2=d^2)\frac{\partial}{\partial t}$ $2x\frac{dx}{dt}+2y\frac{dy}{dt}=2d\frac{dd}{dt}$ $\frac{dd}{dt}=\frac{1}{d}\left(x\frac{dx}{dt}+y\frac{dy}{dt}\right)$

24. If $\dfrac{16i+14i^8+16i^3}{\sqrt{-196+14i+21i^4}}$ simplifies to $\dfrac{a}{b}+\dfrac{c}{b}i$, and $b>0$, then $a+b+c=$ _____.

(A) 23 (B) 39 (C) 27 (D) 161 (E) 117

25. Find x if $2\left(5^{2x+1}\right)-2=12$. $2(5^{2x+1})=14 \Rightarrow 5^{2x+1}=7 \Rightarrow (2x+1)\ln 5=\ln 7 \Rightarrow \frac{\ln 7}{\ln 5}=2x+1 \Rightarrow \frac{\ln 7}{\ln 5}-1=2x$

(A) $\dfrac{\ln 7}{\ln 5}-\dfrac{1}{2}$ (B) $\dfrac{\ln 7}{\ln 25}+\dfrac{1}{2}$ (C) $\dfrac{\ln 7}{\ln 10}-\dfrac{1}{2}$ (D) $\dfrac{\ln 7}{\ln 10}+\dfrac{1}{2}$ (E) $\dfrac{\ln 7}{\ln 25}-\dfrac{1}{2}$ $\frac{\ln 7}{2\ln 5}-\frac{1}{2}=x$

$2\ln 5=\ln(5^2)$

26. Find area of the shaded region shown on the right. (nearest tenth)

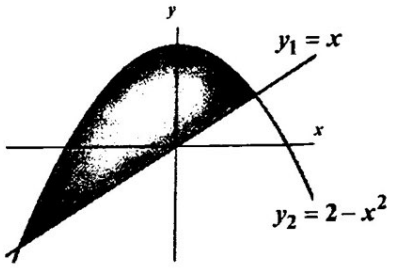
(A) 3.6 $y_1=x$ $y_2=2-x^2$

(B) 3.9 $\int_{-2}^{1}(2-x^2-(x))\,dx$

(C) 4.2

(D) 4.5

(E) 4.8



27. Find the volume of the solid generated by revolving the shaded region about the line $y=-3$. (nearest tenth)

(A) 84.2 $V=\pi\int_a^b((\text{outer-axis})^2-(\text{inner-axis})^2)\,dx$

(B) 96.1

(C) 97.8

(D) 99.2 $V=\pi\int_{-2}^{1}[(2-x^2+3)^2-(x+3)^2]\,dx$

(E) 101.3

$\begin{bmatrix} R+M+W=1496 \\ -1R+1M+0W=18 \\ -1R+1M-1W=-468 \end{bmatrix}$

R M W

28. Students taking the SAT receive a critical reading score, a mathematics score and a writing score. The average total score for students in a particular year was 1496. The average math score was 18 points higher than the average reading score, and the average math score was 468 points less than the sum of the average reading and average writing score. Find the average math score. $M=18+R$ $M=(R+W)-468$

(A) 514 (B) 496 (C) 486 (D) 532 (E) 504

29. Current standard license plates in Texas consist of 3 letters followed by 4 numbers. How many distinct license plates can be formed in Texas? A-Z 0-9 $26^3\cdot 10^4$

(A) 17,576,000 (B) 6,760,000 (C) 676,000 (D) 175,760,000 (E) 115,316,136

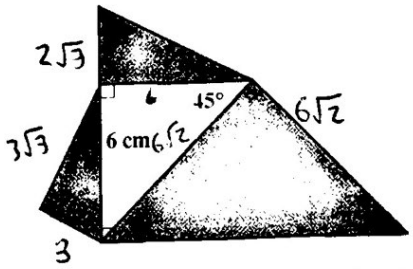
30. Find a if $(3x+5)$ is a factor of $6x^3+ax^2-54x-a$.

(A) 63 (B) –9 (C) 17 (D) –49 (E) –35

$(3x+5)$ is a factor implies the $\varnothing$ of $(3x+5)$. $\Rightarrow 3x+5=0$, $x=-\frac{5}{3}$; $f(x)=0$, $f(-\frac{5}{3})=0$ $\Rightarrow f(-\frac{5}{3})=6(-\frac{5}{3})^3+a(-\frac{5}{3})^2-54(-\frac{5}{3})-a$

$0=\frac{25}{9}a-a+90-\frac{250}{9}$

31. The area of the shaded region is _____ cm^2. (nearest tenth)



(A) 47.3

(B) 52.7 $A=\frac{1}{2}(6\cdot 2\sqrt{3}+3\sqrt{3}\cdot 3+6\sqrt{2}\cdot 6\sqrt{2})$

(C) 54.2

(D) 62.1

(E) 64.6

32. Find the angle between the vectors $u=\langle 3,8,-4\rangle$ and $v=\langle -2,-1,3\rangle$. (nearest tenth) $\cos\theta=\frac{\vec{u}\cdot\vec{v}}{|\vec{u}||\vec{v}|}$

(A) 137.4° (B) 137.1° (C) 136.7° (D) 136.5° (E) 136.1°

33. Find the domain of the function $f(x)=\frac{\sqrt{3x-8}}{2x^2-19x+45}$. $D:\sqrt{3x-8}>0$; $2x^2-19x+45\geq 0$

(A) $x>\frac{8}{3}, x\neq\frac{9}{2},5$ (B) $x\geq-\frac{8}{3}, x\neq\frac{9}{2},5$ (C) $x\leq-\frac{8}{3}, x\neq-5,-\frac{9}{2}$

(D) $x<-\frac{8}{3}, x\neq-5,-\frac{9}{2}$ (E) $x\geq\frac{8}{3}, x\neq\frac{9}{2},5$

34. $\lim_{h\to 0}\frac{\sin\left(\frac{\pi}{3}+h\right)-\sin\left(\frac{\pi}{3}\right)}{h}=$ lim. def. of derivative of $\sin(x)$ at $\frac{\pi}{3}$

(A) 1 (B) $\frac{1}{2}$ (C) $\frac{\sqrt{3}}{2}$ (D) $-\frac{1}{2}$ (E) $-\frac{\sqrt{3}}{2}$

35. Brian has 10 unique school books. In how many ways can he arrange his books on a single shelf so that he keeps his three math books together? $3!8!$

(A) 40,320 (B) 3,628,800 (C) 120,960 (D) 30,240 (E) 241,920

36. Simplify: $\frac{a}{b+\frac{1}{c+\frac{d}{f}}}=\frac{a}{b+\frac{1}{\frac{cf+d}{f}}}=\frac{a}{b+\frac{f}{cf+d}}=\frac{a}{\frac{b(cf+d)+f}{cf+d}}=\frac{a(cf+d)}{bcf+bd+f}$

(A) $\frac{acf+ad}{bcf+bd+f}$ (B) $\frac{af+ad}{bf+bd+f}$ (C) $\frac{ac+ad}{bc+bd+f}$ (D) $\frac{acf+ad}{bcf+bd+cf}$ (E) $\frac{cf+d}{bcf+bd+f}$

37. Six men can do 8 jobs in three days. How many days would it take 9 men to do 20 jobs? Work rate: $\frac{(\text{workers})(\text{time})}{\text{Job}}$

(A) 10 (B) 8 (C) 6 (D) 5 (E) 4 $\frac{6\cdot 3}{8}=\frac{9t}{20}$

38. Which of the following is a solution to the system of inequalities $x-y<2$, $x<2$ and $y\leq 3$?

(A) (3, 1) (B) $\left(\frac{3}{2},-1\right)$ (C) $\left(1,\frac{3}{2}\right)$ (D) (−2, −4) (E) (1, −3)

$Ax+By+Cz+D=\varphi(x_1,y_1,z_1)$ distance $= \dfrac{|Ax_1+By_1+Cz_1+D|}{\sqrt{A^2+B^2+C^2}}$

39. Find the distance between the plane $7x-9y-2z=18$ and the point $(-1,-3,5)$. (nearest tenth)

(A) 0.6 (B) 0.7 (C) 0.9 (D) 2.1 (E) 2.4

40. Which of the following is one of the three cube roots of the 216? Demoivre's Theorem

(A) $3+3i\sqrt{3}$ (B) -6 (C) $-3+i\sqrt{3}$ (D) $-3+3i\sqrt{3}$ (E) $-3-i\sqrt{3}$

41. The sum of the first ten terms of an arithmetic sequence is 27.5, and the sum of the first twenty terms is 205. What is the common difference of the sequence? $a, a+k, a+2k, a+3k$ $\begin{bmatrix} 10a+45k=27.5 \\ 20a+190k=205 \end{bmatrix}$

(A) 2.5 (B) 1.25 (C) 1.5 (D) 2.25 (E) 0.75

42. Mr. Wilson has a weighted tetrahedral die with sides labeled 1, 2, 3 and 4. The table below shows the probability of rolling some of the numbers. What is the expected value for a single roll?

x	1	2	3	4
$p(x)$	$\frac{1}{2}$	$\frac{1}{6}$	$\frac{1}{4}$	$\frac{1}{12}$

$\sum_{x=1}^{4} x\,p(x) =$

(A) $1\frac{7}{12}$ (B) $2\frac{1}{2}$ (C) $1\frac{5}{6}$ (D) $2\frac{1}{3}$ (E) $1\frac{11}{12}$

43. When evaluating $\int\left(t^2e^t\right)dt$ using the method of integration by parts, the best choice for dv is ____.

(A) e^t (B) tdt (C) $e^t dt$ (D) t (E) t^2dt

44. Find the rectangular coordinates of the point given in polar coordinates $\left(9,\frac{7\pi}{9}\right)$. (all answers are rounded to the nearest hundredth) $\left(9\cos\left(\frac{7\pi}{9}\right), 9\sin\left(\frac{7\pi}{9}\right)\right)$

(A) (−6.89, 5.79) (B) (6.89, −5.79) (C) (−7.55, 5.79) (D) (−7.55, −5.79) (E) (8.99, 0.38)

45. Consider the graph of $f(x)=4x^4-3x^2$. Find the sum of the y – values of the points of inflection. (nearest hundredth) $\frac{\partial}{\partial x} f(x) = 0$

(A) 0.00 (B) −0.31 (C) −0.63 (D) 0.26 (E) 0.52

46. If $f(x)=2x+1$ and $g(x)=x^2$, then $g\left(f(x+2)\right)=$ $f(x+2) = 2(x+2)+1 = 2x+5$

$g(2x+5) = (2x+5)^2 = 4x^2+20x+25$

(A) $4x^2+12x+9$ (B) x^2-25 (C) $4x^2+25$ (D) $4x^2+9$ (E) $4x^2+20x+25$

47. If $\sin\theta=-\frac{7}{25}$ and $\frac{\pi}{2}\le\theta\le\frac{3\pi}{2}$, then $\tan\theta=$

(A) $\frac{7}{24}$ (B) $\frac{24}{25}$ (C) $-\frac{24}{7}$ (D) $\frac{24}{7}$ (E) $-\frac{24}{25}$

48. In a normal distribution with a mean of μ and standard deviation σ, _____% of observations fall within σ of μ. (nearest whole number)

(A) 65 (B) 66 (C) 67 (D) 68 (E) 68

49. Find the interval of convergence of $\sum_{n=0}^{\infty} \frac{n(x+2)^n}{3^{n+1}}$. $\lim_{n\to\infty}\left|\frac{a_{n+1}}{a_n}\right| < 1 \Rightarrow \frac{|x+2|}{3} < 1 \Rightarrow -5 < x < 1$

Test $x=1$ and $x=-5$:

$\sum_{n=1}^{\infty} \frac{n(3)^n}{3^{n+1}}$ diverges

$\sum_{n=1}^{\infty} \frac{n(-3)^n}{3^{n+1}} = \frac{n(-1)^n(3)^n}{3^{n+1}}$ diverges

(A) $[-5,1)$ (B) $(-5,1)$ (C) $(-1,1)$ (D) $(-5,5)$ (E) $[-1,5]$

50. Find BD. (nearest quarter inch)

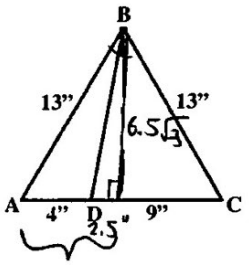
(A) $11\frac{1}{2}$ in $(2.5)^2+(6.5\sqrt{3})^2=(\overline{BD})^2$

(B) $11\frac{3}{4}$ in

(C) $10\frac{1}{4}$

(D) 10

(E) $9\frac{1}{2}$



6.5"

51. Evaluate: $\lim_{x\to\pi^-} \cot x$ graph

(A) –1 (B) 0 (C) $-\infty$ (D) ∞ (E) 1

52. If $f(x)=ax^6+bx^4+x$ and $f(2)=30$, then $f(-2)=$ Even function $30=ax^6+bx^4+2$ $ax^6+bx^4=28$

(A) 28 (B) 26 (C) –30 (D) 30 (E) 32

53. According to Wikipedia, this mathematician "founded the field of game theory as a mathematical discipline."

(A) Charles Babbage (B) Jon von Neumann (C) Tommy Flowers

(D) Alan Turing (E) Christian Goldbach

54. Given: $\int_{-2}^{5} f(x)dx = 9$ and $\int_{-2}^{5} g(x)dx = -6$, evaluate $\int_{-2}^{5} [3f(x)+4g(x)+7]dx = 3\int_{-2}^{5} f(x)dx + 4\int_{-2}^{5} g(x)dx + \int_{-2}^{5} 7dx$

(A) 10 (B) 49 (C) 52 (D) 58 (E) 42

55. The square root of 169_{12} is equal to _____$_{12}$. $12^2\cdot 1+12^1\cdot 6+9=225$

(A) 11 (B) A (C) B (D) 13 (E) 15

56. Jon's Ice Cream Shop serves 6 different flavors of ice cream with 3 container choices and 2 topping choices. How many possible ways are there to order 2 scoops in a container with 1 topping?

(A) 108 (B) 63 (C) 216 (D) 168 (E) 126

$_{n+k-1}C_{k-1}\cdot {}_3C_2\cdot {}_2C_1$

graph

57. How many points of intersection occur when $r = 3\sin\theta - 1$ and $r = 3$ are graphed on the polar coordinate system?

(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

58. The number 31 is considered to be which of the following types of numbers:

I. Happy (sum of squares of digits eventually makes 1) II. Polite (not 2^n, where $n \geq 0 \in \mathbb{N}$) III. Odious (odd # of 1s in base 2) IV. Extravagant

(A) I, II only (B) I, III only (C) I, III, IV only (D) I, II, III only (E) II, III, IV only

59. Find the sum of all the three digit numbers whose digits have a sum of eight and whose digits can all be used to form a perfect cube. 1st restraint: 125, 512 $\Rightarrow$ 6 #s can be formed ${}_3P_3 = \frac{3!}{(3-3)!}$

(A) 1420 (B) 1776 (C) 1925 (D) 861 (E) 915

60. Find the constant term in the expansion of $\left(2x^2 - \frac{3}{x}\right)^9$.

(A) –326,592 (B) 489,888 (C) 979,776 (D) –145,152 (E) 19,683

order of $18 - 2x = 0 \Rightarrow x = 6$

${}_9C_6 \cdot 2^3 \cdot (-3)^6$