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MATEMATIK KANAL

@ALPHRAGANUS

XORAZM ILM ZIYO VA HARBIY 2019 100%

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HURMAT BILAN UMRZOQ URALOV

Matematika 5.07.2019.

1. 12345...110111
$1\cdot 9 + 2\cdot 90 + 3\cdot 12 = 225$ (D)

2. 12345...110111112
$1\cdot 9 + 2\cdot 90 + 3\cdot 13 = 228$ (D)

3. 12345...110111
TURLI RAQAM 10 TA (B)

4. 0; 1; 2; 3; 4
$4\cdot 5\cdot 5 = 100$ (A)

5. 1; 2; 3; 4; 5
$5\cdot 5\cdot 5 = 125$ (B)

6. 0; 1; 2; 3; 4; 5; 6
$6\cdot 7\cdot 7 = 294$ (E) :-))

7. $2^4 = 16$ (A)

8. $2^5 = 32$ (C)

9. $A = \{a; b; c; d; e; f\}$
$n=6$ $2^6 = 64$ $2^5 = 32$ (C)
$64 - 32 = 32$
d element qatnashmagan qism to'plamlar soni 32 ta, qatnashgani ham 32 ta.

10. $A = \{a; b; c; d; e; f\}$
$B = \{a; b; d; e; f\}$ $C = \{a; d; e; f\}$
$n=5$ $2^5 = 32$ $n=4$ $2^4 = 16$
$32 - 16 = 16$ (A)

11. $A = \{a; b; c; d; e; f\}$
$b = \{a; b; e; f\}$
$n=4$ $2^4 = 16$ (A)

12. $A = \{a; b; c; d\}$ $C_3^0 + C_3^1 + C_3^2 = 4$.
$\{a\}\{e\}$ $\{c\}$ $\{a; b\}$ $\{b; d\}$ $\{a; b; c; d\}$
$\{d\}\{a; c\}$ $\{c; d\}$ $\{a; b; c\}$ $\{a; d\}$ $\{a\}$
$\{a; e; d\}$ $\{a; c; d\}$ $\{b; c; d\}$ $\{bc\}$.

13. $A = \{0; 1; 2; 5; 6; 7; 9\}$ $B = \{1; 4; 8; 9\}$
$A \cup B = \{0; 1; 2; 4; 5; 6; 7; 8; 9\}$ $n = 9$.
$2^9 - 2 = 512 - 2 = 510$

14. $A = \{x \mid x = 2n; n \in N\}$
$B = \{x \mid x = 2n+1; n \in N\}$
$A \cup B = N \setminus \{1\}$ (C)

15. $A = \{x \mid x = 2n; n \in N\}$
$B = \{x \mid x = 2n+1; n \in N\}$
$A \cap B = \emptyset$ (D)

16. $N(2) = 63 = \left[\frac{126}{2}\right]$
$N(7) = 18 = \left[\frac{126}{7}\right]$
$N(14) = 9 = \left[\frac{126}{14}\right]$
$63 + 18 - 9 = 72$
$126 - 72 = 54$ (D)

17. $N(3) = 45$
$N(5) = 27$ $45 + 27 - 9 = 63$
$N(15) = 9$ $135 - 63 = 72$ (B)

18. $N(5) = 40 = \left[\frac{200}{5}\right]$
$N(7) = 28 = \left[\frac{200}{7}\right]$
$N(35) = 5 = \left[\frac{200}{35}\right]$
$40 + 28 - 5 = 63$
$200 - 63 = 137$
(A)

19. 324; 255; 71
(C) $EKUB(324-255; 255-71) = 23$.

20. $128^{143} = 128^3 = \ldots 2$ (B)

21. $433^{333} = 433^1 = \ldots 3$ (C)

22. $233^{233} = 233^1 = \ldots 3$ (C)

23. $373^{373} = 373^1 = \ldots 1$ (C)

24. $999^{2^{333}} \overset{333}{=} 999^2 = \ldots 1$ (A)

25. $888^{2^{999}} \overset{888}{=} 888^4 = \ldots 6$ (C).

26. $x = 44$
$x + 2\cdot n = 62$. $n = 9$. (A).

27. $x = 52$
$x + 2\cdot n = 72$ $n = 10$ (B).

28. $\begin{cases} x+y = 1{,}5(x-y) \\ \frac{x^2+y^2}{xy} = \frac{25y^2+y^2}{5y^2} = \frac{26}{5} = 4{,}3 \end{cases}$ $2x + 2y = 3x - 3y$
$5y = x$.
(A) $430\%$
$-100\%$

29. $a^2-b^2=49$.

$(a+b)(a-b)=49\cdot 1$.

$\begin{cases} a+b=49 \\ a-b=1 \end{cases}$ $a=25$, $b=24$

(B) $3\cdot 25-2\cdot 24=75-48=27$

30. $a^2-b^2=25$.

$(a+b)(a-b)=25\cdot 1$

$\begin{cases} a+b=25 \\ a-b=1 \end{cases}$ $a=13$, $b=12$ (C)

$2\cdot 13-12=26-12=14$

31. $a^2-b^2=9$.

$(a+b)(a-b)=9\cdot 1$

$\begin{cases} a+b=9 \\ a-b=1 \end{cases}$ $a=5$, $b=4$ (C)

$2\cdot 5-3\cdot 4=10-12=-2$

32. $(n-m)(n+m)=25$

$\begin{cases} n-m=1 \\ n+m=25 \end{cases}$ $n=13$, $m=12$ (B)

$n+2m=13+2\cdot 12=37$

33. $NBS(EKUB(911;659;647367))$

$NBS(1)=1$. (A)

| 911 | 911 | 659 | 659 | 1014 | 2 |
|---|---|---|---|---|---|
| 1 | | 1 | | 507 | 3 |
| | | | | 169 | 13 |
| | | | | 13 | 13 |
| | | | | 1 | |

$EKUB=1$.

34. $EKUK(NBS(144);51))=EKUK(15;51)$

$144=2^4\cdot 3^2$ $NBS=(4+1)(2+1)=15$ (B)

| 15 | 3 | 51 | 3 |
|---|---|---|---|
| 5 | 5 | 17 | 17 |
| 1 | | 1 | |

$EKUK=3\cdot 5\cdot 17=255$

35. $3a-(5a-(3a-(2a+b)))=$

$=3a-(5a-(3a-2a-b))=$ (B)

$=3a-(5a-a+b)=3a-4a-b=-a-b$

36. $5a-(4a-(3a-(2a-b)))=$

$=5a-(4a-(3a-2a+b))=$ (A)

$=5a-(4a-a-b)=5a-3a+b=2a+b$

37. $\frac{1}{a(a-b)(a-c)}+\frac{1}{b(b-a)(b-c)}+\frac{1}{c(c-a)(c-b)}=$ X

$\frac{1}{a(a-b)(a-c)}-\frac{1}{b(b-c)(a-b)}+\frac{1}{c(a-c)(b-c)}=$

$=\frac{bc(b-c)-ac(a-c)+ab(a-b)}{abc(a-b)(a-c)(b-c)}=$

$=\frac{b^2c-bc^2-a^2c+ac^2+a^2b-ab^2}{abc(a-b)(a-c)(b-c)}=$ (C)

$=\frac{b^2c-bc^2-a^2c+ac^2+a^2b-ab^2}{abc(b^2c-bc^2-a^2c+ac^2+a^2b-ab^2)}=\frac{1}{abc}$

38. $-\frac{1}{abc}$ 37 ni minusligi. (B)

39 $\frac{a+b}{a^{\frac{2}{3}}-a^{\frac{1}{3}}b^{\frac{1}{3}}+b^{\frac{2}{3}}}-\frac{a-b}{a^{\frac{2}{3}}+a^{\frac{1}{3}}b^{\frac{1}{3}}+b^{\frac{2}{3}}}=$ (A)

$=a^{\frac{1}{3}}+b^{\frac{1}{3}}-a^{\frac{1}{3}}+b^{\frac{1}{3}}=2b^{\frac{1}{3}}=2\sqrt[3]{b}$.

40. $\frac{(\sqrt{a}-\sqrt{b})^3+2a^2:\sqrt{a}+b\sqrt{b}}{a\sqrt{a}+b\sqrt{b}}+\frac{3\sqrt{ab}-3b}{a-b}$

1) $\frac{\sqrt{a^3}-3a\sqrt{b}+3\sqrt{a}\cdot b-b\sqrt{b}+2a\sqrt{a}+b\sqrt{b}}{\sqrt{a^3}+\sqrt{b^3}}$

$=\frac{3(a\sqrt{a}-a\sqrt{b}+\sqrt{a}\cdot b)}{(\sqrt{a}+\sqrt{b})(a-\sqrt{ab}+b)}=\frac{3\sqrt{a}}{\sqrt{a}+\sqrt{b}}$

2) $\frac{3\sqrt{a}}{\sqrt{a}+\sqrt{b}}+\frac{3\sqrt{ab}-3b}{a-b}=\frac{3\sqrt{a}(\sqrt{a}-\sqrt{b})+}{a-b}$

$+3\sqrt{ab}-3b=\frac{3a-3\sqrt{ab}+3\sqrt{ab}-3b}{a-b}=$

$=3$ (C)

41. $\frac{(\sqrt{a}+\sqrt{b})^3+2a^2:\sqrt{a}+b\sqrt{b}}{a\sqrt{a}+b\sqrt{b}}-\frac{3\sqrt{ab}+3b}{a-b}$

1) $\frac{\sqrt{a^3}+3a\sqrt{b}+3\sqrt{a}\cdot b+b\sqrt{b}+2a\sqrt{a}-b\sqrt{b}}{a\sqrt{a}-b\sqrt{b}}$

$=\frac{3\sqrt{a^3}+3a\sqrt{b}+3\sqrt{a}\cdot b}{(\sqrt{a}-\sqrt{b})(a+\sqrt{ab}+b)}=\frac{3\sqrt{a}}{\sqrt{a}-\sqrt{b}}$.

2) $\frac{3\sqrt{a}}{\sqrt{a}-\sqrt{b}}-\frac{3\sqrt{ab}-3b}{a-b}=\frac{3\sqrt{a}(\sqrt{a}+\sqrt{b})}{a-b}$

$\left|\frac{-3\sqrt{ab}+3b}{}=\frac{3a+3\sqrt{ab}-3\sqrt{ab}+3b}{a-b}=\right.$

$=3$ (C).

42. $a=75$ $p=4$ $q=3$
$75\cdot 0{,}04=3$
$75\cdot 0{,}003=0{,}225$ (A)

43. $a>1$ (C)
1) $\log_a\log_a\lg 5$ 3) $\lg\log_a\lg 5$

44. $0<a<1$ (D)
$\log_a\log_a\log_a\frac{\pi}{3}$

45. $y=\frac{2}{x}-3$ $(-\infty;-3)\cup(-3;\infty)$ (B)

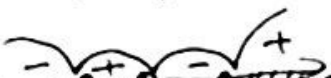
46. $y=\frac{3}{x}-4$ $(-\infty;-4)\cup(-4;\infty)$ (B)

47. $y=\frac{4}{x}-2$ $(-\infty;-2)\cup(-2;\infty)$ (B)

48. $y=\arccos 2^x$
$-1\le 2^x\le 1$ $x\le 0$ (C)

49. $y=\arcsin 3^x$
$-1\le 3^x\le 1$ $x\le 0$ (C)

50. $f(x)=\frac{5}{x}-\sqrt{\frac{x-2}{x(x+3)}}$

$\begin{cases} x\neq 0 \\ \frac{x-2}{x(x+3)}\ge 0 \end{cases}$ 

(B)

51. $f(x)$ $y=2f(x-1)-7$.
$(-\infty;\infty)$ (A)

52. $f(x)$ $y=2f(x-1)-7$.
monoton (A)

53. $\begin{cases} f(x)+2f\left(\frac{1}{x}\right)=x \\ f\left(\frac{1}{x}\right)+2f(x)=\frac{1}{x} \end{cases}$ $(x\neq 0)$

$\ominus\begin{cases} f(x)+2f\left(\frac{1}{x}\right)=x \\ 2f\left(\frac{1}{x}\right)+4f(x)=\frac{2}{x} \end{cases}$ (B)

$3f(x)=\frac{2}{x}-x$ $f(x)=\frac{2-x^2}{3x}$

54. $f(x)+xf\left(\frac{x}{2x-1}\right)=2$ $f(x)=?$

$\frac{x}{2x-1}=a$ $x=2ax-a$ $x=\frac{a}{2a-1}$
$a=2ax-x$

$\ominus\begin{cases} f\left(\frac{a}{2a-1}\right)+\frac{a}{2a-1}f(a)=2 \\ f(a)+af\left(\frac{a}{2a-1}\right)=2 \quad :a \end{cases}$

$\frac{a}{2a-1}f(a)-\frac{1}{a}f(a)=2-\frac{2}{a}$ (A)

$\left(\frac{a}{2a-1}-\frac{1}{a}\right)f(a)=\frac{2a-2}{a}$ $f(a)=\frac{2a-2}{a}\cdot\frac{a(2a-1)}{a^2-2a+1}$

$f(a)=\frac{2(2a-1)}{a-1}$ $f(x)=\frac{4x-2}{x-1}$

55. $y=\frac{x^2}{\sqrt{x^2+5}}$ $y'=\frac{2x\sqrt{x^2+5}-x^2\cdot\frac{2x}{2\sqrt{x^2+5}}}{x^2+5}$

$=\frac{2x(x^2+5)-x^3}{(x^2+5)\sqrt{x^2+5}}=\frac{x^3+10x}{\sqrt{(x^2+5)^3}}$ (D)

56. $f(x)=x^3-3x^2+2x-1$ $f'(2)=?$
$f'(x)=3x^2-6x+2$ $f'(2)=12-12+2$
$f'(2)=2$ (C)

57. $f(x)=\frac{x^3-8}{x^2+2x+4}=x-2$
$f(2x-1)=2x-1-2=2x-3$.
$f'(2x-1)=2$ (C)

58. $f(x)=\frac{x^3-8}{x^2+2x+4}-2x+1=x-2-2x+1=-x-1$
$f'(x)=-1$ (D)

58. $f(x)=\frac{x^3-8}{x^2+2x+4}$ $f'(x)=\frac{3x^2(x^2+2x+4)-(x^3-8)(2x+2)}{(x^2+2x+4)^2}$

$f'(0)=\frac{-16}{16}=-1$.
(D)

59. $f(x)=\frac{x^3-8}{x^2+2x+4}-2x+1$.

$f(x)=x-2-2x+1$

$f(x)=-x-1$

$f'(x)=-1$ (D)

60. $y=\frac{x^3-27}{x^2-3x+9}+3x \quad y'(1)=?$

$y'=\frac{3x^2(x^2-3x+9)-(x^3-27)(2x-3)}{(x^2-3x+9)^2}+3$

$y'(1)=\frac{3(1-3+9)-(1-27)(2-3)}{(1-3+9)^2}+3=$

$=\frac{21-26}{49}+3=2\frac{44}{49}$ (D)

61. $F'(x)=x-4 \quad F(2)=0. \quad F(x)=?$

$F(x)=\frac{x^2}{2}-4x+C$

$0=2-8+C \quad C=6$

$F(x)=\frac{x^2}{2}-4x+6$ (B)

62. $f(x)=2x^2-x \quad x=4 \quad \Delta x=0,1$

$\Delta y=f(x+\Delta x)-f(x)=1,52$ (C)

$f(4,1)=2\cdot 4,1^2-4,1=29,52$

$f(4)=2\cdot 4^2-4=28.$

63. $f(x)=x^2-2x \quad x=3 \quad \Delta x=0,1$

$\Delta y=f(x+\Delta x)-f(x)=0,41$ (B)

$f(3,1)=3,1^2-2\cdot 3,1=3,41$

$f(3)=3^2-2\cdot 3=3$

65. $f(x)\cdot f'(x)\geq 0.$

| | | | |
|---|---|---|---|
| 1. | + | − | $(-\infty;-6]$ |
| (2) | − | − | $[-6;-4]$ |
| 3. | − | + | $[-4;-3]$ (B) |
| (4) | + | + | $[-3;0]$ |
| 5. | + | − | $[0;4]$ |
| (6) | − | − | $[4;5]$ |
| 7. | − | + | $[5;6]$ |
| (8) | + | + | $[6;\infty)$ |

64. $f(x)=-x^2+2x \quad x=-2. \quad \Delta x=0,1$

$\Delta y=f(x+\Delta x)-f(x).$

$\Delta y=f(-1,9)-f(-2)=-7,41+8=0,59$

$f(-1,9)=-1,9^2-2\cdot 1,9=-7,41 \quad f(-2)=-4-4=8$

66. $f(x)\cdot f'(x)<0.$

| | | | |
|---|---|---|---|
| (1) | + | − | $(-\infty;-6)$ |
| 2. | − | − | $(-6;-4)$ |
| (3.) | − | + | $(-4;-3)$ |
| 4. | + | + | $(-3;0)$ |
| (5) | + | − | $(0;4)$ |
| 6. | − | − | $(4;5)$ |
| (7.) | − | + | $(5;6)$ (C) |
| 8. | + | + | $(6;\infty)$ |

67. $\frac{f'(x)}{f(x)}>0$ 65-misol özi faqat qa'tiy. (D)

68. $0,25y'=y. \quad \frac{dy}{dx}=4y. \quad \int\frac{dy}{y}=\int 4dx$

$\ln y=4x+C \quad y=Ce^{4x}$ (A)

69. $0,5y'=y \quad \frac{dy}{dx}=2y \quad \int\frac{dy}{y}=\int 2dx$

$\ln y=2x+C \quad y=Ce^{2x}$ (A)

70. $s(t)=2t^3+9t+3$

$v(t)\cdot a(t)=6t^2+9$ (D)

71. $s(t)=-2t^3+9t+15$

$a(t)=-6t^2+9$ (D)

72. $y=9-x^2 \quad x=-3 \quad y=9-9=0.$

$k=-2x=6.$

$y=6(x+3)=6x+18$ (B)

73. $\int(x^3-\cos 4x)dx=\frac{x^4}{4}-\frac{1}{4}\sin 4x+C$ (B)

74. $\int x^2\sin x^3dx=\int\frac{1}{3}\sin x^3dx^3=$

$=-\frac{1}{3}\cos x^3+C$ (B)

75. $\int x^3\sin x^4dx=\int\frac{1}{4}\sin x^4dx^4=$

$=-\frac{1}{4}\cos x^4+C.$ (B)

76. $\int x^3\cos x^4dx=\int\frac{1}{4}\cos x^4dx^4=$

$=\frac{1}{4}\sin x^4+C$ (C)

(D) 77. $\int \arcsin x\,dx$

77. $\int \arcsin x\,dx = \left[\begin{matrix} \arcsin x = t \\ x = \sin t \end{matrix} \begin{matrix} . \\ \end{matrix} \begin{matrix} dx = \cos t\,dt \\ \end{matrix}\right]$

$\int t\cdot\cos t\,dt = \left[\begin{matrix} t = u \\ dt = du \end{matrix} \begin{matrix} \\ \end{matrix} \begin{matrix} \cos t\,dt = d\vartheta \\ \sin t = \vartheta \end{matrix}\right] =$

$= u\cdot\vartheta - \int \vartheta\,du = t\cdot\sin t - \int \sin t\cdot dt =$ (B)

$= t\cdot\sin t + \cos t = x\cdot\arcsin x + \sqrt{1-x^2} + C.$

78. $\int x\cdot a^x dx = \left[\begin{matrix} x = u \\ dx = du \end{matrix} \begin{matrix} . \\ \end{matrix} \begin{matrix} a^x dx = d\vartheta \\ \frac{a^x}{\ln a} = \vartheta \end{matrix}\right] =$

$= x\cdot\frac{a^x}{\ln a} - \int \frac{a^x}{\ln a}\,du = x\cdot\frac{ax}{\ln a} - \frac{a^x}{\ln^2 a} + C.$ (A)

79. $\int x\cdot 3^x dx = x\cdot\frac{3^x}{\ln 3} - \frac{3^x}{\ln^2 3} + C.$ (A)

80. $\int \cos x\cdot e^x dx = \left[\begin{matrix} \cos x = u \\ -\sin x\,dx = du \end{matrix} \begin{matrix} \\ \end{matrix} \begin{matrix} e^x dx = d\vartheta \\ e^x = \vartheta \end{matrix}\right]$

$= e^x\cdot\cos x + \int e^x\cdot\sin x\,dx = e^x\cdot\cos x + e^x\cdot\sin x -$

$- \int e^x\cdot\cos x\,dx$

$\int 2e^x\cos x\,dx = e^x\cos x + e^x\cdot\sin x.$

$\int e^x\cos x\,dx = \frac{e^x}{2}(\cos x + \sin x) + C$ (A)

81. $\int \ln(\sin x)^{\cos x} dx = \int \cos x\ln\sin x\,dx =$

$\int \ln\sin x\,d(\sin x) = \left[\sin x = t\right] = \int \ln t\,dt =$

$= \left[\begin{matrix} \ln t = u \\ \frac{1}{t}dt = du \end{matrix} \begin{matrix} \\ \end{matrix} \begin{matrix} dt = d\vartheta \\ t = \vartheta \end{matrix}\right] = t\cdot\ln t - \int t\cdot\frac{1}{t}dt =$

$= t\cdot\ln t - t + C = \sin x\cdot\ln\sin x - \sin x + C$ (C)

82. $\int_{-1}^{1}(\operatorname{tg} x + \sin x)\,dx = 0.$ (B) $\int_{-1}^{1}$ Toq funksiya $dx = 0.$

83. $\int_{-\pi}^{\pi} |\sin 2x|\,dx = 2\cdot\int_{0}^{\pi} |\sin 2x|\,dx =$

$= 2\left(\int_{0}^{\frac{\pi}{2}} \sin 2x\,dx - \int_{\frac{\pi}{2}}^{\pi} \sin 2x\,dx\right) =$

$= 2\cdot\left(-\frac{1}{2}\cos 2x\Big|_{0}^{\frac{\pi}{2}} + \frac{1}{2}\cos 2x\Big|_{\frac{\pi}{2}}^{\pi}\right) =$

$= -\cos 2x\Big|_{0}^{\frac{\pi}{2}} + \cos 2x\Big|_{\frac{\pi}{2}}^{\pi} =$ (D)

$-\cos\pi + \cos 0 + \cos 2\pi - \cos\pi = 4$

84. $\int_{-\pi}^{\pi} |\cos 2x|\,dx = 2\int_{0}^{\pi} |\cos 2x|\,dx =$

$= 2\left(\int_{0}^{\frac{\pi}{4}} \cos 2x\,dx + \int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} -\cos 2x\,dx + \int_{\frac{3\pi}{4}}^{\frac{5\pi}{4}} \cos 2x\,dx + \int_{\frac{5\pi}{4}}^{\pi} -\cos 2x\,dx\right) =$

$= 2\cdot\left(\frac{1}{2}\sin 2x\Big|_{0}^{\frac{\pi}{4}} - \frac{1}{2}\sin 2x\Big|_{\frac{\pi}{4}}^{\frac{3\pi}{4}} + \frac{1}{2}\sin 2x\Big|_{\frac{3\pi}{4}}^{\frac{5\pi}{4}} - \frac{1}{2}\sin 2x\Big|_{\frac{5\pi}{4}}^{\pi}\right) =$

$= \sin 2x\Big|_{0}^{\frac{\pi}{4}} - \sin 2x\Big|_{\frac{\pi}{4}}^{\frac{3\pi}{4}} + \sin 2x\Big|_{\frac{3\pi}{4}}^{\frac{5\pi}{4}} - \sin 2x\Big|_{\frac{5\pi}{4}}^{\pi} =$

$= 1 + 1 + 1 + 1 = 4.$ (D)

85. $\int_{0}^{2} x\cdot e^{x^2}\,dx = \int_{0}^{2} \frac{1}{2} e^{x^2}\,dx^2 = \frac{1}{2} e^{x^2}\Big|_{0}^{2} = \frac{e^4-1}{2}$ (B)

86. $\int_{1}^{2} e^{-4\ln x}\,dx = \int_{1}^{2} x^{-4}\,dx = \frac{x^{-3}}{-3}\Big|_{1}^{2} = \frac{2^{-3}}{-3} + \frac{1}{3} =$

$= -\frac{1}{24} + \frac{8}{24} = \frac{7}{24}$ (C)

87. $\int_{1}^{2} e^{-2\ln x}\,dx = \int_{1}^{2} x^{-2}\,dx = \frac{x^{-1}}{-1}\Big|_{1}^{2} = \frac{2^{-1}}{-1} + 1 = \frac{1}{2}$ (A)

88. $\int_{0}^{1} \sqrt{x\sqrt{x\sqrt{x}}}\,dx = \int_{0}^{1} x^{\frac{7}{8}}\,dx = \frac{x^{\frac{7}{8}+1}}{\frac{7}{8}+1}\Big|_{0}^{1} = \frac{8}{15}$ (C)

89. $16 - 3(2x - 3(2 - 3(1-3x))) = 82.$

$16 - 3(2x - 3(2 - 3 + 9x)) = 82$

$16 - 3(2x + 3 - 27x) = 82.$

$16 - 9 + 75x = 82$

$75x = 75 \quad x = 1. \quad 1^2 - 6 = -5$ (A)

90. $16 - 3(2x + 3(2 - 3(1-3x))) = 100$

$16 - 3(2x + 3(2 - 3 + 9x)) = 100$

$16 - 3(2x + 3 - 27x) = 100.$

$16 + 9 + 75x = 100.$

$75x = 75 \quad x = 1.$

$1^2 - 6 = -5$ (A)

91. $xy = 9 \quad x + y = 7$

$(4 - x^2)y + (4 - y^2)x =$

$= 4y - x^2y + 4x - xy^2 =$

$= 4(x+y) - xy(x+y) =$ (A)

$= 4\cdot 7 - 9\cdot 7 = -5\cdot 7 = -35$

92. $xy = -2 \quad x + y = 3.$

$(5 - 4x^2)y + (5 - 4y^2)x =$

$= 5y - 4x^2y + 5x - 4y^2x =$

$= 5(x+y) - 4xy(x+y) =$

$= 5\cdot 3 - 4\cdot(-2)\cdot 3 =$

$= 15 + 24 = 39.$ (D)

93. $xy = -2 \quad x + y = 3.$

$(5 - 3x)^2 y + (5 - 3y)^2 x =$

$= 25y - 30xy + 9x^2y +$

$25x - 30xy + 9y^2x =$

$= 25(x+y) - 60xy + 9xy(x+y)$

$= 25\cdot 3 + 60\cdot 2 - 18\cdot 3 =$

$= 141.$ (D)

94. $xy = -2 \quad x + y = 3$

$(5 - 4x)^2 y + (5 - 4y)^2 x =$

$= 25y - 40xy + 16x^2y +$

$25x - 40xy + 16xy^2 =$

$25(x+y) - 80xy + 16xy(x+y)$ (B)

$25\cdot 3 + 80\cdot 2 - 16\cdot 2\cdot 3 = 139.$

95. $\sin x\cdot\cos x = -0{,}25$

$1{,}6 < x < 3{,}1$ II chordic.

$\sin x > 0 \quad \cos x < 0$

$\cos x - \sin x = -\sqrt{1 - \sin 2x} = -\sqrt{1 + 2\cdot\frac{1}{4}} =$

$= -\frac{\sqrt{3}}{\sqrt{2}} = -\sqrt{1{,}5}$ (C)

96. $\sin x \cdot \cos x = -0{,}345$. $1{,}6 < x < 3{,}1$.
II chorak $\sin x > 0$ $\cos x < 0$
$\sin x - \cos x = \sqrt{1 - \sin 2x} =$ (A)
$= \sqrt{1 + 2 \cdot 0{,}345} = \sqrt{1 + 0{,}69} = 1{,}3$

97. $\cos x = -\sqrt{0{,}2}$ $\sin\left(\frac{3\pi}{2} - 2x\right) =$ (B)
$= \cos 2x = 2\cos^2 x - 1 = 2 \cdot 0{,}2 - 1 = -0{,}6$

98. $\frac{1 + \sin 2x}{\sin x + \cos x} - \frac{1 - tg^2 \frac{x}{2}}{1 + tg^2 \frac{x}{2}} = \sin x + \cos x - \cos x$
$\sin 5^\circ$ (C)

99. $\sin\alpha \cos^3\alpha + \cos\alpha \sin^3\alpha = \sin\alpha \cos\alpha (\sin^2\alpha + \cos^2\alpha) =$
$= \frac{1}{2} \sin 2\alpha$ (B)

100 $\sin 3\alpha \cos^3\alpha + \cos 3\alpha \sin^3\alpha =$
$= (3\sin\alpha - 4\sin^3\alpha)\cos^3\alpha + (4\cos^3\alpha - 3\cos\alpha)\sin^3\alpha =$
$= 3\sin\alpha\cos^3\alpha - 4\sin^3\alpha\cos^3\alpha + 4\cos^3\alpha\sin^3\alpha - 3\cos\alpha\sin^3\alpha$
$= 3\sin\alpha\cos\alpha(\cos^2\alpha - \sin^2\alpha) = \frac{3}{2}\sin 2\alpha\cos 2\alpha =$
$= \frac{3}{4}\sin 4\alpha$ (C)

101 $\frac{\sin(2y+x) + \sin(2y-x)}{\sin x - \sin(2y-x)} \cdot \frac{tgy - tgx}{tgy} =$
$= -\frac{2\sin 2y \cos x}{2\cos y \sin(x-y)} \cdot \frac{\sin(y-x)}{tgy \cos x \cos y} =$
$= -\frac{2\sin y \cos y}{\cos y \cdot \frac{\sin y}{\cos y} \cdot \cos y} = -2$ (A)

102. $\frac{\sin(2x+y) + \sin(2x-y)}{\sin(2x+y) + \sin y} \cdot \frac{tgy + tgx}{tgx} =$ (C)
$= \frac{2\sin 2x \cos y}{2\sin(x+y)\cos x} \cdot \frac{\sin(x+y)}{\cos x \cos y \cdot tgx} = 2$

103. $\frac{\sin(4x+y) + \sin(4x-y)}{\sin y - \sin(4x-y)} \cdot \frac{tgy - tg2x}{tg2x} =$
(A) $= -\frac{2\sin 4x \cdot \cos y}{2\cos 2x \cdot \sin(2x-y)} \cdot \frac{\sin(y-2x)}{tg2x \cdot \cos 2x \cos y} = -2$

104. $\frac{\sqrt{13} - 4}{\sqrt{\sqrt{13} - 3} + 1} - \frac{\sqrt{13} - 12}{\sqrt{\sqrt{13} - 3} - 3} = \frac{(\sqrt{13} - 4)(\sqrt{\sqrt{13} - 3} - 1)}{\sqrt{13} - 3 - 1} -$
$- \frac{(\sqrt{13} - 12)(\sqrt{\sqrt{13} - 3} + 3)}{\sqrt{13} - 1 - 9} = \sqrt{\sqrt{13} - 3} - 1 + \sqrt{\sqrt{13} - 3} + 3 =$
$= -4$ (D)

105. $\frac{\sqrt{21} - 4}{\sqrt{\sqrt{21} - 3} - 1} - \frac{\sqrt{21} - 12}{\sqrt{\sqrt{21} - 3} + 3} =$
$= \frac{(\sqrt{21} - 4)(\sqrt{\sqrt{21} - 3} + 1)}{\sqrt{21} - 3 - 1} - \frac{(\sqrt{21} - 12)(\sqrt{\sqrt{21} - 3} + 3)}{\sqrt{21} + 3 - 9}$
$= \sqrt{\sqrt{21} - 3} + 1 - \sqrt{\sqrt{21} - 3} - 3 = -2$
(C)

106 $\frac{\sqrt{23} - 4}{\sqrt{\sqrt{23} - 3} - 1} - \frac{\sqrt{23} - 12}{\sqrt{\sqrt{23} - 3} + 3} =$
$= \frac{(\sqrt{23} - 4)(\sqrt{\sqrt{23} - 3} + 1)}{\sqrt{23} - 3 - 1} - \frac{(\sqrt{23} - 12)}{\sqrt{23} - 12}$
$(\sqrt{\sqrt{23} - 3} - 3) =$
$= \sqrt{\sqrt{23} - 3} + 1 - \sqrt{\sqrt{23} - 3} + 3$
$= 4$ (B)

107. $\frac{\sqrt[3]{(5 + 2\sqrt{6})^2}}{\sqrt[3]{5 - \sqrt{24}}} - 6 - \sqrt{24} =$
(B) $= \sqrt[3]{\frac{(5 + 2\sqrt{6})^3}{25 - 24}} - 6 - \sqrt{24} = -1$

108. $16 \sin 10^\circ \cdot \sin 20^\circ \cdot \sin 50^\circ \cdot$
(A) $\sin 70^\circ \cdot \sin 90^\circ =$
$= 16 \cdot \frac{1}{4} \sin 30^\circ \cdot \sin 30^\circ = 4 \cdot \frac{1}{2} \cdot \frac{1}{2} = 1$

109. $32 \cos 10^\circ \cdot \cos 30^\circ \cdot \cos 50^\circ \cdot$
$\cos 60^\circ \cdot \cos 70^\circ =$
$\frac{2}{32} \cdot \frac{\sqrt{3}}{2} \cdot \frac{1}{2} \cos 30^\circ =$
$= 2\sqrt{3} \cdot \frac{\sqrt{3}}{2} = 3$ (B)

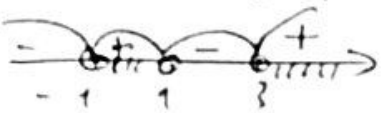
110. $\lg tg1^\circ + \lg tg2^\circ + \ldots + \lg tg89^\circ =$
(C) $= \lg tg1^\circ \cdot tg2^\circ \cdot \ldots \cdot tg89^\circ = 0$
$tgx \cdot tgy = 1$ $x + y = 90^\circ$.

111. $\lg tg1^\circ \cdot \lg tg2^\circ \ldots \lg tg89^\circ$
$\lg tg45^\circ = \lg 1 = 0$.
(C)

112. (B) $\lg\sin 1^\circ \cdot \lg\sin 2^\circ \cdot \lg\sin 3^\circ \dots \lg\sin 89^\circ =$
$= 8 \cdot \lg\sin 90^\circ = \lg 1 = 0$

113. $2^{|x+2|} > 16 \quad |x+2| > 4$
$x+2 > 4 \quad x > 2$
$x+2 < -4 \quad x < -6$ (A)

114. $x^4 \cdot 2^x + 8 > 8x^4 + 2^x$
$x^4(2^x - 8) - (2^x - 8) > 0$
$(2^x - 8)(x^4 - 1) > 0$
$x = 3 \quad x = \pm 1$ (A)



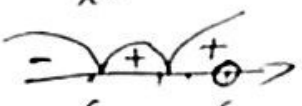

115. $(0,3)^{2+4+6+\dots+2x} > (0,3)^{72}$
$2+4+6+\dots+2x < 72$
$\frac{2+2x}{2} \cdot x < 72 \quad x^2 + x - 72 < 0$
$(-9; 8)$

116. $\arccos x < \arcsin x$
$\frac{\pi}{2} - \arcsin x < \arcsin x$
$\arcsin x > \frac{\pi}{4}$
$\left[\frac{\sqrt{2}}{2}; 1\right]$ (B)

117. $\operatorname{arctg} x \geq \operatorname{arcctg} x$
$\operatorname{arctg} x \geq \frac{\pi}{2} - \operatorname{arcctg} x$
$2\operatorname{arctg} x \geq \frac{\pi}{2} \quad \operatorname{arctg} x \geq \frac{\pi}{4}$
$[1; \infty)$ (A)

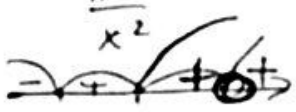
118. $\frac{(\sqrt{3x-7})^2 - 2}{x-3} \leq \frac{3 - (\sqrt{x})^2}{x-3}$
$\begin{cases} 3x - 7 \geq 0 & x \geq \frac{7}{3} \\ x \geq 0 \end{cases}$
$\frac{3x-7-2}{x-3} \leq \frac{3-x}{x-3}$
$\frac{3x-9}{x-3} \leq -1$
$3 \leq -1$ $\varnothing$

119. $\frac{36 - x^2}{6x^{-2} - x^{-1}} \geq 0 \quad \frac{(6-x)(6+x)}{\frac{(6-x)}{x^2}} \geq 0$
$\begin{cases} x^2(6+x) \geq 0 \\ 6 - x \neq 0 \end{cases}$



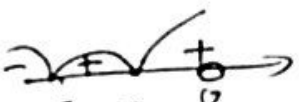

(B) $\frac{5+7+8+9+10+11+12}{7} = \frac{5+12}{2} = 8\frac{1}{2}$ $[5; 13)$

121. $\frac{x^2 - 49}{-7x^{-2} + x^{-1}} \leq 0 \quad \frac{x^2 - 49}{\frac{x-7}{x^2}} \leq 0$
$\begin{cases} (x+7)x^2 \leq 0 \\ x - 7 \neq 0 \end{cases}$



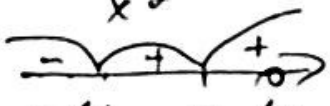

(C) $\frac{-9-8-7}{3} = -8$ $[-9; 1]$

120. $\frac{64 - x^2}{8x^{-2} - x^{-1}} \geq 0 \quad [5; 13)$.
$\frac{(8-x)(8+x)}{\frac{8-x}{x^2}} \geq 0$
$\begin{cases} x^2(8+x) \geq 0 \\ 8 - x \neq 0 \end{cases}$




$\frac{5+6+7+9+10+11+12}{7} = \frac{5+12}{2} = 8\frac{1}{2}$

122. $\frac{x^2 - 121}{-11x^{-2} + x^{-1}} \geq 0 \quad (3; 12)$.
$\frac{(x-11)(x+11)}{\frac{x-11}{x^2}} \geq 0 \quad \begin{cases} x^2(x+11) \geq 0 \\ x - 11 \neq 0 \end{cases}$




$\frac{4+10}{2} = 7$ (B)

123. $\log_{18}(3x+1) > \frac{1}{2}$
$3x + 1 > 3\sqrt{2}$
$x > \frac{3\sqrt{2} - 1}{3}$ (A)

24. $\log_{\frac{1}{\sqrt{3}}}(x-2) - \log_3|x+1| < 0$.

$-\log_3(x-2)^2 < \log_3(x+1)$

$\log_3(x-2)^2(x+1) > 0$.

$\begin{cases} (x-2)^2(x+1) > 1 \\ x > 2 \\ x > -1 \end{cases}$ $x = 3$ (C)

125. $\left|2 - |1-|x||\right| = 1$

$2 - |1-|x|| = 1$ $|1-|x|| = 1$.

$2 - |1-|x|| = -1$ $|1-|x|| = 3$.

$1-|x| = 1$ $1-|x| = 3$

$1-|x| = -1$ $1-|x| = -3$.

$x = 0$ $x = \pm 4$ (A)

$x = \pm 2$

126. $|3x-2| = x$

1) $x > 0$ $3x-2 = x$.

$3x-2 \geq 0$ $x = 1$.

2) $x > 0$ $2-3x = x$

$3x-2 < 0$ $2 = 4x$

$x = \frac{1}{2}$ (D)

127. $\left||6x| - |6x-3|\right| = 3$

1) $|6x| - |6x-3| = 3$.

2) $|6x| - |6x-3| = -3$.

---

1) $x \leq 0$

$-6x + 6x - 3 = 3$. $\varnothing$

2) $0 \leq x \leq \frac{1}{2}$

$6x + 6x - 3 = 3$

$12x = 6$ $\boxed{x = \frac{1}{2}}$

3) $\boxed{x \geq \frac{1}{2}}$

$6x - 6x + 3 = 3$.

---

2) $|6x| - |6x-3| = -3$

1) $\boxed{x \leq 0}$

$-6x + 6x - 3 = -3$.

2) $0 \leq x \leq \frac{1}{2}$

$6x + 6x - 3 = -3$

$\boxed{x = 0}$

3) $x \geq \frac{1}{2}$

$6x - 6x + 3 = -3$ $\varnothing$

$(-\infty; 0] \cup [\frac{1}{2}; \infty)$ (B)

128. $|x+a| - |x-2a| = 3a$ $a > 0$

1. $x \leq -a$

$-x - a + x - 2a = 3a$ $\varnothing$.

2. $-a \leq x \leq 2a$.

$x + a + x - 2a = 3a$.

$2x = 4a$

$\boxed{x = 2a}$

3. $\boxed{x \geq 2a}$

$x + a - x + 2a = 3a$. (B)

$3a = 3a$.

129. $2|x+a| - |x-2a| = 3a$ $a < 0$.

1. $x \leq 2a$.

$-2x - 2a + x - 2a = 3a$.

$-x = 7a$ $x = -7a$.

2. $2a \leq x \leq -a$.

$-2x - 2a + x - 2a = 3a$.

$-3x = 3a$ $\boxed{x = -a}$

3. $x \geq -a$.

$2x + 2a - x + 2a = 3a$.

$\boxed{x = -a}$ (A)

130. $(x^2 - x - 3)^2 - (x^2 - x - 3) - 3 = x$

$x^2 - x - 3 = x$ $y^2 - y - 3 = a$.

$x^2 - 2x - 3 = 0$ $a^2 - a - 3 = x$

$-1 \quad 3$

(B) $(x^2 - x - 3)^2 - x^2 + x + 3 - 3 - x = 0$

$(x^2 - x - 3)^2 = x^2$

$x^2 - x - 3 = x$ $x^2 - x - 3 = -x$

$x^2 - 2x - 3 = 0$. $x^2 - 3 = 0$.

$-1 \quad 3$ $x = \pm\sqrt{3}$

131. $(x^2 - 3x + 3)^2 - 3(x^2 - 3x + 3) + 3 = x$

$x^2 - 3x + 3 = x$

$x^2 - 4x + 3 = 0$ (A)

$1 \quad 3$

132. $(x^2 - 8x + 18)^2 - 8(x^2 - 8x + 18) + 18 = x$

$x^2 - 8x + 18 = x$.

$x^2 - 9x + 18 = 0$.

$6 \quad 3$ (C)

133. $(x^2 - 9x + 16)^2 - 9(x^2 - 9x + 16) + 16 = x$

$x^2 - 9x + 16 = x$.

$x^2 - 10x + 16 = 0$ (D)

$8 \quad 2$

134. $x = \sqrt{\sqrt{68 - 48\sqrt{2}}} = \sqrt{\sqrt{(6-4\sqrt{2})^2}} = \sqrt{6 - 4\sqrt{2}} = 2 - \sqrt{2}$

$2 \cdot 6 \cdot \sqrt{2}$

(D)

135. $x^4 = 68+48\sqrt{2}$ $x>0$

(D) $x = \sqrt{\sqrt{68+48\sqrt{2}}} = \sqrt{\sqrt{(6+4\sqrt{2})^2}} =$

$= \sqrt{6+4\sqrt{2}} = \sqrt{(2+\sqrt{2})^2} = 2+\sqrt{2}$ $-2-\sqrt{2}$

136. $|a|^2+|b|^2+|c|^2=0$.

$a=0$ $b=0$ $c=0$. (B)

$(0+0+0)^2=0$.

137. $\frac{ab}{3} = \frac{ac}{4} = \frac{bc}{5}$ $a+b+c=141$

$b=\frac{3}{4}c$. $a=\frac{4}{5}b=\frac{4}{5}\cdot\frac{3}{4}c=\frac{3}{5}c$.

$\frac{3}{5}c+\frac{3}{4}c+c=\frac{20}{20}141$. (C)

$47c = 20\cdot 141$.

$c=60$ $a=36$ $b=45$.

138. $\frac{ab}{2} = \frac{bc}{3} = \frac{ca}{5}$ $a+b+c=155$.

$a=\frac{2}{3}c$ $b=\frac{3}{5}a=\frac{3}{5}\cdot\frac{2}{3}a=\frac{2}{5}c$

$\frac{5}{2}c+\frac{3}{2}c+c=155$. (C)

$\frac{31c}{15}=155$ $c=75$. $a=50$ $b=30$.

139 $\begin{cases} \frac{ab}{a+b}=-5 \\ \frac{ac}{a+c}=\frac{12}{5} \\ \frac{bc}{b+c}=-4. \end{cases}$ $\begin{cases} \frac{1}{a}+\frac{1}{b}=-\frac{1}{3} \\ \frac{1}{a}+\frac{1}{c}=\frac{5}{12} \\ \frac{1}{b}+\frac{1}{c}=-\frac{1}{4}. \end{cases}$ (-) (+)

$\frac{1}{b}-\frac{1}{c}+\frac{1}{b}+\frac{1}{c} = -\frac{1}{3}-\frac{5}{12}-\frac{1}{4}$ (4) (5)

$\frac{2}{b}=-1$ $b=-2$. $a=6$ $c=4$.

$-6+2+4=0$ (D)

140 $-a+b+c=-6+(-2)+4=-4$ (B)

141 $\left(\frac{2}{5}\right)^x+\left(\frac{3}{5}\right)^x=1=\left(\frac{2}{5}\right)^1+\left(\frac{3}{5}\right)^1$

$x=1$. (C)

142. $2^x+5^x=7^x$ $x=1$ (C)

143 $2^{|x|+1}=2-x^2$ $x=0$. (D)

144. $\begin{cases} 3^x\cdot 5^y=75=3\cdot 5^2 \\ 3^y\cdot 5^x=45=3^2\cdot 5 \end{cases}$ $x=1$ $y=2$. (B)

145. $\begin{cases} 5^x\cdot 7^y=175=5^2\cdot 7 \\ 5^y\cdot 7^x=245=5\cdot 7^2 \end{cases}$ $x=2$ $y=1$ (A)

146. $\begin{cases} \lg|x|+\lg|y|=1+\lg 4 \\ |x|^{\lg|y|}=4 \end{cases}$

$\begin{cases} \lg|xy|=\lg 40 \\ \lg|x|\cdot\lg|y|=\lg 4 \end{cases}$ $\begin{cases} |xy|=40 \\ \lg|x|\cdot\lg|y|=\lg 4 \end{cases}$

$x=\pm 4$ $y=\pm 10$.

$(4;10)$ $(4;-10)$ $(-4;10)$ $(-4;-10)$

(B)

147. $\lg x = 0,12$ $x^{50}=(10^{0,12})^{50}=10^6$

$x=10^{0,12}$ (B)

148. $\lg x = 0,53$ $10^{953}=x$.

$x^{100}=10^{0,53\cdot 100}=10^{53}$ (B)

149. $\log_4 125 = a$ $\lg 64 = 6\lg 2 = \frac{18}{2a+3}$

$\frac{3}{2}\log_2 5 = \frac{3}{2}(\log_2 10 - 1) = a$

$\log_2 10 = \frac{2}{3}a+1$. (B)

$\lg 2 = \frac{3}{2a+3}$

150. $x^{\log_2 x}=2^4$ $\log_2 x\cdot\log_2 x=\log_2 2^4$

$\log_2 x = 2$ $\log_2 x = -2$.

(D) $x=4$ $x=\frac{1}{4}$.

151. $x^{\lg x}=1000$.

$\lg x\cdot\lg x = \lg 1000$.

$\lg x = \sqrt{3}$ $\lg x = -\sqrt{3}$.

$x=10^{\sqrt{3}}$ $x=10^{-\sqrt{3}}$ (C)

152. $4^{\lg x}\cdot 2^{\lg x} = 64 = 2^6$

$2^{2\lg x+\lg x} = 2^6$ (B)

$3\lg x = 6$ $\lg x = 2$ $x=100$.

153. $8^{2\lg x}\cdot 4^{\lg x} = 128$.

$2^{6\lg x+2\lg x} = 2^7$ (A)

$8\lg x = 1$ $\lg x = \frac{7}{8}$ $x=10^{\frac{7}{8}}$

154. $\sin 2x + \cos 2x = 2\operatorname{tg} x + 1$

$\frac{2\operatorname{tg} x}{1+\operatorname{tg}^2 x} + \frac{1-\operatorname{tg}^2 x}{1+\operatorname{tg}^2 x} = 2\operatorname{tg} x + 1 \quad a = \operatorname{tg} x$

$2a + 1 - a^2 = (2a+1)(1+a^2)$

$2a + 1 - a^2 = 2a + 2a^3 + 1 + a^2$

$2a^3 + 2a^2 = 0 \quad 2a(a+1) = 0$

$a = 0 \quad a = -1$

$\operatorname{tg} x = 0 \quad \operatorname{tg} x = -1$

$x = \pi n \quad x = -\frac{\pi}{4} + \pi n$ (D)

155. $\cos(12 \operatorname{arctg} x) = 1$

$12 \operatorname{arctg} x = 2\pi n$

$\operatorname{arctg} x = \frac{\pi n}{6}$

$n = -2; -1; 0; 1; 2$ (D)

156. $\sin(12 \operatorname{arctg} x) = 0$

$12 \operatorname{arctg} x = \pi n$

(B) $\operatorname{arctg} x = \frac{\pi n}{12}$

$n = -5; -4; -3; -2; -1; 0; 1; 2; 3; 4; 5$

157. $EKUB(x; 4) = 1$

$\left[\frac{x}{4}\right] + \left[\frac{2x}{4}\right] + \left[\frac{3x}{4}\right] = 9$

$x = 7 \quad \left[\frac{7}{4}\right] + \left[\frac{14}{4}\right] + \left[\frac{21}{4}\right]$

(B) $1 + 3 + 5 = 9$.

158. $EKUB(x; 3) = 1$

$\left[\frac{x}{3}\right] + \left[\frac{2x}{3}\right] = 9$.

$x = 10, \quad \left[\frac{10}{3}\right] + \left[\frac{20}{3}\right]$

(B) $3 + 6 = 9$.

159. $-1 + 2 - 3 + 4 + 5 + \ldots + 198 - 199 =$

$\frac{198}{2} - 199 = 99 - 199 = -100$ (B)

160. $-1 + 2 - 3 + 4 - 5 + \ldots + 288 - 289 =$

$= \frac{288}{2} - 289 = 144 - 289 = -145$ (C)

161. $S_{20} = 400 \quad S_{30} = 900 \quad S_{50} = ?$

$S_n = n^2 \quad S_{50} = 50^2 = 2500$ (C)

162. $a_1 = 1 \quad S_{20} - S_{12} = 380$

$\frac{a_{13} + a_{20}}{2} \cdot 8 = 380$ (D)

$a_{13} + a_{20} = 95$.

$2a_1 + 31d = 95 \quad 31d = 93 \quad d = 3$

163. $S_n = n^2 + 9n \quad a_{20} = ?$

$S_{20} - S_{19} = 400 + 180 - 361 - 171 = 48$

$S_{20} = 20^2 + 9 \cdot 20$ (A)

$S_{19} = 19^2 + 9 \cdot 19$

164. $S_n = n^3 + 2n^2 \quad a_{10} = ?$

$S_{10} - S_9 = 10^3 + 2 \cdot 10^2 - 9^3 - 2 \cdot 9^2 = 309$

$S_{10} = 10^3 + 2 \cdot 10^2$ (C)

$S_9 = 9^3 + 2 \cdot 9^2$

165. $1 : 4000000 = 1 : 4 \cdot 10^6$

$1{,}2\ dm = 12\ cm$

$\frac{12 \cdot 4 \cdot 10^6}{5 \cdot 10^6} = 16$.

166. $\frac{18 \cdot 6 \cdot 10^6}{4 \cdot 10^6} = 27$ (D)

167. $12 \cdot 4 \cdot 10^6 = 48 \cdot 10^6\ cm = 480\ km$ (C)

168. $\frac{24 \cdot 3 \cdot 10^6}{5 \cdot 10^6} = 14{,}4$ (B)

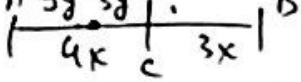
169. $13x + 17x = 180^\circ \quad 30x = 180^\circ \quad x = 6^\circ$

$13 \cdot 6^\circ = 78^\circ$ (D)

170. $11x + 19x = 180^\circ \quad 30x = 180^\circ \quad x = 6^\circ$.

$11x = 11 \cdot 6^\circ = 66^\circ$ (B)

171. $19 \cdot 6^\circ = 114^\circ$ (B)

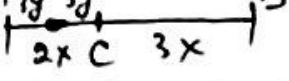
172. 


$4x + 3x = 56$

$x = 8$.

$8y = 4x \quad x = 2y \quad y = 4$.

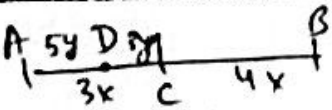
$DC = 3y = 12$ (C)

173. 

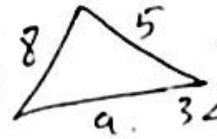

(C) $2x = 8y \quad 7x + 3x = 44$.

$x = 4y \quad 5x = 44 \quad x = 8{,}8$.

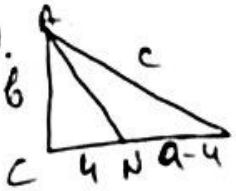
$DC = 5y = 5 \cdot 2{,}2 = 11 \quad y = 2{,}2$.

174. 

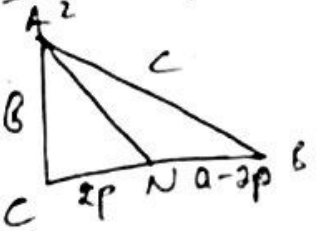
$3x+4x=56$
$x=8$
$5y+3y=3x$ (A)
$8y=3x$
$y=3$ $DC=3y=9$

175. 

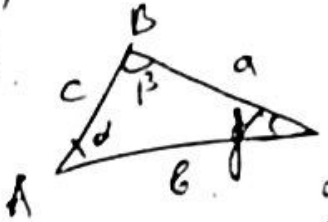
$\begin{cases} 8+5>a \\ 5+a>8 \end{cases}$
$3<a<13$
(A) $a=4$.
$P=8+5+4=17$

179. 

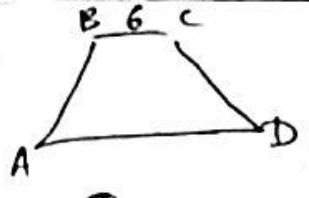
$\begin{cases} b(a-4)=4c \\ b+c=14 \end{cases}$ $ab=4c+4b=$
$=4\cdot 14=56$
$S=\frac{ab}{2}=28$. (C)

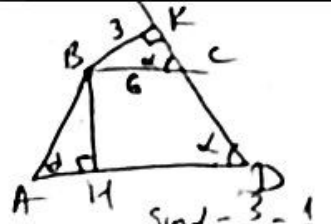
180 

$\begin{cases} b(a-2p)=c\cdot 2p \\ b+c=m \end{cases}$ $ab=2p(b+c)=2pm$.
$S=pm$ (D)

181 

$3\alpha=2\gamma$
$3\alpha+\beta=180°$
$\alpha+\beta+\gamma=180°$
$\alpha+\beta+\gamma=3\alpha+\beta$.
$\gamma=2\alpha$
$\frac{a}{\sin\alpha}=\frac{c}{\sin 2\alpha}$
$\frac{\frac{2}{3}\alpha}{\sin\alpha}=\frac{\alpha}{2\sin\alpha\cos\alpha}$
$\cos\alpha=\frac{3}{4}$.
$a^2=b^2+c^2-2bc\cos\alpha$.
$a^2=b^2+\frac{9}{4}a^2-2\cdot b\cdot\frac{3}{4}a\cdot\frac{3}{4}$.
$4a^2=4b^2+9a^2-9ab$.
$4b^2-9ab+5a^2=0$.
$b=\frac{5}{4}a$ $b=a$. (C)

182. 

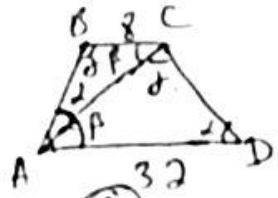
(A)


$\sin\alpha=\frac{3}{6}=\frac{1}{2}$
$\alpha=30°$

183. $\sin\alpha=\frac{3\sqrt{3}}{6}=\frac{\sqrt{3}}{2}$ (B)

184. 
(A)
$d_1=13$ $d_2=\sqrt{105}$
$h=5$
$S=\frac{\sqrt{d_1^2-H^2}\sqrt{d_2^2-H^2}}{2}\cdot H=$
$=\frac{\sqrt{169-25}+\sqrt{105-25}}{2}\cdot 5=\frac{12+10}{2}\cdot 5=$
$=55$

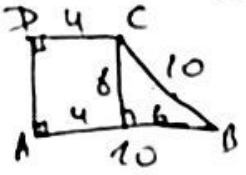
185 $d_1=15$ $d_2=20$ $h=12$.
(B) $S=\frac{\sqrt{15^2-12^2}+\sqrt{20^2-12^2}}{2}\cdot 12=\frac{9+16}{2}\cdot 12$
$=25\cdot 6=150$

186 

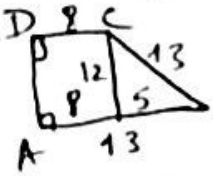
(C)
AC
$\Delta ABC\sim\Delta ACD$.
$\frac{AC}{32}=\frac{8}{AC}$ $AC=\sqrt{8\cdot 32}$
$AC=2\cdot 8$
$AC=16$.

187. $AC=\sqrt{27\cdot 48}=3\cdot 4\cdot 3=36$ (B).

188. $AC=\sqrt{ab}$ (D).

189 

$S=\frac{4+10}{2}\cdot 8=14\cdot 4=56$
(B)

190 

(C) $S=\frac{8+13}{2}\cdot 12=21\cdot 6=$
$=126$

191. $\bar a(-1;2)$ $\bar b(-2;1)$ $\bar c(-3;2)$
$(2\bar a-k\bar b)\cdot\bar c=0$.
$2\bar a\bar c-k\cdot\bar b\cdot\bar c=0$. $2\bar a\cdot\bar c=k\bar b\cdot\bar c$
$\bar a\bar c=3+4=7$ $\bar b\bar c=6+2=8$.
$2\cdot 7=k\cdot 8$ $k=\frac{7}{4}$ (B).

192. $\bar{a}(-1;2)\ \bar{b}(-2;1)\ \bar{c}(-3;2)$

$(\bar{a}-2k\bar{b})(-2\bar{c})=0.$

$-2\bar{a}\bar{c}+4k\bar{b}\bar{c}=0.$

$\bar{a}\cdot\bar{c}=3+4=7.$

$\bar{b}\bar{c}=6+2=8.$ (B)

$-2\cdot 7+4k\cdot 8=0.$

$32k=8 \quad k=\frac{7}{16}$

193. $\frac{n(n-3)}{2}=\frac{11\cdot 8}{2}=44$ (A)

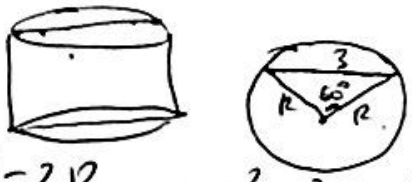
194. $\frac{5\cdot 2}{2}=5$ (D)

195. $\frac{11\cdot 8}{2}=44$ (A)

196. $\frac{6\cdot 3}{2}=9$ (B)

197. $6-x+7=2 \quad x=11$ (B)

198.




$H=2R. \quad 9=R^2+R^2-2\cdot R^2\cdot\frac{1}{2}$

$H=6 \quad R=3.$

$V=\pi R^2 H=54\pi.$ (B)

199. $V=\pi R^2 H=2\pi R^3=2\pi.$ (C)

$R=1.$

200. $V=\pi R^2 H=2\pi R^3=2\pi\cdot 8\cdot 3\sqrt{3}=$

$R=2\sqrt{3} \quad =48\sqrt{3}\pi.$

(A)