Calculus AB/BC
Summer Assignment
Mrs. Dailey

Calculus AB Summer ’25 Expectations

- Complete all problems in this packet. This should be done without the use of a calculator. Completed packet will be turned in on 1st day of school.
- No calculator quiz on assignment will be Friday 9/5/25

Calculus BC Summer ‘25 Expectations

- Complete all problems in this packet. This should be done without the use of a calculator. Completed packet will be turned in on 1st day of school.

Additional BC requirements

- Watch the first 7 lessons of Unit 1 on flippedmath.com (1.1-1.7)
- https://calculus.flippedmath.com/version-1.html

1.1 Can Change Occur at an Instant? (even practice & test prep)

1.2 Defining Limits and Using Limit Notation (even practice & test prep)

1.3 Estimating Limit Values from Graphs (even practice & test prep)

1.4 Estimating Limit Values from Tables (even practice & test prep)

1.5 Determining Limits Using Algebraic Properties (even practice & test prep)

1.6 Determining Limits Using Algebraic Manipulation (Practice # 5-9,27)

1.7 Selecting Procedures for Determining Limits (Practice # 1,3,10)

- For each video,
  - Complete the class notes section
  - Practice problems as stated above.
  - Each section should take about 45 minutes to complete.
- These topics were covered in Pre-Calculus and it is assumed this is review.
- Unit 1 Class notes Packet (Notes and practice problems) will be collected on 1st day
- Test on Unit 1 will be 2nd week of school.

See you in September!
Mrs. Dailey

Email me at jdailey@pmschools.org if you have any questions.

Name ______________________________ Summer 2025

AB/BC Calc Getting Ready!

All of the following should be completed without the use of a calculator.

I. Algebra Skills:

Solve for x. Answers may be left in terms of e as appropriate.

1. $x^2 - 4x + 3 = 0$

2. $x^2 + 6x = 1$

3. $6x^2 + 11x - 10 = 0$

4. $10 = \frac{100}{1+e^{5x}}$

5. $2^x = 64$

6. $5^{x-3} = 125^x$

7. $16^{x-5} = 1024^{286}$

8. $\ln x = 5$

9. $\log_2 3x - \log_2 3 = 8$

10. $4\ln(x+3) = 20$

Solve for x. Answers may be left in logarithmic form as appropriate.

11. $5^x = 128$

12. $e^{2x} = 144$

13. $3^{x^2} = 18$

II. Piecewise Functions

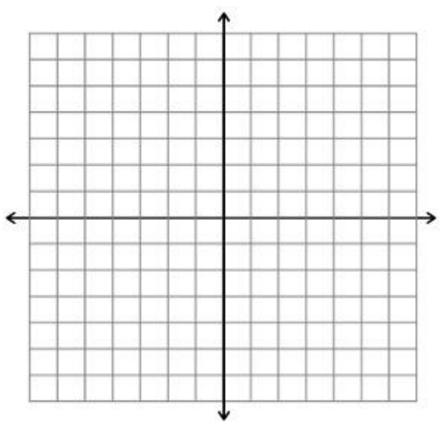
14. Given the function $f(x) = \begin{cases} -x^2 - 1, & x \le 0 \\ 2, & 0 < x < 4 \\ \sqrt{x}, & x \ge 4 \end{cases}$,

a. Find $f(-2)$.

b. Find $f(9)$.

c. Find $f(0)$.

d. Graph $y = f(x)$.



e. Is $f(x)$ continuous at $x = 4$? Why or why not?

f. Is $f(x)$ continuous at $x = 0$? Why or why not?

15. Find the value of k that will make the following piecewise function continuous at $x = -1$. $f(x) = \begin{cases} kx^2 + 1, & x \le -1 \\ 2x - k, & x > -1 \end{cases}$

16. Find the value of k that will make the following piecewise function continuous at $x = 2$. $f(x) = \begin{cases} 2x - 3, & x \le 2 \\ x^2 + k, & x > 2 \end{cases}$

17. Given $f(x)=\begin{cases} 2x+10, & x<0 \\ x^2+1, & x\geq 0 \end{cases}$, solve for x if $f(x)=17$.

An absolute value function can be thought of as a piecewise function: $|x|=\begin{cases} -x \text{ if } x<0 \\ x \text{ if } x\geq 0 \end{cases}$.

Here's another example: $|2x+6|$.

$2x+6$ will change signs when $x=-3$.

If $x<-3$, $2x+6$ comes out negative so to find the absolute value, it must be negated.

If $x\geq -3$, $2x+6$ comes out positive and its absolute value does not need to be changed.

Thus, $|2x+6|=\begin{cases} -2x-6, \ x<-3 \\ 2x+6, \ x\geq -3 \end{cases}$.

18. Express the absolute value function in piecewise form.

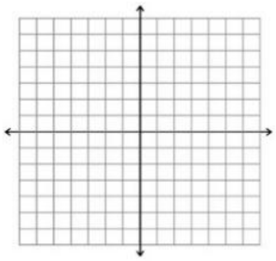
a. $f(x)=|x-1|$

b. $f(x)=|2x+3|$

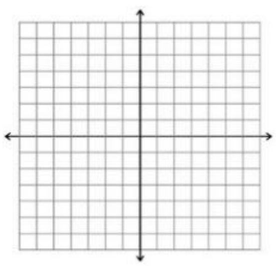
III. Common Functions

19. Graph each of the following functions. Show a few important points for each.

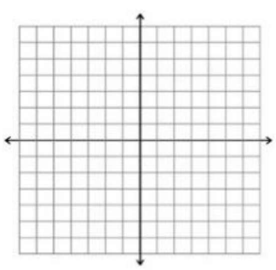
a. $y=\sqrt{x}$



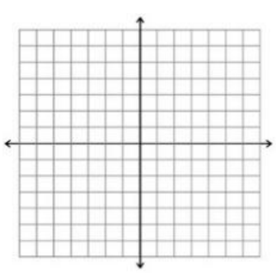
b. $y=\sqrt{x+5}$



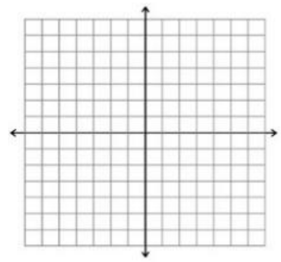
c. $y=3+\sqrt{x}$



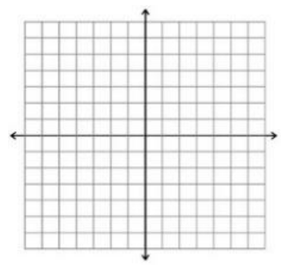
d. $y=4-x^2$



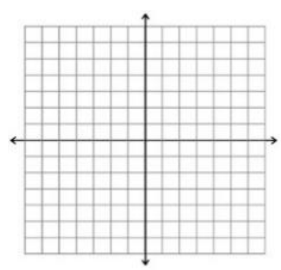
e. $y=e^x$



f. $y=e^{-x}$



g. $y=\ln x$



20. Match the function to its graph.

Equation	A	B	C	D	E	F	G
Graph							

A. $y = x^2$

B. $y = e^x$

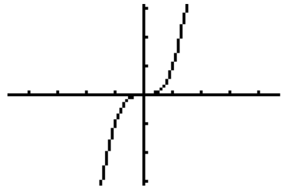
C. $y = \frac{1}{x}$

D. $y = \ln x$

E. $y = \sqrt{x}$

F. $y = x^3$

G. $y = |x|$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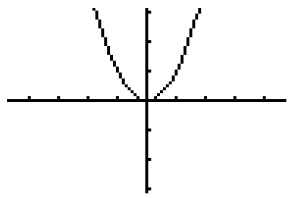
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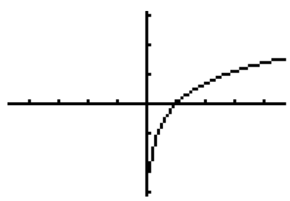
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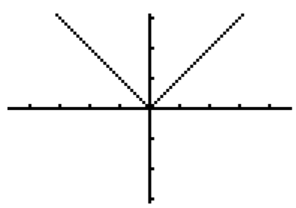
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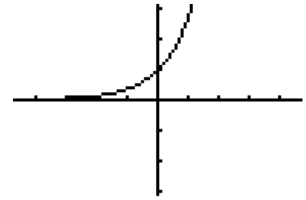
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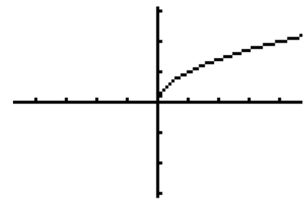
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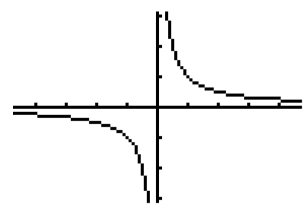

vii.

IV. Odd & Even Functions

State whether the function is odd, even, or neither.

21. $y = x^4$

22. $y = x^3$

23. $y = x^3 + x^2$

24. $y = \sqrt{x^2 + 2}$

25. $y = \dfrac{x^3}{x^2 - 1}$

26. $y = \dfrac{1}{x - 1}$

27. $y = \cos x$

28. $y = \sin x$

VI. Linear Equations

Write the equation of the line.

29. Passing through the point $(-2,3)$ with slope $\frac{2}{3}$.

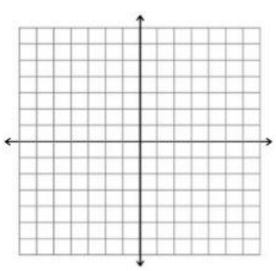
30. Parallel to the line $y=-2x+3$ and passing through the point $(4,0)$.

31. Passing through the point $(0,-3)$ with slope $\frac{3}{4}$.

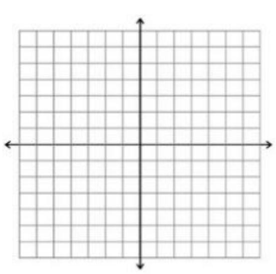
32. Through the points $(-2,3)$ and $(2,-5)$.

Graph the line. State the coordinates of the $x-$ and $y-$intercepts.

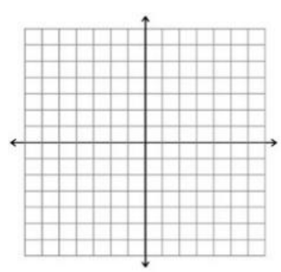
33. $y=\frac{2}{3}x-6$



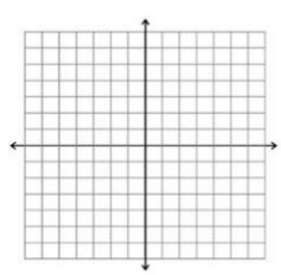
34. $y=-\frac{1}{3}x+2$



35. $y-2=3(x+3)$



36. $y+1=\frac{2}{3}(x-5)$



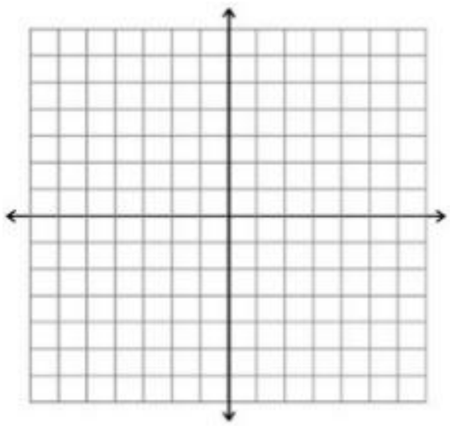
VII. Greatest Integer Function

The Greatest Integer Function, also called a Floor Function, can be written in several ways: $f(x)=\text{int}(x)=\lfloor x \rfloor = \ x$. It is defined to mean "the greatest integer less than or equal to x."

For example, $\lfloor 2.3 \rfloor = 2$ $\lfloor 2.7 \rfloor = 2$ $\lfloor 2.9 \rfloor = 2$ $\lfloor 3 \rfloor = 3$

And also, $\lfloor -4.2 \rfloor = -5$ $\lfloor -4.7 \rfloor = -5$ $\lfloor -5 \rfloor = -5$ $\lfloor -5.2 \rfloor = -6$

37. Graph the function $y=\text{int}(x)$.



VIII. Rational Expressions

38. Rewrite as one fraction.

$$6x^2\sqrt{3x-1}+\frac{3x^3}{\sqrt{3x-1}}$$

39. Simplify (without a calculator; show every step)

$$\left[-\frac{1}{3}-\frac{1}{2}+2\right]-\left[\frac{8}{3}-2-4\right]$$

40. Given $f(x)=e^x\cos x-e^x(\sin x)$, find $f\left(\frac{3\pi}{2}\right)$. Simplify to one term.

IX. Algebra Skills

Simplify each. No calculator.

41. $\frac{\sqrt{x}}{x}$

42. $e^{\ln x}$

43. $e^{1+\ln x}$

44. $\ln 1$

45. $e^{\ln x}$

46. $(5)^{-1}$

47. $(27)^{\frac{2}{3}}$

48. $\ln 6 - \ln 2$

49. $\ln e^{2x}$

50. $\frac{2x-1}{2}$

X. Compositions

Find the composite of the following functions with $f(x)=x+5$ and $g(x)=x^2-3$.

51. $f(g(x))$

52. $g(f(x))$

53. $f(g(0))$

54. $g(f(0))$

55. $g(g(-2))$

56. $f(g(4))$

57. $f(f(x))$

58. Given the function $f(x)=x^2+x$, solve the equation $f\left(\sqrt{x+5}\right)=0$.

59. Given $f(x)=\frac{1}{x}+x^2$, find $f\left(x^{-2}\right)$.

XI. Trigonometry

60. Fill in the chart with the exact values:

Degrees	30	45	60
Radians			
sin			
cos			
tan			

61. Evaluate each of the following using exact values.

a. $\tan\frac{2\pi}{3}$

b. $\sin\frac{5\pi}{6}$

c. $\cos\frac{7\pi}{4}$

d. $\sec\frac{\pi}{3}$

e. $\csc\frac{4\pi}{3}$

f. $\sin\frac{5\pi}{4}$

62. Solve for θ on the interval $[0, 2\pi)$:

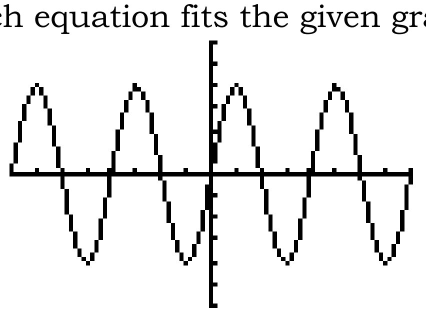
a. $2\sin\theta + 1 = 0$

b. $2\sin^2\theta + \sin\theta - 1 = 0$

c. $\sec\theta = \frac{2\sqrt{3}}{3}$

d. $2\cos^2\theta - \sqrt{2}\cos\theta = 0$

63. Which equation fits the given graph? [Window shows $-2\pi \le x \le 2\pi$]



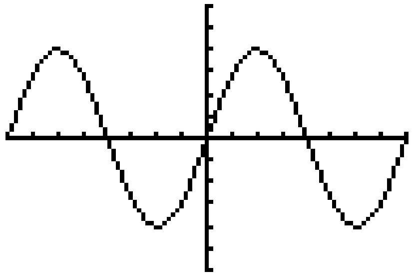
(A) $y = 4\sin x$

(B) $y = 4\sin 2x$

(C) $y = 4\cos x$

(D) $y = 4\cos 2x$

64. Which equation fits the given graph? [Window shows $-2\pi \le x \le 2\pi$]



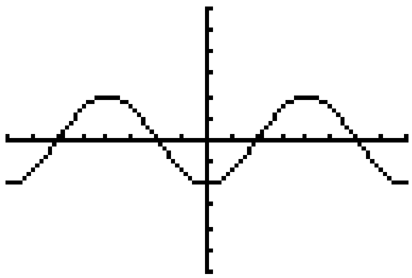
(A) $y = 4\sin x$

(B) $y = 4\sin 2x$

(C) $y = 4\cos x$

(D) $y = 4\cos 2x$

65. Which equation fits the given graph? [Window shows $-2\pi \le x \le 2\pi$]



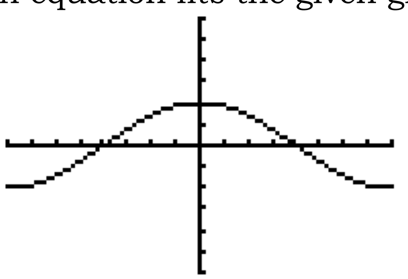
(A) $y = -2\cos x$

(B) $y = 2\cos\frac{1}{2}x$

(C) $y = -2\sin x$

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

66. Which equation fits the given graph? [Window shows $-2\pi \le x \le 2\pi$]



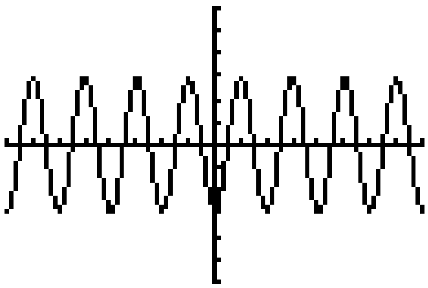
(A) $y = -2\cos x$

(B) $y = 2\cos\frac{1}{2}x$

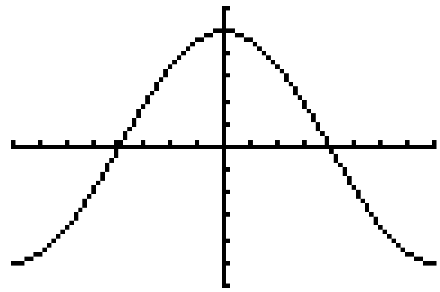
(C) $y = -2\sin x$

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

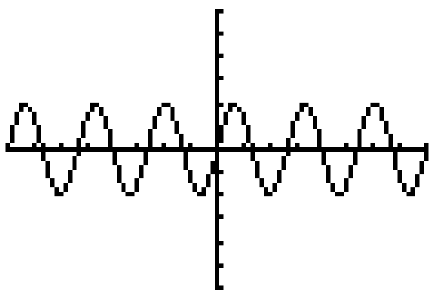
68. State the amplitude and frequency of the graph shown. [Window shows $-2\pi \le x \le 2\pi$]



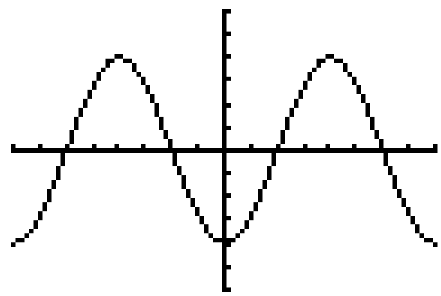
a.



c.



b.



d.

69. State the amplitude and frequency of the equation:

a. $y = 4\sin 2x$

b. $y = -3\cos 2x$

c. $y = 3\sin \frac{1}{4}x$

XII. Basic Limits

Evaluate the limits.

70. $\lim\limits_{x \to 3} \frac{x^2 - x}{2x - 2}$

72. $\lim\limits_{x \to \infty} \frac{3x^7 - \frac{2}{3}x + 4}{x^3 - 24}$

71. $\lim\limits_{x \to 2} \frac{x^2 - x - 2}{x - 2}$

73. $\lim\limits_{x \to -\infty} \frac{5x^4 - x}{x^3 - 10}$

74. $\lim_{x\to\infty} \frac{x^3-6x+3}{x-3}$

75. $\lim_{x\to-\infty} \frac{9x+7}{x^3-14}$

76. $\lim_{x\to\infty} \frac{6-5x^2}{3x+4}$

77. $\lim_{x\to\infty} \frac{4x^2+1}{2x^2-1}$

XIII. Rational Functions

For each function, find all $x-$intercepts, Vertical Asymptotes, Holes, and Horizontal Asymptotes.

78. $y=\frac{2x^2-3x+4}{x^2-4}$

79. $y=\frac{3x^2-3x-18}{x^2-2x-3}$

80. $y=\frac{2x(x-3)(x+1)}{(x+5)(x+1)}$

XV. Derivatives

Find the derivative.

81. $f(t) = t^{-1}\left(6 + 8t^{-2}\right)$

82. $y = \dfrac{3}{x+2}$

83. $f(x) = 3x^4 + 4x^2 - 2x$

84. $f(x) = \dfrac{x^2}{4x-1}$

85. $f(x) = \dfrac{x}{3} + \dfrac{x^2}{4}$

86. $y = \dfrac{3\sin x}{9x + \cos x}$

87. $f(x) = \dfrac{x^5}{25} - \dfrac{2}{x^3} + 4x^2$

88. $y = x^3 \sin^2(4x)$

89. $y = \cos\left(5x^2\right)$

90. $f(x) = \sqrt{6x^3 + 3}$

91. $g(x) = \sin^3 x$

92. $f(x) = 3x^4 + 10x^3 - 36x^2 - 4$

93. $f(x) = 4\sqrt{x^3}$

94. $f(x) = 6\sqrt{x} - 3x^{-2} + 4x^3 - 7x + 5$