Summer 2025 Name_____

Calculus

Date_____ Block____

The questions are a review of algebra rules we will be using throughout the school year. Try your best. The first class of the year we will be going over these questions and then there will be a quiz.

Evaluate each function.

1) $p(t) = t^2 + 2t$; Find $p(7)$

2) $w(x) = x + 2$; Find $w(-8)$

3) $g(t) = 4t + 5$; Find $g(1)$

4) $h(t) = 2\left|3t + 1\right|$; Find $h(9)$

5) $k(x) = -x + 3$; Find $k(x + 2)$

6) $f(x) = -2x - 2$; Find $f(4x)$

7) $g(x) = \left|x + 1\right| + 1$; Find $g(4x)$

8) $h(x) = x^3 - 5x$; Find $h(3x)$

Solve each equation by factoring.

9) $43k = -10k^2 - 28$

10) $38n^2 + 86n + 48 = 3n^2$

11) $6p^2 + 36p + 36 = 3p - 6$

12) $21b^2 + 66b + 54 = -2 - 4b$

13) $-4x^2 - 20x + 38 = 6 - 7x^2$

14) $52a^2 + 164a - 21 = -4a^2 + 3a$

Factor each and find all roots.

15) $x^5 + 2x^4 + 2x^3 + 4x^2 = 0$

16) $x^4 + 6x^2 - 16 = 0$

17) $x^3 - 6x^2 + 9x = 0$

18) $x^3 + x^2 - 4x - 4 = 0$

Write each expression in exponential form.

19) $\left(\sqrt{a}\right)^3$

20) $\dfrac{1}{\left(\sqrt{x}\right)^3}$

21) $\dfrac{1}{\left(\sqrt[3]{m}\right)^2}$

22) $\left(\sqrt[4]{3n}\right)^7$

23) $\left(\sqrt[3]{3x}\right)^5$

24) $\sqrt[3]{2x}$

25) $\dfrac{1}{\left(\sqrt[5]{3n}\right)^8}$

26) $\left(\sqrt[3]{10v}\right)^4$

Simplify. Your answer should contain only positive exponents.

27) $\left(\dfrac{a^4}{a^3 \cdot 2a^{-2}}\right)^2$

28) $\dfrac{\left(2n^{-4} \cdot 2n^2\right)^2}{2n^2}$

29) $\dfrac{x^4 \cdot \left(x^2\right)^{-2}}{x^4}$

30) $\left(\dfrac{\left(k^{-4}\right)^2}{\left(k^{-3} \cdot 2k^2\right)^3}\right)^{-3}$

31) $\dfrac{2x^{-4} \cdot \left(x^{-3}\right)^4}{x^4}$

Simplify. Your answer should contain only positive exponents with no fractional exponents in the denominator.

32) $\dfrac{v^{-\frac{5}{3}}}{v^{\frac{1}{2}} v^{\frac{7}{4}}}$

33) $\dfrac{\left(x^{\frac{3}{4}}\right)^{-4}}{x^{\frac{1}{3}} x^{\frac{3}{2}}}$

34) $\dfrac{\left(b^{\frac{5}{4}}\right)^{-\frac{5}{4}}}{b^0 b^{\frac{1}{2}}}$

35) $\dfrac{r^2}{r^{\frac{3}{4}} r^{\frac{7}{4}}}$

36) $\dfrac{\left(n^{-\frac{2}{3}}\right)^{\frac{5}{4}}}{n \cdot n \cdot \left(n^{\frac{2}{3}}\right)^{\frac{3}{4}}}$

Simplify each expression.

37) $\dfrac{\frac{x+3}{3}}{\frac{x+4}{x+3}}$

38) $\dfrac{\frac{2}{x}}{\frac{4}{x}}$

39) $\dfrac{m^2}{\frac{m}{4}+\frac{16}{m}}$

40) $\dfrac{\frac{6}{5}+\frac{x+6}{5}}{6}$

41) $\dfrac{\frac{1}{a}-\frac{a^2}{5}}{3}$

42) $\dfrac{\frac{x-6}{x}+\frac{x^2}{x+1}}{x+1}$

43) $\dfrac{\frac{x+2}{25}-\frac{x}{2x+4}}{\frac{x+2}{5}-\frac{4}{5x+10}}$

44) $\dfrac{\frac{5}{16}-\frac{5a}{3}}{\frac{5}{4}+\frac{3}{16}}$

45) $\dfrac{\frac{x^2}{16}-\frac{1}{4}}{\frac{2x}{9}+\frac{8}{x}}$

46) $\dfrac{\frac{1}{9}-\frac{x+6}{x^2}}{\frac{x^2}{4}-\frac{x+6}{36}}$

Simplify.

47) $\dfrac{7}{7-8\sqrt{10}}$

48) $\dfrac{\sqrt{6}}{-10-\sqrt{5}}$

49) $\dfrac{3-\sqrt{2}}{3-\sqrt{7}}$

50) $\dfrac{-7+4\sqrt{6}}{-10-8\sqrt{10}}$

Simplify. Assume that all variables are positive.

51) $\dfrac{7b^2}{\sqrt{10b^3} - 5}$

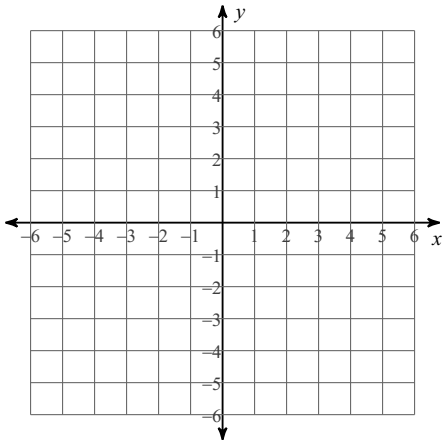
52) $\dfrac{10n}{\sqrt{2n^2} + 3n}$

53) $\dfrac{3 - \sqrt{7r}}{8r + \sqrt{2r}}$

54) $\dfrac{\sqrt{m^3} + 10\sqrt{6m^2}}{\sqrt{3m^2} - \sqrt{7m^2}}$

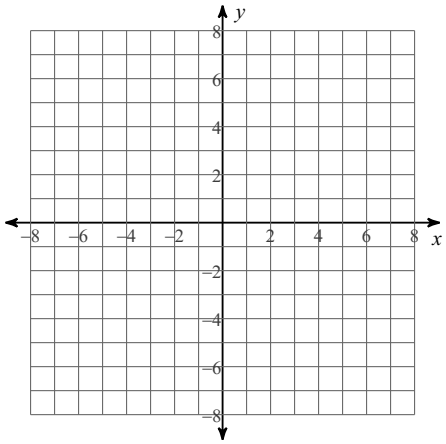
Sketch the graph of each line.

55) $y = -x + 3$



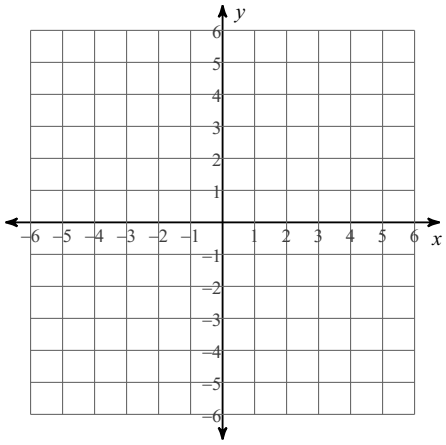
Identify the vertex and axis of symmetry of each. Then sketch the graph.

56) $f(x) = (x + 6)^2 + 4$



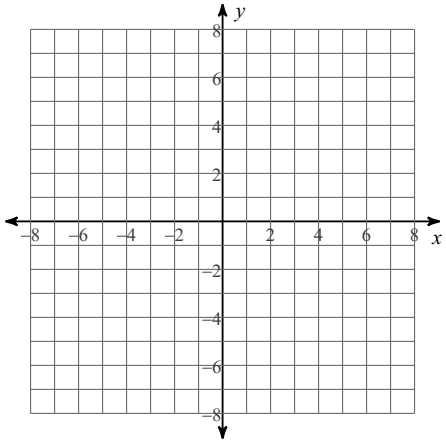
Graph each equation.

57) $y = -\left|x - 3\right| - 4$



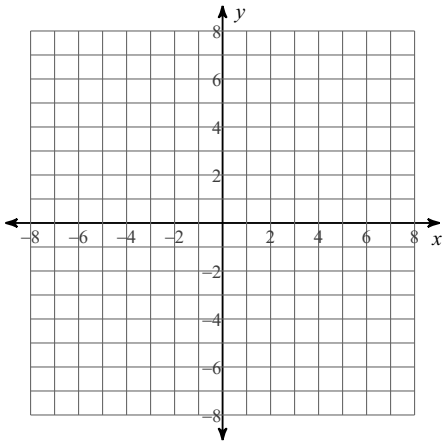
Identify the center and radius of each. Then sketch the graph.

58) $(x - 1)^2 + (y + 2)^2 = 25$



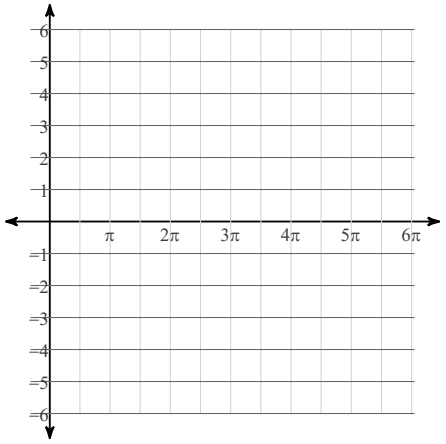
Identify the vertical asymptotes and horizontal asymptote of each. Then sketch the graph.

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

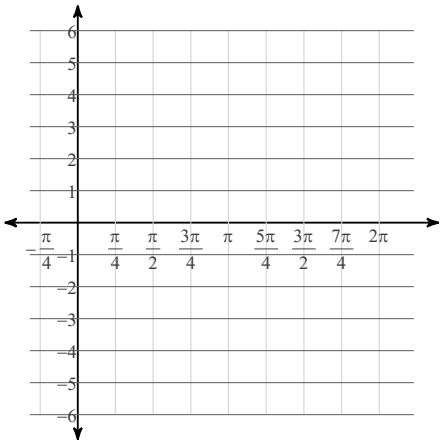


Using radians, find the amplitude and period of each function. Then graph.

60) $y = \cos\dfrac{\theta}{2}$



61) $y = \dfrac{1}{2} \cdot \sin 2\theta$



Verify each identity.

62) $\dfrac{\sec x \csc x}{\cot x} = 1 + \tan^2 x$

63) $\tan x + \cot x = \dfrac{\csc x}{\cos x}$

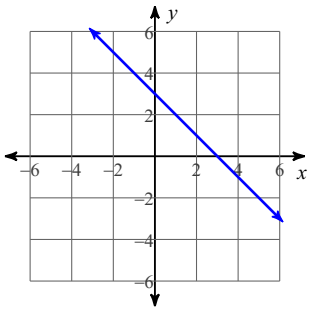
64) $\csc^2 x + \sec^2 x = \dfrac{\sec^2 x}{\sin^2 x}$

65) $\dfrac{\cos^2 x + \sin^2 x}{\cot x} = \sin x \sec x$

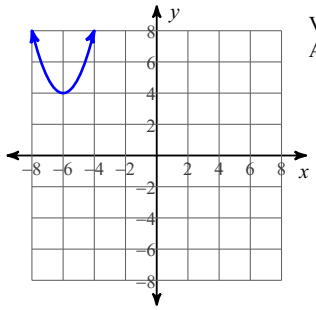
66) $\sin x \csc x - \sec^2 x = -\tan^2 x$

Answers to Calculus

1) 63
2) -6
3) 9
4) 56
5) $-x+1$
6) $-8x-2$
7) $|4x+1|+1$
8) $27x^3-15x$
9) $\left\{-\frac{7}{2}, -\frac{4}{5}\right\}$
10) $\left\{-\frac{8}{5}, -\frac{6}{7}\right\}$
11) $\left\{-\frac{7}{2}, -2\right\}$
12) $\left\{-\frac{4}{3}, -2\right\}$
13) $\left\{\frac{8}{3}, 4\right\}$
14) $\left\{\frac{1}{8}, -3\right\}$
15) Factors to: $x^2(x+2)(x^2+2)=0$
Roots: $\{0 \text{ mult. } 2, -2, i\sqrt{2}, -i\sqrt{2}\}$
16) Factors to: $(x^2+8)(x^2-2)=0$
Roots: $\{2i\sqrt{2}, -2i\sqrt{2}, \sqrt{2}, -\sqrt{2}\}$
17) Factors to: $x(x-3)^2=0$
Roots: $\{0, 3 \text{ mult. } 2\}$
18) Factors to: $(x+1)(x-2)(x+2)=0$
Roots: $\{-1, 2, -2\}$
19) $a^{\frac{3}{2}}$
20) $x^{-\frac{3}{2}}$
21) $m^{-\frac{2}{3}}$
22) $(3n)^{\frac{7}{4}}$
23) $(3x)^{\frac{5}{3}}$
24) $(2x)^{\frac{1}{3}}$
25) $(3n)^{-\frac{8}{5}}$
26) $(10v)^{\frac{4}{3}}$
27) $\frac{a^6}{4}$
28) $\frac{8}{n^6}$
29) $\frac{1}{x^4}$
30) $512k^{15}$
31) $\frac{2}{x^{20}}$
32) $\frac{v^{\frac{1}{12}}}{v^4}$
33) $\frac{x^{\frac{1}{6}}}{x^5}$
34) $\frac{b^{\frac{15}{16}}}{b^3}$
35) $\frac{r^{\frac{1}{2}}}{r}$
36) $\frac{n^{\frac{2}{3}}}{n^4}$
37) $\frac{x^2+6x+9}{3x+12}$
38) $\frac{1}{2}$
39) $\frac{4m^3}{m^2+64}$
40) $\frac{12+x}{30}$
41) $\frac{5-a^3}{15a}$
42) $\frac{x^3+x^2-5x-6}{x^3+2x^2+x}$
43) $\frac{2x^2-17x+8}{10x^2+40x}$
44) $\frac{15-80a}{69}$
45) $\frac{9x^3-36x}{32x^2+1152}$
46) $\frac{4x^2-36x-216}{9x^4-x^3-6x^2}$
47) $\frac{-49-56\sqrt{10}}{591}$
48) $\frac{-10\sqrt{6}+\sqrt{30}}{95}$
49) $\frac{9+3\sqrt{7}-3\sqrt{2}-\sqrt{14}}{2}$
50) $\frac{-35+28\sqrt{10}+20\sqrt{6}-32\sqrt{15}}{270}$
51) $\frac{7b^3\sqrt{10b}+35b^2}{10b^3-25}$
52) $\frac{-10\sqrt{2}+30}{7}$
53) $\frac{24r-3\sqrt{2r}-8r\sqrt{7r}+r\sqrt{14}}{64r^2-2r}$
54) $\frac{-\sqrt{3m}-\sqrt{7m}-30\sqrt{2}-10\sqrt{42}}{4}$
55)

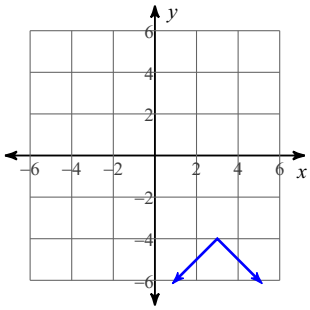


56)

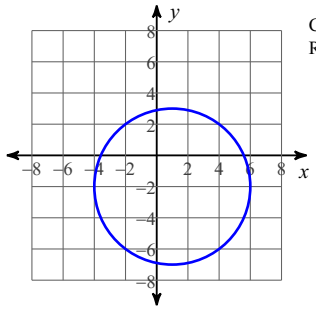


Vertex: $(-6, 4)$
Axis of Sym.: $x = -6$

57)

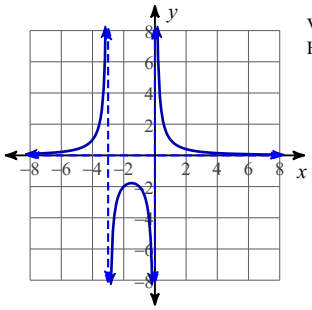


58)



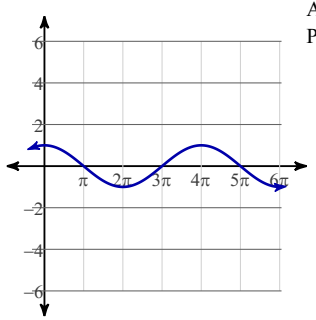
Center: $(1, -2)$
Radius: 5

59)



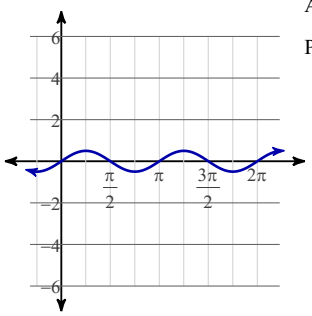
Vertical Asym.: $x = 0$, $x = -3$
Horz. Asym.: $y = 0$

60)



Amplitude: 1
Period: 4π

61)



Amplitude: $\frac{1}{2}$
Period: π

62) $\dfrac{\sec x \csc x}{\cot x}$ Decompose into sine and cosine

$\dfrac{\dfrac{1}{\cos x} \cdot \dfrac{1}{\sin x}}{\dfrac{\cos x}{\sin x}}$ Simplify

$\dfrac{1}{\cos^2 x}$ Use $\sec x = \dfrac{1}{\cos x}$

$\sec^2 x$ Use $\tan^2 x + 1 = \sec^2 x$

$1 + \tan^2 x$ ■

63) $\tan x + \cot x$ Decompose into sine and cosine

$\dfrac{\sin x}{\cos x} + \dfrac{\cos x}{\sin x}$ Simplify

$\dfrac{\sin^2 x + \cos^2 x}{\cos x \sin x}$ Use $\sin^2 x + \cos^2 x = 1$

$\dfrac{1}{\cos x \sin x}$ Use $\csc x = \dfrac{1}{\sin x}$

$\dfrac{\csc x}{\cos x}$ ■

64) $\csc^2 x + \sec^2 x$ Decompose into sine and cosine

$\left(\frac{1}{\sin x}\right)^2 + \left(\frac{1}{\cos x}\right)^2$ Simplify

$\frac{\cos^2 x + \sin^2 x}{\sin^2 x \cos^2 x}$ Use $\sin^2 x + \cos^2 x = 1$

$\frac{1}{\cos^2 x \sin^2 x}$ Use $\sec x = \frac{1}{\cos x}$

$\frac{\sec^2 x}{\sin^2 x}$ ■

65) $\frac{\cos^2 x + \sin^2 x}{\cot x}$ Use $\sin^2 x + \cos^2 x = 1$

$\frac{1}{\cot x}$ Use $\cot x = \frac{\cos x}{\sin x}$

$\frac{\sin x}{\cos x}$ Use $\sec x = \frac{1}{\cos x}$

$\sin x \sec x$ ■

66) $\sin x \csc x - \sec^2 x$ Use $\tan^2 x + 1 = \sec^2 x$

$\sin x \csc x - \tan^2 x - 1$ Decompose into sine and cosine

$\sin x \cdot \frac{1}{\sin x} - \left(\frac{\sin x}{\cos x}\right)^2 - 1$ Simplify

$-\frac{\sin^2 x}{\cos^2 x}$ Use $\tan x = \frac{\sin x}{\cos x}$

$-\tan^2 x$ ■