Graphing sine and cosine functions worksheet

Remember that the sines and cosine functions link the values of real numbers to the x and y coordinates of the unit circle point. So how do they look on the chart coordinates of the plane? Let's start with the spacebar function. We can create a table of values and use them to draw a chart. The following table lists some values for the sine function in a unit circle. x 0 [latex]\frac{π}{6}\\[/latex] [latex]\frac{π}{6}\\[/latex] [latex]\frac{π}{3}\\\[/latex] [latex]\\frac{π}{2}\\[/latex] [latex]\frac{2π}{3}\\[/latex] [latex]\frac{3π}{4}\\[/latex] [latex]\frac{5π}{6}\\[/latex] π sin(x) [latex]\frac{1}{2}\\[/latex] [latex]\frac{\sqrt{2}}{2}\\[/latex] [latex]\frac{\sqrt{3}}{2}\\[/latex] 1 [latex]\frac{\sqrt{3}]<8>}{2}\\[/latex] [latex]\frac{\sqrt{2}}{2}\[/latex] [latex]\frac{1}{2}\[/latex] 0 Drawing and continuation of points from the table on the x-axis provides a sine function form. Figure 2. Figure 2: Sine function Note how the sine values are positive between 0 and π corresponding to the sine function values in the circle of unit I and II, and the gap between π and 2π corresponding to the sine function values in the quadrants III and IV unit circle. Figure 3. Figure 3: Sine function values Now let's look at the cosine function. Again, we can create a table of values and use them in a sketch graph. The following table lists some values for the cosine function in a unit circle. x 0 [latekso]\frac{π}{6}\\[/latekso] [lateksas]\frac{π}{4}\\[/latekso] [latekso]\frac{π π {2} π π{3} [/latekso] [latekso]\frac{2π}{3}\\[/latekso] [latekso]\frac{3π}{4}\\[/latekso] [latekso]\frac{5π}{6}\\[/latekso] π cos(x) 1 [latekso]\\[/latekso] frac{\sqrt{3}}{2}\\[/latekso] [latekso]\frac{\sqrt{2}}{2}\\[/latekso] [latekso]\frac{1}{2}\\[/latekso] 0 [latekso]−\frac{1}{2}\\[/latekso] [latekso] [latekso] \\frac{\sqrt{2}}{2}\\[/latekso] [lateksas]−\frac{\sqrt{3}}{2}\\[/lateksas] −1 Kaip ir su sine funkcija, mes galime sklypai taškų sukurti cosine funkcijos grafiką, kaip parodyta 4 paveiksle. 4 paveikslas. Kosinus function Since we can measure any real number of sine and cosine, both of these features are defined for all real numbers. When considering sine and cosine values as coordinates of the circumference points of the unit, it becomes clear that the range of both functions must be a range [-1,1]. In both charts, the chart form repeats after 2π,which means that the functions are periodic with a period of 2s. Periodic function is a function with a specific horizontal shift, P, triggers a function equal to the original function: f (x + P) = f(x) for all x values in domain f. When this occurs, we call the smallest such horizontal shift with p > 0 function period. Figure 5 shows several periods of sine and cosine functions. Figure 5 When looking back at the sine and cosine functions in the domain, the center of the y axis helps to reveal symmetry. see figure 6, the sine function is origin. Remember from other trigonometric functions that we have set from the unit circle that sine function is an odd function because [latex]sin(−x)=−sinx[/latex]. Now we can clearly see this property from the schedule. Figure 6: The odd symmetry of the sine function Figure 7 indicates that the cosine function is symmetrical on the y-axis. Again, we found that the function of cosine is equal function. Now we can see from the chart that [latex] cos (−x) = cos x \\[/ latex]. Figure 7: Even the symmetry of the cosine features space and cosine features have several different properties: They are periodic functions with a period of 2s. The domain for each function is (-∞,∞) and the range is [-1.1]. The Y = sin x graph is symmetrical about origin because it is an odd function. The Y =cos x graph is symmetrical about the y-axis because it is an equal function. Study of sinusoidal functions As we see, sinus and cosine functions have a regular period and range. If we look at ocean waves or pulsations on the pond, we will see that they resemble sine or cosine functions. However, they are not necessarily identical. Some are taller or longer than others. A function with the same common form as a sinus or cosine function is called sinusoidal function. Common forms of sinusoidal functions are y = A sin (Bx − C) + D and y = A cos (Bx − C) + D When looking at the forms of sinusoidal functions, we see that they are transformations of sinus and cosine functions. For the purpose of setting a period, we can use what we know about transformations. In general formula B is associated with the period [latex]\text{P =}\frac{2π}{| B|} [/latex]. If | B | > 1, then the period is less than 2π and the function performs horizontal compression, and if | B | < 1, then the period is greater than 2π and the function performs a horizontal stretch. For example, f(x) = sin(x), B = 1, so the period is 2π, which we knew. If f(x) = sin(2x), then B = 2, so the period is π and the graph is compressed. If [latex]\text{f (x) = sin} (\frac{x}{2})[/latex], then [latex]B=\frac{1}{2}[/latex], so the period is 4 π and the graph is stretched. Note in Figure 8 as an indirect period | B|. Figure 8 If we allow C = 0 and D = 0 in common sine and cosine function equations, we receive the Time period is [latex]\frac{2π}{| B|} [/latex]. Set the function period [latex]f(x) = \sin(\frac{π}{6}x)\\[/latex]. Let's start comparing the equation with the general form [latex]y=Asin(Bx)[/latex]. In the specified equation [latex]B=\frac{π}{6}[/latex], the period will be [latex]\begin{array}P=\frac{\frac{2}{\pi}}{{ B|} \hfill \\ =\frac{2\pi}{\frac{x}{6}}\hfill\\ =2\pi\times \frac{6}{\pi}\hfill \\ == 12\hfill \end{array}\\[/latex] Set function period [latex]g(x)=\cos(\frac{x}{3})\\[/latex]. Solution Setting Amplitude When Returning to a common formula functions, we analysed how variable B B until the end of the period. Now let's move on to variable A so that we can analyze how it relates to amplitude or the maximum distance from rest. A stands for vertical tension coefficient and its absolute value | A| is an amplitude. The maximum space will be the distance | A| above the vertical middle line of the chart, which is the line x = D; whereas D = 0 in this case, the middle line is the x-axis. Local minima will be the same distance below the middle line. If | A| > 1, the function is stretched. For example, f(x) amplitude = 4 sin x is twice the f(x) amplitude = 2 sin x. If | A| < 1, the function is compressed. Figure 9 compares several sine functions with different amplitudes. Figure 9 If we allow C = 0 and D = 0 in the common sine and kosin function equations, we receive forms [latex]y = A\sin(Bx)\\[/latex] and [latex]y=A\cos(Bx)\\\[/latex] Amplitude is A, and the vertical height from the line is| A|. Also, note the example that [latex] | A|=\text{amplitude}=\frac{1}{2}|\text\maximum}−\text{minimum}|\\\[/latex] What is a siesoid function amplitude [latex]f(x)=−4\sin(x)\\\[/latex]? Is the function stretched or compressed vertically? Let's start by comparing the function with the simplified form y = A sin(Bx). According to the specified function A = -4, so the amplitude is | A|=|−4| = 4. The function is stretched. Analysis of the solution Negative A value indicates that the reflection between the x-axis of the sine function as shown in Figure 10. Figure 10 What is the amplitude of sinusoid function f(x) = 12 sin (x)? Is the function stretched or compressed vertically? Solution By analyzing the variations of the graphs y = sin x and y = cos x Now that we understand how A and B relate to the common form of equation sine and cosine functions, we explore variables C and D. Remember the general form: [latex]y = A \sin(Bx-C)+D\\[/latex] and [latex]y=A\cos(Bx-C)+D\\[/latex] or [latex]y=A\sin(B(x−\frac{C}{B})))+D\\[/latex] and [latex]y=A\cos(B(x−\frac{C}{B})))+D\\[/latex] Sinusoid function value [latex]\frac{C}{B}\\[/latex] is called phase offset, or horizontal displacement of the basic sine or cosine function. If C > 0, the graph is moved to the right. If C < 0, the schedule moves to the left. The higher the value | C|, the more the graph is moved. Figure 11 shows that the [latex] f(x)=\sin(x-π)\\[/latex] graph moves to the right in π units, which is more than we see in the [latex]f(x)=\sin(x−\frac{π}{4})\\[/latex] that moves to the right [latex]\frac{π}{4}\\[/latex]units. Figure 11 Although C is related to a horizontal shift, D indicates a vertical transition from the middle line in the general formula of the sinusoid function. The [latex]y=\cos(x)+D\\[/latex] function has its own middle line at [latex]y=D[/latex]. Figure 12 Any value D, except zero, changes the chart up or down. Figure 13 compares [latex]f(x)=\sin x\\[/latex] with x+2\\[/latex], which is moved in 2 units in the chart. Units. 13 Depending on the equation in the form [latex]f(x)=A\sin(Bx-C)+D\\[/latex]phase]f(x)=A\cos(Bx-C)+D\\[/latex], [latex]\frac{C}{B}\\[/latex] is a phase shift, and D is a vertical shift. Nustatykite [latekso]fazės poslinkio kryptį ir dydį]fazės]fazės]fazės]fazės]fazės]fazės(x)=\sin(x+\frac{π}{6})−2\\[/latekso]. Let's start comparing the equation with the general form [latex] y=A\sin(Bx-C)+D\\[/latex]. In the following equation, note that B = 1 and [latex]C=−\frac{π}{6}\\[/latex]. So the phase offset is [latex]\begin{array}\frac{C}{B}=−\frac{\frac{\frac{\frac{\frac{x}{6}}{1}\hfill \\\frac{\pi}{6}\hfill\end\array}\\[/latex] or [latex]\frac{\pi}{6}\[/latex] units to the left. We need to pay attention to the sign of the equation in the form of a common sinusoidal function. The equation shows a minus sign before C. Therefore, [latex]f(x)=\sin(x+\frac{π}{6})-2\\[/latex] can be overwritten as [latex]f(x)=\sin(x−(\frac{π}{6})))−2\\[/latex]. If the C value is negative, the offset is to the left. Nustatykite fazių poslinkio kryptį ir dydį [latekso]fazės]fazės]fazės]fazės]fazės]fazės]fazės]fazės]fazės]fazės]fazės]fazės]fazės]fazės]fazės]fazės]f%(x)=3\cos(x−\frac{\pi}{2})\\[/latekso]. Solution Set the direction and size of the vertical shift of [latex]f(x)=\cos(x)-3\\[/latex]. Let's start comparing the equation with the general form [latex]y=A\cos(Bx-C)+D\\[/latex] Set the direction and size of the vertical shift [for latex]f(x)=3\sin(x)+2\\[/latex]. Solution How to: Based on the sinusoid function in the form [latex]f(x)=A\sin(Bx-C)+D[/latex], set the middle line, amplitude, period, and phase shift. Set amplitude as| A|. Set the time period to [latex]P=\frac{2π}{| B|} \\[/latex]. Set the phase shift to [latex]\frac{C}{B}\\\[/latex]. Set the middle line to y = D. Set the function's middle line, amplitude, period, and phase shift [latex]y=3\sin(2x)+1\\[/latex]. Let's start comparing the equation with the general form [latex] y=A\sin(Bx-C)+D\\[/latex]. A = 3, so the amplitude is | A| = 3. Next, B = 2, so the period is [latex]\text{P}=\frac{2π}{{ B|} =\frac{2π}{2}=π\\[/latex]. There are no constants attached in parentheses, so C = 0, and the phase offset is [latex]\frac{C}{B}=\frac{0}{2}=0\\[/latex]. Finally, D = 1, so the middle line is y = 1. When checking the graph, we can determine that the period is π, the middle line is y = 1, and the amplitude is 3. Figure 14. Figure 14 Set the middle line, amplitude, period, and phase shift of the function [latex]y=\frac{1}{2}\cos(\frac{x}{3}-\frac{π}{3})\\[/latex]. Solution Set the formula for the cosine function in Figure 15. Figure 15 [latex]f(x)=\sin(x)+2\\[/latex] Set figure 16. Figure 16 Solution Solve the sinusoidal function equation in Figure 17. Figure 17 At the maximum value at 1 and minimum value at-5, the middle line will be halfway from −2. So D = −2. from the middle line to the highest or lowest value gives amplitude | A|=3. The chart period is 6, which can be measured from the peak when x = 1, to the next x = 7, or from the distance between the lowest points. Therefore, [latex]\text{P}=\frac{2\pi}{| B|} =6[/latex]. Using positive value B, we see that [latex]B=\frac{2π}{P}=\frac{2π}{6}=\frac{π}{3}\[/latex] So far, our equation is either [latex]y=3\sin(\frac{\pi}{3}x-C)-2\\[/latex] or [latex]y=3\cos(\frac{\pi}{3}x−C)−2\\[/latex]. For form and shift, we have more than one option. We can write this as one of the following: cosine moved to the right negative cosine moved to the left sine moved to the left negative sine moved to the right Although any of these would be correct, kosin shifts are easier to work than sine shifts in this case because they relate to integer values. So our function becomes [latex] y = 3 cos (\frac{π}{3}x-\frac{π}{3})-2\\[/latex] or [latex]] y=−3\cos(\frac{π}{3}x+\frac{2π}{3})-2\\[/latex] Again, these functions are equivalent, therefore both give the same chart. Write Figure 18. Figure 18 Solution Solution In this section we learned about the types of variants of sine and cosine functions and used this information equation from the graphs. Now we can use the same information to create charts from equations. Instead of focusing on the common form equations [latex]y=A\sin(Bx-C)+D\\[/latex] and [latex]y=A\cos(Bx-C)+D\\[/latex], we will allow C = 0 and D =0 and work with simplified equation form in these examples. How To: Based on the [latex]y = Asin (Bx)\\[/latex] function, draw your own chart. Set amplitude,| A|. Identify period in [latex]P=\frac{2π}{| B|} \\[/latex]. Start with origin, and the function increases to the right if A is positive or decreases if A is negative. To [latex]x=\frac{π}{2| B|} \\[/latex] is the local maximum A > 0 or minimum A < 0, y = A. The curve returns to the x-axis at [latex]x=\frac{π}{| B|} \\[/latex]. There is a local minimum A > 0 (max < 0) in [latex]x=\frac{3π}{2| B|} \\[/latex] with y =-A. The curve returns to the x-axis again at [latex]x=\frac{π}{2| B|} \\[/latex]. Plot the [latex]f(x)=−2\sin(\frac{πx}{2})\\[/latex] chart. Let's start comparing the equation with the form [latex]y=A\sin(Bx)\\[/latex]. Step 1. We see from the equation thatA = -2, so the amplitude is 2. | A| = Step 2 2. The equation shows that the [latex]B=\frac{π}{2}\\\[/latex] so the period is [latex] \begin{array} \text{P}=\frac{2\pi}{\frac{\pi}{2}}\\=2\pi\times\frac{2}{\pi}\\=4 \end{array}\\[/latex] Step 3. Since A is negative, the schedule descends when we go to the right of origin. Step 4-7: The X axis is at the beginning of one period, x = 0, the horizontal middle points are x = 2, and at the end of one period x = 4. Quarter points include the lowest x = 1 and maximum x = 3. The local minimum quantity will be 2 units below the middle line at x = 1, and the local maximum quantity will be 2 units above the middle line at x = 3. Figure 19 shows the Chart. Figure 19 Sketch a a from [latex]g(x)=−0.8\cos(2x)\\[/latex]. Determine the middle line, amplitude, period, and phase shift. Solution How to: Depending on the sinusoidal function with phase shift and vertical shift, draw its schedule. Express the function in general form [latex]y=A\sin(Bx-C)+D[/latex] or [latex]y=A\cos(Bx-C)+D\\[/latex]. Set amplitude, | A|. Identify period, [latex]P=2π| B | [/latex]. Set the phase shift to [latex]\frac{C}{B}\\\[/latex]. Draw a diagram of [latex]f(x)=A\sin(Bx)\\[/latex] moved right or left [latex]\frac{C}{B}\\[/latex] and up or down under D. Draw the [latex]f(x)=3\sin(\frac{π}{4}x-phrase{π}{4})\[latex] chart. Step 1. This function is already written in general: [latex]f(x)=3\sin(\frac{π}{4}x-\frac{π}{4})\\[/latex]. This graph will have a spacebar function form, starting from the middle line and increasing to the right. Step 2. | A|=|3|=3. The amplitude is 3. Step 3. From [latex]| B|=|\frac{π}{4}|=\frac{π}{4}\[/latex], we set the time limit as follows. [latex]\text{P}=\frac{2π}{| B|} =\frac{2π}{\frac{π}{4}}=2π\times\frac{4}{π}=8\\[/latex] The period is 8. Step 4. Because [latex]\text{C}=\frac{π}{4}\\[/latex], the phase offset is [latex]\frac{C}{B}=\frac{\frac{\pi}{4}}{\frac{\pi}{4}}=1\\[/latex]. The phase offset is 1 unit. Step 5. Figure 20 shows the diagram of the function. Figure 20: Horizontally compressed, vertically stretched, and horizontally moved sinusoid Draw a diagram of [latex]g(x)=−2\cos(\frac{\pi}{3}x+\frac{\pi}{6})\\[/latex]. Determine the middle line, amplitude, period, and phase shift. Solution Submitted to [latex]y=−2\cos(\frac{\pi}{2}x+\pi)+3\\[/latex], set amplitude, period, phase shift, and horizontal shift. Then schedule the function. Start the equation equation with a common form, and then follow the steps in example 9. [latex]y=A\cos(Bx-C)+D\\[/latex] Step 1. This feature is already written in general form. Step 2. Because A = -2, the amplitude is| A| = 2. Step 3. [latex]| B|=\frac{\pi}{2}\\[/latex], so the period is [latex]\text{P}=\frac{2π}{| B|} =\frac{2\pi}{\frac{\pi}{2}}\times2\pi=4\\[/latex]. The period is 4. Step 4. [latex] C=−\pi\\\[/latex], so we calculate the phase as [latex]\frac{B}{B}=\frac{\pi}{\frac{\pi}{2}}=-time\times\frac{2}{\pi}=-2\\[/latex]. The phase displacement is −2. Step 5. D = 3, so the middle line is y = 3, and the vertical shift is up to 3. Because A is negative, the graph of the cosine function is reflected on the x-axis. Figure 21 shows one cycle of the function schedule. Figure 21 Using transformations of Sine and Cosine features In most applications we can use sine and cosine feature transformations. As mentioned at the beginning of the section, circular movements can be modeled using sine or cosine function. The point revolves around the radius 3 circle, the center of which is origin. Draw a draw • coordinate graph as a function of the rotation angle. Remember that at the point in the radius r circle, the y coordinate of the point is so in this case we get the equation [latex] y (x) = 3\sin(x) [/ latex]. Constant 3 causes a vertical stretch of the y-values of the function by a coefficient of 3, which we see in the diagram in Figure 22. Figure 22 Decision message analysis that the function period is still 2π; as we travel around the circle, we return to the point (3,0) x = 2π, 4π, 6π, ... Since the graph results now range between -3 and 3, the sinating wave amplitude is 3. What is the amplitude of the function [latex]f(x)=7\cos(x)[/latex]? Draw a diagram for this feature. Solution Circle with a radius of 3 feet mounted with its center 4 feet from the ground. The point closest to the ground shall be marked P as shown in Figure 23. Draw a ground chart of height above point P when the circle is rotated; then find a function that gives height according to the angle of rotation. Figure 23, in which the height is drawn, we note that it will start 1 foot above the ground, then rise to 7 feet above the ground and continue to turn 3 feet above and below the 4-foot central value, as shown in Figure 24. Figure 24 While we can use either sine or cosine function transformation, we start looking for features that make it easier to use one function than another. Let's start using the cosine function, because it starts with the highest or lowest value, and the sine function starts with the middle value. Standard cosine starts with the highest value, and this chart starts with the lowest value, so we need to include a vertical reflection. Secondly, we see that the graph osciliing 3 above and below the center, and the main cosine has 1 amplitude, so this graph was vertically stretched 3, as in the last example. Finally, to move the center of the circle to a height of 4, the graph was moved vertically 4. By combining these transformations, we see that [latex] y = −3 cos(x)+4[/latex] Weight is attached to the spring, which then hang from the board as shown in Figure 25. As the spring fluctuates up and down, the weight position y, depending on the board, ranges from –1 in. (at that time x = 0) to –7in. (at that time x = π) below the board. Assume that position y is presented as a sinusoid function x. Plot the function graph, and then find the cosine function that gives y position x. Figure 25. He completes one rotation every 30 minutes. Riders board from the platform 2 meters above the ground. Express the height of the passenger above the ground as a function of time in minutes. The radius of the wheel with a diameter of 135 m shall be 67,5 m. The height will be oscillated with an amplitude of 67.5 m above and below the center. Passengers on board 2 m above ground level, so the centre of the wheel must be 67,5 + 2 = 69,5 m above ground level. The middle line of vibrations will be 69.5 m. The wheel takes 30 minutes to complete 1 so the height will be sewn with a period of 30 minutes. Finally, since the rider boards at the lowest point, the height will begin at the lowest value and increase, followed by a vertically reflected curve shape. Amplitude: 67,5, so A = 67,5 Middle line: 69,5, so D = 69,5 Period: 30, so [latex]B=\frac{2\pi}{30}=\frac{\pi}{15}[/latex] form: −cos(t) Driver height equation would be [[].*10000000 00000000 latex]y=−67.5\cos(\frac{\pi}{15}t)+69.5[/latex] where t is in minutes and measured in metres. Sinusoidal functions [latex]f(x)=A\sin(Bx−C)+D[/latex] [latex]f(x)=A\cos(Bx-C)+D[/latex] Periodic functions recur after a certain value. The minimum such value is the period. The main functions of sine and cosine have 2π period. The sin x function is odd, so its schedule is symmetrical about origin. The cos x function is equal, so its graph is symmetrical about the y-axis. The graph of the sinusoid function has the same common form as the sinus or cosine function. In the common formula for the sinusoidal function, the period is [latex]\text{P}=\frac{2\pi}{| B|} [/latex]. In a common formula, sinusoidal functions, | A|stands for amplitude. If | A| > 1, the function is stretched, or if| A| < 1, the function is compressed. The value [latex]\frac{C}{B}[/latex] refers to a phase shift in the common formula of the sinusoidal function. In the general formula of the sinusoidal function, the value d indicates a vertical transition from the middle line. Combinations of variation of sinusoidal functions can be detected by equation. The sinusoidal function equation can be determined according to schedule. A function can be displayed by identifying its amplitude and period. The function can also be displayed by identifying its amplitude, period, phase shift, and horizontal shift. Sinusoidal functions can be used to solve real-world problems. amplitude vertical function height; the sinusoidal function in the middle row in the middle line at the middle line with constant A, where D is the form of the periodic function of the general sinusoid function, i.e. the horizontal displacement of the principal sinus sinus or cosine function; [latex]\frac{C}{B}[/latex] sinusoidal function any function that can be expressed in the form [latex]f(x)=A\sin(Bx-C)+D[/latex] or [latex]f(x)=A\cos(Bx-C)+D[/latex] 1. Why are sine and cosine functions called periodic functions? 2. How is the [latex] y=\sin x[/latex] graph compared to the [latex] y=\cos x[/latex] chart? Explain how you can translate the [latex] y=\sin x[/latex] chart horizontally to get [latex]y=\cos x[/latex]. 3. What constants affect the function range and how do they affect the range due to the equation [latex]A\cos(Bx+C)+D[/latex] and how do they affect the range? 4. How the range of translated sine function relates to equation [latex]y = A\sin(Bx +C) + D[/ 5. How can the wheel of the unit be used [latex] f(t)=\sin t[/latex]? 6. [latex]f(x)=2\sin x[/latex] 7. [latex]f(x)=\frac{2}{3}\cos x[/latex] 8. [latex]f(x)=−3\sin x[/latex] 9. [latex]f(x)=4\sin x[/latex] 10. [latex]f(x)=2\cos x[/latex] 11. [latex]f(x)=\cos(2x)[/latex] 12. [latex]f(x)=2\sin(\frac{1}{2}x)[/latex] 13. [latex]f(x)=4\cos(\pi x)[/latex] 14. [latex]f(x)=3\cos(\frac{6}{5}x)[/latex] 15. [latex]y=3\sin(8(x+4))+5[/latex] 16. [latex]y=2\sin(3x-21)+4[/latex] 17. [latex]y=5\sin(5x+20)−2[/latex] For the following exercises, the following exercises nup the schedule one for the entire period of each function, starting with [latex]x=0[/latex]. Specify the amplitude, period, and middle line for each function. Specify the maximum and minimum y-values and the corresponding x values for one period of [latex] x>0[/latex]. Specify the phase shift and vertical translation, if applicable. If necessary, round up the answers to two decimal places. 18. [latex]f(t)=2\sin(t−\frac{5\pi}{6})[/latex] 19. [latex]f(t)=−\cos(t+\frac{\pi}{3})+1[/latex] 20. [latex]f(t)=4\cos(2(t+\frac{\pi}{4})))-3[/latex] 21. [latex]f(t)=−\sin(12t+\frac{5\pi}{3})[/latex] 22. [latex]f(x)=4\sin(\frac{\pi}{2}(x−3))+7[/latex] 23. Determines the amplitude, middle line, period, and equation of the chart shown in Figure 26, which includes the sine function. 26 Figure 24: The diagram shown in Figure 27 determines the amplitude, period, middle line and equation associated with cosine. Figure 27 25: The diagram shown in Figure 28 determines the amplitude, period, middle line and equation associated with cosine. 28 Figure 26: The amplitude, period, middle line and sine equations covering the chart shown in Figure 29 are determined. Figure 29 27: The diagram shown in Figure 30 determines the amplitude, period, middle row and equation in which cosine is involved. Figure 30 28: Set the amplitude, period, middle line, and equation that includes the sine of the chart shown in Figure 31. Figure 31 29: The diagram shown in Figure 32 determines the amplitude, period, middle line and equation in which cosine is involved. Figure 32 30: Set the amplitude, period, middle line, and equation that includes the sine of the chart shown in Figure 33. Figure 33 31. Resolve [latex]f(x)=\frac{1}{2}[/latex]. 32. Rate [latex]f(\frac{\pi}{2})[/latex]. 33. [0,2π], [latex]f(x)=\frac{\sqrt{2}}{2}[/latex]. Find all x. 34 values. [0,29] The maximum value(s) of function(s) at x value(s) appear? 35. [0,2π] the lowest value(s) of function(s) what x value(s)is(are) occurring? 36. Show that [latex]f(−x)=−f(x)[/latex]. This means that [latex]f(x)=\sin x[/latex] is an odd feature and has symmetry compared to ____ For these exercises, let [latex] f(x)=\cos x[/latex]. 37. Resolve equation [0,2π] x=0[/latex]. 38. Resolve [latex]f(x)=\frac{1}{2}[/latex]. 39. Find [0,2π] on x-axis [latex]f(x)=\cos x[/latex]. 40. [0,2π] find the x values that the function has the highest or lowest minimum 41. Resolve the equation [latex]f(x)=\frac{\sqrt{3}}{2}[/latex] equation [0,2π] 42. Graph [latex]h(x)=x+\sin x\text{ on}[0,2\pi][/latex]. Explain why the chart appears the way it appears. 43. Graph [latex]h(x)=x+\sin x[/latex] [-100,100]. Was the graph displayed as projected in the previous estimate? 44. Graph [latex]f(x)=x\sin x[/latex] [0,2π] and orally, as the graph differs from the [latex]f(x)=\sin x[/latex] chart. 45. Graph [latex]f(x)=x\sin x[/latex] on window [−10,10] and explain what the diagram shows. 46. Graph [latex]f(x)=\frac{\sin x}{x}[/latex] in window [-5π,5π] and explain what the chart shows. 47. Ferris wheel is 25 meters in diameter and climbs from a platform that is 1 meter above the ground. The six-hour position of the ferris wheel is equal to the loading platform. The circle completes 1 full revolution in 10 minutes. The h(t) function gives the human height in metres above the ground t minutes after the wheel starts to rotate. A. Find amplitude, middle line, and h(t) period. B. Find the h(t) formula for the height function. C. How high is a person in 5 minutes? Minutes?

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