Answers to Trig Functions Practice Test

Multiple Choice Questions

1. b	**2.** c	**3.** d	**4.** b	**5.** c
6. b	**7.** a	**8.** d	**9.** d	**10.** c
11. d	**12.** a	**13.** b	**14.** b	**15.** a
16. a	**17.** a	**18.** a	**19.** b	**20.** d

Short Answer Questions

21. 2π rad/min$=\dfrac{\pi}{30}$ rad/s

22. 263.89 m

23. $\dfrac{2\pi}{3}$

24. sine and cosine

25. 3.67 cm^2

26. $y=-4\cos x-2$
$y=4\cos x+2$

27. $y=\dfrac{75}{2}\cos 14\pi t+\dfrac{75}{2}$

28. 28 days, $\omega=\dfrac{2\pi}{28}=\dfrac{\pi}{14}$

29. $h(t)=4\sin\left(\dfrac{\pi}{3}\left(t+\dfrac{3}{2}\right)\right)+144$

30. -3.3079

Problems

31. *Solution*

The graphs of $y=\sin x$ and $y=\cos x$ are out of phase by $\dfrac{\pi}{2}$ radians. That is, the graph of $y=\sin x$ can be obtained by translating the graph of $y=\cos x$ by $\dfrac{\pi}{2}$ radians to the right and the graph of $y=\cos x$ can be obtained by translating the graph of $y=\sin x$ by $\dfrac{\pi}{2}$ radians to the left. This suggests the identities $\sin x=\cos\left(x-\frac{\pi}{2}\right)$ and $\cos x=\sin\left(x+\frac{\pi}{2}\right)$.

32. *Solution*

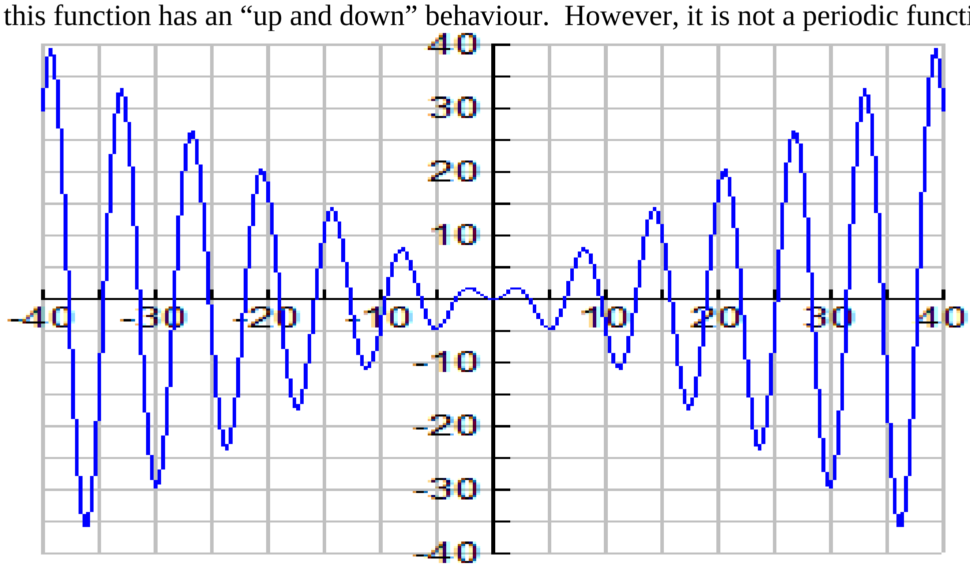
If $0\le\theta\le 2\pi$, then $\theta\doteq 0.7227$ or $\theta\doteq 2\pi-0.7227\doteq 5.56048$ (first and fourth quadrant solutions). If there are no restrictions on θ, then we can write $\theta\doteq 0.7227+2\pi n$ or $\theta\doteq 5.56048+2\pi n$ for all $n\in\mathbb{Z}$.

33. *Solution*

$\dfrac{\pi}{2}$

34. *Solution*

The result is the function $f(x)=x\sin x$, which is a function with a variable amplitude. Like a sinusoidal function, this function has an "up and down" behaviour. However, it is not a periodic function.



35. *Solution*
The period of the tangent function is π while the period of cosine is 2π.

36. *Solution*
The given function has a period of 1, an angular frequency of π, a vertical displacement of –1 and a phase shift of $\frac{1}{2}$.
The range of the function is $\mathbb{R}$ and the domain is $\{x \in \mathbb{R} : x \notin \mathbb{Z}\}$ (the function is defined for all values of x except for the integer values).

37. *Solution*
The minimum value of the given function is –2, which indicates that the point on the spinning wheel would be underground for a certain interval of time. Thus, the student's proposed equation must be incorrect.

38. *Solution*
We want to model the pendulum's side-to-side motion. Knowing that the rope is 3 m long and the pendulum creates a central angle of $\frac{\pi}{3}$ when it is at its widest, we can determine how far away it is from perpendicular using $\sin\theta = \frac{o}{h}$.
Our hypotenuse in this case is 3 and our $\theta = \frac{\pi}{3}$. So our opposite side of the triangle is $\frac{3\sqrt{3}}{2}$, which will be the amplitude of the function. Since it takes 2 seconds to move from vertical to its furthest point, we can assume that it takes 8 seconds for one period, so $k = \frac{2\pi}{8}$. Since the starting point is not asked for we can take d to be 0 and when the rope is perpendicular to the ground is given as 0 we can take c to be zero. Putting all the pieces together we get $x(t) = \frac{3\sqrt{3}}{2}\sin\left(\frac{\pi}{4}t\right)$, where $x(t)$ is the horizontal distance from vertical.

39. *Solution*
Zero at $x = 4$ and 12
Negative for $4 < x < 12$
Positive nowhere

40. *Solution*
The instantaneous rate of change of distance (position) with respect to time is ***velocity***. Whenever the instantaneous rate of change is zero, the distance is not changing. Therefore, the object in question has come to a complete stop, that is, its speed is zero.