1. Find the exact value of the expression.

$$\cos^{-1}\left(\cos\frac{11\pi}{6}\right)$$

A. $-\frac{\pi}{6}$

B. $\frac{11\pi}{6}$

C. $\frac{7\pi}{6}$

D. $\frac{5\pi}{6}$

E. $\frac{\pi}{6}$

2. Find the exact value of the expression.

$$\sin\left(2\cos^{-1}\left(\frac{40}{41}\right)\right)$$

A. 1

B. $\frac{1519}{1681}$

C. $-\frac{1519}{1681}$

D. $\frac{720}{1681}$

E. None of the above

3. Write the expression as an algebraic expression in x, for $x > 0$.

$$\tan\left(\sin^{-1}\left(\frac{x}{3}\right)\right)$$

A. $\frac{x}{3}$

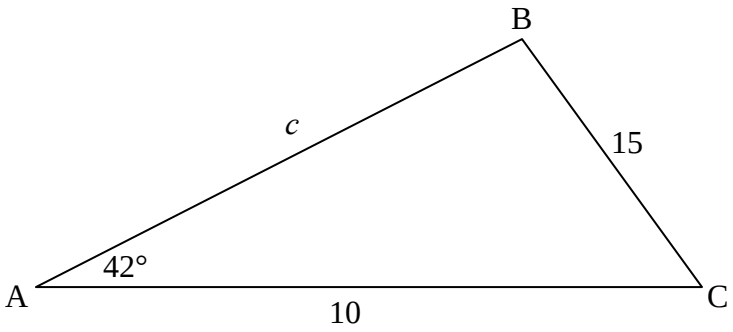
B. $\frac{x}{\sqrt{9-x^2}}$

C. $\frac{\sqrt{9-x^2}}{3}$

D. $1-\frac{x}{3}$

E. None of the above

4. Find the value of side c to one decimal place.



A. 16.7

B. 18.0

C. 11.2

D. 20.9

E. None of the above.

5. **Sighting from a helicopter.** A helicopter hovers at an altitude that is 1100 feet directly above a mountain peak which has altitude 5570 feet. A second, taller peak is viewed from both the mountaintop and the helicopter. From the helicopter, the angle of depression is 41°, and from the mountaintop, the angle of elevation is 17°. Approximate the distance from peak to peak to the nearest foot.

A. 790 *feet*

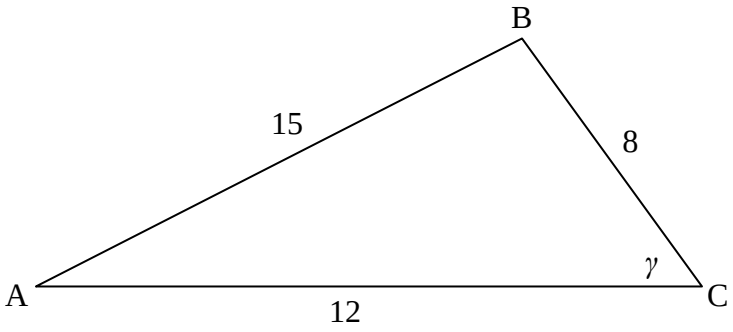
B. 851 *feet*

C. 979 *feet*

D. 873 *feet*

E. None of the above.

6. Find the value of angle γ to one decimal place.



A. 52.8°

B. 95.1°

C. 84.9°

D. 32.1°

E. None of the above.

7. A ship leaves port at 1:00 PM and travels $N34°E$ at a rate of 35 miles per hour. At the same time, a second ship leaves the same port and travels $S75°W$ at a rate of 40 miles per hour. To the nearest mile, how far apart are the ships at 4:00 PM?

A. $205\,miles$

B. $222\,miles$

C. $183\,miles$

D. $211\,miles$

E. None of the above

8. An airplane with an airspeed of 250 miles per hour is flying in the direction of 130° and a 45 mile per hour wind is blowing in the direction of 200°. Approximate the plane's true course to the nearest degree.

A. 139°

B. 137°

C. 135°

D. 133°

E. None of the above

9. To the nearest degree, find the angle between the vectors $\langle 3,6 \rangle$ and $\langle 2,-9 \rangle$.

A. 141°

B. 39°

C. 14°

D. 166°

E. None of the above

10. Given $a = 3i - 4j$ and $b = -i + 6j$, in which quadrant is the vector $2a - 4b$?

A. II

B. I

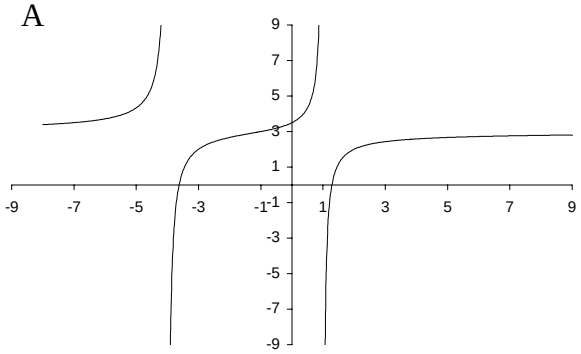
C. IV

D. III

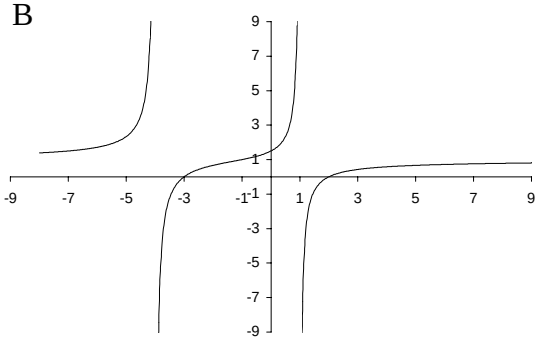
E. There is not enough information to determine.

11. Which of the following is the graph of $f(x)=\dfrac{x^2+x-6}{x^2+3x-4}$?

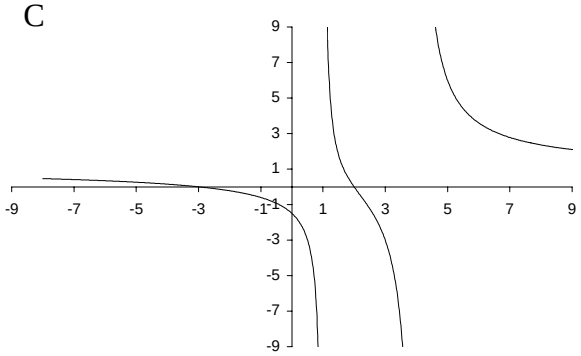
A



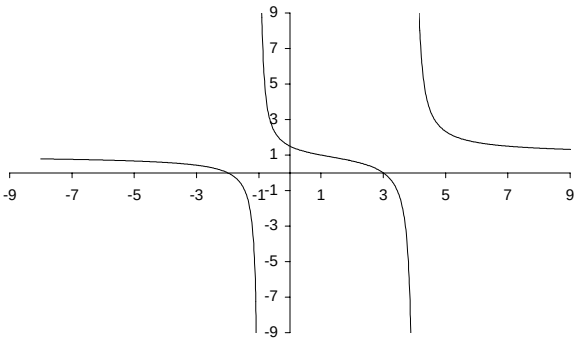
B



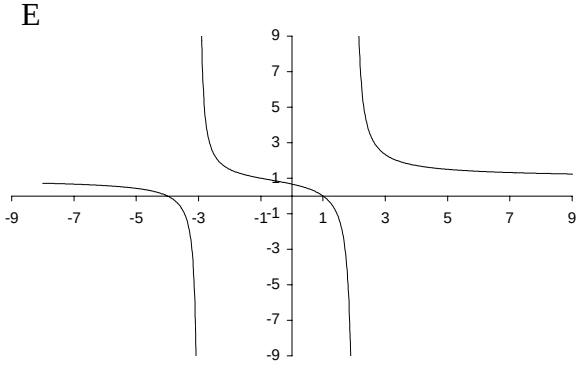
C



D



E



12. What are the equations of the horizontal and vertical asymptotes of the function $f(x)=\dfrac{5x^2-20}{x^2-9}$?

A. Horizontal asymptote: $y=5$
Vertical asymptotes: $x=\pm 3$

B. Horizontal asymptote: $y=0$
Vertical asymptotes: $x=\pm 2$

C. Horizontal asymptote: $y=0$
Vertical asymptotes: $x=\pm 3$

D. Horizontal asymptote: $y=5$
Vertical asymptotes: $x=\pm 2$

E. None of the above

13. Which of the following is an equation of a rational function f that satisfies the given conditions?

Vertical asymptotes: $x=-3, 4$
Horizontal asymptote: $y=7$
x-intercepts: 2, -5

A. $f(x)=\dfrac{7(x-3)(x+4)}{(x+2)(x-5)}$

B. $f(x)=\dfrac{7(x+2)(x-5)}{(x-3)(x+4)}$

C. $f(x)=\dfrac{7(x+3)(x-4)}{(x-2)(x+5)}$

D. $f(x)=\dfrac{7(x-2)(x+5)}{(x+3)(x-4)}$

E. None of the above

14. Determine m such that the two vectors are orthogonal.

$5mi + 2j$ and $3i - 30j$

A. $m = -4$

B. $m = 4$

C. $m = 9$

D. $m = -9$

E. None of the above

15. Find the solutions of the equation in the given interval to four decimal places.

$3\tan^2 t + 8\tan t - 1 = 0 \qquad \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

A. $0.1196, -2.7863$

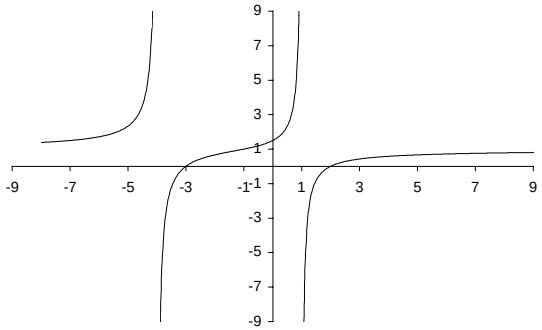
B. $1.0044, -1.3391$

C. $0.1191, -1.2262$

D. $1.5726, -4.2393$

E. None of the above

Answers

Question	Answer	Letter
1.	$\frac{\pi}{6}$	E
2.	$\frac{720}{1681}$	D
3.	$\frac{x}{\sqrt{9-x^2}}$	B
4.	20.9	D
5.	979 *feet*	C
6.	95.1°	B
7.	211*miles*	D
8.	139°	A
9.	141°	A
10.	IV	C
11.		B
12.	Horizontal asymptote: $y=5$ Vertical asymptotes: $x=\pm 3$	A
13.	$f(x)=\frac{7(x-2)(x+5)}{(x+3)(x-4)}$	D
14.	$m=4$	B
15.	0.1191, –1.2262	C