MA 15400

Fall 2014

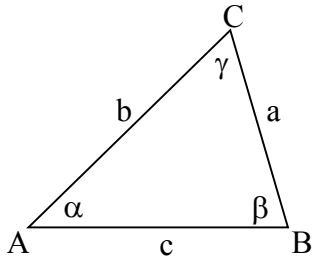
Exam 3

$$\frac{\sin\alpha}{a} = \frac{\sin\beta}{b} = \frac{\sin\gamma}{c}$$

$$a^2 = c^2 + b^2 - 2cb\cos\alpha$$

$$b^2 = a^2 + c^2 - 2ac\cos\beta$$

$$c^2 = a^2 + b^2 - 2ab\cos\gamma$$



$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\sin(2u) = 2\sin u\cos u$$

$$\cos(2u) = \cos^2 u - \sin^2 u$$

$$\tan(2u) = \frac{2\tan u}{1 - \tan^2 u}$$

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Lessons 21-32, Covers Sections 7.6, 8.1, 8.2, and 8.3

1. Find the exact value of $\cos^{-1}\left(\frac{-\sqrt{3}}{2}\right)$

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

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

   C. $\frac{-5\pi}{6}$

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

   E. None of the above

2. Find the exact value of $\arcsin\left(\sin\frac{4\pi}{3}\right)$.

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

   B. $\frac{2\pi}{3}$

   C. $\frac{-\pi}{3}$

   D. $\frac{5\pi}{3}$

   E. $\frac{4\pi}{3}$ (Not the answer! Do not pick this.)

3. Find the solutions of the equation $5\tan^2 t + 3\tan t - 9 = 0$ in the interval $\left(\frac{-\pi}{2}, \frac{\pi}{2}\right)$.

   Round to nearest 0.0001 radians. **Check the mode on your calculator!**

   A. $-1.0325, 0.8214$

   B. $-1.7266, 0.9266$

   C. $-1.0458, 0.7473$

   D. $-1.6748, 1.0748$

   E. None of the above

4. Find the perimeter of $\triangle ABC$, given angle $\gamma = 82°$, side $b = 36$, and side $c = 63$. Round to the nearest whole number. **Check the mode on your calculator!**

   A. 136

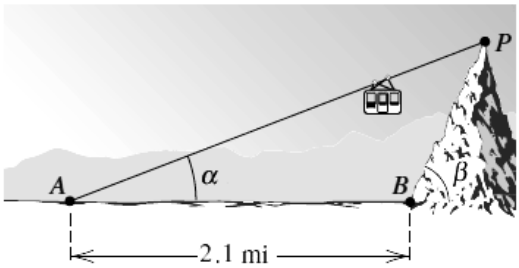
   B. 129

   C. 161

   D. 156

   E. None of the above

5. As shown in the figure below, a cable car carries passengers from a point *A*, which is 2.1 miles from a point *B* at the base of a mountain, to a point *P* at the top of the mountain. The angles of elevation of *P* from *A* and *B* are $\alpha = 31°$ and $\beta = 65°$, respectively. Find the distance from Point A to Point P to the nearest tenth of a mile.



   A. 3.2 miles

   B. 3.0 miles

   C. 3.6 miles

   D. 3.4 miles

   E. None of the above

6. A triangular plot of land has sides of lengths 450 feet, 390 feet, and 280 feet. Approximate the smallest angle between the sides to one decimal place.

   A. 27.9°

   B. 38.1°

   C. 23.4°

   D. 32.7°

   E. None of the above

7. A ship leaves port at 1:00 pm and sails in the direction N40°E at a rate of 50 mph. At 2:00 pm a second ship leaves the same port and sails in the direction N35°W at a rate of 25 mph. To the nearest mile, how far apart are the two ships at 4:00 pm?

   A. 163 miles

   B. 170 miles

   C. 145 miles

   D. 158 miles

   E. None of the above

8. Given $a = \langle 5, -7 \rangle$ and $b = \langle 6, 3 \rangle$, find $4a + 5b$.

   A. $\langle 50, -13 \rangle$

   B. $\langle -10, -43 \rangle$

   C. $\langle 10, -43 \rangle$

   D. $\langle -50, 13 \rangle$

   E. None of the above

9. The vectors *a* and *b* represent two forces acting at the same point, and θ is the smallest positive angle between *a* and *b*. Approximate the magnitude of the resultant force to one decimal place.

$$\|a\| = 8.2\,lb, \qquad \|b\| = 12.5\,lb, \qquad \theta = 60°$$

   A. $\|r\| = 11.0\ lb$

   B. $\|r\| = 18.1\ lb$

   C. $\|r\| = 14.7\ lb$

   D. $\|r\| = 17.3\ lb$

   E. None of the above

10. Find a vector that has the same direction as $5i-8j$ and 6 times the magnitude.

A. $\frac{-30}{\sqrt{89}}i+\frac{48}{\sqrt{89}}j$

B. $-30i+48j$

C. $\frac{30}{\sqrt{89}}i-\frac{48}{\sqrt{89}}j$

D. $30i-48j$

E. None of the above

11. Find side a of ΔABC given $\alpha=40°$, $b=10$, and $c=20$.
Round to one decimal place.

A. 13.5

B. 13.9

C. 14.4

D. 14.8

E. None of the above

For Questions 12 and 13, use vector $a=\langle 7,13\rangle$ and round to one decimal place.

12. What is the magnitude of vector a?

A. $\|a\|=14.8$

B. $\|a\|=14.5$

C. $\|a\|=15.1$

D. $\|a\|=15.4$

E. None of the above

13. What is the smallest positive angle, θ, between the positive x-axis and vector a?

A. $\theta=28.3°$

B $\theta=36.4°$

C. $\theta=61.7°$

D. $\theta=72.5°$

E. None of the above

Questions 14 and 15: An airplane with an airspeed of 510 mph is flying in the direction 150° and a 63 mph wind is blowing in the direction of 80°.

14. What is the ground speed of the plane? Round to the nearest whole number.

A. $535\,mph$

B. $476\,mph$

C. $549\,mph$

D. $498\,mph$

E. None of the above

15. What is the true course of the plane? Round to the nearest whole degree.

A. 135°

B. 141°

C. 138°

D. 144°

E. None of the above

Questions	Answers	Letters
1.	$\frac{5\pi}{6}$	B
2.	$\frac{-\pi}{3}$	C
3.	$-1.0325, 0.8214$	A
4.	156	D
5.	3.4 miles	D
6.	$38.1°$	B
7.	145 miles	C
8.	$\langle 50, -13 \rangle$	A
9.	$\|r\| = 18.1\ lb$	B
10.	$30i - 48j$	D
11.	13.9	B
12.	$\|a\| = 14.8$	A
13.	$\theta = 61.7°$	C
14.	$535\ mph$	A
15.	$144°$	D