

Student Solutions

Solutions are shown in detail. The student may use canceling and other shortcuts as long as the answers match. If you see an error, see online solutions mentioned on page 14.

Lesson 1A

- $\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{5}{5\sqrt{2}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$
- $\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{5}{5\sqrt{2}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$
- $\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{5}{5} = 1$
- $\sin \alpha = \frac{\text{opp}}{\text{hyp}} = \frac{5}{5\sqrt{2}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$
- $\cos \alpha = \frac{\text{adj}}{\text{hyp}} = \frac{5}{5\sqrt{2}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$
- $\tan \alpha = \frac{\text{opp}}{\text{adj}} = \frac{5}{5} = 1$
- $\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{13}{26} = \frac{1}{2}$
- $\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{13\sqrt{3}}{26} = \frac{\sqrt{3}}{2}$
- $\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{13}{13\sqrt{3}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$
- $\sin \alpha = \frac{\text{opp}}{\text{hyp}} = \frac{13\sqrt{3}}{26} = \frac{\sqrt{3}}{2}$
- $\cos \alpha = \frac{\text{adj}}{\text{hyp}} = \frac{13}{26} = \frac{1}{2}$
- $\tan \alpha = \frac{\text{opp}}{\text{adj}} = \frac{13\sqrt{3}}{13} = \frac{\sqrt{3}}{1} = \sqrt{3}$
- $\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{7}{\sqrt{130}} = \frac{7\sqrt{130}}{130}$
- $\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{9}{\sqrt{130}} = \frac{9\sqrt{130}}{130}$
- $\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{7}{9}$
- $\sin \alpha = \frac{\text{opp}}{\text{hyp}} = \frac{9}{\sqrt{130}} = \frac{9\sqrt{130}}{130}$
- $\cos \alpha = \frac{\text{adj}}{\text{hyp}} = \frac{7}{\sqrt{130}} = \frac{7\sqrt{130}}{130}$

- $\tan \alpha = \frac{\text{opp}}{\text{adj}} = \frac{9}{7}$
- $\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{\sqrt{203}}{18}$
- $\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{11}{18}$
- $\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{\sqrt{203}}{11}$
- $\sin \alpha = \frac{\text{opp}}{\text{hyp}} = \frac{11}{18}$
- $\cos \alpha = \frac{\text{adj}}{\text{hyp}} = \frac{\sqrt{203}}{18}$
- $\tan \alpha = \frac{\text{opp}}{\text{adj}} = \frac{11}{\sqrt{203}} = \frac{11\sqrt{203}}{203}$

Lesson 1B

- $\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{30}{50} = \frac{3}{5}$
- $\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{40}{50} = \frac{4}{5}$
- $\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{30}{40} = \frac{3}{4}$
- $\sin \alpha = \frac{\text{opp}}{\text{hyp}} = \frac{40}{50} = \frac{4}{5}$
- $\cos \alpha = \frac{\text{adj}}{\text{hyp}} = \frac{30}{50} = \frac{3}{5}$
- $\tan \alpha = \frac{\text{opp}}{\text{adj}} = \frac{40}{30} = \frac{4}{3}$
- $\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{A}{C}$
- $\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{B}{C}$
- $\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{A}{B}$
- $\sin \alpha = \frac{\text{opp}}{\text{hyp}} = \frac{B}{C}$
- $\cos \alpha = \frac{\text{adj}}{\text{hyp}} = \frac{A}{C}$
- $\tan \alpha = \frac{\text{opp}}{\text{adj}} = \frac{B}{A}$

This lesson is redundant and superfluous.

13. $\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{3.5}{12.5} = \frac{7}{25}$
14. $\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{12}{12.5} = \frac{24}{25}$
15. $\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{3.5}{12} = \frac{7}{24}$
16. $\sin \alpha = \frac{\text{opp}}{\text{hyp}} = \frac{12}{12.5} = \frac{24}{25}$
17. $\cos \alpha = \frac{\text{adj}}{\text{hyp}} = \frac{3.5}{12.5} = \frac{7}{25}$
18. $\tan \alpha = \frac{\text{opp}}{\text{adj}} = \frac{12}{3.5} = \frac{24}{7}$
19. $\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{4}{9}$
20. $\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{8.5}{9} = \frac{17}{18}$
21. $\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{4}{8.5} = \frac{8}{17}$
22. $\sin \alpha = \frac{\text{opp}}{\text{hyp}} = \frac{8.5}{9} = \frac{17}{18}$
23. $\cos \alpha = \frac{\text{adj}}{\text{hyp}} = \frac{4}{9}$
24. $\tan \alpha = \frac{\text{opp}}{\text{adj}} = \frac{8.5}{9} = \frac{17}{18}$

10. $\sin \alpha = \frac{\text{opp}}{\text{hyp}} = \frac{6}{13.4} = \frac{60}{134} = \frac{30}{67}$
11. $\cos \alpha = \frac{\text{adj}}{\text{hyp}} = \frac{12}{13.4} = \frac{120}{134} = \frac{60}{67}$
12. $\tan \alpha = \frac{\text{opp}}{\text{adj}} = \frac{6}{12} = \frac{1}{2}$
13. $\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{13.6}{15} = \frac{136}{150} = \frac{68}{75}$
14. $\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{6.4}{15} = \frac{64}{150} = \frac{32}{75}$
15. $\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{13.6}{6.4} = \frac{136}{64} = \frac{17}{8}$
16. $\sin \alpha = \frac{\text{opp}}{\text{hyp}} = \frac{6.4}{15} = \frac{64}{150} = \frac{32}{75}$
17. $\cos \alpha = \frac{\text{adj}}{\text{hyp}} = \frac{13.6}{15} = \frac{136}{150} = \frac{68}{75}$
18. $\tan \alpha = \frac{\text{opp}}{\text{adj}} = \frac{6.4}{13.6} = \frac{64}{136} = \frac{8}{17}$
19. $\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{X}{2X} = \frac{1}{2}$
20. $\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{X\sqrt{3}}{2X} = \frac{\sqrt{3}}{2}$
21. $\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{X}{X\sqrt{3}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$
22. $\sin \alpha = \frac{\text{opp}}{\text{hyp}} = \frac{X\sqrt{3}}{2X} = \frac{\sqrt{3}}{2}$
23. $\cos \alpha = \frac{\text{adj}}{\text{hyp}} = \frac{X}{2X} = \frac{1}{2}$
24. $\tan \alpha = \frac{\text{opp}}{\text{adj}} = \frac{X\sqrt{3}}{X} = \sqrt{3}$

Lesson 1C

1. $\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{8}{12.8} = \frac{80}{128} = \frac{5}{8}$
2. $\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{10}{12.8} = \frac{5}{6.4} = \frac{50}{64} = \frac{25}{32}$
3. $\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{8}{10} = \frac{4}{5}$
4. $\sin \alpha = \frac{\text{opp}}{\text{hyp}} = \frac{10}{12.8} = \frac{5}{6.4} = \frac{50}{64} = \frac{25}{32}$
5. $\cos \alpha = \frac{\text{adj}}{\text{hyp}} = \frac{8}{12.8} = \frac{80}{128} = \frac{5}{8}$
6. $\tan \alpha = \frac{\text{opp}}{\text{adj}} = \frac{10}{8} = \frac{5}{4}$
7. $\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{12}{13.4} = \frac{120}{134} = \frac{60}{67}$
8. $\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{6}{13.4} = \frac{60}{134} = \frac{30}{67}$
9. $\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{12}{6} = 2$

Lesson 2A

1. $6^2 + 9^2 = H^2$
 $36 + 81 = H^2$
 $117 = H^2$
 $H \approx 10.82$
- $\sin \theta = \frac{6}{10.82} \approx .5545$
 $\cos \theta = \frac{9}{10.82} \approx .8318$
 $\tan \theta = \frac{6}{9} \approx .6667$
 $\csc \theta = \frac{10.82}{6} \approx 1.8033$
 $\sec \theta = \frac{10.82}{9} \approx 1.2022$
 $\cot \theta = \frac{9}{6} \approx 1.5000$