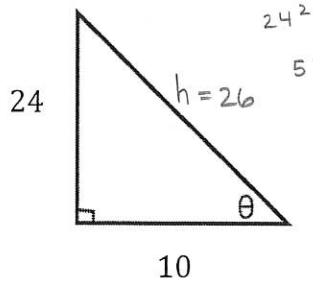
Honors Math II
Unit 9 day 1 ws
Trig ratios / special right triangles

Name Key
Period_____ Date_____

Evaluate the six trigonometric functions of the angle θ.

1.



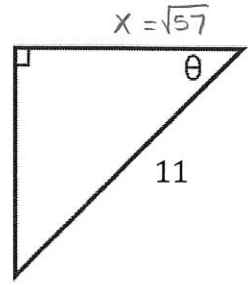
$24^2 + 10^2 = h^2$
$576 + 100 = h^2$
$h^2 = 676$
$h = 26$

$\sin\theta = \frac{24}{26} = \frac{12}{13}$ $\csc\theta = \frac{13}{12}$

$\cos\theta = \frac{10}{26} = \frac{5}{13}$ $\sec\theta = \frac{13}{5}$

$\tan\theta = \frac{24}{10} = \frac{12}{5}$ $\cot\theta = \frac{5}{12}$

2.



$x^2 + 8^2 = 11^2$
$x^2 = 121 - 64$
$x^2 = 57$
$x = \sqrt{57}$

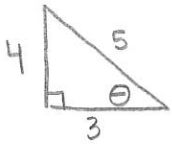
$\sin\theta = \frac{8}{11}$ $\csc\theta = \frac{11}{8}$

$\cos\theta = \frac{\sqrt{57}}{11}$ $\sec\theta = \frac{11\sqrt{57}}{57}$

$\tan\theta = \frac{8}{\sqrt{57}} = \frac{8\sqrt{57}}{57}$ $\cot\theta = \frac{\sqrt{57}}{8}$

Let θ be an acute angle of a right triangle. Find the values of the other five trigonometric functions of θ.

3. $\sin\theta = \frac{4}{5}$ $\frac{\text{opp}}{\text{hyp}}$

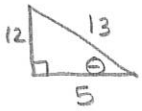


$\csc\theta = \frac{5}{4}$

$\cos\theta = \frac{3}{5}$ $\sec\theta = \frac{5}{3}$

$\tan\theta = \frac{4}{3}$ $\cot\theta = \frac{3}{4}$

4. $\cos\theta = \frac{5}{13}$ $\frac{\text{adj}}{\text{hyp}}$

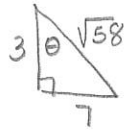


$\sin\theta = \frac{12}{13}$ $\csc\theta = \frac{13}{12}$

$\sec\theta = 13/5$

$\tan\theta = \frac{12}{5}$ $\cot\theta = 5/12$

5. $\tan\theta = \frac{7}{3}$ $\frac{\text{opp}}{\text{adj}}$



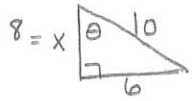
$3^2 + 7^2 = h^2$
$h = \sqrt{58}$

$\sin\theta = \frac{7}{\sqrt{58}} = \frac{7\sqrt{58}}{58}$ $\csc\theta = \frac{\sqrt{58}}{7}$

$\cos\theta = \frac{3}{\sqrt{58}} = \frac{3\sqrt{58}}{58}$ $\sec\theta = \frac{\sqrt{58}}{3}$

$\cot\theta = \frac{3}{7}$

6. $\csc\theta = \frac{10}{6}$ $\frac{\text{hyp}}{\text{opp}}$



$x^2 + 6^2 = 10^2$
$x^2 = 64$
$x = 8$

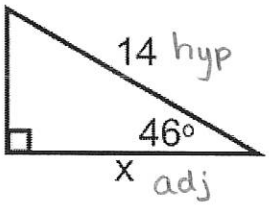
$\sin\theta = \frac{6}{10} = \frac{3}{5}$ $\sec\theta = \frac{5}{4}$

$\cos\theta = \frac{8}{10} = \frac{4}{5}$ $\cot\theta = \frac{4}{3}$

$\tan\theta = 6/8 = 3/4$

Find x. Round to the nearest hundredth.

7.

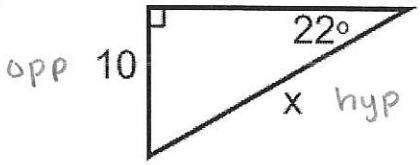


$\cos 46° = \frac{x}{14}$

$14\cos 46° = x$

$x = 9.73$

8.



$\sin 22° = \frac{10}{x}$

$x = \frac{10}{\sin 22°} = 26.69$

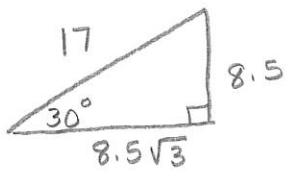
9. In a 45° - 45° - 90° triangle, the ratio of the length of the hypotenuse to the length of a side is:

$\sqrt{2} : 1$ or $\frac{\sqrt{2}}{1}$

10. In a 30° - 60° - 90° triangle, the ratio of the length of the hypotenuse to the length of the shorter side is:

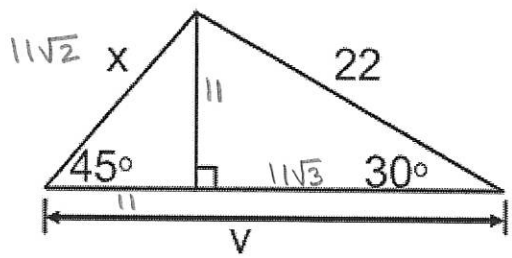
$2 : 1$ or $\frac{2}{1}$

11. The shorter leg of a 30° - 60° - 90° triangle is 8.5 feet long. Find the perimeter.



$17 + 8.5 + 8.5\sqrt{3} \approx 40.2$ ft

12. Find the value of x and y.

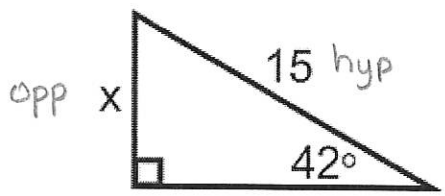


$x = 11\sqrt{2}$

$V = 11 + 11\sqrt{3}$

Find x. Round to the nearest hundredth.

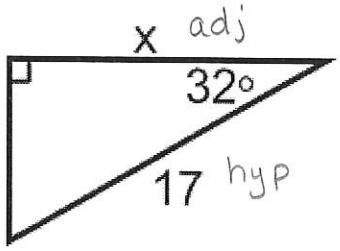
13.



$\sin 42° = \frac{x}{15}$

$x = 15 \sin 42° = 10.04$

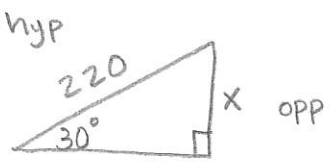
14.



$\cos 32° = \frac{x}{17}$

$x = 17 \cos 32° = 14.42$

15. A 220 ft string attached to a kite makes a 30° angle with the ground. What is the height of the kite to the nearest tenth?

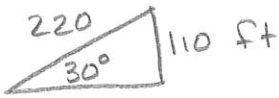


$\sin 30° = \frac{x}{220}$

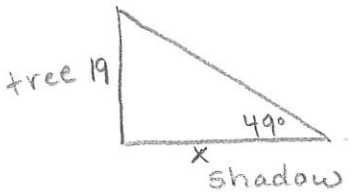
$220 \sin 30° = x$

$x = 110$ ft

or use special △ patterns



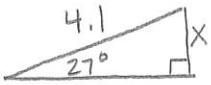
16. A tree 19 feet tall casts a shadow which forms an angle of 49° with the ground. How long is the shadow to the nearest hundredth?



$\tan 49° = \frac{19}{x}$

$x = \frac{19}{\tan 49°}$ $\quad x \approx 16.52$ ft.

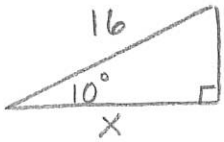
17. A slide 4.1 m long makes an angle of 27° with the ground. How high is the top of the slide above the ground?



$\sin 27° = \frac{x}{4.1}$ $\quad x = 4.1 \sin 27°$

$x \approx 1.86$ m

18. Liola drives 16 km up a hill that is at a grade of 10°. What horizontal distance, to the nearest tenth of kilometer, has she covered?



$\cos 10° = \frac{x}{16}$

$x = 16 \cos 10°$ $\quad x \approx 15.8$ km

Solve for x.

19. $\frac{18}{x^2 - 3x} + \frac{-6}{x-3} = \frac{5}{x}$ $\quad x(x-3)$ $\quad x(x-3)$ $\quad x(x-3)$ $\quad x(x-3)$

$18 + -6x = 5(x-3)$

$18 - 6x = 5x - 15$
$15 + 6x \quad +6x \quad +15$

$33 = 11x$

$\cancel{x = 3}$ No solution

20. $\frac{6x}{x+4} + 4 = \frac{2x+2}{x-1}$ $\quad (x+4)(x-1)$ $\quad (x+4)(x-1)$ $\quad (x+4)(x-1)$

$6x(x-1) + 4(x+4)(x-1) = (x+4)(2x+2)$

$6x^2 - 6x + 4(x^2 + 3x - 4) = 2x^2 + 10x + 8$

$10x^2 + 6x - 16 = 2x^2 + 10x + 8$

$8x^2 - 4x - 24 = 0$

$4(2x^2 - x - 6) = 0$

$4(2x + 3)(x - 2) = 0$

$x = -3/2 \quad x = 2$

21. $\frac{9}{x^2 - 6x + 9} = \frac{3x}{x^2 - 3x}$

$(x-3)^2 \qquad x(x-3)$

$9x(x-3) = 3x(x-3)(x-3)$

$9x = 3x^2 - 9x$
$-9x \qquad -9x$

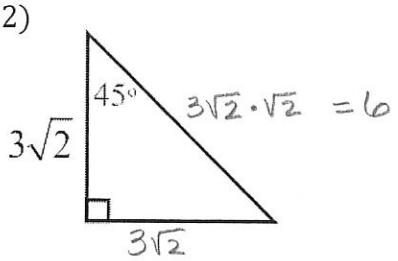
$0 = 3x^2 - 18x$

$0 = 3x(x-6)$

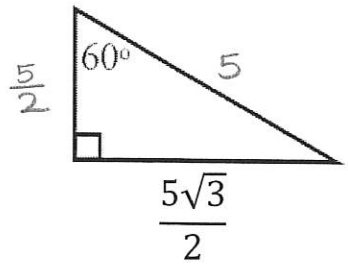
$\cancel{x = 0}$ or $x = 6$

Find the missing side lengths. Leave your answers as radicals in simplest form.

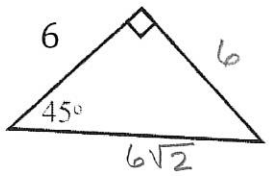
22)



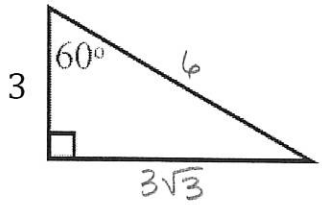
23)



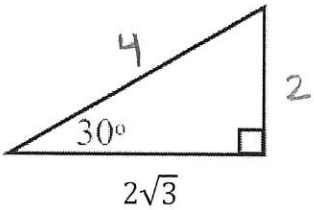
24)



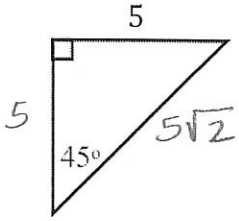
25)



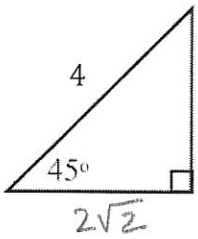
26)



27)

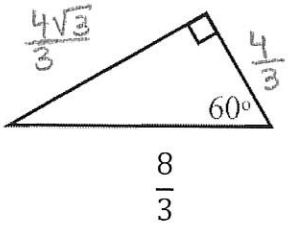


28)

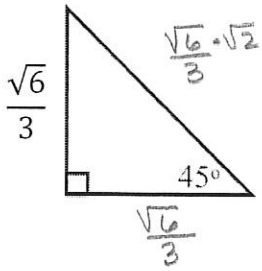


$\frac{4}{\sqrt{2}}\frac{\sqrt{2}}{\sqrt{2}} = \frac{4\sqrt{2}}{2} = 2\sqrt{2}$

29)

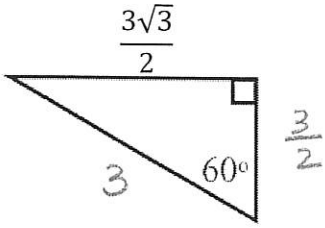


30)

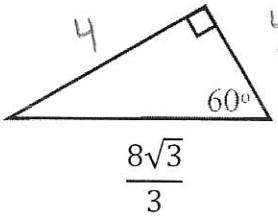


$\frac{\sqrt{6}}{3}\cdot\sqrt{2} = \frac{2\sqrt{3}}{3}$

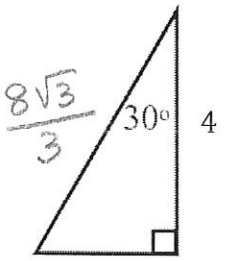
31)



32)



33)



$\frac{4}{\sqrt{3}} = \frac{4\sqrt{3}}{3}$