Name___Key___

Find the exact values of the indicated trigonometric functions. Write fractions in lowest terms.

1)
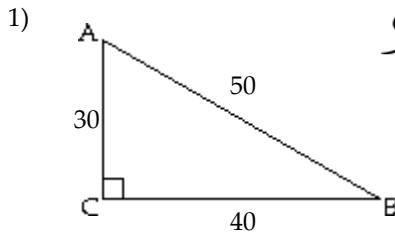
Find sin A and cos A.

$$\sin A = \frac{opp\ A}{hyp} = \frac{40}{50} = \boxed{\frac{4}{5}}$$

$$\cos A = \frac{adj\ A}{hyp} = \frac{30}{50} = \boxed{\frac{3}{5}}$$

2)
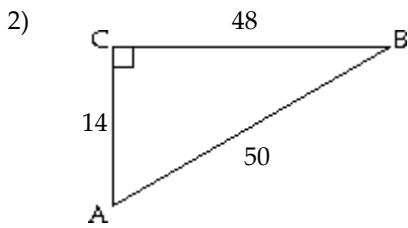
Find sin B and tan B.

$$\sin B = \frac{opp.\ B}{hyp} = \frac{14}{50} = \boxed{\frac{7}{25}}$$

Without using a calculator, give the exact trigonometric function values with rational denominators.

3) sin 30°

$$\sin 30° = \frac{side\ opp\ 30°}{hyp} = \frac{\left(\frac{x}{2}\right)}{x} = \frac{x}{2} \cdot \frac{1}{x} = \boxed{\frac{1}{2}}$$

4) cos 30°

$$\cos 30° = \frac{side\ adj\ 30°}{hyp} = \frac{\frac{x\sqrt{3}}{2}}{x} = \boxed{\frac{\sqrt{3}}{2}}$$

5) $\cos 60° = \dfrac{\frac{x}{2}}{x} = \boxed{\frac{1}{2}}$

6) $\sin 60°\quad \boxed{\dfrac{\sqrt{3}}{2}}$

7) cot 45° $\boxed{1}$

$$\frac{x}{x} =$$

8) sec 45° $\dfrac{x\sqrt{2}}{x} = \boxed{\sqrt{2}}$
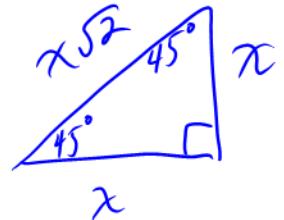
9) $\sec 30°\quad \dfrac{x}{\frac{x}{2}\sqrt{3}} = \dfrac{2}{\sqrt{3}}\left(\dfrac{\sqrt{3}}{\sqrt{3}}\right) = \boxed{\dfrac{2\sqrt{3}}{3}}$
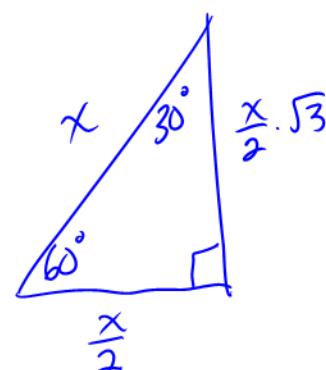
Find the length of the third side of the right triangle.

10)

15 ft, c, 20 ft
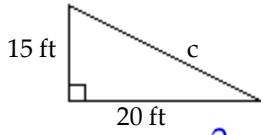
$$c^2 = 15^2 + 20^2 \implies \boxed{c = 25 \text{ ft}}$$
$$c^2 = 225 + 400$$
$$c^2 = 625$$

Write in terms of the cofunction of a complementary angle.

11) sin 20°

$$= \cos(90° - 20°)$$
$$= \boxed{\cos 70°}$$

12) cos 61°

$$= \sin(90° - 61°)$$
$$= \boxed{\sin 29°}$$

13) tan 76°

$$= \cot(90° - 76°)$$
$$= \boxed{\cot 14°}$$

Find a solution for the equation. Assume that all angles are acute angles.

14) sin(2β + 10°) = cos(3β – 25°)

$$\sin(2β + 10°) = \sin[90° - (3β - 25)]$$

equate the ∡'s since they are each inside the same trig. function

$$2β + 10° = 90° - 3β + 25°$$
$$5β = 105°$$
$$\boxed{β = 21°}$$

15) tan(3θ + 55°) = cot(θ + 9°)

$$\cot[90° - (3θ + 55°)] = \cot(θ + 9°)$$
$$90° - 3θ - 55° = θ + 9°$$
$$35° = 4θ + 9°$$
$$26° = 4θ \implies θ = \left(\frac{13}{2}\right)°$$

Decide whether the statement is true or false.

16) tan 19° > cot 19°

False

Without using a calculator, give the exact trigonometric function value with rational denominator.

17) cot 45°

$$= \boxed{1}$$

18) tan 60°

$$= \boxed{\sqrt{3}}$$

Solve the problem for the given information.

19) Find the equation of a line passing through the origin and making a 45° angle with the positive x–axis.

y = x, 45°, x

$$\text{slope} = \tan 45°$$
$$= 1$$
$$\text{y-int}: (0,0)$$
$$\boxed{y = x}$$

2
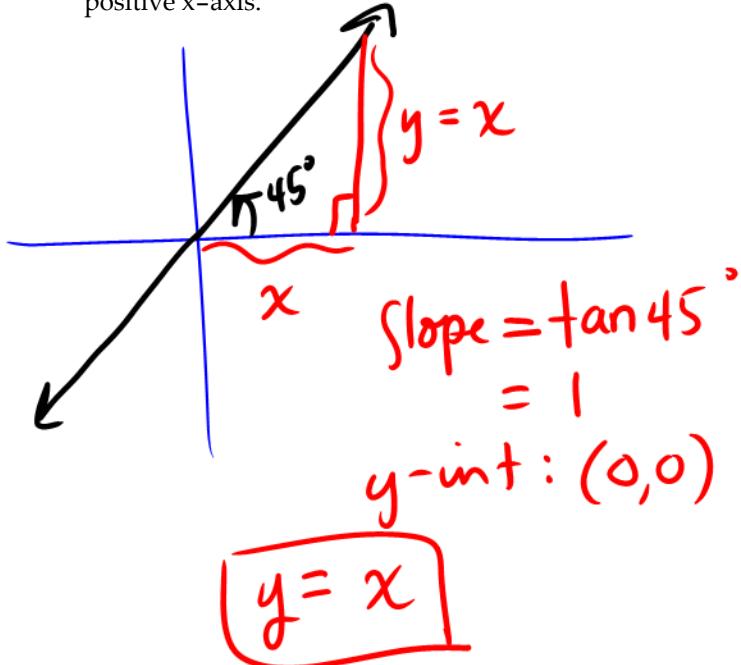
Solve the problem.

20) Find the exact value of x in the figure.

$2x$ — 30° / 45° / $x\sqrt{3}$ / 16 / 60° / x / 45° / 16
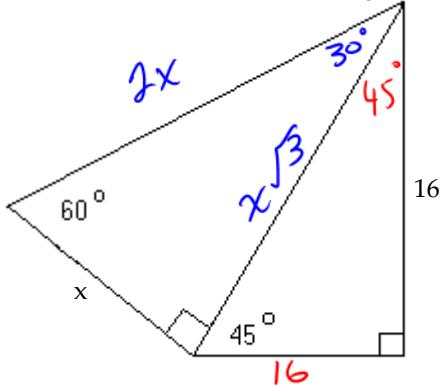
$$x\sqrt{3} = 16\sqrt{2}$$
$$x = \frac{16\sqrt{2}}{\sqrt{3}} = \boxed{\frac{16\sqrt{6}}{3}}$$

21) Find a formula for the area of the figure in terms of s.

60° / s / 30° / $s\sqrt{3}$
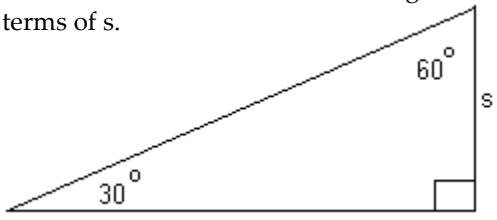
$$A = \tfrac{1}{2}bh$$

$$h = s$$
$$b = s\sqrt{3} \implies A = \tfrac{1}{2}\left(s\sqrt{3}\right)(s)$$
$$\boxed{A = \frac{s^2\sqrt{3}}{2}}$$

Find the reference angle for the given angle.

22) A = −15.9°

−15.9°

$$= \boxed{15.9°}$$

23) A = 263.4°

263.4°

$$\begin{array}{r}263.4°\\-180°\\\hline\boxed{83.4°}\end{array}$$

3
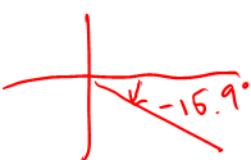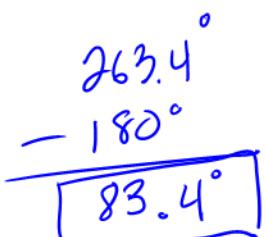
Find the exact value of the following expression without using a calculator.

24) tan (60°)

$$\frac{\sin 60°}{\cos 60°} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \boxed{\sqrt{3}}$$

25) cot (60°)

$$\frac{\cos 60°}{\sin 60°} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}}\frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{\sqrt{3}}{3}}$$

26) sec (30°)

$$\frac{1}{\cos 30°} = \frac{1}{\frac{\sqrt{3}}{2}} = \frac{2}{\sqrt{3}}\frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{2\sqrt{3}}{3}}$$

27) sec (45°)

$$\frac{1}{\cos 45°} = \frac{1}{\frac{1}{\sqrt{2}}} = \boxed{\sqrt{2}}$$

Find the exact function value if it exists.

28) tan 300° $= -\tan 60° = -\dfrac{\sin 60°}{\cos 60°}$

$$= -\frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}}$$
$$= \boxed{-\sqrt{3}}$$

29) tan 150°

150° / 30°

$$= -\tan 30° = -\frac{\sin 30°}{\cos 30°}$$
$$= -\frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}}$$
$$= \boxed{-\frac{\sqrt{3}}{3}}$$

30) cos 90°

$= \frac{0}{r} = \boxed{0}$

$y = r$

$x = 0$

31) sin 210° $= -\sin 30° = \boxed{-\frac{1}{2}}$
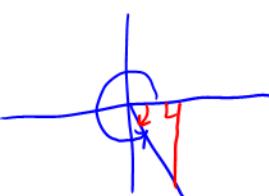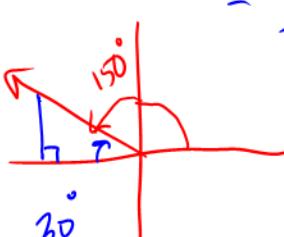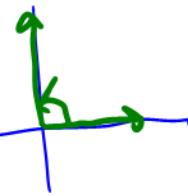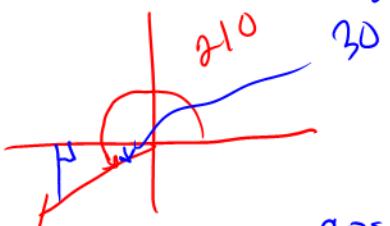
32) cot 120° $= \frac{\cos 120°}{\sin 120°} = -\frac{\cos 60°}{\sin 60°}$

$= \boxed{-\frac{1}{2}}$

33) sec (−210°)

$= \frac{1}{\cos(-210°)}$

$= -\frac{1}{\cos 30°} = -\frac{1}{\frac{\sqrt{3}}{2}} = -\frac{2}{\sqrt{3}} = \boxed{-\frac{2\sqrt{3}}{3}}$
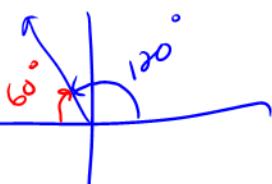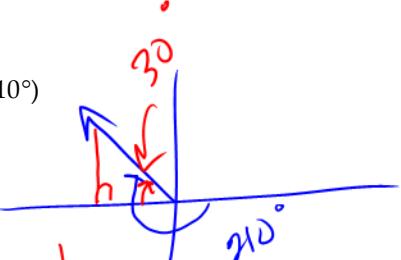
Find the exact function value.

34) tan −315°

$= \tan 45° = \boxed{1}$

−315° coterminal
with 45°

35) sin 1110°

1110° coterminal with 30°

$\sin 1110° = \sin 30°$

$= \boxed{\frac{1}{2}}$

Determine whether the statement is true or false.

36) cos 240° = 1 − sin²120°

RHS: $1 - \sin^2 120° = \cos^2 120° = \left(-\frac{1}{2}\right)^2 = \frac{1}{4}$

$\neq \cos 240° = -\frac{1}{2}$

false

Give the signs of the trigonometric functions.

37) cos (−302°) and sin (−302°)

positive
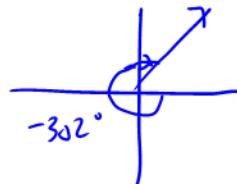
Find all values of θ, if θ is in the interval [0, 360°) and has the given function value.

38) $\cos \theta = \frac{1}{2}$

cosine >0 in QI
QIV

$\cos \theta = \frac{x}{r}$

$\boxed{\theta = 60°, 300°}$

short side

39) $\sin \theta = -\frac{1}{2}$ 30° ref ∡

y values
negative in
QIII, QIV
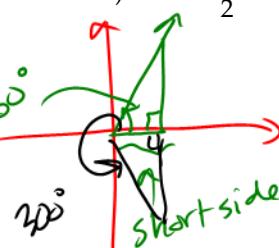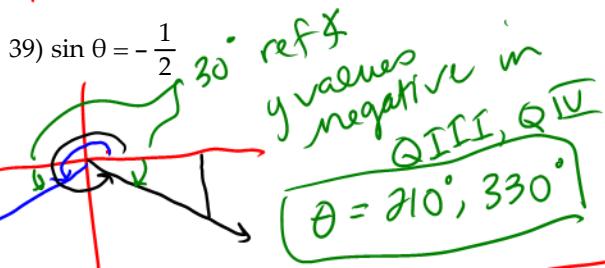
$\boxed{\theta = 210°, 330°}$

40) sec θ is undefined $\Rightarrow \boxed{\theta = 90°, 270°}$

$\sec \theta = \frac{r}{x}$

when x=0, sec θ is
undefined
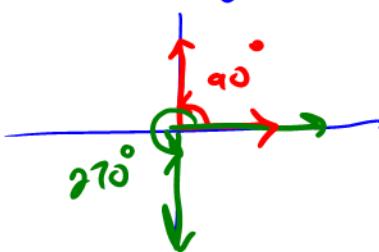
no left−right
movement
at 90°, 270°

4

1) $\sin A = \frac{4}{5}$; $\cos A = \frac{3}{5}$

2) $\sin B = \frac{7}{25}$; $\tan B = \frac{7}{24}$

3) $\frac{1}{2}$

4) $\frac{\sqrt{3}}{2}$

5) $\frac{1}{2}$

6) $\frac{\sqrt{3}}{2}$

7) 1

8) $\sqrt{2}$

9) $\frac{2\sqrt{3}}{3}$

10) c = 25 ft

11) cos 70°

12) sin 29°

13) cot 14°

14) β = 21°

15) θ = 6.5°

16) FALSE

17) 1

18) $\sqrt{3}$

19) y = x

20) $\frac{16\sqrt{6}}{3}$

21) $\frac{\sqrt{3}}{2} s^2$

22) 15.9°

23) 83.4°

24) $\sqrt{3}$

25) $\frac{\sqrt{3}}{3}$

26) $\frac{2\sqrt{3}}{3}$

27) $\sqrt{2}$

28) $-\sqrt{3}$

29) $-\frac{\sqrt{3}}{3}$

30) 0

31) $-\frac{1}{2}$

32) $-\dfrac{\sqrt{3}}{3}$

33) $-\dfrac{2\sqrt{3}}{3}$

34) 1

35) $\dfrac{1}{2}$

36) False

37) + and +

38) 60° and 300°

39) 210° and 330°

40) 90° and 270°