Precalculus Unit 3 worksheet: Trig functions on the unit circle

Name _____ Date _____ Period _____

1. The terminal side of an angle θ in standard position passes through the given point. Find $\cos\theta$, $\sin\theta$ and $\tan\theta$ exactly, with rational denominators.

(a) $(-5, -12)$

(b) $(20, -21)$

(c) $(-15, 8)$

(d) $(-6, -4)$

(e) $(\sqrt{3}, -1)$

(f) $(0, -3)$

2. Find, to the nearest hundredth, the point where the terminal side of θ meets the circle of radius r centered at the origin. Use a calculator, in degree mode for angles in degrees and in radian mode for the others.

(a) $r = 5, \theta = 200^\circ$

(b) $r = 10, \theta = 3$

(c) $r = 6, \theta = -1.2$

(d) $r = 4, \theta = 470^\circ$

3. The terminal point of an angle θ has x-coordinate $\frac{1}{4}$ and lies below the x-axis. Find $\sin\theta$ and $\tan\theta$ exactly.

4. The terminal side of an angle θ passes through the point $(k, -24)$, and $\cos\theta = \frac{5}{13}$. Find k, $\sin\theta$ and $\tan\theta$.

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5. The terminal side of an angle θ crosses the circle of radius 17 centered at the origin at the point $(8, -15)$.

(a) Find the terminal point of θ.

(b) Find where the terminal side crosses the circle of radius 34 and the circle of radius 3, both centered at the origin.

(c) The terminal side also passes through a point with y-coordinate -45. Find that point and its distance from the origin.

6. The terminal side of an angle θ lies along the line $5x + 12y = 0$ and is below the x-axis.

(a) Find $\cos\theta$, $\sin\theta$ and $\tan\theta$.

(b) Where does the terminal side meet the circle of radius 39 centered at the origin?

(c) Where does the line containing the terminal side meet the vertical line $x = 1$?

7. The glass plate in a microwave oven turns on a round turntable. Seen from above, put the center of the plate at the origin, with lengths in centimeters. The plate has radius 15 cm and turns counterclockwise.

(a) A mug sits at the edge of the plate at (15, 0), and the plate turns 115°. Find the mug's new position to the nearest tenth of a centimeter (use a calculator).

(b) A small cup sits on the same radius as the mug, halfway between the center and the edge, and turns with the plate. Where is the cup after the same turn?

(c) The plate then turns a further 140°. Where is the mug now, to the nearest tenth of a centimeter?

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