Name:_____ Signature:_____ J. number:_____

Math 113 - 101 - Quiz 4

CALCULATORS MAY BE USED.

If you do not have a calculator you should write your solutions as the expression you would put into your calculator to obtain your final answer.
Work to 2 decimal places.

question	1	2	3	4	total
points available	3	4	5	3	15
grade					

1. Complete the table (working to 2 decimal places.):

Arc length s	Radius r	Angle θ (radians)	Angle θ (degrees)
3 ft	5ft	$\frac{3}{5}=0.6$	34.38°
75 cm	146.23	$\frac{\pi}{6}\simeq 0.52$	30°
14 in	10.40	$\frac{3\pi}{7}$	77.14

$\theta=\frac{s}{r}$

$r=\frac{s}{\theta}$

$\frac{1}{2}$ each entry

Use $\theta=\frac{s}{r}$

$1 \text{ radian} = \frac{180^\circ}{\pi}$

$1^\circ = \frac{\pi}{180}$ radians

2. The earth has a radius of 4000 miles. Given that the earth completes one revolution every 24 hours, find the linear speed of a point on the equator in miles per hour. (Work to 2 decimal places.)

$V=r\omega$ (1)

To find ω: 1 rev. per 24 hours $= 2\pi$ rad $/24$h $= \frac{2\pi}{24}$ rad/h

$\simeq 0.26$ rad/h (2)

so

$V=4000\times 0.26 \simeq 1040$ mph

or $V=\frac{4000\pi}{12}=\frac{1000\pi}{3}$ mph $\simeq 1047.20$ mph

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Here is another solution

every 24 hours the equator travels $2\pi\times 4000\times\pi = 8000\pi$ miles

So $V=\frac{s}{t}=\frac{8000\pi}{24}$ mph

3. A water wheel has radius 12 ft. A river passing through the water wheel turns it at a rate of 14 revolutions per minute.

a) Find the speed of the river in feet per minute. (Work to 2 decimal places.)

$V = r\omega$ (1)

to find ω: $14 \text{ rev} = 14 \times 2\pi$ radians

So 14 rev/min $= 28\pi$ radians/min $\simeq 87.96$ rad/min (1)

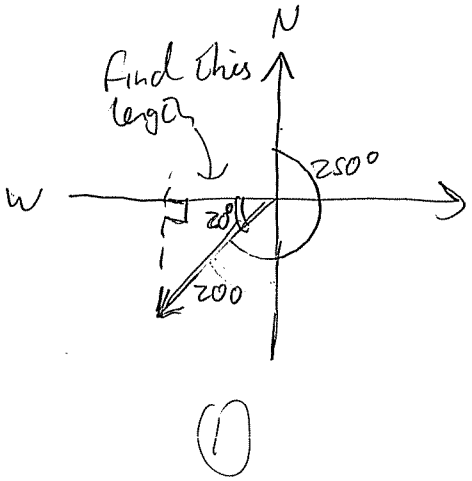
$V = r\omega = 12 \times 28\pi$ ft/min $\simeq 1055.58$ ft/min (1)

b) Given that there are 5280 feet in a mile, find the speed of the river in miles per hour.

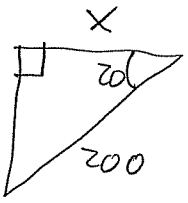
5280 ft $= 1$ mile $\Rightarrow 1$ ft $= \frac{1}{5280}$ miles $\Rightarrow 1055.58$ ft $= 0.20$ miles/m (1)

0.20 miles/min $= 60 \times 0.20$ miles/hour $= 12$ mph. (1)

4. An airplane flies 200 km from an airport in the direction of 250°. How far west of the airport is the airplane then. (In navigation degrees are measured clockwise from north.)



(1)



$\cos(20) = \frac{x}{200}$ (1)

So $x = 200\cos(20)$

$= 187.94$ km. (1)