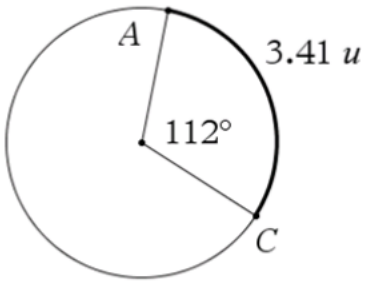
Problem 1



Determine the radius of the circle

$s = \theta r$

We know s= 3.41 units

we know angle in degrees is 112°

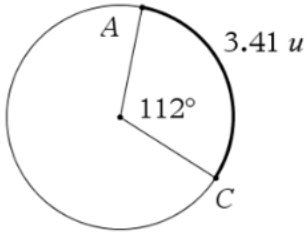
Step 1) Find θ

$\theta = 112° \cdot \frac{\pi \ radians}{180°}$

$= \frac{112}{180}\pi \text{ radians} = \frac{28}{45}\pi \text{ radians}$

Step 2) Solve for r

$3.41 = \left(\frac{112}{180}\pi\right) r$



Determine the radius of the circle

$s = \theta r$

s= 3.41 units

angle in degrees is 112°

$\theta = \frac{112}{180}\pi \text{ radians}$

Use $s = \theta r$ replace s and θ and solve for r

Step 2) Solve for r

$3.41 = \left(\frac{112}{180}\pi\right) r$

$\frac{3.41}{1} = \frac{112\pi r}{180}$

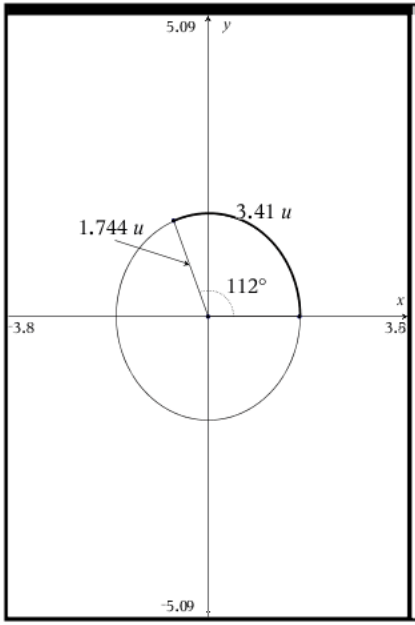
$3.41 \cdot 180 = 112\pi r$

$613.8 = 112\pi r$

$\frac{613.8}{112\pi} = \frac{112\pi r}{112\pi}$

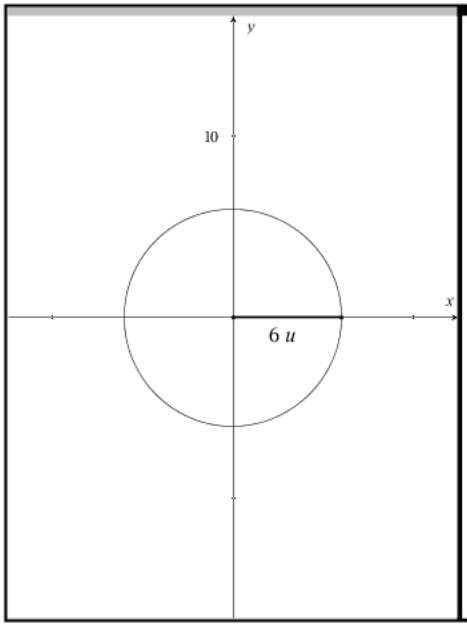
$r = \frac{613.8}{112\pi} = \frac{6138}{1120\pi} = \frac{3069}{560 \cdot \pi}$

$r \approx 1.744$ units



This drawing was created with a computer and it checks that the radius is $\frac{3069}{560 \cdot \pi} \approx 1.744$

Problem 2



Drum with a diameter of 12 meters is making 3.6 revolutions per minute

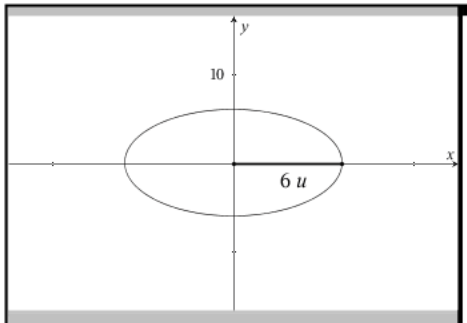
3.6 revolutions per min

$$\text{Angular speed} = \frac{3.6\ rev.}{\text{min.}} \cdot \frac{360°}{rev} = \frac{1296°}{\text{min}}$$

$$\text{Angular speed} = \frac{3.6\ rev.}{\text{min.}} \cdot \frac{2\pi}{rev} = \frac{7.2\pi\ radians}{\text{min}}$$

Note Linear Speed =(Angular speed)(radius)

$$= \frac{7.2\pi\ radians}{\text{min}} \cdot \frac{6m.}{radian} = \frac{43.2\pi\ m}{\text{min}}$$



$$\text{Angular speed} = \frac{3.6\ rev.}{\text{min.}} \cdot \frac{2\pi}{rev} = \frac{7.2\pi\ radians}{\text{min}}$$

$\theta = 7.2 \cdot \pi\ radians$ $r = \frac{12}{2} = 6$ meters

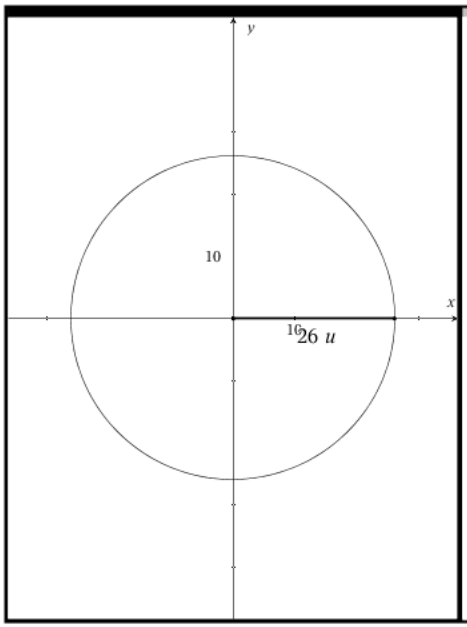
Drum with a diameter of 12 meters is making 3.6 revolutions per minute

$$\text{Linear Speed} = \frac{\theta r}{t} = \frac{7.2 \cdot \pi \cdot 6\ m.}{1\ \text{min.}} = \frac{43.2 \cdot \pi\ m.}{1\ \text{min}} \approx 135.717\ \frac{m.}{\text{min.}}$$

Now convert meters/min to meters/sec

$$\text{Linear Speed} = \frac{43.2 \cdot \pi\ m.}{1\ \text{min}} \cdot \frac{1\text{min}}{60\ \text{sec}} = \frac{43.2\pi\ m.}{60\ \text{sec}} = \frac{0.72\pi\ m.}{\text{sec}} = \frac{18\pi}{25}\ \frac{m.}{\text{sec.}} \approx 2.262\ \frac{m}{\text{sec}}$$

Problem 3



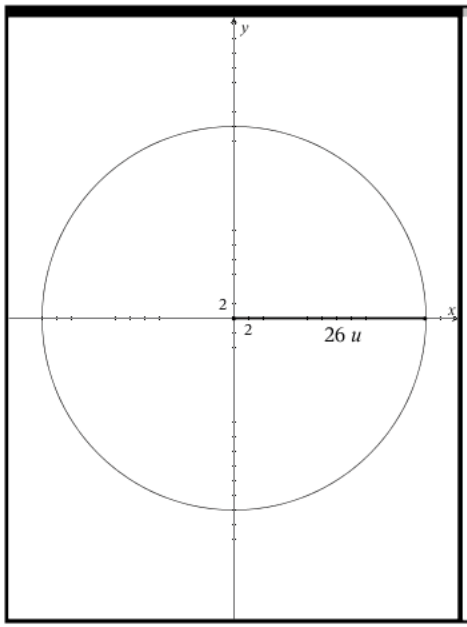
tire with a radius of 26 meters is making 4.5 revolutions per 20 seconds

4.5 revolutions per 20 seconds

$\frac{4.5}{20} = 0.225$ revolution per second

$$\text{Angular speed} = \frac{0.225\ rev.}{\text{sec.}} \cdot \frac{360°}{rev} = \frac{81°}{\text{sec}}$$

$$\text{Angular speed} = \frac{0.225\ rev.}{\text{sec.}} \cdot \frac{2\pi}{rev} = \frac{0.45\pi\ radians}{\text{sec}}$$



tire with a radius of 26 inches is making 4.5 revolutions per 20 seconds

$$\text{Angular speed} = \frac{0.225\ rev.}{\text{sec.}} \cdot \frac{2\pi}{rev} = \frac{0.45\pi\ radians}{\text{sec}} \approx 1.414\ \frac{radians}{\text{sec}}$$

Now convert radians/sec to radians/min

$$\text{Angular Speed} = \frac{0.45 \cdot \pi\ radians.}{1\ \text{sec}} \cdot \frac{60\ \text{sec}}{1\ \text{min}} = \frac{27\pi\ radians}{1\text{min}} \approx 84.823\ \frac{radians}{\text{min}}$$