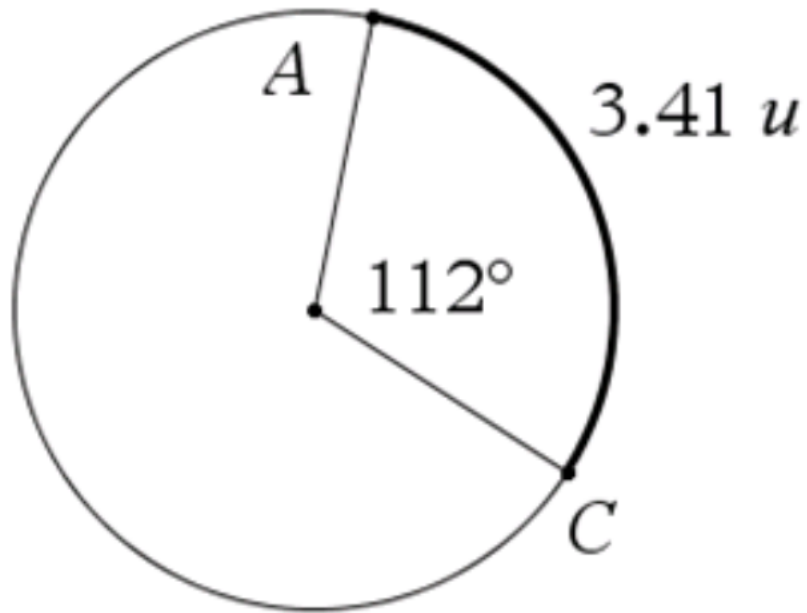Problem 1

Determine the radius of the circle

s =θr

We know s= 3.41 units

we know angle in degrees is 112°

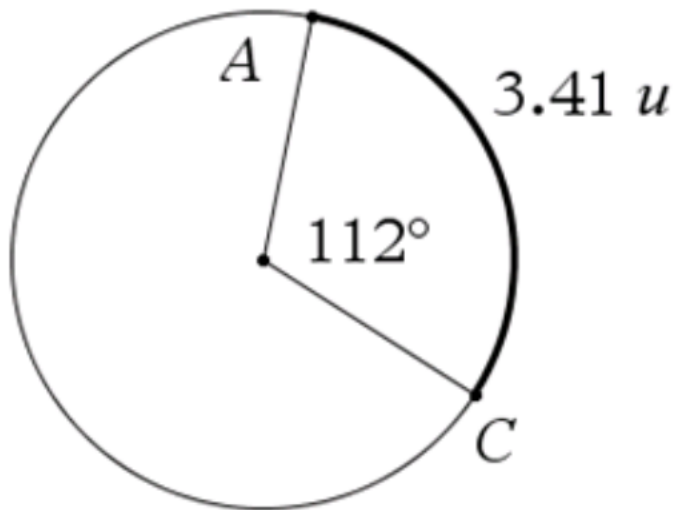Step 1) Find θ

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

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

Step 2) Solve for r

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

Determine the radius of the circle

s =θr

s= 3.41 units

angle in degrees is 112°

$\theta = \dfrac{112}{180}\pi$ radians

Use s =θr replace s and θ and solve for r

Step 2) Solve for r

$$3.41 = \left(\dfrac{112}{180}\pi\right)r$$
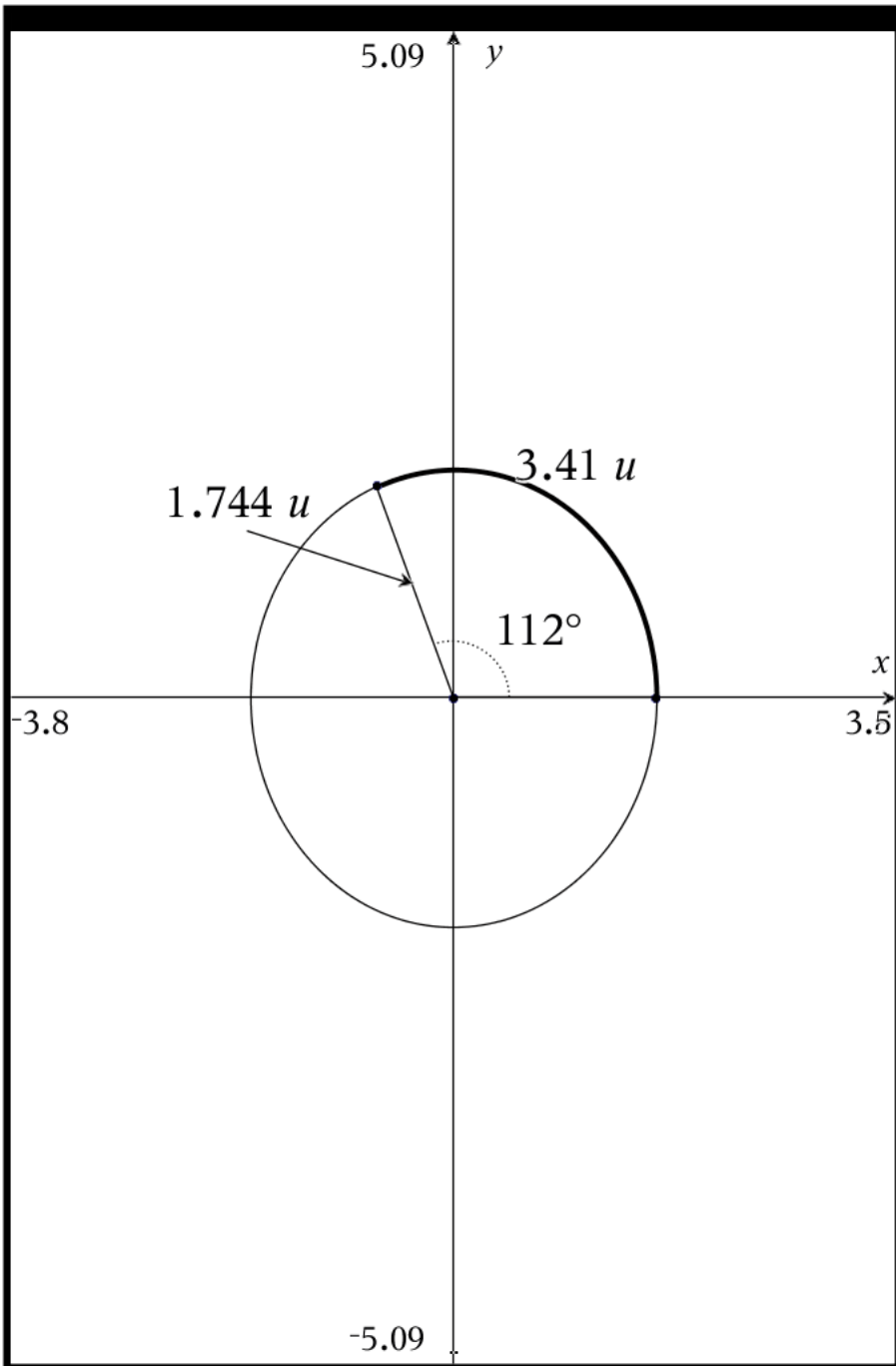
$$\dfrac{3.41}{1} = \dfrac{112\pi r}{180}$$

$$3.41 \cdot 180 = 112\pi r$$

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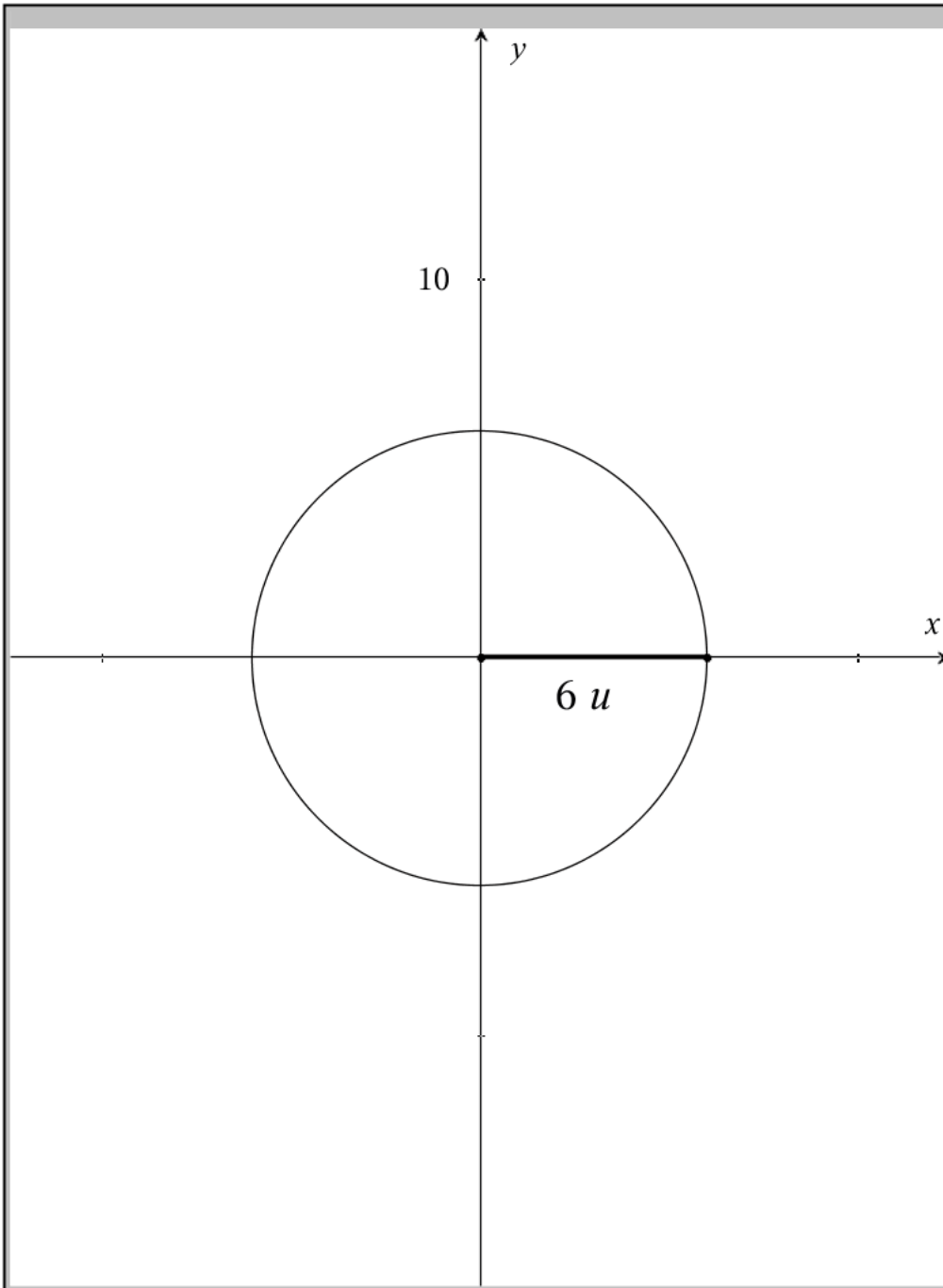
$$\dfrac{613.8}{112\pi} = \dfrac{112\pi r}{112\pi}$$

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

r≈1.744 units

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

Graph labels: 5.09, y, 3.41 u, 1.744 u, 112°, x, -3.8, 3.5, -5.09

Problem 2

y

10

x

6 *u*

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

3.6 revolutions per min

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

$$= \frac{1296°}{min}$$

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

$$= \frac{7.2\pi \ radians}{min}$$

Note Linear Speed =(Angular speed)(radius)

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

$$= \frac{43.2\pi \ m}{min}$$

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

Linear Speed $= \dfrac{\theta r}{t} = \dfrac{7.2 \cdot \pi \cdot 6\ m.}{1\ min.}$

$= \dfrac{43.2 \cdot \pi\ m.}{1\ min}$

$\approx 135.717\ \dfrac{m.}{min.}$

Now convert meters/min to meters/sec

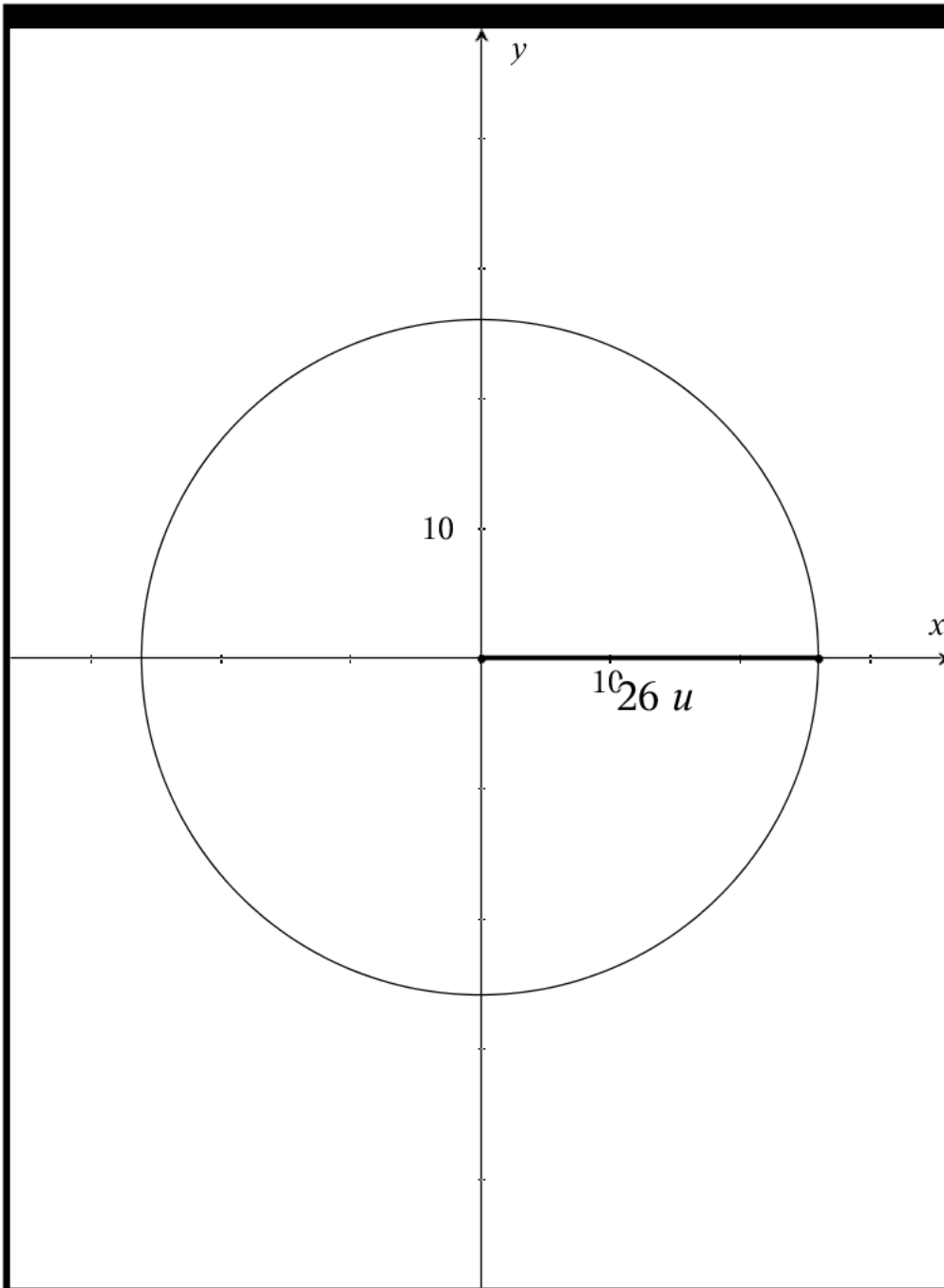Linear Speed $= \dfrac{43.2 \cdot \pi\ m.}{1\ min} \cdot \dfrac{1\ min}{60\ sec}$

$= \dfrac{43.2\pi\ m.}{60\ sec} = \dfrac{0.72\pi\ m.}{sec}$

$= \dfrac{18\pi}{25}\ \dfrac{m.}{sec.}$

$\approx 2.262\ \dfrac{m}{sec}$

10

6 u

Angular speed $= \dfrac{3.6\ rev.}{min.} \cdot \dfrac{2\pi}{rev}$

$= \dfrac{7.2\pi\ radians}{min}$

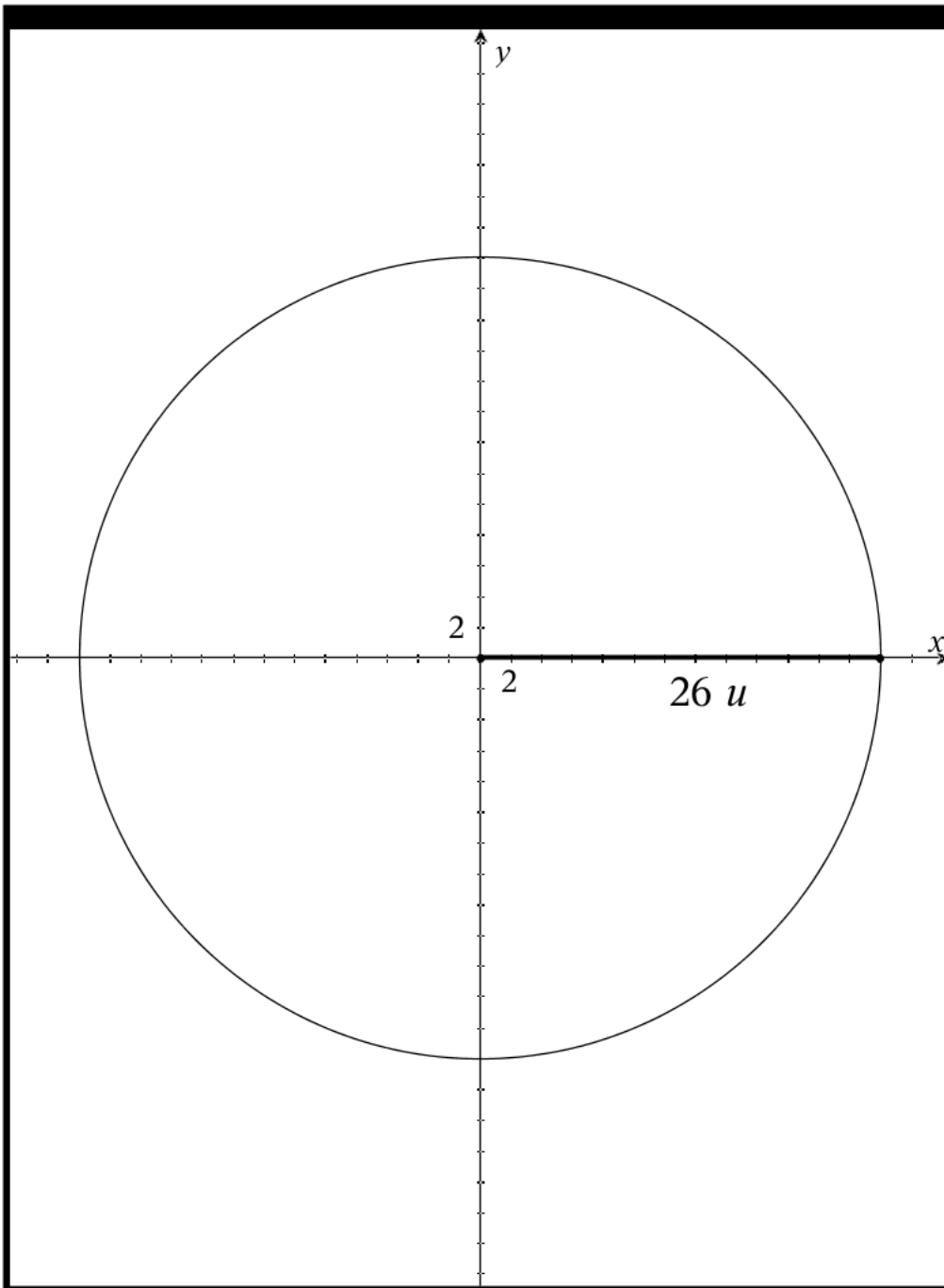$\theta = 7.2 \cdot \pi\ radians \quad r = \dfrac{12}{2} = 6\ meters$

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

4.5 revolutions per 20 seconds

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

Angular speed $= \dfrac{0.225 \; rev.}{sec.} \cdot \dfrac{360°}{rev}$

$$= \frac{81°}{sec}$$

Angular speed $= \dfrac{0.225 \; rev.}{sec.} \cdot \dfrac{2\pi}{rev}$

$$= \frac{0.45\pi \; radians}{sec}$$

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

Angular speed $= \dfrac{0.225 \ rev.}{sec.} \cdot \dfrac{2\pi}{rev}$

$= \dfrac{0.45\pi \ radians}{sec}$

$\approx 1.414 \ \dfrac{radians}{sec}$

Now convert radians/sec to radians/min

Angular Speed $= \dfrac{0.45 \cdot \pi \ radians.}{1 \ sec} \cdot \dfrac{60 \ sec}{1 \ min}$

$= \dfrac{27\pi \ radians}{1 min}$

$\approx 84.823 \ \dfrac{radians}{min}$