Historic Bicycle

This problem gives you the chance to:
- work with the circumference of a circle

The circumference of a circle, \( C = \pi d \), where \( d \) is the diameter

Basil saw a strange old bicycle at the museum.
It had one very big wheel and one very small one.
It was called an ‘Ordinary’ or a ‘Penny Farthing’.

At home Basil looked it up on the internet and found that:

the big wheel could have a 52 inch diameter and
the small wheel could have an 18 inch diameter.

1. What is the circumference of the big wheel?
   Show how you figured it out.

   \[
   C = \pi d \\
   C = \pi (52) \\
   C = 163.28
   \]

   \( 163.28 \) inches

2. How far would you travel in one turn of the big wheel?
   Give your answer in feet and inches.
   Show how you figured it out.

   \[
   \begin{align*}
   163.28 & \div 12 = 13.606 \\
   12 \times 163.28 & = 1959.36 \\
   1959.36 - 156 & = 1803.36 \\
   \end{align*}
   \]

   13 feet 7 inches

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3. How many times must the cyclist turn the big wheel to travel 1 mile?  
(A mile is 1760 yards.) 
Give your answer to the nearest 10 turns. 
Show how you figured it out.

\[
\frac{4.535}{3.13606} \quad \text{about 5 yards}
\]

\[
4.535 \div 1760
\]

391.1 turns

4. How many times does the small wheel turn when the cycle travels 1 mile? 
Give your answer to the nearest 10 turns. 
Show how you figured it out.

\[
c = \pi d
\]

\[
c = \pi (18)
\]

\[
\frac{4.78 \text{ ft.}}{12} \div \frac{56.52 \text{ in}}{\pi} \quad \frac{1.52 \text{ yds}}{3} \quad \frac{4.21}{1}
\]

1,121 turns
Historic Bicycle

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At home Basil looked it up on the internet and found that:

- the big wheel could have a 52 inch diameter and
- the small wheel could have an 18 inch diameter.

1. What is the circumference of the big wheel?
   Show how you figured it out.

   \[ \pi \times 52 = 163.28 \text{ inches} \]
   \[ \pi \times 18 = 56.52 \]

2. How far would you travel in one turn of the big wheel?
   Give your answer in feet and inches.
   Show how you figured it out.

   \[ rac{1}{12} \times 163.28 = 13 \text{ feet} \ 6 \text{ inches} \]
3. How many times must the cyclist turn the big wheel to travel 1 mile? (A mile is 1760 yards.)
Give your answer to the nearest 10 turns.
Show how you figured it out.

\[ C = 163.28 \]
\[ 5280 \div 163.28 = 32.33 \]

4. How many times does the small wheel turn when the cycle travels 1 mile?
Give your answer to the nearest 10 turns.
Show how you figured it out.

\[ C = 5280 \div 56.52 = 93.41 \]
Basil saw a strange old bicycle at the museum. It had one very big wheel and one very small one. It was called an ‘Ordinary’ or a ‘Penny Farthing’.

At home Basil looked it up on the internet and found that:

*the big wheel could have a 52 inch diameter and the small wheel could have an 18 inch diameter.*

1. What is the circumference of the big wheel? Show how you figured it out.
   \[
   C = \pi \cdot d \quad d = 52
   \]
   \[
   C = \pi \cdot 52
   \]
   \[
   C = 163.362818
   \]

2. How far would you travel in one turn of the big wheel? Give your answer in feet and inches. Show how you figured it out.
   \[
   C = \frac{163.362818}{12}
   \]
3. How many times must the cyclist turn the big wheel to travel 1 mile?  
(A mile is 1760 yards.)  
Give your answer to the nearest 10 turns.  
Show how you figured it out.  

\[
5280 \div 13.6
\]

\[\text{inches and feet}\]

388 turns

4. How many times does the small wheel turn when the cycle travels 1 mile?  
Give your answer to the nearest 10 turns.  
Show how you figured it out.

\[
\pi \cdot 18 = C
\]
\[
C = 56.54866776
\]

\[
\left[\frac{56.55}{12}\right] = 4.71238898
\]

4 Feet 7 inches

\[
5280 \div 4.7
\]

\[
112 \text{.}3404255
\]
Historic Bicycle

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the small wheel could have an 18 inch diameter.

1. What is the circumference of the big wheel?
   Show how you figured it out.

   \[ 26 \times \pi \]

   _81_ inches

2. How far would you travel in one turn of the big wheel?
   Give your answer in feet and inches.
   Show how you figured it out.

   \[ 81 \div 12 = 6.75 \]

   _6_ feet _7_ inches
3. How many times must the cyclist turn the big wheel to travel 1 mile? 
(A mile is 1760 yards.)
Give your answer to the nearest 10 turns.
Show how you figured it out.

\[ 1760 \times 3 = 5280 \text{ ft} \]

\[ \frac{5280}{10.7} \]

4. How many times does the small wheel turn when the cycle travels 1 mile? 
Give your answer to the nearest 10 turns.
Show how you figured it out.

\[ 9 \times \pi \]

\[ 1 \text{ turn} = 2.3 \]

\[ 2295 \text{ turns} \]
Historic Bicycle

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The circumference of a circle, $C = \pi d$, where $d$ is the diameter

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At home Basil looked it up on the internet and found that:

the big wheel could have a 52 inch diameter and
the small wheel could have an 18 inch diameter.

1. What is the circumference of the big wheel?
   Show how you figured it out.
   
   I used the equation at the top
   
   \[ C = \pi d \text{ and entered 52 inch the diameter into the equation.} \]

   \[
   163.36 \text{ inches}
   \]

2. How far would you travel in one turn of the big wheel?
   Give your answer in feet and inches.
   Show how you figured it out.

   I divided 163 by 12 which got me how many feet and the remainder got me the inches.

   \[
   13 \text{ feet } 7 \text{ inches}
   \]
3. How many times must the cyclist turn the big wheel to travel 1 mile? 
   (A mile is 1760 yards.)
   Give your answer to the nearest 10 turns.
   Show how you figured it out.

   \[
   \text{Multiplied 1760 by 3 then divided by 13 because that's how far the big wheel turns once.}
   \]

   \[400 \text{ turns}\]

4. How many times does the small wheel turn when the cycle travels 1 mile? 
   Give your answer to the nearest 10 turns.
   Show how you figured it out.

   \[
   \text{Multiplied 1760 by 3 then divided it by 4.7 because that's how far the little wheel turns once.}
   \]

   \[1120 \text{ turns}\]
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At home Basil looked it up on the internet and found that:

the big wheel could have a 52 inch diameter and
the small wheel could have an 18 inch diameter.

1. What is the circumference of the big wheel?
   Show how you figured it out.

\[
C = \pi \times 52 = 163.28
\]

2. How far would you travel in one turn of the big wheel?
   Give your answer in feet and inches.
   Show how you figured it out.

\[
\frac{163.28}{12} = 13\text{ft} \ 7.28\text{ in}
\]
3. How many times must the cyclist turn the big wheel to travel 1 mile?
   (A mile is 1760 yards.)
   Give your answer to the nearest 10 turns.
   Show how you figured it out.

   \[ \frac{5280}{13.61} = 387.95 \]

4. How many times does the small wheel turn when the cycle travels 1 mile?
   Give your answer to the nearest 10 turns.
   Show how you figured it out.

   \[ \frac{5280}{54.52} = 97.1 \]

   \[ \frac{5280}{390} = 13.61 \]
Historic Bicycle

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The circumference of a circle, \( C = \pi d \), where \( d \) is the diameter

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At home Basil looked it up on the internet and found that:

the big wheel could have a 52 inch diameter and
the small wheel could have an 18 inch diameter.

1. What is the circumference of the big wheel?
   Show how you figured it out.

   \[ C = \pi (52) \]
   \[ C = 163.4 \text{ inches} \]

2. How far would you travel in one turn of the big wheel?
   Give your answer in feet and inches.
   Show how you figured it out.

   \[ \frac{163.4}{12} = 13.6 \text{ feet 6 inches} \]
3. How many times must the cyclist turn the big wheel to travel 1 mile? 
   (A mile is 1760 yards.)
   Give your answer to the nearest 10 turns.
   Show how you figured it out.

\[
\frac{\frac{13}{3}}{4 \frac{1}{3}} = 4 \frac{1}{3}
\]

\[
\frac{1760}{4 \frac{1}{3}} = 406.15
\]

4. How many times does the small wheel turn when the cycle travels 1 mile? 
   Give your answer to the nearest 10 turns.
   Show how you figured it out.

\[
C = \pi (18)
\]

\[
= \frac{56.5}{12} \text{ in}
\]

\[
= \frac{4.71}{3} \text{ in}
\]

\[
= 1.5 \text{ yds}
\]

\[
1760 \times 1.5 = 2640
\]
Historic Bicycle

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At home Basil looked it up on the internet and found that:

the big wheel could have a 52 inch diameter and
the small wheel could have an 18 inch diameter.

1. What is the circumference of the big wheel?
   Show how you figured it out.
   \[ \text{On the calculator, } 52\pi = 163.36 \]
   \[ 163.36 \text{ inches} \]

2. How far would you travel in one turn of the big wheel?
   Give your answer in feet and inches.
   Show how you figured it out.
   \[ 12 \times 13 = 156, \quad 163 \text{ feet } 7'' \]
   \[ 13 \text{ feet } 7'' \]
3. How many times must the cyclist turn the big wheel to travel 1 mile?
(A mile is 1760 yards.)
Give your answer to the nearest 10 turns.
Show how you figured it out.

\[
\begin{align*}
7 \div 12 &= 0.58 \\
\text{One mile} &= 5280 \text{ ft} \\
5280 \div 13.58 &= 388.8
\end{align*}
\]

4. How many times does the small wheel turn when the cycle travels 1 mile?
Give your answer to the nearest 10 turns.
Show how you figured it out.

\[
\begin{align*}
18\pi &= 56.54 \\
12 \times 4 &= 48 \\
4'8'' &= 4.66 \\
8 \text{ leftover} \\
5280 \div 4.66 &= 1133
\end{align*}
\]
Historic Bicycle

This problem gives you the chance to:
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The circumference of a circle, \( C = \pi d \), where \( d \) is the diameter

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At home Basil looked it up on the internet and found that:

the big wheel could have a 52 inch diameter and
the small wheel could have an 18 inch diameter.

1. What is the circumference of the big wheel?
   Show how you figured it out.

   \[ 163.28 \text{ inches} \]

2. How far would you travel in one turn of the big wheel?
   Give your answer in feet and inches.
   Show how you figured it out.

   \[ 13 \text{ feet } 7 \text{ inches} \]
3. How many times must the cyclist turn the big wheel to travel 1 mile?
   (A mile is 1760 yards.)
   Give your answer to the nearest 10 turns.
   Show how you figured it out.

\[
\begin{array}{c}
176 \\
10 \overline{1760} \\
-16 \\
\underline{76} \\
-76 \\
\underline{60}
\end{array}
\]

4. How many times does the small wheel turn when the cycle travels 1 mile?
   Give your answer to the nearest 10 turns.
   Show how you figured it out.

\[
1,121
\]
Historic Bicycle

This problem gives you the chance to:
- work with the circumference of a circle

The circumference of a circle, $C = \pi d$, where $d$ is the diameter

Basil saw a strange old bicycle at the museum.
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At home Basil looked it up on the internet and found that:

the big wheel could have a 52 inch diameter and
the small wheel could have an 18 inch diameter.

1. What is the circumference of the big wheel?
   Show how you figured it out.
   
   $\pi e \approx 3.14$
   
   \[
   \frac{3.14 \times 52}{163.28}
   \]
   
   $163.28$ inches

2. How far would you travel in one turn of the big wheel?
   Give your answer in feet and inches.
   Show how you figured it out.

   $12$ inch = $1$ foot
   
   \[
   \frac{13.60667}{12}/163.28
   \]
   
   $13$ feet $6$ inches
3. How many times must the cyclist turn the big wheel to travel 1 mile?  
   (A mile is 1760 yards.)  
   Give your answer to the nearest 10 turns.  
   Show how you figured it out.

\[ 5.28 \text{ in} = 1 \text{ mile} \]
\[ 5.280 \text{ in} \div 163.28 = 32.33 \]

4. How many times does the small wheel turn when the cycle travels 1 mile?  
   Give your answer to the nearest 10 turns.  
   Show how you figured it out.

\[ \text{Small} = 56.52 \]
\[ 5.280 \text{ in} \div 56.52 = 93.41 \]
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At home Basil looked it up on the internet and found that:

the big wheel could have a 52 inch diameter and
the small wheel could have an 18 inch diameter.

1. What is the circumference of the big wheel?
   Show how you figured it out.

\[
C = 3.14 \cdot 52''
\]

\[
C = \pi (d)
\]

2. How far would you travel in one turn of the big wheel?
   Give your answer in feet and inches.
   Show how you figured it out.

\[
C = 163.28''
\]

\[
\frac{163.28}{12} = 13' 6''
\]

\[
13 \text{ feet } 7 \text{ inches}
\]
3. How many times must the cyclist turn the big wheel to travel 1 mile?
(A mile is 1760 yards.)
Give your answer to the nearest 10 turns.
Show how you figured it out.

\[ 3 \text{ feet} = 1 \text{ yard} \]

\[ 1760 \]

\[ 700.60 \]

\[ 63360 \text{ inches} \]

\[ 634 \]

\[ \times \frac{2}{1268} \]

\[ 634 \text{ turns} \]

4. How many times does the small wheel turn when the cycle travels 1 mile?
Give your answer to the nearest 10 turns.
Show how you figured it out.

\[ 1268 \]
**Historic Bicycle**

This problem gives you the chance to:
- work with the circumference of a circle

---

**The circumference of a circle, \( C = \pi d \), where \( d \) is the diameter**

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At home Basil looked it up on the internet and found that:

1. **the big wheel could have a 52 inch diameter and**
2. **the small wheel could have an 18 inch diameter.**

---

1. **What is the circumference of the big wheel?**
   Show how you figured it out.

   \[
   C = \pi d \\
   \pi \times 52 = 163.362818 \\
   C = 163.362818 
   \]

   \[\text{163.362818 inches}\]

2. **How far would you travel in one turn of the big wheel?**
   Give your answer in feet and inches.
   Show how you figured it out.

   \[
   156 \div 12 = 13 \text{ ft.} \\
   + 7.362 \text{ in.} \\
   163.362 \text{ in.}
   \]

   \[\text{13 feet 7.362 inches}\]
3. How many times must the cyclist turn the big wheel to travel 1 mile?
(A mile is 1760 yards.)
Give your answer to the nearest 10 turns.
Show how you figured it out.

\[ \frac{7}{12} = 0.583 = 7 \text{ in} \]

\[ \frac{1760 \cdot 3 = 5280}{13.583} = \text{Roughly 390 turns} \]

4. How many times does the small wheel turn when the cycle travels 1 mile?
Give your answer to the nearest 10 turns.
Show how you figured it out.

\[ C = \pi d \]
\[ 56.548 = \pi \times 18 \]
\[ \frac{18}{48} = 5 \text{ times} \]
\[ 48 + 8 = 56 \text{ inches} \]
\[ \frac{58.548''}{1 \text{ turn}} = 1 \text{ turn} \]

\[ \frac{52}{18} = 2.888888889 \]

\[ 390 = \text{Amount of turns in 1 m for big wheel} \]

\[ 390 \times 2.888888889 = 1126.6666 \]

Round Up

1130 turns
Historic Bicycle

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At home Basil looked it up on the internet and found that:

the big wheel could have a 52 inch diameter and the small wheel could have an 18 inch diameter.

1. What is the circumference of the big wheel?
   Show how you figured it out.
   \[ 163.363 \text{ inches} \]

   I multiplied \( \pi \) by 52 which is the diameter.

2. How far would you travel in one turn of the big wheel?
   Give your answer in feet and inches.
   Show how you figured it out.
   \[ 13 \text{ feet } 7 \text{ inches} \]

   I divided 163 by 12 and got 13.58
3. How many times must the cyclist turn the big wheel to travel 1 mile?  
(A mile is 1760 yards.)  
Give your answer to the nearest 10 turns.  
Show how you figured it out.  

I multiplied 1760 by 3 and got 5280 feet.  
Then divided 5280 by 13.58 and got 388.801.  

390 turns

4. How many times does the small wheel turn when the cycle travels 1 mile?  
Give your answer to the nearest 10 turns.  
Show how you figured it out.  

I figured out the circumference, got the feet and inches then did the same thing I did for  
# 3.  

1240 turns
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At home Basil looked it up on the internet and found that:

the big wheel could have a 52 inch diameter and
the small wheel could have an 18 inch diameter.

1. What is the circumference of the big wheel?
   Show how you figured it out.

   \[
   \pi(52) \\
   3.14(52) \\
   163.28
   \]

2. How far would you travel in one turn of the big wheel?
   Give your answer in feet and inches.
   Show how you figured it out.

   \[
   12\sqrt{163.28} = 13.6066 \\
   1 \sqrt{163.28}
   \]
3. How many times must the cyclist turn the big wheel to travel 1 mile? (A mile is 1760 yards.)
Give your answer to the nearest 10 turns. Show how you figured it out.

\[ \text{1 turn} = 13 \text{ ft.} \times \frac{409.30}{1760} \]
\[ \text{1 turn} = 4.3 \text{ yds.} \times \frac{409.30}{1760} \]
\[ \text{turns} : 409.30 \]
Nearest 10 turns: 410

4. How many times does the small wheel turn when the cycle travels 1 mile? Give your answer to the nearest 10 turns.
Show how you figured it out.

\[ \pi (18) \]
\[ 3.14 (18) = 56.52 \]
\[ \frac{24.6}{12} = 1.5 \]
\[ \frac{3.14}{1.5} \]

\[ \text{1 turn} = 4.6 \text{ ft} \]
\[ \text{1 turn} = 1.5 \text{ yds.} \]
\[ \text{turns} : 117.33 \]
Nearest 10 turns: 1170
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the small wheel could have an 18 inch diameter.

1. What is the circumference of the big wheel?
   Show how you figured it out.

   \[ \pi \times 52 = C \text{ for the big wheel, } C = 163.4 \text{ inches} \]

2. How far would you travel in one turn of the big wheel?
   Give your answer in feet and inches.
   Show how you figured it out.

   \[ 163.4 \text{ feet} \]
3. How many times must the cyclist turn the big wheel to travel 1 mile? (A mile is 1760 yards.)
   Give your answer to the nearest 10 turns.
   Show how you figured it out.
   \[ \text{converted 1760 yards to feet, then inches, then divided 63360 in by 163.4 in.} \]
   \[ 390 \text{ turns} \]

4. How many times does the small wheel turn when the cycle travels 1 mile?
   Give your answer to the nearest 10 turns.
   Show how you figured it out.
   \[ 1120 \text{ turns} \]
   \[ \frac{6360}{56.5 \text{ inches}} \]