The Penny Farthing problem

Name: _____ Date:_____

You must show all your working out even if you use a calculator

Step 1

Step 2

The Penny Farthing or High Bicycle with spoked wheels (known as 'spider' wheels) was first patented by Frenchman Eugene Meyer in 1869. They were rather dangerous to use as riders were likely to be tipped off, head first. This was known as 'taking a header.' Some models had the large wheel at the front, but rather predictably the rider fell off backwards when going uphill.

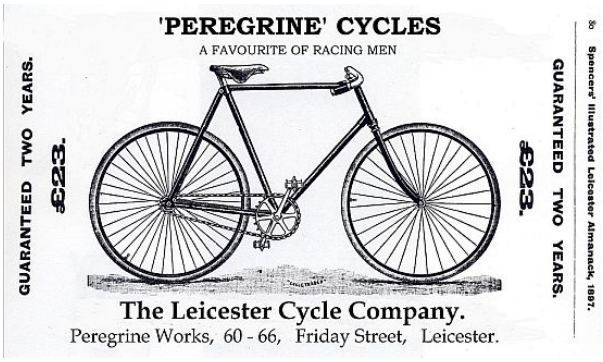
The development of the chain drive mechanism, and Scotsman John Dunlop's invention of pneumatic tyres in 1888, resulted in a design recognisable as the modern bike, and started a bike craze across Europe and North America.

1. The name 'Penny Farthing' comes from two coins that were in circulation at the time. The farthing is what fraction of the old penny?

2. Britain converted to decimal currency on 'D-Day', the 15th February 1971. One old penny is 0.42 of the current penny, so how much is an old farthing in decimal currency, as a decimal and as an approximate fraction?

3. When you ride a Penny Farthing bicycle, do both wheels turn at the same speed? ***Work it out.***

Assume the large wheel is 150 cm in diameter and the smaller is 60 cm. The circumference of a circle is calculated using C = ∏ d (use 3.14 for ∏)



A popular model, produced in the 1890s

Images courtesy of Google images

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Answers

1. ¼

2. 0.42 divided by 4 is 0.105 of a new penny, or approximately 1/10

3. No

Method A – work out the circumference of each wheel, then see how many times the small wheel has to turn to equal a turn of the large wheel

C = ∏d (Note: ∏d means ∏ x d)

Large wheel circumference
3.14 x 150 = 471 cm

Small wheel circumference
3.14 x 60 = 188.4 cm

471 / 188.4 = 2.5

Method B – Quick method

The answer must be how many times does the small wheel go into the large one? Let D be the diameter of the large wheel, and d be the diameter of the small wheel.

$\frac{\pi D}{\pi d}$ cancel out the ∏ top and bottom $\frac{D}{d}$ substitute $\frac{150}{60}$ = 2 ½ or 2.5

So the small wheel would turn 2 ½ times for every one revolution of the large wheel.