

What number,  
when multiplied by itself,  
is equal to  $27 \times 147$ ?



$p$  and  $q$  are two numbers each greater than zero.

$$\sqrt{p^2 + 5q} = 8$$

$$\sqrt{p^2 - 3q} = 6$$

Find the values of  $p$  and  $q$ .



Find the sum of any three consecutive numbers.

What do you notice about the total?

Is this true for any three consecutive numbers?

Can you **prove** why this is true?



## Welcome to Plus magazine!



### Taming QED

This is the third article in our four-part series exploring quantum electrodynamics. After struggling with a theory plagued by unwieldy infinities an ingenious trick put QED back on track.

12345678 [Read more...](#)



Plus magazine opens a door to the world of maths, with all its beauty and applications, by providing articles from the top mathematicians and science writers on topics as diverse as art, medicine, cosmology and sport. You can read the latest mathematical news on the site every week, listen to our

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### Dark energy say cheese!



Images are now being taken on the world's most powerful digital camera. For over 500

nights over the next five years the *Dark Energy Camera* will

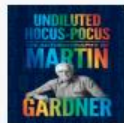
### Caves, drugs and art



Why are drug induced hallucinations so compelling that they apparently provided

much of the inspiration for early

### 'Undiluted Hocus-Pocus'



Martin Gardner has inspired several generations of students to become

mathematicians. An ardent fan reviews Gardner's autobiography

### Mathematical theatre at the Science Museum: X&Y



In their new show X&Y Marcus du Sautoy and Victoria Gould use mathematics and the theatre to

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A team of Australian researchers has delivered dire news for polar ecosystems, predicting that in some...

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### Caves, drugs and art



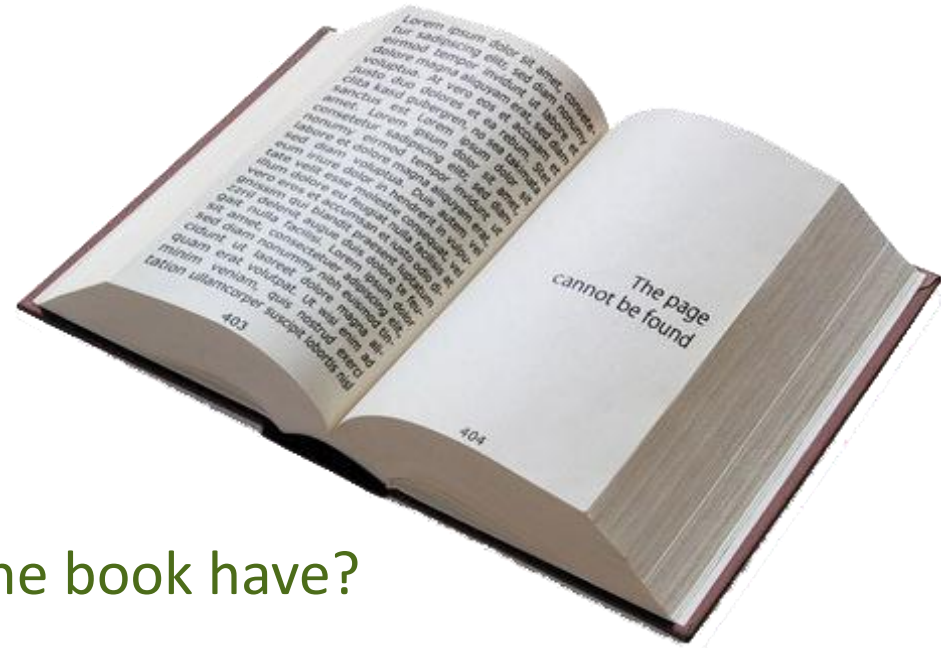
Why are drug induced hallucinations so compelling that they apparently provided much of the inspiration for...

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### Bluffing and exploitation: An introduction to making maths



Over the course of numbering every page in a book, a mechanical stamp printed 2,929 individual digits.



How many pages does the book have?

Discuss your method and reasoning with at least three other people

Explain to someone, or ask someone to explain, the joke



Find the sum of *four* consecutive numbers.  
What do you notice about the total?  
Is this true for any *four* consecutive numbers?  
Can you explain why this is true?

Discuss your method, reasoning and result with  
at least three other people



Use all the digits

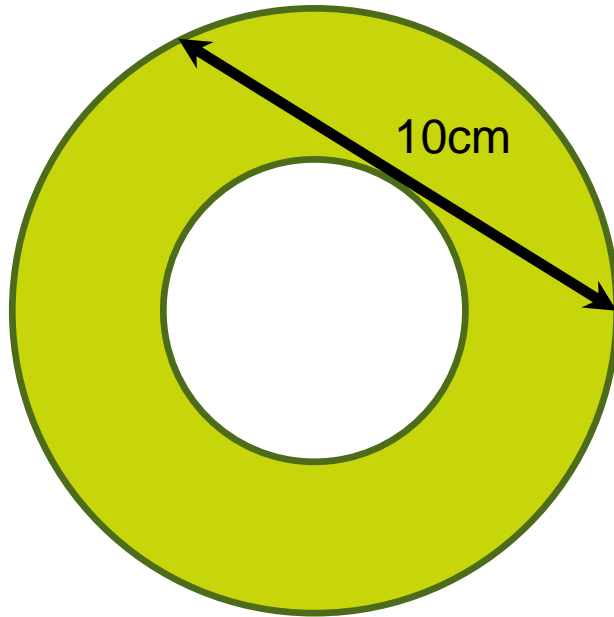
0 1 5 0 1 5 0

To complete this multiplication:

$$\underline{\quad} \underline{\quad} \underline{\quad} \times 2 = \underline{\quad} \underline{\quad} \underline{\quad} \underline{\quad}$$



Work out the shaded area in the diagram.

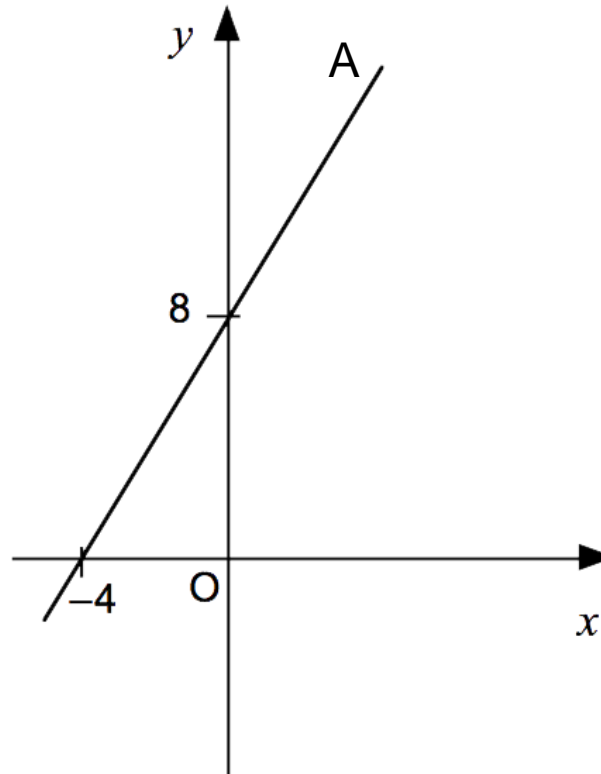


(the line shown just touches the inner circle)





What is the equation of the line A?



not drawn to scale

Discuss your method and reasoning with someone else,  
be able to state all formulae used.



Make the two columns add up to the same total  
by swapping just two cards

1	3
2	4
7	5
9	8

your methods

Discuss



There are eight coins that all look identical  
but only one is solid gold.

The gold coin weighs slightly less than the fakes.



Use the balance only twice to find the real gold coin.



<http://voyager.jpl.nasa.gov>



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# INTERSTELLAR VOYAGER

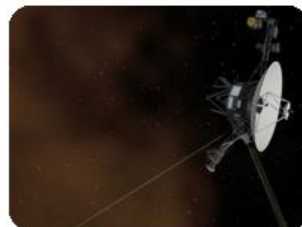
"Voyager is in interstellar space — the space between the stars."

- Dr. Ed Stone, Voyager Project Scientist

Voyager 1 has entered interstellar space. The NASA spacecraft, which rose from Earth on a September morning 36 years ago, has traveled farther than anyone, or anything, in history. Now Voyager 1 is in the space between the stars. How did Voyager 1 get there? How do we know and where is it going? For more information on humanity's first emissary to what lies beyond, explore the videos, images and stories below.

## RELATED LINKS

- › [Voyager Mission Website](#)
- › [Audio of Interstellar Space \(mp3\)](#)
- › [Greetings on Voyager \(mp3\)](#)
- › [Voyager Links](#)



Interstellar News Release



New Voyager Videos



40 Things to Know About Voyager



Sir Isaac Newton Sixth Form

Maths and Science Centre of Excellence

Take any prime number greater than 3.  
Square it and take away 1.

Is the answer a multiple of 24?

Try again, and again, and again.

Why is that?



Use only the digits 1 to 9  
(you can repeat digits if you wish)

Start with a three digit number      497

Reverse the digits                              794

Add the numbers together                      1291

Find the largest three-digit starting number that  
produces a total less than 1000.



Provide a proof  
to accompany your answer.

Is  $n^2+n+41$  a prime number  
for all natural numbers  $n$ ?

Suppose that  $a$ ,  $b$ , and  $c$  are real numbers and  $a(b + c) = 0$ .

What can you say is certain? (Choose just one option)

a)  $a = 0$

b)  $b + c = 0$

c)  $b = c = 0$

d)  $a = 0$  or  $b = -c$





Suppose that  $a$ ,  $c$ , and  $d$  are real numbers and  $ac = ad$ .

What can you say is certain? (Choose just one option)

a)  $c = d$

b)  $c = 0$  or  $d = 0$

c)  $a = 0$  or  $c = d$

d)  $a = 0$



Suppose that  $a$  and  $b$  are real numbers and  $a^2 - b^2 = a + b$ .

What can you say is certain? (Choose just one option)

a)  $a - b = 1$  or  $a + b = 0$

b)  $a - b = 0$  or  $a + b = 0$

c)  $a = b$  or  $a + b \neq 0$

d)  $a = b$



<http://www.mathscareers.org.uk>

The screenshot shows the homepage of mathscareers.org.uk. At the top, there is a navigation bar with links for 'HEI / Ambassadors', 'Careers Advisers', 'Teachers', and 'Cymru'. A search bar is on the right. Below this is a menu for user levels: '11-14', '14-16', '16-19', 'Undergraduates', 'Graduates', and 'Adult Learners'. A secondary menu lists interest areas: 'I ♥ Maths', 'Environment', 'Health & Society', 'Business & Money', 'Entertainment', 'Science & Engineering', and 'Sport'. The main banner features a large image of Earth from space and text for the 'IMA MathsCareers Citi Money Gallery Poster Competition 2013-14', mentioning a prize of an Android tablet and family tickets to The British Museum. Below the banner are three featured sections: 'Maths Photo Competition 2013' with a graphic of a person surrounded by math terms; 'Engineering in action' with a collage of engineering-related images; and a 'Featured career profile' for Matt Henderson, a speech and language processing researcher, with a quote about the value of a maths degree.



Sir Isaac Newton Sixth Form

Maths and Science Centre of Excellence

Three numbers have a total of 10

and

when multiplied make 30.

What are the numbers?

\_\_\_\_\_



Three numbers have a total of 30.

Two of the numbers are equal.

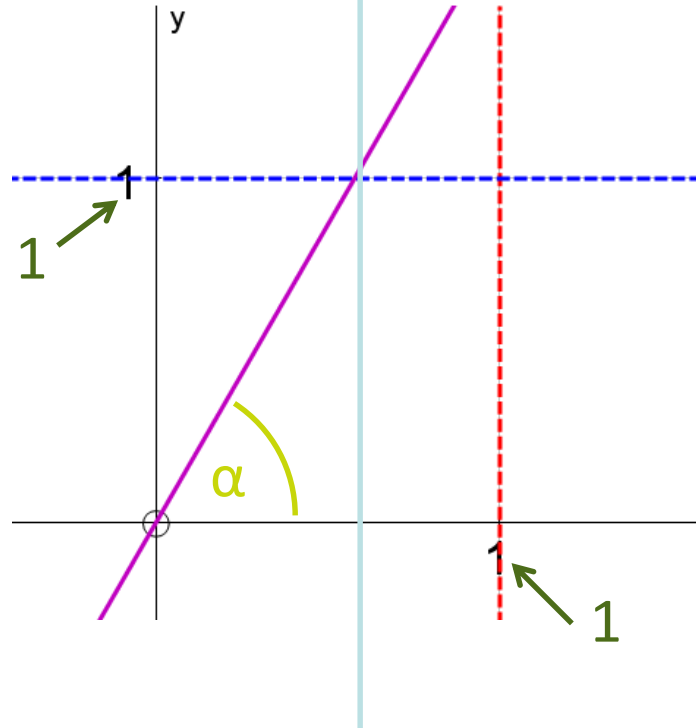
The third number is half the size of the other two.

What are the numbers?

\_\_\_\_\_



The equation of the line shown in the diagram below is  $y = \sqrt{3}x$



What is the value of  $\alpha$ ?

[ Bonus points for not  
using a calculator ]

