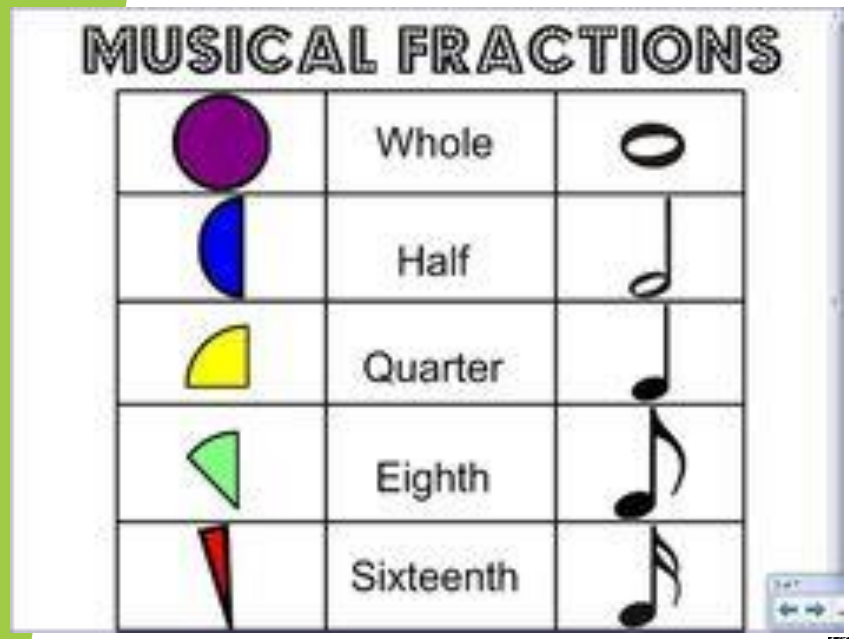
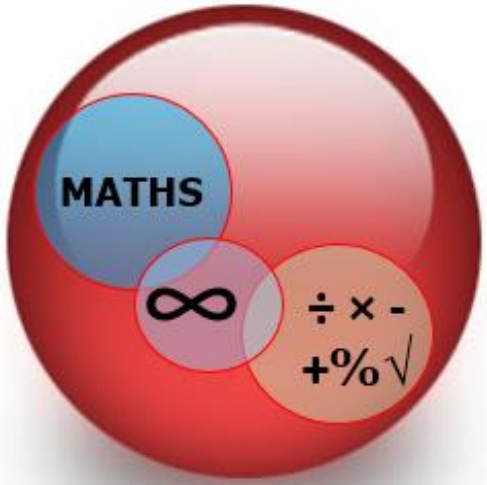
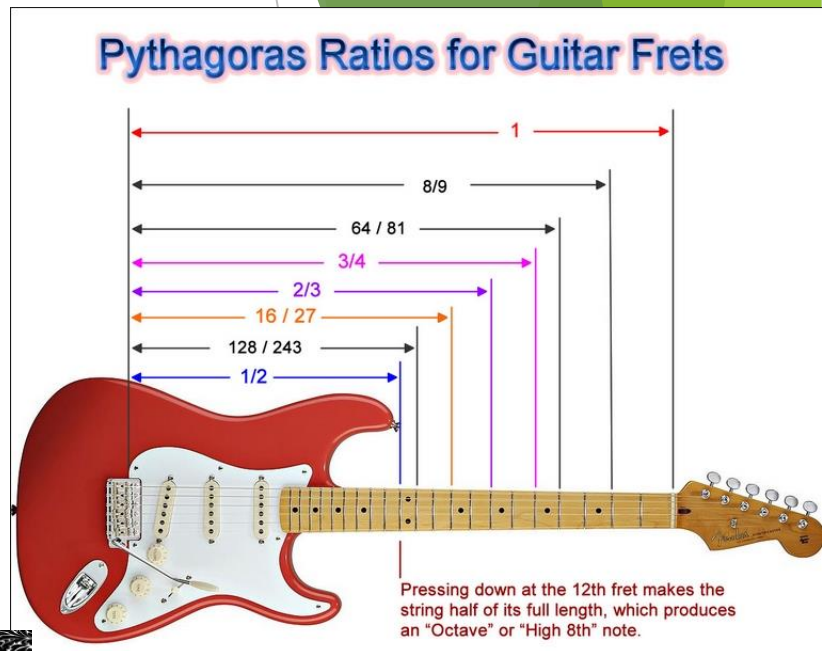
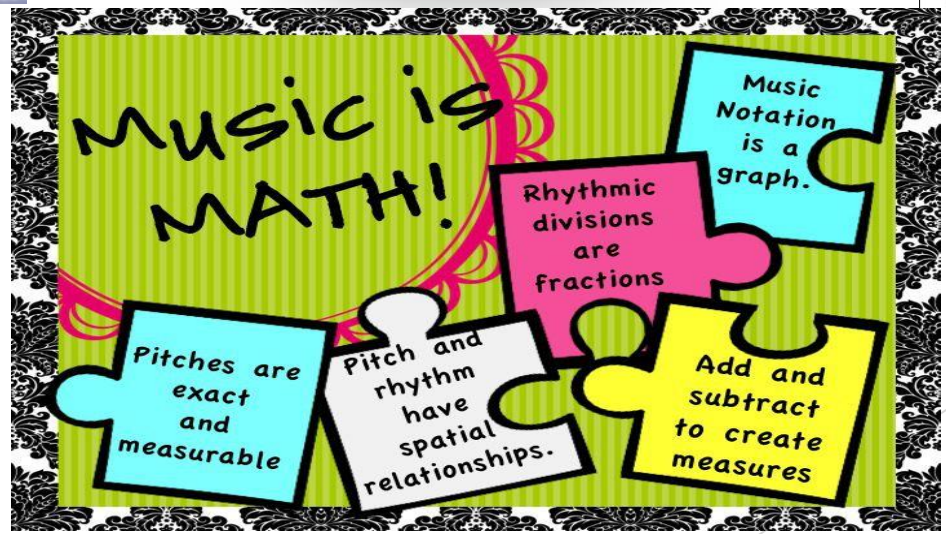
Mathematical Skills Across The Curriculum









DJs like Calvin Harris need to use the mathematical part of their brains when they are mixing different tracks together.

Different tracks will have a different number of beats per minute.
They will also have different rhythms within them.

DJs need to be able to work out how to best fit different tracks together so that the change between them goes smoothly.

- Math and music are usually organized into two separate categories, without obvious overlap. In actuality, math and music are indeed related and we commonly use numbers and math to describe and teach music.

- Beats in a bar, for instance, translate into fractions, note lengths into ratios and symmetry is used to create harmonies and texture.

- The next few slides will show some of the facts that relate maths to music.

What is a Fibonacci sequence? Can you describe it?

The Fibonacci sequence is a famous and well-known sequence that follows as: 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, … and so on, adding each term to the one before it to create the next term.

That is, 5 + 8 = 13, 8 + 13 = 21, 13 + 21 = 34, and continuing infinitely.

In music, the Fibonacci sequence can be seen in piano scales. For example, the C scale on the piano consists of 13 keys from C to C; eight white keys and five black keys, with black keys arranged in groups of three and two.

Pythagoras and Frequency: Can you state the fact?

It was Pythagoras who realized that different sounds can be made with different weights and vibrations.

This led to his discovery that the pitch of a vibrating string is proportional to and can be controlled by its length.

Symmetry and Music

The closest tie between music and math is patterns. Musical pieces often have repeating choruses or bars, similar to patterns. In mathematics, we look for patterns to explain and predict the unknown. Music uses similar strategies.

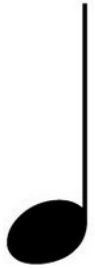
Fractions are extremely important when it comes to rhythm.

 A semibreve is a whole note.

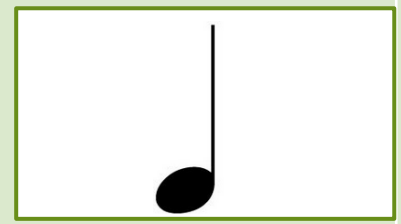
Do you know what fraction of a note each of these is worth?

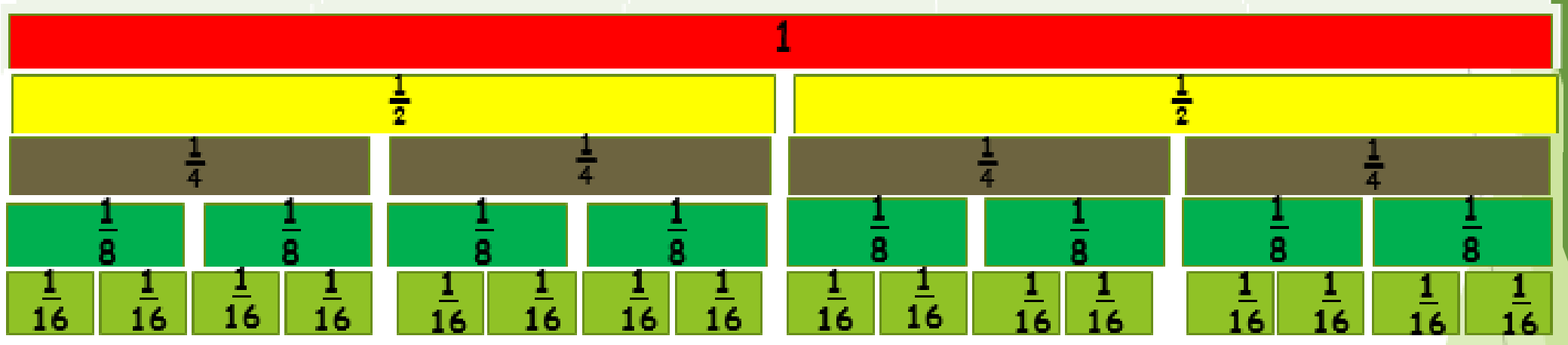
 Minim $\frac{1}{2}$

 Quaver $\frac{1}{8}$

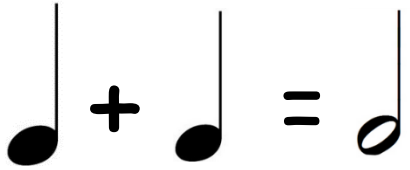
 Crotchet $\frac{1}{4}$

 Semiquaver $\frac{1}{16}$

Semibreve	Minim	Crotchet	Quaver	Semiquaver
				
1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$



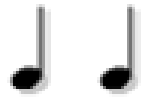
How many crotchets are there in a minim?
Could you write this as a fraction sum?



$$\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$$

Symbol							
Name	Semibreve	Minim	Crotchet	Quaver	Semiquaver	Demi-semi-quaver	Hemi-demi-semi-quaver
Fraction of a beat	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{32}$	$\frac{1}{64}$

Now think about rhythm using equivalent fractions…

$\frac{1}{2} = \frac{2}{4} = 2 \times \frac{1}{4}$ so  lasts for the same time as 

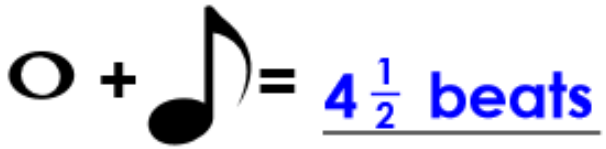
$\frac{1}{4} = \frac{4}{16} = 4 \times \frac{1}{16}$ so  lasts for the same time as 

Using equivalent fractions can you work out which other combinations of notes last the same time?

Counting Beats

				
whole note 4 beats	**half note** 2 beats	**quarter note** 1 beat	**eighth note** $\frac{1}{2}$ beat	**sixteenth note** $\frac{1}{4}$ beat

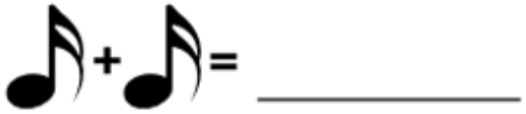
example:

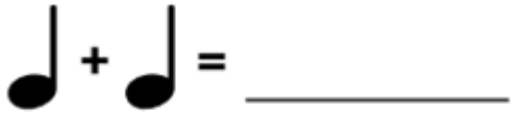


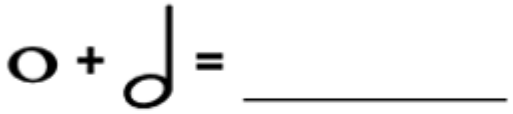
Using the above information solve the questions given on next slide.

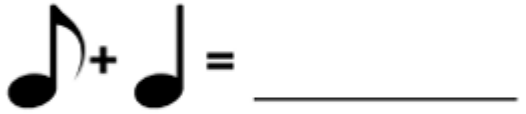
Count the beats

				
whole note 4 beats	**half note** 2 beats	**quarter note** 1 beat	**eighth note** $\frac{1}{2}$ beat	**sixteenth note** $\frac{1}{4}$ beat

 = _____

 = _____

 = _____

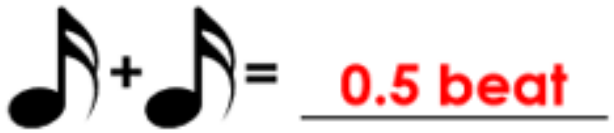
 = _____

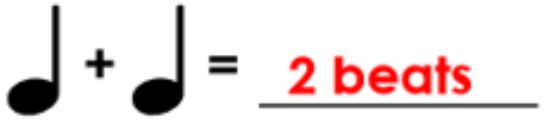
 = _____

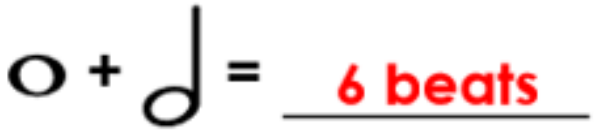
 = _____

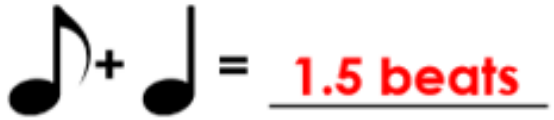
 = ___

Answers

 = 0.5 beat

 = 2 beats

 = 6 beats

 = 1.5 beats

 = 6.5 beats

 = 1 beat

 = 6 beats