

Learn about **Black Holes**

Black Hole by Caryn Wiegand Neidhold

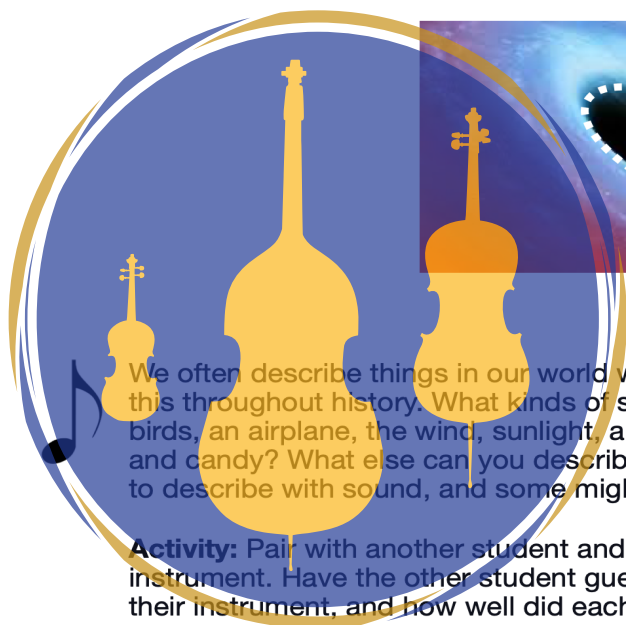


What is a black hole?

In space, there are places where gravity is so huge that nothing can escape, even light! These places are called *black holes*. Astronomers (people who study space) find black holes by learning about what is happening near the black hole. Some of the ways astronomers find black holes is to study the light we see, X-rays, and what is falling into the black hole. Astronomers even study the sound waves coming from a black hole.

Our galaxy, the Milky Way, has a black hole at the center, but don't worry, this black hole is over 25 thousand light-years away! There are other black holes in our galaxy, and astronomers are learning more about these black holes every day.

One interesting thing about a black hole is something called the **event horizon**. Once matter reaches the *event horizon*, it cannot escape the black hole, even if it can travel at the speed of light. Astronomers know how to calculate the *event horizon* using observations and math.



Event Horizon

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We often describe things in our world with sound and music, and many composers have done this throughout history. What kinds of sounds would you make on your instrument to describe: birds, an airplane, the wind, sunlight, an earthquake, ocean waves, a mountain, a train, winter, and candy? What else can you describe with music and sound? Some things may seem easy to describe with sound, and some might be difficult.

Activity: Pair with another student and try to describe something with sound on your instrument. Have the other student guess. How well did each student describe something with their instrument, and how well did each student guess?

Black Hole for string orchestra has several ways of describing black holes with sound and music. With a partner or the entire class, discuss the different ways black holes are described in this piece. Where is the *event horizon* in the piece?

Counting and rhythm are very important in **Black Hole** for string orchestra. Here is an activity to clap or play in class. Don't fall into a black hole!

Violin



Black Hole

5

Caryn Wiegand Neidhold
(ASCAP)

Allegro

The musical score is arranged in a standard orchestral format. The top staves are for Violin I, Violin II (Viola), Viola, Violoncello, and Double Bass. The middle section includes Piano (Optional), Vln. I, Vln. II, Vla., Vc., and Db. The bottom staff is for Pno. The score is marked with a tempo of 'Allegro' and a dynamic of 'f'. A large blue watermark 'PREVIEW ONLY' is overlaid across the center. A circular logo for 'GRAND MESA STRINGS' is positioned on the left side, featuring silhouettes of a violin, a cello, and a viola. The score is numbered 1 through 12 at the bottom.

Black Hole

13

Vln. I *f* *mf*

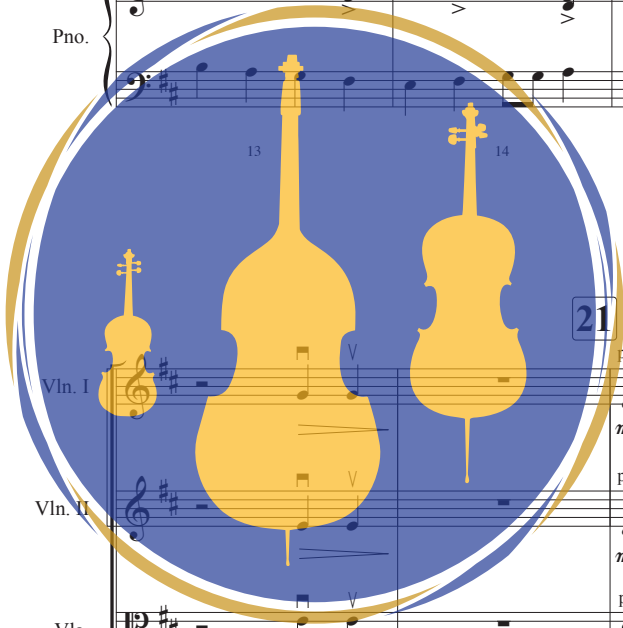
Vln. II *f* *mf*

Vla. *f* *mf*

Vc. *f* *mf*

Db. *f* *mf*

Pno. *mf*



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21

Vln. I *mp*

Vln. II *mp*

Vla. *mp*

Vc. *mf*

Db. *mf*

Pno. *mf*

pizz.

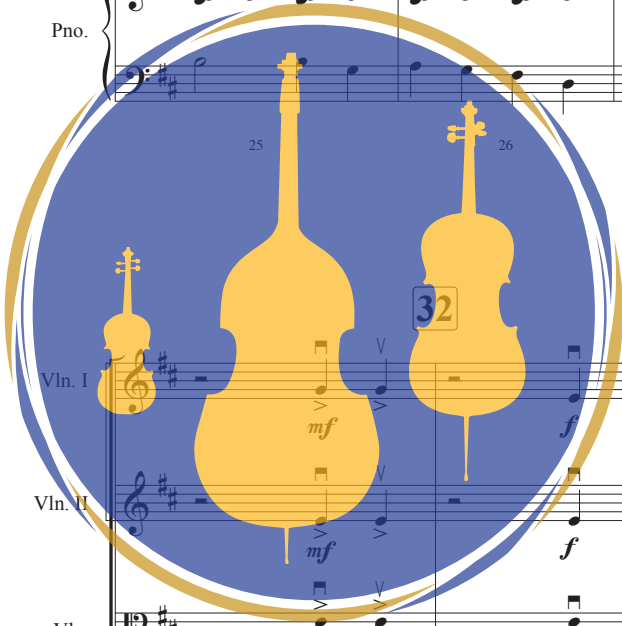
Black Hole

arco
mp
arco
mp
arco
mp
p
mp
p
mp
p
mp
mf
f
mf
f
mf
f
mf
f

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25 26 27 28 29 30 31 32 33 34 35



Black Hole

40 *optional accel.*

Vln. I
Vln. II
Vla.
Vc.
Db.

mp *crescendo poco a poco*

mp *crescendo poco a poco*

mp *crescendo poco a poco*

mp *crescendo poco a poco*

mp *crescendo poco a poco*

mp *crescendo poco a poco*

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Pno.

mp *crescendo poco a poco*

Vln. I
Vln. II
Vla.
Vc.
Db.

ff

ff

ff

ff

ff

Pno.

ff