New device helps biologists decode underwater language of narwhals

By Smithsonian.com, adapted by Newsela staff (8)

Known as "unicorns of the sea," narwhals are little whales. The males have a long tusk that comes out from above their mouth like a horn.

These whales have been having a moment in the last few years. The elusive creatures have graduated from unappreciated Arctic Ocean animals to become meme subjects, plush toys and the topic of weird songs. One tune is about a narwhal eating a bagel.

Despite their popularity, researchers still don't know as much about the whales as they'd like. It is mainly because the animals live among cracks in the ice in one of the most remote and harsh regions in the world. However, Leah Rosenbaum at ScienceNews reports that biologists were recently able to tag a population of the whales with a new type of acoustic device. It allowed them to get the most intimate recordings yet of the clicks, whirs and buzzes the animals use to hunt and communicate, especially at times of the year when sunlight is scarce.

In particular, the researchers wanted to get more information on narwhal communication to provide a baseline for future research. As the Arctic warms and ice crumbles with climate change, many areas where narwhals live will be open to activities like oil exploration, shipping and tourism. Researchers want to understand how the human-generated noise will affect the whales.

Six Narwhals Are Tagged

For the new study in the journal PLoS One, researchers looked at the remote and little-studied narwhals of Scoresby Sound in eastern Greenland. It is an island between the North Atlantic and Arctic oceans. Over several field seasons, they successfully tagged six narwhals, five females and one male, with a device called Acousonde.

In previous studies of narwhals, researchers used underwater microphones called hydrophones, which picked up all the sounds in the ocean, but could not pinpoint individual animals, their location or what activity they were doing. Other types of satellite tags last only a few hours. The Acousonde device, however, attaches to a ridge on a narwhal's back via a magnesium link. After three to eight days, the magnesium breaks down, allowing the device to float to the surface where researchers can recover it.

In total, the team collected 533 hours worth of narwhal sounds from individuals known as Thora, Helge, Frida, Freya, Eistla and Balder. They were able to pair up the recordings with GPS tracking data.

Alan Burdick at the New Yorker reports that the recordings illuminate how the whales use sound. The animals tend to make clicking and buzzing sounds while in the deep sea, about 700 to 2,000 feet down, and buzzed quite a bit in one particular fjord, or sea inlet. It seemed likely they were using echolocation while hunting shrimp and cod. Kate Stafford, of the University of Washington, who was not involved in the study, tells Rosenbaum, "They're like wet bats." Echolocation is the sound reflection used by animals like bats to find their way and avoid obstacles.

Communicating Through Squeaking And Whistling

Narwhals made their squeaky, whistling calls when they were closer to the surface, often within 20 feet, probably to communicate with other narwhals. In some cases several narwhals were recorded calling at once during a "conference."

The study illuminates some of the basic natural history of the whales, which researchers have had an almost impossible time trying to collect. "The inhospitable pack-ice environment that is narwhals' home for much of the year has for millennia kept them in relative isolation — even from biologists," the lead author of the study, Susanna Blackwell of Greeneridge Sciences, said in a press release. Greeneridge Sciences produces the acoustic tag. "Now new amazing tools allow us to take a multi-day, virtual ride on the back of a narwhal!"

The next step will be simulating human-generated noise to see how the whales react, reports JoAnna Klein at The New York Times. Oil and gas exploration crews often use air guns to search for fossil fuels under the seabed. The blasts from the guns are believed to damage the ears and internal organs of marine animals, and can prevent them from communicating with one another.

Narwhals are used to the incredibly loud sounds of icebergs breaking off into the Arctic Ocean. It's possible that they will just shrug off the air gun blasts. Then again, the blasts might disrupt their ability to hunt. "Maybe air gun pulses

sort of sound like icebergs for a narwhal — I have no idea — but if we don't have the data, we can't make sound decisions to make sure that we have narwhals in the future," Blackwell says.

If we don't have narwhals, who is going to eat all our extra bagels?

Questions

1 Read the following selection from the introduction [paragraphs 1-4]. As the Arctic warms and ice crumbles with climate change, many areas where narwhals live will be open to activities like oil exploration, shipping and tourism. Researchers want to understand how the human-generated noise will affect the whales. Which sentence from the article BEST supports the idea that it is important to know how these activities affect narwhals?

(A) Over several field seasons, they successfully tagged six narwhals, five females and one male, with a device called Acousonde.

(B) Narwhals made their squeaky, whistling calls when they were closer to the surface, often within 20 feet, probably to communicate with other narwhals.

(C) The study illuminates some of the basic natural history of the whales, which researchers have had an almost impossible time trying to collect.

(D) The blasts from the guns are believed to damage the ears and internal organs of marine animals, and can prevent them from communicating with one another.

2 Read the selection from the section "Six Narwhals Are Tagged." The animals tend to make clicking and buzzing sounds while in the deep sea, about 700 to 2,000 feet down, and buzzed quite a bit in one particular fjord, or sea inlet. It seemed likely they were using echolocation while hunting shrimp and cod. Kate Stafford, of the University of Washington, who was not involved in the study, tells Rosenbaum, "They're like wet bats." What can be inferred from this selection?

(A) The scientists immediately identified what each narwhal sound means.

(B) The shrimp and cod narwhals eat only live in one fjord in the Arctic.

(C) The ability to use echolocation is central to narwhals' survival.

(D) The growing popularity of narwhals is due to their similarity to bats.

3 What is the relationship between the first two and final two paragraphs of the article?

(A) Both the first and last two paragraphs compare the cartoonish representations of narwhals that people are familiar with to their actual appearance.

(B) Both the first and last two paragraphs demonstrate the way that the growing popularity of narwhals has affected scientists' ability to study them.

(C) The first two paragraphs explore the ways that the physical appearance of narwhals has contributed to their popularity, and the final two paragraphs explore how it has harmed their survival.

(D) The first two paragraphs indicate the growing attention to narwhals in popular culture, and the final two paragraphs emphasize the importance of this attention in both a serious and humorous way.

4 Read the following sentences from the sections "Six Narwhals Are Tagged" and "Communicating Through Squeaking And Whistling." In previous studies of narwhals, researchers used underwater microphones called hydrophones, which picked up all the sounds in the ocean, but could not pinpoint individual animals, their location or what activity they were doing. "The inhospitable pack-ice environment that is narwhals' home for much of the year has for millennia kept them in relative isolation — even from biologists," the lead author of the study, Susanna Blackwell of Greeneridge Sciences, said in a press release. HOW does the relationship between these sentences help to develop a key idea of the article?

(A) by indicating an effect and a cause of the difficulty of studying narwhals until now

(B) by indicating a problem and a solution with the technology for studying narwhals

(C) by presenting a timeline of how the study of narwhals has changed chronologically

(D) by presenting an outline of the contrast between the study of narwhals now and in the past

8th Grade Review Packet

Name_____

Evaluate each expression. Same sign add and keep the sign, different signs find the difference and keep sign of number furthest from zero.

1) $-7 - 3 - -7$

2) $-8 + -5 + 1$

3) $5 + -5 + 6$

4) $-6 + 7 + 3$

Solve each equation. Inverse operations: addition/subtractions; multiplication/division

5) $22 = n + 5$

6) $-14n = -252$

7) $6 = -8 + x$

8) $3 = 9 - p$

9) $80 = 10 - 10n$

10) $-2 = \frac{-6 + x}{2}$

11) $-6(7m - 1) = 342$

12) $-147 = 7(-4n + 3)$

13) $5(n - 2) = -22 - 7n$

14) $8(5r + 5) - 4r = -3r + 1$

15) $4v + 6(-3v - 5) = -8(1 - v)$

16) $6(m - 4) = 4(1 - 2m)$

Simplify. Your answer should contain only positive exponents.

17) $5 \cdot 5^2 \cdot 5^4$

18) $7^4 \cdot 7^4$

19) $\frac{3^3}{3}$

20) $\frac{6^2}{6^4}$

21) $2^3 \cdot (2^3)^4$

22) $4 \cdot (4^4)^2 \cdot 4^2$

23) $ab \cdot 3ab^4$

24) $3x^4y^4 \cdot 5x^2y^4$

25) $8p^4 \cdot 4p$

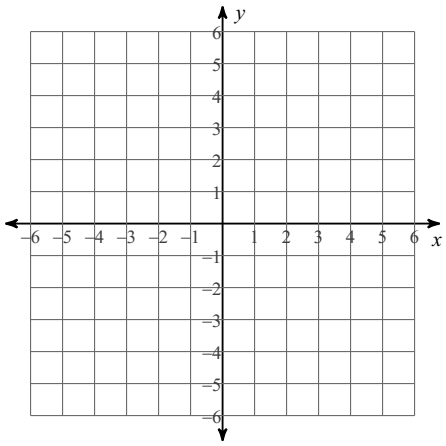
26) $6x^2 \cdot 2x^4$

27) $8n^4 \cdot 4n^{-2}$

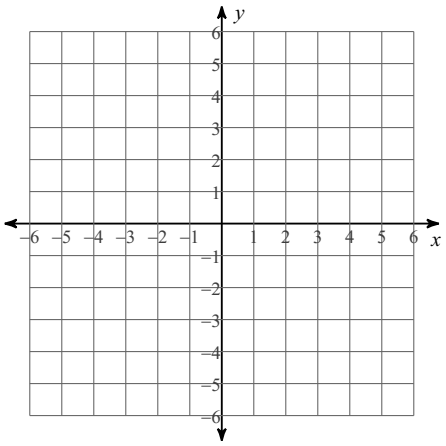
28) $p^{-3} \cdot 7p^4$

Sketch the graph of each line.

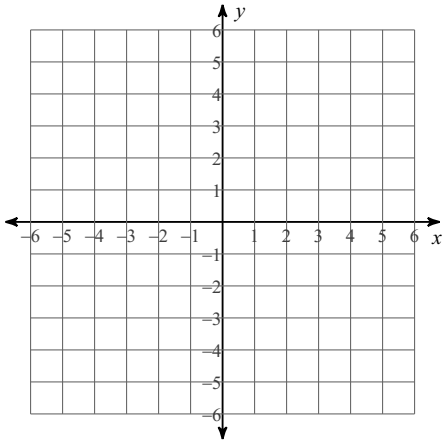
29) $y = -\frac{1}{5}x + 3$



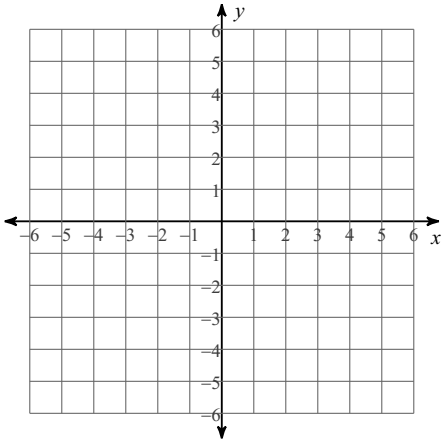
30) $y = \frac{1}{2}x - 1$



31) $y = \frac{4}{3}x - 5$

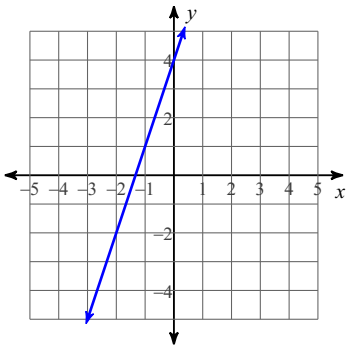


32) $y = -2x + 1$

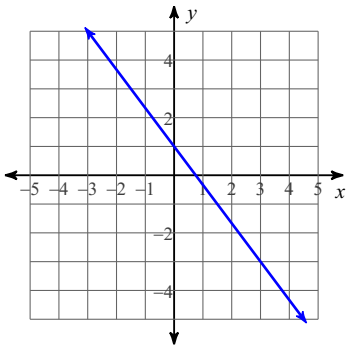


Write the slope-intercept form of the equation of each line.

33)

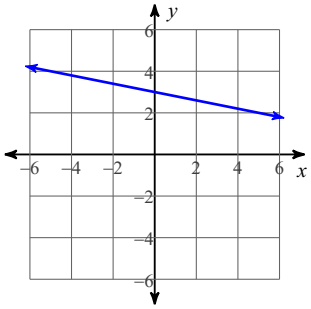


34)

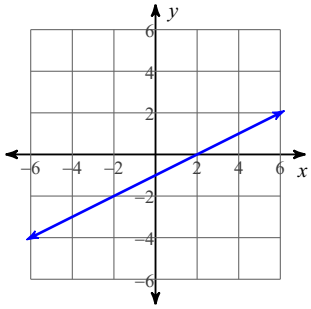


Answers to 8th Grade Review Packet

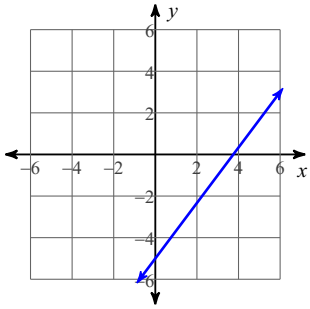
1) -3
2) -12
3) 6
4) 4
5) $\{17\}$
6) $\{18\}$
7) $\{14\}$
8) $\{6\}$
9) $\{-7\}$
10) $\{2\}$
11) $\{-8\}$
12) $\{6\}$
13) $\{-1\}$
14) $\{-1\}$
15) $\{-1\}$
16) $\{2\}$
17) 5^7
18) 7^8
19) 3^2
20) $\frac{1}{6^2}$
21) 2^{15}
22) 4^{11}
23) $3a^2b^5$
24) $15x^6y^8$
25) $32p^5$
26) $12x^6$
27) $32n^2$
28) $7p$
29)



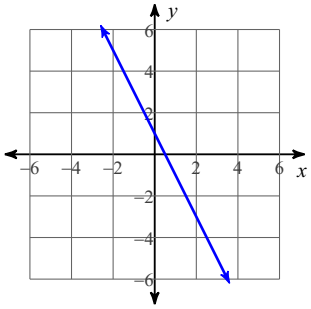
30)



31)



32)



33) $y = 3x + 4$

34) $y = -\frac{4}{3}x + 1$