LA BREA TAR PITS MUSEUM

La Brea Tar Pits' Grid Layout Activity

Ages 6 - 12

Standards

CCSS Math Practices:
1, 3, 4, 5, 6

CCSS Math Content:

Grade K: MD.A.1
Describe measurable attributes.

Grades 1&2: MD.A.1, MD.A.2
Measure lengths indirectly and directly in standard units.

Grade 5: G.A.1, G.A.2
Represent and interpret points in a 2D coordinate plane.

Learn to measure fossils

like a Preparator at The La Brea Tar Pits

The La Brea Tar Pits in Los Angeles, California, are famous for the large number of Late Pleistocene ("Ice Age") fossils they have preserved.

However, one of the most incredible aspects of the La Brea Tar Pits is the variety of its fossil record.

The asphalt-rich sands have not only preserved large and small animal bones, but also fossils from plants, insects and other arthropods, and freshwater mollusk shells.

As you would expect, these assorted fossils come in many different shapes and sizes!

In this exercise, our Preparators will lead you through a grid layout activity, to help you practice how they collect information while excavating fossil deposits.

Collecting and recording data are important parts of being a paleontologist!

LA BREA TAR PITS MUSEUM

STEP 1: Decide the level of difficulty you want to start with for this activity:

(for ideas on how to modify the activity for ages 4-6, see Page 27)

Volunteer Preparator:

This is the lowest level of difficulty, and is best for ages 6-8.

Start on Page 4.

Junior Preparator:

This is a medium level of difficulty for ages 8 -10, or Volunteer Preparators who are ready for the next level!

Start on Page 11.

Senior Preparator:

This is the highest level of difficulty and best for ages 10-12, or Junior Preparators who are ready to master the skills of data collection!

Start on Page 19.

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STEP 2: Gather supplies!

- Pencil (can use other writing tool, but erasable is best, while practicing)
- Tape or coins or small paperweights to hold down your cutouts
- Ruler that displays centimeters (cm) (if your ruler only has inches, you can use two inches instead of five centimeters for your grids- it's close enough for this activity!)
- Print out the GRID LAYOUT on page 6.
    - If you don't have a printer available: Use a blank piece of paper and draw your own 5 cm (or 2") grid using a ruler. The example grid layout has five columns labeled 1, 2, 3, 4, 5 from left to right. It also has four rows labeled A, B, C, D from top to bottom.
- Print out your FOSSIL DATA CARDS on page 8.
    - If you do not have a printer available: Use a blank piece of paper or notebook and write out your notes.
- Print out the FOSSILS on page 9, and cut out your specimens
    - If you don't have a printer available: Use a blank piece of paper and draw your own fossils to cut out for this activity.
    - Or you can use other everyday items such as leaves, coins, or toys!

LA BREA TAR PITS MUSEUM

STEP 3: Measure, for science!

1. Place your specimens on your grid layout and tape them or weigh them down so that they don't move. Place them so that they fit into one grid square. Check out page 7 for an example layout.
2. Use the FOSSIL IDENTIFICATION KEY on page 10 to identify the fossils on your grid.
3. Determine what grid your fossil occupies, and write it down on the identification card. Letter goes before number, as in “grid C-2”.
4. Start measuring. Line your ruler up to match with the nearest vertical line and make your measurement along the x-axis (horizontal). Write down the first measurement based on the length of the fossil running left to right within the numbered columns. Record your two points of measurement on your specimen identification card under x-axis.
5. Repeat your measuring for the horizontal line and make your measurement along the y-axis (vertical). Write down your measurement based on the length of the fossil running top to bottom within the lettered rows. Record your two points of measurement on your specimen identification card under y-axis.

STEP 4: Test your skills!

After you master measuring within the grid layout system, have someone else provide you with measurement coordinates, and see if you can place the fossil picture in the correct position on your grid layout, based on the measurements given.

LA BREA TAR PITS MUSEUM	1	2	3	4	5
A					
B					
C					
D					

Volunteer Preparator	1	2	3	4	5
A					
B					
C					
D					

LA BREA TAR PITS MUSEUM

La Brea Deposit	La Brea Deposit	La Brea Deposit	La Brea Deposit	La Brea Deposit
Grid:____-____	Grid:____-____	Grid:____-____	Grid:____-____	Grid:____-____
X axis =___to___	X axis =___to___	X axis =___to___	X axis =___to___	X axis =___to___
Y axis =___to___	Y axis =___to___	Y axis =___to___	Y axis =___to___	Y axis =___to___
Black-tailed Jackrabbit	*Darkling Beetle*	*Woodrat / Packrat*	*Three-spined stickleback*	*Juniper*

LA BREA TAR PITS MUSEUM

FOSSILS- Feel free to change sizes, print, cut out, place on your grid, and measure





Use these if you need help cutting:





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FOSSIL IDENTIFICATION KEY (sizes not to scale)

SCIENTIFIC NAME: *Lepus californicus*
COMMON NAME: Black-tailed Jackrabbit
SPECIMEN TYPE: skull and jaw
APPROX. TRUE SIZE: 9cm (~3.5in)

SCIENTIFIC NAME: *Tenebrionid*
COMMON NAME: Darkling Beetle
SPECIMEN TYPE: abdomen
APPROX. TRUE SIZE: 2cm (~.75in)

SCIENTIFIC NAME*:* *Neotoma*
COMMON NAME: Woodrat/ Packrat
SPECIMEN TYPE: coprolite (poop)
APPROX. TRUE SIZE: 1cm (~.5in)

SCIENTIFIC NAME: *Gasterosteus aculeatus*
COMMON NAME: Three-spined stickleback
SPECIMEN TYPE: spine
APPROX. TRUE SIZE: .5cm (~.25in)

SCIENTIFIC NAME: *Juniperus*
COMMON NAME: Juniper
SPECIMEN TYPE: branchlet
APPROX. TRUE SIZE: .5cm (~.25in)

LA BREA TAR PITS MUSEUM

STEP 2: Gather supplies!

- Pencil (can use other writing tool, but erasable is best, while practicing)
- Tape or coins or small paperweights to hold down your cutouts
- Ruler that displays centimeters (cm) (if your ruler only has inches, you can use two inches instead of five centimeters for your grids- it's close enough for this activity!)
- Print out the GRID LAYOUT on page 14.
    - If you don't have a printer available: Use a blank piece of paper and draw your own 5 cm (or 2") grid using a ruler. The example grid layout has five columns labeled 1, 2, 3, 4, 5 from left to right. It also has four rows labeled A, B, C, D from top to bottom.
- Print out your FOSSIL DATA CARDS on page 16.
    - If you do not have a printer available: Use a blank piece of paper or notebook and write out your notes.
- Print out the FOSSILS on page 17, and cut out your specimens
    - If you don't have a printer available: Use a blank piece of paper and draw your own fossils to cut out for this activity.
    - Or you can use other everyday items such as leaves, coins, or toys!

STEP 3: Measure, for science!

1. Place your specimens on your grid layout and tape them or weigh them down so that they don't move. Place them so that they either fit into one grid square or across two squares. (Note: if they lay across two squares, it will make the activity more challenging.) Check out page 15 for an example layout.
2. Use the FOSSIL IDENTIFICATION KEY on page 18 to identify the fossils on your grid.
3. Determine what grid your fossil occupies and write it down on the identification card. Letter goes before number, as in "grid C-2".
4. Start measuring. Line your ruler up to match with the nearest vertical line and make your measurement along the x-axis (horizontal). Write down the first measurement based on the length of the fossil running left to right within the numbered columns. Record your two points of measurement on your specimen identification card under x-axis.
5. Repeat your measuring for the horizontal line and make your measurement along the y-axis (vertical). Write down your measurement based on the length of the fossil running top to bottom within the lettered rows. Record your two points of measurement on your specimen identification card under y-axis.

But what about those measurements that crossed two grids?

At this level, measurements become a little more complicated. If specimens span over multiple grids, you must provide extensions per each axis. If the fossil is found in both the "A" grid and "B" grids, measure based off the first extension in grid "A" and then "B" and see if there is a greater distance in "A" versus "B". For example, if the specimen is 5 cm long and 3 cm of it are in "A" and 2 cm of it are in "B", then the fossil is technically an "A" fossil that extends into "B". To indicate this, write "A" at the top. When you write what grid the fossil belongs to along the y-axis, you would write "y-axis: 2 cm to 2 cm (B)". The same is true for numerical grids along the x-axis. If the specimen is mostly in grid "1" but extends slightly into grid "2", indicate in the grid section that it belongs in "1" and along the x-axis you would write "x-axis: 2 cm to 2 cm (2)".

This can get tricky, so it is important to be patient, and double-check your work.

STEP 4: Test your skills!

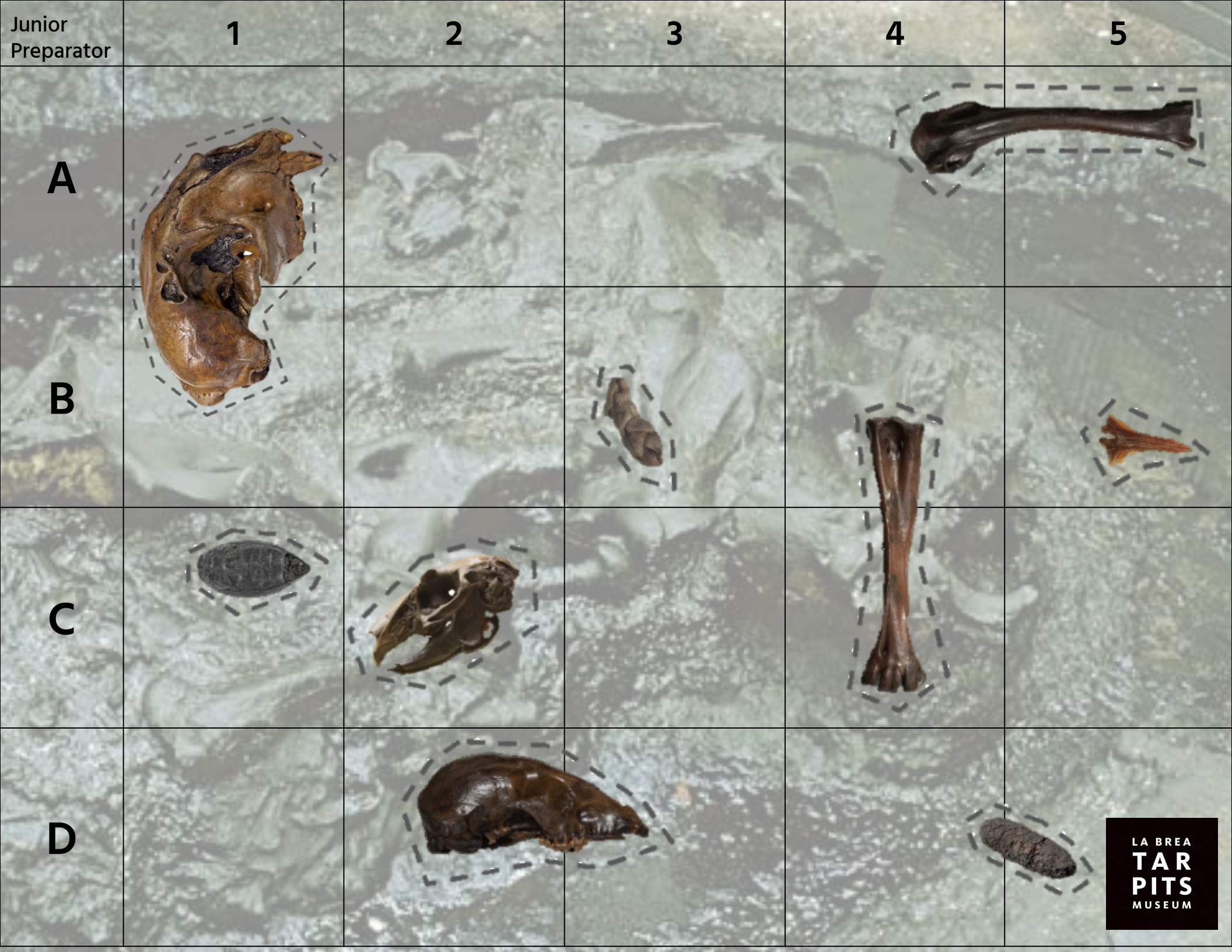
After you master measuring within the grid layout system, have someone else provide you with measurement coordinates and see if you can place the fossil picture in the correct position on your grid layout, based on the measurements given.

Try only using the SCIENTIFIC NAMES for the fossils!

These standards help us when we need to talk about the same organism with researchers from around the world, as we use many different COMMON NAMES.

LA BREA TAR PITS MUSEUM	1	2	3	4	5
A					
B					
C					
D					

Junior Preparator	1	2	3	4	5
A					
B					
C					
D					



LA BREA TAR PITS MUSEUM

La Brea Deposit Grid:____-____ X axis =____to____ Y axis =____to____ *Procyon skull*	La Brea Deposit Grid:____-____ X axis =____to____ Y axis =____to____ *Puma skull*	La Brea Deposit Grid:____-____ X axis =____to____ Y axis =____to____ *Lepus skull and jaw*	La Brea Deposit Grid:____-____ X axis =____to____ Y axis =____to____ *Tenebrionid abdomen*
La Brea Deposit Grid:____-____ X axis =____to____ Y axis =____to____ *Buteo humerus*	La Brea Deposit Grid:____-____ X axis =____to____ Y axis =____to____ *Juniperus branchlet*	La Brea Deposit Grid:____-____ X axis =____to____ Y axis =____to____ *Aquila tarsometatarsus*	La Brea Deposit Grid:____-____ X axis =____to____ Y axis =____to____ *Neotoma coprolite*

FOSSILS- Feel free to change sizes, print, cut out, place on your grid, and measure

LA BREA TAR PITS MUSEUM

FOSSIL IDENTIFICATION KEY (sizes not to scale)

SCIENTIFIC NAME: *Puma concolor*
COMMON NAME: mountain lion
SPECIMEN TYPE: skull
APPROX. TRUE SIZE: 18cm (~7in)

SCIENTIFIC NAME: *Procyon lotor*
COMMON NAME: raccoon
SPECIMEN TYPE: skull
APPROX. TRUE SIZE: 10.5cm (~4.25in)

SCIENTIFIC NAME: *Lepus californicus*
COMMON NAME: Black-tailed Jackrabbit
SPECIMEN TYPE: skull and jaw
APPROX. TRUE SIZE: 9cm (~3.5in)

SCIENTIFIC NAME: *Aquila chrysaetos*
COMMON NAME: Golden Eagle
SPECIMEN TYPE: tarsometatarsus
(main bone of foot)
APPROX. TRUE SIZE: 10cm (~4in)

SCIENTIFIC NAME: *Buteo jamaicensis*
COMMON NAME: Red-tailed Hawk
SPECIMEN TYPE: humerus
(bone of wing closest to shoulder)
APPROX. TRUE SIZE: 10.5cm (~4.25in)

SCIENTIFIC NAME: *Tenebrionid*
COMMON NAME: Darkling Beetle
SPECIMEN TYPE: abdomen
APPROX. TRUE SIZE: 2cm (~.75in)

SCIENTIFIC NAME: *Neotoma*
COMMON NAME: Woodrat/ Packrat
SPECIMEN TYPE: coprolite (poop)
APPROX. TRUE SIZE: 1cm (~.5in)

SCIENTIFIC NAME: *Gasterosteus aculeatus*
COMMON NAME: Three-spined stickleback
SPECIMEN TYPE: spine
APPROX. TRUE SIZE: .5cm (~.25in)

SCIENTIFIC NAME: *Juniperus*
COMMON NAME: Juniper
SPECIMEN TYPE: branchlet
APPROX. TRUE SIZE: .5cm (~.25in)

LA BREA TAR PITS MUSEUM

STEP 2: Gather supplies!

- Pencil (can use other writing tool, but erasable is best, while practicing)
- Tape or coins or small paperweights to hold down your cutouts
- Ruler that displays centimeters (cm) (if your ruler only has inches, you can use two inches instead of five centimeters for your grids- it's close enough for this activity!)
- Print out the GRID LAYOUT on page 22.
    - If you don't have a printer available: Use a blank piece of paper and draw your own 5 cm (or 2") grid using a ruler. The example grid layout has five columns labeled 1, 2, 3, 4, 5 from left to right. It also has four rows labeled A, B, C, D from top to bottom.
- Print out your FOSSIL DATA CARDS on page 24.
    - If you do not have a printer available: Use a blank piece of paper or notebook and write out your notes.
- Print out the FOSSILS on page 25, and cut out your specimens
    - If you don't have a printer available: Use a blank piece of paper and draw your own fossils to cut out for this activity.
    - Or you can use other everyday items such as leaves, coins, or toys!

STEP 3: Measure, for science!

1. Place your specimens on your grid layout and tape them or weigh them down so that they don't move. Place them so that they either fit into one grid square or across multiple squares. (Keep in mind: with every additional square they cross, this activity will become increasingly challenging!) Check out page 23 for an example layout.
2. Use the FOSSIL IDENTIFICATION KEY on page 26 to identify the fossils on your grid.
3. Determine what grid your fossil occupies and write it down on the identification card. Letter goes before number, as in "grid C-2".
4. Start measuring. Line your ruler up to match with the nearest vertical line and make your measurement along the x-axis (horizontal). Write down the first measurement based on the length of the fossil running left to right within the numbered columns. Record your two points of measurement on your specimen identification card under x-axis.
5. Repeat your measuring for the horizontal line and make your measurement along the y-axis (vertical). Write down your measurement based on the length of the fossil running top to bottom within the lettered rows. Record your two points of measurement on your specimen identification card under y-axis.

But what about those measurements that crossed into multiple grids?

At this level, measurements become even more complicated! If specimens span over multiple grids, you must provide extensions per each axis. If the fossil is found in both the "A" grid and "B" grids, measure based off the first extension in grid "A" and then "B" and see if there is a greater distance in "A" versus "B". For example, if the specimen is 5 cm long and 3 cm of it are in "A" and 2 cm of it are in "B", then the fossil is technically an "A" fossil that extends into "B". To indicate this, write "A" at the top. When you write what grid the fossil belongs to along the y-axis, you would write "y-axis: 2 cm to 2 cm (B)". The same is true for numerical grids along the x-axis. If the specimen is mostly in grid "1" but extends slightly into grid "2", indicate in the grid section that it belongs in "1" and along the x-axis you would write "x-axis: 2 cm to 2 cm (2)".

Now that some of the fossils may cross into several grids this can get pretty tricky, so it is important to be patient, and double-check your work. This is how many of our fossils are found, and they are also tangled with each other in three dimensions, and covered in sticky sands!

STEP 4: Test your skills!

After you master measuring within the grid layout system, have someone else provide you with measurement coordinates and see if you can place the fossil picture in the correct position on your grid layout, based on the measurements given.

Try only using the SCIENTIFIC NAMES for the fossils!

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LA BREA TAR PITS MUSEUM	1	2	3	4	5
A					
B					
C					
D					


Senior Preparator
1
2
3
4
5
A
B
C
D
LA BREA TAR PITS MUSEUM

La Brea Deposit Grid:____-____ X axis =____to____ Y axis =____to____ *Fossil =*	La Brea Deposit Grid:____-____ X axis =____to____ Y axis =____to____ *Fossil =*	La Brea Deposit Grid:____-____ X axis =____to____ Y axis =____to____ *Fossil =*	La Brea Deposit Grid:____-____ X axis =____to____ Y axis =____to____ *Fossil =*
La Brea Deposit Grid:____-____ X axis =____to____ Y axis =____to____ *Fossil =*	La Brea Deposit Grid:____-____ X axis =____to____ Y axis =____to____ *Fossil =*	La Brea Deposit Grid:____-____ X axis =____to____ Y axis =____to____ *Fossil =*	La Brea Deposit Grid:____-____ X axis =____to____ Y axis =____to____ *Fossil =*

FOSSILS- Feel free to change sizes, print, cut out, place on your grid, and measure

LA BREA TAR PITS MUSEUM

FOSSIL IDENTIFICATION KEY (sizes not to scale)

SCIENTIFIC NAME: *Puma concolor*
COMMON NAME: mountain lion
SPECIMEN TYPE: skull
APPROX. TRUE SIZE: 18cm (~7in)

SCIENTIFIC NAME: *Procyon lotor*
COMMON NAME: raccoon
SPECIMEN TYPE: skull
APPROX. TRUE SIZE: 10.5cm (~4.25in)

SCIENTIFIC NAME: *Lepus californicus*
COMMON NAME: Black-tailed Jackrabbit
SPECIMEN TYPE: skull and jaw
APPROX. TRUE SIZE: 9cm (~3.5in)

SCIENTIFIC NAME: *Aquila chrysaetos*
COMMON NAME: Golden Eagle
SPECIMEN TYPE: tarsometatarsus
(main bone of foot)
APPROX. TRUE SIZE: 10cm (~4in)

SCIENTIFIC NAME: *Buteo jamaicensis*
COMMON NAME: Red-tailed Hawk
SPECIMEN TYPE: humerus
(bone of wing closest to shoulder)
APPROX. TRUE SIZE: 10.5cm (~4.25in)

SCIENTIFIC NAME: *Tenebrionid*
COMMON NAME: Darkling Beetle
SPECIMEN TYPE: abdomen
APPROX. TRUE SIZE: 2cm (~.75in)

SCIENTIFIC NAME: *Neotoma*
COMMON NAME: Woodrat/ Packrat
SPECIMEN TYPE: coprolite (poop)
APPROX. TRUE SIZE: 1cm (~.5in)

SCIENTIFIC NAME: *Gasterosteus aculeatus*
COMMON NAME: Three-spined stickleback
SPECIMEN TYPE: spine
APPROX. TRUE SIZE: .5cm (~.25in)

SCIENTIFIC NAME: *Juniperus*
COMMON NAME: Juniper
SPECIMEN TYPE: branchlet
APPROX. TRUE SIZE: .5cm (~.25in)

LA BREA TAR PITS MUSEUM

Ideas on how to modify for ages 4-6, “Trainee Preparators”

In the following pages, we have removed the measuring aspect of the original activity to allow use of the original printables in a related activity that focuses instead only on learning how to use a grid system.

The example fossils are all meant to be printed or drawn smaller than 5cm (2in) and placed on the grid in a single square each, to then figure out which grid each are in.

To expand upon this idea, you could take a much larger object that has varied parts, like an action figure, and then figure out where the head is, then the left foot, the right foot, etc.

Feel free to build a physical grid on a table or floor with materials like shoelaces or chopsticks, and resize the fossil images to fit your own grid.

LA BREA TAR PITS MUSEUM

STEP 2: Gather supplies!

- Pencil or other writing tool
- Tape or coins or small paperweights to hold down your cutouts, if using
- Print out the GRID LAYOUT on page 30.
    - If you don't have a printer available: Use a blank piece of paper and a ruler, and draw your own ~5 cm (or ~2 inch) grids. The example grid layout has five columns labeled 1, 2, 3, 4, 5 from left to right. It also has four rows labeled A, B, C, D from top to bottom.
- Print out your FOSSIL DATA CARDS on page 32.
    - If you do not have a printer available: Use a blank piece of paper or notebook and write out your notes.
- Print out the FOSSILS on page 33, and cut out your specimens.
    - If you don’t have a printer available: Use a blank piece of paper and draw your own fossils to cut out for this activity.
    - Or you can use other everyday items such as leaves, coins, or toys!

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STEP 3: Figure out the grid locations!

1. Place your specimens on your grid layout and tape them or weigh them down so that they don't move. Place them so that they fit into one grid square each. Check out page 31 for an example layout.
2. Use the FOSSIL IDENTIFICATION KEY on page 34 to identify the fossils on your grid.
3. Determine what grid your fossil occupies, and write it down on the identification card. Letter goes before number, as in “grid C-2”.

STEP 4: Test your skills!

After you master finding things within the grid layout system, have someone else provide you with grid coordinates, and see if you can place the fossil picture in the correct position on your grid layout, based on the measurements given.

LA BREA TAR PITS MUSEUM	1	2	3	4	5
A					
B					
C					
D					

Trainee Preparator	1	2	3	4	5
A					
B					
C					
D					

LA BREA TAR PITS MUSEUM

FOSSIL DATA CARDS, Trainee Preparator

La Brea Deposit	La Brea Deposit	La Brea Deposit	La Brea Deposit	La Brea Deposit
Grid:____-____	Grid:____-____	Grid:____-____	Grid:____-____	Grid:____-____
Black-tailed Jackrabbit	*Darkling Beetle*	*Woodrat / Packrat*	*Three-spined stickleback*	*Juniper*
				

LA BREA TAR PITS MUSEUM

FOSSILS- Feel free to change sizes, print, cut out, and place on your grid





Use these if you need help cutting:





LA BREA TAR PITS MUSEUM

FOSSIL IDENTIFICATION KEY (sizes not to scale)

SCIENTIFIC NAME: *Lepus californicus*
COMMON NAME: Black-tailed Jackrabbit
SPECIMEN TYPE: skull and jaw
APPROX. TRUE SIZE: 9cm (3.5in)

SCIENTIFIC NAME: *Tenebrionid*
COMMON NAME: Darkling Beetle
SPECIMEN TYPE: abdomen
APPROX. TRUE SIZE: 2cm (.75in)

SCIENTIFIC NAME*:* *Neotoma*
COMMON NAME: Woodrat/ Packrat
SPECIMEN TYPE: coprolite (poop)
APPROX. TRUE SIZE: 1cm (~.5in)

SCIENTIFIC NAME: *Gasterosteus aculeatus*
COMMON NAME: Three-spined stickleback
SPECIMEN TYPE: spine
APPROX. TRUE SIZE: .5cm (~.25in)

SCIENTIFIC NAME: *Juniperus*
COMMON NAME: Juniper
SPECIMEN TYPE: branchlet
APPROX. TRUE SIZE: .5cm (~.25in)

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