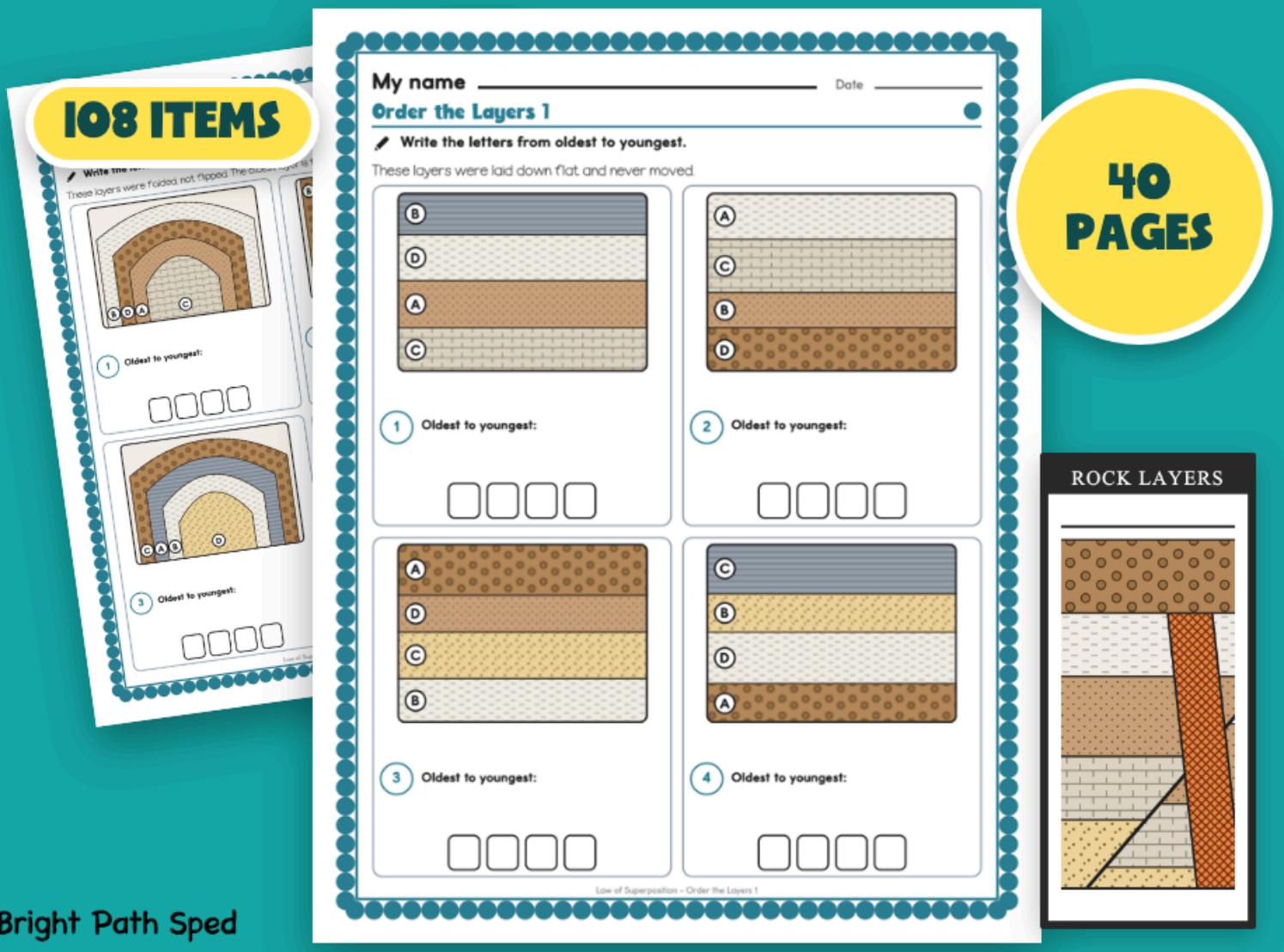
LAW OF SUPERPOSITION

ROCK LAYERS, GRADES 6-8



Bright Path Sped

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- Open it in a PDF reader (Adobe Acrobat Reader, Preview, or your browser), click into a line or a box, type, and Save As.
- Every name line, answer box, check box and ruled box on the student pages is a type-in field, and so are the tracker and the other record pages. You can also print any page and write by hand.
- It works offline, with no account needed.

Print at 100 percent

Turn off fit to page and shrink to fit so the ruled lines stay 0.34 inch apart and the cut pieces keep their size. Every picture in this file is a diagram drawn in flat color and a texture, and every layer also carries its letter, so a black and white copy reads too.

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A filled-in tracker, class grid or team note carries a real student's name. Keep it in the data folder.

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PREVIEW

Teacher Notes

How the pictures are read, the page types in order, and a few teaching notes.

How the pictures are read

- **The law.** Layers are laid down one on top of another, so in layers that were not flipped the lowest is the oldest. Every order page asks for the letters oldest first.
- **Cutting events.** A fault or a dike is younger than every layer it cuts. A layer that lies across it without a break is younger than the fault or dike. If one cuts the other, the one that is cut is older.
- **One right order.** Each picture with a fault or a dike was written as a short list of facts, and the file checks that the list gives exactly one order. The answer keys use that order.
- **The cut lines.** Cut pages 1 and 2: 6 pieces, each 2.4 by 1.46 inches. Page 3: 10 pieces, each 1.46 by 1.15. Page 4: 5 pieces, each 1.46 by 1.5, and glue boxes 1.78 by 2.75. Edge to edge.

Page type	What it looks like	What the student does
How Layers Tell Time; Rules File; Words	3 pages, 6 items	The law, six rules with pictures, six words to match.
Worked Example	1 page, 2 items	A stack walked through step by step, then two to try.
Order the Layers 1 and 2; Tilted; Folded	4 pages, 16 items	Four stacks a page: flat, thick and thin, tilted, arch and bowl.
Faults; Dikes; A Worn Surface; All Events	4 pages, 18 items	Put layers and cutting events in order, then one picture with everything.
Fix the Statements; Good Clue?	2 pages, 12 items	Sentences to check and fix; clues that do and do not show age.
Claim, Evidence, Reasoning 1 and 2	2 pages, 12 items	Four short scenarios with invented numbers.
Quiz; Short Answer	2 pages, 15 items	Ten choices, then five written answers.
Cut and Order; Cut and Sort (3 pages)	4 pages, 27 items	Cards to paste by age, by feature, by group, and a five-step history.

Three steps, marked by a shape

- **Circle.** Order the Layers 1 (page 9) and Cut and Order the Layers (page 23): flat layers, four or six to a picture.
- **Square.** Order the Layers 2 (page 10) and Cut and Sort the Features (page 24): five layers, and what each feature shows.
- **Triangle.** Tilted and folded layers (pages 11, 12), ten layers in groups and the five-step history (pages 25, 26).

Teaching notes

- Say it every day: **new layers go on top, so the bottom layer is the oldest.**
- Students often name the thickest or darkest layer as the oldest. Pages 17 and 18 ask for a reason about position or cutting instead.
- Arches and bowls are the hardest page (12). Ask: which layer was laid down first? It is the oldest, wherever the fold put it.
- This file is about order, not dating by fossils or by years. For rock classes, pair it with the types of rocks product; for how the bits get made and carried, see the weathering and erosion product.

PREVIEW

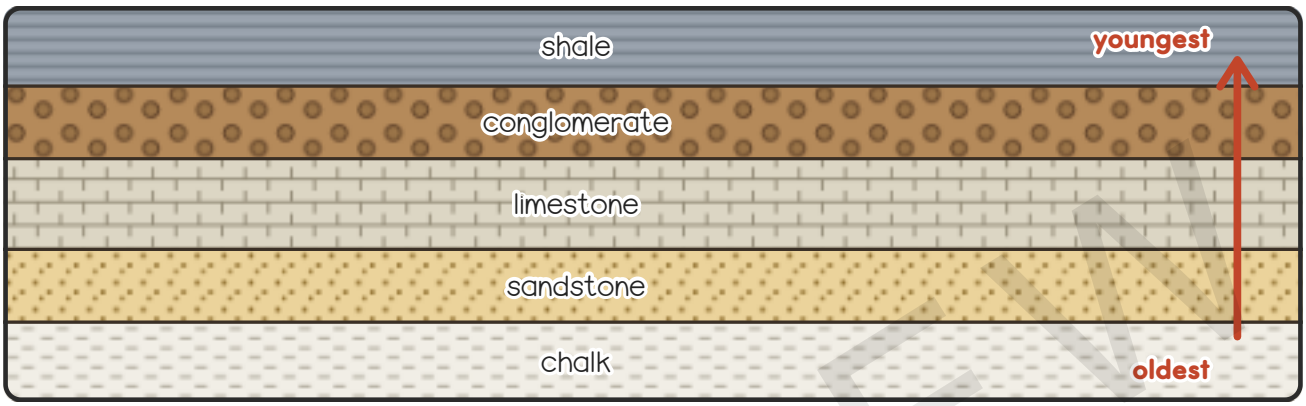
Preview - Bright Path Shed

My name _____ Date _____

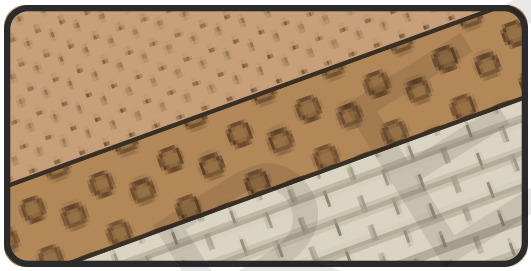
How Layers Tell Time

Read how layers tell time. Keep this page next to you.

Rock in layers is called **strata**. New layers are laid down on top of old ones. This is the **law of superposition**: in layers that were not flipped, the oldest layer is at the bottom and the youngest is at the top.

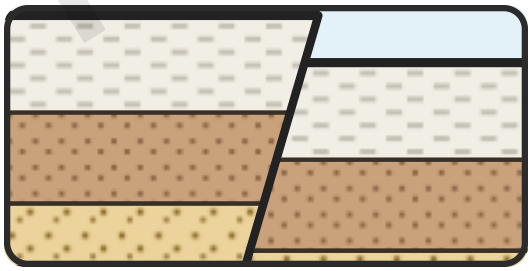


Tilted or folded



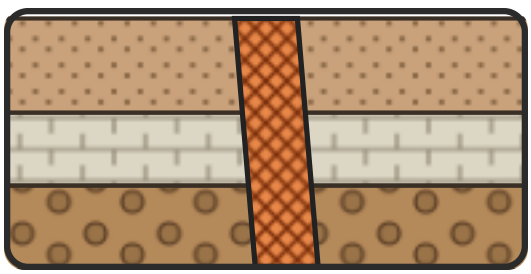
Tilting or folding came later. The layer laid down first is still the oldest.

A fault



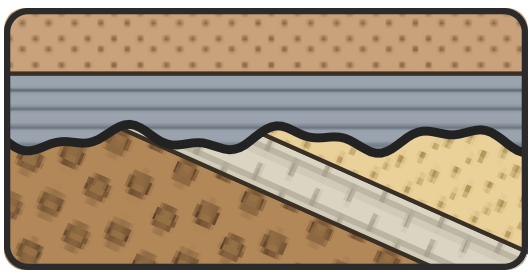
A crack cuts the layers. The fault is younger than every layer it cuts.

A dike



A band of rock cuts across. It is younger than the layers it cuts.

A worn surface



A wavy line means a gap in the record. Time is missing there.

PREVIEW

Preview - Bright Path Shed

My name _____ Date _____

Key Words

Match each word to what it means.

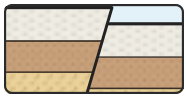
Write the letter of the meaning in the box.



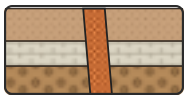
Law of superposition ☐



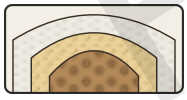
Relative age ☐



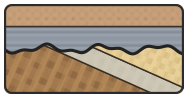
Fault ☐



Intrusion ☐



Fold ☐



Unconformity ☐

A melted rock that pushed into older rock and cooled there

B in layers that were not flipped, the oldest layer is at the bottom and the youngest is at the top

C a gap in the rock record: layers were worn away before new layers formed

D a bend in rock layers

E whether one rock or event is older or younger than another, with no number of years

F a crack in rock where the blocks on each side have moved

Use two of the words in one sentence.

PREVIEW

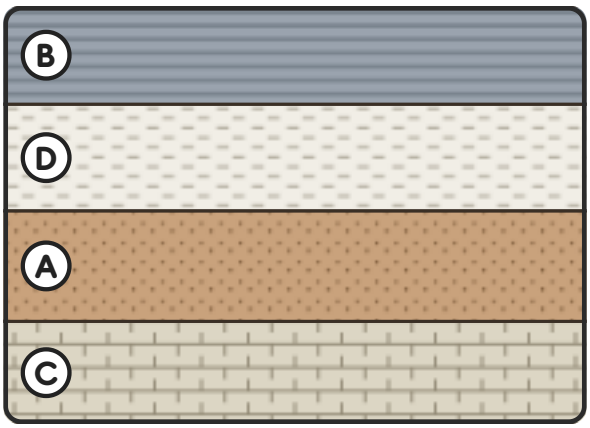
Preview - Bright Path Shed

My name _____ Date _____

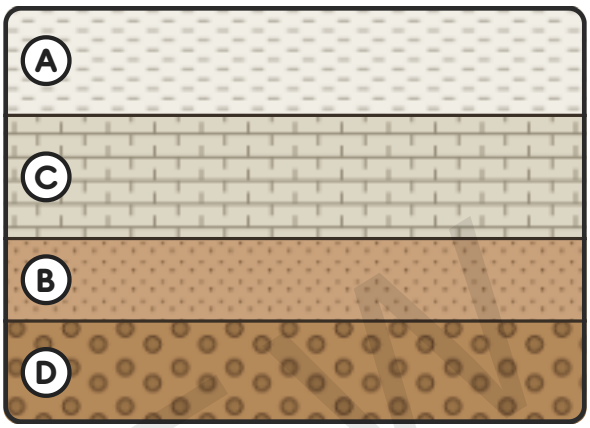
Order the Layers 1

Write the letters from oldest to youngest.

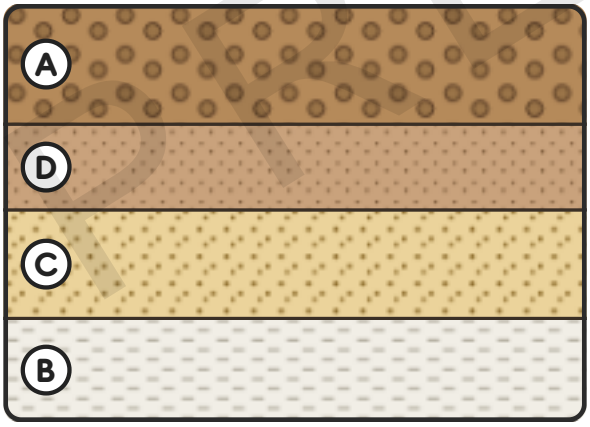
These layers were laid down flat and never moved.



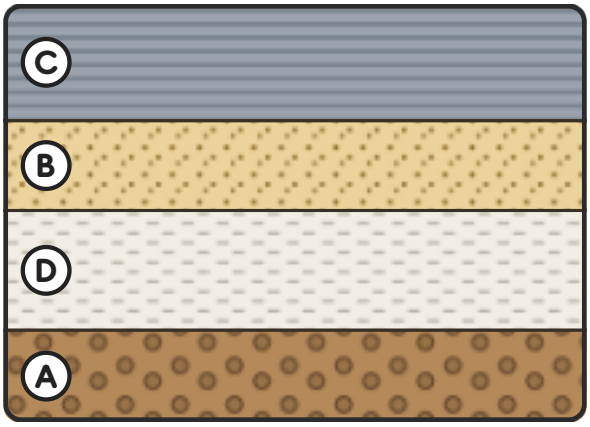
1 **Oldest to youngest:**



2 **Oldest to youngest:**



3 **Oldest to youngest:**



4 **Oldest to youngest:**

PREVIEW

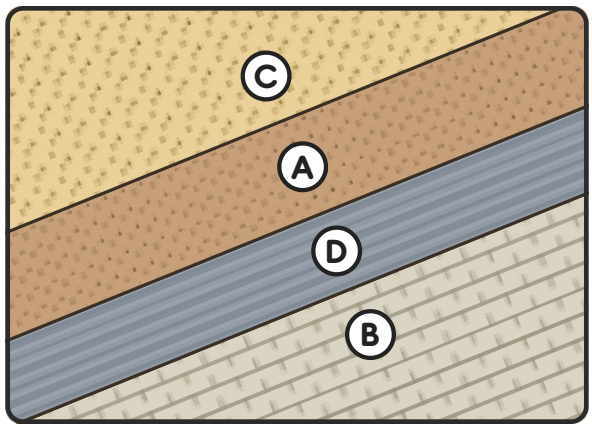
Preview - Bright Path Shed

My name _____ Date _____

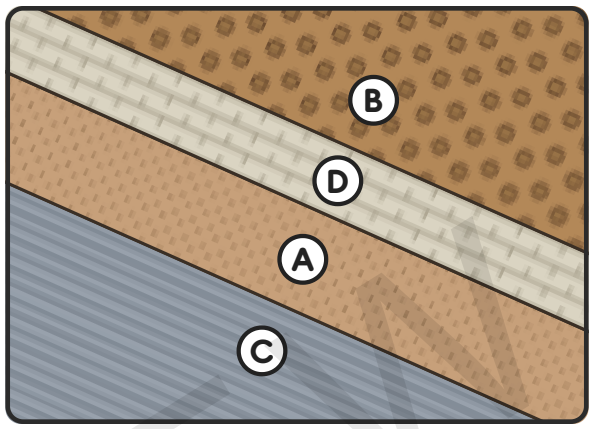
Order Tilted Layers

Write the letters from oldest to youngest.

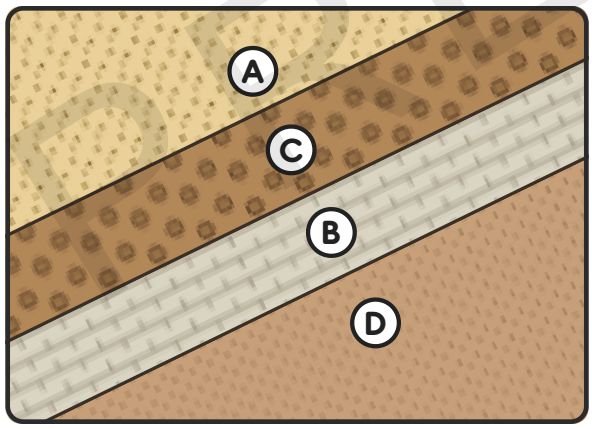
These layers were tilted after they formed. They were not flipped over.



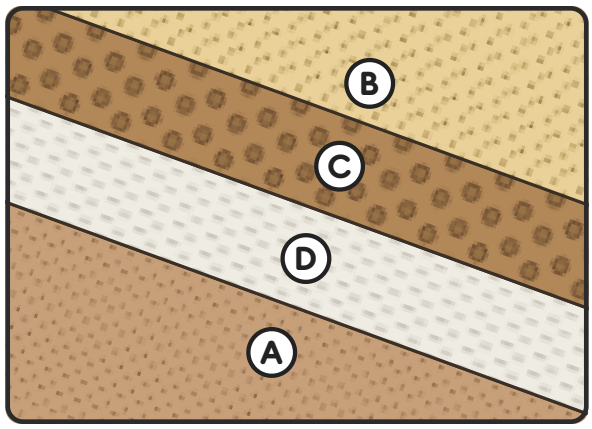
1 **Oldest to youngest:**



2 **Oldest to youngest:**



3 **Oldest to youngest:**



4 **Oldest to youngest:**

PREVIEW

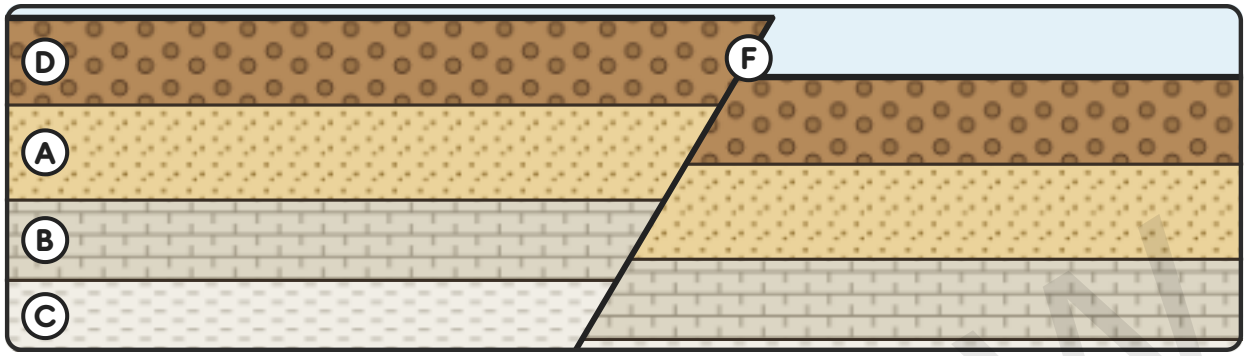
Preview - Bright Path Sped

My name _____ Date _____

Faults

Look at each picture. Put the layers and the fault in order.

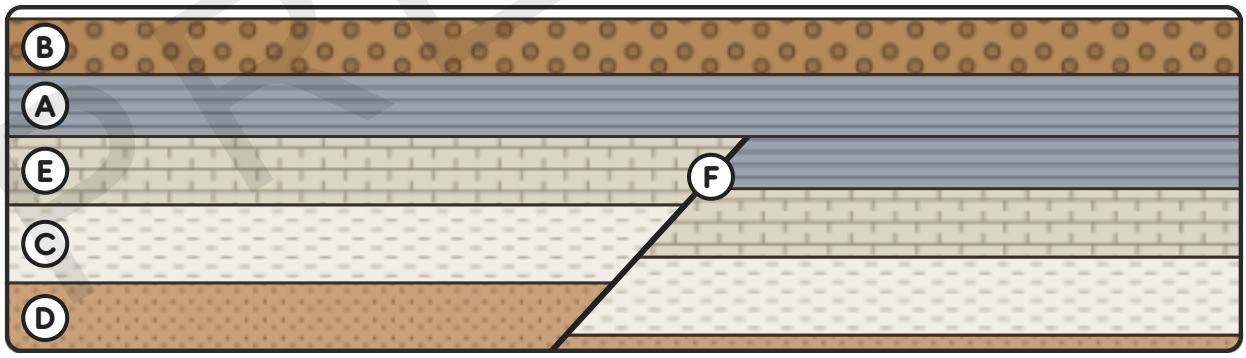
A fault is a crack where the rock on one side moved. Which came first, the layers or the crack?



1 **Oldest to youngest (F is the fault):**

☐ ☐ ☐ ☐ ☐

2 In picture 1, the fault is ___ than layer D. ☐ **older** ☐ **younger**



3 **Oldest to youngest (F is the fault):**

☐ ☐ ☐ ☐ ☐ ☐

4 In picture 2, the fault is ___ than layer A. ☐ **older** ☐ **younger**

PREVIEW

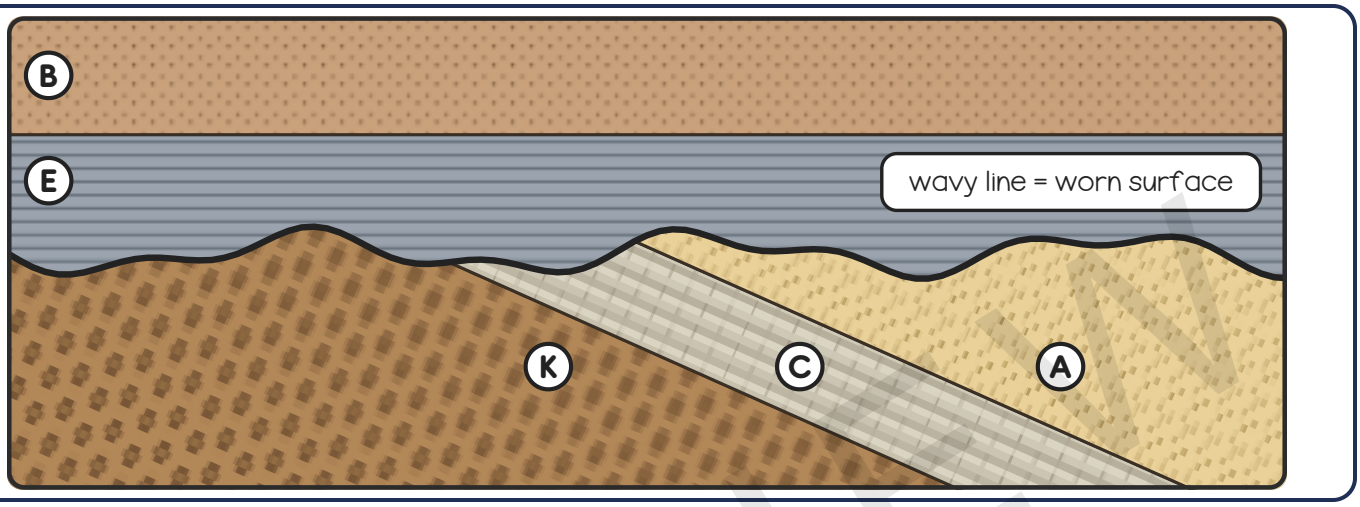
Preview - Bright Path Sped

My name _____ Date _____

A Worn Surface

Look at the picture. Answer each question.

A wavy line like this one is a worn surface. Rock was worn away there before the new layers were laid down.



1 **All five layers, oldest to youngest:** ☐ ☐ ☐ ☐ ☐

2 The tilted layers (K, C, A) are ___ than the flat layers (E, B). ☐ **older** ☐ **younger**

Number the four events 1 to 4, first to last.

3 The tops of the tilted layers were worn away. **Step** ☐

4 The tilted layers were laid down flat, one on top of another. **Step** ☐

5 New flat layers were laid down on top. **Step** ☐

6 The layers were squeezed and tilted. **Step** ☐

PREVIEW

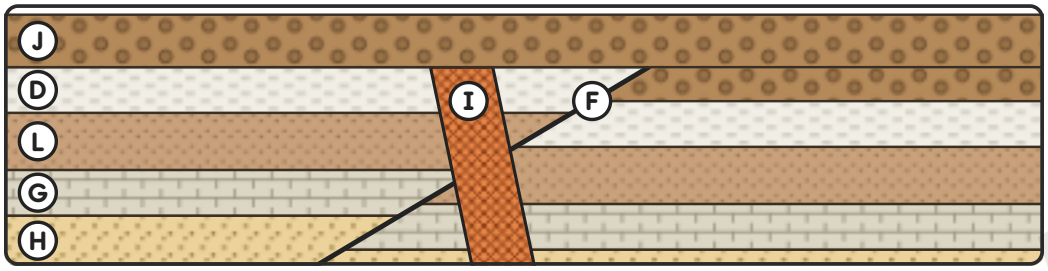
Preview - Bright Path Sped

My name _____ Date _____

Fix the Statements

Find the wrong sentences. Fix them.

Look at the picture. I is the dike and F is the fault. Is each sentence right?



1. Layer G is older than layer L. ☐ right ☐ wrong
   If wrong, write it right: _____

2. The fault is older than layer G. ☐ right ☐ wrong
   If wrong, write it right: _____

3. The fault is older than the dike. ☐ right ☐ wrong
   If wrong, write it right: _____

4. The dike is older than layer D. ☐ right ☐ wrong
   If wrong, write it right: _____

5. Layer J is older than the fault. ☐ right ☐ wrong
   If wrong, write it right: _____

6. Layer D is younger than layer L. ☐ right ☐ wrong
   If wrong, write it right: _____

PREVIEW

My name _____ Date _____

Claim, Evidence, Reasoning 1

Read the facts. Write your claim, evidence and reasoning.

Which layer is older? (invented)

A road cut shows 5 flat layers, numbered 1 at the bottom to 5 at the top. Which is older, layer 2 or layer 4?

Claim

Evidence: use the numbers or the clues

Reasoning: why does the evidence fit the claim?

A dike and a layer (invented)

A dike cuts through layers P, Q and R. It stops at the bottom of layer S, which lies across the top of it without a break. Is the dike older or younger than layer S?

Claim

Evidence: use the numbers or the clues

Reasoning: why does the evidence fit the claim?

PREVIEW

Preview - Bright Path Shed

My name _____ Date _____

Short Answer

Answer each question in your own words.

Useful words **older** **younger** **layer** **fault** **dike** **worn away**

1. Why is the oldest layer usually at the bottom?

2. How can you tell a fault is younger than the layers it cuts?

3. One layer is red and thick. Another is gray and thin. Why can you not tell which is older from that?

4. What does a wavy line between tilted layers and flat layers tell you?

5. Why do we say relative age instead of exact age?

PREVIEW

Preview - Bright Path Shed

My name _____ Date _____

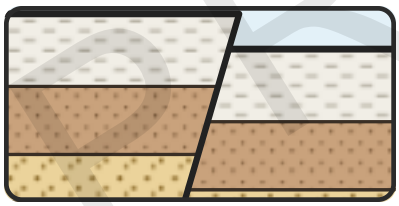
Cut and Sort the Features

Cut out the pieces. Paste each one in its box.

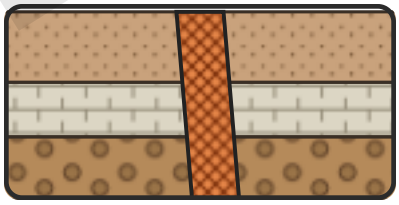
What does each card show: a fault, a dike or a worn surface? Paste each card in its box.

Fault a crack, blocks moved	**Dike** rock cuts across layers	**Worn surface** a gap in the record

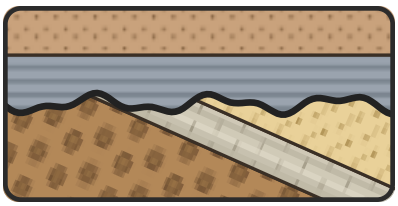
Cut on the dashed lines: one cut across and two down.



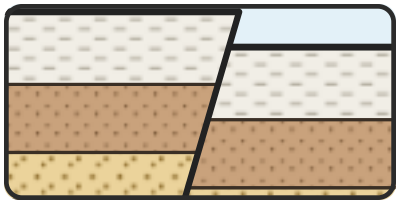
Blocks of rock slid along a crack.



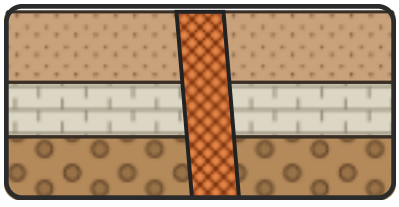
A band of melted rock pushed up through the layers and cooled.



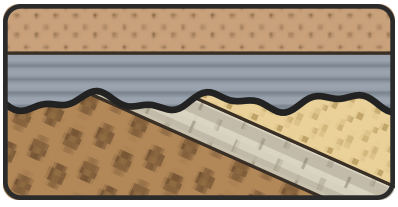
Tilted layers are cut off by a wavy line, with flat layers on top.



A layer ends on one side of a line and starts lower on the other.



A band of different rock cuts straight across the layers.



Flat layers lie across the worn tops of the layers below.

PREVIEW

Preview - Bright Path Shed

My name _____ Date _____

Cut and Build the History

Cut out the pieces. Paste them in order, 1 to 5.

This history built a cliff. Read the five steps. Paste each step in its box, 1 to 5.

1 glue step 1 →	**2** glue step 2 →	**3** glue step 3
4 glue step 4 →	**5** glue step 5 →	**The rock record we read today**

Cut on the dashed lines: one cut across and two down.

New flat layers are laid down on top.	Flat layers are laid down.	A crack cuts through all the layers: a fault.
The layers are squeezed and tilted.	The tops of the tilted layers wear away.	

PREVIEW

Answer Key: Words, Worked Example, Faults, Dikes

Check your answers, then fill in the tracker.

Key Words page 7

Word	Letter
Law of superposition	B
Relative age	E
Fault	F
Intrusion	A
Fold	D
Unconformity	C

Worked Example page 8

Part	Oldest to youngest
Example	D, B, E, C, A
Your turn 1	A, C, B, D
Your turn 2	B, A, I, D

About the pictures

I is the dike and F is the fault. In every picture the order was computed from what each event cuts and what lies across it, and the file checks that only one order fits.

Faults page 13

Item	Answer
1	C, B, A, D, F
2	younger (the fault cuts layer D)
3	D, C, E, F, A, B
4	older (layer A lies across it)

Dikes page 14

Item	Answer
1	B, D, A, C, I
2	younger (the dike cuts layer B)
3	E, B, D, I, A, C
4	older (layer A lies across it)

PREVIEW

Answer Key: Claims, Quiz and Short Answer

Sample answers for pages 19, 20, 21 and 22. Accept any answer that says the same thing, with the evidence (a number or a clue about position or cutting).

Which layer is older? (page 19)

Claim: Layer 2 is older than layer 4. **Evidence:** Layer 2 is the 2nd layer up from the bottom. Layer 4 is the 4th layer up. Layer 2 is lower. **Reasoning:** Each new layer is laid down on top of the ones already there, so in flat layers the lower layer is older.

A dike and a layer (page 19)

Claim: The dike is older than layer S. **Evidence:** The dike cuts through 3 layers (P, Q and R). It does not cut layer S. **Reasoning:** Anything that cuts through a layer is younger than it. Layer S is not cut, so S formed after the dike.

Thick or old? (page 20)

Claim: Layer Z is older. Layer W took longer to form. **Evidence:** Z lies below W. W is 10 cm thick, so it took about 500 years (10 divided by 2, times 100). Z is 4 cm, about 200 years. W took about 300 years longer. **Reasoning:** Position tells which layer is older. Thickness tells how long a layer took to form, not which one is older.

A fault and a layer on top (page 20)

Claim: The fault is younger than layers 1, 2 and 3, and older than layer 4. **Evidence:** The fault cuts 3 layers. Layer 4 has no break. **Reasoning:** A fault is younger than everything it cuts. A layer that lies across it unbroken formed later.

Quiz page 21

#	Answer
1	at the bottom
2	younger than the layers
3	which of two things is older
4	nothing about which is older
5	older than that layer
6	in the middle
7	a gap in the record
8	its color
9	in the middle
10	older than that layer

Short Answer page 22

#	Question and a sample answer
1	**Why is the oldest layer usually at the bottom?** Each new layer is laid down on top of the layers already there, so the first one laid down ends up lowest.
2	**How can you tell a fault is younger than the layers it cuts?** A crack cannot cut through something that is not there yet. The layers had to exist first.
3	**One layer is red and thick. Another is gray and thin. Why can you not tell which is older from that?** Color and thickness do not show when a layer formed. Only its place in the stack, and what cuts it, shows that.
4	**What does a wavy line between tilted layers and flat layers tell you?** The lower layers were tilted and worn away before the upper layers formed, so some time is missing from the record.
5	**Why do we say relative age instead of exact age?** We can tell which is older or younger, but this method gives no number of years.

PREVIEW

Law of Superposition Tracker

One student, every scored page. Filled example: page 36.

Student _____ Teacher _____ Month _____

Page	Page type and set	Items	Right	Date	Notes
7	Key Words	6			
8	Worked Example	2			
9	Order the Layers 1	4			
10	Order the Layers 2	4			
11	Order Tilted Layers	4			
12	Order Folded Layers	4			
13	Faults	4			
14	Dikes	4			
15	A Worn Surface	6			
16	Put All the Events in Order	4			
17	Fix the Statements	6			
18	Good Clue?	6			
19	Claim, Evidence, Reasoning 1	6			
20	Claim, Evidence, Reasoning 2	6			
21	Quiz	10			
22	Short Answer	5			
23	Cut and Order the Layers	6			
24	Cut and Sort the Features	6			
25	Cut and Sort Ten Layers	10			
26	Cut and Build the History	5			

PREVIEW

How to fill this in

Write how many items the student got right with no prompt, and the date. A blank means not tried yet, never wrong. There are 108 items on the 20 scored pages. Answer keys: pages 27 to 31. Filled example: page 36.

This month we are working on (your own standard or wording)

Team Note

Use this page between team meetings or when a student moves classes, to hand off what changed without writing a note from scratch. Everything below is observable, with a blank for the number or the wording your team already uses.

Student _____ Team member _____ Date _____

Page type	Covered since last note (Y/N)	Items right	Still blank
Words and worked example			
Ordering layers			
Faults, dikes and events			
Fix it			
Claims, quiz and short answer			
Cut and sort			

What I saw (observable, not a conclusion)

- Put a stack of layers in order on ___ of ___ items without a prompt.
- Named the bottom layer as the oldest on ___ of ___ tries.
- Used what a fault or dike cuts as a reason: yes / no / with a reminder.
- Used the rules file (page 6): yes / no / with a reminder.

Next step

- Next page or set: ___, because ___ (what you saw).
- What to try in another class or at home: ___.
- What to keep doing because it is working: ___.
- Anything for the team meeting to decide: ___ (this page records what happened, never a label or a plan).

Summary, in one or two sentences, for whoever reads this next

A filled-in line, for reference

"Put 3 of 4 tilted stacks in order on Order Tilted Layers without a prompt on 11/6. Next step: ask the student to say which layer was laid down first before writing the letters." That is the level of detail this page is built for. It matches the filled example on page 36.

PREVIEW

Jordan's Tracker (Invented Student)

Jordan T. is invented; nothing on this page describes a real student. The blank tracker is on page 32.

Student: Jordan T. (an invented student)

Teacher: Ms. Alvarez (invented)

Month: November

Page	Page type and set	Items	Right	Date	Notes
7	Key Words	6	5	11/3	Mixed up fault and fold
8	Worked Example	2	-	-	-
9	Order the Layers 1	4	4	11/4	-
10	Order the Layers 2	4	4	11/5	-
11	Order Tilted Layers	4	3	11/6	Counted the top of a tilt as the oldest
12	Order Folded Layers	4	-	-	-
13	Faults	4	3	11/10	Put the fault first
14	Dikes	4	-	-	-
15	A Worn Surface	6	-	-	-
16	Put All the Events in Order	4	-	-	-
17	Fix the Statements	6	4	11/12	Kept a thickness reason
18	Good Clue?	6	-	-	-
19	Claim, Evidence, Reasoning 1	6	-	-	-
20	Claim, Evidence, Reasoning 2	6	-	-	-
21	Quiz	10	-	-	-
22	Short Answer	5	-	-	-
23	Cut and Order the Layers	6	6	11/13	-
24	Cut and Sort the Features	6	-	-	-
25	Cut and Sort Ten Layers	10	-	-	-
26	Cut and Build the History	5	-	-	-

How to read it

Jordan T. has done **7 of 20** scored pages and got **29 of 34** items right with no prompt. **3** pages were all right and **4** carry a note. Every number comes from the table.

What the table points to

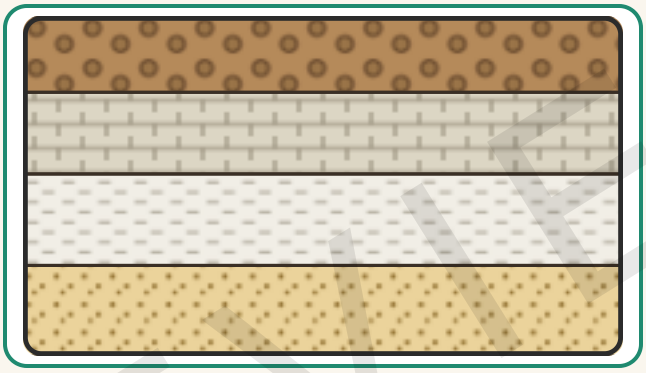
The lowest page is Fix the Statements (4 of 6). That is where the next practice goes. The 13 pages left blank are not tried yet, never wrong.

PREVIEW

Binder Cover

Slide this into the front of a binder. The divider tabs and a spine label to cut out are on the next page (page 39).

Science - Earth Science



LAW OF SUPERPOSITION

Rock Layers and Relative Age

Oldest	Older	Youngest

Teacher _____

Class or student _____

PREVIEW