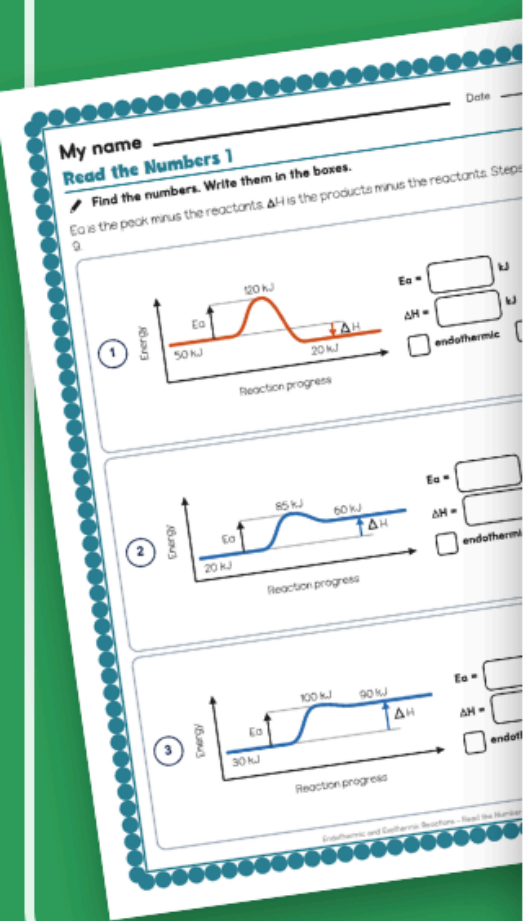
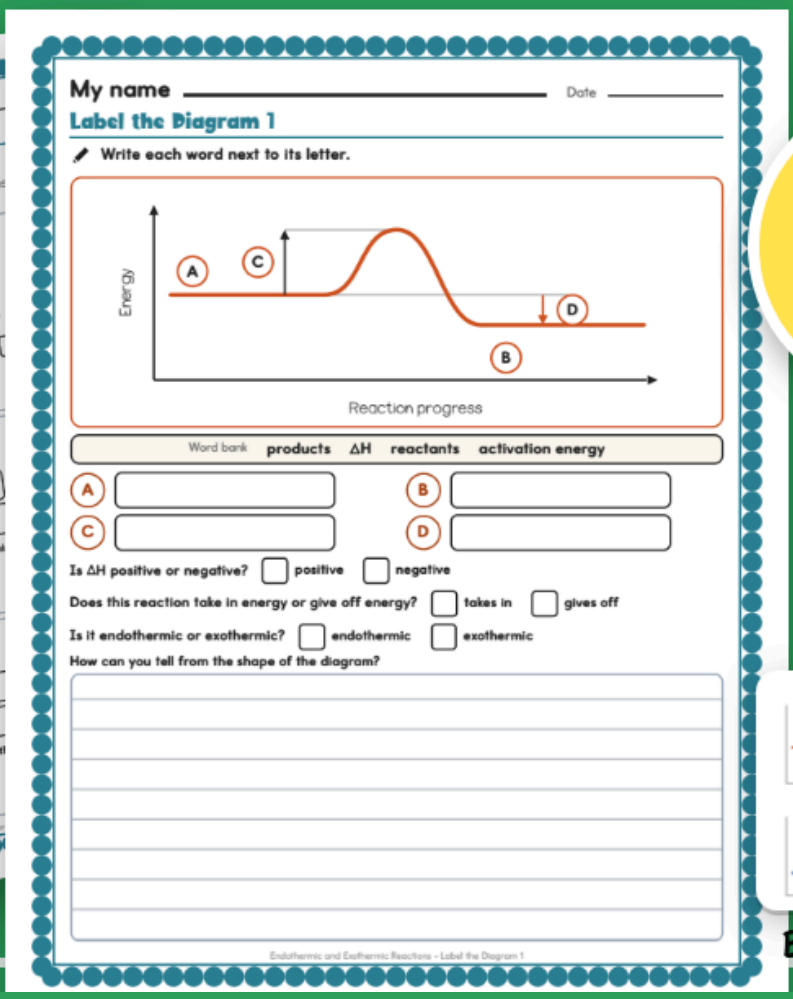
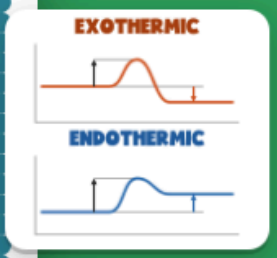
ENDOTHERMIC AND EXOTHERMIC REACTIONS

ENERGY DIAGRAMS - GRADES 7-10





30 PAGES



Bright Path Sped

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- This file is for one classroom: one teacher, one group of students.
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This is a fillable PDF

- 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. Print the lab page to plot its graphs in pencil.
- 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. Endothermic is blue and exothermic is orange-red, and every box also carries the word, so a black and white copy reads too.

Student work

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

Need help?

If a field will not behave or a page will not print the way you expect, use Ask a Question on the product page before leaving a review. A fix to the file ships as a free update from My Purchases.

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PREVIEW

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Teacher Notes

The parts of a student page, the page types in order, and a few teaching notes.

The parts of a page

- **The color code.** Endothermic is blue and exothermic is orange-red on the comparison page, the diagrams, the sort mats and the keys.
- **The answer box.** A bordered box. Click it to type, or print and write in it.
- **The check box.** Endothermic or exothermic; positive or negative.
- **The ruled work box.** Lines 0.34 inch apart, one idea to a line.
- **The cut line.** Ten pieces in a 5 by 2 grid, each 1.46 by 1.15 inches, edge to edge: one cut across and four down.

Page type	What it looks like	What the student does
Endothermic or Exothermic? Parts of an Energy Diagram	2 pages	Side-by-side comparison, then two labeled diagrams and four definitions.
Label the Diagram 1 and 2	2 pages, 14 items	Write four terms beside circled letters, say whether it takes in or gives off energy.
Worked Example	1 page, 3 items	Four steps from the three kJ numbers on a diagram, then a Your Turn.
Read the Numbers 1 and 2	2 pages, 18 items	Subtract to find Ea and the change in energy; or add to find the peak and the products.
Name the Type 1 and 2	2 pages, 16 items	Everyday examples, then clues such as a temperature change or a sign.
Lab Data 1 and 2	2 pages, 18 items	Plot invented temperatures, find the change, claim and evidence.
Short Answer	1 page, 5 questions	Explain in a sentence or two. Sample answers are on the last key.

Two steps, marked by a shape

- **Circle.** Read the Numbers 1 (page 10) and Name the Type 1 (page 12): all the numbers are on the diagram; everyday examples.
- **Triangle.** Read the Numbers 2 (page 11) and Name the Type 2 (page 13): students work backward from givens; clues, not stories.

Teaching notes

- Say it every day: **endo, energy enters; exo, energy exits.** The sign of the change in energy ties the diagram to the temperature.
- The change in energy is products minus reactants, in kJ. A negative ΔH means exothermic; a positive ΔH means endothermic. Your course may use a different sign convention: write it on the line on the tracker.
- The temperature clue is about the **surroundings**, which is why an endothermic mixture feels cold. Short Answer 2 asks why a fire still counts as exothermic.
- All temperatures and energy values are invented for practice. No lab procedure is included; follow your own school's lab rules.

PREVIEW

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My name _____ Date _____

Endothermic or Exothermic?

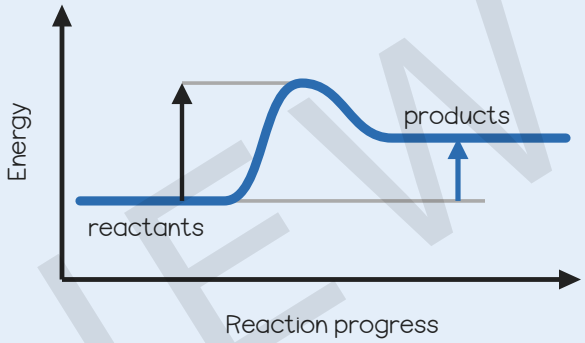


Read about the two kinds. Keep this page next to you.

Memory help: ENdo, energy ENters. EXo, energy EXits.

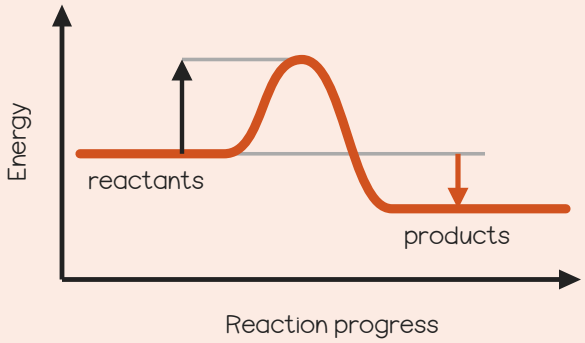
Endothermic

Energy goes IN. The reaction takes in energy.
Products have MORE energy than the reactants.
ΔH is positive.
Surroundings get colder.
Example an instant cold pack.



Exothermic

Energy goes OUT. The reaction gives off energy.
Products have LESS energy than the reactants.
ΔH is negative.
Surroundings get warmer.
Example a campfire.



Which one would feel cold to touch? Why?

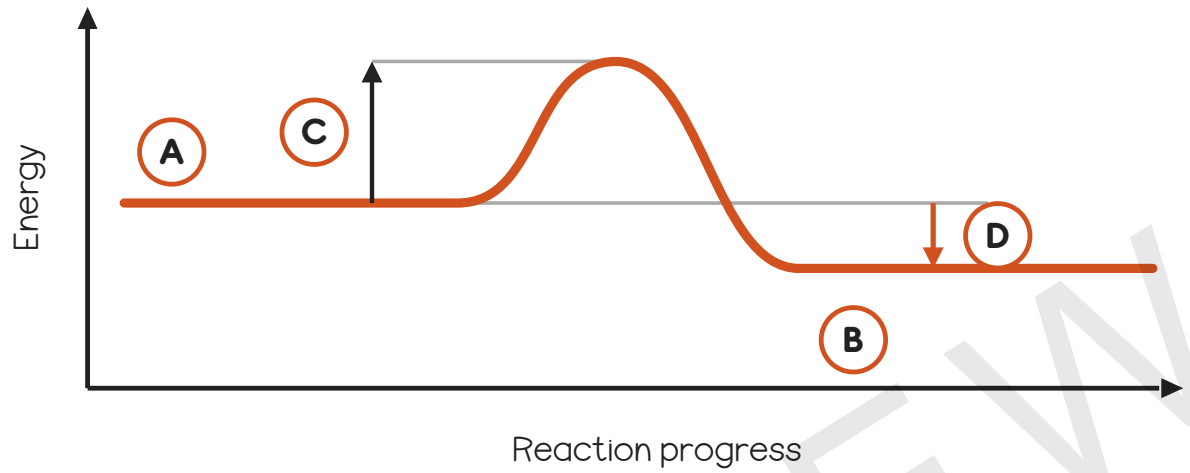
PREVIEW

Preview - Bright Path Shed

My name _____ Date _____

Label the Diagram 1

Write each word next to its letter.



Word bank **products** **ΔH** **reactants** **activation energy**

A _____ B _____

C _____ D _____

Is ΔH positive or negative? ☐ **positive** ☐ **negative**

Does this reaction take in energy or give off energy? ☐ **takes in** ☐ **gives off**

Is it endothermic or exothermic? ☐ **endothermic** ☐ **exothermic**

How can you tell from the shape of the diagram?

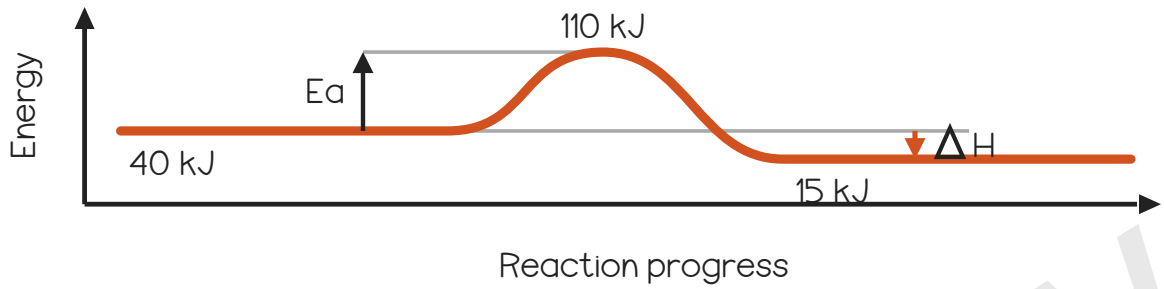
PREVIEW

Preview - Bright Path Sped

My name _____ Date _____

Worked Example

Read how it is done. Then try one.



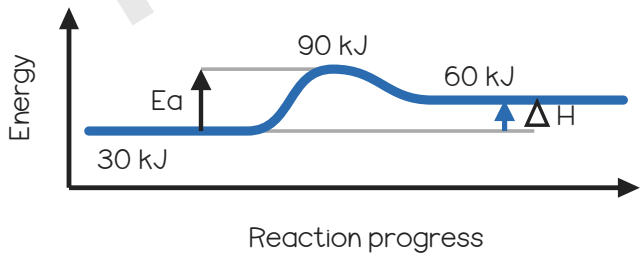
Step 1 Find Ea. Peak minus reactants: 110 - 40 = **70 kJ**.

Step 2 Find ΔH. Products minus reactants: 15 - 40 = **-25 kJ**.

Step 3 Look at the sign. -25 is negative, so energy goes out.

Step 4 Name it. The products are lower than the reactants. It is **exothermic**.

Your turn. Use the numbers on this diagram.



Ea = ☐ **kJ**

ΔH = ☐ **kJ**

☐ **endothermic** ☐ **exothermic**

I know because...

PREVIEW

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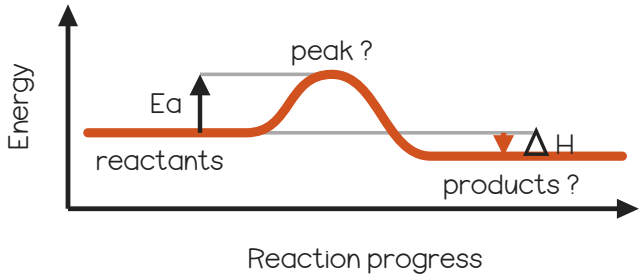
My name _____ Date _____

Read the Numbers 2

Use the numbers you are given. Fill in the boxes.

You know the reactants, Ea and ΔH. Add to find the peak. Then add ΔH to find the products.

1 reactants 40 kJ | Ea 50 kJ | ΔH -20 kJ

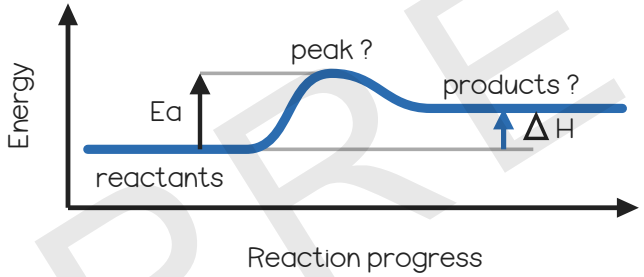


peak = ☐ **kJ**

products = ☐ **kJ**

☐ **endothermic** ☐ **exothermic**

2 reactants 25 kJ | Ea 65 kJ | ΔH +35 kJ

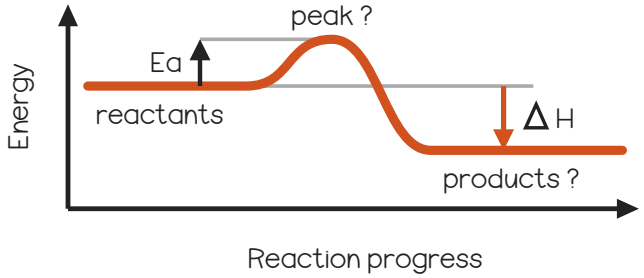


peak = ☐ **kJ**

products = ☐ **kJ**

☐ **endothermic** ☐ **exothermic**

3 reactants 80 kJ | Ea 40 kJ | ΔH -55 kJ



peak = ☐ **kJ**

products = ☐ **kJ**

☐ **endothermic** ☐ **exothermic**

PREVIEW

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My name _____ Date _____

Name the Type 2

Check one box for each one. Write how you know.

Use the clue to decide. ΔH and temperatures are clues.

1. The thermometer goes from 18 °C up to 26 °C.

☐ **endothermic** ☐ **exothermic** **I know because** _____

2. ΔH = +45 kJ.

☐ **endothermic** ☐ **exothermic** **I know because** _____

3. The cup feels colder after the two substances are mixed.

☐ **endothermic** ☐ **exothermic** **I know because** _____

4. On the energy diagram, the products are lower than the reactants.

☐ **endothermic** ☐ **exothermic** **I know because** _____

5. ΔH = -120 kJ.

☐ **endothermic** ☐ **exothermic** **I know because** _____

6. The thermometer goes from 25 °C down to 19 °C.

☐ **endothermic** ☐ **exothermic** **I know because** _____

7. The reaction gives off energy to the surroundings.

☐ **endothermic** ☐ **exothermic** **I know because** _____

8. The reaction takes in energy from the surroundings.

☐ **endothermic** ☐ **exothermic** **I know because** _____

PREVIEW

Preview · Bright Path Sped

My name _____ Date _____

Lab Data 2

Find each change. Check a box.

These temperatures are invented. Find the change for each mixture. Change = end minus start.

Mixture	Start (°C)	End (°C)	Change (°C)	Type
Mixture 3	21	33		☐ endothermic ☐ exothermic
Mixture 4	25	13		☐ endothermic ☐ exothermic
Mixture 5	22	17		☐ endothermic ☐ exothermic
Mixture 6	19	27		☐ endothermic ☐ exothermic

Biggest rise: Mixture ☐ **Biggest drop:** Mixture ☐

Claim: Mixture 4 is endothermic. Write your evidence from the table.

A student says, "Mixture 4 got cold because it lost energy." Is that right? Explain.

PREVIEW

Preview - Bright Path Shed

My name _____ Date _____

Cut and Sort 2

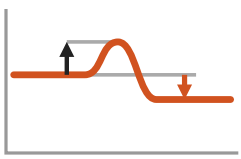
Cut out the pieces. Paste each one in its box.

Each diagram has the reactants on the left and the products on the right. Paste five pieces in each box.

Endothermic energy goes in	**Exothermic** energy goes out

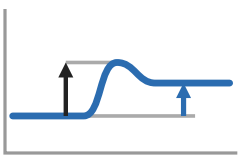
PREVIEW

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



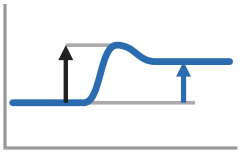
the surroundings get colder

ΔH is negative



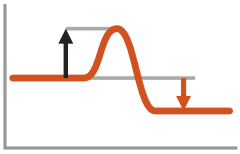
products have more energy than reactants

the surroundings get warmer



ΔH is positive

products have less energy than reactants



Answer Key: Diagrams, Numbers and Lab Data

Ea is the peak minus the reactants. The change in energy is the products minus the reactants. Every value was computed from the diagram numbers.

Label the Diagram pages 7, 8

Page	Letters	Then
Label the Diagram 1	A reactants, B products, C activation energy, D ΔH	ΔH negative; gives off energy; Exothermic
Label the Diagram 2	A reactants, B products, C activation energy, D ΔH	ΔH positive; takes in energy; Endothermic

Read the Numbers 1 and the worked example (reactants, peak, products in kJ) pages 9, 10

Item	kJ	Answers	Type
Worked example	40, 110, 15	Ea 70, ΔH -25	Exothermic
Your Turn	30, 90, 60	Ea 60, ΔH 30	Endothermic
Read 1, #1	50, 120, 20	Ea 70, ΔH -30	Exothermic
Read 1, #2	20, 85, 60	Ea 65, ΔH 40	Endothermic
Read 1, #3	30, 100, 90	Ea 70, ΔH 60	Endothermic

Read the Numbers 2 page 11

#	Given (kJ)	Answers (kJ)	Type
#1	40, Ea 50, ΔH -20	peak 90; products 20	Exothermic
#2	25, Ea 65, ΔH 35	peak 90; products 60	Endothermic
#3	80, Ea 40, ΔH -55	peak 120; products 25	Exothermic

Three checks for every diagram

- Ea = the peak minus the reactants.
- ΔH = the products minus the reactants.
- Negative ΔH: products are lower, energy goes out, exothermic. Positive ΔH: products are higher, energy goes in, endothermic.

Lab Data 1 and 2 (temperatures in °C, invented) pages 14, 15

Mixture	Start	End	Change	Type
Mixture 1	22	30	+8	Exothermic
Mixture 2	24	16	-8	Endothermic
Mixture 3	21	33	+12	Exothermic
Mixture 4	25	13	-12	Endothermic
Mixture 5	22	17	-5	Endothermic
Mixture 6	19	27	+8	Exothermic

Points to plot (minute, temperature)

- **Mixture 1:** (0, 22), (1, 26), (2, 28), (3, 30), (4, 30), (5, 30)
- **Mixture 2:** (0, 24), (1, 20), (2, 18), (3, 16), (4, 16), (5, 16)

Lab Data 2 questions

Biggest rise: Mixture 3 (+12). Biggest drop: Mixture 4 (-12). Claim for Mixture 4: the temperature fell from 25 to 13, so it took in energy from the surroundings. The student is not right: the surroundings lost energy; the mixture did not lose it.

PREVIEW

Energy Changes Tracker

One student, every scored page. Filled example: page 26.

Student _____ Teacher _____ Month _____

Page	Page type and set	Items	Right	Date	Notes
7	Label the Diagram 1	7			
8	Label the Diagram 2	7			
9	Worked Example	3			
10	Read the Numbers 1	9			
11	Read the Numbers 2	9			
12	Name the Type 1	8			
13	Name the Type 2	8			
14	Lab Data 1	8			
15	Lab Data 2	10			
16	Short Answer	5			
17	Cut and Sort 1	10			
18	Cut and Sort 2	10			

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 94 items on the 12 scored pages. Answer keys: pages 19 to 21. Filled example: page 26.

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
Label the Diagram			
Worked example			
Read the Numbers			
Name the Type			
Lab data and short answer			
Sorts			

What I saw (observable, not a conclusion)

- Named endothermic or exothermic correctly on ___ of ___ items without a prompt.
- Found Ea and the change in energy from the numbers on ___ of ___ diagrams.
- Used the sign of the change (or the temperature) as evidence: yes / no / with a reminder.
- Used the parts page (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

"Found Ea and the change in energy on 7 of 9 items on Read the Numbers 1 without a prompt on 11/5. Next step: say the subtraction out loud (products minus reactants) before writing." That is the level of detail this page is built for. It matches the filled example on page 26.

PREVIEW

Priya's Tracker (Invented Student)

Priya N. is invented; nothing on this page describes a real student. The blank tracker is on page 22.

Student: Priya N. (an invented student)

Teacher: Mr. Okafor (invented)

Month: November

Page	Page type and set	Items	Right	Date	Notes
7	Label the Diagram 1	7	6	11/3	Mixed up activation energy and the change in energy
8	Label the Diagram 2	7	-	-	-
9	Worked Example	3	3	11/4	-
10	Read the Numbers 1	9	7	11/5	Added instead of subtracted on one item
11	Read the Numbers 2	9	-	-	-
12	Name the Type 1	8	7	11/6	Called a heated sample exothermic
13	Name the Type 2	8	-	-	-
14	Lab Data 1	8	7	11/10	Left the minus sign off one change
15	Lab Data 2	10	-	-	-
16	Short Answer	5	-	-	-
17	Cut and Sort 1	10	9	11/12	One piece pasted in the wrong box
18	Cut and Sort 2	10	-	-	-

PREVIEW

How to read it

Priya N. has done **6 of 12** scored pages and got **39 of 45** items right with no prompt. **1** page was all right and **5** carry a note. Every number comes from the table.

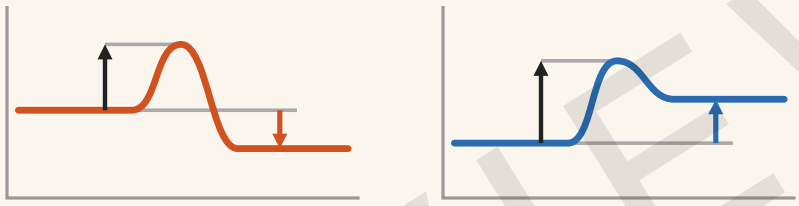
What the table points to

The lowest page is Read the Numbers 1 (7 of 9). That is where the next practice goes. The 6 pages left blank are not tried yet, never wrong.

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 29).

Science - Chemistry



ENDOTHERMIC AND EXOTHERMIC REACTIONS

Energy Diagrams

Learn | **Practice** | **Check**

Teacher _____

Class or student _____

PREVIEW