

8TH GRADE Flex Day 4 NAME: _____

EVALUATE

① 5^2

② 2^5

③ 5^1

④ 1^5

⑤ 0^4

⑥ 4^0

⑦ $(-5)^2$

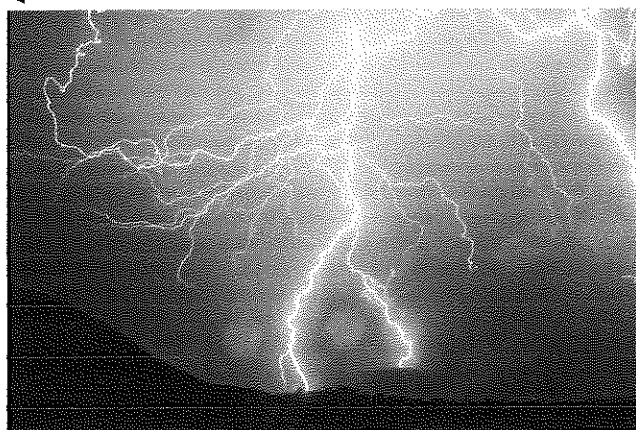
⑧ $-(5)^2$

⑨ $(-5)^3$

⑩ -5^3

THE SCIENCE OF LIGHTNING

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We have all seen those ominous dark clouds that suddenly flash a bright bolt of lightning through the sky, with a loud clap of thunder trailing close by. Thunderstorms are a common occurrence on our planet, thousands happening any given minute, but much information is yet to be discovered about this mysterious light show. Scientists continue to have unanswered questions about lightning because the process is so complex. It involves an in depth knowledge of both physics and chemistry. (1)

Lightning is an electric current that originates inside of a cloud, caused by rapidly rising and falling air currents. Ice and water droplets move around inside the cloud, forming collisions and friction that cause the cloud to fill with both positive and negative charges, each at opposite ends of the cloud. To generate a bolt of lightning, the negative charges must gain enough power and pull towards the positive charges on the ground. The negative charge from the cloud will send out a feeler, best known as a *stepped*

leader, which is a series of negative charges. As the stepped leader approaches the ground, a *positive streamer* will extend up for it creating a *channel* and then a flash of light is created from the return stroke running from the ground to the clouds. (2)

Bolts of lightning do not always flash vertically. Most of the electrical energy created from a thunderstorm is dissipated within the clouds. Lightning may flash horizontally towards the positive particles of another nearby cloud, hopping back and forth between the positive and negative charges. (3)

As the air surrounding the lightning bolt is heated, it causes the air to expand faster than the speed of sound, squeezing the air and forming a shock wave that we know as thunder. Since lightning bolts can create many short bursts, multiple shock waves at various altitudes are made, which reach your ears at different times, making a rumbling sound. (4)

Light travels at 186,291 miles per second, which is much faster than sound at 1,088 feet per second. This explains why we always see a bolt of lightning before we hear a rumble of thunder. If you want an estimate as to how many miles away the lightning struck, simply count the seconds between the flash of light and the rumble of thunder and divide by 5. (5)

THE SCIENCE OF LIGHTNING

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Do not underestimate the speed and heat of lightning at 220,000 miles per hour and 54,000 degrees Fahrenheit, respectively (five times hotter than the sun). The total electrical energy generated in a large thunderstorm is more than an atomic bomb! When the negative charges from the clouds make a connection with the positive charges from the ground, the amount of light generated is enough to temporarily

blind a camera lens. (6)

Studying lightning is not easy, and it can be very dangerous. In 2015, lightning took the lives of 27 people. During a thunderstorm, it is best to remain indoors and stay off the roads, if possible. People on the road should remain in their cars and seek shelter away from trees or other tall objects, which are known to be good conductors of electricity. (7)

1. Why do scientists continue to have so many unanswered questions about lightning?
2. Explain what is lightning and how does it happen.
3. Why do we see lightning before we hear thunder?
4. How can we estimate the distance from where a bolt of lightning struck?
5. What makes the rumbling sound of thunder?
6. Why is studying lightning so dangerous?
7. What should you do to remain safe during a thunderstorm?

Name: _____

Understanding COMMA SPLICES

In written English, the comma splice is one of the most frequent errors. Learn what it is, and how to avoid it, and your writing will be all the better for it.

WHAT IS IT?

A **comma splice** is the use of a **comma** to join two independent clauses.



EXAMPLE: *It is late, we will not make the bus on time.*

Either side of this comma, we have independent clauses – sentences in their own right, which can stand alone.

X WRONG

In English, this is considered **incorrect**. In order to join together two independent clauses, we need to use a comma and a coordinating **conjunction** (such as *and*, *so* or *but*). Or we can write them as two separate sentences, or join with a semicolon.

EXAMPLES: *It is late, and we will not make the bus on time.* ✓

It is late; we will not make the bus on time. ✓

It is late. We will not make the bus on time. ✓

RIGHT
RIGHT
RIGHT

PRACTICE

For each of the following, decide if they are complete sentences or if there are comma splices.

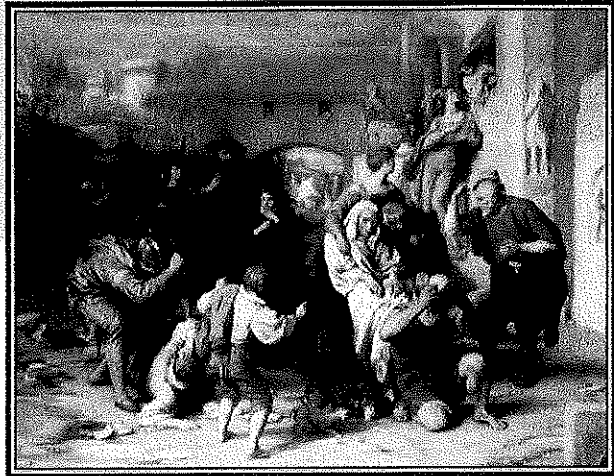
Comma Splice Complete Sentence

- Susan was always late for work, nobody seemed to care.
- He didn't like to ski, so he always went to the restaurant instead.
- Sitting down, she realised she didn't have her work with her.
- English is a difficult subject, Math is easy.
- After I passed my exam, I was allowed to drive alone.
- He makes delicious pizzas, I love them.
- Jen loves cake, Tom likes cookies, but I love them both.
- It is cold outside, put on a jacket.
- As the students understood comma splice, the teacher was pleased.
- He loved her with all his heart, yet she couldn't love him back.
- Marking quizzes is bearable, marking essays is painful.
- Ben loves to read and travel, he often reads while travelling!
- Although she was tired, she couldn't sleep.

Name: _____

Shakespeare's Language: What's the Meaning?

All the World's a Stage
from Act II, Scene VII of
As You Like It
by *William Shakespeare*



All the world's a stage,
And all the men and women merely players:
They have their exits and their entrances;
And one man in his time plays many parts,
His acts being seven ages. At first the infant,
Mewling and puking in the nurse's arms.
And then the whining school-boy, with his satchel
And shining morning face, creeping like snail
Unwillingly to school. And then the lover,
Sighing like furnace, with a woeful ballad
Made to his mistress' eyebrow. Then a soldier,
Full of strange oaths and bearded like the pard,
Jealous in honour, sudden and quick in quarrel,
Seeking the bubble reputation
Even in the cannon's mouth. And then the justice,
In fair round belly with good capon lined,
With eyes severe and beard of formal cut,
Full of wise saws and modern instances;
And so he plays his part. The sixth age shifts
Into the lean and slipper'd pantaloon,
With spectacles on nose and pouch on side,
His youthful hose, well saved, a world too wide
For his shrunk shank; and his big manly voice,
Turning again toward childish treble, pipes
And whistles in his sound. Last scene of all,
That ends this strange eventful history,
Is second childishness and mere oblivion,
Sans teeth, sans eyes, sans taste, sans everything.

Find the Meaning

Briefly explain the meaning of each of the following phrases.

"...creeping like snail/Unwillingly to school"

"His youthful hose, well saved, a world too wide/For his shrunk shank"

"Sans teeth, sans eyes, sans taste, sans everything"
