

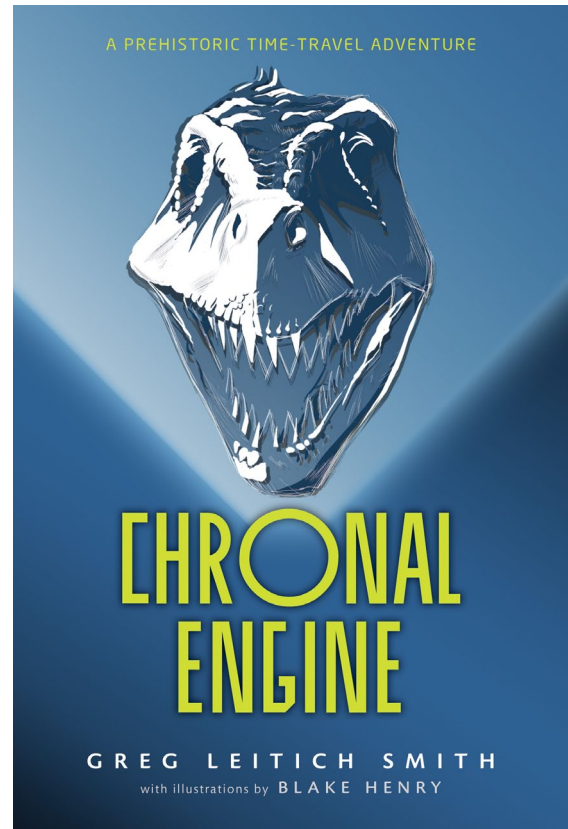
A Common Core State
Standards & TEKS-aligned
Educator's Guide for

CHRONAL ENGINE

ISBN-13/EAN: 9780547608495 (HC)

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For Grades 4 - 7



WRITTEN BY GREG LEITICH SMITH
ILLUSTRATIONS BY BLAKE HENRY
PUBLISHED BY CLARION BOOKS

When Max, Kyle, and Emma are sent to live with their reclusive grandfather, they think he's crazy, especially when he tells them about his time machine. But after Emma is kidnapped at the exact time that her grandfather predicted, Max and Kyle are forced to believe his eccentric stories—even the one about the Chronal Engine in the basement.

Now, to save Emma, Max, Kyle, and their new friend Petra must pile into a VW Bug, and use the Chronal Engine to take the road trip of a lifetime—right back to the Cretaceous Period. With dangers all around, the teens find themselves dodging car-crushing herbivores in addition to the terrifying T. rex. In this ancient environment, can three contemporary teens hunt down a kidnapper, forage for food, and survive long enough to return home?

**GUIDE CRAFTED BY
DEBBIE GONZALES**



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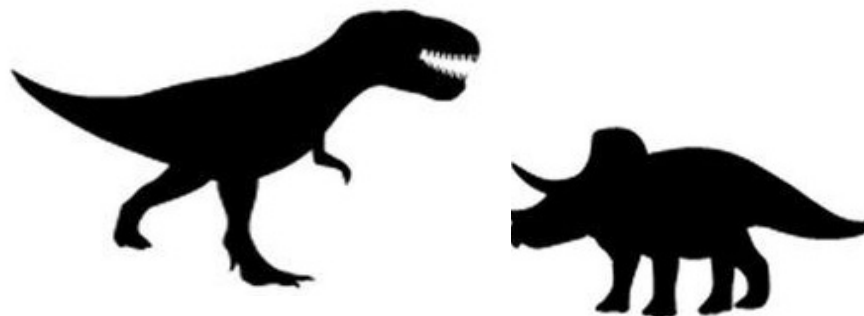
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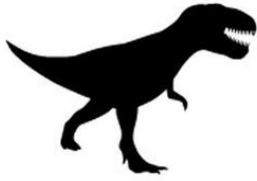
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DISCUSSION QUESTIONS



Max is the only one of three siblings who has inherited the “dinosaur gene” from his mother and her family. How does Max’s knowledge of dinosaurs help the teens when they find themselves in the Cretaceous Period?

The lives of the Takahashi family have been marked by episodes of loss and estrangement, from the death of the father in Afghanistan to the alienation of the grandfather from the rest of the family. How do these difficult elements in their family help or hinder Max, Kyle, and Emma in their efforts to survive in another time period?

Through the difficulties of maintaining their survival, Max and Kyle forge a stronger bond. The new characters of Petra and Samuel represent an unknown to the brothers. Max and Kyle question what motivates each character and what knowledge each may possess. The brothers question whether they can trust Petra and Samuel throughout their time in the Cretaceous Period. Discuss the role of trust in a group’s quest to survive.

As a reader, which characters are likeable? Which character would be an asset in a situation that would require survival skills and why? How would you imagine this character helping you in a high stakes situation of survival?

The concept of time travel allows *Chronal Engine* author Greg Leitich Smith to utilize the literary device of foreshadowing. What examples of foreshadowing did you recognize as you were reading the novel? What story elements involving foreshadowing prepare the groundwork for a sequel to *Chronal Engine*?

The element of conflict is central to all stories, including *Chronal Engine*. What conflicts did you notice between the siblings, between all the characters, and with nature? Describe and discuss the physical, moral, intellectual, and/or emotional conflicts found in the story.



ACTIVITIES



PICTURE THIS:

The author of *Chronal Engine* uses vivid detail to describe the landscape of the Cretaceous Period. Using the descriptive excerpt below, create a colorful illustration of the setting the characters find themselves in when they travel back in time.

The (VW) Beetle rested at an angle on a mound, nestled against a giant tree, at least a hundred feet tall, at the edge of a forest of other giants - redwoods, I thought - some with trunks as much as ten feet in diameter. The undergrowth seemed to be mostly ferns, with occasional stands of stubby palms and cycads.

Away from the forest was a sandy beach, about seventy-five, maybe a hundred feet wide, leading up to an endless expanse of glassy, still water.

POINT OF VIEW:

The majority of *Chronal Engine* is told from Kyle, Max, and Petra's point of view. The story details their journey back in time and their attempt to rescue Emma after she is kidnapped. Retell a portion of the story from Emma's point of view. Start with the section of the story (below) where she is kidnapped. Express what she is feeling and seeing as she is captured and dragged back to the Cretaceous period.

. . . there was a flash of light on the creek bank and a man appeared from nowhere next to Emma . . . The man was wearing a tweed jacket with a vest and a straw hat that looked like something he'd stolen from a barbershop quartet. Or from another time. He was holding a Recall Device on one hand and a pistol in the other. Before any of use could react, he had his arm around Emma's neck from behind . . . It was too late. There was another flash of light and a booming sound, and both my sister and the man were gone.

LIGHTS, CAMERA, ACTION!:

Imagine that *Chronal Engine* were to be adapted into a screenplay for a movie. Design a movie poster for the film. How would you advertise the story? What scene would you use on the poster? Which actors would star in the movie? What slogan would you use to entice moviegoers to see *Chronal Engine* in the theater?

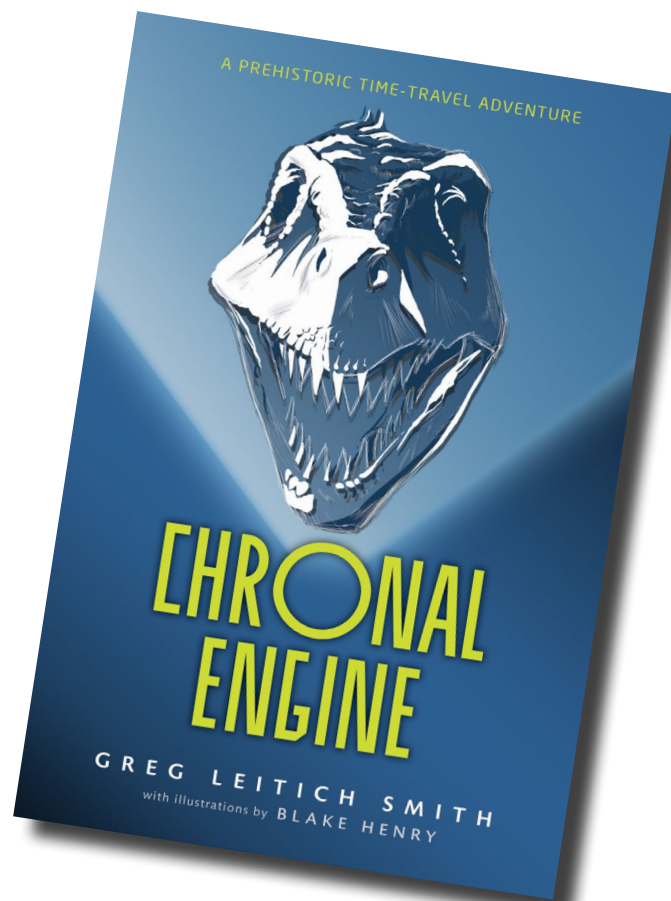


DINOSAUR DETAILS:

Max has extensive knowledge of dinosaurs and uses his understanding of the creatures to help Kyle and Petra survive in the Cretaceous Period. Select a dinosaur mentioned in *Chronal Engine* and gather research about the dinosaur to share with your class or reading group.

DINOSAUR DETAILS:

The illustrations that appear throughout the novel illustrate significant events in the story. Go back through the book and examine each illustration closely. Write a caption for each that expresses what's going on at that particular moment in the narrative.



Smith, Greg Leitich. *CHRONAL ENGINE*. New York: Clarion Books, 2012.
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WORD SEARCH

S X N S L A P S U K Z X G Q G D K D M X
 D Q T I D P T H B G V J A X F I D B Q S
 W Y R H F S E N J K M H J E D R L M U A
 P E I J N U R L G O S B S R C O A O F S
 C L C L A H O C I O E Q U S T T C R O F
 J Q E P N P S Z Y Y S F H U X P K N I X
 T I R Q O O A H K O U S C R Y A O I D R
 T R A X T L U U D H R V U U D R D T S O
 C N T A Y O R V B G U E S A I I O H U T
 Z E O G R R I U V M A L O S F V U O R P
 E H P L A U G J P S S O N O N O N M U A
 S S S S N A U G F K O C I N J Z B I A R
 A C H A N S P D V U M I E N T L F M S O
 L V M M U A O Z D B A R D A B P Y U O R
 Q P Y Q S R T I D A L A E R Q N T S T C
 B X H A Z A H E U P A P L Y B B C Q A I
 Q L V Z X P T G M L B T G T R B R Q P M
 N L U S O U Y R U A S O E A M O R D A B
 P H L W I K S P O T A R E C O T P E L W
 K R U A S O N A T I T P M Y X M N O K L

ALAMOSAUROSAURUS

APATOSAURUS

DEINOSUCHUS

DROMAEOSAURUS

NANOTYRANNUS

LEPTOCERATOPS

MICRORAPTOR

ORNITHOMIMUS

OVIRAPTORID

VELOCIRAPTOR

PARASAUROLOPHUS

PTEROSAUR

TITANOSAUR

TRICERATOPS

TYRANNOSAURUS REX



WORD SEARCH PUZZLE ANSWERS

S X N S L A P S U K Z X G Q G D K D M X
 D Q T I D P T H B G V J A X F I D B Q S
 W Y R H F S E N J K M H J E D R L M U A
 P E I J N U R L G O S B S R C O A O F S
 C L C L A H O C I O E Q U S T T C R O F
 J Q E P N P S Z Y Y S F H U X P K N I X
 T I R Q O O A H K O U S C R Y A O I D R
 T R A X T L U U D H R V U U D R D T S O
 C N T A Y O R V B G U E S A I I O H U T
 Z E O G R R I U V M A L O S F V U O R P
 E H P L A U G J P S S O N O N O N M U A
 S S S S N A U G F K O C I N J Z B I A R
 A C H A N S P D V U M I E N T L F M S O
 L V M M U A O Z D B A R D A B P Y U O R
 Q P Y Q S R T I D A L A E R Q N T S T C
 B X H A Z A H E U P A P L Y B B C Q A I
 Q L V Z X P T G M L B T G T R B R Q P M
 N L U S O U Y R U A S O E A M O R D A B
 P H L W I K S P O T A R E C O T P E L W
 K R U A S O N A T I T P M Y X M N O K L

ALAMOSAUROS

APATOSAURUS

DEINOSUCHUS

DROMAEOSAUR

NANOTYRANNUS

LEPTOCERATOPS

MICRORAPTOR

ORNITHOMIMUS

OVIRAPTORID

VELOCIRAPTOR

PARASAUROLOPHUS

PTEROSAUR

TITANOSAUR

TRICERATOPS

TYRANNOSAURUS REX



THE END OF AN ERA – RESEARCH THE CRETACEOUS PERIOD

Identify and discuss the terms featured on the word cloud and the geological time scale below.

Choose a term of interest, one that you desire to know more about. Use the KWL graphic organizer on the following page to gather information and references. Write an informational essay using your research findings. Illustrate your work and share it with your classmates.

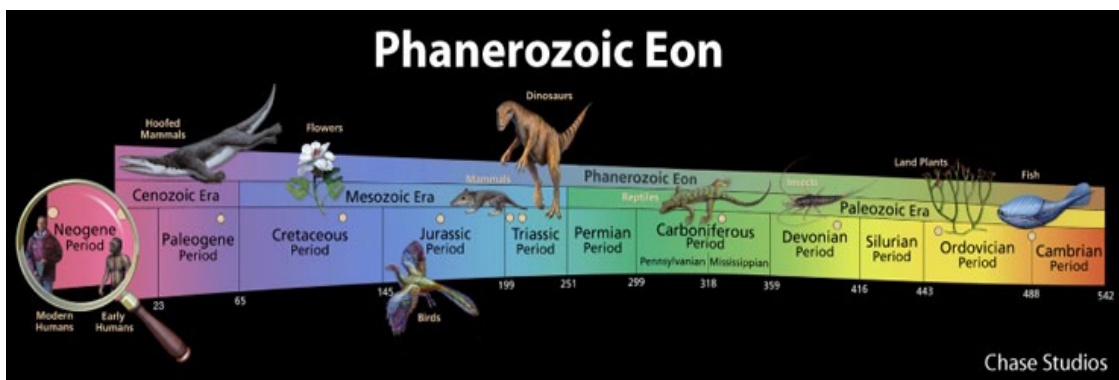


Photo Credit: Sam Noble Museum - Geological Time Scale (<http://samnoblemuseum.ou.edu>)



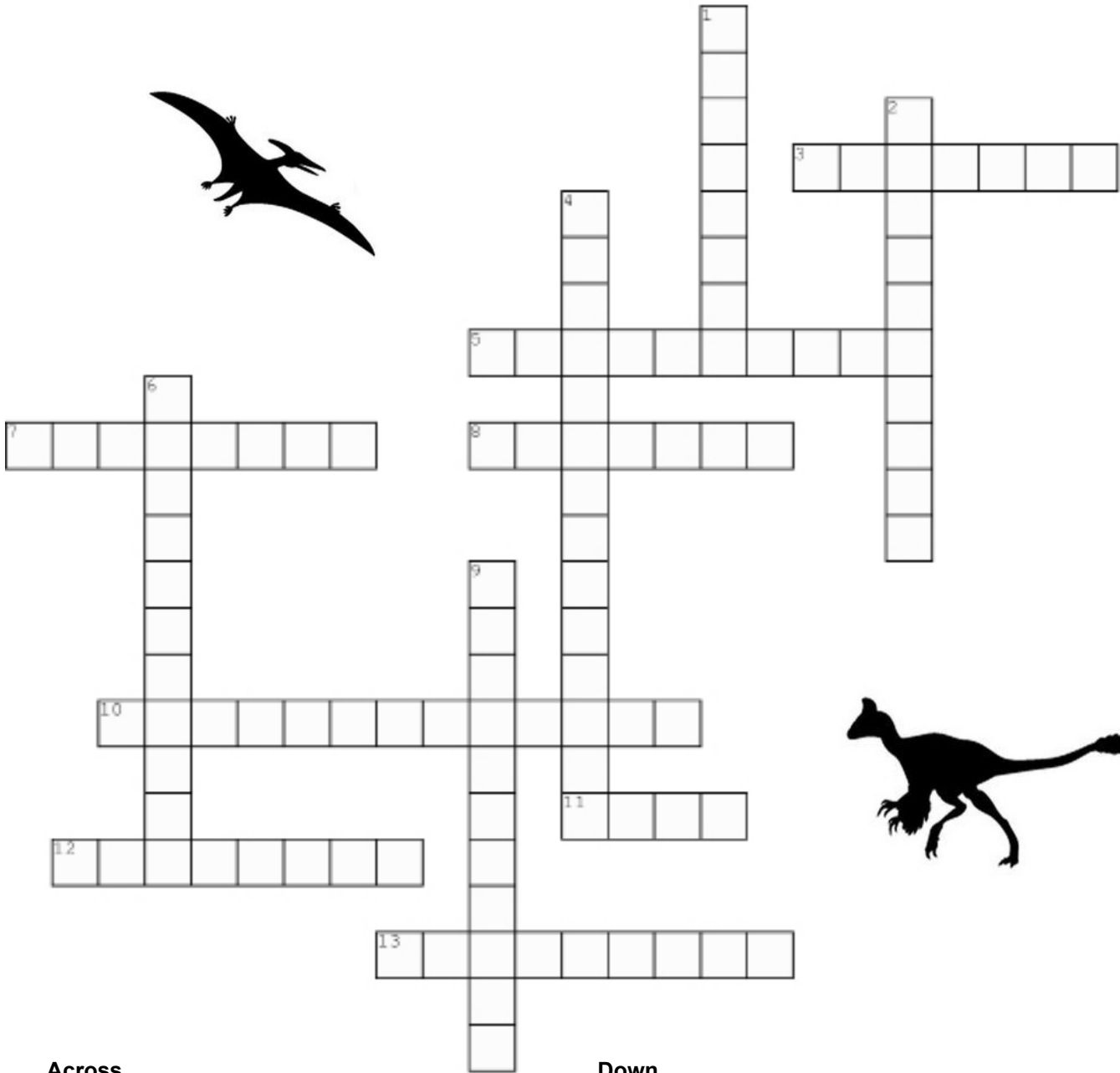
THE KWL GRAPHIC ORGANIZER

Topic _____

KNOW	WANT TO KNOW	LEARNED
<p><i>In the space below, write everything you know about your topic.</i></p>	<p><i>In the space below, write everything you want to know about your topic.</i></p>	<p><i>After researching your topic, write everything you learned about your topic and list the reference sources and pages where you found the information.</i></p>



THE CRETACEOUS PERIOD—A CROSSWORD PUZZLE



Across

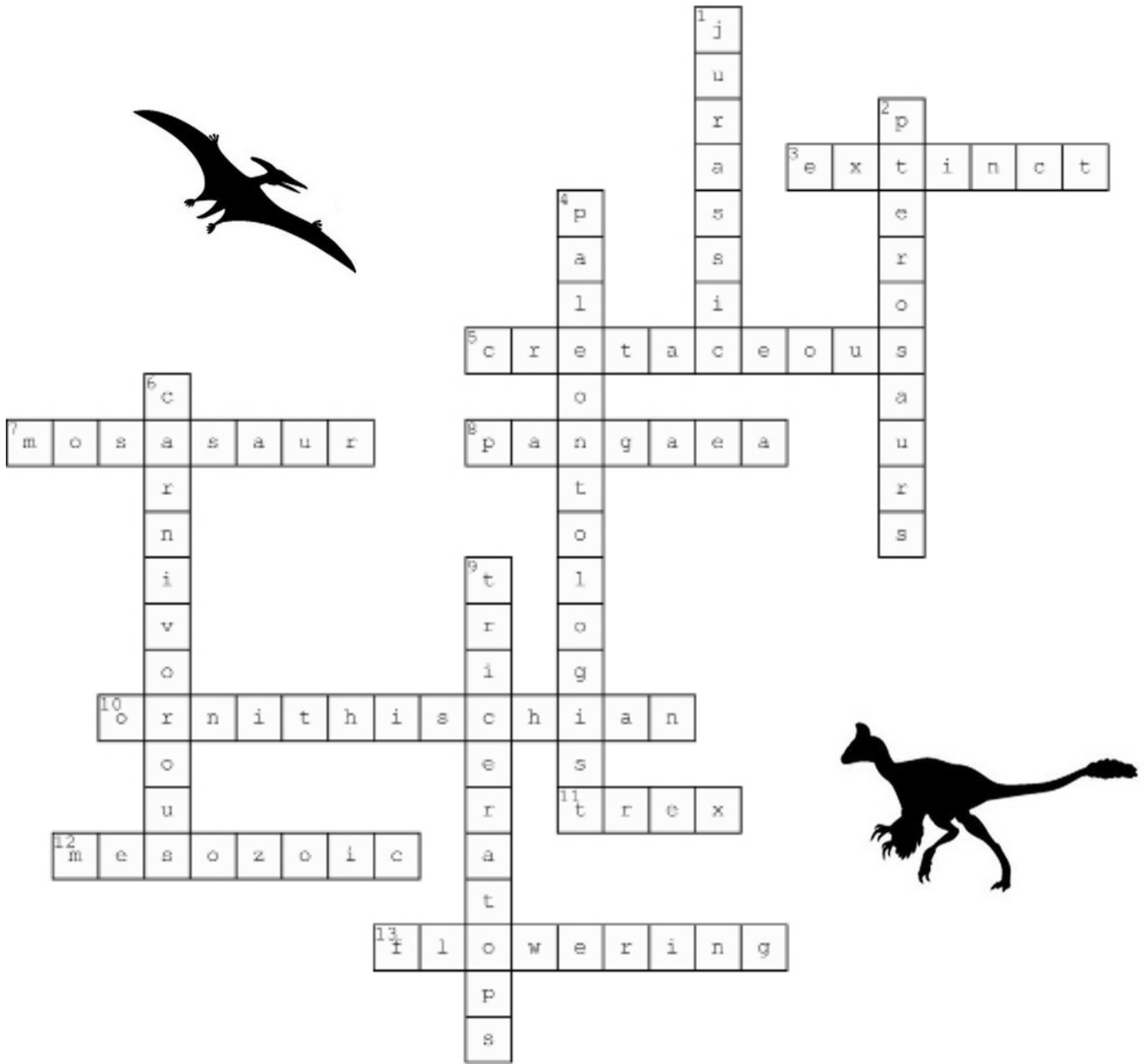
- 3. Non-avian dinosaurs and aquatic reptiles became _____ at the end of the Cretaceous Period
- 5. The _____ Period lasted about 79 million years
- 7. Aquatic lizard
- 8. Supercontinent that was breaking apart during the early Cretaceous Period
- 10. Herbivore dinosaur having a hip structure like a bird
- 11. One of the largest carnivores of all time
- 12. The Age of Dinosaurs
- 13. _____ plants were an important development during the Cretaceous Period

Down

- 1. The Cretaceous Period began at the end of the _____ Period
- 2. Flying archosaurs
- 4. A scientist who studies fossils
- 6. Meat-eating
- 9. Three-horned lizard



THE CRETACEOUS PERIOD-CROSSWORD PUZZLE ANSWERS



Across

- 3. Non-avian dinosaurs and aquatic reptiles became _____ at the end of the Cretaceous Period
- 5. The _____ Period lasted about 79 million years
- 7. Aquatic lizard
- 8. Supercontinent that was breaking apart during the early Cretaceous Period
- 10. Herbivore dinosaur having a hip structure like a bird
- 11. One of the largest carnivores of all time
- 12. The Age of Dinosaurs
- 13. _____ plants were an important development during the Cretaceous Period

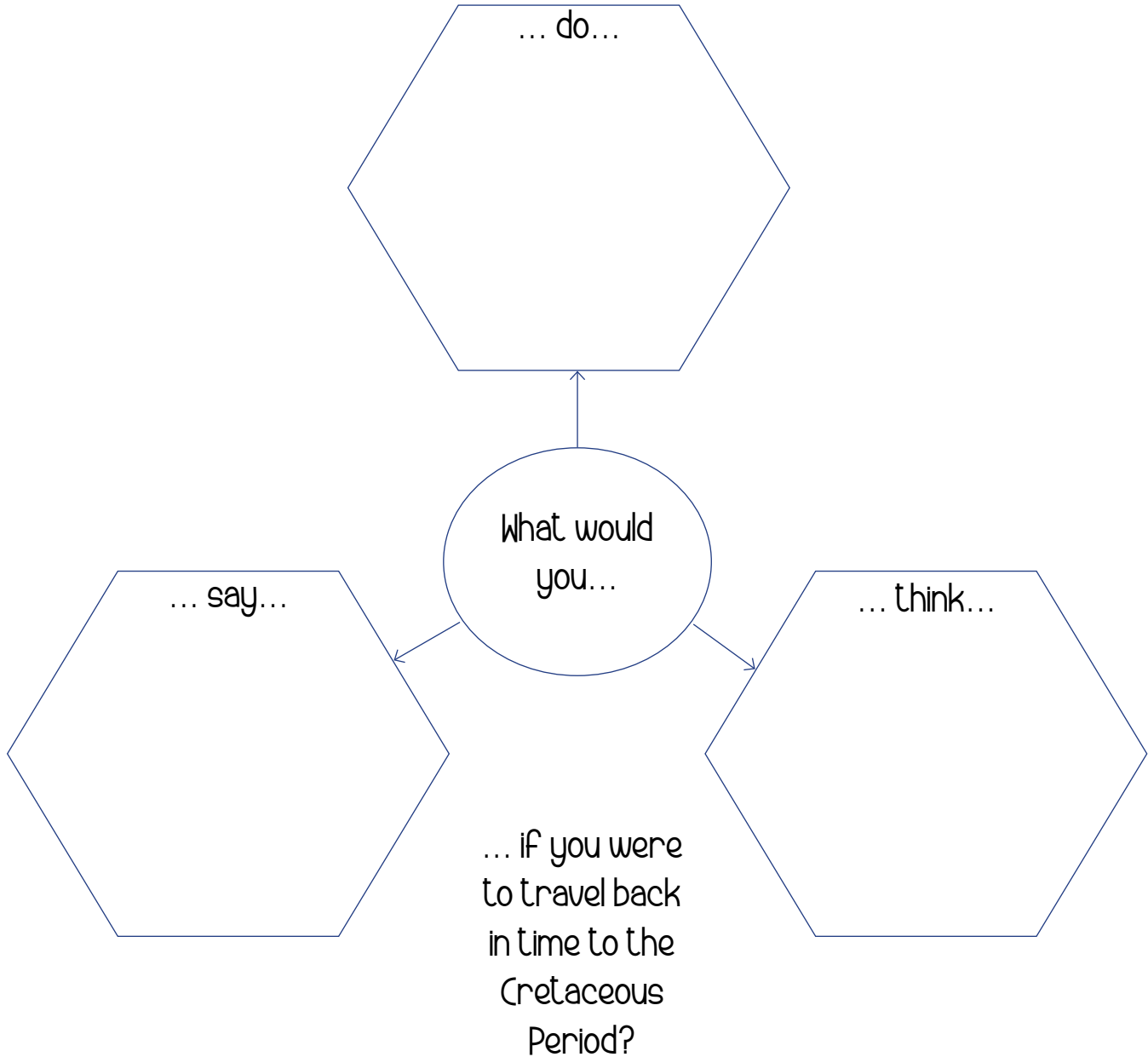
Down

- 1. The Cretaceous Period began at the end of the _____ Period
- 2. Flying archosaurs
- 4. A scientist who studies fossils
- 6. Meat-eating
- 9. Three-horned lizard



HITCH A RIDE

What would you do, say, and think if you were to travel into this novel and share a journey back into the Cretaceous Period with Max, Kyle, and Petra? Using the graphic organizer below, describe your initial reactions to arriving in the hot, humid past surrounded by tall trees and dinosaurs. Choose one aspect to develop by writing and illustrating a short narrative piece explaining your imaginary experience. Share your work with the class.



MEET THE AUTHOR – GREG LEITICH SMITH

Greg Leitich Smith is the award-winning author of the middle grade novels *Little Green Men at the Mercury Inn*; *Chronal Engine*; *Borrowed Time*; *Ninjas, Piranhas, and Galileo*; and *Tofu and T.Rex*. Greg and Cynthia Leitich Smith are the co-authors of the picture book, *Santa Knows*, illustrated by Steve Bjorkman, and the short story “The Wrath of Dawn,” in the anthology *Geektastic*, edited by Holly Black and Cecil Castellucci.

Greg’s novels are characterized by their humor, adventure, and reflect his background in science and engineering. He is of German and Japanese descent, and many of his characters are similarly mixed-race. Greg holds degrees in electrical engineering from the University of Illinois at Urbana-Champaign and the University of Texas at Austin. In addition, he holds a degree in law from The University of Michigan Law School, Ann Arbor.



Get set for
CHRONAL ENGINE’s
action-packed sequel

BORROWED TIME

ISBN: 9780544237117

Grades 4-7



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ACADEMIC STANDARDS ALIGNMENT

COMMON CORE STATE STANDARDS

English Language Arts Standards » Reading: Literature

		Discussion Questions	Activities	Word Search	Crossword Puzzle	End of an Era	Hitch a Ride
CCSS.ELA-Literacy.RL.4.2	Determine a theme of a story, drama, or poem from details in the text; summarize the text.	•	•			•	•
CCSS.ELA-Literacy.RL.4.4	Determine the meaning of words and phrases as they are used in a text, including those that allude to significant characters found in mythology (e.g., Herculean).			•	•		
CCSS.ELA-Literacy.RL.4.10	By the end of the year, read and comprehend literature, including stories, dramas, and poetry, in the grades 4-5 text complexity band proficiently, with scaffolding as needed at the high end of the range.	•	•	•	•	•	•
CCSS.ELA-Literacy.RL.5.2	Determine a theme of a story, drama, or poem from details in the text, including how characters in a story or drama respond to challenges or how the speaker in a poem reflects upon a topic; summarize the text.	•	•			•	•
CCSS.ELA-Literacy.RL.5.4	Determine the meaning of words and phrases as they are used in a text, including figurative language such as metaphors and similes.			•	•		
CCSS.ELA-Literacy.RL.5.10	By the end of the year, read and comprehend literature, including stories, dramas, and poetry, at the high end of the grades 4-5 text complexity band independently and proficiently.	•	•	•	•	•	•
CCSS.ELA-Literacy.RL.6.3	Describe how a particular story's or drama's plot unfolds in a series of episodes as well as how the characters respond or change as the plot moves toward a resolution.	•	•				•
CCSS.ELA-Literacy.RL.6.10	By the end of the year, read and comprehend literature, including stories, dramas, and poems, in the grades 6-8 text complexity band proficiently, with scaffolding as needed at the high end of the range.	•	•	•	•	•	•
CCSS.ELA-Literacy.RL.7.3	Analyze how particular elements of a story or drama interact (e.g., how setting shapes the characters or plot).	•	•				•
CCSS.ELA-Literacy.RL.7.10	By the end of the year, read and comprehend literature, including stories, dramas, and poems, in the grades 6-8 text complexity band proficiently, with scaffolding as needed at the high end of the range.	•	•	•	•	•	•

English Language Arts Standards » Writing

CCSS.ELA-Literacy.W.4.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.					•	
CCSS.ELA-Literacy.W.4.3	Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.						•
CCSS.ELA-Literacy.W.5.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.					•	
CCSS.ELA-Literacy.W.5.3	Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.						•
CCSS.ELA-Literacy.W.6.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.					•	
CCSS.ELA-Literacy.W.6.3	Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.						•
CCSS.ELA-Literacy.W.7.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.					•	
CCSS.ELA-Literacy.W.7.3	Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.						•



TEXAS ESSENTIAL KNOWLEDGE & SKILLS

		Discussion Questions	Activities	Word Search	Crossword Puzzle	End of an Era	Hitch a Ride
English Language Arts and Reading, Grade 4							
110.15.b.1	Reading/Fluency. Students read grade-level text with fluency and comprehension. Students are expected to read aloud grade-level stories with fluency (rate, accuracy, expression, appropriate phrasing) and comprehension.	●	●	●	●		
110.15.b.2	Reading/Vocabulary Development. Students understand new vocabulary and use it when reading and writing.			●	●		
110.15.b.3	Reading/Comprehension of Literary Text/Theme and Genre. Students analyze, make inferences and draw conclusions about theme and genre in different cultural, historical, and contemporary contexts and provide evidence from the text to support their understanding.	●	●			●	●
110.15.b.6	Reading/Comprehension of Literary Text/Fiction. Students understand, make inferences and draw conclusions about the structure and elements of fiction and provide evidence from text to support their understanding.	●	●				●
110.15.b.15	Writing/Writing Process. Students use elements of the writing process (planning, drafting, revising, editing, and publishing) to compose text.					●	●
110.15.b.16	Writing/Literary Texts. Students write literary texts to express their ideas and feelings about real or imagined people, events, and ideas						●
110.15.b.23	Research/Research Plan. Students ask open-ended research questions and develop a plan for answering them.					●	●
English Language Arts and Reading, Grade 5							
110.16.b.1	Reading/Fluency. Students read grade-level text with fluency and comprehension. Students are expected to read aloud grade-level stories with fluency (rate, accuracy, expression, appropriate phrasing) and comprehension	●	●	●	●		
110.16.b.2	Reading/Vocabulary Development. Students understand new vocabulary and use it when reading and writing.			●	●		
110.16.b.3	Reading/Comprehension of Literary Text/Theme and Genre. Students analyze, make inferences and draw conclusions about theme and genre in different cultural, historical, and contemporary contexts and provide evidence from the text to support their understanding.	●	●			●	●
110.16.b.3.C	Explain the effect of a historical event or movement on the theme of a work of literature.					●	
110.16.b.6	Reading/Comprehension of Literary Text/Fiction. Students understand, make inferences and draw conclusions about the structure and elements of fiction and provide evidence from text to support their understanding.	●	●				●
110.16.b.6.A	Describe incidents that advance the story or novel, explaining how each incident gives rise to or foreshadows future events.	●	●				●
110.16.b.15	Writing/Writing Process. Students use elements of the writing process (planning, drafting, revising, editing, and publishing) to compose text.					●	●
110.16.b.16	Writing/Literary Texts. Students write literary texts to express their ideas and feelings about real or imagined people, events, and ideas.						●
110.16.b.23	Research/Research Plan. Students ask open-ended research questions and develop a plan for answering them.					●	
110.16.b.26	Research/Organizing and Presenting Ideas. Students organize and present their ideas and information according to the purpose of the research and their audience.					●	●
English Language Arts and Reading, Grade 6							
110.18.b.1	Reading/Fluency. Students read grade-level text with fluency and comprehension. Students are expected to adjust fluency when reading aloud grade-level text based on the reading purpose and the nature of the text.	●	●	●	●		
110.18.b.2	Reading/Vocabulary Development. Students understand new vocabulary and use it when reading and writing.			●	●		
110.18.b.3	Reading/Comprehension of Literary Text/Theme and Genre. Students analyze, make inferences and draw conclusions about theme and genre in different cultural, historical, and contemporary contexts and provide evidence from the text to support their understanding.	●	●			●	●
110.18.b.6	Reading/Comprehension of Literary Text/Fiction. Students understand, make inferences and draw conclusions about the structure and elements of fiction and provide evidence from text to support their understanding.	●	●			●	●
110.18.b.14	Writing/Writing Process. Students use elements of the writing process (planning, drafting, revising, editing, and publishing) to compose text.					●	●
110.18.b.15	Writing/Literary Texts. Students write literary texts to express their ideas and feelings about real or imagined people, events, and ideas.	●	●			●	●
110.18.b.22	Research/Research Plan. Students ask open-ended research questions and develop a plan for answering them.					●	

English Language Arts and Reading, Grade 7		Discussion Questions	Activities	Word Search	Crossword Puzzle	End of an Era	Hitch a Ride
110.19.b.1	Reading/Fluency. Students read grade-level text with fluency and comprehension. Students are expected to adjust fluency when reading aloud grade-level text based on the reading purpose and the nature of the text.	●	●	●	●		
110.19.b.2	Reading/Vocabulary Development. Students understand new vocabulary and use it when reading and writing.			●	●		
110.19.b.3	Comprehension of Literary Text/Theme and Genre. Students analyze, make inferences and draw conclusions about theme and genre in different cultural, historical, and contemporary contexts and provide evidence from the text to support their understanding.	●	●			●	●
110.19.b.6	Comprehension of Literary Text/Fiction. Students understand, make inferences and draw conclusions about the structure and elements of fiction and provide evidence from text to support their understanding.	●	●			●	●
110.19.b.14	Writing/Writing Process. Students use elements of the writing process (planning, drafting, revising, editing, and publishing) to compose text.					●	●
110.19.b.15	Writing/Literary Texts. Students write literary texts to express their ideas and feelings about real or imagined people, events, and ideas.	●	●			●	●
110.19.b.22	Research/Research Plan. Students ask open-ended research questions and develop a plan for answering them.					●	

