Grade 8
Family Resource Bundle

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ANSWER KEY Text #1 Invictus

by William Ernest Henley 1875

1. RL.KID.2

Which of the following best describes a central theme of the text?

A. Identity is important to building self-confidence.
B. Independence means refusing to follow anyone else's rules or laws.
C. Resilience is the ability to keep going and to refuse to give up.
D. Sacrifice is necessary to make someone a hero.

2. RL.KID.3

How does the poem's use of darkness in its imagery contribute to the text's overall meaning?

A. The poem describes night covering the earth from "pole to pole" (line 2), suggesting that the speaker's outlook on the world is very bleak and hopeless.
B. The poem describes "night" (line 1) covering the speaker, symbolic of the adversity and/or suffering he faces.
C. The poem describes "the Horror of the shade" (line 10), suggesting that the speaker's hard times are only temporary.
D. The poem describes a dark "place of wrath and tears" (line 9), implying that the speaker is overcome by his depression.

3. RL.CS.4

PART A: Given the context of the poem, what does the title word "Invictus" most likely mean?

A. Careless
B. Lucky
C. Unfortunate
D. Undefeated

4. RL.KID.1

PART B: Which of the following quotes best supports the answer to Part A?

A. "I thank whatever gods may be / For my unconquerable soul." (Lines 3-4)
B. "In the fell clutch of circumstance / ….Under the bludgeonings of chance" (Lines 5-7)
C. "Beyond this place of wrath and tears / Looms but the Horror of the shade" (Lines 9-10)
D. "It matters not how strait the gate, / How charged with punishments the scroll" (Lines 13-14)

5. RL.CS.5

How does the poem's rhyme scheme and meter develop the tone?

1. **Answers will vary; students should outline the poem's rhyme scheme and meter, and explain how it develops the overall tone. The poem's rhyme scheme follows: ABAB CDCD EFEF GHGH--or GAGA, as long as the student understands that it is an alternating rhyme scheme. The meter is composed on four feet (eight syllables) per line. Overall, the poem's form is consistent and not elaborate. While some may argue the poem's diction is somewhat melodramatic, the structure in meter and rhyme suggests otherwise; it creates a strong, sturdy, and self-assured tone.**

ANSWER KEY Text #2 Healing 'Brick City': A Newark Doctor Returns Home

by NPR Staff 2013

1. RI.KID.2

PART A: Which of the following best identifies the central idea of this article?

A. Physicians have a responsibility to actively campaign for comprehensive healthcare and health insurance reform in the communities in which they work.
B. Davis overcame the influence of a tremendously negative environment to achieve great success and intends to use his training to better the community in which he grew up.
C. Dr. Sampson Davis and his two colleagues were able to become doctors due to a combination of hard work and luck; many Newark residents are not so fortunate.
D. Access to healthcare for people living in high-crime, high-density urban areas is the primary concern of physicians who live and work in these underserved communities.

2. RI.KID.1

PART B: Which phrase from the text best supports the answer to Part A?

A. "'Growing up, I was surrounded by so much negative peer pressure and negativity, it wasn't long before I became a part of that fabric.'" (Paragraph 4)
B. "'[I] committed an armed robbery when I was 17 1/2. And I often say 17 1/2 because had I been 18, my story would have been written differently.'" (Paragraph 5)
C. "'There has to be more programs that exist... to help the students matriculate through high school, through college, through medical school.'" (Paragraph 8)
D. "'And I think that's a crime in itself.... You have to have some social consciousness to give back, to be a part of making it better tomorrow.'" (Paragraph 9)

3. RI.CS.5

How does the following phrase contribute to the development of the main ideas of the text: "'It was the Don Moses that I knew from childhood'" (Paragraph 6)?

A. It illustrates how many people from underserved communities go down a negative path and it makes Davis's ascent all the more remarkable by comparison.
B. It demonstrates the impact the death of a childhood friend had on Davis, who would go on to become an emergency room physician.

C. It shows that a life of crime will inevitably result in an untimely death or permanent incarceration.
D. It advances the notion that Newark, New Jersey is an underserved city.

4. RI.CS.6

What is the author's main purpose in writing the article?

A. To emphasize the extent to which growing up in a negative environment can stunt a young person's growth and development.
B. To show people how doctors from all different backgrounds can work together to make a difference in the quality of healthcare nationwide.
C. To inform and inspire people by sharing the narrative of a hard-working, compassionate person who prevailed over alarming circumstances to realize great success.
D. To encourage more young people who have endured difficult childhoods to pursue careers in emergency medicine.

5. RI.KID.3

How does Davis describe the relationship between growing up in Newark and returning to the city as a physician? Cite evidence from the text in your response.

1. **Answers will vary; students should acknowledge that while Davis describes growing up in Newark as a stunting and damaging experience, it remains part of what motivated him to improve himself and return to the community as a figure of support and care. Davis notes that it was "important for me to come back and become a beacon of hope" (Paragraph 3) for other young people struggling to overcome their circumstances. In this way, we may see his upbringing as a motivational force that encouraged him to return to Newark and serve as a source of inspiration for young people dealing with many of the same issues that he had dealt with as an adolescent. He further identifies a need in the urban community to which he returned, which contributes to his desire to serve as a physician and supplier of healthcare guidance: "When you look at mental illness, in the inner city community particularly, it's taboo" (Paragraph 7). Finally, Davis explicitly frames his desire to return to Newark as a manifestation of compassion and a deep-rooted urge to improve the community in which he experienced violence and terror as a child: "'You have to have some social consciousness to give back, to be a part of making it better tomorrow'" (Paragraph 9).**

Related Media Links and Descriptions

Related Media #1: The Power of the Invictus Games
The Duke of Sussex, competitors and Invictus Games Foundation CEO share what the Invictus Games mean to them and why they are having such an impact on Wounded, Injured and Sick Servicemen and women. 3:31

Related Media #2: Three Doctors on CNN Pt 1
The famous three doctors who were part of the pact described in the first paragraph of the text discuss the healthcare debate that has been waged over the past several years in the United States. 6:19

Applying Properties for Powers with the Same Base

➤ **Rewrite each expression as a single power.**

1. $6^4 \cdot 6^4$

   6^8

2. $(-5^5)^2$

   5^{10}

3. $\frac{2^9}{2^5}$

   2^4

4. $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3^2$

   3^6

5. $\frac{12^5 \cdot 12^7}{-12^4}$

   -12^8

6. $\left(\frac{7^5}{7^2}\right)^2$

   7^6

➤ **Evaluate each expression.**

7. $\frac{4^8}{4^5}$

   64

8. $(-10) \cdot (-10)^4$

   $-100{,}000$

9. $\left(\frac{(-3)^4}{(-3)^2}\right)^3$

   729

➤ **What value of *x* makes the equation true?**

10. $\frac{8^x}{8^5} = 8^7$

    $x = 12$

11. $(-11)^x \cdot (-11)^4 = \frac{(-11)^{10}}{(-11)^3}$

    $x = 3$

12. $(6^x)^{10} = \frac{(6^{12})^2}{6^4}$

    $x = 2$

13. Explain how you solved for *x* in problem 12.

    Possible answer: I know that $(a^m)^n = a^{m \cdot n}$. So, I simplified the left side of the equation to be 6^{10x} and the right side of the equation to be $\frac{6^{24}}{6^4}$. Also, I know $\frac{a^m}{a^n} = a^{m-n}$, so I subtracted the exponents on the right side of the equation. Therefore, $6^{10x} = 6^{20}$. Since $10 \cdot 2 = 20$, $x = 2$.

Applying Properties for Powers with the Same Exponent

➤ **Rewrite each expression as a single power.**

1. $9^4 \cdot 10^4$

   90^4

2. $(12 \cdot 6)^3$

   72^3

3. $\frac{3^3}{2^3}$

   $\left(\frac{3}{2}\right)^3$

4. $\frac{6^2}{2^2}$

   3^2

5. $(-5)^6 \cdot (-7)^6$

   35^6

6. $\left(\frac{6^4}{12^4}\right)^2$

   $\left(\frac{1}{2}\right)^8$

➤ **Rewrite each expression as a product of two powers or quotient of two powers.**

7. $5^5(16^2 \cdot 5^3)^3$

   $16^6 \cdot 5^{14}$

8. $\left(\frac{8^4 \cdot 5^3}{8^5}\right)^2$

   $\frac{5^6}{8}$

9. $\left(\frac{5^8 \cdot 3^7}{5^4}\right)^{10}$

   $5^{40} \cdot 3^{70}$

10. How does multiplying powers with the same base differ from multiplying powers with the same exponent but different bases?

    Possible answer: When powers with the same base are multiplied, the bases remain the same and the exponents are added. When powers with the same exponent but different bases are multiplied, the bases are multiplied and the exponents remain the same.

Applying Properties of Negative Exponents

➤ **Rewrite each expression using only positive exponents. The answers are mixed up at the bottom of the page. Cross out the answers as you complete the problems.**

1. $7^3 \cdot 16^{-9}$

   $\frac{7^3}{16^9}$

2. $\frac{8^{-6}}{21^{-4}}$

   $\frac{21^4}{8^6}$

3. $\left(\frac{7}{16}\right)^{-3}$

   $\frac{16^3}{7^3}$

4. $16^3 \cdot (-7)^{-3}$

   $\frac{16^3}{(-7)^3}$

5. $(8 \cdot 21)^{-4}$

   $\frac{1}{(8 \cdot 21)^4}$

6. $8 \cdot 21^{-3}$

   $\frac{8}{21^3}$

7. $\frac{11^{-7} \cdot 5^9}{6^9}$

   $\frac{5^9}{11^7 \cdot 6^9}$

8. $\frac{11^{-7} \cdot 5^9}{6^{-9}}$

   $\frac{6^9 \cdot 5^9}{11^7}$

9. $6^9 \cdot 11^{-7} \cdot 5^{-9}$

   $\frac{6^9}{11^7 \cdot 5^9}$

10. $\frac{3^5 \cdot (-4)^{-10}}{7^9 \cdot 21^{-4}}$

    $\frac{3^5 \cdot 21^4}{7^9 \cdot (-4)^{10}}$

11. $\frac{(-21)^{-4} \cdot (-4)^0}{3^{-5} \cdot 7^{-9}}$

    $\frac{3^5 \cdot 7^2}{(-21)^4}$

12. $\left(\frac{3}{7}\right)^{-5} \cdot (-21)^{-4} \cdot (-4)^2$

    $\frac{7^5 \cdot (-4)^2}{3^5 \cdot (-21)^4}$

Answers

$\frac{1}{(8 \cdot 21)^4}$ $\quad$ $\frac{6^9}{11^7 \cdot 5^9}$ $\quad$ $\frac{16^3}{7^3}$ $\quad$ $\frac{7^5 \cdot (-4)^2}{3^5 \cdot (-21)^4}$

$\frac{21^4}{8^6}$ $\quad$ $\frac{6^9 \cdot 5^9}{11^7}$ $\quad$ $\frac{16^3}{(-7)^3}$ $\quad$ $\frac{3^5 \cdot 21^4}{7^9 \cdot (-4)^{10}}$

$\frac{3^5 \cdot 7^2}{(-21)^4}$ $\quad$ $\frac{8}{21^3}$ $\quad$ $\frac{5^9}{11^7 \cdot 6^9}$ $\quad$ $\frac{7^3}{16^9}$

Applying Properties of Integer Exponents

➤ **Evaluate each expression.**

1. $18^{-4} \cdot 6^{7}$

   $\frac{8}{3}$

2. $3^{4} \cdot 3^{-6} \cdot 9^{0}$

   $\frac{1}{9}$

3. $\left(\frac{3^{-4} \cdot 3^{6}}{6^{3} \cdot 6^{-1}}\right)^{-2}$

   16

➤ **Write each expression using only positive exponents.**

4. $19^{-3} \cdot 19 \cdot 19^{-4} \cdot 19^{3}$

   $\frac{1}{19^{3}}$

5. $\frac{6^{-3} \cdot 17^{3} \cdot 2}{6^{5} \cdot 17^{-4} \cdot 2^{-1}}$

   $\frac{17^{7} \cdot 2^{2}}{6^{8}}$

6. $24^{-3} \cdot 24^{7} \cdot (24^{-3})^{4} \cdot 24^{9}$

   24

7. $\left(\frac{7^{-3} \cdot 3^{-8}}{7^{-2} \cdot 3^{-2}}\right)^{-4}$

   $7^{4} \cdot 3^{24}$

8. $(2^{-1} \cdot 3^{0})^{-3} \cdot (2^{0} \cdot 5^{3})^{5}$

   $2^{3} \cdot 5^{15}$

9. $\left(\frac{5^{6} \cdot 3^{-3}}{3^{-3}}\right)^{4}$

   5^{24}

10. How could you have simplified problem 7 in a different way?

    Possible answer: I simplified in the parentheses first by subtracting the exponents of 7 and the exponents of 3. Then I multiplied the resulting exponents by −4. I could have multiplied the exponents by −4 before subtracting the exponents.

Number Correct: _____

Applying Properties of Exponents to Generate Equivalent Expressions I—Round 1

Directions: Simplify each expression using the laws of exponents. Use the least number of bases possible and only positive exponents. All letters denote numbers.

1.	$2^2 \cdot 2^3$	
2.	$2^2 \cdot 2^4$	
3.	$2^2 \cdot 2^5$	
4.	$3^7 \cdot 3^1$	
5.	$3^8 \cdot 3^1$	
6.	$3^9 \cdot 3^1$	
7.	$7^6 \cdot 7^2$	
8.	$7^6 \cdot 7^3$	
9.	$7^6 \cdot 7^4$	
10.	$11^{15} \cdot 11$	
11.	$11^{16} \cdot 11$	
12.	$2^{12} \cdot 2^2$	
13.	$2^{12} \cdot 2^4$	
14.	$2^{12} \cdot 2^6$	
15.	$99^5 \cdot 99^2$	
16.	$99^6 \cdot 99^3$	
17.	$99^7 \cdot 99^4$	
18.	$5^8 \cdot 5^2$	
19.	$6^8 \cdot 6^2$	
20.	$7^8 \cdot 7^2$	
21.	$r^8 \cdot r^2$	
22.	$s^8 \cdot s^2$	

23.	$6^3 \cdot 6^2$	
24.	$6^2 \cdot 6^3$	
25.	$(-8)^3 \cdot (-8)^7$	
26.	$(-8)^7 \cdot (-8)^3$	
27.	$(0.2)^3 \cdot (0.2)^7$	
28.	$(0.2)^7 \cdot (0.2)^3$	
29.	$(-2)^{12} \cdot (-2)^1$	
30.	$(-2.7)^{12} \cdot (-2.7)^1$	
31.	$1.1^6 \cdot 1.1^9$	
32.	$57^6 \cdot 57^9$	
33.	$x^6 \cdot x^9$	
34.	$2^7 \cdot 4$	
35.	$2^7 \cdot 4^2$	
36.	$2^7 \cdot 16$	
37.	$16 \cdot 4^3$	
38.	$3^2 \cdot 9$	
39.	$3^2 \cdot 27$	
40.	$3^2 \cdot 81$	
41.	$5^4 \cdot 25$	
42.	$5^4 \cdot 125$	
43.	$8 \cdot 2^9$	
44.	$16 \cdot 2^9$	

Number Correct: _____

Improvement: _____

Applying Properties of Exponents to Generate Equivalent Expressions I—Round 2

Directions: Simplify each expression using the laws of exponents. Use the least number of bases possible and only positive exponents. All letters denote numbers.

1.	$5^2 \cdot 5^3$	
2.	$5^2 \cdot 5^4$	
3.	$5^2 \cdot 5^5$	
4.	$2^7 \cdot 2^1$	
5.	$2^8 \cdot 2^1$	
6.	$2^9 \cdot 2^1$	
7.	$3^6 \cdot 3^2$	
8.	$3^6 \cdot 3^3$	
9.	$3^6 \cdot 3^4$	
10.	$7^{15} \cdot 7$	
11.	$7^{16} \cdot 7$	
12.	$11^{12} \cdot 11^2$	
13.	$11^{12} \cdot 11^4$	
14.	$11^{12} \cdot 11^6$	
15.	$23^5 \cdot 23^2$	
16.	$23^6 \cdot 23^3$	
17.	$23^7 \cdot 23^4$	
18.	$13^7 \cdot 13^3$	
19.	$15^7 \cdot 15^3$	
20.	$17^7 \cdot 17^3$	
21.	$x^7 \cdot x^3$	
22.	$y^7 \cdot y^3$	

23.	$7^3 \cdot 7^2$	
24.	$7^2 \cdot 7^3$	
25.	$(-4)^3 \cdot (-4)^{11}$	
26.	$(-4)^{11} \cdot (-4)^3$	
27.	$(0.2)^3 \cdot (0.2)^{11}$	
28.	$(0.2)^{11} \cdot (0.2)^3$	
29.	$(-2)^9 \cdot (-2)^5$	
30.	$(-2.7)^5 \cdot (-2.7)^9$	
31.	$3.1^6 \cdot 3.1^6$	
32.	$57^6 \cdot 57^6$	
33.	$z^6 \cdot z^6$	
34.	$4 \cdot 2^9$	
35.	$4^2 \cdot 2^9$	
36.	$16 \cdot 2^9$	
37.	$16 \cdot 4^3$	
38.	$9 \cdot 3^5$	
39.	$3^5 \cdot 9$	
40.	$3^5 \cdot 27$	
41.	$5^7 \cdot 25$	
42.	$5^7 \cdot 125$	
43.	$2^{11} \cdot 4$	
44.	$2^{11} \cdot 16$	

8.EE Extending the Definitions of Exponents, Variation 1

Task

Marco and Seth are lab partners studying bacterial growth. They were surprised to find that the population of the bacteria doubled every hour.

a. The table shows that there were 2,000 bacteria at the beginning of the experiment. What was the size of population of bacteria after 1 hour? After 2, 3 and 4 hours? Enter this information into the table:

Hours into study				0	1	2	3	4
Population (thousands)				2				

b. If you know the size of the population at a certain time, how do you find the population one hour later?

c. Marco said he thought that they could use the equation $P = 2t + 2$ to find the population at time t. Seth said he thought that they could use the equation $P = 2 \cdot 2^t$. Decide whether either of these equations produces the correct populations for $t = 1, 2, 3, 4$.

d. Assuming the population doubled every hour before the study began, what was the population of the bacteria 1 hour *before* the students started their study? What about 3 hours before?

e. If you know the size of the population at a certain time, how do you find the population one hour *earlier*?

f. What number would you use to represent the time 1 hour before the study started? 2 hours before? 3 hours before? Finish filling in the table if you haven't already.

g. Now use Seth's equation to find the population of the bacteria 1 hour before the study started. Use the equation to find the population of the bacteria 3 hours before. Do these values produce results consistent with the arithmetic you did earlier?

h. Use the context to explain why it makes sense that $2^{-n} = (\frac{1}{2})^n = \frac{1}{2^n}$. That is, describe why, based on the population growth, it makes sense to define 2 raised to a negative integer exponent as repeated multiplication by $\frac{1}{2}$.