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EXERCISE SCIENCE

The Facilitative Effect of Acute Rhythmic Exercise on Reading Comprehension of Junior High Students

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Abstract

With tightening school budgets and continued emphasis on core subject standardized testing, physical education often takes a backseat to academic areas that school administrators deem more important. Much time is spent using improvement strategies in the classroom that do not involve exercise. Two hundred eighty-five sixth to eighth grade students were measured on their ability to correctly answer questions from an age-appropriate reading passage to see if exercise is an effective intervention. Half of the students were randomly selected to conduct an 8-in. step test for 10 min at a pace of one complete step up and down every 2 s. All participants were allowed 10 min to read a four-paragraph passage and to answer 10 multiple-choice questions. Participants were enrolled in a middle school physical education class and were measured on weight, body fat, and blood pressure. English Language Arts scaled scores (range

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of 100 to 500) taken from the Integrated Louisiana Educational Assessment Program norm-referenced tests were used to verify equality on reading ability of the participants. Findings revealed that students who exercised immediately prior to reading the passage scored statistically higher (M = 6.4) than the control group (M = 4.3). An ANCOVA was computed to control for the differing ELA scores (control = 320, experimental = 338), and a significant difference was observed between the control and experimental groups, F(1, 281) = 83.1, p < .001, on reading scores. Weight, body fat, and blood pressure had no effect on reading scores. The results indicate that short-duration exercise is one method that schools should consider in attempts to improve reading scores.

Studies on the effects of exercise on cognitive function are gaining renewed focus in conjunction with continued threats to K–12 physical education programs. Declining state budgets and continued emphasis on standardized testing have curtailed the amount of time students spend in physical activity during school hours (Coe, Pivarnik, Womack, Reeves, & Malina, 2006). School districts emphasize reading, writing, and math during school hours at the expense of physical education. This is compounded by research indicating that most of the time spent in physical education is at a minimum intensity (Fairclough & Stratton, 2005). This may be because of the large class sizes in physical education courses when they exist or the lack of support money for safe facilities or equipment. Declines in physical education are occurring even though research supports that active kids perform better academically (Castelli, Hillman, Buck, & Erwin, 2007; Dwyer, Sallis, Blizzard, Lazarus, & Dean, 2001; Stevens, To, Stevenson, & Lochbaum, 2008; Wittberg, Cottrell, Davis, & Northrup, 2010) and that exercise can improve cognition (Hillman, Castelli, & Buck, 2005; Sibley & Etnier, 2003). However, in Louisiana at the middle school level, some schools have removed struggling students from physical education courses so that the student can focus on math, reading, and writing. School administrators often fail to recognize the importance of daily exercise and prefer to implement strategies to improve standardized scores that do not incorporate physical activity. It is not known if placing kids in structured learning environments emphasizing math, reading, and writing content areas, in lieu of giving them opportunities to exercise, improves standardized test scores.

Studies investigating the impact of exercise on academic achievement with school-aged participants often have compared test scores from students that had just taken a physical education course to those who did not participate in a physical education course prior to test taking. Coe et al. (2006) found no difference in achievement scores, namely, course grades. Tremarche, Robinson, and Graham (2007) observed that students who engaged in more contact hours in physical education scored higher on standardized reading tests. Limitations noted in these studies were that the specific activity in the physical education course in which the student engaged was not always controlled, the measures of learning varied across experiments, and the previous learning between control and experimental groups was not controlled (Smith & Lounsbery, 2009).

Most studies examining the effects of exercise on academic achievement focus on chronic exercisers. In studies of chronic exercise and academic achievement, Castelli et al. (2007) observed improved reading performance among physically fit children, whereas Tremblay, Inman, and Williams (2000) reported no relation between self-reported physical activity levels and reading performance. Few studies have examined the impact of acute bouts of exercise on academic abilities of adolescents. Budde, Voelcker-Rehage, Pietrabyk-Kendziorra, Riberio, and Tidow (2008) found that 150 kids aged 13 to 16 performed better on an attention and concentration test following 10 min of five coordinative sport movements. Hillman et al. (2009) tested 20 preadolescents on cognitive control following 20 min of treadmill walking. Once heart rate returned within 10% of normal, participants completed the Wide Range Achievement Test, which assessed the number of words correctly pronounced, the number of words correctly spelled, and the number of mathematical problems correctly answered. In the Hillman study, reading comprehension was significantly improved following exercise, but spelling and math scores did not change. Conversely, mathematical ability actually increased among sixth grade boys and girls following paced walking durations of 20 to 50 min with the longer duration producing the greatest gains (Gabbard & Barton, 1979). Kubesch et al. (2009) found that 30 min of physical education improved attention spans of seventh grade students, but 5 min of physical activity did not. McNaughten and Gabbard (1993) observed that mathematical performance also increased following 30- and 40-min exercise durations but not after 20 min of paced walking at a moderate intensity.

In recent comprehensive reviews of studies investigating the research effects of exercise on children's academic performance, Tomporowski, Davis, Miller, and Naglieri (2008) and Berg (2010) observed that among adults and children the largest impact of chronic exercise on cognition was in the area of executive function. Executive function was related to thinking skills that involve memory, planning, and making correct decisions. Among children, increases in executive control were believed to lead to increases in attention, application of knowledge, and control of appropriate and inappropriate behaviors. An acute bout of exercise may produce a heightened sense of arousal that may facilitate attention and subsequently improve academic achievement.

Other research has cited an increased blood flow to learning areas of the brain during exercise (Ide & Secher, 2000), which may be a potential means of improved learning following acute bouts of exercise. Research has shown that chronic exercise increases cerebral vasculature (Ding, Li, Zhou, Rafols, Clark, & Ding, 2006), and studies on elderly patients revealed that among those who regularly exercised cerebral vasculature structural changes led to a reduction in pathophysiology associated with Alzheimer's disease (Lange-Asschenfeldt & Kojda, 2008). It previously was believed that chronic exercise led to new blood vessel formation (angiogenesis) and new nerve formation (neurogenesis). However, in a mini research review of the benefits of exercise on cerebral function, Lange-Asschenfeldt and Kojda (2008) noted that most research supports the hypothesis that increased cerebral vasculature associated with regular exercise disrupted the neurodegeneration process, particularly in Alzheimer's disease. In terms of learning and memory acquisition following chronic aerobic exercise, Kerr, Steuer, Pochtarev, and Swain (2010) observed that angiogenesis, not neurogenesis, was responsible for improved performance among rats in learning how to navigate through a water maze. The general belief now is that among chronic exercisers structural changes in cerebrovascular physiology over time account for improved cognitive ability following chronic exercise. Because angiogenesis occurs following weeks of training, it is not known how increased blood flow during exercise impacts learning following an acute bout of aerobic exercise.

With increased pressure to meet adequate yearly progress, schools are looking for cost-effective methods to improve academic performance. To date, only a few studies have examined short-

duration bouts of exercise as a means of improving reading performance. Many schools, especially at the middle school level, are now being challenged to meet the physical education needs of students and still perform well in core academic areas. A school administrator may see a physical education course as wasted time that can be better served teaching math and reading skills. School leaders need to investigate other options for exercise that may be of shorter duration yet may increase academic performance either in taking standardized tests or in studying these subject areas. In this study, students performed a 10-min acute bout of exercise prior to taking an age-appropriate reading comprehension test to determine if exercise can improve reading cognition. The purpose was to determine if short-duration exercise can be an effective strategy to improve one core area of standardized testing. Schools spend much time and effort on strategies to improve standardized test scores when short-duration exercise may be more practical and effective. A junior high in Louisiana was selected to participate in a study on how exercise may facilitate the comprehension of a reading passage. This particular school was chosen because the majority of students at the school took daily physical education courses, few students were classified as learning disabled, and an abundance of teachers, nurses, and staff were available to participate in data acquisition.

Methods

Subjects

This study involved 123 males and 162 females of a student body totaling 285 students: sixth grade, 99 students; seventh grade, 97 students; and eighth grade, 89 students. Students at this particular junior high were 10 to 13 years old. A total of 15.9% of the students were labeled as a minority (Louisiana Department of Education, 2011a). According to 2009–2010 statistics from the Louisiana Department of Education, Berwick Junior High had a student enrollment of 384 and a total of 49% of the students at this school received free or reduced lunch (Louisiana Department of Education, 2011b).

All data were collected at the school site. The students were given an informed consent document, approved by the institutional review board from the sponsored university, which was signed by the student and by the parent/guardian of the child. Only students who completed and returned the consent form were assessed in this

study. Because of absences, unreturned consent documents, and various disabilities, not all students at the school participated in the experiment. Seventy-four percent of the students at the school participated in the experiment. All subjects were informed of the experiment being conducted immediately prior to experimentation. To ensure confidentiality to the extent permitted by law, students' names were not recorded during data analysis or associated with any results. No special education or learning disabled students were used in the study.

Age, gender, health data, and grade level statistics were collected from students participating in the study during their physical education classes. English Language Arts (ELA) scaled scores (range from 100–500) from the 2010 Integrated Louisiana Educational Assessment Program (iLEAP) were collected from the school guidance counselor. ELA scores from the previous year were used to verify reading equality of the control and experimental group. The iLEAP tests were administered in grades 3, 5, 6, and 7 and aligned with Louisiana's content standards, benchmarks, and grade level expectations in English language arts, mathematics, science, and social studies. The iLEAP was developed in response to No Child Left Behind and replaced the Iowa Tests of Basic Skills. The test is referred to as an "integrated" LEAP because it combines a norm-referenced test, which compares a student's test results to the performance of students in a national sample, with a criterion-referenced test, which reports a student's test results in terms of the state's achievement levels (Louisiana Department of Education, 2011c).

Apparatus

Participants' weight was measured with a Toledo scale. The students' systolic and diastolic blood pressure were collected using a digital blood pressure reader. An Omron HBF-306 body fat analyzer bioelectrical impedance skinfold analyzer measured percentage of body fat. A metronome, step exerciser, and a stopwatch were used for the experimental group. A Reebok step with two risers on each end was used for the step exercise. The height of the step including the risers was 8 in. An English teacher at the school selected a four-paragraph reading comprehension passage (see Appendix) geared for middle school students. Participants were given 10 min to read the passage and to answer 10 multiple-choice questions associated with the reading.

Procedures

Students were randomly selected by counting 1s and 2s. Ones were assigned to the experimental group and 2s were assigned to the control group. Students were randomly placed in groups of 16 because only eight Reebok steps were available. Half would perform the step test before the reading test and the other half would immediately take the reading test. The remaining students in the class sat in the bleachers until it was their time to participate in the study. The control group (n = 144) did no exercise prior to completing the reading assignment. They read the passage provided and answered 10 multiple-choice questions within a 10-min time frame immediately after completing the step exercise. The experimental group (n = 141) completed a rhythmic exercise 8-in. step test in the school gymnasium for 10 min synchronous to a metronome. The metronome beeped once a second. Subjects were told to step up when they heard a beep and then step down when they heard the beep again. This process continued for 10 min. A stopwatch was used to time the students. After completing the step test, the experimental group immediately entered an adjacent classroom to the gym, read the same passage as the control group, and answered the identical 10 multiple-choice questions. The passage provided to the students exhibited a challenging yet intermediate level that all students should have been able to comprehend. Answers were recorded on Scantron answer sheets under the watch of a physical education teacher. Scores on the reading passage were tabulated by a Scantron scoring machine. Students had the option of discontinuing the experiment at any given time, but none did. Neither financial benefit nor incentive was offered to the individual participants. Students who chose not to participate were given an alternate assignment. Data were collected by hand and then inputted into an Excel chart, which was later converted into an SPSS data file for analysis.

Results

Means and standard deviations of the demographics, health assessments, ELA scores, and number of correct responses by grade level of the participants are provided in Table 1. A 3 x 2 x 2 factorial ANOVA was computed to determine differences in reading passage scores across grade, gender, and condition (experimental vs. control). Overall, a significant ANOVA was computed, $F(1, 273) = 16.3$, $p <$

Table 1

Means and Standard Deviations by Grade Level and Gender for Control and Experimental Group

Group Gender	Grade Level		*n*	ELA Score	Age	kg Weight	Systolic	Diastolic	Percentage Body Fat	Number Correct
Control										
Male	6	M	23	318.9	11.6	50.2	109.8	57.5	20.1	3.87
		SD		34.9	.72	11.9	11.7	8.1	9.5	1.42
Female	6	M	24	311.9	11.5	45.8	104.4	56.7	23.3	3.58
		SD		36.8	.59	15.8	14.7	8.9	8.5	1.56
Male	7	M	18	316.2	12.1	51.1	108.3	62.8	20.0	3.78
		SD		41.2	.24	20.1	12.3	8.8	10.4	1.80
Female	7	M	34	322.8	12.3	54.9	106.3	62.1	22.0	3.62
		SD		41.4	.47	15.2	13.9	10.7	10.7	1.84
Male	8	M	19	331.8	13.1	61.4	113.0	60.0	20.8	5.21
		SD		48.5	.23	24.1	16.5	8.3	11.5	2.02
Female	8	M	26	316.9	13.2	54.5	109.6	62.4	22.9	5.65
		SD		40.1	.40	12.5	11.5	9.2	6.2	2.16

Table 1 (cont.)

Group Gender	Grade Level		*n*	ELA Score	Age	kg Weight	Systolic	Diastolic	Percentage Body Fat	Number Correct
Experimental										
Male	6	M	26	330.4	11.5	50.3	112.7	60.9	20.9	6.53
		SD		29.5	.65	12.4	15.0	10.9	8.3	1.14
Female	6	M	26	333.8	11.4	48.2	108.2	55.8	22.9	5.69
		SD		39.0	.57	13.2	19.3	6.7	8.6	1.41
Male	7	M	17	333.8	12.1	52.7	114.2	65.0	20.6	5.76
		SD		22.7	.33	14.9	11.6	8.9	9.3	1.03
Female	7	M	28	349.4	12.1	52.3	109.6	62.1	18.8	5.71
		SD		34.9	.36	13.8	14.4	7.8	9.5	1.80
Male	8	M	20	318.4	13.3	63.2	117.8	58.5	20.9	6.53
		SD		60.0	.47	11.4	14.3	9.3	7.1	1.88
Female	8	M	24	354.8	13.1	53.6	104.6	59.5	20.2	7.79
		SD		29.3	.28	10.5	12.0	9.3	6.1	1.61

.001. Main effects were found for grade, $F(2, 273) = 25.4$, $p < .001$, and condition, $F(1, 273) = 107.1$, $p < .001$, but not for gender, $F(1, 273) = .01$, $p = .94$. A Scheffe post hoc analysis revealed that eighth grade participants performed statistically better on the reading passage ($M = 6.4$) than seventh grade ($M = 5.0$) and sixth grade participants ($M = 4.6$). The control group averaged 4.3 (range 1 to 9) questions correct and the experimental group averaged 6.4 (range 1 to 10) correct answers out of 10 on the reading test. A significant interaction was only computed between grade and gender, $F(2, 272) = 3.17$, $p = .044$. Without accounting for experimental and control groups, males scored higher at the sixth (male $M = 5.29$ vs. female $M = 4.68$) and seventh grade level (male $M = 4.74$ vs. female $M = 4.56$), but females scored higher than males at the eighth grade level (male $M = 6.03$ vs. female $M = 6.68$). When separating the control and experimental groups, the same occurrence was observed where females performed better on the reading test only at the eighth grade level (Table 1).

Table 2 provides Louisiana Department of Education ratings of ELA scaled scores for grades 5–7. Score ranges are classified from *unsatisfactory* to *advanced*. The ratings vary from grade to grade. Based on previous year scores, current sixth through eighth graders scored at a basic level on average on ELA scaled scores.

Table 3 provides the correlations of body weight, blood pressure, body fat, and reading passage scores. No statistical significance was found between the relationships of the fitness variables with number of correct responses from the reading comprehension test. None of the health and fitness variables correlated significantly with number of correct items on the reading passage. ELA scores also did not correlate with number of correct items on the reading passage.

Mean ELA scores were higher for the experimental group ($M = 338$, $SD = 38.7$) versus the control group ($M = 320$, $SD = 40.2$). Therefore, a homogeneity of regression assumption was tested between the interaction of group and ELA scores, $F(1, 281) = .42$, $p = .126$. Reading passage scores did not vary as a function of the covariate. An ANCOVA with ELA scores as the covariate was then computed to determine differences on reading passage scores between the control and experimental group, $F(1, 281) = 83.1$, $p < .001$, $\omega^2 = .21$. The experimental group ($M = 6.4$, $SD = 1.68$) scored significantly better than the control group ($M = 4.3$, $SD = 1.97$) when ELA scores were used as a covariate. Twenty-one

Table 2

*Louisiana Ratings of English Language Scaled Scores (ELA) by Grade Level**

Grade	Satisfactory	Approaching Basic	Basic	Mastery	Proficient
7	100–235	236–285	286–343	344–382	383–500
6	100–238	239–279	280–340	341–386	387–500
5	100–246	247–285	286–340	341–385	386–500

*ELA scores were determined from each student's score on the previous year's test because the iLEAP test is only given at the end of the academic year.

Table 3

Correlations Between the Number of Correct Items on the Reading Passage and Select Assessments for the Control and Experimental Groups

	Body Weight	Percentage Body Fat	Systolic	Diastolic	ELA Score
Control Reading Score	.19	.14	.06	-.02	.14
Experimental Reading Score	-.03	-.05	-.02	-.01	.11

percent of the variance in reading passage scores was accounted for by the treatment condition when ELA scaled scores were controlled. Cohen's *d* formula was used to calculate the effect size (1.15), which was considered large.

Discussion

Health levels as measured in this study did not have a relationship with reading ability, which is dissimilar to other research showing that aerobically fit children perform better academically than unfit children (e.g., Wittberg et al., 2010). However, in this study, execution of the step test was not done at a high aerobic level. Percent body fat was within normal ranges: 20.5% for males and 21.7% for females.

Measures of weight also were similar with males averaging 54.5 kg and females averaging 51.8 kg. Similarly, blood pressure average values were within normal ranges. The experimental and control group did not differ on percent body fat, blood pressure, or body weight assessments. Most of the students in this experiment were in normal ranges for health, so further measurement of fitness parameters of middle school students is needed to determine if one's health has an impact on reading scores following an acute bout of exercise.

The main emphasis of this study was to determine if rhythmic exercise was an alternative method to standard classroom emphasis on improving reading scores. Participants in this study who completed the exercise performed at a higher level on the reading comprehension test than students who did not. The effect size was quite large and was supported by other studies demonstrating that reading skills can be improved among people who participate in comprehensive physical education courses (Tremarche et al., 2007) or who perform acute bouts of activity (Hillman, 2009), even among those with reading difficulties (Reynolds, Nicolson, & Hambly, 2003). Specific reasons for this improvement are linked to attention (Budde et al., 2008) and cognitive functioning (Tomporowski, 2003). Middle school students are often considered distracted and unfocused and need activities to focus their attention (Vawter, 2010). Effective interventions that direct these young students toward more attentive behavior need to be implemented so that they can perform better academically so the school will score higher in high-stakes tests. In this study, 10 min of rhythmic exercise was enough to create a difference in improving the executive function of reading comprehension. Using more classroom time to improve reading skills may be counterproductive and may compound the inattentiveness of these young students. Even a short 10-min exercise break may be enough to refocus middle school students on a learning task.

Exercise also provides an increased arousal state in the test taker, but whether this increased arousal aids cognition following exercise is uncertain. Following acute bouts of aerobic exercise, greater attention and faster information processing has been observed (Hillman et al., 2005), but during exercise the demands of the exercise may use valuable information processing resources and subsequently hinder the brains ability to perform additional tasks (Pontiflex & Hillman, 2007). Participants in this study were not

required to perform high-level cognitive skills during the exercise, so there was no competition between cognitive tasks. Exercise participants could solely focus on the step task and then solely on the reading test. Participants who did not execute the 10-min step test were likely not aroused prior to the reading test and therefore had less physiological advantage going into the test.

Other research cites increased brain blood flow during and following chronic exercise, which theoretically over time can improve the brain's ability to form new connections between neurons as students learn. Studies have examined neuronal activation at the anatomical level by measuring Event Related Potentials (ERPs) and amplitude and latency of the P300 wave (P3). ERPs are electrical brain signals that identify when synchronous activity of neurons occurs and can be measured without invasion by using an electroencephalogram. The P3 wave is believed to indicate cognitive functioning in making decisions, as it is elicited in response to a stimulus. Increases in P3 amplitude and decreases in P3 latency indicate an increase in attention during acute bouts of exercise that are not prolonged (Tomporowski et al., 2008). Acute bouts of aerobic exercise have been found to increase P3 amplitude and decrease P3 latency (Hillman et al., 2005). In this study, it is unknown what specific neuronal or cerebrovascular activity was occurring in the brain either during or following the rhythmic episode that led to reading improvement. Continued electroencephalographic and functional MRI research is needed to document what specifically is occurring at the neurological level to further validate that acute exercise is an effective intervention in improving reading scores.

Standardized testing performance in reading is heavily reliant on a student's ability to effectively read and understand textual information. Schools need to look beyond the current strategies available to improve students' ability to focus and comprehend reading content. Exercise should be seen as one critical tool among many that can be employed. Teachers and administration must continue to work together to balance physical education, NCLB demands, and preparation for standardized testing particularly in the area of reading comprehension. Schools need to understand that rhythmic, continuous exercise is a cost-effective and time-efficient method to keep students attentive and focused on learning and should not be neglected even in the absence of physical education. In schools where daily physical education is missing, classroom teachers should consider short activity breaks to boost academic

performance. However, further research is needed to determine if short bouts of exercise can improve scores on an actual standardized test.

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Appendix

Age appropriate reading passage, questions,
and correct answers in *italics*.

An excerpt from *The Crisis*
By Thomas Paine
December 23, 1776

These are times that try men's souls. The summer soldier and sunshine patriot will, in this crisis, shrink from the service of their country; but he that stands by it now, deserves the love and thanks of man and woman. Tyranny, like hell, is not easily conquered; yet we have this consolation with us that the harder the conflict, the more glorious the triumph. What we obtain too cheap, we esteem too lightly; it is dearness only that gives everything its value. Heaven knows how to put a proper price upon its goods; and it would be strange indeed if so celestial an article as FREEDOM should not be highly rated. Britain, with an army to enforce her tyranny, has declared that she has a right (not only to TAX) but "to BIND us in ALL CASES WHATSOEVER" and if being bound in that manner, is not slavery, then is there not such a thing as slavery upon earth. Even in the expression is impious, for so unlimited a power can belong only to God.

Whether the independence of the continent was declared too soon, or delayed too long, I will not now enter into as an argument; my own simple opinion is, that had it been eight months earlier, it would have been much better. We did not make a proper use of last winter, neither could we, while we were dependent on the state. However, the fault, if it were one, was all our own; we have none to blame but ourselves. But no great deal is lost yet. All that Howe has been doing for this month past, is rather a ravage than a conquest, which the spirit of the Jerseys, a year ago, would have quickly repulsed, and which time a little resolution would soon recover.

I have as little superstition in me as any man living, but my secret opinion has ever been, and still is, that God Almighty will not give up a people to military destruction, or leave them unsupported to perish, who have so earnestly and so repeatedly sought to avoid the calamities of war, by every decent method which wisdom could invent. Neither have I so much of the infidel in me, as to suppose that He has relinquished the government of the world, and given us

up to the care of the devils; and as I do not, I cannot see on what grounds the king of Britain can look up to heaven for help against us: a common murderer, a highwayman, or a housebreaker, has as good pretence as he.

'Tis surprising to see how rapidly a panic will sometimes run through a country. All nations and ages have been subject to them. Britain has trembled like an ague at the report of a French fleet of flat-bottomed boats; and in the fourteenth (fifteenth) century the whole English army, after ravaging the kingdom of France, was driven back like men petrified with fear; and the brave exploit was performed by a few broken forces collected and headed by a woman, Joan of Arc. Would that heaven might inspire some Jersey maid to sprit up her countrymen, and save her fair fellow suffers from ravage and ravishment! Yet panic, in some cases, have their uses; they produce as much good as hurt. Their duration is always short; the mind soon grows through them, and acquires a firmer habit than before.

Reading Comprehension Quiz: Nonfiction[1]

1) To what crisis is the author referring?

    a. The American Civil War
    b. The French Revolution
    c. The American Revolution
    d. The Hundred Years War

2) What characterizes a "summer soldier" and a "sunshine patriot"?

    a. They only fight in the summertime
    b. They are completely committed
    c. They are not very tall
    d. They only fight when things are easy

3) According to the author, what do we value the most?

    a. Things that come to us easy
    b. Things that are difficult to get or achieve
    c. Things that bring us comfort and convenience
    d. A good battle

4) The author likens the situation of the colonists to what?

   a. Being enslaved
   b. Being hostages
   c. Being taxpayers
   d. Being bound and gagged

5) According to Paine, to whom does unlimited power belong?

   a. American colonists
   b. The King of England
   c. Joan of Arc
   d. God

6) What is the author's opinion of the King of England?

   a. He despises him
   b. He admires him
   c. He is confused by his actions
   d. He finds him quite unintelligent

7) What do you think a highwayman is?

   a. A person who builds roads
   b. A person who collects tolls
   c. A person who robs people on the highway
   d. A house-breaker

8) Why does Paine think that God will not abandon the American cause?

   a. Because the colonists sincerely tried to avoid war
   b. Because back then everybody was very religious
   c. Because a priest told him so
   d. None of these

9) What is the author's "simple opinion"?

   a. That the Americans are better equipped to win
   b. That the British make really good tea
   c. That the Joan of Arc was really from Jersey
   d. That the American colonies should have declared independence eight months earlier

10) Who led the forces that drove back the British from France?

a. Napoleon
b. Joan of Arc
c. King Louis the XV
d. Howe

[1]Reading questions taken from Teacher Created Resources, 6421 Industry Way, Westminster, CA 92683