Week #4: Review of "The Heart of Algebra"

1. Which of the following best describes the solutions to the inequality $3l - 6 \geq 8$?

A) $l \geq \frac{2}{3}$
B) $l \geq 2$
C) $l \geq \frac{14}{3}$
D) $l \geq 14$

2. In the equation, $3 + 10x - 5 = (a + 1) \cdot x - 2$, a is a constant. For what value of a does the equation have infinitely many solutions?

A) 2
B) 7
C) 10
D) 9

3. $P = 3.53t + 100$

The amount of money that farmers in Massachusetts paid to maintain their crops between 1991 and 2008 is modeled by the equation above, where P is the amount of money the farmers paid, in millions of dollars, and t is the year (assuming 1991 is t = 0). What does the 3.53 mean in the equation?

A) The cost for maintaining crops was $3.53 million in 1991.
B) The cost for maintaining crops was $3.53 million in 2008.
C) The costs for maintaining crops increased a total of $3.53 million between 1991 and 2008.
D) The costs for maintaining crops increased by $3.53 million each year between 1991 and 2008.

4. $g = 15 - \dfrac{m}{32}$

Alice fills up the gas tank of her car before going on a long drive. The equation above models the amount of gas, g, in gallons, in Alice's car when she has driven m miles. What is the meaning of the 32 in the equation?

A) Alice uses 32 gallons of gas per mile
B) Alice's tank can hold 32 gallons of gas
C) Alice can drive 32 miles on a tank of gas
D) Alice's car can travel 32 miles to the gallon

5. Kaylee wants to do well in her classes, so she is budgeting her time carefully to decide the number of classes, c, she will take this year. For each class that she takes, she expects to spend $2\frac{1}{2}$ hours each week working on homework. She expects to spend an additional $6\frac{1}{2}$ hours each week completing the assigned reading for all of her classes together. If Kaylee has 19 hours available each week to complete homework and reading for her classes, which equation best models the situation.

A) $2\frac{1}{2}c - 6\frac{1}{2} = 19$
B) $2\frac{1}{2}c + 6\frac{1}{2} = 19$
C) $6\frac{1}{2}c - 2\frac{1}{2} = 19$
D) $6\frac{1}{2}c + 2\frac{1}{2} = 19$

6. A convenience store requires that Ayumi spend \$4 or more if she wants to pay using a debit card. Donuts cost \$0.80 each. A bottle of orange juice costs \$1.20. If d represents the number of donuts Ayumi would need to buy to pay for one orange juice and the donuts using a debit card, which of the following inequalities best models the situation described above?

A) $0.8(d + 1.2) > 4$
B) $0.8(d + 1.2) \geq 4$
C) $0.8d + 1.2 > 4$
D) $0.8d + 1.2 \geq 4$

7. Ngozi needs to send out 300 wedding invitations. In 1 minute, she can put 6 invitations into envelopes and apply stamps to them. It takes her a minimum of 50 seconds to address each invitation by hand. If n represents the number of invitations Ngozi can prepare for mailing in 180 minutes, which of the following inequalities best models the situation described above?

A) $180 \geq \frac{n}{6} + \frac{5n}{6}$

B) $180 > \frac{n}{6} + \frac{5n}{6}$

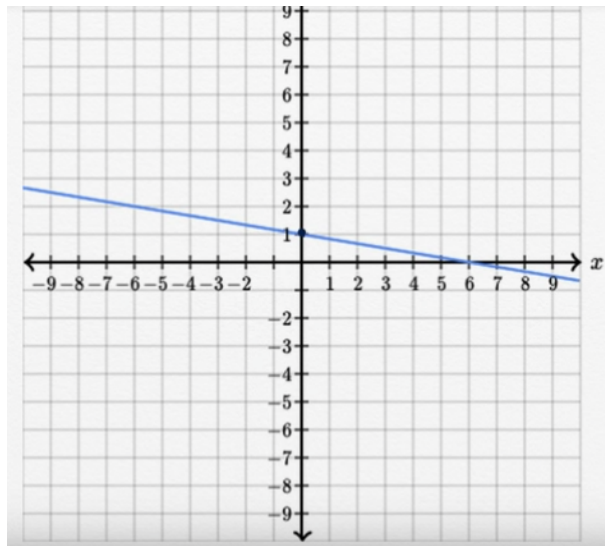C) $300 \leq 6n + \frac{6}{5}n$

D) $300 < 6n + \frac{6}{5}n$

8. The value of a bond on January 1st, 2014 is $1000. Each year the value of the bond increases linearly by $75. Which graph below represents v, the dolar value of the bond, as a function of t, the number of years after January 1st, 2014?
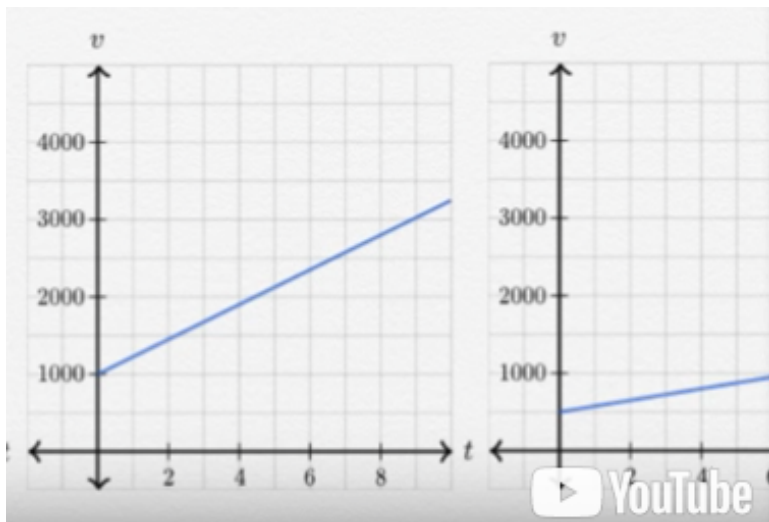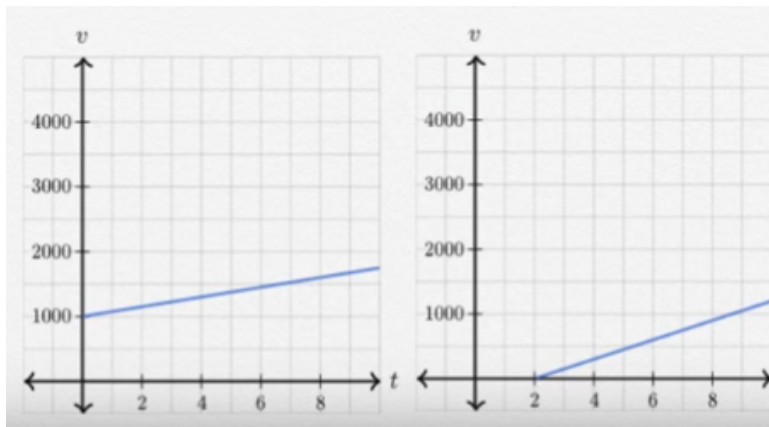
9.

A line is graphed in the xy-plane as shown above. Which of the following represents the line?

A) $x + 6y = 1$
B) $x + 6y = 6$
C) $x - 6y = 1$
D) $x - 6y = -6$

10. A college bookstore charges $60 for a yearly membership. The first book is free with the membership, and any book after that costs $7.60 including tax. How much money, m, does a student spend after buying b books and a yearly membership?

A) $m = 7.60b$
B) $m = 7.60(b - 1)$
C) m=7.60b+60
D) $b = 7.60(b - 1) + 60$

11. Minli's house is located 1.4 miles from her school. When she walks home from school, it takes an average of 24 minutes. Assuming that Minli walks at a constant rate, which of the following functions best models Minli's distance from home, *d*, in miles, if she has walked a total of *t* minutes on her trip home that day?

A) $d = 1.4 - \frac{7}{120}t$

B) $d = 1.4 - 24t$

C) $d = 1.4 - \frac{120}{7}t$

D) $d = 1.4 + \frac{7}{120}t$

12. Karunesh is a gym owner who wants to offer a full schedule of yoga and circuit training classes. Yoga classes are each 1.5 hours long, while circuit training classes are only 1 hour, and he wants at least 25 hours of classes on the schedule each week. All of his instructors are paid $35 per class, but Karunesh doesn't want to spend more than $1,000 per week on salaries. Which of the following falls within Karunesh's guidelines for the weekly schedule?

A) 3 yoga classes and 19 circuit training classes

B) 10 yoga classes and 12 circuit training classes

C) 20 yoga classes and 12 circuit training classes

D) 25 yoga classes and 6 circuit training classes

13. A cell phone producer distributes boxes of units to retail stores. A unit is either a cell phone or an accessory, and each box can have up to 24 units composed of *c* cellphones and *a* accessories. In addition, each box must have at least as many cell phones as accessories. Which of the following systems of inequalities best models the situation described above?

A) $24 \leq a + c$
    $a \leq c$

B) $24 \leq a + c$
    $c \geq a$

C) $a + c \leq 24$
    $a \leq c$

D) $a + c \leq 24$
    $c \leq a$

14. $y = 3x$
$x = 3y$

Consider the system of equations above. How many solutions does this system have?

A) 0
B) 1
C) 2
D) Infinitely many

15. $9x - 14y = -3$
$2x - ay = -6$

Consider the system of linear equations above. Which of the following choices of *a* will result in a system of equations with no solution?

A) $-\dfrac{9}{14}$

B) $-\dfrac{28}{9}$

C) $\dfrac{9}{14}$

D) $\dfrac{28}{9}$

16. Tickets for a play were $2 for each child and $4 for each adult. At one showing of the play, one adult brought 4 children and the remaining adults brought 2 children each. The total ticket sales from children and adults was $60. How many children and adults attended the play?

A) 12 children and 9 adults
B) 14 children and 8 adults
C) 16 children and 7 adults
D) 18 children and 6 adults