

## Part I

Answer all 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Record your answers on your separate answer sheet. [48]

Use this space for  
computations.

- 1 A part of Jennifer's work to solve the equation  $2(6x^2 - 3) = 11x^2 - x$  is shown below.

$$\text{Given: } 2(6x^2 - 3) = 11x^2 - x$$

$$\text{Step 1: } 12x^2 - 6 = 11x^2 - x$$

Which property justifies her first step?

- (1) identity property of multiplication
  - (2) multiplication property of equality
  - (3) commutative property of multiplication
  - (4) distributive property of multiplication over subtraction
- 2 Which value of  $x$  results in equal outputs for  $j(x) = 3x - 2$  and  $b(x) = |x + 2|$ ?
- (1)  $-2$
  - (2)  $2$
  - (3)  $\frac{2}{3}$
  - (4)  $4$

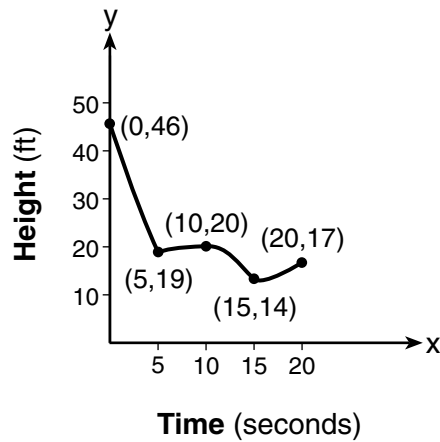
- 3 The expression  $49x^2 - 36$  is equivalent to

- (1)  $(7x - 6)^2$
- (2)  $(24.5x - 18)^2$
- (3)  $(7x - 6)(7x + 6)$
- (4)  $(24.5x - 18)(24.5x + 18)$

Use this space for computations.

- 4 If  $f(x) = \frac{1}{2}x^2 - \left(\frac{1}{4}x + 3\right)$ , what is the value of  $f(8)$ ?
- (1) 11                                      (3) 27  
(2) 17                                      (4) 33

- 5 The graph below models the height of a remote-control helicopter over 20 seconds during flight.

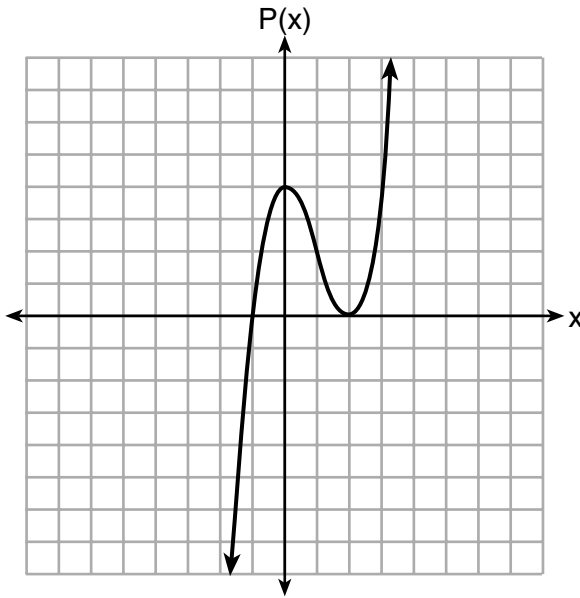


Over which interval does the helicopter have the *slowest* average rate of change?

- (1) 0 to 5 seconds                      (3) 10 to 15 seconds  
(2) 5 to 10 seconds                    (4) 15 to 20 seconds
- 6 In the functions  $f(x) = kx^2$  and  $g(x) = |kx|$ ,  $k$  is a positive integer. If  $k$  is replaced by  $\frac{1}{2}$ , which statement about these new functions is true?
- (1) The graphs of both  $f(x)$  and  $g(x)$  become wider.  
(2) The graph of  $f(x)$  becomes narrower and the graph of  $g(x)$  shifts left.  
(3) The graphs of both  $f(x)$  and  $g(x)$  shift vertically.  
(4) The graph of  $f(x)$  shifts left and the graph of  $g(x)$  becomes wider.

Use this space for computations.

7 Wenona sketched the polynomial  $P(x)$  as shown on the axes below.



Which equation could represent  $P(x)$ ?

- (1)  $P(x) = (x + 1)(x - 2)^2$       (3)  $P(x) = (x + 1)(x - 2)$   
(2)  $P(x) = (x - 1)(x + 2)^2$       (4)  $P(x) = (x - 1)(x + 2)$

8 Which situation does *not* describe a causal relationship?

- (1) The higher the volume on a radio, the louder the sound will be.  
(2) The faster a student types a research paper, the more pages the research paper will have.  
(3) The shorter the time a car remains running, the less gasoline it will use.  
(4) The slower the pace of a runner, the longer it will take the runner to finish the race.

- 9 A plumber has a set fee for a house call and charges by the hour for repairs. The total cost of her services can be modeled by  $c(t) = 125t + 95$ .

Which statements about this function are true?

- I. A house call fee costs \$95.
- II. The plumber charges \$125 per hour.
- III. The number of hours the job takes is represented by  $t$ .

- (1) I and II, only
- (2) I and III, only
- (3) II and III, only
- (4) I, II, and III

- 10 What is the domain of the relation shown below?

$$\{(4,2),(1,1),(0,0),(1,-1),(4,-2)\}$$

- (1)  $\{0, 1, 4\}$
- (2)  $\{-2, -1, 0, 1, 2\}$
- (3)  $\{-2, -1, 0, 1, 2, 4\}$
- (4)  $\{-2, -1, 0, 0, 1, 1, 1, 2, 4, 4\}$

- 11 What is the solution to the inequality  $2 + \frac{4}{9}x \geq 4 + x$ ?

- (1)  $x \leq -\frac{18}{5}$
- (2)  $x \geq -\frac{18}{5}$
- (3)  $x \leq \frac{54}{5}$
- (4)  $x \geq \frac{54}{5}$

- 12 Konnor wants to burn 250 Calories while exercising for 45 minutes at the gym. On the treadmill, he can burn 6 Cal/min. On the stationary bike, he can burn 5 Cal/min.

If  $t$  represents the number of minutes on the treadmill and  $b$  represents the number of minutes on the stationary bike, which expression represents the number of Calories that Konnor can burn on the stationary bike?

- (1)  $b$
- (2)  $5b$
- (3)  $45 - b$
- (4)  $250 - 5b$