

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.

Given: $2(6x^2 - 3) = 11x^2 - x$

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

• she distributed $2(6x^2 - 3)$ to get step 1: $12x^2 - 6$

- 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

• Plug into calculator
 $y_1 = 3x - 2$
 $y_2 = \text{abs}(x + 2)$

x	y_1	y_2

MATH NUM ABS

• Find where they have same y values (outputs).

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

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

Two ways to answer this:

Op 1: (Algebraically)
- Factor using DOPS.

Op 2: (Calc Trick)
- Plug each answer choice into calculator and see which table matches with table for $49x^2 - 36$.

Use this space for computations.

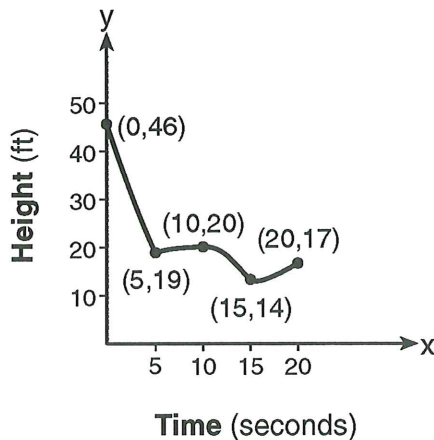
4 If $f(x) = \frac{1}{2}x^2 - \left(\frac{1}{4}x + 3\right)$, what is the value of $f(8)$? $x=8$

- (1) 11 (3) 27
 (2) 17 (4) 33

$$f(8) = \frac{1}{2}(8)^2 - \left(\frac{1}{4}(8) + 3\right)$$

$$f(8) = 27$$

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



→ look for the segment that is the flattest

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

• compare AROC $\frac{\Delta y}{\Delta x}$

(2)

x	y
5	19
10	20

 $\Delta x = +5$, $\Delta y = +1$

AROC = $\frac{1}{5}$ ← smallest AROC

(4)

x	y
15	14
20	17

 $\Delta x = +5$, $\Delta y = +3$

AROC = $\frac{3}{5}$

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.

* Since k is a coefficient, it makes the original graph narrower or wider.
 - If $|k| < 1$, then graph gets wider.
 - If $|k| > 1$, then graph gets narrower [OVER]

* you can also compare graphs of $y = x^2$ to $y = \frac{1}{2}x^2$ in calculator.