

Part I

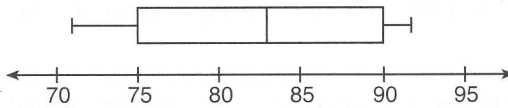
Answer all 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Record your answers in the space provided. [48]

1. The solution to $4p + 2 < 2(p + 5)$ is
 (1) $p > -6$ (2) $p < -6$ (3) $p > 4$ (4) $p < 4$ 1 _____

2. If $k(x) = 2x^2 - 3\sqrt{x}$, then $k(9)$ is
 (1) 315 (2) 307 (3) 159 (4) 153 2 _____

3. The expression $3(x^2 + 2x - 3) - 4(4x^2 - 7x + 5)$ is equivalent to
 (1) $-13x - 22x + 11$ (3) $19x^2 - 22x + 11$
 (2) $-13x^2 + 34x - 29$ (4) $19x^2 + 34x - 29$ 3 _____

4. The zeros of the function $p(x) = x^2 - 2x - 24$ are
 (1) -8 and 3 (2) -6 and 4 (3) -4 and 6 (4) -3 and 8 4 _____

5. The box plot summarizes the data for the average monthly high temperatures in degrees Fahrenheit for Orlando, Florida. The third quartile is

 (1) 92 (2) 90 (3) 83 (4) 71 5 _____

6. Joy wants to buy strawberries and raspberries to bring to a party. Strawberries cost \$1.60 per pound and raspberries cost \$1.75 per pound. If she only has \$10 to spend on berries, which inequality represents the situation where she buys x pounds of strawberries and y pounds of raspberries?
 (1) $1.60x + 1.75y \leq 10$ (3) $1.75x + 1.60y \leq 10$
 (2) $1.60x + 1.75y \geq 10$ (4) $1.75x + 1.60y \geq 10$ 6 _____

7. On the main floor of the Kodak Hall at the Eastman Theater, the number of seats per row increases at a constant rate. Steven counts 31 seats in row 3 and 37 seats in row 6. How many seats are there in row 20?
 (1) 65 (2) 67 (3) 69 (4) 71 7 _____

8. Which ordered pair below is *not* a solution to $f(x) = x^2 - 3x + 4$?
 (1) (0, 4) (2) (1.5, 1.75) (3) (5, 14) (4) (-1, 6) 8 _____

9. Students were asked to name their favorite sport from a list of basketball, soccer, or tennis. The results are shown in the table below.

	Basketball	Soccer	Tennis
Girls	42	58	20
Boys	84	41	5

What percentage of the students chose soccer as their favorite sport?
 (1) 39.6% (2) 41.4% (3) 50.4% (4) 58.6% 9 _____

10. The trinomial $x^2 - 14x + 49$ can be expressed as
 (1) $(x - 7)^2$ (2) $(x + 7)^2$ (3) $(x - 7)(x + 7)$ (4) $(x - 7)(x + 2)$ 10 1

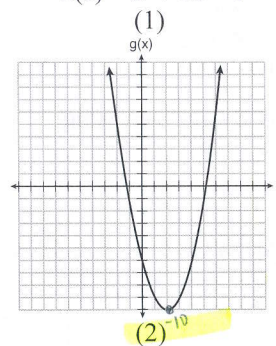
11. A function is defined as $\{(0, 1), (2, 3), (5, 8), (7, 2)\}$. Isaac is asked to create one more ordered pair for the function. Which ordered pair can he add to the set to keep it a function?
 (1) (0, 2) (2) (5, 3) (3) (7, 0) (4) (1, 3) 11 4

12. The quadratic equation $x^2 - 6x = 12$ is rewritten in the form $(x + p)^2 = q$, where q is a constant. What is the value of p ?
 (1) -12 (2) -9 (3) -3 (4) 9 12 3

13. Which of the quadratic functions below has the *smallest* minimum value?

$h(x) = x^2 + 2x - 6$

$k(x) = (x + 5)(x + 2)$



x	f(x)
-1	-2
0	-5
1	-6
2	-5
3	-2

(1) (3) 13 2

14. Which situation is *not* a linear function?
 (1) A gym charges a membership fee of \$10.00 down and \$10.00 per month.
 (2) A cab company charges \$2.50 initially and \$3.00 per mile.
 (3) A restaurant employee earns \$12.50 per hour.
 (4) A \$12,000 car depreciates 15% per year. 14 4

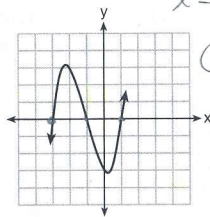
15. The Utica Boilermaker is a 15-kilometer road race. Sara is signed up to run this race and has done the following training runs:
 I. 10 miles II. 44,880 feet III. 15,560 yards
 Which run(s) are at least 15 kilometers?
 (1) I, only (2) II, only (3) I and III (4) II and III 15 1

16. If $f(x) = x^2 + 2$, which interval describes the *range* of this function?
 (1) $(-\infty, \infty)$ (2) $[0, \infty)$ (3) $[2, \infty)$ (4) $(-\infty, 2]$ 16 3

17. The amount Mike gets paid weekly can be represented by the expression $2.50a + 290$, where a is the number of cell phone accessories he sells that week. What is the *constant term* in this expression and what does it represent?
 (1) $2.50a$, the amount he is guaranteed to be paid each week
 (2) $2.50a$, the amount he earns when he sells a accessories
 (3) 290, the amount he is guaranteed to be paid each week
 (4) 290, the amount he earns when he sells a accessories 17 3

3/21
roots
 $x = -3, x = -1, x = 1$

18. A cubic function is graphed on the set of accompanying axes. Which function could represent this graph?



$(x+3)(x+1)(x-1) = 0$

- (1) $f(x) = (x-3)(x-1)(x+1)$
- (2) $g(x) = (x+3)(x+1)(x-1)$
- (3) $h(x) = (x-3)(x-1)(x+3)$
- (4) $k(x) = (x+3)(x+1)(x-3)$

18 2

19. Mrs. Allard asked her students to identify which of the polynomials below are in standard form and explain why.

exponents in descending order

- I. $15x^4 - 6x + 3x^2 - 1$
- II. $12x^3 + 8x + 4$
- III. $2x^5 + 8x^2 + 10x$

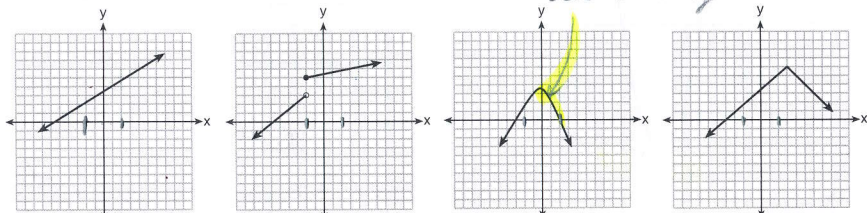
Which student's response is correct?

- (1) Tyler said I and II because the coefficients are decreasing.
- (2) Susan said only II because all the numbers are decreasing.
- (3) Fred said II and III because the exponents are decreasing.
- (4) Alyssa said II and III because they each have three terms.

19 3

20. Which graph does *not* represent a function that is always increasing over the entire interval $-2 < x < 2$?

decreasing



20 3

21. At an ice cream shop, the profit, $P(c)$, is modeled by the function $P(c) = 0.87c$, where c represents the number of ice cream cones sold. An appropriate domain for this function is

- (1) an integer ≤ 0
- (2) an integer ≥ 0
- (3) a rational number ≤ 0
- (4) a rational number ≥ 0

21 _____

22. How many real-number solutions does $4x^2 + 2x + 5 = 0$ have?

- (1) one
- (2) two
- (3) zero
- (4) infinitely many

22 _____

23. Students were asked to write a formula for the length of a rectangle by using the formula for its perimeter, $p = 2\ell + 2w$. Three of their responses are shown.

- I. $\ell = \frac{1}{2}p - w$
- II. $\ell = \frac{1}{2}(p - 2w)$
- III. $\ell = \frac{p - 2w}{2}$

Which responses are correct?

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

23 _____

24. If $a_n = n(a_{n-1})$ and $a_1 = 1$, what is the value of a_5 ?

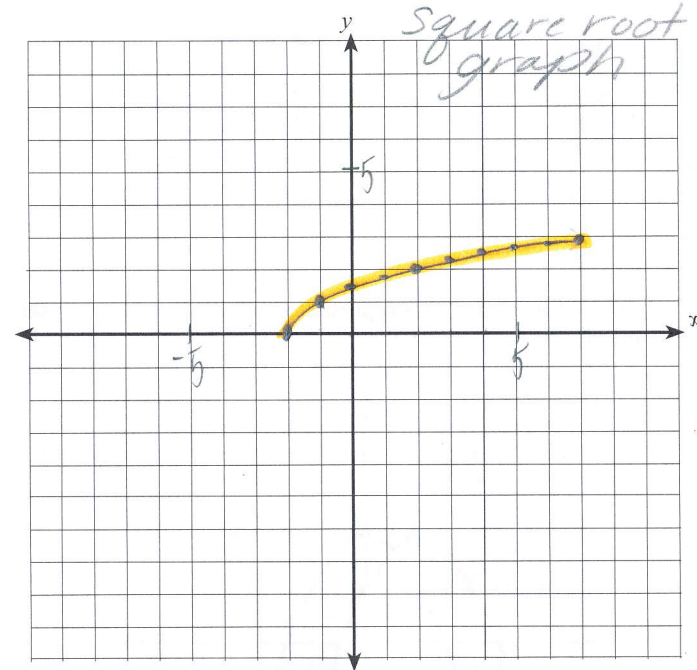
- (1) 5
- (2) 20
- (3) 120
- (4) 720

24 _____

Part II

Answer all 8 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [16]

25) Graph $f(x) = \sqrt{x+2}$ over the domain $-2 \leq x \leq 7$.



x	f(x)
-2	0
-1	1
0	1.4
1	1.7
2	2
3	2.2
4	2.4
5	2.6
6	2.8
7	3

26. Caleb claims that the ordered pairs shown in the accompanying table are from a nonlinear function. State if Caleb is correct. Explain your reasoning.

x	f(x)
0	2
1	4
2	8
3	16

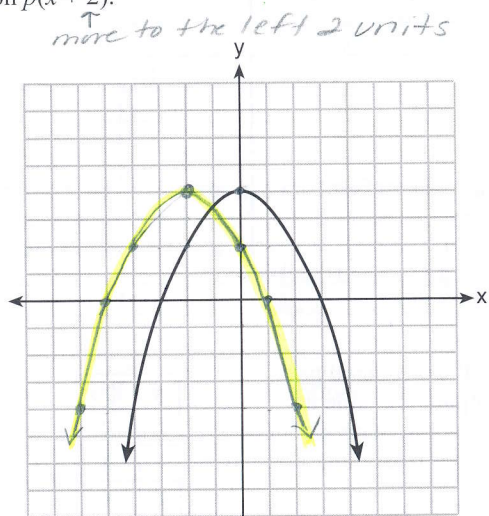
27. Solve for x to the nearest tenth: $x^2 + x - 5 = 0$. $a=1, b=1, c=-5$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-1 \pm \sqrt{(1)^2 - 4(1)(-5)}}{2(1)}$$

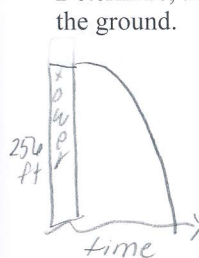
$$x = \frac{-1 \pm \sqrt{21}}{2} = \begin{cases} 1.8 \\ -2.8 \end{cases}$$

28. The graph of the function $p(x)$ is represented below. On the same set of axes, sketch the function $p(x+2)$.



vertex $(0, 4)$ → move the vertex 2 units to the left. Then move all points 2 units to the left.

29. When an apple is dropped from a tower 256 feet high, the function $h(t) = -16t^2 + 256$ models the height of the apple, in feet, after t seconds. Determine, algebraically, the number of seconds it takes the apple to hit the ground.



$$0 = -16t^2 + 256$$

$$+16t^2 + 16t^2$$

$$\frac{16t^2}{16} = \frac{256}{16}$$

$$\sqrt{t} = \sqrt{16}$$

$$t = \pm 4$$

4 seconds

DOTS

$$\text{or } 0 = -16t^2 + 256$$

$$16t^2 - 256 = 0$$

$$(4t+16)(4t-16) = 0$$

$4t+16=0$	$4t-16=0$
$-16-16$	$+16+16$
$4t = -16$	$4t = 16$
$\frac{4t}{4} = \frac{-16}{4}$	$\frac{4t}{4} = \frac{16}{4}$
$t = -4$	$t = 4$
reject	seconds

30. Solve the equation below algebraically for the exact value of x .

LCD $\frac{3}{1} \frac{3}{3} \frac{3}{3}$

$$3 \cdot \left[\frac{6}{1} - \frac{2}{3}(x+5) \right] = 4x$$

$$18 - 2(x+5) = 4x$$

$$18 - 2x - 10 = 4x$$

$$+2x \quad +2x$$

$$\frac{8}{14} = \frac{14x}{14}$$

$$\frac{4}{7} = x$$