

Name:
Teacher:

Date:
Class/Period:

1-7 Linear 29.3%
D Functions
 $-4 < x < 8$

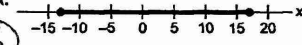
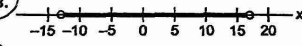
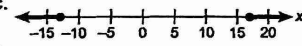
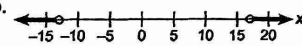
1) Find the solution set of $|x-2| < 6$.

- A. $\{x | -8 < x < 4\}$ $x-2 < 6$
- B. $\{x | -4 < x < 8\}$ $x < 8$
- C. $\{x | x < 4\}$ $x-2 > -6$
- D. $\{x | x < 8\}$ $x > -4$

2) The target heart rate range during physical activity for a certain 16-year-old girl of average fitness is within 21 beats per minute of 141 beats per minute. Which inequality represents this target range?

- A. $|r - 141| \leq 21$ $r - 141 \leq 21$ $r - 141 \geq -21$
- B. $|r - 141| \leq 162$ $r \leq 162$ $r \geq 120$
- C. $|r| \leq 21$
- D. $|r| \leq 120$ $120 \leq r \leq 162$

3) Which graph represents the solution set of $-16 < x - 3 < 14$?

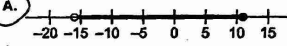
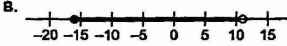
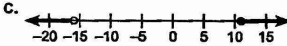
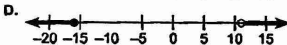
- A. 
- B. 
- C. 
- D. 

~~$-13 < x < 17$~~
 $-15 -10 -5 0 5 10 15 20$

4) Which graph represents this statement?

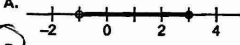
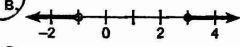
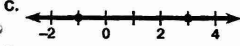
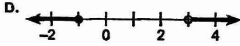
-12 is less than $x + 4$, and $x + 4$ is less than or equal to 15.

$-12 < x + 4 \leq 15$
 $-16 < x \leq 11$

- A. 
- B. 
- C. 
- D. 

5) Which is the graph of the solution set for $2x - 10 < -12$ or $4 - 3x \leq -5$?

$2x - 10 < -12$ $4 - 3x \leq -5$
 $2x < -2$ $-3x \leq -9$
 $x < -1$ or $x \geq 3$

- A. 
- B. 
- C. 
- D. 

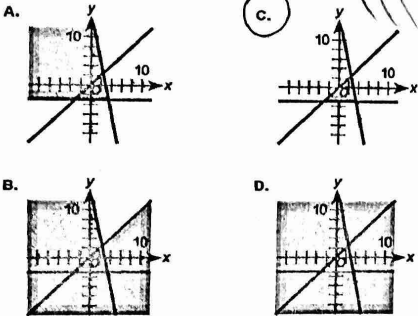
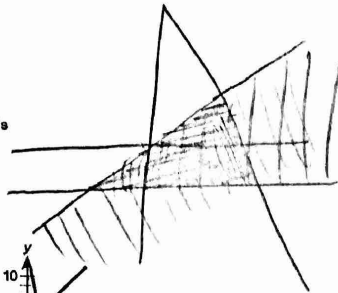
~~$x < -1$ or $x \geq 3$~~

16.9

8-14 Number Sense, Quadratic Functions, (CE I) + Matrices

6) Which graph represents the solution set to this system of equations?

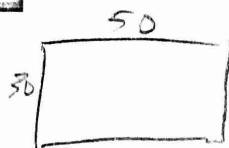
$$\begin{cases} y \leq x \\ y \geq -3 \\ y \leq 15 - 5x \end{cases}$$



7) The Gala Events Center has a rectangular parking lot measuring 30 m by 50 m. Only 80% of the lot is usable space. Each parked car requires 6 m² of space and each bus requires 30 m². The attendant can handle no more than 100 vehicles. It costs \$5 to park a car and \$15 to park a bus. What is the maximum income for a full lot?

- A. \$ 500
- B. \$ 750**
- C. \$1,000
- D. \$1,500

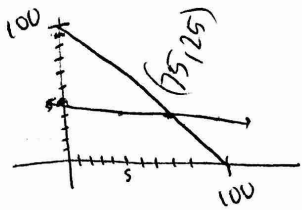
x: cars
y: buses



1500 * 80% = 1200

$$\begin{aligned} x + y &\leq 100 \rightarrow y \leq 100 - x \\ 6x + 30y &\leq 1200 \end{aligned}$$

$$\begin{aligned} C &= 5x + 15y \\ &= 5(75) + 15(25) \\ &= 750 \end{aligned}$$



8) What is the complex conjugate of $7 + \sqrt{-8}$?

- A. $7 + 4\sqrt{2}$
- B. $7 - 4\sqrt{2}$
- C. $7 + 2i\sqrt{2}$
- D. $7 - 2i\sqrt{2}$**

$7 + 2i\sqrt{2}$ $\sqrt{-8} = 2i\sqrt{2}$

9) Which function has the same range as $y = (x+3)^2$? vertex (3,0)

- A. $y = (x+3)^2 - 2$
- B. $y = x^2 + 9$
- C. $y = 2(x-3)^2 + 1$
- D. $y = (x-5)^2$**

$y = a(x-h)^2 + k$ vertex (3,0) $\begin{matrix} 3 \\ 0 \end{matrix}$ $\begin{matrix} 4 \\ 2 \end{matrix}$

10) A used bookstore sells paperback books for \$1.00 each, hardback books for \$3.00 each, and CDs for \$4.00 each. On Saturday, they sold 37 paperbacks, 52 hardbacks, and 42 CDs. What matrix operation would compute the store's total income for that day?

A. $\begin{bmatrix} \$1.00 & \$3.00 & \$4.00 \end{bmatrix} \begin{bmatrix} 37 \\ 52 \\ 42 \end{bmatrix}$ B. $\begin{bmatrix} 37 \\ 52 \\ 42 \end{bmatrix} \begin{bmatrix} \$1.00 & \$3.00 & \$4.00 \end{bmatrix}$

$\begin{pmatrix} 1 & 3 & 3 \end{pmatrix} \begin{pmatrix} 37 \\ 52 \\ 42 \end{pmatrix}$ $\begin{pmatrix} 37 \\ 52 \\ 42 \end{pmatrix} \begin{pmatrix} 1 & 3 & 3 \end{pmatrix}$

C. $\begin{bmatrix} 37 & 52 & 42 \end{bmatrix} \begin{bmatrix} \$1.00 \\ \$3.00 \\ \$4.00 \end{bmatrix}$ D. $\begin{bmatrix} \$1.00 & \$3.00 & \$4.00 \end{bmatrix} \begin{bmatrix} 37 & 52 \end{bmatrix}$

11) If $c - d = 7$ and $c = 3 - 4i$, what is d ?

- A. $-4 - 4i$**
- B. $-4 + 4i$
- C. $4 - 4i$
- D. $4 + 4i$

$$\begin{aligned} 3 - 4i - d &= 7 \\ -4i - d &= 4 \\ -d &= 4 + 4i \\ d &= -4 - 4i \end{aligned}$$

$$\begin{aligned} 100 - x &= \frac{1}{3}x + 40 \\ 60 &= \frac{4}{3}x \\ 75 &= x \end{aligned}$$

12) For the equation $x^2 - 4x + 4 = 9$, determine the discriminant.

- A. -36
- B. 0
- C. 6
- D. 36

$$x^2 - 4x - 5 = 0$$

$$(-4)^2 - 4(1)(-5) = 36$$

13) What is AB ?

$$A = \begin{bmatrix} -3 & 1 \\ 6 & 0 \\ 4 & 2 \\ 9 & 7 \end{bmatrix}$$

$$B = \begin{bmatrix} 2 & 6 \\ 5 & 1 \end{bmatrix}$$

$$\begin{bmatrix} -3 & 1 \\ 6 & 0 \\ 4 & 2 \\ 9 & 7 \end{bmatrix} \cdot \begin{bmatrix} 2 & 6 \\ 5 & 1 \end{bmatrix}$$

$(4 \times 2) \cdot (2 \times 2)$

A. $\begin{bmatrix} 52 & 156 \\ 130 & 26 \end{bmatrix}$

C. $\begin{bmatrix} -6 & 6 \\ 30 & 0 \\ 8 & 12 \\ 45 & 7 \end{bmatrix}$

B. $\begin{bmatrix} -1 & -17 \\ 12 & 36 \\ 18 & 26 \\ 53 & 61 \end{bmatrix}$

D. $\begin{bmatrix} -42 & 14 \\ 84 & 0 \\ 56 & 28 \\ 128 & 98 \end{bmatrix}$

14) If D , E , F , and X are 2×2 matrices, with

$$D = \begin{bmatrix} 2 & -1 \\ 3 & 5 \end{bmatrix}$$

$$E = \begin{bmatrix} 3 & -1 \\ 0 & 6 \end{bmatrix}$$

$$F = \begin{bmatrix} 2 & 1 \\ -3 & 0 \end{bmatrix}$$

$$DX + E = F$$

$$DX = F - E$$

$$X = \begin{bmatrix} \frac{8}{13} & \frac{4}{13} \\ -\frac{3}{13} & -\frac{13}{13} \end{bmatrix}$$

and $DX + E = F$, what is X ?

A. $\begin{bmatrix} 1 & 10 \\ -15 & -24 \end{bmatrix}$

C. $\begin{bmatrix} \frac{8}{13} & \frac{4}{13} \\ -\frac{3}{13} & -\frac{13}{13} \end{bmatrix}$

B. $\begin{bmatrix} \frac{5}{4} & \frac{1}{4} \\ -\frac{1}{4} & \frac{11}{4} \end{bmatrix}$

D. $\begin{bmatrix} \frac{9}{10} & \frac{11}{30} \\ \frac{2}{10} & \frac{1}{30} \end{bmatrix}$

15) Simplify this expression:

$$3(x^2 + 2) - 5(2x^2 + 3x - 4) + 2(-x^2 - 4)$$

$$= 3x^2 + 6 - 10x^2 - 15x + 20 - 2x^2 - 8$$

$$= -9x^2 - 15x + 18$$

Polynomial

16) Find all zeros of $f(x) = x^4 - 1$.

- A. $x = -1, 1$
- B. $x = 1, i$
- C. $x = 1, i, -1$
- D. $x = 1, -1, i, -i$

Functions

$$(x^2 - 1)(x^2 + 1)$$

$$(x - 1)(x + 1)(x + i)(x - i)$$

$$x = \pm 1, \pm i$$

$$(a^3 - b^3) = (a - b)(a^2 + ab + b^2)$$

17) Which is an equivalent form of this expression?

$$(3x + 2)(x - 5) - 6(x - 1)$$

- A. $3x^2 - 6x - 9$
- B. $3x^2 - 7x - 11$
- C. $3x^2 - 9x - 16$
- D. $3x^2 - 19x - 4$

$$3x^2 - 15x + 2x - 10 - 6x + 6$$

$$3x^2 - 19x - 4$$

18) What is the complete factorization of $16r^{2n} - 54q^{4n}$ where $a, n, r,$ and q are integers?

- A. $2(8r^{2n} - 27q^{4n})$
- B. $(4r^{2n} + 6q^n)(4r^n - 9q^{3n})$
- C. $2(4r^{2n} + 3q^n)(2r^n - 9q^{3n})$
- D. $2(2r^n - 3q^{2n})(4r^{2n} + 6r^n q^{2n} + 9q^{4n})$

$$16r^{2n} - 54q^{4n} = 2r^{2n} \cdot 8 - 2 \cdot 27q^{4n}$$

$$2(8r^{2n} - 27q^{4n})$$

$$2(2r^n - 3q^{2n})(4r^{2n} + 6r^n q^{2n} + 9q^{4n})$$

19) What is the completely simplified expression of $\frac{x^2 - 4x}{x^3 - 8x^2}$?

- A. $\frac{x^2 - 4x}{x^3 - 8x^2}$
- B. $\frac{1}{x(x+2)}$
- C. $\frac{x^2 - 4}{x(x^2 - 8)}$
- D. $\frac{x+2}{x(x^2 + 2x + 4)}$

$$\frac{x(x^2 - 4)}{x^2(x^2 - 8)}$$

$$\frac{x(x-2)(x+2)}{x^2(x^2 + 2x + 4)}$$

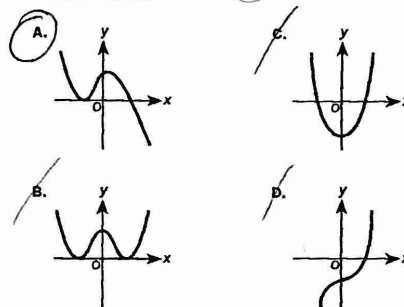
20) For what values of x does the graph of $f(x) = 3x^2 - 5\frac{1}{2}x - 5$ intersect the x -axis?

- A. -11 and 5
- B. 11 and -5
- C. $-\frac{1}{2}$ and $\frac{2}{3}$
- D. $2\frac{1}{2}$ and $-\frac{2}{3}$

$$\frac{x+2}{x(x^2 + 2x + 4)}$$

$$-\frac{2}{3} \text{ and } 2\frac{1}{2}$$

21) Which graph could represent a cubic function with 2 distinct real zeros?



22) If $\log_2 x = -3$, what is x ?

- A. $\frac{1}{9}$
- B. $\frac{1}{8}$
- C. 8
- D. 9

$$2^{-3} = x$$

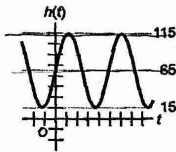
$$\frac{1}{2^3} = x$$

$$x = \frac{1}{8}$$

22-28 G
Non Polynomial
Functions
12%

11 n 4-11

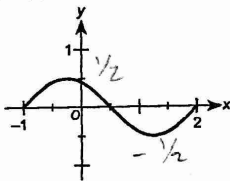
- 23) This graph shows the height above ground, $h(t)$, of a rider on a Ferris wheel as a function of time, t . What is the amplitude of the sine function that models the rider's height above ground?



$$115 - 65 = 50$$

- A. 50
B. 65
C. 100
D. 115

- 24) Which best describes the range of this graph of the relation $y = f(x)$?



$$-\frac{1}{2} \leq y \leq \frac{1}{2}$$

- A. $-1 \leq x \leq 2$
B. $-\frac{1}{2} \leq x \leq \frac{1}{2}$
C. $-1 \leq y \leq 2$
D. $-\frac{1}{2} \leq y \leq \frac{1}{2}$

- 25) Rewrite this expression in simplest form. Assume variables represent positive numbers.

$$\frac{\sqrt{16w^2y^3}}{\sqrt{75x^4}} = \frac{4wy\sqrt{3xy}}{5x^2\sqrt{3x}}$$

- A. $\frac{\sqrt{3xy}}{3x}$
B. $\frac{4wy\sqrt{3xy}}{15x^2}$
C. $\frac{4wy^2\sqrt{5xy}}{25x^2}$
D. $\frac{4wy^2\sqrt{3xy}}{15x^3}$

- 26) Which expression is equivalent to $\ln(3e^{2x})$?

- A. $2x + \ln 3$
B. $2x \ln 3$
C. $6x$
D. $3 \ln 2x$

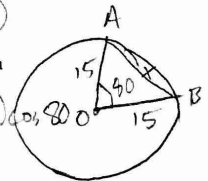
$$\ln(3) + \ln(e^{2x}) = \ln(3) + 2x \cdot \ln(e) = 2x + \ln(3)$$

- 27) The radius of circle O is 15 m. Two radii, OA and OB , form an angle of 80° . To the nearest tenth of a meter, how long is chord AB ?

- A. 14.8
B. 15.0
C. 9.3
D. 21.2

$$x^2 = 15^2 + 15^2 - 2(15)(15)\cos(80^\circ)$$

$$x = 19.3$$



- 28) A business owner spent \$500 on start-up fees to produce and sell candles. Each candle costs an additional \$3.00 to produce. What is the minimum number of candles that the owner must produce for the average cost per candle to be less than \$3.75?

- A. 134
B. 167
C. 375
D. 667

$$3.75 = \frac{500 + 3x}{x}$$

$$3.75x = 500 + 3x$$

$$.75x = 500$$

$$x = 667$$

29) Yi has a bag of 15 stones: 8 blue and 7 purple and randomly chooses 3 stones from the bag. If Yi picks 2 blue stones and does not return them to the bag, what is the probability that she will pick a purple stone next?

- A. $\frac{7}{15}$
- B. $\frac{6}{15}$
- C. $\frac{7}{13}$
- D. $\frac{6}{13}$

2 purple
13 stones left

29-35 H
Probability,
Sequences, and
Series

26.3%

30) Richard has 5 shirts, 6 pairs of jeans, and 3 vests. How many different outfits, each composed of a shirt, a pair of jeans, and a vest, can he make?

- A. 6
- B. 14
- C. 33
- D. 90

$$5(6)(3) = 90$$

31) Find the 100th term of this arithmetic sequence.

5, 8, 11, 14, 17, ...

- A. 302
- B. 305
- C. 308
- D. 311

$$a_{100} = 5 + (100-1)3$$

$$a_{100} = 302$$

32) In a geometric sequence where $a_1 = 15$ and $a_5 = 240$, what is the first term in the sequence that is a multiple of 4?

- A. $a_2 = 20$
- B. $a_3 = 60$
- C. $a_4 = 60$
- D. $a_4 = 120$

$$240 = 15 \cdot r^4$$

$$16 = r^4$$

$$r = 2$$

$$a_n = 15 \cdot 2^{n-1}$$

15, 30, 60, 120, 240

33) On the first of every month, a new library receives a new shipment of 575 book titles. If the library starts the beginning of the first year with 3,000 book titles and does receive a shipment that month, how many book titles will it have at the end of 3 years?

- A. 42,900
- B. 23,700
- C. 5,363
- D. 4,150

$$3000 + 575(12 \cdot 3)$$

34) The yearbook staff includes 8 photographers. One photographer needs to cover a dance, and another needs to cover a basketball game. In how many ways can photographers be assigned to these events?

- A. 16
- B. 28
- C. 56
- D. 64

$$8 \text{ nPr } 2 = 56$$

35) This chart shows the number of students, by gender, in each grade at a local high school. The principal will randomly select one student to meet the governor.

	9th	10th	11th	12th
Female	80	95	75	80
Male	75	100	75	70

Let $A = \{\text{choosing a female}\}$ and $B = \{\text{choosing a ninth grader}\}$. What is $P(B|A)$?

- A. $\frac{8}{65}$
- B. $\frac{31}{66}$
- C. $\frac{16}{31}$
- D. $\frac{8}{33}$

$$\frac{80}{330} = \frac{8}{33}$$