Eastern School District

Mathematics 2200
Common Mathematics Assessment

Sample 2013

Name:
Mathematics
Teacher:

27 Selected Response   27 marks
11 Constructed Response   40 marks

_____

FINAL   **67 Marks**

TIME: 2 HOURS

NOTE

Diagrams are not necessarily drawn to scale.

FORMULAE

$$t_n = t_1 + (n-1)d \ , n \in N$$

$$t_n = t_1 r^{n-1} \ , n \in N$$

$$S_n = \frac{n}{2}(t_1 + t_n)$$

$$S_n = \frac{t_1(r^n - 1)}{r - 1}$$

$$S = \frac{t_1}{1 - r}$$

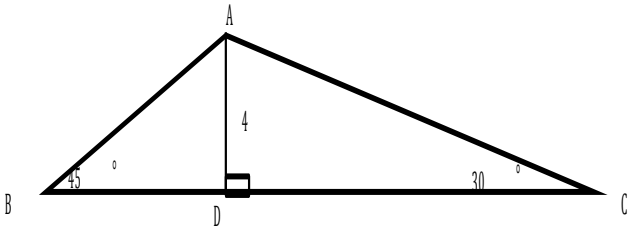$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

Selected Response:
Choose the appropriate response on the answer sheet or SCANTRON.

1.   How many terms are in the sequence $\{3, 1, -1, \dots, -91\}$

    (A)   43
    (B)   45
    (C)   46
    (D)   48

2.   In an arithmetic sequence, $t_3 = m$ and $t_4 = n$. Which expression represents t_6?

    (A) $2m - n$
    (B) $2n - m$
    (C) $3n - m$
    (D) $3n - 2m$

3.   Which describes the series $\left\{-19, -\frac{19}{2}, -\frac{19}{4}, -\frac{19}{8}, \dots\right\}$?

    (A)   convergent with a sum of -38
    (B)   convergent with no sum
    (C)   divergent with a sum of -38
    (D)   divergent with no sum

4.   What is the exact length of BC?
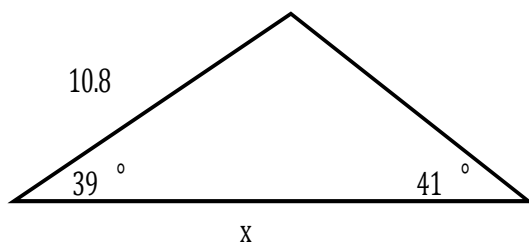

    (A)   6
    (B)   12
    (C) $4 + 4\sqrt{3}$
    (D) $4\sqrt{2} + 4\sqrt{3}$
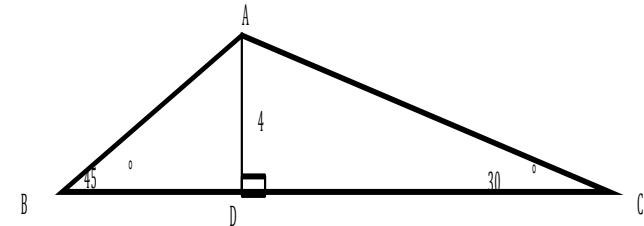
5.   The point $(6, -8)$ lies on the terminal arm of an angle θ in standard position. What is the value of $\sin\theta$?

    (A) $-\dfrac{4}{3}$

    (B) $-\dfrac{4}{5}$

    (C) $\dfrac{3}{5}$

    (D) $\dfrac{4}{5}$

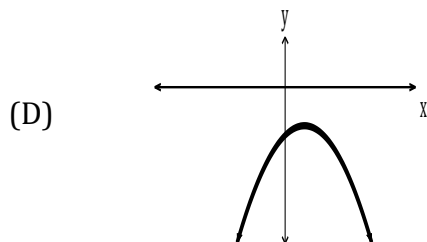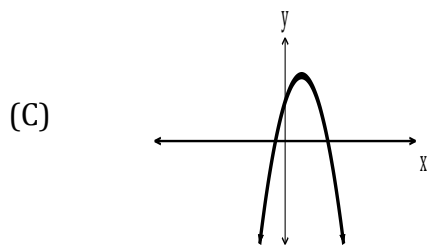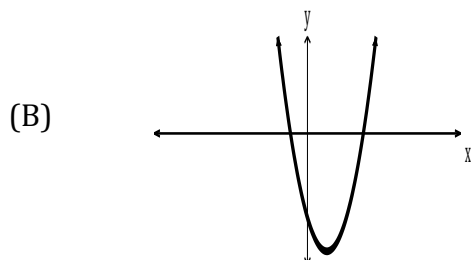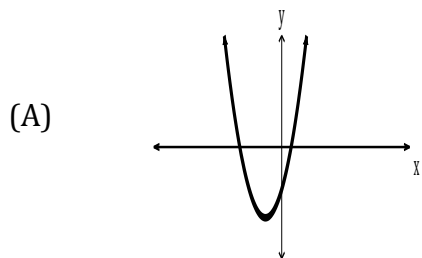6. Solve: $\cos \theta = -0.6947$, where $0° \leq \theta \leq 360°$

   (A) $\theta = 46°$ and $\theta = 134°$
   (B) $\theta = 46°$ and $\theta = 314°$
   (C) $\theta = 134°$ and $\theta = 226°$
   (D) $\theta = 226°$ and $\theta = 314°$

7. What is the length of **x**?


   (A) 7.2
   (B) 10.4
   (C) 11.3
   (D) 16.2

8. Which represents the function $y = 2x^2 - 4x - 5$?

   (A)

   (B)

   (C)

   (D)

9. Which represents a parabola with y-intercept -15 and vertex $(1, -5)$?

    (A) $f(x) = -20(x - 1)^2 - 5$

    (B) $f(x) = -20(x + 1)^2 + 5$

    (C) $f(x) = -10(x - 1)^2 - 5$

    (D) $f(x) = -10(x + 1)^2 + 5$

10. If $y = 2x^2 + 12x + 10$ is written in the form $y = a(x - p)^2 + q$, what is the value of q?

    (A) -26

    (B) -8

    (C) 1

    (D) 28

11. A rancher plans to use 430 m of fencing to build a cattle enclosure with three equal sections. Which represents the total area of the enclosure in terms of its width, x?
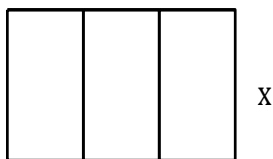
    (A) $A = x(215 - 2x)$

    (B) $A = x(215 - x)$

    (C) $A = x(430 - 2x)$

    (D) $A = x(430 - x)$

12. Theresa's incorrect solution to the equation $4x^2 - 7x - 3 = 0$ is shown. In which step does the **first** error occur?

    Step 1 $x = \dfrac{7 \pm \sqrt{(-7)^2 - (4)(4)(-3)}}{2(4)}$

    Step 2 $x = \dfrac{7 \pm \sqrt{49 - 48}}{8}$

    Step 3 $x = \dfrac{7 \pm \sqrt{1}}{8}$

    Step 4 $x = 1 , x = \dfrac{3}{4}$

    (A)   1

    (B)   2

    (C)   3

    (D)   4

13. Which describes the quadratic function that has vertex $(-9, 3)$ and passes through the point $(-4, -2)$?

    (A)   The axis of symmetry is $x = -9$ and the discriminant is negative.

    (B)   The axis of symmetry is $x = -9$ and the discriminant is positive.

    (C)   The axis of symmetry is $x = 9$ and the discriminant is negative.

    (D)   The axis of symmetry is $x = 9$ and the discriminant is positive.
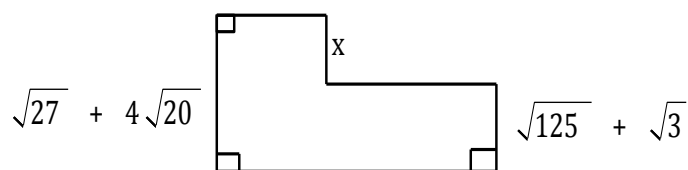
14. Solve: $2x(x - 3) + 5(x - 3) = 0$

(A) $x = -3$, $x = -\dfrac{5}{2}$

(B) $x = -3$, $x = \dfrac{5}{2}$

(C) $x = 3$, $x = -\dfrac{5}{2}$

(D) $x = 3$, $x = \dfrac{5}{2}$

15. Determine a simplified expression for the value of **x**:

$\sqrt{27}$ + $4\sqrt{20}$ [diagram with x] $\sqrt{125}$ + $\sqrt{3}$

(A) $2\sqrt{3} + \sqrt{5}$

(B) $2\sqrt{3} + 3\sqrt{5}$

(C) $4\sqrt{3} + \sqrt{5}$

(D) $4\sqrt{3} + 3\sqrt{5}$

16. Write $4x^3y^2\sqrt{5xy}$ as an entire radical.

(A) $\sqrt{20x^7y^5}$

(B) $\sqrt{20x^{10}y^5}$

(C) $\sqrt{80x^7y^5}$

(D) $\sqrt{80x^{10}y^5}$

17. Simplify completely: $\dfrac{\sqrt{6}}{\sqrt{3}+\sqrt{2}}$

(A) $3\sqrt{2} - 2\sqrt{3}$

(B) $3\sqrt{2} + 2\sqrt{3}$

(C) $\dfrac{3\sqrt{2} - 2\sqrt{3}}{5}$

(D) $\dfrac{3\sqrt{2} + 2\sqrt{3}}{5}$

18. Simplify completely: $\dfrac{\sqrt[3]{2}}{\sqrt[3]{6}}$

    (A) $\dfrac{\sqrt[3]{3}}{3}$

    (B) $\dfrac{\sqrt[3]{9}}{3}$

    (C) $\dfrac{\sqrt[3]{12}}{6}$

    (D) $\dfrac{\sqrt[3]{72}}{6}$

19. Simplify completely: $\dfrac{1}{x} - \dfrac{2}{x+6}$

    (A) $-\dfrac{1}{x}$

    (B) $-\dfrac{1}{2x+6}$

    (C) $\dfrac{-1}{x(x+6)}$

    (D) $\dfrac{-x+6}{x(x+6)}$

20. Simplify completely: $\dfrac{9x - \dfrac{1}{x}}{6 + \dfrac{2}{x}}$

    (A) $\dfrac{3x-1}{2}$

    (B) $\dfrac{3x+1}{2}$

    (C) $\dfrac{9x-1}{8}$

    (D) $\dfrac{9x-1}{2(3x+1)}$

21. Simplify completely: $\dfrac{25-x^2}{x^2} \cdot \dfrac{x^2-2x}{x^2+3x-10}$
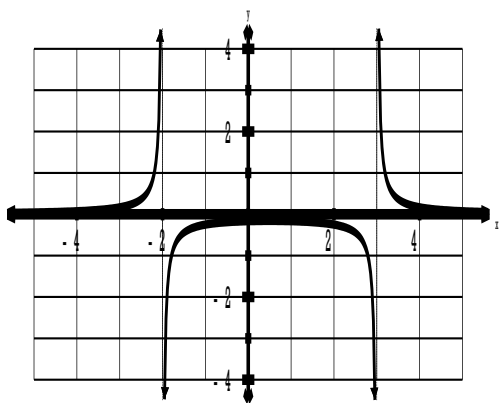
    (A) $\dfrac{5-x}{x}$

    (B) $\dfrac{x+5}{x}$

    (C) $\dfrac{(5-x)(x+2)}{x^2}$

    (D) $\dfrac{(x+5)(x-2)}{x^2}$

22. The graph shown represents the reciprocal of which quadratic function?

    (A) $f(x) = x^2 - 5x + 6$
    (B) $f(x) = x^2 + 5x + 6$
    (C) $f(x) = x^2 - x - 6$
    (D) $f(x) = x^2 + x - 6$

23. What is the range of $y = |x + 5|$?

    (A) $\{y|y > -5, y \in \mathbb{R}\}$
    (B) $\{y|y \geq -5, y \in \mathbb{R}\}$
    (C) $\{y|y > 0, y \in \mathbb{R}\}$
    (D) $\{y|y \geq 0, y \in \mathbb{R}\}$

24. Which is a solution to the system $\begin{cases} \frac{1}{2}x^2 + x - y = 13 \\ x^2 - 2x + y = 7 \end{cases}$?

    (A) $(-2, -1)$
    (B) $(2, -9)$
    (C) $(4, -1)$
    (D) $(6, -11)$

25. The first four steps of an incorrect solution to the system $\begin{cases} 4x^2 + 3x - 2y = 4 \\ x^2 - 2x - y = 1 \end{cases}$ are shown. Identify the step in which the **first** error occurs.

    Step 1 : $\begin{cases} 4x^2 + 3x - 2y = 4 \\ -2x^2 + 4x + 2y = 1 \end{cases}$
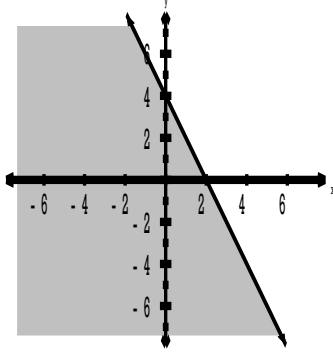
    Step 2: $2x^2 + 7x = 5$

    Step 3: $2x^2 + 7x + 5 = 0$

    Step 4: $(2x + 5)(x + 1) = 0$
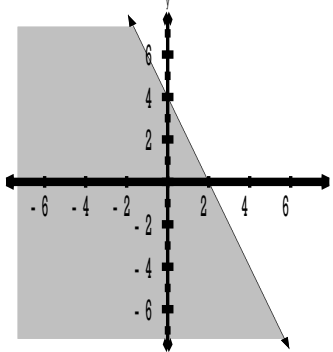
    (A)   1
    (B)   2
    (C)   3
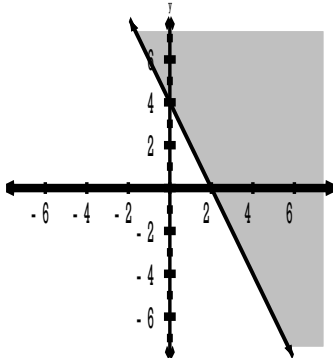   (D)   4
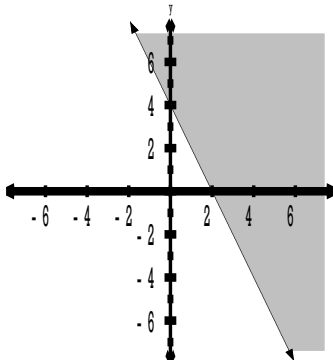
26. Which represents the inequality $2x + y > 4$?

(A)

(B)

(C)

(D)

27. Which is a solution to $y > -2(x - 1)^2 + 3$?

(A) $(0, 2)$
(B) $(1, 2)$
(C) $(2, 0)$
(D) $(2, 1)$

Constructed Response:
Answers to be written on this paper in the space provided. Show all workings.

28. The first three terms of an arithmetic sequence are $\{x + 4, 5x + 1, 7x + 4, \dots\}$. **3 marks**
     Algebraically determine the value of **x** and state the common difference.

29. The monthly production of crude oil, in barrels, for the first four months for a **3 marks**
     test well at Hebron is given below. In theory, what is the expected lifetime
     production of the well, to the nearest barrel?

Month	# of Barrels
1	40 000
2	34 000
3	28 900
4	24 565

30. Calculate the length of CD to the nearest tenth of a cm. **4 marks**
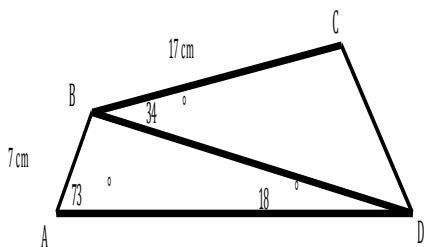
31. From a height of 2 m, a volleyball is hit into the air. After 1 second, the ball reaches a maximum height of 7 m. Write the quadratic function, in the form $y = a(x - p)^2 + q$, that models the situation and use it to determine the height of the ball at 1.5 seconds.

3 marks

Function_____

Height_____

32. Algebraically determine the **exact** roots, in simplest form:
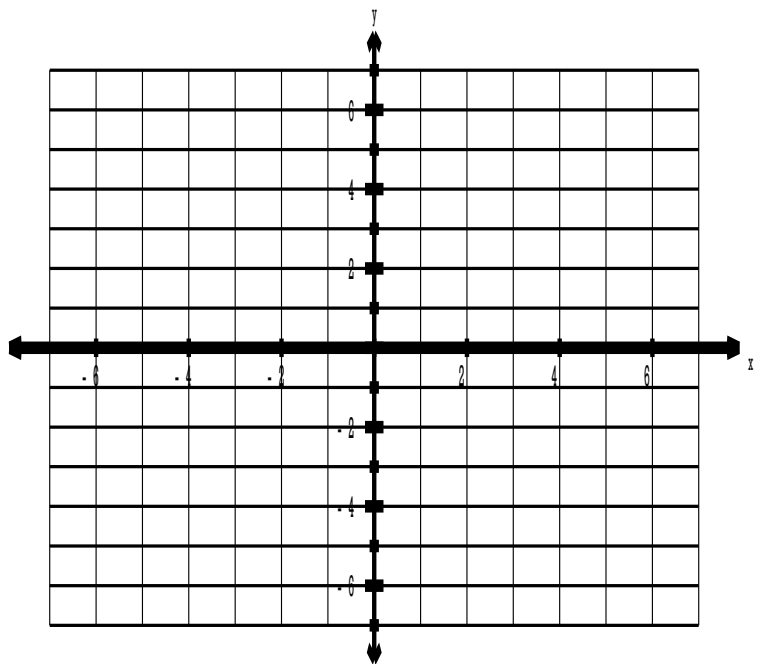
4 marks

$16(x^2 - 1) = 24(2x + 1)$

33. State restrictions on the variable and **solve**: $\frac{1}{2}m - \sqrt{13 - m} = -1$

4 marks

34. Identify all non-permissible values and **solve**: $\dfrac{9x-3}{x^2-x-6} - \dfrac{6}{x-3} = 2$
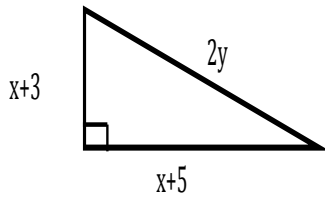
4 marks

35. Algebraically determine the **invariant points**, **equations of asymptotes**, and **x- and y-intercepts** for the functions $f(x) = 2x + 4$ and $y = \dfrac{1}{f(x)}$.

4 marks

Sketch both graphs on the same set of axes.

36. Solve algebraically: $| x^2 + 5x | = 2x$ 4 marks

37. The right triangle shown has a perimeter of 24 cm and an area of $(2y + 14)\ cm^2$.   4 marks
     Algebraically determine the value(s) of x and y.

38. Algebraically determine the value(s) of x where $y = x^2 - 4x$ lies above   3 marks
     $y = x + 6$.

ANSWER SHEET

Name: _____

Mathematics Teacher:_____

1.	A	B	C	D		15.	A	B	C	D
2.	A	B	C	D		16.	A	B	C	D
3.	A	B	C	D		17.	A	B	C	D
4.	A	B	C	D		18.	A	B	C	D
5.	A	B	C	D		19.	A	B	C	D
6.	A	B	C	D		20.	A	B	C	D
7.	A	B	C	D		21.	A	B	C	D
8.	A	B	C	D		22.	A	B	C	D
9.	A	B	C	D		23.	A	B	C	D
10.	A	B	C	D		24.	A	B	C	D
11.	A	B	C	D		25.	A	B	C	D
12.	A	B	C	D		26.	A	B	C	D
13.	A	B	C	D		27.	A	B	C	D
14.	A	B	C	D						