✑ Unit 3 Test (Lessons 23–30)

Answer all parts of the open response problem.

1) Use the equations of conic sections to answer parts A–D.
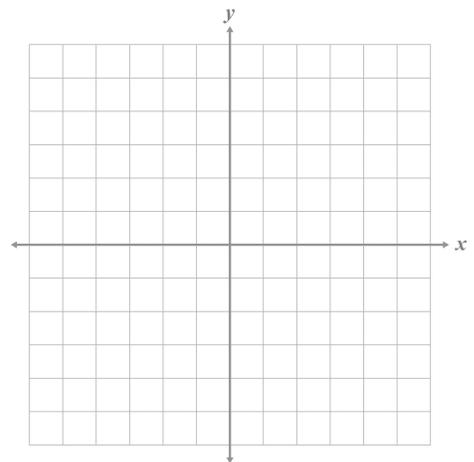
$G: 64(y-4)^2 - 25x^2 = 1600$ $H: x^2 + y^2 + 2y = 24$

$J: x^2 = 10y + 100$ $K: 4x^2 + 64x - 25(y-8)^2 = -156$

A) Name the type of conic each equation represents. Explain your reasoning.

B) Write the equation of a parabola in standard form, then transform it left 15 spaces.

C) Graph the equation of the circle.

D) Write the equation of an ellipse with the same center and vertical major axis as the circle and with a minor axis equal to 6 units.
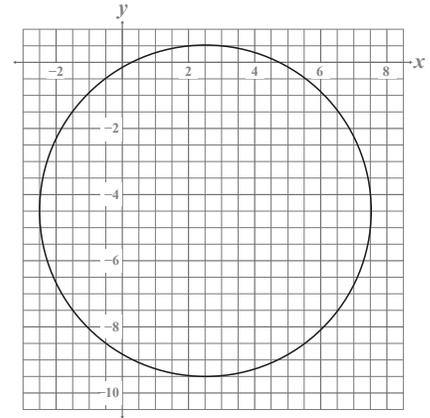
Multiple Choice

____ **2)** Which equation represents the given conic section?

A) $\dfrac{(x-2.5)^2}{25} + \dfrac{(y+4.5)^2}{25} = 1$

B) $\dfrac{(x+2.5)^2}{25} + \dfrac{(y-4.5)^2}{25} = 1$

C) $\dfrac{(x-2.5)^2}{25} - \dfrac{(y+4.5)^2}{25} = 1$

D) $\dfrac{(x-4.5)^2}{25} + \dfrac{(y+2.5)^2}{25} = 1$

____ **3)** An object launched into the air is modeled by the equation: $y = -16t^2 + 144t + 160$. How many seconds, t, after launch does the object reach the ground?

A) –1

B) 2

C) 10

D) 16

____ **4)** Solve $x^2 + 12 = 0$ under the set of complex numbers.

A) $2i\sqrt{3}$

B) $2\sqrt{3}$

C) $\pm 2i\sqrt{3}$

D) no solution

____ **5)** Select the equation that translates the center of an ellipse at the origin into the third quadrant.

A) $\dfrac{(x+13)^2}{5} - \dfrac{(y+8)^2}{7} = 1$

B) $\dfrac{(x-13)^2}{5} + \dfrac{(y-8)^2}{7} = 1$

C) $\dfrac{(x-13)^2}{5} + \dfrac{(y+8)^2}{7} = 1$

D) $\dfrac{(x+13)^2}{5} + \dfrac{(y+8)^2}{7} = 1$

____ **6)** Select the statement that is true.

A) An ellipse is a special circle where $a = b$.

B) A circle is a special ellipse where $a = b$.

C) A circle is a special ellipse where $a \neq b$.

D) There is no relationship between a circle and an ellipse.

____ **7)** What value of b will form a perfect square trinomial $x^2 + bx = -14$?

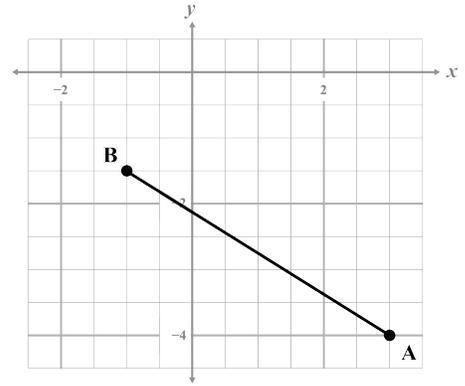   **A)** 7   **B)** $\sqrt{14}$

    C) $2\sqrt{14}$ **D)** 49

____ **8)** Determine the distance between point A and the midpoint of segment AB.

    A) 5.57

    B) 4.72

    C) 2.36
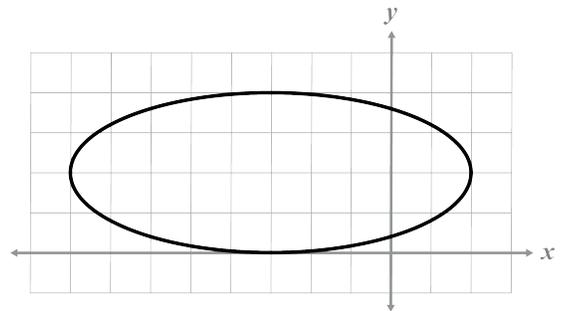
    D) 1.18

____ **9)** Select the equation that best represents the graph.

    A) $\dfrac{(y-2)^2}{4} + \dfrac{(x+3)^2}{25} = 1$

    B) $\dfrac{(y-2)^2}{4} - \dfrac{(x+3)^2}{25} = 1$

    C) $\dfrac{(y-2)^2}{4} + \dfrac{(x-3)^2}{25} = 1$

    D) $\dfrac{(y-2)^2}{25} + \dfrac{(x+3)^2}{4} = 1$

____ **10)** Solve $x^2 + 38 = 2x$ by completing the square.

    A) $\pm i\sqrt{37}$ **B)** $1 + i\sqrt{37}$

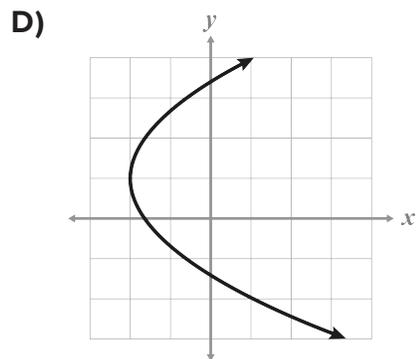   **C)** $1 \pm \sqrt{37}$ **D)** $1 \pm i\sqrt{37}$

____ **11)** Which equation represents a hyperbola?
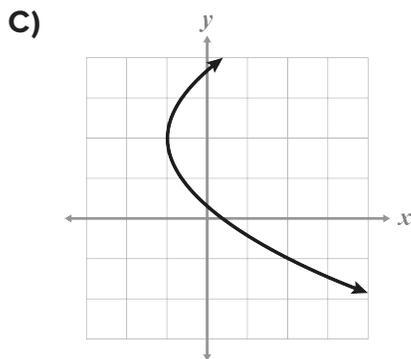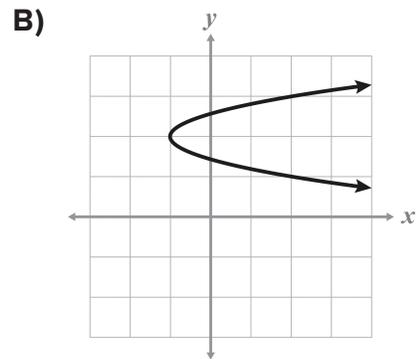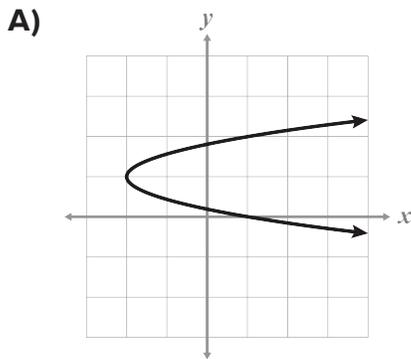
    A) $7x^2 + y^2 + 6y = 5x + y^2$ **B)** $8y^2 + 6y + 12 = 7x^2 + y^2 + 5x$

    C) $7x^2 + 8y^2 + 6y = y^2 + 5x + 12$ **D)** $7y^2 + 6y + 12 = 7x^2 + 8y^2 + 5x$

_____ **12)** Select the graph that best represents the equation: $x = 3(y-2)^2 - 1$.

A)

B)

C)

D)

_____ **13)** Which equation represents a polynomial equation with integer coefficients given the roots $x = 1, \sqrt{13}$?

A) $x^3 - x^2 - 13x + 13 = 0$

B) $x^2 - x - x\sqrt{13} + \sqrt{13}$

C) $x^3 + x^2 - 13x - 13 = 0$

D) $x^3 - 12x + 13 = 0$

_____ **14)** Determine the distance between the vertices of the two parabolas $x = -(y - 2.25)^2 + 5$ and $y = -(x + 4)^2 + 3.4$ to the nearest hundredth.

A) 1.60

B) 5.74

C) 8.93

D) 9.07

_____ **15)** Write the equation of a circle with endpoints on the diameter at (18, 11) and (−19, −13).

A) $(x - 0.5)^2 + (y - 1)^2 = 486.25$

B) $(x + 1)^2 + (y + 0.5)^2 = 486.25$

C) $(x + 0.5)^2 + (y + 1)^2 = 486.25$

D) $(x + 0.5)^2 + (y + 1)^2 = 1945$

_____ **16)** Order the steps to correctly show the derivation of the Quadratic Formula from the equation $ax^2 + bx + c = 0$.

A) I, II, III, IV

B) II, I, IV, III

C) III, IV, I, II

D) IV, I, II, III

I $\quad \sqrt{\left(x + \dfrac{b}{2a}\right)^2} = \pm\sqrt{\dfrac{-4ac + b^2}{4a^2}}$

II $\quad x^2 + \dfrac{b}{a}x + \dfrac{b^2}{4a^2} = -\dfrac{c}{a} + \dfrac{b^2}{4a^2}$

III $\quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

IV $\quad x + \dfrac{b}{2a} = \dfrac{\pm\sqrt{-4ac + b^2}}{2a}$

_____ **17)** What type of roots will result from the equation $x^2 - 6x + 9 = 8$?

A) one real, rational root

B) two real, rational roots

C) two real, irrational roots

D) two imaginary roots

_____ **18)** Determine the graph of the parabola that opens left and is wider than the graph of $x = y^2$.

A) $x = 3y^2 + 2x - 5$

B) $x = \dfrac{1}{3}y^2 + 2x - 5$

C) $x = -3y^2 + 2x - 5$

D) $x = -\dfrac{1}{3}y^2 + 2x - 5$

_____ **19)** Which statement describes the graph of the equation $3x^2 - 2y^2 + 12x + 8y + 6 = 0$?

A) a hyperbola with a center (–2, 2) and vertices (–2, 1) and (–2, 3)

B) a hyperbola with center (2, –2) and vertices (2, –1) and (2, –3)

C) an ellipse with center (2, –2) and a major axis length of 2

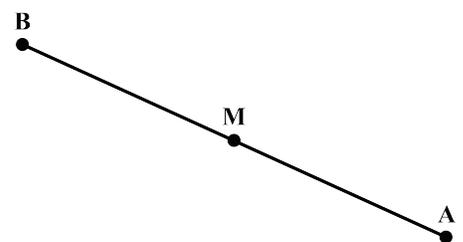**D)** an ellipse with center (–2, 2) and a major axis length of 4

_____ **20)** Determine the length of segment AB with the midpoint M (2.5, 3.5) and point A (8, 1).

A) 11.42

B) 12.08

C) 6.04

D) 0

_____ **21)** Determine the set of equations that represents the asymptotes of the hyperbola:

$$\frac{(x-1)^2}{9} - \frac{(y+3)^2}{4} = 1$$

A) $y = \frac{3}{2}(x-1) + 3, \ y = -\frac{3}{2}(x-1) + 3$

B) $y = \frac{2}{3}(x-1) + 3, \ y = -\frac{2}{3}(x-1) + 3$

C) $y = \frac{3}{2}(x-1) - 3, \ y = -\frac{3}{2}(x-1) - 3$

D) $y = \frac{2}{3}(x-1) - 3, \ y = -\frac{2}{3}(x-1) - 3$

_____ **22)** If $(4 + i)$ is a solution for $x^2 + bx + c = 0$ where b and c are real numbers, what is the value of c?

A) 17

B) 16

C) –1

D) –8

_____ **23)** Determine the quadratic equation with exactly one real solution.

A) $x^2 - 3x + 9 = 0$

B) $2x^2 + 2x = 0$

C) $4x^2 - 12x + 9 = 0$

D) $x^2 + 3x + 7 = 0$

24) Select all possible solutions under the set of complex numbers for the polynomial equation $(2x^2 - 3)(x^2 - 6x + 13) = 0$. Remember to rationalize solutions.

☐ $\pm\sqrt{3}$

☐ $\pm\dfrac{\sqrt{6}}{2}$

☐ $1, 5$

☐ $\pm 2i$

☐ $3 \pm 2i$

25) Select the rules to determine an ellipse in the general form $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$.

☐ $A = C$

☐ A and C are non-zero

☐ A and C have opposite signs

☐ A and C have the same signs

☐ $A \neq C$