

Summer Math Preparing for Algebra III

To assist students in retaining material from their previous math course, we require the completion of the Summer Math Packet before the first day of school in August. The work will be collected and graded, and there will be an assessment on these types of problems.

NO calculator will be allowed on this assessment, so be sure to practice without a calculator. Also, be sure to have the Quadratic Formula memorized.

Problems should be worked on loose-leaf with pages and problem numbers clearly labeled. All work must be in pencil. In order to receive credit, ALL work must be shown. An answer key is provided to check for accuracy.

Part A – Exponents

Simplify.

1) $2x^2 \cdot 3x^3$

2) $2a \cdot 2a^4$

3) $(4x)^2$

4) $(2k)^2$

Simplify. Your answer should contain only positive exponents.

5) $\frac{3x^2}{2x^2}$

6) $\frac{3v^3}{v^3}$

7) $\frac{n}{n \cdot 4n^2}$

8) $\frac{4n^3 \cdot 3n^3}{n^3 \cdot 3n}$

9) $\frac{4v^2}{4v^2 \cdot 2v^2}$

10) $\frac{n^3 \cdot n^2 n^3}{3n^4}$

11) $(2yx^3)^{-4}$

12) $(2x^3 y^{-1})^{-1}$

13) $\frac{4x^{-3} y^{-2}}{2y^2}$

14) $\frac{2vu^4}{2u^4 y^2}$

15) $\frac{4x^{-4} y^2}{3x^4}$

16) $\frac{3m^4 n^2}{4n^{-4}}$

Simplify.

17) $4n^{\frac{2}{3}} \cdot 2nn^{\frac{3}{2}}$

18) $x^{\frac{2}{3}} \cdot 3x^{\frac{7}{4}} \cdot 4x^{\frac{5}{4}}$

Simplify. Your answer should contain only positive exponents with no fractional exponents in the denominator.

19) $\frac{3r^{-1}}{3r^{-2}}$

20) $\frac{4v^{-\frac{3}{2}}}{v^{\frac{3}{2}}}$

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Part B – Factoring

Factor each expression completely. Show the work that leads to your answer on loose leaf. Do **NOT** use a calculator.

1. $b^2 + 8b + 7$

2. $m^2 + m - 90$

3. $n^2 - 10n + 9$

4. $m^2 + 2m - 24$

5. $k^2 - 13k + 40$

6. $n^2 - n - 56$

7. $b^2 - 6b + 8$

8. $2n^2 + 6n - 108$

9. $2k^2 + 22k + 60$

10. $p^2 + 11p + 10$

11. $2p^2 + 2p - 4$

12. $x^2 - 15x + 50$

13. $p^2 + 3p - 18$

14. $3p^2 - 2p - 5$

15. $3n^2 - 8n + 4$

16. $2v^2 + 11v + 5$

17. $7a^2 + 53a + 28$

18. $15n^2 - 27n - 6$

19. $4n^2 - 15n - 25$

20. $4n^2 - 17n + 4$

21. $6x^2 + 37x + 6$

22. $6n^2 + 5n - 6$

23. $16n^2 - 9$

24. $16b^2 - 40b + 25$

25. $9x^2 - 1$

26. $n^4 - 100$

27. $k^4 - 36$

28. $98n^2 - 200$

29. $400 - 36v^2$

30. $10n^2 + 100n + 250$

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Part C – Solve by Factoring

Date _____ Period _____

Solve each equation by factoring.

1) $8(k - 8)(k + 1) = 0$

2) $p(p - 5) = 0$

3) $3(b - 6)(b - 5) = 0$

4) $(m - 5)(5m + 2) = 0$

5) $4x^2 - 192 = -8x$

6) $4k^2 - 24k = 0$

7) $8r^2 = -104r - 320$

8) $3m^2 - 15m = 0$

9) $5n^2 + 24n = 36$

10) $5a^2 - 13a = 6$

11) $0 = -b^2 - b$

12) $0 = -n^2 - 4n$

13) $n^2 - 4n = 5$

14) $-1 = -n^2$

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Part D – Solve using Quadratic Formula

Solve each equation with the quadratic formula.

1) $6x^2 - 12x - 16 = 0$

2) $12r^2 - 20 = 0$

3) $3v^2 - 85 = -2v$

4) $4x^2 - 8x = -2$

5) $b^2 = 3b + 19$

6) $6p^2 - 5 = -6p$

7) $11x^2 - 6x = 2$

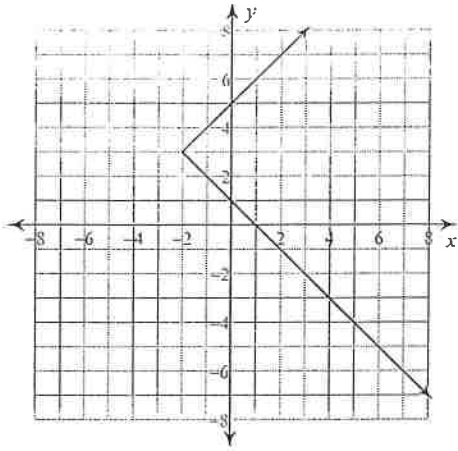
8) $4k^2 - 90 = -9$

Part E – Domain, Range

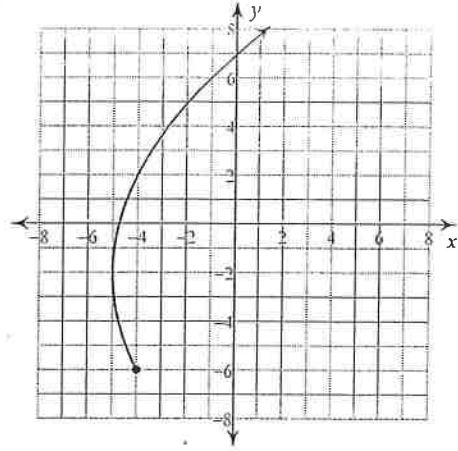
Date _____ Period _____

Each graph represents a relation. Determine the domain and range. Write answers using interval notation.

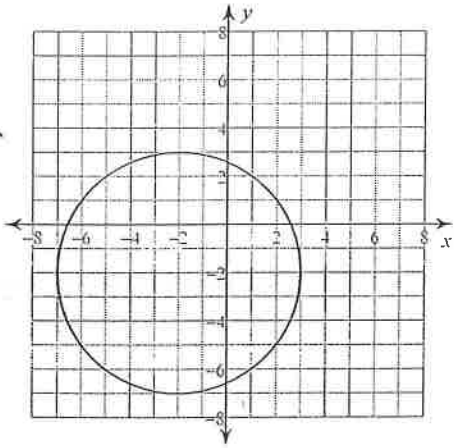
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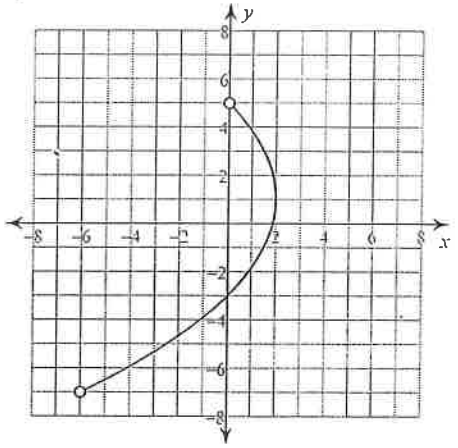
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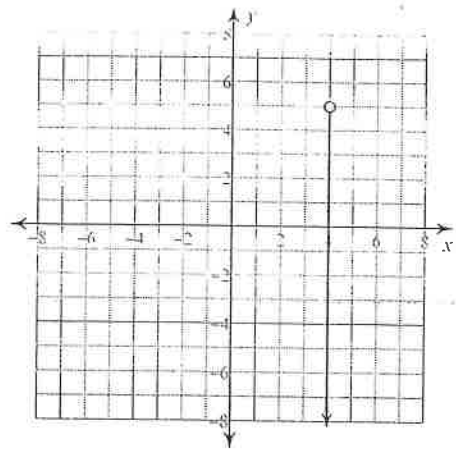
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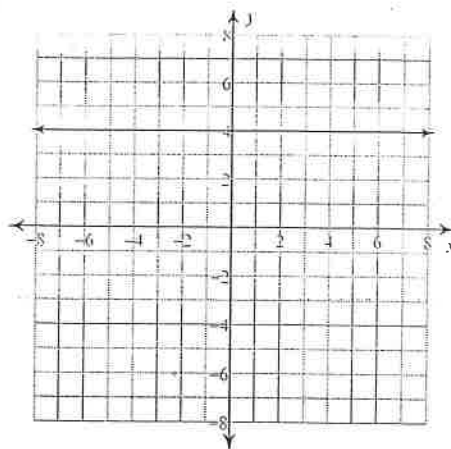
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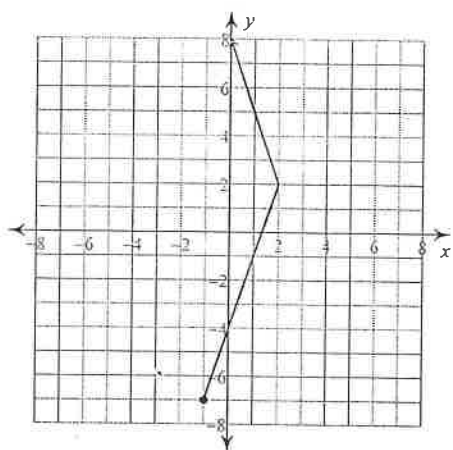
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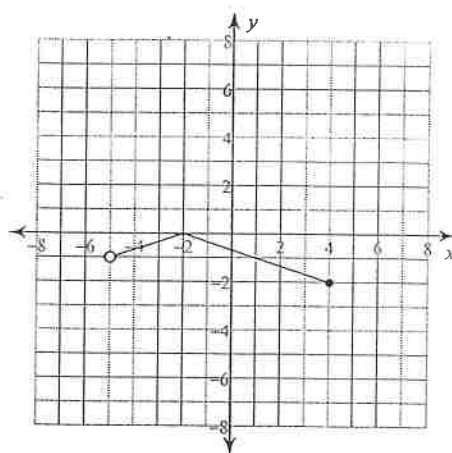
6)



7)



8)

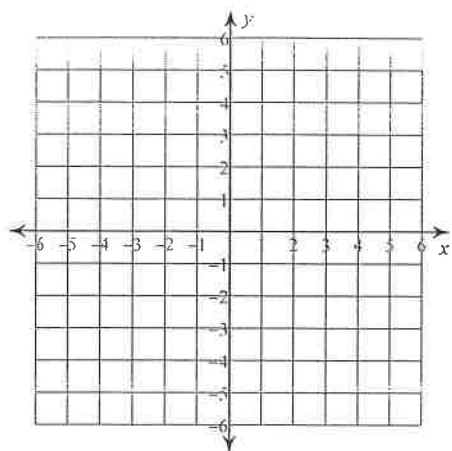


Part F - Graphing

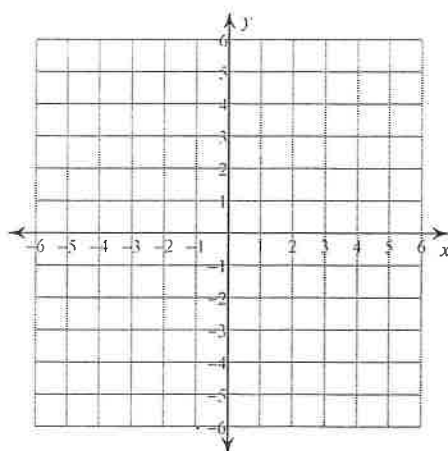
Date _____ Period _____

Sketch the graph of each line. *Identify at least two points on the line.*
(Points may vary.)

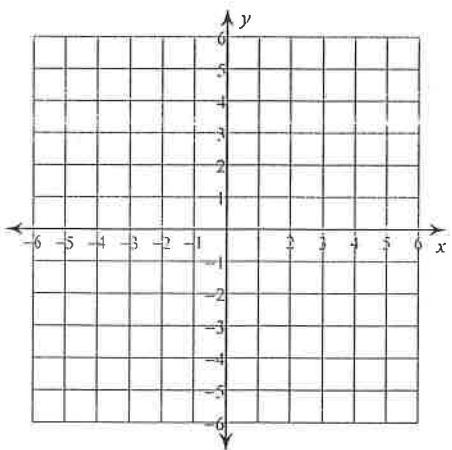
1) $8x + 5y = 20$



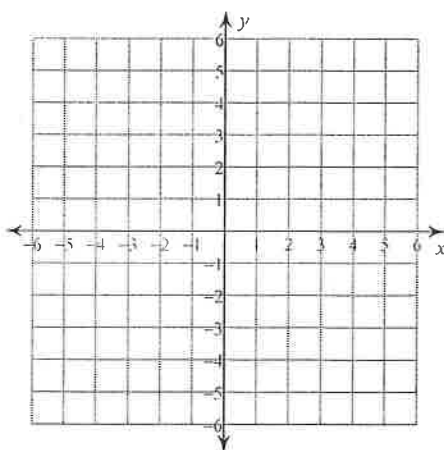
2) $4x - 5y = 25$



3) $x - y = -2$

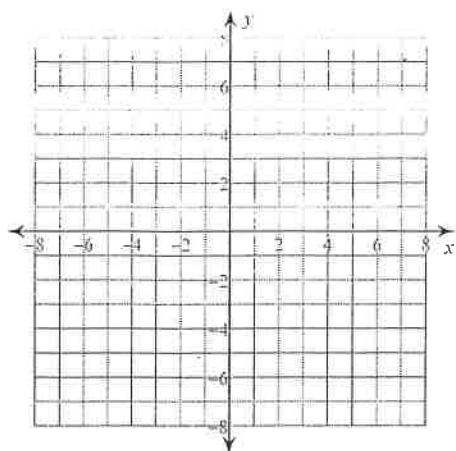


4) $7x - 3y = -6$

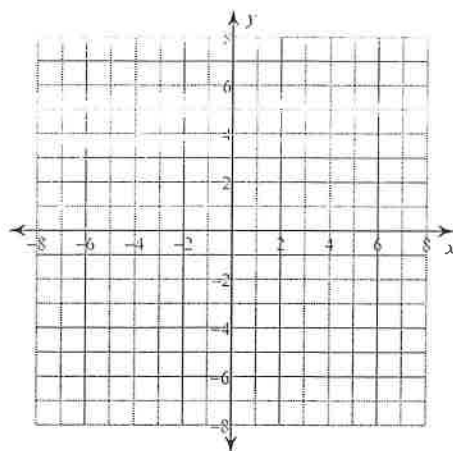


Identify the vertex and axis of symmetry of each. Then sketch the graph. Identify at least one point on each side of the axis of symmetry. (Points may vary.)

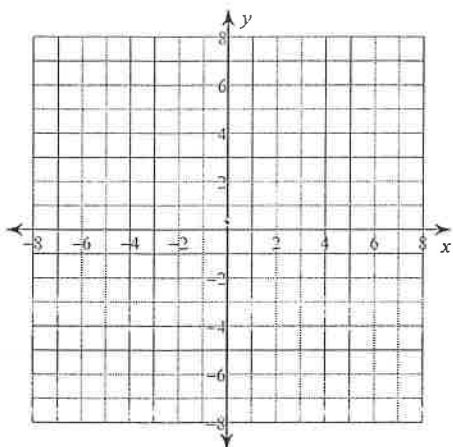
5) $y = \frac{1}{2}x^2 + 4x + 7$



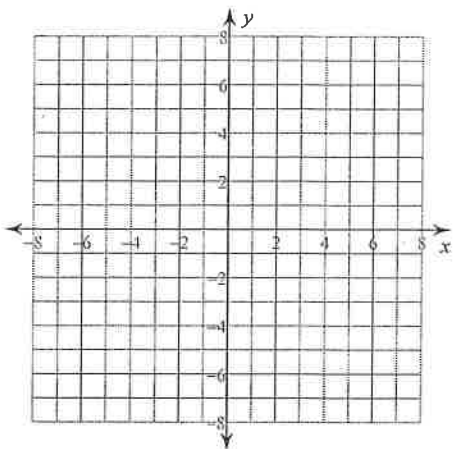
6) $y = \frac{1}{3}x^2 + 6$



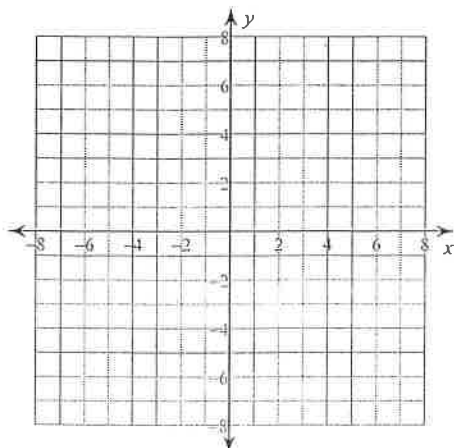
7) $y = \frac{1}{2}x^2 - x + \frac{13}{2}$



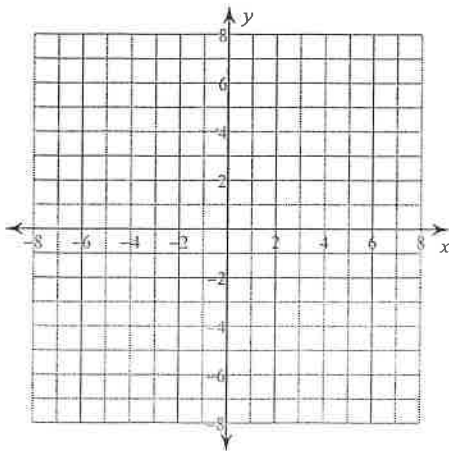
8) $y = x^2 + 10x + 26$



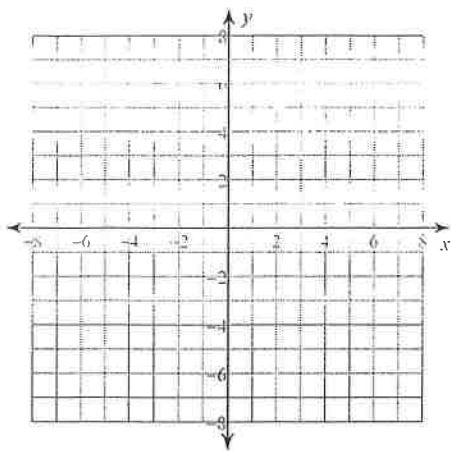
9) $y = \frac{1}{3}(x+3)^2 + 2$



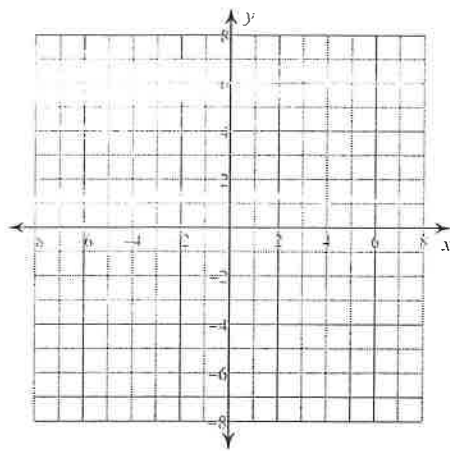
10) $y = (x-5)^2 - 2$



$$11) y = 2(x - 5)^2 - 4$$

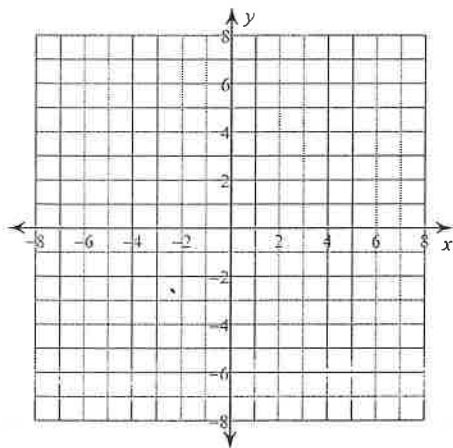


$$12) y = -(x - 3)^2 - 4$$

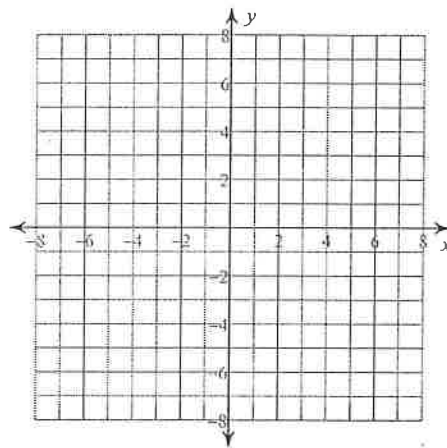


Identify the center and radius of each. Then sketch the graph. *Identify the four points used to graph the circle.*

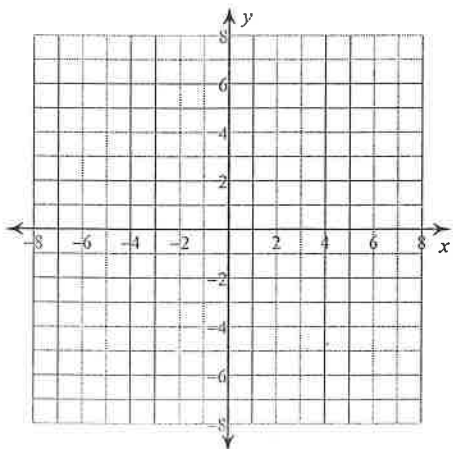
$$13) x^2 + y^2 = 5$$



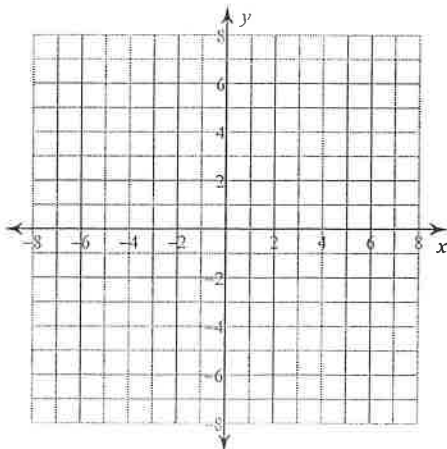
$$14) (x + 4)^2 + (y + 2)^2 = 9$$



$$15) (x - 4)^2 + y^2 = 9$$



$$16) (x - 2)^2 + (y - 2)^2 = 4$$



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Part A – Exponents - SOLUTIONS

1) $6x^5$

5) $\frac{3}{2}$

9) $\frac{1}{2v^2}$

13) $\frac{2}{x^3y^4}$

17) $8n^{\frac{19}{6}}$

2) $4a^5$

6) 3

10) $\frac{n^4}{3}$

14) $\frac{1}{v}$

18) $12x^{\frac{11}{3}}$

3) $16x^2$

7) $\frac{1}{4n^2}$

11) $\frac{1}{16y^4x^{12}}$

15) $\frac{4y^2}{3x^8}$

19) r

4) $4k^2$

8) $4n^2$

12) $\frac{y}{2x^3}$

16) $\frac{3n^6m^4}{4}$

20) $\frac{4}{v^3}$

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Part B – Factoring - SOLUTIONS

1. $(b + 7)(b + 1)$

2. $(m - 9)(m + 10)$

3. $(n - 1)(n - 9)$

4. $(m + 6)(m - 4)$

5. $(k - 5)(k - 8)$

6. $(n + 7)(n - 8)$

7. $(b - 4)(b - 2)$

8. $2(n + 9)(n - 6)$

9. $2(k + 5)(k + 6)$

10. $(p + 10)(p + 1)$

11. $2(p - 1)(p + 2)$

12. $(x - 10)(x - 5)$

13. $(p - 3)(p + 6)$

14. $(3p - 5)(p + 1)$

15. $(3n - 2)(n - 2)$

16. $(2v + 1)(v + 5)$

17. $(7a + 4)(a + 7)$

18. $3(5n + 1)(n - 2)$

19. $(n - 5)(4n + 5)$

20. $(n - 4)(4n - 1)$

21. $(x + 6)(6x + 1)$

22. $(2n + 3)(3n - 2)$

23. $(4n + 3)(4n - 3)$

24. $(4b - 5)^2$

25. $(3x + 1)(3x - 1)$

26. $(n^2 + 10)(n^2 - 10)$

27. $(k^2 + 6)(k^2 - 6)$

28. $2(7n + 10)(7n - 10)$

29. $4(10 + 3v)(10 - 3v)$

30. $10(n + 5)^2$

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Part C – Solve by Factoring - SOLUTIONS

1) $\{8, -1\}$

2) $\{5, 0\}$

3) $\{6, 5\}$

4) $\left\{5, -\frac{2}{5}\right\}$

5) $\{6, -8\}$

6) $\{6, 0\}$

7) $\{-5, -8\}$

8) $\{5, 0\}$

9) $\left\{\frac{6}{5}, -6\right\}$

10) $\left\{-\frac{2}{5}, 3\right\}$

11) $\{-1, 0\}$

12) $\{-4, 0\}$

13) $\{-1, 5\}$

14) $\{-1, 1\}$

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Part D – Solve using Quadratic Formula - SOLUTIONS

1) $\left\{\frac{3 + \sqrt{33}}{3}, \frac{3 - \sqrt{33}}{3}\right\}$

2) $\left\{\frac{\sqrt{15}}{3}, -\frac{\sqrt{15}}{3}\right\}$

3) $\left\{5, -\frac{17}{3}\right\}$

4) $\left\{\frac{2 + \sqrt{2}}{2}, \frac{2 - \sqrt{2}}{2}\right\}$

5) $\left\{\frac{3 + \sqrt{85}}{2}, \frac{3 - \sqrt{85}}{2}\right\}$

6) $\left\{\frac{-3 + \sqrt{39}}{6}, \frac{-3 - \sqrt{39}}{6}\right\}$

7) $\left\{\frac{3 + \sqrt{31}}{11}, \frac{3 - \sqrt{31}}{11}\right\}$

8) $\left\{\frac{9}{2}, -\frac{9}{2}\right\}$

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Part E – Domain, Range - SOLUTIONS

1) Domain: $x \geq -2$

Range: All real numbers

2) Domain: $x \geq -5$

Range: $y \geq -6$

3) Domain: $[-7, 3]$

Range: $[-7, 3]$

4) Domain: $(-6, 2]$

Range: $(-7, 5)$

5) Domain: $\{4\}$

Range: $(-\infty, 5)$

6) Domain: $(-\infty, \infty)$

Range: $\{4\}$

7) Domain: $(-\infty, 2]$

Range: $[-7, \infty)$

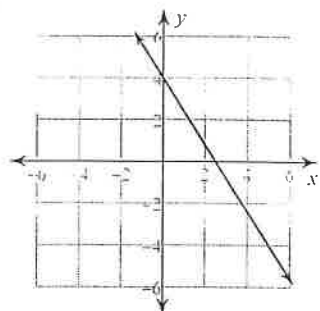
8) Domain: $(-5, 4]$

Range: $[-2, 0]$

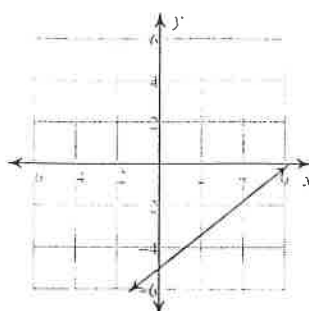
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Part F - Graphing - SOLUTIONS

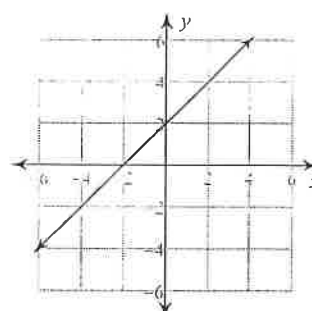
1)



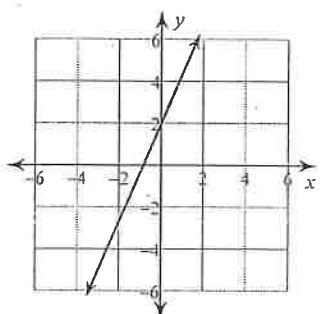
2)



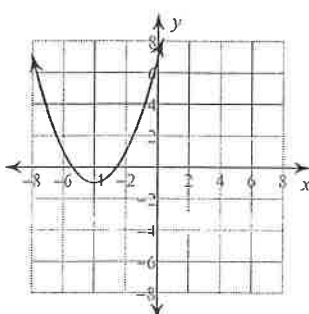
3)



4)

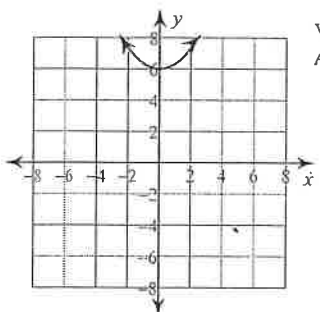


5)



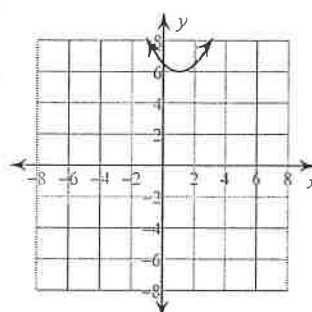
Vertex: $(-4, -1)$
Axis of Sym.: $x = -4$

6)



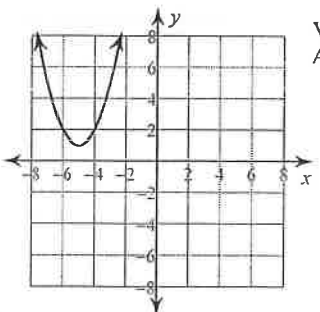
Vertex: $(0, 6)$
Axis of Sym.: $x = 0$

7)



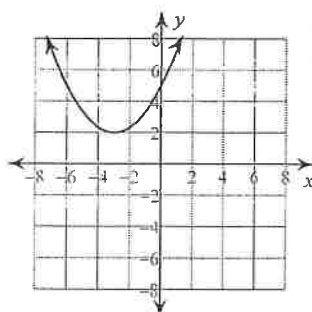
Vertex: $(1, 6)$
Axis of Sym.: $x = 1$

8)



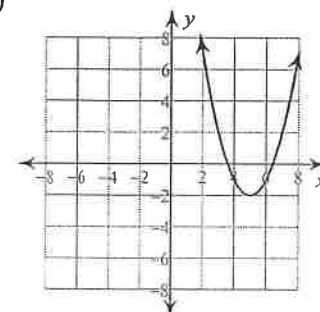
Vertex: $(-5, 1)$
Axis of Sym.: $x = -5$

9)



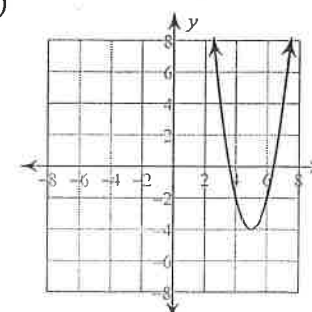
Vertex: $(-3, 2)$
Axis of Sym.: $x = -3$

10)



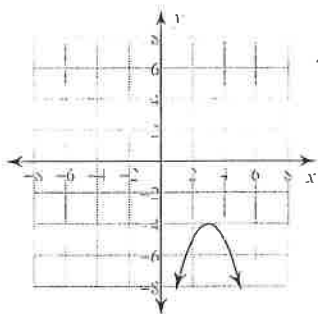
Vertex: $(5, -2)$
Axis of Sym.: $x = 5$

11)



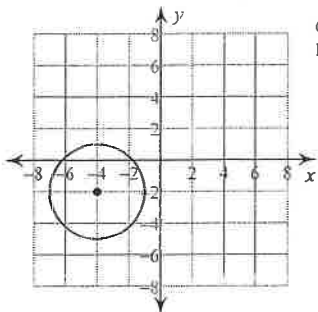
Vertex: $(5, -4)$
Axis of Sym.: $x = 5$

12)



Vertex: $(3, -4)$
Axis of Sym.: $x = 3$

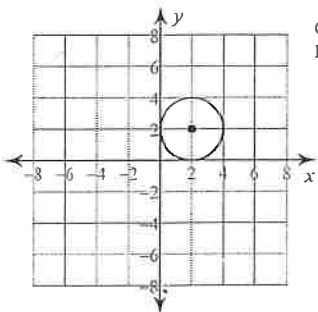
14)



Center: $(-4, -2)$
Radius: 3

$(-1, -2)$ $(-7, -2)$
 $(-4, 1)$ $(-4, -5)$

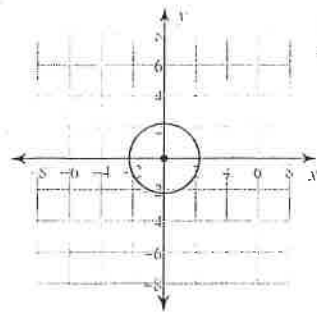
16)



Center: $(2, 2)$
Radius: 2

$(4, 2)$ $(0, 2)$
 $(2, 4)$ $(2, 0)$

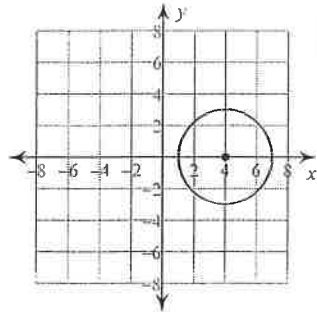
13)



Center: $(0, 0)$
Radius: $\sqrt{5}$

$(\sqrt{5}, 0)$ $(-\sqrt{5}, 0)$
 $(0, \sqrt{5})$ $(0, -\sqrt{5})$
Note: $\sqrt{5} \approx 2.24$

15)



Center: $(4, 0)$
Radius: 3

$(7, 0)$ $(1, 0)$
 $(4, 3)$ $(4, -3)$