Name _____ Period _____ Date _____

Algebra II CP
2009 - 2010

1st Semester Practice Final Exam

Benchmarks 1, 2, 3, 4, & 5

Standards: | **Chapters: 1, 2, 3, 5, & 6**

***Instructions*:**
Be sure to justify each of your answers. Take your time. There are 50 questions all equivalent in value. Be sure to bubble in your responses on the answer document. Instructions are in **bold** and key terms are in ***bold italic***. You have the entire period to finish this exam. The goal is not to see who can finish first, but rather who can answer more questions correctly. Chances are the one who finishes first gets the most wrong...hahaha.

Standard **1.** A **Simplify.** $\sqrt[3]{256t^4}$

(A) $4t\sqrt[3]{4t}$
B. $16t\sqrt[3]{t}$
C. $\pm 4t\sqrt[3]{4t}$
D. $4t\sqrt{4t}$

$\sqrt[3]{64 \cdot 4 \cdot t^3 \cdot t}$
$\sqrt[3]{4^3} \cdot \sqrt[3]{4} \cdot \sqrt[3]{t^3} \cdot \sqrt[3]{t}$
$4 \cdot \sqrt[3]{4} \cdot t \cdot \sqrt[3]{t}$
$4t\sqrt[3]{4t}$ A

Standard **2.** J **Simplify.** $\sqrt{32} - \sqrt{18} + \sqrt{54} + \sqrt{150}$

F. $7\sqrt{2} - 2\sqrt{6}$
G. $7\sqrt{2} + 8\sqrt{6}$
H. $3\sqrt{2} + 3\sqrt{6}$
(J.) $\sqrt{2} + 8\sqrt{6}$

$\sqrt{16 \cdot 2} - \sqrt{9 \cdot 2} + \sqrt{9 \cdot 6} + \sqrt{25 \cdot 6}$
$4\sqrt{2} - 3\sqrt{2} + 3\sqrt{6} + 5\sqrt{6}$
$4 - 3\sqrt{2} + 3 + 5\sqrt{6}$
$1\sqrt{2} + 8\sqrt{6}$

Standard **3.** A **Simplify.** $\dfrac{5}{2-\sqrt{3}}$

(A.) $10+5\sqrt{3}$
B. $10-5\sqrt{3}$
C. $-10-5\sqrt{3}$
D. $-10+5\sqrt{3}$

$\dfrac{5}{(2-\sqrt{3})} \cdot \dfrac{(2+\sqrt{3})}{(2+\sqrt{3})} = \dfrac{10+5\sqrt{3}}{4-3} = \dfrac{10+5\sqrt{3}}{1}$
$4 - \sqrt{3} \cdot \sqrt{3} = \sqrt{9} = 3$

Standard **4.** G **Simplify** the expression $\dfrac{t^{\frac{3}{4}}}{t^{\frac{1}{5}}}$

F. t^{-1}
(G.) $t^{\frac{11}{20}}$
H. $t^{\frac{19}{20}}$
J. $t^{\frac{1}{20}}$

$t^{\frac{3}{4} - \frac{1}{5}}$
$t^{\frac{15}{20} - \frac{4}{20}}$
$t^{\frac{11}{20}}$

Standard **5.** D Which of the following steps represents a correct step used to determine the solution of the equation $(5z-1)^{\frac{1}{3}}-3=1$?

A. $5z-1=4^{\frac{1}{3}}$
B. $(5z-1)-27=1$
C. $(5z-1)-9=3$
D. $5z-1=64$

$+3\ +3$
$((5z-1)^{\frac{1}{3}})^3=(4)^3 \rightarrow 5z-1=64$ (D)
$5z-1=4^3$

Standard **6.** J **Simplify.** $\frac{1+2i}{2-3i}$

F. $\frac{8}{7}+i$
G. $-4+7i$
H. $\frac{8}{7}+\frac{1}{7}i$
J. $\frac{4}{13}+\frac{7}{13}i$

$\frac{1+2i}{2-3i}\cdot\frac{(2+3i)}{(2+3i)}$
$\frac{2+3i+4i+6i^2}{4-9i^2+9}$ ($6i^2=-6$)
$\frac{-4+7i}{13}$

Standard **7.** B Identify the ***y*-intercept** and the ***axis of symmetry*** for the graph of $f(x)=-3x^2+6x+12$.

A. 2; $x=-12$
B. 12; $x=1$
C. -2; $x=0$
D. -12; $x=-1$

y-int
12

Standard **8.** J Which expression is ***equivalent*** to the expression $(6y^2-2)(6y+2)$?

F. $36y^2-4$
G. $36y^3-4$
H. $36y^2+12y^2+12y-4$
J. $36y^3+12y^2-12y-4$

$36y^3+12y^2-12y-4$

Standard **9.** C **Solve** the compound inequality $-2<4z+10\le 12$

A. $\{z\mid -3<z\le 2\}$
B. $\{z\mid -3<z\le 3\}$
C. $\left\{z\mid -3<z\le \frac{1}{2}\right\}$
D. $\left\{z\mid -\frac{1}{2}<z\le \frac{1}{2}\right\}$

$-10\ \ -10\ -10$
$\frac{-12}{4}<\frac{4z}{4}\le\frac{2}{4}$
$-3<z\le\frac{1}{2}$

Standard **10.** G Determine the *roots* of the function $f(x) = x^2 + 2x + -2$.

F. -1 and 1
G. $-1 \pm \sqrt{3}$
H. 2 and -2
J. $\frac{-1 \pm \sqrt{12}}{2}$

$x = \frac{-2 \pm \sqrt{2^2 - 4 \cdot 1 \cdot -2}}{2 \cdot 1}$

$x = \frac{-2 \pm \sqrt{12}}{2}$ $\sqrt{12} = \sqrt{4 \cdot 3}$

$x = \frac{-2 \pm 2\sqrt{3}}{2}$

$x = -1 \pm \sqrt{3}$

Standard **11.** D Determine whether the function $f(x) = -5x^2 - 10x + 6$ has a maximum or a minimum value and then determine that value.

A. ~~Minimum; -1~~
B. ~~Minimum; 11~~
C. Maximum; ~~-1~~
D. Maximum; 11

max vertex $(-1, 11)$ (y)

$x = \frac{-b}{2a} = \frac{10}{2 \cdot -5} = -1$ max value

$-5(-1)^2 - 10(-1) + 6 = 11$

Standard **12.** G Which quadratic equation has *roots* 7 and $-\frac{2}{3}$?

F. $x^2 + 23x + 14 = 0$
G. $3x^2 - 19x - 14 = 0$
H. $2x^2 - 11x - 21 = 0$
J. $2x^2 + 11x - 21 = 0$

$(x - 7)(x + \frac{2}{3}) = 0$

$(x - 7)(3x + 2) = 0$

$3x^2 + 2x - 21x - 14 = 0$

$-19x$

Standard **13.** D **Simplify.** $(7x^3 - 2x^2 + 3) + (x^2 - x - 5)$

A. $7x^3 - 3x^2 - 2$
B. ~~$8x^6 - 3x^3 - 2$~~
C. $7x^3 - 2x^2 - x - 2$
D. $7x^3 - x^2 - x - 2$

$-2x^2 + x^2 = -1x^2$

Standard **14.** H **Simplify.** $(5x - 4)^2$

F. $25x^2 - 16$
G. $25x^2 - 20x + 16$
H. $25x^2 - 40x + 16$
J. $25x^2 - 18x + 16$

$(5x - 4)(5x - 4)$

$25x^2 - 20x - 20x + 16$

Standard 15. ____ **Simplify.** $(6x^3 - 16x^2 + 11x - 5) \div (3x - 2)$

A. $6x^2 - 12x + 3 - \frac{9}{3x-2}$

B. $2x^2 - 4x + 1 - \frac{3}{3x-2}$

C. $2x^2 - 4x + 1 - \frac{1}{3x-2}$

D. $x^2 + 8x - 3 - \frac{9}{3x-2}$

Standard 16. ____ **Simplify** the expression $\frac{2x^2y^5z^{-4}}{8x^6y^2z^3}$. *Assume that no variable equals 0.*

F. $\frac{y^4}{4x^{4z}}$

G. $\frac{y^4z}{4x^4}$

H. $\frac{y^4}{4x^4z^7}$

J. $\frac{y^4}{4x^2z^7}$

Standard 17. ____ **Solve** the system of linear equations to the right.

$x + y + z = 6$

$2x + y - 4z = -15$

$3x - 3y + z = -10$

A. (1, 3, 4)

B. (– 1, 3, 4)

C. (– 1, 3, – 4)

D. (– 1, – 3, – 4)

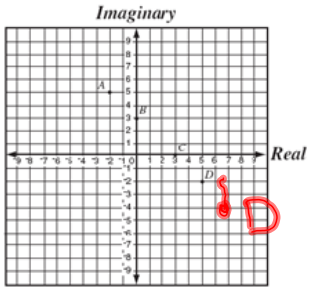
Standard 18. ____ If $i = \sqrt{-1}$, which point shows the location of $5 - 2i$ on the plane?

F. Point *A*

G. Point *B*

H. Point *C*

J. Point *D*



Standard **19.** B **Solve** the absolute inequality $\frac{3|m-4|}{3} > \frac{6}{3}$ > OR < and

A. $\{m|2 < m < 6\}$
B. $\{m|m < 2 \text{ or } m > 6\}$
C. $\{m|m < 1 \text{ or } m > 7\}$
D. All real numbers

$|m-4|>2$ $m-4<-2$ $m-4>2$
$+4\ +4$ $+4\ +4$
$m<2$ or $m>6$

Standard **20.** F **Solve** the inequality $-3(r-11)+15 \geq 9$

F. $\{r|r \leq 13\}$
G. $\{r|r \geq 13\}$
H. $\{r|r \leq -13\}$
J. $\{r|r \geq -13\}$

$-3r+33+15 \geq 9$
$-3r+48 \geq 9$
$-48\ -48$
$\frac{-3r}{-3} \geq \frac{-39}{-3}$
$r \leq 13$

Standard **21.** D Identify the ***domain*** of $y = 3|x+2|$

A. $\{x|x \geq 2\}$
B. $\{y|y \geq 0\}$
C. $\{y|y \geq 2\}$
D. All Real Numbers

x's
Range
(-2, 0)

Standard **22.** F **Evaluate** $f(-\frac{3}{4})$ if $f(x) = [[2x-1]]$ ← Round down your answer.

F. -3
G. -2
H. -1
J. 1

$f(-\frac{3}{4}) = [[2 \cdot -\frac{3}{4} - 1]] \Rightarrow [[-\frac{3}{2} - 1]] \Rightarrow [[\frac{-3}{2} - \frac{2}{2}]]$
$f(-\frac{3}{4}) = [[-\frac{5}{2}]] = [[-2\frac{1}{2}]]$ round down to -3

$-2\frac{1}{2}$
$-3\ -2\ -1\ 0$

Standard **23.** D Write an equation in ***slope-intercept form*** for the line that has a slope of 3 and passes through (– 1, 2).

A. $y = 3x - 1$
B. $y = 3x - 5$
C. $y = 5x + 3$
D. $y = 3x + 5$

$m = 3 \quad (-1, 2)$
$y - y_1 = m(x - x_1)$
$y - 2 = 3(x - -1)$
$y - 2 = 3x + 3$
$+2\ \ +2$
$y = 3x + 5$

Standard **24.** J The graph of the line through (2, 3) that is ***perpendicular*** to the line with equation $y = x - 1$ also goes through which point?

F. (0, – 1)
G. (– 2, 3)
H. (2, – 4)
J. (1, 4)

which one is on the green line

(1, 4) (2, 3) $y = x - 1$ G H F J

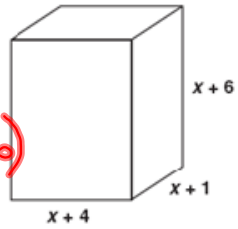
Standard **25.** A Suppose the first equation of the linear system is multiplied by 2. By what number should the second equation be multiplied to eliminate the variable x by adding?

$2(6x-5y=21)$
$-3(4x+7y=15)$
↑ mult by −3

A. -3
B. -2
C. 2
D. 3

$12x-10y=42$
$+-12x$

Standard **26.** G Which expression represents the ***volume*** of the figure to the right?



F. $x^3+10x^2+34x+24$
G. $x^3+11x^2+34x-24$
H. $x^3+10x^2+24x+24$
J. $x^3+11x^2+24x-24$

$V=l\cdot w\cdot h$
$V=(x+4)(x+1)(x+6)$
$=(x^2+x+4x+4)(x+6)$
$V=(x^2+5x+4)(x+6)$
$V=x^3+5x^2+4x+6x^2+30x+24$
$V=x^3+11x^2+34x+24$

Standard **27.** B **Factor completely.** $25x^2-40xy+16y^2$

$5\cdot5\cdot x\cdot x \quad -4\cdot4\cdot y\cdot y$
$(5x-4y)(5x-4y)$

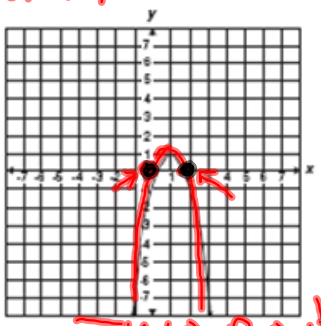
A. $(4xy)^2$
B. $(5x-4y)^2$
C. $(5x-4y)^2$
D. $(5x+10-4y)^3$

Standard **28.** G If $r(x)=4x^2-3x+7$, find $r(3a^2)$.

F. $12a^4-9a^2+7$
G. $36a^4-9a^2+7$
H. $36a^4+9a^2+7$
J. $144a^4-9a^2+7$

$r(3a^2)=4(3a^2)^2-3(3a^2)+7$
$=4(9a^4)-9a^2+7$
$=36a^4-9a^2+7$

Standard **29.** B State the number of real ***zeros*** for the function whose graph is shown to the right.



A. 1
B. 2
C. 3
D. 4

TWO Roots Real

1 root
2 roots Real
0 Real roots that are really 2 imaginary roots.

Standard **30.** F Suppose the equation $x^2 - 18x = -106$ is to be solved by ***completing the square***. Which equation represents one of the steps in determining the solution?

F. $x - 9 = \pm 5i$
G. $(x-9)^2 = 25$
H. $x^2 - 13x + 106 = 0$
J. $x^2 - 18x + 81 = -106$

$+C = \left(\frac{b}{2}\right)^2$ $C = \left(\frac{-18}{2}\right)^2 = (9)^2 = 81$

$x^2 - 18x + C = -106 + C$
$x^2 - 18x + 81 = -106 + 81$
$(x-9)^2 = -25$ → $x - 9 = \pm 5i$
$x - 9 = \pm\sqrt{-25}$

Standard **31.** C **Factor completely.** $27x^3 - 1$

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

diff of cubes
$3^3x^3 - 1^3$ (Bino)(Trino)
only one −
$(3x-1)(3^2x^2 + 3\cdot1\cdot x + 1^2)$

Standard **32.** G Write an equation for the parabola whose vertex is at (– 5, 7) and passes through (– 3, – 1).

F. $y = -\frac{1}{1}(x+5)^2 + 7$
G. $y = -2(x+5)^2 + 7$
H. $y = -\frac{1}{2}(x+5)^2 + 7$
J. $y = -\frac{1}{2}(x-5)^2 + 7$

$x = -3$ $y = -1$ $h = -5$ $k = 7$
$a = ?$
$y = a(x-h)^2 + k$ $y = a(x+5)^2 + 7$
$-1 = a(-3--5)^2 + 7$
$-7 \quad -7$
$-8 = a\cdot(4)$
$-\frac{8}{4} = a$
$a = -2$
$y = -2(x+5)^2 + 7$

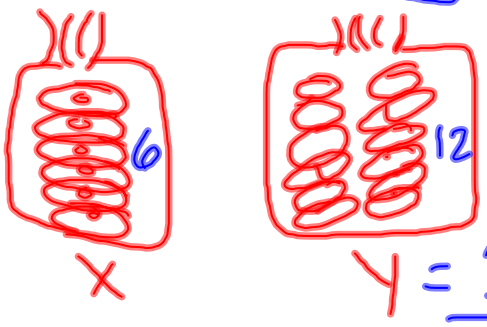
Standard **33.** C Which quadratic function has its vertex at (– 3, 5) and opens down?

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

opposite sign Keep sign
$y = -(x+3)^2 + 5$
$a = -\#$

Standard **34.** J A restaurant manager bought 20 packages of bagels. Some packages contained 6 bagels each, and the rest contained 12 bagels each. There were 168 bagels in all. How many packages of 12 bagels did the manager buy?

F. 6
G. 8
H. 10
J. 12



$-6\cdot \quad -6 \quad \cdot -6$
$X + Y = 20$
$6\cdot X + 12Y = 168$
$-6X - 6Y = -120$
$+ 6X + 12Y = 168$
$6Y = 48$
$Y = 8$

Standard **35.** C Find the ***slope*** of the line that passes through (1, 3) and (– 7, 8).

A. $-\frac{11}{8}$

B. $-\frac{5}{3}$

C. $-\frac{5}{8}$

D. $\frac{3}{5}$

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $x_1 y_1$ $x_2 y_2$

$m = \frac{8-3}{-7-1} = \frac{5}{-8}$

Standard **36.** J Determine the quotient using ***long division***. $(2x^4 + 21x^3 + 35x^2 - 37x + 46) \div (2x + 7)$

F. $x^3 + 7x^2 - 7x + 6 - \frac{4}{2x+7}$

G. $2x^3 + 14x^2 - 14x + 12 - \frac{4}{2x+7}$

H. $x^3 - 7x^2 + 7x - 6 + \frac{4}{2x+7}$

J. $x^3 + 7x^2 - 7x + 6 + \frac{4}{2x+7}$

$x^3 + 7x^2 - 7x + 6 + \frac{4}{2x+7}$

$-2x^4 + 7x^3$

$14x^3 + 35x^2$

$-14x^3 + 49x^2$

$-14x^2 - 37x$

$-14x^2 - 49x$

$+12x + 46$

$-12x + 42$

$+4$

$-\frac{7}{2}$ | 1 | $\frac{21}{2}$ | $\frac{35}{2}$ | $-\frac{37}{2}$ | $\frac{46}{2}$

+ | $-\frac{7}{2}$

0 | 1 | 7 | 7 | −7 | R

Standard **37.** D Jenny is solving the equation $x^2 - 8x = 9$ by ***completing the square***. What number should be added to both sides of the equation to complete the square.

A. 2

B. 4

C. 8

D. 16

$x^2 - 8x + c = 9 + c$

$c = \left(\frac{-8}{2}\right)^2 = (-4)^2 = 16$

Standard **38.** G Identify the ***range*** of $y = 3|x + 2|$

F. $\{x | x = 2\}$

G. $\{y | y \geq 0\}$

H. $\{y | y \geq -2\}$

J. All Real Numbers

D: y's value

(2, 4)

anything larger than zero

Range

Standard **39.** D Name the set(s) of numbers to which -28 belongs.

X. Integers → + #'s

X. Naturals, Integers, and Reals missing R

C. Integers and Rationals

D. Integers, Rationals, and Reals

−28, integer, Real, Rational

Standard

40. H **Solve** the system by ***substitution***:

$3x + 2y = 7$

$x - 4y = -6$

F. $(3, -1)$

G. $\left(\frac{7}{3}, \frac{7}{2}\right)$

H. $\left(\frac{8}{7}, \frac{25}{14}\right)$

J. $(1, 5)$

$+4y \quad +4y$

$x = 4y - 6$

$3(4y-6)+2y=7$

$12y-18+2y=7$

$14y-18=7$

$+18 \quad +18$

$\frac{14y}{14} = \frac{+25}{14}$

$y = \frac{25}{14}$

$x = 4\left(\frac{25}{14}\right) - 6$

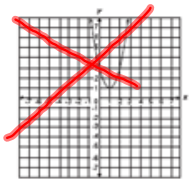
$x = \frac{8}{7}$

Standard

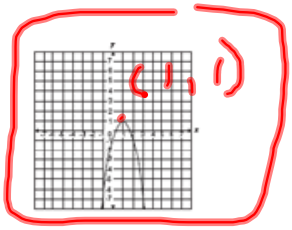
41. C Which is the ***graph*** of $y = -2(x-1)^2 - 1$

vertex $(1, 1)$

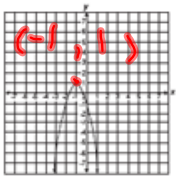
A.



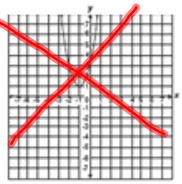
C.



B.



D.



Standard

42. H Find the ***x-intercept*** and the ***y-intercept*** of the graph of $y = \frac{3}{5}x - 6$.

TWO diff points

1 pt. → ~~F. $\left(\frac{3}{5}, -6\right)$~~

~~G. $-6; -10$~~

H. $10; -6$

1 pt. → ~~J. $(-10, -6)$~~

y-int = -6

(0, -6)

Standard

43. B What is the ***slope*** of the line that is ***parallel*** to the graph of $2x + 3y = 6$

Same slope

A. $-\frac{3}{2}$

B. $-\frac{2}{3}$

C. $\frac{2}{3}$

D. 2

$m = \frac{-A}{B} = \frac{-2}{3}$

$2x + 3y = 6$

$-2x \quad -2x$

$\frac{3y}{3} = \frac{-2x+6}{3}$

$y = -\frac{2}{3}x + 2$

Standard **44.** F Find the equation of the line that passes through the point (−6, 3) and is ***perpendicular*** to the line with the equation $y = 3x - 5$

Slopes are negative reciprocals

$m = 3$ | $m = -\frac{1}{3}$

$m = -\frac{1}{3}$ • $(-6, 3)$

$y - y_1 = m(x - x_1)$

$y - 3 = -\frac{1}{3}(x - -6)$

$y - 3 = -\frac{1}{3}x - 2$

$+3 \quad +3$

$y = -\frac{1}{3}x + 1$

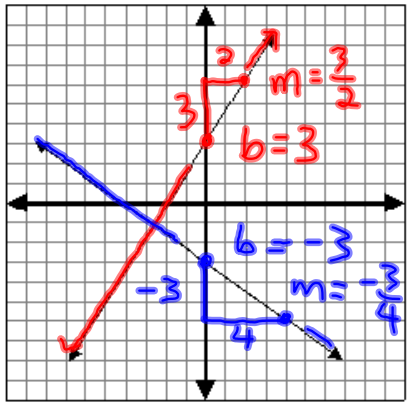
F. $y = -\frac{1}{3}x + 1$

G. $y = \frac{1}{3}x + 1$

H. $y = -\frac{1}{3}x - 1$

J. $y = \frac{1}{3}x - 1$

Standard **45.** B Which system of linear ***equations*** is graphed?



$2 \cdot y = \frac{3}{2}x + 3 \cdot 2$

$2y = 3x + 6$

$-3x \quad -3x$

$-3x + 2y = 6$

$3x - 2y = -6$

$4 \quad 4 \cdot y = -\frac{3}{4}x - 3 \quad y$

$4y = -3x - 12$

$+3x \quad +3x$

$3x + 4y = -12$

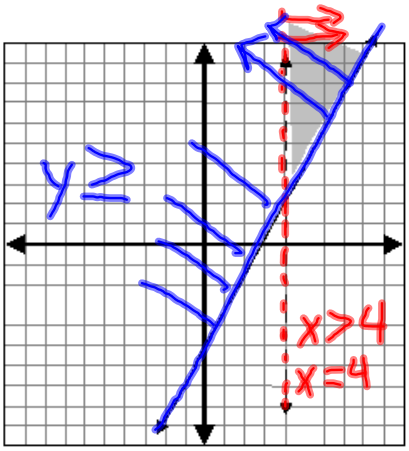
A. ~~$3x - 2y = 6$~~ $3x + 4y = -12$ ✓

B. $3x - 2y = -6$ ✓ $y = -\frac{3}{4}x - 3$ ✓

C. ~~$y - \frac{3}{2}x + 3$~~ $3x - 4y = -12$

D. ~~$y = \frac{2}{3}x + 3$~~ $y = -\frac{4}{3}x - 3$

Standard **46.** B Which system of linear ***inequalities*** is graphed?



A. $y \leq \frac{7}{4}x - 5$ ~~$x < 4$~~

B. $y \geq \frac{7}{4}x - 5$ $x > 4$ ✓

C. $y \geq \frac{7}{4}x - 5$ ~~$y < 4$~~

D. ~~$y > \frac{7}{4}x - 5$~~ $x > 4$ ✓

Standard **47.** C For a wedding, Fabiola bought several dozen roses and several dozen carnations. The roses cost \$15 per dozen, and the carnations cost \$8 per dozen. Fabiola bought a total of 17 dozen flowers and paid a total of \$192. How many roses did she buy?

$r + c = 17$ Ellimate the c

$15r + 8c = 192$

$-8r - 8c = 136$

$7r = 56$

$r = 8$

A. 6 dozen
B. 7 dozen
C. 8 dozen
D. 9 dozen

Standard **48.** F If $i = \sqrt{-1}$, what is the ***value*** of i^{13}?

$i^{13} = i^{12} \cdot i^1 = (i^2)^6 \cdot i^1 = (-1)^6 \cdot i^1$

$= 1 \cdot i$

$= i$

F. i
G. $-i$
H. 1
J. -1

Standard **49.** A The total area of a rectangle is $4x^4 - 9y^2$. Which ***factors*** could represent the length times the width of the rectangle?

$2 \cdot 2x^2 \cdot x^2 \quad 3 \cdot 3 \cdot y \cdot y$

$(2x^2 + \quad)(2x^2 - \quad)$

A. $(2x^2 - 3y)(2x^2 + 3y)$
B. $(2x^2 + 3y)(2x^2 + 3y)$
C. $(2x^2 - 3y)(2x - 3y)$
D. $(2x^2 + 3y)(2x - 3y)$

Standard **50.** F Which of the following most accurately describes the ***translation*** of the graph $y = (x+3)^2 - 2$ to the graph of $y = (x-2)^2 + 2$

vertex $(-3,-2)$ vertex $(2,2)$

F. Up 4 units and to the Right 5 units
G. Down 2 units and to the Right 2 units
H. Down 2 units and to the left 3 units
J. Up 4 units and to the left 5 units