Answer Key

Common Core Algebra Regents Review Session 1

1) Which is an irrational number?

(1) $\sqrt{9}$ (2) 3.14 (3) $\sqrt{3}$ (4) $\frac{3}{17}$

2) Which value is rational?

(1) π (2) $\sqrt{\frac{1}{2}}$ (3) $\frac{5}{13}$ (4) $\sqrt{17}$

3) The expression $3^2 \bullet 3^3 \bullet 3^4$ is equivalent to:

(1) 27^9 (2) 27^{24} (3) 3^9 (4) 3^{24}

4) The statement "n is even and a perfect square" is true when n equals:

(1) 1 (2) 18 (3) 25 (4) 4

5) Which property is illustrated by the equation $ax + ay = a(x + y)$?

(1) associative (2) commutative (3) distributive (4) identity

6) Which is the multiplicative inverse of 5?

(1) 1 (2) $\frac{1}{5}$ (3) $-\frac{1}{5}$ (4) -5

7) Which is the additive inverse of 5?

(1) 1 (2) $\frac{1}{5}$ (3) $-\frac{1}{5}$ (4) -5

8) Under which operation is the set $\{-1, 0, 1\}$ closed?

(1) multiplication (2) division (3) addition (4) subtraction

$-1 + 0 = -1$
$-1 + 1 = 0$
$0 + 1 = 1$

9) If $r = 2$ and $n = -7$, what is the value of $|r| - |n|$?

(1) 5 (2) 9 (3) -5 (4) -9

$|2| - |-7|$
$2 - 7 = -5$

10) The expression $\sqrt{50}$ can be simplified into

(1) $2\sqrt{25}$ (2) $5\sqrt{10}$ (3) $25\sqrt{2}$ (4) $5\sqrt{2}$

11) Express $4\sqrt{60}$ in simplest radical form.

$4\sqrt{60}$
$4\sqrt{4}\sqrt{15}$
$4 \cdot 2\sqrt{15} \rightarrow 8\sqrt{15}$

12) Given: $L = \sqrt{2}$, $M = 3\sqrt{3}$, $N = \sqrt{16}$, $P = \sqrt{9}$, which expression results in a rational number?

(1) L + M (2) M + N (3) N + P (4) P + L

13) Which statement is *not* always true?

(1) The product of two irrational numbers is irrational.

(2) The product of two rational numbers is rational.

(3) The sum of two rational numbers is rational.

(4) The sum of a rational number and an irrational number is irrational.

irrational, rational: $\sqrt{2} \cdot \sqrt{2} = 2$

14) Tara bought two items that cost d dollars each. She gave the cashier \$20. Which expression represents the change she received?

(1) $20-2d$ (2) $20-d$ (3) $20+2d$ (4) $2d-20$

$20-2d$

15) Which expression represents "5 less than the product of 7 and x"?

(1) $7(x-5)$ (2) $5-7x$ (3) $7x-5$ (4) $5-7x$

16) The sum of Scott's age and Greg's age is 33 years. If Greg's age is represented by g, Scott's age is represented by:

(1) $33-g$ (2) $g-33$ (3) $g+33$ (4) 33g

$33-g$

17) Which equation can be used to solve the problem: If four times a number is increased by 15, the result is three less than six times the number. Find the number.

(1) $4(x+15)=6x-3$ (2) $4x+15=6(x-3)$ (3) $4x+15=6x-3$ (4) $4x+15=3-6x$

18) When Albert flipped open his math textbook, he noticed that the product of the page numbers of the two facing pages he saw is 156. What are the page numbers? (solve algebraically)

pg. 12 ← x = 1st page

pg. 13 ← $x+1$ = 2nd page

$x(x+1)=156$

$x^2+x=156$

$x^2+x-156=0$

$(x+13)(x-12)=0$

$x+13=0$, $x=-13$ REJECT

$x-12=0$, $x=12$ ✓

19) When solved for y, the equation $ay-b=c$ is equivalent to:

(1) $\frac{c-b}{a}$ (2) $\frac{c+b}{a}$ (3) $\frac{c+b}{y}$ (4) $\frac{c+a}{b}$

$ay-b=c$

$+b \quad +b$

$\frac{ay}{a}=\frac{c+b}{a}$

$y=\frac{c+b}{a}$

20) If $x=2a-b^2$, then a equals

(1) $\frac{x-b^2}{2}$ (2) $\frac{x+b^2}{2}$ (3) $\frac{b^2-x}{2}$ (4) $x+b^2$

$x=2a-b^2$

$+b^2 \quad +b^2$

$\frac{x+b^2}{2}=\frac{2a}{2}$

$a=\frac{x+b^2}{2}$

21) The equation $P = 2L + 2W$ is equivalent to:

(1) $L = \frac{P-2W}{2}$ (2) $L = \frac{P+2W}{2}$ (3) $2L = \frac{P}{2W}$ (4) $L = P - W$

$P = 2L + 2W$
$-2W \quad -2W$
$\frac{P-2W}{2} = \frac{2L}{2}$
$L = \frac{P-2W}{2}$

22) In the equation $A = p + prt$, t is equivalent to:

(1) $\frac{A-pr}{p}$ (2) $\frac{A-p}{pr}$ (3) $\frac{A}{pr} - p$ (4) $\frac{A}{p} - pr$

$A = p + prt$
$-p \quad -p$
$A - p = prt$
$\frac{A-p}{pr} = \frac{prt}{pr}$
$t = \frac{A-p}{pr}$

23) The formula for the area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$. Express b_1 in terms of A, h, and b_2.

$2[A] = [\frac{1}{2}h(b_1 + b_2)]2$
$\frac{2A}{h} = \frac{h(b_1 + b_2)}{h}$
$\frac{2A}{h} = b_1 + b_2$
$-b_2 \quad -b_2$
$\frac{2A}{h} - b_2 = b_1$

The area of a trapezoid is 60 square feet, its height is 6 ft, and one base is 12 ft. Find the number of feet in the other base.

$A = \frac{1}{2}h(b_1 + b_2)$
$60 = \frac{1}{2}(6)(12 + b_2)$
$60 = 3(12 + b_2)$
$60 = 36 + 3b_2$
$-36 \quad -36$
$\frac{24}{3} = \frac{3b_2}{3}$
$b_2 = 8$ ft.

24) If $2n+1$ represents an odd integer, the next larger odd integer is represented by

(1) $2n+3$ (2) $2n+2$ (3) $2n$ (4) $2n-1$

25) In the Ambrose family, the ages of the three children are consecutive even integers. If the age of the youngest child is represented by $x+3$, which expression represents the age of the oldest child?

(1) $x+5$ (2) $x+6$ (3) $x+7$ (4) $x+8$

$x \xrightarrow{+3} x+3$
$x+2$
$x+4 \xrightarrow{+3} x+7$

$13 - 2x - 8 = 8x + 1$
$+2x \qquad +2x$
$5 = 10x + 1$
$-1 \qquad -1$
$\frac{4}{10} = \frac{10x}{10}$

26) Find the value of x in the equation $13 - 2(x+4) = 8x + 1$.

$x = \frac{2}{5}$

27) a) An electronics store sells DVD players and cordless telephones. The store makes a $75 profit on the sale of each DVD player, *d*, and a $30 profit on each sale of a cordless phone, *c*. The store wants to make a profit of at least $550 from its sales of these 2 items. Write an inequality that describes this situation.

$75d + 30c \geq 550$

b) If the store sold 5 DVD players, what is the least number of cordless phones they need to sell in order to make the profit they want?

$75(5) + 30c \geq 550$
$375 + 30c \geq 550$
$-375 \qquad -375$
$30c \geq 175$
$c \geq 5.8\overline{3}$

At least 6 cordless phones

28) A truck traveling at a constant rate of 45 miles per hour leaves Albany. One hour later a car traveling at a constant rate of 60 miles per hour also leaves Albany traveling in the same direction on the same highway. How long will it take for the car to catch up to the truck if both vehicles continue in the same direction on the highway?

29) Rhonda has $1.35 in nickels and dimes in her pocket. If she has six more dimes than nickels, which equation can be used to determine x, the number of nickels she has?

(1) $0.05(x+6) + 0.10x = 1.35$
(2) $0.05x + 0.10(x+6) = 1.35$
(3) $0.05 + 0.10(6x) = 1.35$
(4) $0.15(x+6) = 1.35$

dimes = n + 6
nickels = n
$.10(n+6) + .05n = 1.35$

30) a) Which inequality is represented by the graph below?

(1) $-2 \leq x \leq 3$ (2) $-2 < x < 3$ (3) $-2 \leq x < 3$ (4) $-2 < x \leq 3$

b) Express each of the choices in part *a* using interval notation.

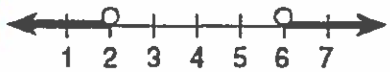
(1) [-2, 3] (2) (-2, 3) (3) [-2, 3) (4) (-2, 3]

$2x-4>8$
$2x>12$
$x>6$

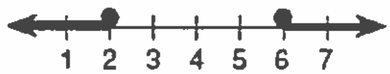
$x+5<7$
$x<2$

31) Which graph represents the solution set for $2x-4>8$ or $x+5<7$

(1) 

(3) 

(2) 

(4) 

32) When solving the equation $4(3x^2+2)-9=8x^2+7$, Emily wrote $4(3x^2+2)=8x^2+16$ as her first step. Which property justifies Emily's first step? $+9$

(1) addition property of equality
(2) commutative property of addition
(3) multiplication property of equality
(4) distributive property of multiplication over addition

33) Which sentence best describes the following set? $\{-2x-1 \mid x \in \text{ the set of whole numbers}\}$

(1) The set of integers less than 0.
(2) The set of integers one less than twice as big as x.
(3) The set of natural numbers greater than one less than twice a whole number.
(4) The set of negative odd integers.

34) Find the solution set for the open sentence $5x \leq 16$, using the domain = $\{\textit{odd whole numbers}\}$.

(1) $\{1,2,3\}$ (2) $\varnothing$ (3) $\{1,3\}$ (4) $\{3.2\}$ $x \leq 3.2$

35) The cost, y, for a pizza from King's is \$4 plus \$0.50 for each topping, x. Which of the following sets best describes the total cost for one pizza?

(1) $\{x \mid y=4x+0.5 \text{ and } x \in \text{ the set of integers}\}$
(2) $\{x \mid x \text{ is an integer and } x>4.50\}$
(3) $\{y \mid y=0.5x+4 \text{ and } x \in \text{ the set of whole numbers}\}$
(4) $\{y \mid y \text{ is a whole number and } x=4+0.5y\}$

Factor each expression as completely as possible.

36) $56x^4y^3-42x^2y^6$ $14x^2y^3(4x^2-3y^3)$

37) $16x^2-25y^2$ $(4x-5y)(4x+5y)$

38) $x^2 - 5x + 6$ $(x-3)(x-2)$

39) $7x^2 + 22x + 3$ ×7 21

$7x^2+22x+21 \rightarrow (7x+1)\frac{(7x+21)}{7}$

$(7x+1)(x+3)$

40) $2x^2 - 3x - 5$ ×2 −10

$2x^2-3x-10 \rightarrow (2x-5)\frac{(2x+2)}{2}$

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

41) $2x^2 + 15x + 18$ ×2 36

$2x^2+15x+36 \rightarrow \frac{(2x+12)}{2}(2x+3)$

$(x+6)(2x+3)$

42) $2x^2 - 50$

$2(x^2-25)$

$2(x+5)(x-5)$

43) $2x^2 + 10x - 12$

$2(x^2+5x-6)$

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

44) $4x^2 + 36x + 72$

$4(x^2+9x+18)$

$4(x+6)(x+3)$

45) $x^4 + 6x^2 - 7$

$(x^2+7)(x^2-1) \rightarrow (x^2+7)(x-1)(x+1)$

46) $x^4 - 12x^2 + 36$

$(x^2-6)(x^2-6)$

47) When factored completely, $x^3 + 3x^2 - 4x - 12$ equals

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

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

48) The expression $x^2(x+2)-(x+2)$ is equivalent to:

(1) x^2 (2) x^2-1 (3) x^3+2x^2-x+2 (4) $(x+1)(x-1)(x+2)$

x^3+2x^2-x-2

49) Given $2x + ax - 7 > -12$, determine the largest integer value of a when $x = -1$.

$2(-1) + (-1)a > -12$

$-2 - 2a > -12$
$+2 \quad\quad +2$

$-2a > -10$
$\overline{-2} \quad \overline{-2}$

$a < 5$

greatest integer is 4.

50) Find the product of $\frac{1}{3}x^2y$ and $\frac{1}{6}xy^3$.

$\frac{1}{18}x^3y^4$

51) Express $(3x-1)(3-x)+4x^2+19$ as a polynomial in standard form.

	3	−x
3x	9x	$-3x^2$
−1	−3	x

$-3x^2 + 9x + x - 3 + 4x^2 + 19$

$x^2 + 10x + 16$

52) If $A = 3x^2 - 7x + 6$ and $B = 5x^2 - 3x + 4$, find A − B.

$(3x^2 - 7x + 6) - (5x^2 - 3x + 4)$

$3x^2 - 7x + 6 - 5x^2 + 3x - 4$

$-2x^2 - 4x + 2$

53) Find the product of $(-3x^2y)$ and $(5xy^2 + xy)$.

$-15x^3y^3 - 3x^3y^2$

54) Find the sum of $(3x^2 + 4x - 2)$ and $(x^2 - 5x + 3)$.

$4x^2 - x + 1$

55) Simplify: $2x^2 - x^2$

$1x^2$

56) Multiply and express in simplest form. $(2x-3)(x^2-4x+5)$.

	x^2	−4x	5
2x	$2x^3$	$-8x^2$	10x
−3	$-3x^2$	12x	−15

$-11x^2 \quad 22x$

$2x^3 - 11x^2 + 22x - 15$

57) Solve for x: $|2x+3| - 4 = 12$

$+4 \quad +4$

$|2x+3| = 16$

$2x + 3 = 16$ or $2x + 3 = -16$

$2x = 13 \quad\quad 2x = -19$

$x = 6.5 \quad\quad x = -9.5$

~~3x+7=-8~~

58) $|2x-1|=9$

$2x-1=9$ $\quad$ $2x-1=-9$

$2x=10$ $\quad$ $2x=-8$

$\boxed{x=5}$ $\quad$ $\boxed{x=-4}$

59) $|3x+7|=-8$

No solution – Abs. value cannot = a negative.

Solving Quadratic Equations

A ***quadratic equation*** is a polynomial of the second degree in one variable. The standard form for a quadratic equation is $Ax^2+Bx+C=0$ where A, B, and C are real numbers.

To solve a quadratic equation:

a) Write the equation in standard form.

b) If Ax^2+Bx+C can be factored, factor it. If not you will need to use the quadratic formula or completing the square to solve the equation. See below.

c) Set each factor equal to zero to solve. The solutions are also called the roots or the zeros.

d) The Quadratic Formula: $x=\dfrac{-B\pm\sqrt{B^2-4AC}}{2A}$, where $A\neq 0$.

Be sure to identify the variables in the formula A= B= C= . Then substitute into the formula and simplify. If the question states to express the roots in simplest radical form, be sure to simplify the radical.

Completing the Square: An equation in which one side is a perfect square trinomial can be easily solved by taking the square root of each side. We can create a perfect square trinomial if we want to use this method.

$x^2+6x-16=0$

$x^2+6x+\underline{\ 9\ } = 16+\underline{\ 9\ }$ $\quad$ The value 9 was obtained by taking half the linear coefficient 6 and squaring it.

$(x+3)^2=25$

$\sqrt{(x+3)^2}=\sqrt{25}$

$x+3=\pm 5$ $\quad$ Don't forget to put the $\pm$ to indicate both solutions. The quadratic formula has a $\pm$ also.

$x=-3\pm 5$

$x=-3+5$ $\quad$ $x=-3-5$

$x=2$ $\quad$ $x=-7$

60) Tamara has two sisters. One of the sisters is 5 years older than Tamara. The other sister is 4 years younger than Tamara. The product of Tamara's sisters' ages is 70. How old is Tamara?

9 ← x = Tamara's age

14 ← x + 5 = one sister

5 ← x − 4 = younger sister

$(x+5)(x-4)=70$

$x^2+x-20=70$

$\quad -70 \quad -70$

$x^2+x-90=0$

$(x+10)(x-9)=0$

reject ~~x=-10~~ $\quad$ $\boxed{x=9}$

61) When the square of the third of three consecutive odd integers is added to three times the second integer, the result is 92 more than twice the first. Find the integers.

5 ← x = 1st
7 ← $x+2$ = 2nd
9 ← $x+4$ = 3rd

$3(x+2)+(x+4)^2=2x+92$

$3x+6+(x+4)(x+4)=2x+92$

$3x+6+x^2+8x+16=2x+92$

$x^2+11x+22=2x+92$

$-2x-92\quad -2x-92$

$x^2+9x-70=0$

$(x+14)(x-5)=0$

$x=-14$ reject | $x=5$

62) Solve for x: $4(x-3)^2-8=60$

$+8\quad +8$

$\frac{4(x-3)^2}{4}=\frac{68}{4}$

$\sqrt{(x-3)^2}=\sqrt{17}$

$x-3=\pm\sqrt{17}$

$+3\quad +3$

$x=3\pm\sqrt{17}$

63) Solve by completing the square: $x^2+6x-7=0$

$+7\quad +7$

$\left(\frac{6}{2}\right)^2=(3)^2=9$

$x^2+6x+9=7+9$

$(x+3)(x+3)=16$

$\sqrt{(x+3)^2}=\sqrt{16}$

$x+3=\pm 4$

$-3\quad -3$

$x=-3\pm 4$

$-3+4$ → 1 $\quad$ $-3-4$ → -7

64) Solve by completing the square and express the roots in simplest radical form: $x^2+10x-3=0$.

$+3\quad +3$

$x^2+10x+25=3+25$

$(x+5)(x+5)=28$

$\sqrt{(x+5)^2}=\sqrt{28}$

$x+5=\pm\sqrt{28}$

$\sqrt{28}$ → $\sqrt{4}\,\sqrt{7}$ → $2\sqrt{7}$

$x+5=\pm 2\sqrt{7}$

$-5\quad -5$

$x=-5\pm 2\sqrt{7}$

65) Solve by the quadratic formula and express the roots in simplest radical form: $x^2 + 10x - 3 = 0$.

$a=1$
$b=10$
$c=-3$

$$x = \frac{-10 \pm \sqrt{(10)^2 - 4(1)(-3)}}{2(1)}$$

$$x = \frac{-10 \pm \sqrt{112}}{2}$$

$\sqrt{112} = \sqrt{16}\sqrt{7} = 4\sqrt{7}$

$$x = \frac{-10 \pm 4\sqrt{7}}{2}$$

$$x = -5 \pm 2\sqrt{7}$$

In the remaining questions, solve by any appropriate algebraic method.

66) $x^2 + 5x - 5 = 3x + 10$

$-3x - 10 \quad -3x - 10$

$x^2 + 2x - 15 = 0$

$(x+5)(x-3) = 0$

$x = -5 \quad x = 3$

67) $\frac{x+2}{2} = \frac{12}{x}$

$x(x+2) = 24$

$x^2 + 2x = 24$

$-24 \quad -24$

$x^2 + 2x - 24 = 0$

$(x+12)(x-2) = 0$

$x = -12 \quad x = 2$

68) Which equation has the zeros $\{1,3\}$?

(1) $y = x^2 - 4x + 3$ (2) $y = x^2 - 4x - 3$ (3) $y = x^2 + 4x + 3$ (4) $y = x^2 + 4x - 3$