Algebra I Name Key ID: 1

Assignment

Date _____ Period ____

Simplify. Your answer should contain only positive exponents.

1) $\left(\frac{2x^0 \cdot 2x^{-2}}{xy^{-4}}\right)^{-3} = \left(\frac{4x^{-2}}{xy^{-4}}\right)^{-3} = \left(\frac{4x^{-3}}{y^{-4}}\right)^{-3} = \left(\frac{4x^3}{y^4}\right)^3 = \frac{64x^9}{y^{12}}$

2) $\frac{m}{(mn^{-2})^{-2} \cdot 2nm^2} = \frac{m}{m^2n^4 \cdot 2nm^2} = \frac{m}{2n^5}$

3) $\frac{(yx^{-1})^4}{x^3 \cdot 2x^0y^{-1}} = \frac{x^{-4}y^4}{2x^3y^{-1}} = \frac{y^5}{2x^7}$

4) $\frac{2m^2n^3 \cdot (nm^2)^0}{m^4} = \frac{2m^2n^3 \cdot 1}{m^4} = \frac{2n^3}{m^2}$

Simplify.

5) $-3\sqrt{32} = -3\sqrt{16}\sqrt{2} = -3 \cdot 4\sqrt{2} = -12\sqrt{2}$

6) $-5\sqrt{125} = -5\sqrt{25}\sqrt{5} = -5 \cdot 5\sqrt{5} = -25\sqrt{5}$

7) $\sqrt{x^4y^3} = \sqrt{x^2}\sqrt{x^2}\sqrt{y^2}\sqrt{y} = x \cdot x \cdot y\sqrt{y} = x^2y\sqrt{y}$

8) $\sqrt{20x^5y^4} = \sqrt{4}\sqrt{5}\sqrt{x^2}\sqrt{x^2}\sqrt{x}\sqrt{y^2}\sqrt{y^2} = 2x^2y^2\sqrt{5x}$

9) $\sqrt{\frac{45}{24}} = \sqrt{\frac{15}{8}} = \frac{\sqrt{15}}{\sqrt{8}} = \frac{\sqrt{15}}{\sqrt{4}\sqrt{2}} = \frac{\sqrt{15}}{2\sqrt{2}} = \frac{\sqrt{15}\sqrt{2}}{2\sqrt{2}\sqrt{2}} = \frac{\sqrt{30}}{4}$

10) $\sqrt{\frac{15}{98}} = \frac{\sqrt{15}}{\sqrt{49}\sqrt{2}} = \frac{\sqrt{15}}{7\sqrt{2}} = \frac{\sqrt{15}\sqrt{2}}{7\sqrt{2}\sqrt{2}} = \frac{\sqrt{30}}{7 \cdot 2} = \frac{\sqrt{30}}{14}$

11) $3\sqrt{10}(\sqrt{10} + \sqrt{2})$

$3\sqrt{100} + 3\sqrt{20}$

$3 \cdot 10 + 3\sqrt{4}\sqrt{5}$

$30 + 3 \cdot 2\sqrt{5}$

$30 + 6\sqrt{5}$

12) $-\sqrt{10}(4 + \sqrt{2})$

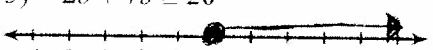
$-4\sqrt{10} + -\sqrt{20}$

$-4\sqrt{10} - \sqrt{4}\sqrt{5}$

$-4\sqrt{10} - 2\sqrt{5}$

Solve each inequality and graph its solution.

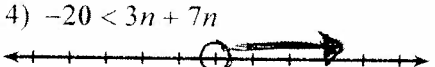
13) $-2b + 7b \geq 20$



$5b \geq 20$

$b \geq 4$

14) $-20 < 3n + 7n$



$-20 < 10n$

$-2 < n$

Solve each equation.

15) $10 + 8|5 - 8p| = 50$

$-10 \quad -10$

$\frac{8|5 - 8p|}{8} = \frac{40}{8}$

$|5 - 8p| = 5$

$5 - 8p = 5$ or $5 - 8p = -5$

$-5 \quad -5$ $\quad -5 \quad -5$

$\frac{-8p}{-8} = \frac{0}{-8}$ $\quad \frac{-8p}{-8} = \frac{-10}{-8}$

$p = 0$ or $p = \frac{5}{4}$

16) $4 - 4|6 + 2n| = -28$

$-4 \quad -4$

$\frac{-4|6 + 2n|}{-4} = \frac{-32}{-4}$

$|6 + 2n| = 8$

$6 + 2n = 8$ or $6 + 2n = -8$

$-6 \quad -6$ $\quad -6 \quad -6$

$\frac{2n}{2} = \frac{2}{2}$ $\quad \frac{2n}{2} = \frac{-14}{2}$

$n = 1$ or $n = -7$

> → SHADE ABOVE EQUATION

< → SHADE BELOW EQUATION

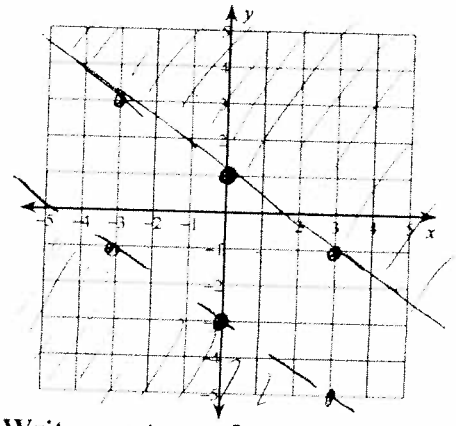
LOOKING FOR DOUBLE SHADED AREA.

Sketch the solution to each system of inequalities.

17) $y \geq -\frac{2}{3}x + 1$

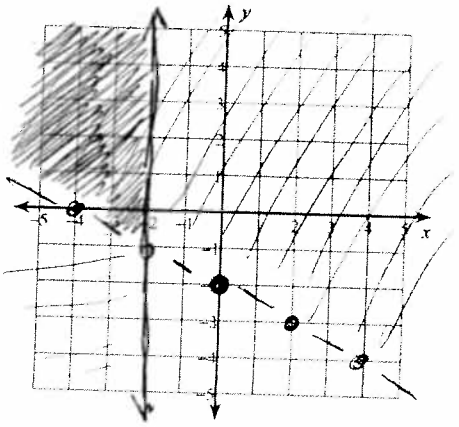
$y < -\frac{2}{3}x - 3$

NO SOLUTION



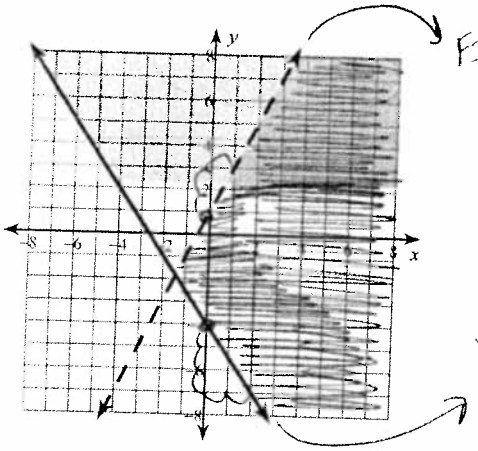
18) $y > -\frac{1}{2}x - 2$

$x \leq -2$



Write a systems of equations that defines the dark shaded region.

19)



FIRST LINE: $y = mx + b$

$y < \frac{2}{1}x + 1$

< because its shaded below line and dotted.

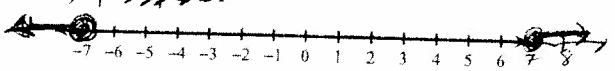
Second LINE: $y = mx + b$

$y \geq -\frac{3}{2}x - 4$

≥ because its shaded above line and is solid.

Solve each inequality and graph its solution.

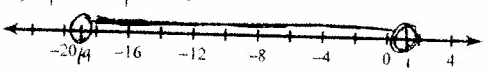
20) ~~$|9a| \geq 63$~~



$9a \geq 63$ or $9a \leq -63$

$a \geq 7$ $a \leq -7$

21) $|v + 9| < 10$



$v + 9 < 10$ $v + 9 > -10$

$v < 1$ $v > -19$

FOR shaded portion ref 1ST sheet

will apply TO ONE DIFFERENT BUT OPPOSITE OF OTHER - THEN ADD.

Solve each system.

22) $10x - 2y = -20$
$-x + 4y = -17$
$20x + -4y = -40$
$19x = -57$
$x = -3$

$10(-3) - 2y = -20$
$-30 - 2y = -20$
$-2y = 10$
$y = -5$
$(-3, -5)$

23) $6x - 10y = 2$
$-2(3x - 2y = -14)$
$-6x + 4y = 28$
$-6y = 30$
$y = -5$

$3x - 2(-5) = -14$
$3x + 10 = -14$
$3x = -24$
$x = -8$
$(-8, -5)$

24) $2x + y = 21$
$-2x + 6y = 14$
$7y = 35$
$y = 5$

$2x + 5 = 21$
$2x = 16$
$x = 8$
$(8, 5)$

25) $(x - y = 11)$
$-2x - 4y = 2$
$2x - 2y = 22$
$-6y = 24$
$y = -4$

$x - (-4) = 11$
$x + 4 = 11$
$x = 7$
$(7, -4)$

Simplify each polynomial.

26) $(5 - 6n^3 - n^4) + (3n^3 + 4n^4 + 1)$
$-5n^4 - 9n^3 + 6$

27) $(4x^4 + 5 - 2x) + (4 - x + 6x^3)$
$4x^4 + 6x^3 - 3x + 9$

Find each product.

28) $(7p + 6)(3p - 3)$
$21p^2 - 21p + 18p - 18$
$21p^2 - 3p - 18$

29) $(6k - 5)(6k^2 - 2k - 5)$
$36k^3 - 12k^2 - 30k - 30k^2 + 10k + 25$
$36k^3 - 42k^2 - 20k + 25$

30) $(2n + 6)^2 = (2n+6)(2n+6)$
$4n^2 + 12n + 12n + 36$
$4n^2 + 24n + 36$

Factor each completely.

31) $72n^3 + 24n^2 - 80n$
$8n(9n^2 + 3n - 10)$
$8n(9n \quad)(9n \quad)$
9
$\times 90 \rightarrow$ NO #'s
$+ 3$
so this is it

32) $7k^5 + 28k^3 + 21k^2$
$7k^2(k^3 + 4k + 3)$

33) $x^2 - 19x + 90$
$(x - 9)(x - 10)$
$\times 90$
$+ 19$

34) $16x^2 + 156x - 40$
$4(4x^2 + 39x - 10) = \frac{4(4x+40)(4x-1)}{4}$
$\times -40$
$+ 39$
$\frac{(4)(4)(x+10)(4x-1)}{4} = 4(x+10)(4x-1)$

35) $9r^2 - 39r - 30$
$3(3r^2 - 13r - 10) = 3(3r - 15)(3r + 2)$
$\times -30$
$+ -13$
$\frac{3(3)(r-5)(3r+2)}{3} = 3(r-5)(3r+2)$

36) $5r^2 + 25r - 30$
$5(r^2 + 5r - 6) = 5(r + 6)(r - 1)$
$\times -6$
$\rightarrow 5$

37) $25x^2 - 9$
$(25x - 15)(25x + 15)$
$\times 225$
$+ 0$
25
$\frac{5(5x-3)5(5x+3)}{25} = (5x-3)(5x+3)$

Solve each equation.

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

$+2 \quad +2$

$\sqrt{x^2} = \sqrt{-6}$

NO SOLUTION

39) $p^2 + 10 = 74$

$-10 \quad -10$

$\sqrt{p^2} = \sqrt{64}$

$p = \pm 8$

40) $3k^2 - 2 = -2k$

USE CALCULATOR OR QUADRATIC FORMULA

$3k^2 + 2k - 2 = 0$

$a=3, b=2, c=-2$

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

$\frac{-2 \pm \sqrt{2^2 - 4(3)(-2)}}{2(3)}$

$\frac{-2 \pm \sqrt{4 + 24}}{6}$

$\frac{-2 \pm \sqrt{28}}{6}$

$\frac{-2 \pm \sqrt{4}\sqrt{7}}{6}$

$\frac{-2 \pm 2\sqrt{7}}{6}$

$\frac{-1 \pm \sqrt{7}}{3}$

41) $a^2 - 5 = 3a$

$a^2 - 3a - 5 = 0$

$a=1, b=-3, c=-5$

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

$\frac{3 \pm \sqrt{9 + 20}}{2}$

$\frac{3 \pm \sqrt{29}}{2}$

Solve each equation. Remember to check for extraneous solutions.

FOR DETAILED EXPLANATION SEE LAST PAGE

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

$x + 2 = 9$

$x = 7$

43) $7 = -2 + \sqrt{r-5}$

$+2 \quad +2$

$(9)^2 = (\sqrt{r-5})^2$

$81 = r - 5$

$+5 \quad +5$

$r = 86$

44) Brenda and Ted each improved their yards by planting daylilies and geraniums. They bought their supplies from the same store. Brenda spent \$73 on 7 daylilies and 3 geraniums. Ted spent \$117 on 3 daylilies and 12 geraniums. What is the cost of one daylily and the cost of one geranium? d = daylilies g = geraniums

$-4(73 = 7d + 3g)$

$117 = 3d + 12g$

$-292 = -28d - 12g$

$117 = 3d + 12g$

$-175 = -25d$

$d = 7$

$73 = 7(7) + 3g$

$73 = 49 + 3g$

$24 = 3g$

$8 = g$

45) The senior classes at High School A and High School B planned separate trips to the state fair. The senior class at High School A rented and filled 12 vans and 14 buses with 626 students. High School B rented and filled 4 vans and 2 buses with 126 students. Each van and each bus carried the same number of students. How many students can a van carry? How many students can a bus carry? v = students in vans b = students in buses

$12v + 14b = 626$

$-3(4v + 2b = 126)$

$12v + 14b = 626$

$-12v - 6b = -378$

$8b = 248$

$b = 31$

$4v + 2(31) = 126$

$4v + 62 = 126$

$4v = 64$

$v = 16$

Find the vertex, axis of symmetry and zeroes of each function and graph it.

46) $f(x) = x^2 - 5x + 6$

AXIS OF SYMMETRY

VERTEX

$x = \frac{-b}{2a}$

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

AXIS OF SYMMETRY

$(\frac{5}{2})^2 - 5(\frac{5}{2}) + 6$

$y = -\frac{1}{4}$

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

VERTEX

ZEROES

$0 = x^2 - 5x + 6$

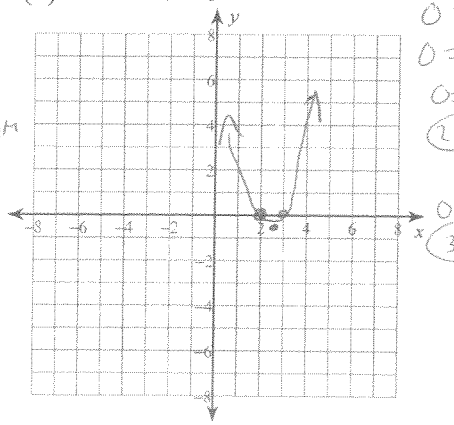
$0 = (x-2)(x-3)$

$0 = x - 2$

$2 = x$

$0 = x - 3$

$3 = x$



47) $f(x) = (2x-3)(2x+5)$

ZEROES

$2x - 3 = 0$

$2x = 3$

$x = \frac{3}{2}$

$2x + 5 = 0$

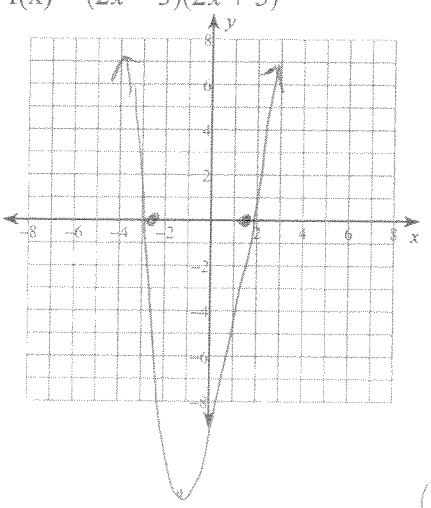
$2x = -5$

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

AXIS OF SYMMETRY

$\frac{\frac{3}{2} + \frac{-5}{2}}{2} = \frac{-\frac{2}{2}}{2}$

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



VERTEX

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

$(-1 - 3)(-1 + 5)$

$(-4)(4)$

-16

$(-\frac{1}{2}, -16)$

Detailed EXPLANATION

→ SQUARE ROOTS w/ VARIABLES

#7, 8

SAME AS LOOKING FOR PERFECT SQUARES.

x^2 is perfect so $\sqrt{x^2} = x$

#7 $\sqrt{x^4 y^3}$

$\sqrt{x^2}\sqrt{x^2}\sqrt{y^2}\sqrt{y^1} = x \cdot x \cdot y \cdot \sqrt{y}$

$x^2 y\sqrt{y}$

remember $x^2 \cdot x^2 = x^4$ add exponents

#8 $\sqrt{20 x^5 y^4}$

$\sqrt{4}\sqrt{5}\sqrt{x^2}\sqrt{x^2}\sqrt{x}\sqrt{y^2}\sqrt{y^2}$

$2\sqrt{5}\, x \cdot x\sqrt{x}\, y \cdot y$

$2x^2 y^2 \sqrt{5x}$

→ ABSOLUTE VALUE INEQUALITIES

→ COMBINE 2 THINGS YOU KNOW

① SET ABSOLUTE VALUE TO THE POSITIVE AND NEGATIVE

② WHEN YOU MULT/DIVIDE BY A NEG, SWITCH INEQUALITY

#20 $|9a| \geq 63$

$\frac{9a}{9} \geq \frac{63}{9}$

$a \geq 7$

$9a \geq -63$ *BUT we changed to a negative so switch inequality

$\frac{9a}{9} \leq \frac{-63}{9}$

$a \leq -7$

#21 $|v+9| < 10$

$v+9 < 10$

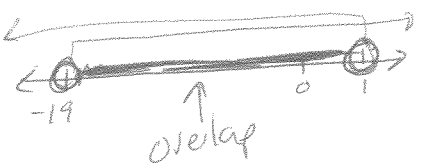
$-9 \quad -9$

$v < 1$

$v+9 < -10$ Neg so switch

$\frac{v+9}{-1} > \frac{-10}{-1}$

$v > -19$



SQUARE ROOT EQUATIONS

THE INVERSE (OPPOSITE) OF TAKING A SQUARE ROOT IS SQUARING.

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

#1 MAKE SURE EVERYTHING OUTSIDE RADICAL IS ON OTHER SIDE

#2 SQUARE BOTH SIDES

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

$x+2 = 9$

#3 SOLVE

$x+2 = 9$

$-2 \quad -2$

$x = 7$

(43) $7 = -2 + \sqrt{r-5}$

$+2 \quad +2$

$9 = \sqrt{r-5}$

$(9)^2 = (\sqrt{r-5})^2$

$81 = r-5$

$81 = r-5$

$+5 \quad +5$

$86 = r$