COLLEGE ALGEBRA EXAM 1 CGR   NAME_____

SHOW ALL WORK ON THIS TEST OR ON SEPARATE PAPER. Circle answers.
TURN IN <u>ALL</u> WORKSHEETS. GRAPHING CALCULATORS ARE REQUIRED ON
THIS TEST.   (WHEN CALCULATORS ARE USED, SKETCH THE GRAPH,
DESCRIBE THE WINDOW, OR OTHERWISE INDICATE WHAT YOU DID!!)

In 1 - 4, factor completely and simplify if possible:

1. $x^3 - 5x^2 - 4x + 20$

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

3. $x^4 - 16$

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

**In 5 – 8, use your calculator to find the value. give scientific notation
or round to the nearest hundredth.**

5a) $864{,}000 \times 980{,}000$

6a) $\dfrac{85}{\sqrt{0.0035}}$

7a) $(1 - i)^{12}$

b) $\dfrac{6.25 \times 10^{23}}{2.74 \times 10^{-8}}$

b) $\sqrt[3]{1765.21}$

b)   Give fractional form:

$$\dfrac{6 + 3i}{7 - 3i}$$

8a) Give fractional form:

$$16^{-\frac{3}{4}}$$

b) Calculate the decimal approximation

$$7000^{\frac{5}{8}}$$

1

In 9 – 10, simplify the fractions completely:

9. $\dfrac{x^2 - 5x + 25}{x^3 + 125}$

10. $\dfrac{2x^{-1} - (2y)^{-1}}{2xy^{-1}}$

In 11 – 13, simplify the radicals (rationalize denominators). Give answers in simplest RADICAL FORM.

11a) $\sqrt{80x^4 y^{15}}$

12a) $\dfrac{12}{\sqrt{2}}$

13. $(2\sqrt{6} + 3)^2$

b) $\sqrt[3]{80x^4 y^{15}}$

b) $\dfrac{12}{\sqrt[3]{2}}$

In 14 – 18, solve for x (use complex numbers if necessary):

14. $x^2 = 4(x - 2)$

15. $x^2 = 2(3x - 2)$ **Give exact radical form!**
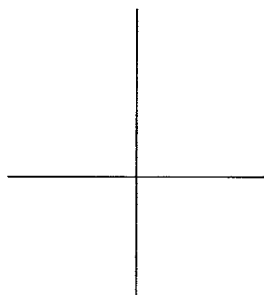
16. $2\sqrt{3x + 1} = x - 2$

17. $P = \dfrac{xy}{a + bx}$,   solve for *x*.

18. Use the substitution method to solve: $\dfrac{x^2-8}{x} + \dfrac{14x}{x^2-8} = 9$
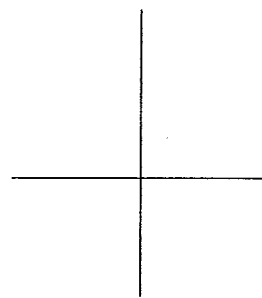
19. How many liters of pure (100%) acid must be added to 20 liters of 30% solution to bring the total solution up to 50%?   (An equation is required.)

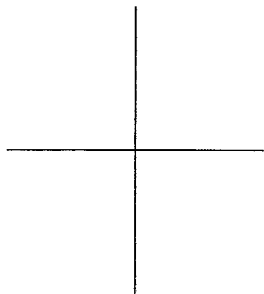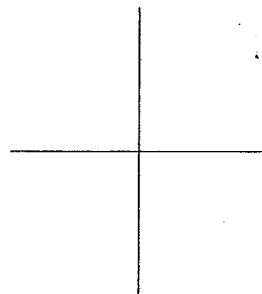In 20 – 21, graph each of the following.

20a) $y = x^2 - 6x$

21a) $y = \sqrt{x-4}$

b) $y = -x^2 + 4$

b) $y = \sqrt{x} - 4$

COLLEGE ALGEBRA EXAM 1 CGR Solutions

1. $x^3 - 5x^2 - 4x + 20$
$x^2(x-5) - 4(x-5)$
$(x-5)(x^2-4)$
$\boxed{(x-5)(x-2)(x+2)}$

2. $(x+2y)^2 - 6(x+2y) + 5$
$[(x+2y) - 5][(x+2y) - 1]$
$\boxed{(x+2y-5)(x+2y-1)}$

3. $x^4 - 16$
$(x^2-4)(x^2+4)$
$\boxed{(x-2)(x+2)(x^2+4)}$

4. $(x^2+4)^{3/2} - x^2(x^2+4)^{1/2}$
$(x^2+4)^{1/2}[(x^2+4) - x^2]$
$\boxed{4(x^2+4)^{1/2}}$

5a) 8.47×10^{11}
b) 2.28×10^{31}

6a) 1.44×10^3
≈ 1436.76
b) 12.09

7a) $(1-i)^{12}$
$(1, (-)1) \wedge 12$
$\boxed{-64}$
b) $\dfrac{6+3i}{7-3i}$
$(6,3) \div (7, (-)3)$
$(.5689..., .6724...)$
CUSTOM FRAC ENTER $\boxed{\dfrac{33}{58} + \dfrac{39}{58}i}$

8a) $16^{-3/4} = (\sqrt[4]{16})^{-3}$
$= 2^{-3}$
$= \boxed{\dfrac{1}{8}}$
b) $7000 \wedge (5 \div 8)$
$\boxed{253.04}$

9. $\dfrac{x^2-5x+25}{x^3+125}$
$\dfrac{x^2-5x+25}{(x+5)(x^2-5x+25)}$
$\boxed{\dfrac{1}{x+5}}$

10. $\dfrac{2x^{-1} - (2y)^{-1}}{2xy^{-1}}$
$\dfrac{2xy\left(\dfrac{2}{x} - \dfrac{1}{2y}\right)}{2xy\left(\dfrac{2x}{y}\right)}$
$= \boxed{\dfrac{4y-x}{4x^2}}$

11a) $\sqrt{80x^4y^5}$
$\sqrt{16x^4y^4}\sqrt{5y}$
$\boxed{4x^2y^2\sqrt{5y}}$
b) $\sqrt[3]{80x^4y^5}$
$\sqrt[3]{8x^3y^{15}}\sqrt[3]{10x}$
$\boxed{2xy^5\sqrt[3]{10x}}$

12a) $\dfrac{12\sqrt{3}}{\sqrt{3}\sqrt{2}} = \dfrac{12\sqrt{3}}{2} = \boxed{6\sqrt{2}}$
b) $\dfrac{12\sqrt[3]{4}}{\sqrt[3]{2}\sqrt[3]{4}} = \dfrac{12\sqrt[3]{4}}{2} = \boxed{6\sqrt[3]{4}}$

13. $(2\sqrt{6}+3)^2$
$4\cdot6 + 12\sqrt{6} + 9$
$\boxed{33 + 12\sqrt{6}}$

14. $x^2 = 4x - 8$
$x^2 - 4x = -8$
$x^2 - 4x + 4 = -8 + 4$
$(x-2)^2 = -4$
$x - 2 = \pm\sqrt{-4} = \pm2i$
$\boxed{x = 2 \pm 2i}$

OR 2nd POLY for
$x^2 - 4x + 8 = 0$
ORDER = 2
$a_2 = 1$
$a_1 = -4$ $(2,2)$
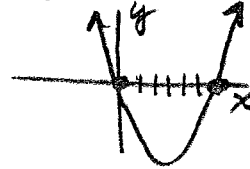$a_0 = 8$ $(2,-2)$
$\boxed{2 \pm 2i}$

15. $x^2 = 6x - 4$
$x^2 - 6x = -4$
$x^2 - 6x + 9 = -4 + 9$
$(x-3)^2 = 5$
$x - 3 = \pm\sqrt{5}$
$\boxed{x = 3 \pm \sqrt{5}}$ or

QUAD FORMULA:
$x^2 - 6x + 4 = 0$
$a=1 \quad b=-6 \quad c=4$
$x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$
$= \dfrac{6 \pm \sqrt{36 - 4(1)(4)}}{2(1)}$
$= \dfrac{6 \pm \sqrt{20}}{2}$
$= \dfrac{6 \pm 2\sqrt{5}}{2} = \dfrac{2(3 \pm \sqrt{5})}{2}$
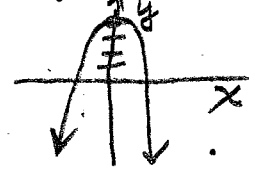
16. $(2\sqrt{3x+1})^2 = (x-2)^2$
$4(3x+1) = x^2 - 4x + 4$
$12x + 4 = x^2 - 4x + 4$
$0 = x^2 - 16x$
$0 = x(x-16)$
$x = 0 \quad x = 16$
ch: $x=0 \quad \boxed{x=16}$
$2\sqrt{1} = 0 - 2 \quad 2\sqrt{49} = 16 - 2$
Reject. $14 = 14$ ✓

17. $\dfrac{P}{T} = \dfrac{xy}{a+bx}$ for x
$Pa + Pbx = xy$
$\dfrac{-Pbx \quad -Pbx}{Pa = xy - Pbx}$
$Pa = x(y - Pb)$
$\dfrac{Pa}{y-Pb} = \dfrac{x(y-Pb)}{y-Pb}$
$\boxed{x = \dfrac{Pa}{y-Pb}}$

18. $\left(\dfrac{x^2-8}{x}\right) + 14\dfrac{x}{x^2-8} = 9$
$u\left(u + 14\dfrac{1}{u}\right) = (9)u$
$u^2 + 14 = 9u$
$u^2 - 9u + 14 = 0$
$(u-7)(u-2) = 0$
$u=7 \quad u=2$
$\left(\dfrac{x^2-8}{x}\right) = 7 \quad \left(\dfrac{x^2-8}{x}\right) = 2$
$x^2 - 8 = 7x \quad x^2 - 8 = 2x$
$x^2 - 7x - 8 = 0 \quad x^2 - 2x - 8 = 0$
$(x-8)(x+1) = 0 \quad (x-4)(x+2) = 0$
$\boxed{x=8 \quad x=-1} \quad \boxed{x=4 \quad x=-2}$
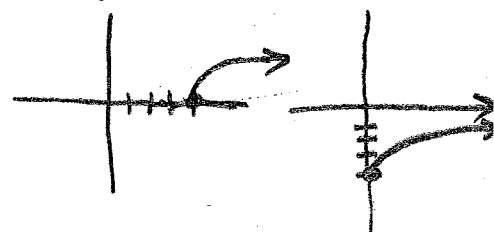
19.

	No Liters	%	PureStuff
Pure	x	1.00	1x
30%	20	.30	.30(20)
50%	$x+20$	.50	.50(x+20)

$x + .30(20) = .50(x+20)$
$x + 6 = .5x + 10$
$.5x = 4 \quad \boxed{x = 8\ell}$

20a) $y = x^2 - 6x$

b) $y = -x^2 + 4$

21a) $y = \sqrt{x-4}$

b) $y = \sqrt{x}$