

Show ALL WORK on this test or on separate paper. Circle answers.  
TURN IN ALL WORKSHEETS. Calculators are required on this test.

In 1 - 3, factor completely and simplify if possible:

1.  $2a^4b - 16ab^4$

2.  $(2x+y)^2 - 10(2x+y) + 25$

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

In 4 - 6, use your calculator to evaluate. Give scientific notation or round to nearest hundredth.  
(NOTE: These are CALCULATOR PROBLEMS!!)

4a)  $\sqrt[3]{70,000}$

5a)  $\frac{6.45 \times 10^{-6}}{9.36 \times 10^{16}}$

6a)  $(2 + i)^4$

b)  $\sqrt[5]{70,000}$

b)  $\frac{\sqrt{6} + \sqrt{13}}{\sqrt{7} - \sqrt{5}}$

b)  $\frac{2 - i}{8 + 5i}$

(Express in fractional form!)

7. Simplify:  $[3x^{-1} - (3y)^{-1}]^{-1}$

**In 8 - 10, simplify the radicals (rationalize denom):**

8a)  $\sqrt{72X^9Y^{10}}$

9a)  $\frac{12}{\sqrt{3}}$

10a) Give radical form.  $\frac{\sqrt{12}}{6\sqrt{2} + \sqrt{6}}$

b)  $\sqrt[3]{72X^9Y^{10}}$

b)  $\frac{12}{\sqrt[3]{3}}$

b) Give calculator approximation

**In 11 - 18, solve for X (use exact radical form and complex numbers as necessary!):**

11.  $\frac{1}{F} = \frac{1}{X} + \frac{1}{U}$

12.  $(x + 5)^2 = 20$

13.  $x^2 - 6x - 4 = 0$

14.  $2x(x + 3) = 7x$

15.  $x^2 + 6x + 25 = 0$

16.  $(x^2 + 6x)^2 + 3(x^2 + 6x) - 70 = 0$

17.  $\sqrt{x+4} - \sqrt{3x} = 2$

18.  $\frac{x^2+12}{x} + \frac{56x}{x^2+12} = 15$

19. sketch the graph

a)  $y = x^2 + 6x$

b)  $y = -x^2 - 6x$

20. sketch the graph

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

b)  $y = |x-3| + 2$

COLLEGE ALGEBRA EXAM | EGR Solutions

1.  $2a^4b - 16ab^4$   
 $2ab(a^3 - 8b^3)$   
 $2ab(a-2b)(a^2+2ab+4b^2)$

2.  $(2x+y)^2 - 10(2x+y) + 25$   
 $[2x+y-5][2x+y-5]$   
 $(2x+y-5)^2$

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

4a) 41.21  
 b) 9.31

5a)  $6.89 \times 10^{-23}$   
 b) 14.78

6a)  $(2+4)^{14} = -7+24i$   
 b)  $\frac{11}{89} - \frac{18}{89}i$

7.  $[3x^{-1} - (3y)^{-1}]^{-1}$   
 $[\frac{3}{x} - \frac{1}{3y}]^{-1}$   
 $(\frac{9y-x}{3xy})^{-1} = \frac{3xy}{9y-x}$

8a)  $\sqrt{72x^9y^{10}}$   
 $\sqrt{36x^8y^{10}} \sqrt{2x}$   
 $6x^4y^5\sqrt{2x}$

9a)  $\frac{12\sqrt{3}}{\sqrt{3}\sqrt{3}} = \frac{12\sqrt{3}}{3}$   
 $= 4\sqrt{3}$

10.  $\frac{\sqrt{12}}{6\sqrt{2} + \sqrt{6}}$

b)  $\frac{12\sqrt[3]{9}}{\sqrt[3]{3}\sqrt[3]{9}}$   
 $= \frac{12\sqrt[3]{9}}{3}$   
 $= 4\sqrt[3]{9}$

$= \frac{2\sqrt{3}(6\sqrt{2}-\sqrt{6})}{(6\sqrt{2}+\sqrt{6})(6\sqrt{2}-\sqrt{6})}$   
 $= \frac{12\sqrt{6}-2\sqrt{18}}{72-6}$   
 $= \frac{12\sqrt{6}-2 \cdot 3\sqrt{2}}{66}$

$\frac{6(2\sqrt{6}-\sqrt{2})}{66}$   
 $\frac{2\sqrt{6}-\sqrt{2}}{11}$

b)  $\sqrt[3]{72x^9y^{10}}$   
 $\sqrt[3]{8x^9y^9} \sqrt[3]{9y}$   
 $2x^3y^3\sqrt[3]{9y}$

10b) .3167969 or 0.32

11.  $\frac{1}{x} = \frac{1}{x} + \frac{1}{x}$   
 $\frac{FXU}{FXU} = \frac{FXU}{FXU} + \frac{FXU}{FXU}$   
 $\frac{-FX}{FXU-FX} = \frac{-FX}{FXU-FX}$   
 $\frac{X(U-F)}{U-F} = \frac{UF}{U-F}$   
 $X = \frac{UF}{U-F}$

12.  $(x+5)^2 = 20$   
 $x+5 = \pm\sqrt{20}$   
 $x+5 = \pm 2\sqrt{5}$   
 $x = -5 \pm 2\sqrt{5}$

13.  $x^2 - 6x - 4 = 0$   
 $a=1 \quad b=-6 \quad c=-4$   
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$   
 $= \frac{6 \pm \sqrt{36 - 4(1)(-4)}}{2(1)}$   
 $= \frac{6 \pm \sqrt{52}}{2}$

14.  $2x(x+3) = 7x$   
 $2x^2 + 6x - 7x = 0$   
 $2x^2 - x = 0$   
 $x(2x-1) = 0$   
 $x=0 \quad x=1/2$

13.  $x^2 - 6x - 4 = 0$   
 $x^2 - 6x + 9 = 4 + 9$   
 $(x-3)^2 = 13$   
 $x-3 = \pm\sqrt{13}$   
 $x = 3 \pm \sqrt{13}$

$= \frac{6 \pm 2\sqrt{13}}{2} = 3 \pm \sqrt{13}$

17.  $\sqrt{x+4} - \sqrt{3x} = 2$   
 $(\sqrt{x+4})^2 = (\sqrt{3x} + 2)^2$   
 $x+4 = 3x + 4\sqrt{3x} + 4$   
 $-3x - 4 = -3x + 4\sqrt{3x} + 4$   
 $-2x = 4\sqrt{3x}$   
 $(-x)^2 = (2\sqrt{3x})^2$   
 $x^2 = 12x$   
 $x^2 - 12x = 0$   
 $x(x-12) = 0$   
 $x=0 \quad x=12$

15.  $x^2 + 6x + 25 = 0$   
 $a=1 \quad b=6 \quad c=25$   
 $x = \frac{-6 \pm \sqrt{36 - 4(1)(25)}}{2(1)}$   
 $= \frac{-6 \pm \sqrt{-64}}{2}$   
 $= \frac{-6 \pm 8i}{2}$   
 $= \frac{-3 \pm 4i}{1}$   
 $= -3 \pm 4i$

16.  $(x^2+6x)^2 + 3(x^2+6x) - 70 = 0$   
 $[(x^2+6x)+10][(x^2+6x)-7] = 0$   
 $x^2+6x+10=0 \quad (x+7)(x-1)=0$   
 $x = \frac{-6 \pm \sqrt{36-40}}{2} \quad x=-7 \quad x=1$   
 $= \frac{-6 \pm \sqrt{-4}}{2}$   
 $= \frac{-6 \pm 2i}{2}$   
 $= -3 \pm i$

$x=0 \quad x=12$   
 ch  $\sqrt{4}-\sqrt{6}=2 \quad \sqrt{16}-\sqrt{36}=2$   
 $2=2 \quad 4-6=2$   
 No

Calculator works great!  
 Completing Square also!

$$18. \quad \frac{x^2+12}{x} + \frac{56x}{x^2+12} = 15$$

$$\text{Let } u = \frac{x^2+12}{x}$$

$$u + 56 \frac{1}{u} = 15$$

$$u^2 + 56 = 15u$$

$$u^2 - 15u + 56 = 0$$

$$(u-8)(u-7) = 0$$

$$u = 8 \quad u = 7$$

$$\frac{x^2+12}{x} = 8 \quad \frac{x^2+12}{x} = 7$$

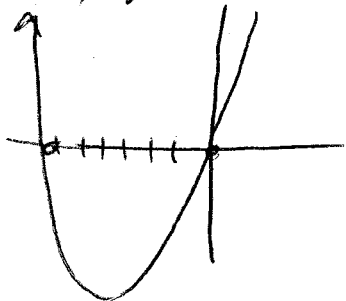
$$x^2+12 = 8x \quad x^2+12 = 7x$$

$$x^2 - 8x + 12 = 0 \quad x^2 - 7x + 12 = 0$$

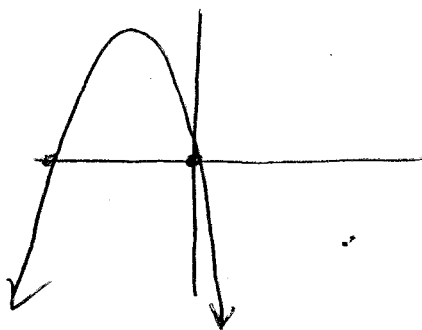
$$(x-6)(x-2) = 0 \quad (x-4)(x-3) = 0$$

$$x=6 \quad x=2 \quad x=4 \quad x=3$$

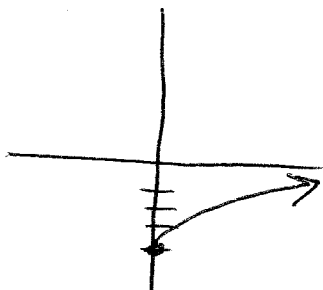
$$19a) \quad y = x^2 + 6x$$



$$b) \quad y = -x^2 - 6x$$



$$20a) \quad y = \sqrt{x} - 4$$



$$b) \quad y = |x-3| + 2$$

