

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

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

1. $9a^3b - 16ab^3$

2. $(X+Y)^2 + 5(X+Y) + 4$

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

4a) Simplify: $(1 + i)^4$

b) Divide (give answer in form
using fractions)

$$\frac{6 - i}{4 + i}$$

5. Simplify the fraction:

$$\frac{5}{X^2 - X - 2} - \frac{3}{X^2 - 5X + 6}$$

6. Sketch and find the roots of

$$Y = X^3 - 5X^2 - 6X$$

In 7 - 9, simplify the radicals (rationalize denom). Give radical form:

7a) $\sqrt{54X^6Y^{11}}$

8a) $\frac{12}{\sqrt{2}}$

9. $\frac{\sqrt{6} - \sqrt{3}}{\sqrt{6} + \sqrt{3}}$

b) $\sqrt[3]{54X^6Y^{11}}$

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

10. Simplify by using definitions or calculator:

a) $8^{-\frac{2}{3}}$

b) $-25^{\frac{3}{2}}$

In 11 - 18, solve for X:

11. $P = \frac{XY}{X + Y}$

12. $|3X - 6| = |2x + 9|$

In 13 - 16, give exact radical form (use complex numbers if necessary):

13. $(X + 8)^2 = 27$

14. $X(X - 6) = -2$

15. $X^2 + 6X + 13 = 0$

16. $X^4 - 8X^2 - 9 = 0$

17. $\sqrt{X+12} + \sqrt{X} = 6$

18. $\frac{X-14}{X} + 16 \cdot \frac{X}{X-14} = 10$

In 19 - 20, use the calculator to find the value. Round to nearest hundredth or give scientific notation.

19a) $864,000 \times 980,000,000$

20a) $\sqrt[5]{750}$

b) $\left(\frac{127.3}{0.00025}\right)^7$

b) $\frac{\sqrt{6} - \sqrt{3}}{\sqrt{6} + \sqrt{3}}$

c) $\sqrt{\frac{6.2 \times 10^6}{9.6 \times 10^{-9}}}$

c) $\frac{850}{\sqrt{0.00035}}$

COLLEGE ALGEBRA EXAM 1 DG Solutions

1-8-99

10. $9a^3b - 16ab^3$
 $ab(9a^2 - 16b^2)$

2. $(x+y)^2 + 5(x+y) + 4$
 $[(x+y) + 4][(x+y) + 1]$
 $(x+y+4)(x+y+1)$

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

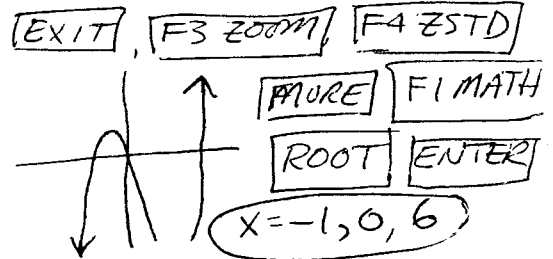
4. $(1+i)^4$

5. $\frac{5}{(x-2)(x+1)} - \frac{3}{(x-2)(x-3)}$
 $\frac{5(x-3) - 3(x+1)}{(x-2)(x+1)(x-3)}$
 $= \frac{5x-15-3x-3}{(x-2)(x+1)(x-3)}$
 $= \frac{2x-18}{(x-2)(x+1)(x-3)}$

6. $y = x^3 - 5x^2 - 6x$
 CALCULATOR:
 GRAPH, F1, $y = x^3 - 5x^2 - 6x$

CALCULATOR
 a) $[-]$, 1 , $[-]$, 1 , $[-]$, 4 , $[=]$
 $(-4, 0)$ or (-4)

b) 1 , 6 , $[-]$, 1 , $[-]$, 0 , $[=]$
 1 , 4 , 9 , 1 , $[-]$, 0 , $[=]$
 $(1.35294117647, -588...)$
 CUSTOM, FRAC, ENTER
 $(\frac{23}{17}, -\frac{10}{17})$ $(\frac{23}{17} - \frac{10}{17}i)$



7a) $\sqrt{54x^6y^{11}} = \sqrt{9x^6y^{10}} \sqrt{6y}$
 $= 3x^3y^5 \sqrt{6y}$

8a) $\frac{12\sqrt{2}}{\sqrt{2}\sqrt{2}} = \frac{12\sqrt{2}}{2} = 6\sqrt{2}$

9. $\frac{(\sqrt{6}-\sqrt{3})(\sqrt{6}-\sqrt{3})}{(\sqrt{6}+\sqrt{3})(\sqrt{6}-\sqrt{3})}$
 $= \frac{6 - \sqrt{18} - \sqrt{18} + 3}{6 - 3}$
 $= \frac{9 - 2\sqrt{18}}{3}$

b) $\sqrt[3]{54x^6y^{11}} = \sqrt[3]{27x^6y^9} \sqrt[3]{2y^2}$
 $= 3x^2y^3 \sqrt[3]{2y^2}$

a) $\frac{12}{\sqrt{2}} \sqrt[3]{4} = \frac{12\sqrt[3]{4}}{2} = 6\sqrt[3]{4}$

10a) $8^{-2/3} = (\sqrt[3]{8})^{-2}$
 $= 2^{-2} = \frac{1}{4}$

11. $P = \frac{xy}{x+y}$
 $Px + Py = xy$
 $Py = xy - Px$
 $\frac{Py}{y-P} = \frac{x(y-P)}{y-P}$
 $x = \frac{Py}{y-P}$

12. $|3x-6| = |2x+9|$
 $3x-6 = 2x+9$ or $3x-6 = -(2x+9)$
 $x = 15$ or $5x = -3$
 $x = -3/5$
 CALCULATOR: $x = -3/5$

b) $-25^{3/2} = -(\sqrt{25})^3$
 $= -5^3 = -125$

$|y| = \text{abs}(3x-6) - \text{abs}(2x+9)$
 ROOTS:
 $x = -6, 15$

13. $(x+8)^2 = 27$
 $x+8 = \pm\sqrt{27}$
 $x+8 = \pm 3\sqrt{3}$
 $x = -8 \pm 3\sqrt{3}$

14. $x(x-6) = -2$
 $x^2 - 6x + 2 = 0$

Quadratic Formula or 14.

14. Complete the Square

$x^2 - 6x = -2$ - OR - $x^2 - 6x + 2 = 0$
 $x^2 - 6x + 9 = -2 + 9$
 $(x-3)^2 = 7$
 $x-3 = \pm\sqrt{7}$
 $x = 3 \pm \sqrt{7}$

QUAD. FORMULA
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
 $= \frac{6 \pm \sqrt{36 - 4(1)(2)}}{2}$
 $= \frac{6 \pm \sqrt{28}}{2}$
 $= \frac{6 \pm 2\sqrt{7}}{2}$
 $= 3 \pm \sqrt{7}$

15. CALCULATOR
 ROOT: Does not work
 Since no real roots.
 2nd Poly,
 Order = 2 Enter:
 $a_2 = 1$ ENTER
 $a_1 = 6$ ENTER
 $a_0 = 13$ Solve: $(-3, 2)$
 $(-3, -2)$
 $x = -3 \pm 2i$

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

CALCULATOR - See right side →

$$16. x^4 - 8x^2 - 9 = 0$$

$$(x^2 - 9)(x^2 + 1) = 0$$

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

$$x = \pm 3 \quad x = \pm i$$

CALCULATOR: 2nd POLY

$$\text{Order} = 4$$

$$a_4 = 1$$

$$a_3 = 0$$

$$a_2 = -8$$

$$a_1 = 0$$

$$a_0 = -9$$

$$17. \sqrt{x+12} + \sqrt{x} = 6$$

$$(\sqrt{x+12})^2 = (6 - \sqrt{x})^2$$

$$\begin{array}{r} x+12 = 36 - 12\sqrt{x} + x \\ -x-36 \quad -36 \quad -x \end{array}$$

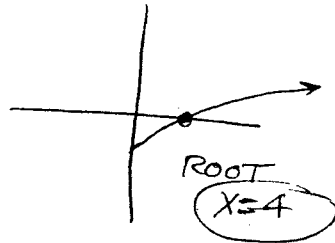
$$\frac{-24}{-12} = \frac{-12\sqrt{x}}{-12}$$

$$2 = \sqrt{x}$$

$$x = 4$$

Easier to use calculator:

$$y1 = \sqrt{x+12} + \sqrt{x} - 6 = 0$$



$$18. \frac{x-14}{x} + \frac{16x}{x-14} = 10$$

$$\text{Let } u = \frac{x-14}{x} \quad \frac{1}{u} = \frac{x}{x-14}$$

$$u(u + 16 \frac{1}{u}) = 10$$

$$u^2 + 16 = 10u$$

$$u^2 - 10u + 16 = 0$$

$$(u-8)(u-2) = 0$$

$$u = 8 \quad u = 2$$

$$\frac{x-14}{x} = 8 \quad \frac{x-14}{x} = 2$$

$$x-14 = 8x \quad x-14 = 2x$$

$$-2 = x$$

$$-14 = x$$

— OR —

$$\frac{x(x-14)}{x(x-14)} + \frac{16x}{x(x-14)} = 10$$

$$x^2 - 28x + 14^2 + 16x^2 = 10x^2 - 140x$$

$$17x^2 - 28x + 196 = 10x^2 - 140x$$

$$7x^2 + 112x + 196 = 0$$

$$7(x^2 + 16x + 28) = 0$$

$$(x+2)(x+14) = 0$$

$$x = -2 \quad x = -14$$

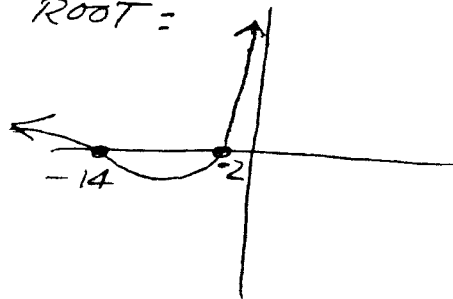
or Calculator

$$y1 = (x-14) \div x + 16x \div (x-14) - 10$$

use a large enough window!

Range $x = -20$ to 20 .

MORE, MATH, ROOT:



$$19a) 8.4672E14 \quad (8.47 \times 10^{14})$$

$$b) 8.87603E39 \quad (8.88 \times 10^{39})$$

$$c) 25413251.1366 \approx (2.54 \times 10^7)$$

$$20a) \sqrt[5]{750}$$

$$5 \sqrt[5]{750} = (3.76)$$

$$b) \frac{(\sqrt{6} - \sqrt{3})}{(\sqrt{6} + \sqrt{3})} = (0.17)$$

$$c) \frac{850}{\sqrt{0.00035}} = (45434.41)$$