Ch. 6 – Board Problems

Factor.

① $400 - 36x^2$

② $100x^2 + 180x + 81$

Simplify

③ $$\frac{\frac{x^2+10x+16}{x^2+6x+8}}{\frac{1}{x+4}}$$

Combine

④ $$\frac{2x}{x-4} - \frac{3x}{5-x}$$

Solve

⑤ $81x^4 - 1 = 0$

⑥ $15x^2 - 27x - 6 = 0$

Ch. 6 - Fractional Exponents

$\sqrt{7} = 7^{-}$ $\quad 7^{\frac{2}{}}$ ← ←

$\sqrt[3]{7} = 7^{-}$ on a calculator.

$\sqrt[6]{7^5} = 7^{-}$

$\sqrt[3]{7^{12}} = 7^{-}$

$7^{\sqrt{6}} =$

$(7^6)^{\frac{1}{2}} =$

$10^{\frac{1}{3}} = \sqrt{}$

$\sqrt[3]{8} =$

$1000^{\frac{1}{3}} =$

$\sqrt{4^6} =$

$\sqrt{\sqrt{81}} =$

$\sqrt{9} =$

$\sqrt[5]{A^{10}} =$

26. HYPERBOLAS - HAVE THE FORM → $XY=N$ (N IS THE INTEGER)

$XY=6$ 1) SOLVE FOR Y

2) MAKE A TABLE

$XY=N$ ┐

$XY=-N$ ┘

$Y=MX+B$ LINE

$AX^2+BX+C=\emptyset$ PARABOLA

$Y=\frac{6}{X}$

X	Y
±1	6
±2	3
±3	2
±6	1

Ex2) $X^2-Y^2=9$

$Y^2=X^2-9$

$Y=\sqrt{X^2-9}$

X	Y
±3	0
±4	$\sqrt{7}$
±5	4

$AX^2-BY^2=N^2$

$AY^2-BX=N^2$

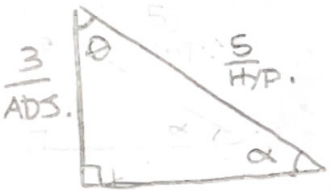
$X^2+Y^2=R^2$ = CIRCLE

$(X-1)^2+(Y-3)^2=R^2$

$4X^2+Y^2=1$ ELLIPSE

BASIC "TRIG"

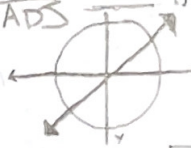
SOH-CAH-TOA



SIN = OPP/HYP $\sin\theta=\frac{4}{5}$ $\sin\alpha=\frac{3}{5}$

COS = ADS/HYP $\cos\theta=\frac{3}{5}$ $\cos\alpha=\frac{4}{5}$

TAN = OPP/ADS $\tan\theta=\frac{4}{3}$ $\tan\alpha=\frac{3}{4}$



$XY=6$ → HYPERBOLA

Ex3 $XY=4$, $X^2+Y^2=8$

$\sqrt{8}=2.8$

$X^2\left(\frac{4}{X}\right)^2=8 \rightarrow X\left(X^2+\frac{16}{X^2}=8\right)$

$X^4+16=8X^2$

$(X^2-4)(X^2-4)$

$X^2-4=\emptyset$

$(X-2)(X-2)$

$X=2,-2$

CH 27.

1) $X^2+Y^2=6$, $Y=2X-1$

$X^2+(2X-1)^2=6 \rightarrow X^2+4X^2-4X+1=6$

$5X^2-4X-5=\emptyset$

$A=5$, $B=-4$, $C=-5$

$X1=1.477$

$X2=-.677$

Ex2). $XY=6$ - HYPERBOLA; $3X+2Y=12$ - LINE

$2(S_{20}+S_{50}=3)$

$.2S_{20}+.5S_{50}=3(.3)=.9$

$y=\frac{6}{x} \rightarrow y=\frac{-3}{2}x+6$

$2x\left(\frac{6}{x}=\frac{-3}{2}x+6\right)$

$12=-3x^2+12x$

$\frac{3x^2}{3}x^2-\frac{12x}{3}+\frac{12}{3}=\frac{0}{3}$

x^2-4x

CH 28

$-5(N+D=7)$

$5N+10=55$

$-5N-5D=-35$

$5D=20$

$D=4$

$N=3$

CON INT: N, N+1, N+2

EVEN INT: N, N+2, N+4

ODD INT: N, N+2, N+4

$-X^2+4Y^2=-16$

$X^2+Y=49$

$5Y^2=33$

$Y^2=6.6$

$\sqrt{Y^2}=\sqrt{6.6}$

$Y=2.5$

CH 29.

1) $S+9=2(I+9) \rightarrow S+9=2I+18$

$S=12+9$

$I-4=\frac{1}{3}(S-4)$

$I-4=\frac{1}{3}(2I+9-4) \rightarrow I-4=\frac{1}{3}(2I+5) \rightarrow I-\frac{2}{3}I+\frac{5}{3}+\frac{12}{3}+4 \rightarrow -\frac{2}{3}I+\frac{2}{3}I$

$1=\frac{2}{3}1+\frac{5}{3}+\frac{12}{3}$

$3\left(\frac{1}{3}I=\frac{17}{3}\right)=I=17$

$S=43$

CH 30

A $3X+2Y+4Z=9$

B $4X+3Y-2Z=6$

C $5X+4Y-3Z=8$

B WAS x BY 2 $(4X+3Y-2Z=6)2$

A $3X+2Y+4Z=9$

B $8X+6Y-4Z=12$

$D=11X+8Y=12$

A $(3X+2Y+4Z=9)3$

C $(5X+4Y-3Z=8)4$

$9X+6Y+12Z=27$

$20X+16Y-12Z=32$

$E=29X+22Y=59$

$(11X+8Y=21)11 \quad 121X+88Y=231$

$(29X+22Y=59)-4 \quad -116X-88Y=-236$

$5X=5$

$X=-1$

PLUG IN X TO A B OR C.

$D=RT$

RATE DOWNSTREAM = R_B+R_C

RATE UPSTREAM = R_B-R_C

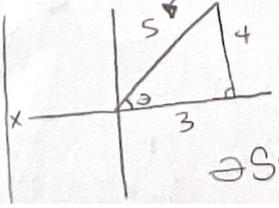
$D_D=R_DT_D$, $D_U=R_UT_U$

$D_D=(R_B+R_C)T_C$ $D_U=(R_B-R_C)T_U$

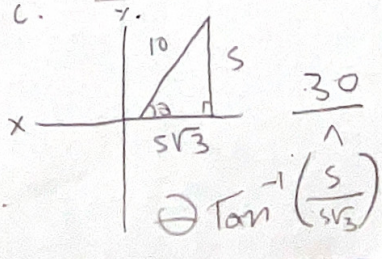
CH 31. VECTORS < DIRECTION / MAGNITUDE

Ex $\xrightarrow{+7}$ + $\xrightarrow{+3}$ = $\xrightarrow{+10}$

↑ 1 → - ↑ +1



$\theta=\sin^{-1}\left(\frac{4}{5}\right)=53.13$



$\frac{30}{\uparrow}$

$\ominus \tan^{-1}\left(\frac{5}{5\sqrt{3}}\right)$

Lesson 6 Fractional Exponents and Solving Equations with Rational Expressions

As we learned in Algebra 1, square roots and cube roots can also be written as exponents. Instead of $\sqrt{5}$ we can write $5^{1/2}$. The cube root of 7 can be written as $\sqrt[3]{7}$ or $7^{1/3}$.

Two or more operations can be expressed as one fractional exponent. The square root of 9 raised to the third power is written as: $(\sqrt{9})^3 = (9^{1/2})^3 = 9^{3/2} = 27$. The square root of 9 is 3, and 3 to the third power is 27.

Example 1 $(\sqrt{4})^5 = (4^{1/2})^5 = 4^{5/2} = 32$

$\searrow = 2^5 = 32$

The square root of 4 is 2, and 2 to the fifth power is 32.

Example 2 $(\sqrt[3]{27})^2 = (27^{1/3})^2 = 27^{2/3} = 9$

$\searrow = (3)^2 = 9$

The cube root of 27 is 3, and 3 to the second power is 9.

The denominator of the fractional exponent tells what root, and the numerator tells to what power it is raised.

Example 3 $(\sqrt{\sqrt{5}}) = (5^{1/2})^{1/2} = 5^{1/4}$

Example 4 $(\sqrt{\sqrt{81}}) = (81^{1/2})^{1/2} = 81^{1/4} = 3$

$\searrow = \sqrt{9} = 3$

The square root of 81 is 9, and the square root of 9 is 3. So the square root of the square root of 81 is 3.

Practice Problems

1) $(8^{1/3})^2 =$ 2) $(3^4)^{1/2} =$ 3) $(32^{1/5})^3 =$ 4) $(81^{1/4})^3 =$

Rewrite using fraction exponents, then solve.

5) $(\sqrt[4]{16})^3 =$ 6) $(\sqrt{3^4}) =$ 7) $(\sqrt{4})^3 =$ 8) $(\sqrt{25})^3 =$

9) $(\sqrt{\sqrt[3]{X}}) =$ 10) $(\sqrt{\sqrt{Y}}) =$ 11) $(\sqrt[3]{Q^4}) =$ 12) $(\sqrt[3]{A^2}) =$

LESSON PRACTICE

6A

Simplify.

1. $(16^{1/2})^3$

2. $(x^{3/4})^{8/3}$

3. $(2^6)^{1/3}$

4. $\left[(-4)^2\right]^{3/4}$

5. $(3^{-4})^{1/2}$

6. $\left[\left(\frac{4}{9}\right)^{1/2}\right]^3$

7. $\left(\frac{1}{2}\right)^{-3}$

8. $(x^{AB})^{1/A}$

9. $\left[(-6)^2\right]^{1/2}$

10. $(27^{2/3})^2$

Rewrite using fractional exponents, and then simplify.

11. $\sqrt{\sqrt{x}}$

12. $\left(\sqrt[3]{\sqrt{125}}\right)^2$

13. $\sqrt[3]{b^5}$

14. $\sqrt{\sqrt[3]{64}}$

15. $\left(\sqrt{\sqrt{36}}\right)^3$

16. $\sqrt{\sqrt{25}}$

17. $\left(\sqrt[6]{\sqrt{64}}\right)^{-3}$

18. $\sqrt{\sqrt[4]{81}}$

19. $\sqrt{\sqrt{a^{16}}}$

20. $\left(\sqrt[3]{\sqrt{8}}\right)^5$

Rewrite using fractional exponents, and then simplify.

11. $\sqrt{\sqrt{x^4}}$

12. $\left(\sqrt[3]{64}\right)^4$

13. $\sqrt[3]{8^5}$

14. $\sqrt{\sqrt[4]{16}}$

15. $\left(\sqrt{49}\right)^2$

16. $\sqrt[4]{A^8}$

17. $\left(\sqrt[3]{216}\right)^{-2}$

18. $\sqrt{\sqrt{100}}$

19. $\sqrt{\sqrt{81}}$

20. $\left(\sqrt[5]{32}\right)^4$

LESSON PRACTICE

6B

Simplify.

1. $\left(32^{2/5}\right)^2$

2. $\left(2^{2/3}\right)^{1/4}$

3. $\left(x^3\right)^{1/4}$

4. $\left[(-3)^3\right]^{2/9}$

5. $\left(2^{-3}\right)^{1/3}$

6. $\left[\left(\frac{16}{81}\right)^{1/8}\right]^2$

7. $\left(\frac{1}{3}\right)^{-4}$

8. $\left(B^{Y/X}\right)^{2X/Y}$

9. $\left[(5)^2\right]^{-1/2}$

10. $\left(9^{1/4}\right)^2$

Simplify.

7. $\dfrac{\frac{A}{B}}{\frac{A+B}{AB}} =$

8. $\dfrac{3-\frac{1}{3}}{5+\frac{3}{5}} =$

9. $\dfrac{4+\frac{1}{X}}{5+\frac{X}{X+1}} =$

10. $\dfrac{\frac{X^2+4X-5}{X^2-3X-18}}{\frac{X^2+6X+5}{X^2-8X+12}} =$

11. $\dfrac{Y-\frac{2}{3}}{Y-\frac{1}{4}} =$

12. $\dfrac{\frac{X^4-16}{X^2-5X+4}}{\frac{X^2-4}{X^2+3X-28}} =$

Rewrite using fractional exponents, and then simplify.

5. $\sqrt[3]{\sqrt{x}}$

6. $\left(\sqrt[3]{27}\right)^2$

7. $\sqrt{\sqrt[4]{16}}$

8. $\left(\sqrt{25}\right)^4$

Find the factors.

9. $x^2 - 5x - 14$

10. $25x^2 - 1$

11. $2x^2 - 5x - 3$

12. $\frac{1}{9}x^2 - \frac{36}{25}$

SYSTEMATIC REVIEW

6E

Simplify.

1. $(49^{1/2})^3$

2. $(125)^{4/3}$

3. $(1{,}000^{5/3})$

4. $(-32^{3/5})^2$

Rewrite using fractional exponents, and then simplify.

5. $\sqrt{\sqrt{81}}$

6. $(\sqrt{36})^3$

7. $\sqrt{\sqrt[4]{x^8}}$

8. $(\sqrt[3]{1000})^{-5}$

Find the factors.

9. $x^2 - 4x + 4$

10. $x^2 + 10x + 25$

11. $x^2 - 12x + 36$

12. $3x^2 + 14x - 5$

Solve by factoring to find the roots, and then check your answers in the original equation.

13. $42 - 3X^2 = 15X$

14. $X^2 - 25 = X - 5$

Combine.

15. $\frac{8}{3X} - \frac{2}{2X} - \frac{5}{6X^2} =$

16. $\frac{X-3}{X-2} - \frac{4X+3}{X^2-4} - \frac{X+3}{X+2} =$

17. $\frac{\frac{1}{9} - \frac{X}{3}}{\frac{X}{12} + \frac{5}{8}} =$

18. $\frac{X^2-6X-16}{X+2} \div \frac{X^2-8X+16}{X-4} =$

Simplify.

19. $\frac{\sqrt{5}}{\sqrt{3}}$

20. $\frac{1}{\sqrt{7}} - \frac{2}{\sqrt{8}}$

1) $\frac{1}{9}x^2 - \frac{36}{25}$

2) $\frac{x^3 - x}{2x^2 + 12x + 18} \div \frac{x^2 + 2x + 1}{x^3 - 9x}$

3) $\frac{6}{\sqrt{2}} - \frac{3}{\sqrt{6}}$

SOLVE FOR X.

4) $42 - 3x^2 = 15x$