Intermediate Algebra (Math 0303)
Practice Test over Rational Exponents, Radicals, Equations with Radicals, & Complex Numbers

#1 Simplify: $\sqrt{68}$

#2 Evaluate: $\left(\frac{8}{125}\right)^{\frac{2}{3}}$

#3 Multiply: $\left(\sqrt{x}+5\right)\left(2\sqrt{x}+3\right)$

#4 Simplify: $\sqrt[3]{24x^3y^7}$

#5 Rationalize: $\frac{2}{\sqrt{3}}$

#6 Rationalize: $\frac{4}{\sqrt{3}+3}$

#7 Multiply: $\left(\sqrt{x}+2\right)\left(\sqrt{x}-2\right)$

#8 Multiply: $\left(\sqrt{x}+2y\right)^3$

#9 Combine: $\sqrt{112x^5y^9} - 2xy^4\sqrt{28x^3y}$

#10 Rationalize: $\dfrac{1}{\sqrt[3]{9x^2}}$

#11 Solve the equation: $\sqrt{x} = \dfrac{2}{5}$

#12 Solve the equation: $\sqrt{x} + 4 = 7$

#13 Solve the equation: $\sqrt{x-3} = 4$

#14 Solve the equation: $2\sqrt{x+11} = -3x$

#15 Solve the equation: $\sqrt{x} - 1 = \sqrt{x-9}$

#16 Evaluate: $\sqrt{-16}$

#17 Simplify: i^{22}

#18 Combine: $(7-3i)-[2-(5+2i)]$

#19 Multiply: $(3+2i)(4-i)$

#20 Rationalize: $\dfrac{5}{4-2i}$

SOLUTIONS

Practice Test over Rational Exponents, Radicals, Equations with Radicals, & Complex Numbers

#1 Simplify: $\sqrt{68}$

$\sqrt{68} = \sqrt{4 \cdot 17} = \sqrt{4} \cdot \sqrt{17} = 2\sqrt{17}$

#2 Evaluate: $\left(\frac{8}{125}\right)^{\frac{2}{3}} = \left(\frac{8^{\frac{1}{3}}}{125^{\frac{1}{3}}}\right)^2 = \left(\frac{\sqrt[3]{8}}{\sqrt[3]{125}}\right)^2 = \left(\frac{2}{5}\right)^2 = \frac{4}{25}$

#3 Multiply: $\left(\sqrt{x}+5\right)\left(2\sqrt{x}+3\right)$

$2\sqrt{x^2} + 3\sqrt{x} + 10\sqrt{x} + 15$

$2x + 13\sqrt{x} + 15$

#4 Simplify: $\sqrt[3]{24x^3y^7}$

$\sqrt[3]{8 \cdot 3x^3y^6y}$

$2xy^2\sqrt[3]{3y}$

#5 Rationalize: $\frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{\sqrt{9}} = \frac{2\sqrt{3}}{3}$

#6 Rationalize: $\frac{4}{\sqrt{3}+3} \cdot \frac{\sqrt{3}-3}{\sqrt{3}-3} = \frac{4(\sqrt{3}-3)}{3-9} = \frac{4(\sqrt{3}-3)}{-6} = \frac{-2(\sqrt{3}-3)}{3}$

#7 Multiply: $\left(\sqrt{x}+2\right)\left(\sqrt{x}-2\right)$

$x - 4$

Use the difference of squares rule:

$(a + b)(a - b) = a^2 - b^2$

Use the binomial square rule:
$(a \pm b)^2 = (a^2 \pm 2ab + b^2)$

#8 Multiply:

$$\left(\sqrt{x}+2y\right)^3 = \left(\sqrt{x}+2y\right)^2\left(\sqrt{x}+2y\right)$$
$$\left(x+2\cdot 2y\sqrt{x}+4y^2\right)\left(\sqrt{x}+2y\right)$$
$$\left(x+4y\sqrt{x}+4y^2\right)\left(\sqrt{x}+2y\right)$$
$$x\sqrt{x}+2xy+4y\sqrt{x^2}+8y^2\sqrt{x}+4y^2\sqrt{x}+8y^3$$
$$x\sqrt{x}+2xy+4xy+12y^2\sqrt{x}+8y^3$$
$$x\sqrt{x}+6xy+12y^2\sqrt{x}+8y^3$$

#9 Combine:

$$\sqrt{112x^5y^9}-2xy^4\sqrt{28x^3y}$$
$$\sqrt{16\cdot 7x^4xy^8y}-2xy^4\sqrt{4\cdot 7x^2xy}$$
$$4x^2y^4\sqrt{7xy}-2xy^4\cdot 2x\sqrt{7xy}$$
$$4x^2y^4\sqrt{7xy}-4x^2y^4\sqrt{7xy}$$
$$0x^2y^4\sqrt{7xy}$$
$$0$$

#10 Rationalize:

$$\frac{1}{\sqrt[3]{9x^2}}\cdot\frac{\sqrt[3]{3x}}{\sqrt[3]{3x}}=\frac{\sqrt[3]{3x}}{\sqrt[3]{27x^3}}=\frac{\sqrt[3]{3x}}{3x}$$

#11 Solve the equation:

$$\sqrt{x}=\frac{2}{5}$$
$$\left(\sqrt{x}\right)^2=\left(\frac{2}{5}\right)^2$$
$$x=\frac{4}{25}$$

#12 Solve the equation:

$$\sqrt{x}+4=7$$
$$\left(\sqrt{x}+4\right)^2=(7)^2$$
$$x+8\sqrt{x}+16=49$$
$$x+8\sqrt{x}=33$$
$$\left(8\sqrt{x}\right)^2=(33-x)^2$$
$$64x=1089-66x+x^2$$
$$x^2-66x-64x+1089=0$$
$$x^2-130x+1089=0$$
$$(x-121)(x-9)=0$$
$$x-121=0,\ x-9=0$$
$$x=121,\ x=9$$

x = 9

Check:

$$\sqrt{121}+4\neq 7$$
$$11+4\neq 7$$

Check:

$$\sqrt{9}+4=7$$
$$3+4=7$$

#13 Solve the equation:

$$\sqrt{x-3}=4$$
$$\left(\sqrt{x-3}\right)^2=4^2$$
$$x-3=16$$
$$x=19$$

x = 19

Check:

$$\sqrt{19-3}=4$$
$$\sqrt{16}=4$$

#14 Solve the equation:

$$2\sqrt{x+11}=-3x$$
$$\left(2\sqrt{x+11}\right)^2=(-3x)^2$$
$$4(x+11)=9x^2$$
$$4x+44=9x^2$$
$$9x^2-4x-44=0$$
$$(9x-22)(x+2)=0$$
$$9x-22=0,\ x+2=0$$
$$x=\frac{22}{9},\ x=-2$$

x = -2

Check:

$$2\sqrt{-2+11}=-3(-2)$$
$$2\sqrt{9}=6$$
$$2\cdot 3=6$$
$$2\sqrt{\frac{22}{9}+11}\neq -3\left(\frac{22}{9}\right)$$
$$2\sqrt{\frac{22}{9}+\frac{99}{9}}\neq \frac{-66}{9}$$
$$2\sqrt{\frac{121}{9}}\neq -\frac{22}{3}$$
$$2\cdot\frac{11}{3}\neq -\frac{22}{3}$$
$$\frac{22}{3}\neq -\frac{22}{3}$$

#15 Solve the equation:

$$\left(\sqrt{x}-1\right)^2=\left(\sqrt{x-9}\right)^2$$
$$x-2\sqrt{x}+1=x-9$$
$$-2\sqrt{x}=-10$$
$$\sqrt{x}=5$$
$$\left(\sqrt{x}\right)^2=5^2$$
$$x=25$$

x = 25

Check: $\sqrt{25}-1=\sqrt{25-9}$

$5-1=\sqrt{16}$

$4=4$

#16 Evaluate: $\sqrt{-16}=\sqrt{16\cdot -1}=4i$

#17 Simplify: $i^{22}=\left(i^4\right)^5 i^2=i^2=$ [ ]

Remember that $i^4 = 1$.

#18 Combine:

$$(7-3i)-[2-(5+2i)]$$
$$7-3i-[2-5-2i]$$
$$7-3i-[-3-2i]$$
$$7-3i+3+2i$$
$$7+3-3i+2i$$

10 - i

#19 Multiply: $(3+2i)(4-i)=12-3i+8i-2i^2=12+5i-2(-1)=12+5i+2=$ 14 + 5i

#20 Rationalize: $\frac{5}{4-2i}\cdot\frac{4+2i}{4+2i}=\frac{20+10i}{16-4i^2}=\frac{10(2+i)}{16-4(-1)}=\frac{10(2+i)}{16+4}=\frac{10(2+i)}{20}=$ $\frac{2+i}{2}$