HW: Sage Practice #1

Name_____

1. Which is equivalent to $(7^4)^{\frac{1}{4}}$

(A) $\sqrt[4]{7} \approx 1.6$

(B) $\sqrt[4]{28} \approx 2.3$

(C) $\sqrt[4]{7^4} = 7$

(D) $\frac{7^4}{4} = 600.25$

2.

An expression is shown.

$$9^{\frac{1}{3}}$$

Find the equivalent expression.

(A) 729

(B) 27

(C) $\sqrt[2]{9}$

(D) $\sqrt[3]{9}$

3. Which expression is equivalent to $32x^{\frac{1}{5}}$?

(A) $2\sqrt[5]{x}$

(B) $32\sqrt[5]{x}$

(C) $\frac{161}{5}\sqrt[5]{x}$

(D) $\frac{32}{5}\sqrt[5]{x}$

4.

Which expression is equivalent to $(\sqrt{8})^{\frac{1}{3}}$?

(A) $\sqrt[3]{8}$

(B) $\sqrt[6]{8}$

(C) $\sqrt{512}$

(D) $\sqrt[6]{32678}$

5.

Which expression is equivalent to $\left(x^{\frac{1}{2}}\right)^2$?

(A) $2x$

(B) $2x^{\frac{1}{2}}$

(C) $x^{\frac{1}{4}}$

(D) x

6.

Which expression is equivalent to $\left(a^{\frac{2}{3}}\right)\left(a^{\frac{1}{2}}\right)$?

(A) $a^{\frac{1}{3}}$

(B) $a^{\frac{7}{6}}$

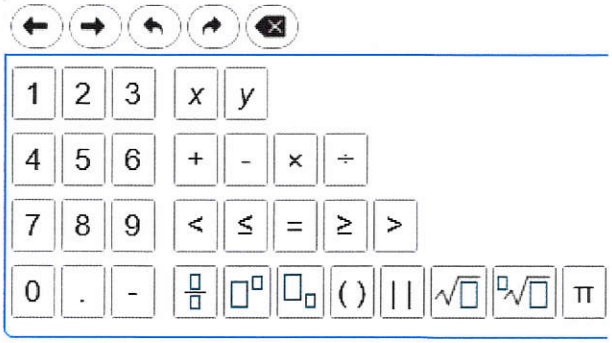
(C) $2a^{\frac{1}{3}}$

(D) $2a^{\frac{7}{6}}$

7. Use properties of radicals to write an expression that is equivalent to

$$\sqrt[3]{27x^{-3}y^6}$$

using only positive exponents.



8. Which expression is equivalent to $\sqrt{2} \cdot 2^{\frac{1}{3}} - 3\sqrt[6]{2} \cdot 2^{\frac{2}{3}}$

(A) $\sqrt{2} \cdot 2^{\frac{1}{3}}(1 - 3 \cdot 2^{\frac{1}{3}})$

(B) $2^{\frac{1}{6}} - 3 \cdot 2^{\frac{1}{9}}$

(C) $-2\sqrt[6]{2}$

(D) $-2^{\frac{11}{6}}$

9. Circle all expressions that are equivalent to 24.

$6\sqrt{2}$ $(2\sqrt{6})^2$ $\sqrt{\frac{48}{2}}$

$\frac{(4\sqrt{6})^2}{4}$ $(\sqrt{24})^{\frac{1}{2}}$ $(24^{\frac{1}{3}})^3$

10. Which equation is equivalent to $3y^{\frac{1}{3}} = -\frac{1}{x}$?

(A) $y = \sqrt[3]{-\frac{1}{27x}}$

(B) $y = -\frac{1}{27x^3}$

(C) $y = -\frac{1}{3x}$

(D) $y = -\frac{1}{x}$

11. Which is equivalent to the expression: $\frac{35a^2b^6}{7a^{\frac{3}{2}}b^4c^3}$?

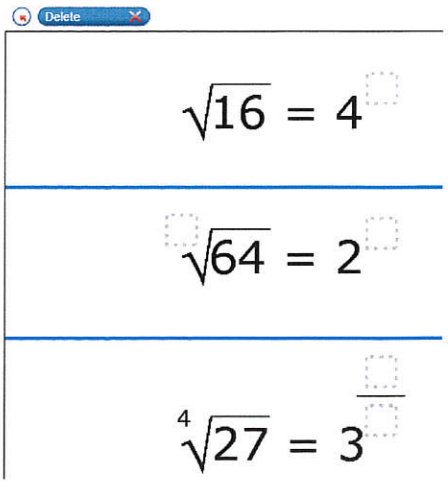
(A) $5a^{\frac{-1}{2}}b^2c^3$

(B) $5a^{\frac{1}{2}}b^2c^{-3}$

(C) $5a^{\frac{1}{2}}b^2c^3$

(D) $28a^{\frac{1}{2}}b^2c^3$

12. Place a number from 0-9 in each box to make the equation true.



13. Select all expressions that are equivalent to $4^{\frac{3}{2}}$

$(4^2)^{\frac{1}{3}}$	$(4^{\frac{1}{2}})^3$	$\sqrt[3]{4^2}$
$(\sqrt[3]{4})^2$	8	$\sqrt{4^3}$
$(4^3)^{\frac{1}{2}}$	$(\sqrt{4})^3$	$(4^{\frac{1}{3}})^2$

14. Express $\sqrt[3]{x^2}$ using rational exponents. Place a positive or negative sign in the circle and one digit (0-9) in each box to make the equation true.

Complete the equation to make it true.

$$\sqrt[3]{x^2} = x^{\bigcirc \frac{\square}{\square}}$$

15. Place one number in each box so the simplified expression will be an integer. Then simplify the expression in part A. Place one number in the box to show the integer resulting from this simplification.

A. Expression

$$\square^{\frac{1}{\square}}$$

B. Evaluate the expression from Part A.

$\square$

16. Simplify $\sqrt{18} \cdot 2^{\frac{5}{2}}$

(A) $4\sqrt{18} \cdot \sqrt{2}$

(B) $8\sqrt{3}$

(C) $3 \cdot 2^{\frac{5}{4}}$

(D) 24

17. A. Select the expressions that are equivalent to $25^{\frac{3}{2}}$. B. Choose digits to fill the boxes to show the value of $25^{\frac{3}{2}}$. You do not need to use all the boxes.

A.

$\sqrt{25^3}$	$\sqrt[2]{25^3}$	$\sqrt[3]{5^2}$
$\sqrt[3]{25^2}$	$\sqrt[25]{3^2}$	5^3

B.

$$25^{\left(\frac{3}{2}\right)} = \square\square\square\square$$

18. Which expression represents an irrational number?

(A) $\frac{3}{17} + \sqrt{\left(\frac{6}{13}\right)^2}$

(B) $\sqrt{\frac{4}{9}} + \frac{5}{12}$

(C) $4 + \sqrt{2}$

(D) $\sqrt{4} + \sqrt{9}$

19.

Which statement is always true?

(A) The product of two irrational numbers is irrational.

(B) The sum of two rational numbers can be rational or irrational.

(C) The product of a non-zero rational number and an irrational number is irrational.

(D) The sum of a rational number and an irrational number can be rational or irrational.

20.

Which expression is a rational number?

(A) 2π

(B) $2-\sqrt{2}$

(C) $\dfrac{\sqrt[3]{2}^{2}}{\sqrt{2}^{3}}$

(D) $2\sqrt{2}-\sqrt{8}$

21. A ball is dropped from 5,000 meters above ground. The distance it has fallen after t seconds is expressed as $4.9t^2$. Which expression represents the height of the ball after t seconds?

(A) $-5000+4.9t^2$

(B) $-4.9t^2$

(C) $5000-4.9t^2$

(D) $5000+4.9t^2$

22. For the quadratic expression $3x^2 + 5x - 8$, identify each part as a term, coefficient, or factor by placing it in the correct column. If an expression does not fit into one of the descriptions, leave it in the gray area.

Term	Factor	Coefficient

3	$3x^2$	$3x^2 + 5x$
$3x + 8$	5	$5x$
$5x - 8$	$x - 1$	

23. Simplify.

$$(x^2+2x-1)(x-2)+x^2-3x+2$$

(A) $2x^2-1$

(B) $4x^2-3x+4$

(C) x^3+x^2-8x+4

(D) x^3-5x+2

24. Under which operations is the set of all polynomials closed?

Ⓐ addition, subtraction, and division

Ⓑ addition, multiplication, and division

Ⓒ subtraction, multiplication, and division

Ⓓ addition, subtraction, and multiplication

25.

Find the product.

$(9x-6)(6x^2+2x-3)$

Ⓐ $54x^3-12x-3$

Ⓑ $36x^3-39x+18$

Ⓒ $54x^3-18x^2-39x+18$

Ⓓ $54x^3+54x^2-15x-18$

26.

Evaluate $(x^2+2x-1)\cdot(x^2+5x-3)$.

Ⓐ $2x^2+7x-4$

Ⓑ x^4+10x^2+3

Ⓒ x^4+3x^2-x+3

Ⓓ $x^4+7x^3+6x^2-11x+3$

27.

Calculate.

$(3x-2)^2-(9x+1)(x-3)$

Ⓐ 7

Ⓑ $-38x+1$

Ⓒ $14x+7$

Ⓓ $26x-1$

28.

Subtract $10x^2-8$ from $16x^2+2$.

Ⓐ $6x^2+10$

Ⓑ $6x^2-6$

Ⓒ $-6x^2-6$

Ⓓ $-6x^2-10$

29.

Which is equal to $\sqrt{-36}$?

Ⓐ 6

Ⓑ $6i$

Ⓒ $i\sqrt{6}$

Ⓓ $\sqrt{6i}$

30. Which is the standard expression of a complex number with real part 5 and imaginary part -3?

Ⓐ $(5,-3)$

Ⓑ $(5,-3i)$

Ⓒ $5+3i$

Ⓓ $5-3i$

31. Evaluate $3(2-7i)+4i$

Place one digit 0-9 in each box and a positive or negative in the circle to complete your answer.

□□○□□i

32.

What is the product of $(2 - 4i)(3 + i)$?

Ⓐ $2 - 10i$

Ⓑ $2 + 14i$

Ⓒ $10 - 10i$

Ⓓ $10 + 14i$

33.

Write the expression $\frac{(1+i)^2}{i^3}$ in $a + bi$ form.

Ⓐ $2i$

Ⓑ -2

Ⓒ 2

Ⓓ 0

34. Select all the expressions that are equivalent to $4i$.

- ○ $(3 + 2i) - (3 + 2i)$
- ○ $(2i)^2 i^3$
- ○ $(2 + 2i) - (2 - 2i)$
- ○ $2(2 + i)$
- ○ $(1 + i)(2 + 2i)$

35. What two complex numbers have a sum of 4 and a product of 29? Enter each number on separate lines.

36.

What is one solution to the equation $x^2 + 6x + 10 = 0$?

37.

What is the solution set for the given equation?

$x^2 - 4x + 4 = -5$

Ⓐ $-2 - \sqrt{5}$ and $-2 + \sqrt{5}$

Ⓑ $-2 - i\sqrt{5}$ and $-2 + i\sqrt{5}$

Ⓒ $2 - \sqrt{5}$ and $2 + \sqrt{5}$

Ⓓ $2 - i\sqrt{5}$ and $2 + i\sqrt{5}$

38.

Given:

- $ax^2 + bx + c = 0$, with $b = 2$ and $c = 4$.
- The solutions to the equation are $x = \frac{-1 + i\sqrt{11}}{3}$ and $x = \frac{-1 - i\sqrt{11}}{3}$.

What is the value of a?

39. Kayla used the quadratic formula to solve the equation shown. $2x^2 + 2 = 0$

Place operation symbols in the circles and digits in the boxes to show the solutions to this equation in a + bi form.

$$2x^2 + 2 = 0$$

$x =$ ☐ ○ ☐ i **or** $x =$ ☐ ○ ☐ i

40.

What are the roots of $x^2 - 4x + 5$?

Ⓐ 1 and 3

Ⓑ 3 and 5

Ⓒ $2 + i$ and $2 - i$

Ⓓ $2 + 2i$ and $2 - 2i$

41.

Factor the expression shown.

$$x^8 - y^8$$

Ⓐ $(x^4 - y^4)(x^4 + y^4)$

Ⓑ $(x^2 - y^2)(x^2 + y^2)(x^4 + y^4)$

Ⓒ $(x - y)(x + y)(x^2 + y^2)(x^4 + y^4)$

Ⓓ This expression cannot be factored.

42. Factor $2x^2 + 24x + 64$ completely.

Ⓐ $(x + 4)(2x + 16)$

Ⓑ $2(x + 4)(x + 8)$

Ⓒ $(2x + 8)(x + 8)$

Ⓓ $2(x + 2)(x + 16)$

43.

What are the factors of the expression $x^2 + 4x - 21$?

Ⓐ $(x - 3)$ and $(x - 7)$

Ⓑ $(x - 3)$ and $(x + 7)$

Ⓒ $(x + 3)$ and $(x - 7)$

Ⓓ $(x + 3)$ and $(x + 7)$

44. What are the zeros of $y = x^2 + 4x - 5$?

Ⓐ $x = -1$ and $x = -5$

Ⓑ $x = -1$ and $x = 5$

Ⓒ $x = 1$ and $x = -5$

Ⓓ $x = 1$ and $x = 5$

45. What is the factored form of $x^2 + 9$?

Ⓐ $(x + 3i)(x + 3i)$

Ⓑ $(x - 3)(x + 3)$

Ⓒ $(x + 3i)(x - 3i)$

Ⓓ $(x + 9)(x - 9)$

46. A quadratic equation is shown.

$$x^2 + 8x + 25 = 0$$

Complete the square to rewrite this equation in the form $(x - p)^2 = q$.

Ⓐ $(x + 4)^2 = -9$

Ⓑ $(x - 4)^2 = 0$

Ⓒ $(x + 5)^2 = 2$

Ⓓ $(x + 4)^2 = 41$

47.

What are the solutions to $3x^2 - 2x + 1 = 0$?

Ⓐ $1 \pm i\sqrt{2}$

Ⓑ $\frac{1}{3} \pm i\sqrt{2}$

Ⓒ $\frac{1}{3} \pm \frac{1}{3}i\sqrt{2}$

Ⓓ $\frac{1}{3} \pm \frac{2}{3}i\sqrt{2}$

48.

Which equation has two complex solutions?

Ⓐ $x^2 - 4x = -3$

Ⓑ $2x^2 - 4x + 2 = 0$

Ⓒ $2x^2 - 4x + 7 = 0$

Ⓓ $4x^2 + 6x + 1 = 0$

49.

What are the solutions to the equation $x^2 - 5x + 4 = -2$?

Ⓐ $x = -4$ and $x = -1$

Ⓑ $x = -3$ and $x = -2$

Ⓒ $x = 3$ and $x = 2$

Ⓓ $x = 4$ and $x = 1$

50.

James wants to solve this quadratic equation by completing the square.

$$x^2 - 6x + 3 = 0$$

His first step in solving the equation by this method is as follows:

$$\begin{aligned} x^2 - 6x + 3 &= 0 \\ x^2 - 6x &= -3 \end{aligned}$$

What are the next two steps to solve using this method?

Ⓐ $\begin{aligned} x^2 - 6x - 9 &= -12 \\ (x-3)^2 &= -12 \end{aligned}$

Ⓑ $\begin{aligned} x^2 - 6x + 9 &= 6 \\ (x-3)^2 &= 6 \end{aligned}$

Ⓒ $\begin{aligned} x^2 - 6x + 9 &= 6 \\ (x+3)^2 &= 6 \end{aligned}$

Ⓓ $\begin{aligned} x^2 - 6x + 9 &= -3 \\ (x+3)^2 &= -3 \end{aligned}$

51. Find the zeroes of $f(x) = 2x^2 - 5x - 12$.

$x = \square \frac{\square}{\square}$ or $x = \square \frac{\square}{\square}$