Name Teacher Key Date _____ Class _____

# Final Exam Review: Chapter 6

## Section 1 - Integer Exponents

**Simplify.**

1. $5^{-3} = \frac{1}{5^3} = \boxed{\frac{1}{125}}$

2. $2^{-6} = \frac{1}{2^6} = \boxed{\frac{1}{64}}$

3. $(-5)^{-2} = \frac{1}{(-5)^2} = \boxed{\frac{1}{25}}$

4. $-(4)^{-3}$ $-\left(\frac{1}{(4)^3}\right) = -\left(\frac{1}{64}\right) = \boxed{\frac{-1}{64}}$

5. $-6^0 = \boxed{1}$

6. $(7)^{-2} = \frac{1}{(7)^2} = \boxed{\frac{1}{49}}$

**Evaluate each expression for the given value(s) of the variable(s).**

7. $d^{-3}$ for $d = -2$

$(-2)^{-3} = \frac{1}{(-2)^3} = \boxed{\frac{1}{-8}}$

8. $a^5b^{-6}$ for $a = 3$ and $b = 2$

$(3)^5(2)^{-6}$

$243\left(\frac{1}{2^6}\right)$

$243\left(\frac{1}{64}\right) = \boxed{\frac{243}{64}}$

9. $(b - 4)^{-2}$ for $b = 1$

$(1-4)^{-2}$

$(-3)^{-2} = \frac{1}{(-3)^2} = \boxed{\frac{1}{9}}$

10. $5z^{-x}$ for $z = -3$ and $x = 2$

$5(-3)^{-(2)}$

$5\left(\frac{1}{(-3)^2}\right) = 5\left(\frac{1}{9}\right)$

$= \boxed{\frac{5}{9}}$

11. $(5z)^{-x}$ for $z = -3$ and $x = 2$

$(5\cdot(-3))^{-(2)}$

$(-15)^{-2}$

$\frac{1}{(-15)^2} = \boxed{\frac{1}{225}}$

12. $c^{-3}(16^{-2})$ for $c = 4$

$(4)^{-3}\left(\frac{1}{16^2}\right)$

$\left(\frac{1}{43}\right)\left(\frac{1}{256}\right)$

$\left(\frac{1}{64}\right)\left(\frac{1}{256}\right) = \boxed{\frac{1}{16384}}$

Name _____ Date _____ Class _____

**Simplify.**

13. $t^{-4}$

$\frac{1}{t^4}$

14. $3r^{-5}$

$\frac{3}{r^5}$

15. $\frac{s^{-3}}{t^{-5}}$

$\frac{t^5}{s^3}$

16. $\frac{h^0}{3} = \frac{1}{3}$

17. $\frac{2x^{-3}y^{-2}}{z^4}$

$\frac{2}{x^3y^2z^4}$

18. $\frac{4fg^{-5}}{5h^{-3}}$

$\frac{4fh^3}{5g^5}$

19. $\frac{14a^{-4}}{20bc^{-1}}$

$\frac{7 \cdot 14c^1}{10 \cdot 20a^4b}$

$\frac{7c}{10a^4b}$

20. $\frac{a^4c^2e^0}{b^{-1}d^{-3}}$

$ab^1c^2d^3(1)$

$abc^2d^3$

21. $\frac{-3g^{-2}hk^{-2}}{-6h^0}$

$\frac{-3h}{2 \cdot g^2k^2}$

$\frac{h}{2g^2k^2}$

Name_____ Date _____ Class_____

## Section 2 - Rational Exponents

**Simplify each expression. All variables represent nonnegative numbers.**

1. $27^{\frac{1}{3}}$

$\sqrt[3]{27^1}$

$\sqrt[3]{27}$

9 3

3 3

$\boxed{3}$

2. $121^{\frac{1}{2}}$

$\sqrt[2]{121^1}$

$\sqrt{121}$

11 11

$\boxed{11}$

3. $0^{\frac{1}{3}}$

$\sqrt[3]{0^1}$

$\sqrt[3]{0}$ ← special case!

0 0 0

$\boxed{0}$

4. $64^{\frac{1}{2}} + 27^{\frac{1}{3}}$

$\sqrt[2]{64^1} + \sqrt[3]{27^1}$

$\sqrt{64}$ $\sqrt[3]{27}$

8 8 9 3

4 2 2 2 3 3

$8 + 3 = \boxed{11}$

5. $16^{\frac{1}{4}} + 8^{\frac{1}{3}}$

$\sqrt[4]{16^1} + \sqrt[3]{8^1}$

$\sqrt[4]{16}$ $\sqrt[3]{8}$

8 2 4 2

4 2 2 2 2

$2 + 2 = \boxed{4}$

6. $100^{\frac{1}{2}} - 64^{\frac{1}{6}}$

$\sqrt[2]{100^1} - \sqrt[6]{64^1}$

$\sqrt{100}$ $\sqrt[6]{64}$

10 10 8 8

2 5 2 5 4 2 4 2

2 2 2 2

$10 - 2 = \boxed{8}$

7. $1^{\frac{1}{5}} + 49^{\frac{1}{2}}$

special case ↓

$\sqrt[5]{1^1} + \sqrt[2]{49^1}$

$\sqrt[5]{1}$ $\sqrt{49}$

1 1 1 1 1 7 7

$1 + 7$

$\boxed{8}$

8. $25^{\frac{3}{2}}$ exponent

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

$\sqrt{25^3}$

1

25 25 25

5 5 5 5 5 5

$\boxed{125}$

9. $32^{\frac{3}{5}}$

$\sqrt[5]{32^3}$

1

32 32 32

8 4 16 2 8 4

4 2 2 2 8 2 4 2 2 2

4 2 2 2

2 2

$\boxed{8}$

Name _____ Date _____ Class _____

10. $16^{\frac{3}{4}}$

$\sqrt[4]{16^3}$

16 16 16 4 4

8 2 4 4 2 2 2 2 2 2

2 2

8

11. $1^{\frac{5}{6}}$

$\sqrt[6]{1^5}$ special case

1

12. $121^{\frac{3}{2}}$

$\sqrt[2]{121^3}$

$\sqrt{121^3}$

121 121 121

11 11 11 11 11 11

1331

13. $\sqrt[5]{y^5}$

yyyyy

y

14. $\sqrt{x^4y^{12}}$

xxxx yyyyyy yyyyyy

$x \cdot x \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y$

$x^2y^6$

15. $\sqrt[3]{a^6b^3}$

aaa aaa bbb

$a^2b$

16. $(x^{\frac{1}{2}})^4\sqrt{x^6}$

$\sqrt[2]{x^1} \cdot \sqrt{x^6}$

$(\sqrt{x})^4 \cdot \sqrt{x^6}$

$\sqrt{x}$ $\sqrt{x}$ $\sqrt{x}$ xx xx xx

$\sqrt{x} \cdot \sqrt{x} \cdot x \cdot x \cdot x$

$\sqrt{x^2}$

$x^4$

17. $(x^{\frac{1}{3}}y)^3\sqrt{x^2y^2}$

xx yy

$x^{\frac{3}{3}}y^3$

$x^1y^3$

$xy^3$

$x^2y^4$

18. $\frac{(x^{\frac{1}{4}})^8}{\sqrt[3]{x^3}}$

x xx $\frac{8}{4}$

$\frac{x}{x}$

$\frac{x^2}{x} = x$

Name _____ Date _____ Class _____

## Section 3 - Polynomials

**Find the degree and number of terms of each polynomial.**

1. $14h^3 + 2h + 10$

degree: 3 (cubic)

terms: 3

2. $7y - 10y^2$

degree: 2 (quadratic)

terms: 2

3. $2a^2 - 5a + 34 - 6a^4$

degree: 4 (quartic)

terms: 4

**Write each polynomial in standard form. Then, give the leading coefficient.**

4. $3x^2 - 2 + 4x^8 - x$

$= \boxed{4}x^8 + 3x^2 - x - 2$

LC

5. $7 - 50j + 3j^3 - 4j^2$

$= \boxed{3}j^3 - 4j^2 - 50j$

LC

6. $6k + 5k^4 - 4k^3 + 3k^2$

$= \boxed{5}k^4 - 4k^3 + 3k^2 + 6k$

LC

**Classify each polynomial by its degree and number of terms.**

7. $-5t^2 + 10$

quadratic

8. $8w - 32 + 9w^4$

quartic

9. $b - b^3 - 2b^2 + 5b^4$

quartic

**Evaluate each polynomial for the given value.**

10. $3m + 8 - 2m^3$ for $m = -1$

$3(-1) + 8 - 2(-1)^3 = +3(-1) + 8 - 2(-1) = -3 + 8 + 2 = \boxed{7}$

E M M A A

11. $4y^5 - 6y + 8y^2 - 1$ for $y = -1$

$4(-1)^5 - 6(-1) + 8(-1)^2 - 1 = 4(-1) - 6(-1) + 8(1) - 1 =$

E E M M M

$= -4 + 6 + 8 - 1 = \boxed{9}$

12. $2w + w^3 - \frac{1}{2}w^2$ for $w = 2$

$2(2) + (2)^3 - \frac{1}{2}(2)^2 = 2(2) + 8 - \frac{1}{2}(4) = 4 + 8 - 2$

E E M M

$\boxed{10}$

Name_____ Date _____ Class_____

13. An egg is thrown off the top of a building. Its height in meters above the ground can be approximated by the polynomial $300 + 2t - 4.9t^2$, where $t$ is the time since it was thrown in seconds.

a. How high is the egg above the ground after 5 seconds? $t = 5$

$300 + 2(5) - 4.9(5)^2$ (E)

$300 + 2(5) - 4.9(25)$ (M)

$300 + 10 - 122.5 =$ **187.5 meters**

b. How high is the egg above the ground after 6 seconds? $t = 6$

$300 + 2(6) - 4.9(6)^2$ (E)

$300 + 2(6) - 4.9(36)$ (M)

$300 + 12 - 176.4 =$ **135.6 meters**

## Section 4 - Adding and Subtracting Polynomials

**Add or subtract.**

1. $3m^3 + 8m^3 - 3 + m^3 - 2m^2$ $12m^3 - 2m^2 - 3$

2. $2pg - p^5 - 12pg + 5g - 6p^5$ $-7p^5 - 10pg + 5g$

Name_____ Date _____ Class_____

**Add.**

3. $3k^2 - 2k + 7$
$+ \quad k - 2$

$3k^2 - k + 5$

4. $5x^2 - 2x + 3y$
$+ 6x^2 + 5x + 6y$

$11x^2 + 3x + 9y$

5. $11hz^3 + 3hz^2 + 8hz$
$+ 9hz^3 + hz^2 - 3hz$

$20hz^3 + 4hz^2 + 5hz$

6. $(ab^2 + 13b - 4a) + (3ab^2 + a + 7b)$

$4ab^2 + 20b - 3a$

7. $(4x^3 - x^2 + 4x) + (x^3 - x^2 - 4x)$

$5x^3 - 2x^2$

**Subtract.**

8. $12d^2 + 3dx + x$
$-(-4d^2 + 2dx - 8x)$

$12d^2 + 3dx + x$
$+ \quad 4d^2 - 2dx + 8x$
$16d^2 + dx + 9x$

9. $2v^5 - 3v^4 - 8$
$-(3v^5 + 2v^4 - 8)$

$2v^5 - 3v^4 - 8$
$+ \quad -3v^5 - 2v^4 + 8$
$-v^5 - 5v^4$

10. $-y^4 + 6ay^2 - y + a$
$-(-6y^4 - 2ay^2 + y)$

$-y^4 + 6ay^2 - y + a$
$+ \quad 6y^4 + 2ay^2 - y$
$5y^4 + 8ay^2 - 2y + a$

11. $(-r^2 + 8pr - p) - (-12r^2 - 2pr + 8p)$

$-r^2 + 8pr - p + 12r^2 + 2pr - 8p$

$11r^2 + 10pr - 9p$

12. $(un - n^2 + 2un^3) - (3un^3 + n^2 + 4un)$

$un - n^2 + 2un^3 - 3un^3 - n^2 - 4un$

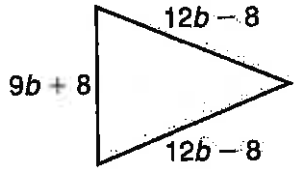
$-2n^2 - un^3 - 3un$

Name _____ Date _____ Class _____

$9b+8 + 12b-8+12b-8$

$33b - 8$

13. Antoine is making a banner in the shape of a triangle. He wants to line the banner with a decorative border. How long will the border be?




14. Darnell and Stephanie have competing refreshment stand businesses. Darnell's profit can be modeled with the polynomial $c^2 + 8c - 100$, where $c$ is the number of items sold. Stephanie's profit can be modeled with the polynomial $2c^2 - 7c - 200$.

a. Write a polynomial that represents the difference between Stephanie's profit and Darnell's profit.

$(2c^2-7c-200) - (c^2+8c-100)$

$2c^2-7c-200 - c^2-8c+100$

$c^2-15c-100$

b. Write a polynomial to show how much they can expect to earn if they decided to combine their businesses.

$2c^2-7c-200 + c^2+8c-100$

$3c^2+1c-300$

$3c^2+c-300$

Name _____ Date _____ Class _____

## Section 5 - Multiplying Polynomials

**Multiply.**

1. $(6m^4)(8m^2)$

$48m^6$

2. $(5x^3)(4xy^2)$

$20x^4y^2$

3. $(10s^5t)(7st^4)$

$70s^6t^5$

4. $4(x^2+5x+6)$

$4x^2+20x+24$

5. $2x(3x-4)$

$6x^2-8x$

6. $7xy(3x^2+4y+2)$

$21x^3y+28xy^2+14xy$

7. $(x+3)(x+4)$

$x^2+4x+3x+12$

$x^2+7x+12$

8. $(x-6)(x-6)$

$x^2-6x-6x+36$

$x^2-12x+36$

9. $(x-2)(x-5)$

$x^2-5x-2x+10$

$x^2-7x+10$

10. $(2x+5)(x+6)$

$2x^2+12x+5x+30$

$2x^2+17x+30$

11. $(m^3+3)(5m+n)$

$5m^4+m^3n+15m+3n$

12. $(a^2+b^2)(a+b)$

$a^3+a^2b+b^2a+b^3$

13. $(x+4)(x^2+3x+5)$

$x^3+3x^2+5x$

$+4x^2+12x+20$

$x^3+7x^2+17x+20$

14. $(3m+4)(m^2-3m+5)$

$3m^3-9m^2+15m$

$4m^2-12m+20$

$3m^3-5m^2+3m+20$

15. $(2x-5)(4x^2-3x+1)$

$8x^3-6x^2+2x$

$-20x^2+15x-5$

$8x^3-26x^2+17x-5$

16. **The length of a rectangle is 3 inches greater than the width** (Hint: (x + 3) is the length, and x is the width).

a. Write a polynomial that represents the area of the rectangle.

$A = LW = x(x+3) = x^2+3x$

b. Find the area of the rectangle when the width is 4 inches.

$x = 4$

$A = x^2+3x = 4^2+3(4)$

$16+12$

$28 in^2$

Name _____ Date _____ Class _____

17. **The length of a rectangle is 8 centimeters less than 3 times the width.** $L = 3W$, $W$ = width.

a. Write a polynomial that represents the area of the rectangle.

$A = LW = W(3W - 8)$

$= 3W^2 - 8W$

b. Find the area of the rectangle when the width is 10 centimeters. $W = 10$

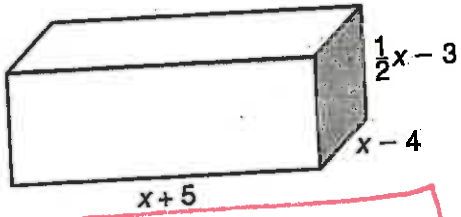
$= 3W^2 - 8W$

$= 3(10)^2 - 8(10)$

$= 3(100) - 8(10)$

$= 300 - 80 = 220\text{cm}^2$

18. Write a polynomial to represent the volume of the rectangular prism.




$V = LWH$

$= [(x+5)(x-4)]\left(\frac{1}{2}x - 3\right)$

$= x^2 - 4x + 5x - 20$

$(x^2 + x - 20)\left(\frac{1}{2}x - 3\right)$

$= \frac{1}{2}x^3 + \frac{1}{2}x^2 - 10x - 3x^2 - 3x + 60$

$= \frac{1}{2}x^3 - \frac{5}{2}x^2 - 13x + 60$

## Section 6 - Special Products of Binomials

**Multiply.**

1. $(x + 2)^2$

$(x+2)(x+2)$

$x^2 + 2x + 2x + 4$

$x^2 + 4x + 4$

2. $(m + 4)^2$

$(m+4)(m+4)$

$m^2 + 4m + 4m + 16$

$m^2 + 8m + 16$

3. $(3 + a)^2$

$(3+a)(3+a)$

$9 + 3a + 3a + a^2$

$a^2 + 6a + 9$

4. $(2x + 5)^2$

$(2x+5)(2x+5)$

$4x^2 + 10x + 10x + 25$

$4x^2 + 20x + 25$

5. $(3a + 2)^2$

$(3a+2)(3a+2)$

$9a^2 + 6a + 6a + 4$

$9a^2 + 12a + 4$

6. $(6 + 5b)^2$

$(6+5b)(6+5b)$

$36 + 30b + 30b + 25b^2$

$25b^2 + 60b + 36$

Name _____ Date _____ Class _____

7. $(b-3)^2$

$(b-3)(b-3)$

$b^2-3b-3b+9$

$b^2-6b+9$

8. $(8-y)^2$

$(8-y)(8-y)$

$64-8y-8y+y^2$

$64-16y+y^2$

9. $(a-10)^2$

$(a-10)(a-10)$

$a^2-10a-10a+100$

$a^2-20a+100$

10. $(3x-7)^2$

$(3x-7)(3x-7)$

$9x^2-21x-21x+49$

$9x^2-42x+49$

11. $(4m-9)^2$

$(4m-9)(4m-9)$

$16m^2-36m-36m+81$

$16m^2-72m+81$

12. $(6-3n)^2$

$(6-3n)(6-3n)$

$36-18n-18n+9n^2$

$36-36n+9n^2$

13. $(x+3)(x-3)$

$x^2-3x+3x-9$

$x^2-9$

14. $(8+y)(8-y)$

$64-8y+8y-y^2$

$-y^2+64$

15. $(x+6)(x-6)$

$x^2-6x+6x-36$

$x^2-36$

16. $(5x+2)(5x-2)$

$25x^2-10x+10x-4$

$25x^2-4$

17. $(10x+7y)(10x-7y)$

$100x^2-70xy+70xy-49y^2$

$100x^2-49y^2$

18. $(x^2+3y)(x^2-3y)$

$x^4-3x^2y+3x^2y-9y^2$

$x^4-9y^2$

19. Write a simplified expression that represents the...

a. area of the large rectangle.

$(6+x)(6-x)$

$36-6x+6x-x^2$

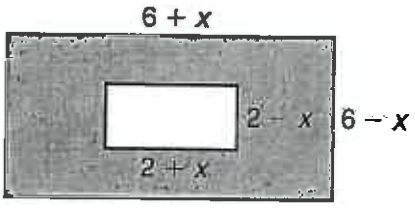
$-x^2+36$

b. area of the small rectangle.

$(2+x)(2-x)$

$4+2x-2x-x^2$

$-x^2+4$




c. area of the shaded area.

$(-x^2+36)-(-x^2+4)$

$-x^2+36+x^2-4$

$32$

Name _____ Date _____ Class _____

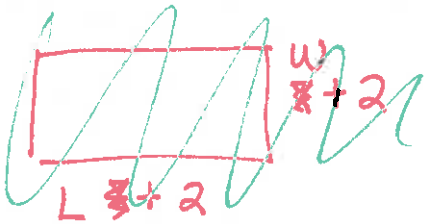
goals w/19

20. The small rectangle is made larger by adding 2 units to the length and 2 units to the width.

a. What is the new area of the smaller rectangle?

$(x+2)(x+2)$

$x^2+2x$




$(2-x+2)(2+x+2)$

$(4-x)(4+x) = 16+4x-4x-x^2 = \boxed{-x^2+16}$

b. What is the area of the new shaded area?

large area − new small

$(-x^2+36) - (16+-x^2)$

$-x^2+36-16+x^2$

$\boxed{20}$