Version B

Algebra I **Semester 2 Review Packet (Ch 6-9, 11)** **Name:** Key

Chapter 6: Exponential Functions

mplify.

1. $(r^3)(2r^5)$ $2r^8$

2. $(x^5)^4$ x^{20}

3. $(-4t^2n^3)(3tn^4)$ $-12t^3n^7$

4. $(-5x^4y^2)^3$ $(-5)^3 x^{12}y^6$ $-125x^{12}y^6$

5. $(2cd)^2(-4c^3)^0 = 1$ $4c^2d^2$

6. $\frac{6^{15}}{6^9}$ 6^6

7. $\frac{y^8}{y^3}$ y^5

8. $\frac{r^6n^{-7}}{r^4n^2}$ $\frac{r^6}{r^4n^2n^7}$ $\frac{r^2}{n^9}$

9. $\frac{16r^3t^{-5}}{4r^{-1}t^2}$ $\frac{16r^3r^1}{4t^5t^2}$ $\frac{4r^4}{t^7}$

Simplify.

10. $\sqrt[4]{81}$ 3

11. $4^{\frac{3}{2}}$ $(\sqrt{4})^3 = 2^3 = 8$

12. $64^{\frac{5}{6}}$ $(\sqrt[6]{64})^5 = 2^5 = 32$

13. $81^{\frac{5}{4}}$ $(\sqrt[4]{81})^5 = 3^5 = 243$

xpress each number in scientific notation.

14. 14,000,000 1.4×10^7

15. 0.0000308 3.08×10^{-5}

Solve:

16. $6^{x+1} = 1296$

$6^{x+1} = 6^4$

$x+1 = 4$

$x = 3$

17. $36^{x-2} = 6$

$(6^2)^{x-2} = 6^1$

$6^{2x-4} = 6^1$

$2x-4 = 1$

$2x = 5$

$x = 5/2$

18. $4^{2x+1} = \left(\frac{1}{8}\right)^{-3x-4}$

$(2^2)^{2x+1} = (2^{-3})^{-3x-4}$

$2^{4x+2} = 2^{9x+12}$

$4x+2 = 9x+12$

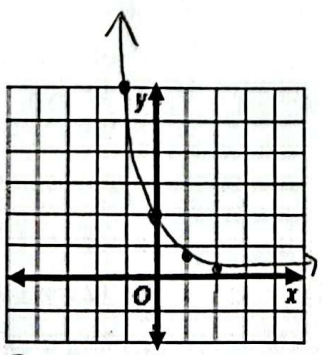
$-5x = 10$

$x = -2$

Graph each function:

19. $y = 2\left(\frac{1}{3}\right)^x$

x	y
-2	18
-1	6
0	2
1	2/3
2	2/9



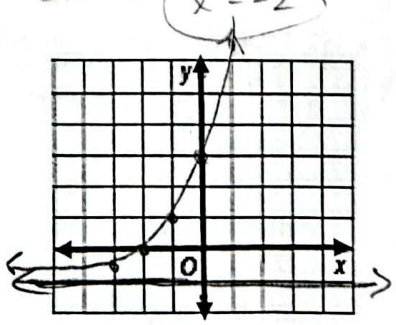
D: $\mathbb{R}$

R: $y > 0$

20. $y = 4(2)^x - 1$ ↑ down 1

Asymptote: $y = -1$

x	y
-3	-1/2
-2	0
-1	1
0	3
1	7
2	15



$A = P\left(1+\frac{r}{n}\right)^{nt}$

21. Determine the amount of an investment if $700 is invested at an interest rate of 8% compounded monthly for 9 years. $A = P\left(1+\frac{r}{n}\right)^{nt}$ $A = 700\left(1+\frac{.08}{12}\right)^{12(9)}$ .08 $n=12$

$A = \$1434.67$

22. A new welding machine valued at $38,000 depreciates at a steady rate of 9% per year. What is the value of the welding machine in 10 years? $y = 38{,}000(1-.09)^{10}$

$y = 38{,}000(0.91)^{10}$ $y = \$14{,}797.81$

$y = a(b)^x$ decay $1-r$

23. A certain fast-growing bacteria increases 6% per minute. If there are 100 bacteria now, about how many will there be 12 minutes later? $y = 100(1+.06)^{12}$

$y = 100(1.06)^{12}$ ⇒ about 201 bacteria

$y = a(b)^x$ growth $1+r$

24. What is the explicit and recursive equation for the nth term of the geometric sequence 81, 27, 9, 3, ...

Explicit: $a_n = a_1(r)^{n-1}$

Recursive: $a_1 = \_\_$; $a_n = r \cdot a_{n-1}$

E: $a_n = 81(1/3)^{n-1}$

R: $a_1 = 81$; $a_n = \frac{1}{3} \cdot a_{n-1}$

$(1/3)(1/3) = r$

25. What is the explicit and recursive equation for the nth term of the sequence 5, 9, 13, 17, ...

Explicit: $a_n - a_1 = d(n-1)$

Recursive: $a_1 = \_\_$, $a_n = a_{n-1} + d$

E: $a_n - 5 = 4(n-1)$

$a_n = 4n - 4 + 5$

$a_n = 4n+1$

$+4\ +4 = d$

R: $a_1 = 5$, $a_n = a_{n-1} + 4$

26. What is the 13th term of the geometric sequence -2, 8, -32, ...

$a_{13} = -2(-4)^{13-1}$

$a_{13} = -33{,}554{,}432$

$(-4)(-4)$

Chapter 7: Polynomial Operations and Factoring

Write each polynomial in standard form. Identify the leading coefficient.

27) $4x^2 - 3x^3 + 2x + 12$

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

LC: -3

28) $4x^2 - 7x^4 + x - 15$

$-7x^4 + 4x^2 + x - 15$

LC: -7

Find each sum or difference.

29. $(-2x^2 + x + 6) + (5x^2 - 4x - 2)$

$-2x^2 + x + 6 + 5x^2 - 4x - 2$

$3x^2 - 3x + 4$

30. $(5a + 9b) - (2a + 4b)$

$5a + 9b - 2a - 4b$

$3a + 5b$

31. **MULTIPLE CHOICE** Simplify $5c^2(c + 10) - 4c(2c^2 - 6c + 1)$.

A $-3c^3 + 74c^2 - 4c$ **B** $-3c^3 - 6c + 11$ **C** $-3c^3 - 26c^2 + 4c$ **D** $3c^3 - 9c + 11$

$5c^3 + 50c^2 - 8c^3 + 24c^2 - 4c$

$-3c^2 + 74c^2 - 4c$

Simplify all of the following:

32. $2x^3(x - 4x^2)$

$2x^4 - 8x^5$

$-8x^5 + 2x^4$

33. $5(x^2 - 2) - 2x(x + 1)$

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

$3x^2 - 2x - 10$

34. $(2x + 1)(x - 4)$ FOIL

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

$2x^2 - 7x - 4$

35. $(2x + 6y)(2x - 6y)$

$4x^2 - 12xy + 12xy - 36y^2$

$4x^2 - 36y^2$

36. $(4m - 1)(m + 2)$

$4m^2 + 8m - m - 2$

$4m^2 + 7m - 2$

37. $(2x + 7)^2$

$(2x+7)(2x+7)$

$4x^2 + 14x + 14x + 49$

$4x^2 + 28x + 49$

Factor the following:

38. $5n^3 - 10n^2 + 3n - 6$

$5n^2(n-2) + 3(n-2)$

$(5n^2 + 3)(n-2)$

39. $x^2 - 10x + 9$

9, -9, -1, -10

$(x-9)(x-1)$

40. $2x^2 - 12x - 14$

$2(x^2 - 6x - 7)$

-7, -7, 1, -1

$2(x-7)(x+1)$

41. $9x^2 - 25$

$(3x)^2 - (5)^2$

$(3x-5)(3x+5)$

42. $x^2 - 4$

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

43. $7x^2 - 20x - 3$

-21, -21, 1, -20

	x	-3
$7x$	$7x^2$	$-21x$
1	$1x$	-3

$(7x+1)(x-3)$

Solve each of the following by factoring:

44. $x^2 - 2x = 0$

$x(x-2) = 0$

$=0$ $=0$

$x = 2, 0$

45. $(y + 4)(3y - 5) = 0$

$=0$ $=0$

$y = -4, 5/3$

46. $m^2 + 12m - 28 = 0$

-28, 14, -2, 12

$(m+14)(m-2) = 0$

$m = -14, 2$

47. Julian kicked a soccer ball into the air with an initial upward velocity of 40 feet per second. The height h in feet of the ball above the ground can be modeled by $h = -16t^2 + 40t$, where t is the time in seconds after Julian kicked the ball. Find the time it takes the ball to reach 25 feet above the ground.

$25 = -16t^2 + 40t$

$-25 \quad -25$

$0 = -16t^2 + 40t - 25$

400, -20, -20, -40

$0 = -1(16t^2 - 40t + 25)$

	$4t$	-5
$4t$	$16t^2$	$-20t$
-5	$-20t$	25

$0 = (4t-5)(4t-5)$

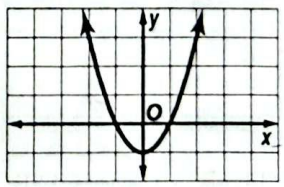
$t = 5/4$

$t = 1.25$ seconds

Chapter 8/9: Quadratics

48. Which equation corresponds to the graph shown?

F $y = x^2 + 1$ **H** $y = x^2 - 1$ **G** $y = -x^2 - 1$ **J** $y = x^2$



49. Find the indicated information for $y = \frac{1}{2}x^2 - 4x + 3$ and then graph it.

$-b/2a$ a. Vertex: $(4, -5)$

$\frac{4}{2(\frac{1}{2})} = \frac{4}{1} = (4, -5)$

b. Axis of Symmetry: $x = 4$

$8 - 16 + 3$

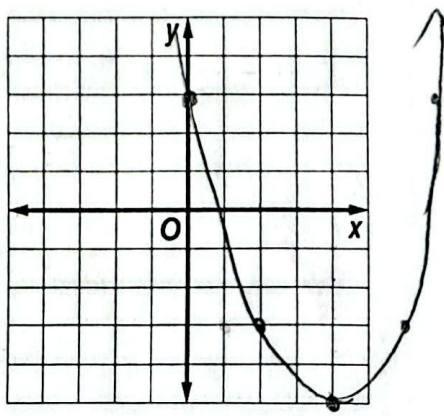
$2 - 8 + 3$

$(0,0)$ c. Y-intercept: $(0, 3)$

d. Domain: $\mathbb{R}$

e. Range: $y \geq -5$

x	y
0	3
2	-3
4	-5
6	-3
8	3



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$f(x) = 3(x+2)^2 - 13$ ← 2 ↓ 13

$3(0+2)^2 - 13$
$3(4) - 13$

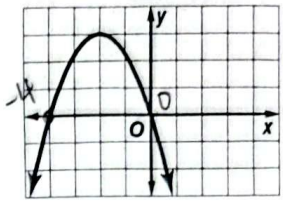
50. Find the indicated information for ~~[illegible]~~

f. Vertex: $(-2, -13)$ b. Axis of Symmetry: $x = -2$ c. Y-intercept: $(0, -1)$

d. Domain: $\mathbb{R}$ e. Range: $y \geq -13$

$(2, -13)$

51. Which appear to be the roots (solutions) of the quadratic equation whose related function is graphed at the right?



A 4, 0 B –2, 3 C 2, 3 D –4, 0

Describe the transformations of the following functions from the parent function $f(x) = x^2$

52. $f(x) = -2(x-1)^2 + 4$

* right 1
* up 4
* opens down (reflection)
* vertical stretch

53. $g(x) = -x^2 - 5$

* opens down
* down 5

54. $y = 2(x-4)^2$

* right 4
* vertical stretch

55. What value of c makes $x^2 + 24x + c$ a perfect square trinomial. Then, factor the trinomial.

$(24/2)^2 = 12^2 = 144$ $x^2 + 24x + 144$ $(x+12)^2$

56. Find the value of c that makes $x^2 - 5x + c$ a perfect square trinomial. Then, factor the trinomial.

$x^2 - 5x + 25/4$ $(x - 5/2)^2$

57. State the value of the discriminant of $3x^2 + 8x = 2$. Determine how many solutions there will be.

$b^2 - 4ac$ $3x^2 + 8x - 2 = 0$ $64 - 4(3)(-2)$ $64 + 24 = 88$ 2 solns

58. Determine the number of real solutions of $7x^2 - 18x + 12 = 0$.

A 2 B infinitely many C none D 1

$324 - 4(7)(12)$
$324 - 336 = -12 \Rightarrow$ no solns

Solve the following either by the quadratic formula or by completing the square.

59. $4x^2 + 11x - 3 = 0$

$x = \frac{-11 \pm \sqrt{121 - 4(4)(-3)}}{8}$

$x = \frac{-11 \pm \sqrt{121 + 48}}{8}$

$x = \frac{-11 \pm \sqrt{169}}{8}$

$x = \frac{-11 \pm 13}{8}$ $x = \frac{1}{4}, -3$

60. $y^2 + 8y = 2$

$y^2 + 8y + 16 = 2 + 16$

$\sqrt{(y+4)^2} = \sqrt{18} < \frac{9}{2} < \frac{3}{3}$

$y + 4 = \pm 3\sqrt{2}$
$-4 \quad -4$

$y = -4 \pm 3\sqrt{2}$

****You also need to look at your notes from Chapter 11 (Stats and Probability) as there will be some questions regarding those topics. Things such as mean, median, and mode, making and reading two-way tables, theoretical and experimental probability, fundamental counting principal, and permutations and combinations*****

Version B