

Advanced Algebra II ~ 2nd Semester REVIEW

What is the simplified form of each expression?

1. $\frac{c^9 d^{-7}}{c^{14} d^{-10}} = c^{-5} d^3 = \frac{d^3}{c^5}$

What is the simplified form of the expression?

2. $\left(\frac{3}{5y^9}\right)^3 = \frac{27}{125y^{27}}$

$a^0 = 1$
 $\frac{a^{-b}}{c^{-d}} = \frac{c^d}{a^b}$
 $a^m \cdot a^n = a^{m+n}$
 $(a^m)^n = a^{mn}$
 $\frac{a^m}{a^n} = a^{m-n}$

Find the length of the missing side. The triangle is not drawn to scale.

3. $a^2 + b^2 = c^2$
 $6^2 + 8^2 = c^2$
 $36 + 64 = c^2$
 $100 = c^2$
 $c = 10$

5. Find the value of the variable. If your answer is not an integer, leave it in simplest radical form.

$x\sqrt{2} = 5$
 $x = \frac{5\sqrt{2}}{\sqrt{2}\sqrt{2}}$
 Not drawn to scale
 $x = \frac{5\sqrt{2}}{2}$

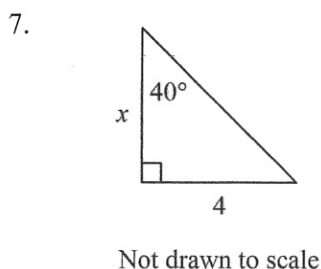
4. $17^2 = 15^2 + a^2$
 $289 = 225 + a^2$
 $64 = a^2$
 $a = 8$

Find the value of the variable(s). If your answer is not an integer, leave it in simplest radical form.

6. $2(11) = 2x$
 $22 = 2x$
 $x = 11$

$x\sqrt{3} = 11\sqrt{3}$
 Not drawn to scale

Use a trigonometric ratio to find the value of x . Round your answer to the nearest tenth.



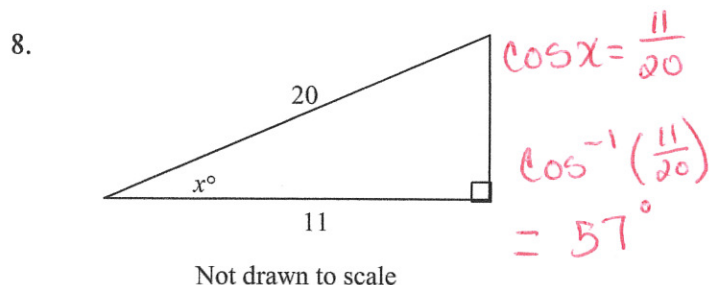
$$\tan 40^\circ = \frac{4}{x}$$

$$4 = x \tan 40^\circ$$

$$x = \frac{4}{\tan 40^\circ}$$

$$x = 4.7$$

Find the value of x . Round to the nearest degree.



$$\cos x = \frac{11}{20}$$

$$\cos^{-1}\left(\frac{11}{20}\right)$$

$$= 57^\circ$$

9. Prestige Builders has a development of new homes. There are four different floor plans, seven exterior colors, and an option of either a two-car or a three-car garage. How many choices are there for one home? 2

$$4 \cdot 7 \cdot 2 = 56$$

10. In how many ways can 11 basketball players be listed in a program?

$$11! = 39,916,800$$

What is a simpler form of the radical expression?

15. $\sqrt[4]{81x^{20}y^8} = \sqrt[4]{3^4 \cdot (x^5)^4 \cdot (y^2)^4}$
 $= 3x^5y^2$

What is the simplest form of the product?

17. $\sqrt[3]{7x^7} \cdot \sqrt[3]{9x^4} = \sqrt[3]{63x^{11}}$
 $= \sqrt[3]{63(x^3)^3 x^2}$
 $= x^3 \sqrt[3]{63x^2}$

11. A mathematics journal has accepted 14 articles for publication. However, due to budgetary restraints only 9 articles can be published this month. How many ways can the journal editor assemble 9 of the 14 articles for publication?

a. 726,485,760 b. 14 c. 2,002 d. 126

12. 9 students volunteer for a committee. How many different 6-person committees can be chosen?

$${}_{14}P_6 = 84$$

13. In a word game, you choose a tile from a bag, replace it, and then choose another. If there are 24 vowels and 15 consonants, what is the probability you will choose a consonant and then a vowel?

$$15 + 24 = 39 \text{ choices}$$

$$\frac{15}{39} \cdot \frac{24}{39} = \frac{40}{169}$$

Suppose S and T are mutually exclusive events. Find $P(S \text{ or } T)$.

14. $P(S) = 20\%$, $P(T) = 22\%$

$$42\%$$

16. $\sqrt[3]{27x^{15}y^{24}} = \sqrt[3]{3^3(x^5)^3(y^8)^3}$
 $= 3x^5y^8$

18. $\frac{\sqrt[3]{270x^{20}}}{\sqrt[3]{5x^4}}$ $= \sqrt[3]{54x^{19}}$ $= \sqrt[3]{3 \cdot 3 \cdot 2 \cdot (x^6)^3 \cdot x}$
 $= 3x^6 \sqrt[3]{2x}$

What is the product of the radical expression?

19. $(-5 - \sqrt{3})^2 = (-5 - \sqrt{3})(-5 - \sqrt{3})$
 $25 + 5\sqrt{3} + 5\sqrt{3} + 3$
 $28 + 10\sqrt{3}$

How can you write the expression with rationalized denominator?

20. $\frac{(\sqrt{3} - \sqrt{6})(\sqrt{3} - \sqrt{6})}{(\sqrt{3} + \sqrt{6})(\sqrt{3} - \sqrt{6})}$
 $\frac{3 - \sqrt{18} - \sqrt{18} + 6}{3 + \sqrt{18} - \sqrt{18} - 6}$
 $= \frac{9 - 2\sqrt{18}}{-3} = \frac{9 - 2\sqrt{9 \cdot 2}}{-3}$
 $= \frac{9 - 6\sqrt{2}}{-3} = -3 + 2\sqrt{2}$

21. Write the exponential expression $3x^8$ in radical form.

$3 \sqrt[8]{x^3}$

What is the simplest form of the number?

22. $\sqrt{2}(\sqrt[8]{2}) = 2^{\frac{1}{2}} \cdot 2^{\frac{1}{8}} = 2^{\frac{4}{8}} \cdot 2^{\frac{1}{8}} = 2^{\frac{5}{8}}$

- a. 1024 b. $2^{\frac{5}{8}}$ c. $2^{\frac{8}{5}}$ d. $2^{\frac{1}{10}}$

What is the solution of the equation?

23. $4(3-x)^{\frac{4}{3}} - 5 = 59$ PEMDAS
 $\frac{4(3-x)^{\frac{4}{3}}}{4} = \frac{64}{4}$
 $(3-x)^{\frac{4}{3}} = 16$ even \neq
 $3-x = \pm 8$ $-x = -11$
 $-x = 5$ $x = -5, 11$

What is the solution of the equation? Eliminate any extraneous solutions.

24. $(5x)^2 = \sqrt{10 + 15x}^2$
 $25x^2 = 10 + 15x$ $(x-1)(5x+2) = 0$
 $25x^2 - 15x - 10 = 0$ $x = 1, -\frac{2}{5}$
 $5(5x^2 - 3x - 2) = 0$
 $\frac{x}{-1} = \frac{5x}{-5} \cdot \frac{5x}{-3} = -2 \neq 2$ extraneous

25. $\sqrt{3x+28} - 8 = x$
 $\sqrt{3x+28} = x+8$
 $3x+28 = (x+8)(x+8)$
 $3x+28 = x^2 + 16x + 64$
 $0 = x^2 + 13x + 36$
 $0 = (x+9)(x+4)$
 $x = -9, -4$
 extraneous $-7 \neq -9$

26. Let $f(x) = -2x - 7$ and $g(x) = -4x + 3$. Find $(f \circ g)(-5)$.

(23) *(-5)*
 $g(x) = 20 + 3 = 23$
 $-46 - 7 = -53$

27. Let $f(x) = x^2 + 6$ and $g(x) = \frac{x+8}{x}$. Find $(g \circ f)(-7)$.

$= g(f(-7))$
 $= g((-7)^2 + 6)$
 $= g(49 + 6)$
 $= g(55)$
 $= \frac{55 + 8}{55} = \frac{63}{55}$

What is the inverse of the given relation?

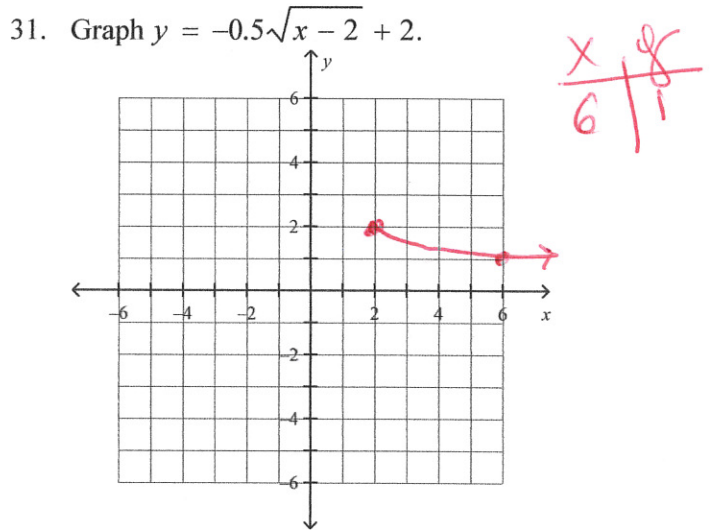
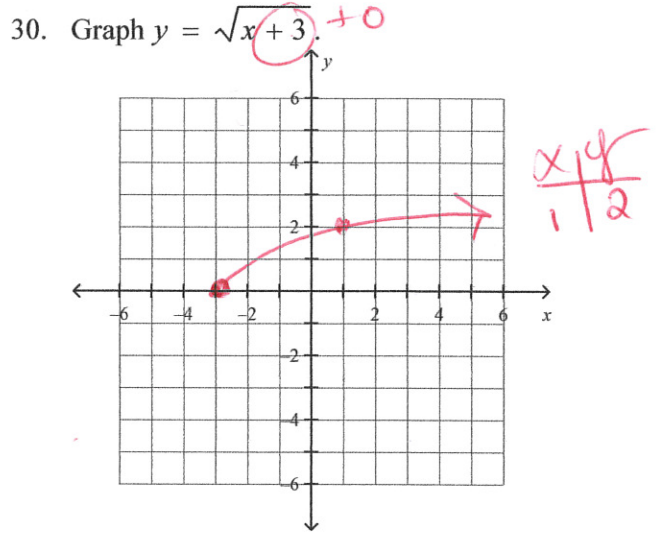
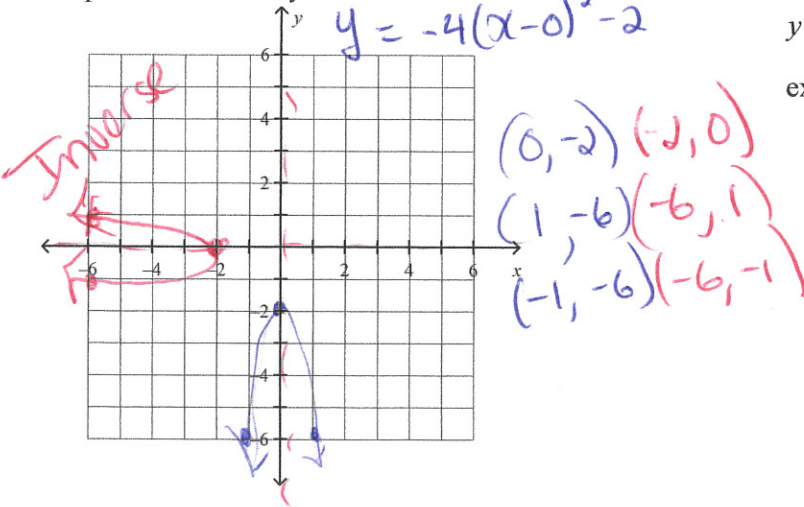
28. $y = 7x^2 - 3$

$x = 7y^2 - 3$
 $x + 3 = 7y^2$
 $\frac{x+3}{7} = y^2$

$y = \pm \sqrt{\frac{x+3}{7}}$

29. Graph the inverse of $y = -4x^2 - 2$.

$y = -4(x-0)^2 - 2$

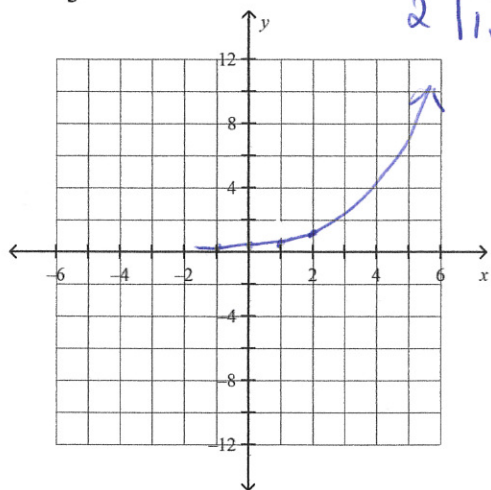


32. Without graphing, determine whether the function $y = 7\left(\frac{2}{3}\right)^x$ represents exponential growth or exponential decay.

because $\frac{2}{3} < 1$

Graph the function.

33. $y = \frac{1}{5} (3)^x$



x	y
-1	1/15
0	1/5
1	3/5
2	1.8

34. Use the table feature on a graphing calculator to evaluate $e^{1.8}$ to four decimal places.

6.0496

35. Suppose you invest \$1600 at an annual interest rate of 4.6% compounded continuously. How much will you have in the account after 4 years?

$$A = Pe^{rt}$$

$$= 1600e^{.046 \cdot 4}$$

$$= \$1923.23$$

Evaluate the logarithm.

36. $\log_5 \frac{1}{625}$

-4

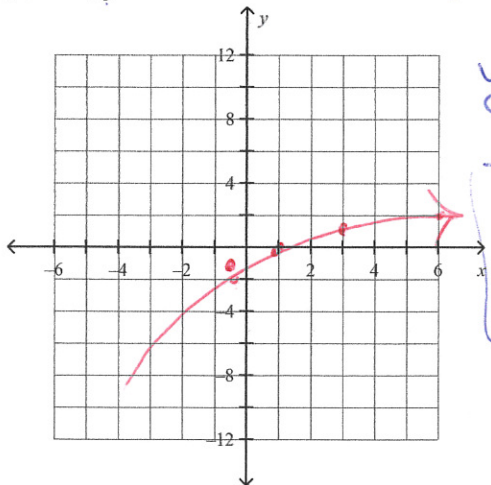
$$5^x = \frac{1}{625}$$

$$5^x = \frac{1}{5^4}$$

$$5^x = 5^{-4}$$

Graph the logarithmic equation.

37. $y = \log_3 x$



$3^y = x$

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

$$\log_b m = \frac{\log m}{\log b}$$

Write the expression as a single logarithm.

38. $4 \log x - 6 \log(x+2)$ $\log \frac{x^4}{(x+2)^6}$

39. Use the Change of Base Formula to evaluate $\log_7 40$.

$$= \frac{\log 40}{\log 7} = 1.896$$

Solve the exponential equation.

40. $4^{4x} = 8$

$$\log 4^{4x} = \log 8$$

$$\frac{4x \log 4}{4 \log 4} = \frac{\log 8}{4 \log 4}$$

$$x = \frac{3}{8} = 0.375$$

41. Solve $\log 5x + \log 14 = 1$. Round to the nearest hundredth if necessary.

$$\log_{10} 70x = 1$$

$$\frac{10^1}{70} = \frac{70x}{70}$$

$$x = \frac{1}{7} = 0.14$$

42. Solve $\ln x - \ln 6 = 0$.

~~$$\ln \frac{x}{6} = 0$$~~

$$\frac{x}{6} = 1$$

$$x = 6$$

Use natural logarithms to solve the equation. Round to the nearest thousandth.

43. $e^{2x} = 1.4$

$$\ln e^{2x} = \ln(1.4)$$

$$\frac{2x}{2} = \frac{\ln 1.4}{2} = 0.1682$$

45. Write an equation for the translation of $y = \frac{4}{x}$ that has the asymptotes $x = 7$ and $y = 6$.

$$y = \frac{4}{x-7} + 6$$

44. Suppose that x and y vary inversely, and $x = 10$ when $y = 8$. Write the function that models the inverse variation.

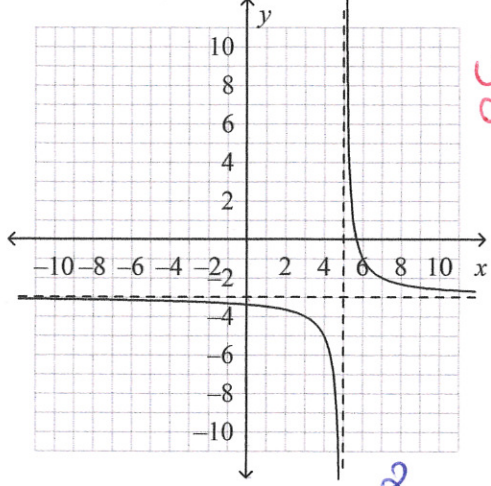
direct $y = kx$
inverse $y = \frac{k}{x}$

or $xy = k$
 $10 \cdot 8 = 80$

$$y = \frac{80}{x}$$

46. This graph of a function is a translation of $y = \frac{2}{x}$.

What is an equation for the function?



$$y = \frac{a}{x-h} + k$$

$$y = \frac{2}{x-5} - 3$$

47. Describe the vertical asymptote(s) and hole(s) for

$$y = \frac{(x-3)(x-1)}{(x-1)(x-5)}$$

hole $x=1$
V.A. @ $x=5$

48. Find the horizontal asymptote of the graph of $y = \frac{-2x^3 + 3x + 2}{2x^3 + 6x + 2}$.

$$y = -1$$

What is the product in simplest form? State any restrictions on the variable.

$$49. \frac{3g^5}{10h^2} \cdot \frac{h^5}{10g^2} = \frac{3g^3h^3}{100gh} = \frac{3g^3h^3}{100} \quad \begin{matrix} h \neq 0 \\ g \neq 0 \end{matrix}$$

What is the quotient in simplified form? State any restrictions on the variable.

$$50. \frac{a+2}{a-5} \div \frac{a+1}{a^2-8a+15} = \frac{(a+2)(a-3)(a-5)}{(a-5)(a+1)}$$

Simplify the sum.

$$51. \frac{a^2+7a+10}{a^2+2a-15} + \frac{10}{a-3} = \frac{a^2+7a+10}{(a+5)(a-3)} + \frac{10(a+5)}{(a-3)(a+5)} \quad \text{LCD} = (a+5)(a-3)$$

$$= \frac{a^2+7a+10+10a+50}{(a+5)(a-3)} = \frac{a^2+17a+60}{(a+5)(a-3)}$$

$$= \frac{(a+12)(a+5)}{(a+5)(a-3)} = \frac{a+12}{a-3}$$

Simplify the difference.

$$52. \frac{n^2 - 10n + 24}{n^2 - 13n + 42} - \frac{9}{n-7} = \frac{n^2 - 10n + 24}{(n-6)(n-7)} + \frac{-9(n-6)}{(n-7)(n-6)}$$

$$\frac{n^2 - 10n + 24}{LCD} + \frac{-9n + 54}{LCD} = \frac{n^2 - 19n + 78}{(n-7)(n-6)} = \frac{(n-13)(n-6)}{(n-7)(n-6)} = \frac{n-13}{n-7}$$

Solve the equation. Check the solution.

$$53. \frac{-4}{x+1} = \frac{-1}{x+5}$$

$$-x-1 = -4x-20$$

$$19 = -3x$$

$$x = -19/3$$

$$54. \frac{a}{a^2 - 36} + \frac{2}{a-6} = \frac{1}{a+6} \quad LCD = (a+6)(a-6)$$

$$= \frac{(a+6)(a)(a+6)}{(a+6)(a-6)} + \frac{2(a+6)(a-6)}{a-6} = \frac{1(a+6)(a-6)}{a+6}$$

$$= a + 2a + 12 = a - 6$$

$$= 3a + 12 = a - 6$$

$$2a = -18 \quad a = -9$$

Write an equation of a circle with the given center and radius.

55. center (2, -4) and radius 5

$$(x-2)^2 + (y+4)^2 = 25$$

56. Will the parabola open up, down, left, or right?
 $x = 5y^2$

Match the equations in numbers 57-60 with an appropriate conic section.

- circle
- ellipse
- hyperbola
- parabola

57. $2x^2 + 3y^2 = 36$ b. ellipse

58. $2x^2 - 3y^2 = 36$ c. hyperbola

59. $3x^2 + 3y^2 = 36$ a. circle

60. $2x^2 + 3y = 36$ d. parabola