

### Analytical Trig

1.] Use the sum/difference or double/half angle formulas to find the **exact** value of  $\cos 15^\circ$ .

2.] Use the sum/difference or double/half angle formulas to find the **exact** value of  $\tan 165^\circ$ .

#3 -6: Given that  $\sin \theta = -\frac{3}{4}$ ,  $\theta$  is in quadrant IV, find the exact value of each angle.

3.]  $\sin 2\theta$

4.]  $\cos 2\theta$

5.]  $\tan \frac{\theta}{2}$

6.]  $\cos \frac{\theta}{2}$

7.] Solve the equation on the interval  $[0, 2\pi)$ :  $\cos^2 \theta - \sin^2 \theta + \sin \theta = 0$ .

8.] Solve the equation on the interval  $[0, 2\pi)$ :  $4\cos^2(2\theta) - 3 = 0$ .

9.] Solve the equation on the interval  $(-\infty, \infty)$ :  $4\tan \theta - 3 = 1$

10.] Solve the equation on the interval  $(-\infty, \infty)$ :  $2\sec(3\theta) + 5 = 1$ .

## Answers

$$1.] \frac{\sqrt{6} + \sqrt{2}}{4}$$

$$2.] -2 + \sqrt{3}$$

$$3.] \frac{-3\sqrt{7}}{8}$$

$$4.] \frac{-1}{8}$$

$$5.] \frac{4 - \sqrt{7}}{-3}$$

$$6.] -\sqrt{\frac{4 + \sqrt{7}}{8}}$$

$$7.] \theta = \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{2}$$

$$8.] \theta = \frac{\pi}{12}, \frac{5\pi}{12}, \frac{7\pi}{12}, \frac{11\pi}{12},$$
$$\frac{13\pi}{12}, \frac{17\pi}{12}, \frac{19\pi}{12}, \frac{23\pi}{12}$$

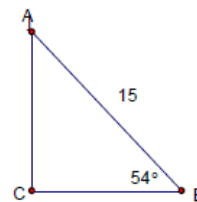
$$9.] \theta = \frac{\pi}{4} + \pi k$$

$$10.] \theta = \frac{2\pi}{9} + \frac{2\pi}{3}k, \frac{4\pi}{9} + \frac{2\pi}{3}k$$

### Triangle Trig

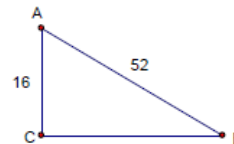
#11-12: Solve this triangle. Angle C is a right angle.  
Round answers to whole numbers. (Calculator problem)

- 11.]  $a \approx ?$                       12.]  $b \approx ?$



#13-15: Solve this triangle. Angle C is a right angle.  
Round answers to the nearest tenth. (Calculator)

- 13.]  $a \approx ?$                       14.]  $\angle A \approx ?$                       15.]  $\angle B \approx ?$



- 16.] The angle of elevation from a spot on the ground 30 feet from the base of a tree to the top of a tree is  $50^\circ$ . How tall is the tree? (Calculator).
- 17.] Sam is standing at the top of a 75-foot tall building. He sees his friend standing on the ground at a location that is 100 feet from the base of the building. What is the angle of depression between Sam and his friend? (Calculator)
- 18.] A large flagpole stands at the top of the Smythe Office Building. From the street at a point 100 feet from the base of the building, the angle of elevation to the top of the flagpole is  $55^\circ$ . The angle of elevation to the bottom of the flagpole is  $50^\circ$ . Find the height of the flagpole. (Calculator).
- 19.] Given triangle ABC with  $m\angle A = 40^\circ$ ,  $b = 2$ ,  $a = 3$ , use Law of Sines to find the measure of angle B. Remember, there can be more than one answer!
- 20.] Given triangle ABC with  $m\angle A = 35^\circ$ ,  $b = 8$ ,  $a = 6$ , use Law of Sines to find the measure of angle B. Remember, there can be more than one answer!
- 21.] Given triangle ABC with  $m\angle B = 100^\circ$ ,  $c = 2$ ,  $a = 3$ , use Law of Cosines to find the measure of angle A.
- 22.] Given triangle ABC with  $a = 10$  inches,  $b = 8$  inches, and  $c = 12$  inches, find the measure of angle B.
- 23.] Find the area of Triangle ABC with  $m\angle B = 80^\circ$ ,  $c = 6$ ,  $a = 4$ .
- 24.] Find the area of the triangle with sides 6, 8, and 9.

## Answers

11.]  $a = 8.8$

12.]  $b = 12.1$

13.]  $a = 49.5$

14.]  $A = 72.1$

15.]  $B = 17.9$

16.]  $x = 35.8$

17.]  $x = 36.9$

18.]  $y = 23.6$

19.]  $B = 25.4$

20.]  $B = 50$  and  $130$

21.]  $\alpha = 49.53^\circ$  ( $b = 3.9$ )

22.]  $B = 41.4$

23.] area =  $11.8$  sq. units

24.] area =  $23.5$  sq. units

**Chapter 3 – Polynomial and Rational Functions**

# 25 -27: Use  $f(x) = x^4 + 5x^3 + 3x - 4$ .

25.] Use synthetic substitution to find  $f(-3)$

26.] Use synthetic division to divide  $f(x)$  by  $(x+2)$ .

27.] Is  $(x + 1)$  a factor of  $f(x)$ ?

28.] If  $f(x) = 2x^3 - 4x^2 + 5x + k$ , find  $k$  so that  $(x + 1)$  is a factor.

29.] Find the zeros of  $f(x) = 4x^3 + 12x^2 - 28x + 12$ .

30.] Solve the equation over the complex numbers.  $x^4 + 2x^2 = 3x^3 + 6x$

#31 – 32: Identify the hole, vertical asymptote, horizontal asymptote, intercepts, and key points for each. **Graph on graph paper.**

31.]  $f(x) = \frac{4x}{x-7}$

32.]  $f(x) = \frac{x^2 + 2x - 35}{x+7}$

33.] Use zeros, multiplicities, end behaviors, and key points to sketch a good graph of the function:  $f(x) = x^4 - 3x^3 + x^2 + 3x - 2$ . **Use graph paper.**

#34 – 35: Solve each inequality. Write answers in interval notation.

34.]  $2x^2 - 5x < x + 8$

35.]  $\frac{3x-5}{x+2} \geq 2$

## Answers

25.] -67

$$26.] x^3 + 3x^2 - 6x + 15 - \frac{34}{x+2}$$

27.] no

28.]  $k = 11$

$$29.] x = 1, -2 \pm \sqrt{7}$$

$$30.] x = 0, 3, \pm i\sqrt{2}$$

31.] no hole, VA:  $x = 7$ , HA:  $y = 4$ , x-int(0, 0),  
y-int(0, 0)

32.] hole:  $(-7, -12)$ , VA: none, HA: none, SA:  
none, x-int(5, 0), y-int(0, -5)

33.] graph- use calculator to check

34.]  $(-1, 4)$

35.]  $(-\infty, -2), [9, \infty)$

### Log and Exponential Functions

36.] Write in logarithmic form:  $4^3 = 64$ .

37.] Write in exponential form:  $\log_7 b = 1$

# 38 -41 : Solve for x

38.]  $64 = 4^{(5x-3)}$

39.]  $\log_2(x-6) + \log_2 x = 4$

40.]  $e^{-0.097x} = 12$

41.]  $3^{(x-1)} = 5^{2x}$

42.] Write  $2\log_6 x - (3\log_6 y + \log_6 z)$  in condensed form.

43.] Write  $\log_4 \frac{x^3 y^2}{\sqrt{1w}}$  in expanded form.

# 44 – 46: Graph each on **graph paper**.

44.]  $f(x) = 4^{-x}$

45.]  $y = 3^x$

46.]  $\log_3 x = y$

47.] If \$2000 is invested at 4% interest, compounded continuously, how much will be in the account at the end of five years?

48.] Solve: Determine the amount of money, P, that must be invested at a rate of 8% interest compounded quarterly so that the amount in the account, A, in 40 years will be \$200,000.

49.] Solve: The spread of a virus through a population is modeled by the equation

$$y = \frac{1000}{1 + 990e^{-0.7t}}, \text{ where } y \text{ is the total number of people infected and } t \text{ is time in days.}$$

In how many days will 530 people be infected with the virus?

50.] A certain amount of bacteria doubles every 10 hours.

If there were 100 grams of bacteria at noon on day 1, how many bacteria will be present at midnight of the next day?

## Answers

36.]  $\log_4 64 = 3$

37.]  $7^{13} = b$

38.]  $\frac{6}{5}$

39.] 8 (-2 is extraneous)

40.] -25.618

41.] -.518

42.]  $\log_6 \frac{x^2}{y^3 z}$

43.]  $3\log_4 x + 2\log_4 y - \frac{1}{2}\log_4 w$

44 – 46.] graphs

47.] \$2442.81

48.] \$8414.00

49.] 10.025

50.] 229.74 grams



### Sequences

# 51 – 53: Classify each sequence as arithmetic, geometric, or neither.

51.] 100, 50, 25, ...      52.] 9, 12, 15, ...      53.]  $\frac{1}{9}, \frac{1}{12}, \frac{1}{15},$

54.] Determine if the sequence  $a_n = \frac{1}{2n}$  converges or diverges.

55.] Identify the 4<sup>th</sup> term of the sequence described by  $a_n = 5 + n^2$ .

56.] Identify the 3<sup>rd</sup> term of the sequence described by  $a_1 = 5$  and  $a_{n+1} = a_n -$

57.] Write a recursive formula for the sequence 4, 9, 19, 39 ...

58.] Write an explicit formula for the sequence 2, -4, 8, -16, ...

59.] Find  $a_{23}$  for  $19 + 15 + 11 + 7 + \dots$

60.] Find  $\sum_{n=1}^{500} (3n + 5)$

61.] Find  $\sum_{n=0}^{10} 2\left(\frac{3}{5}\right)^n$ .

62.] Find  $\sum_{n=0}^{\infty} 2\left(\frac{1}{2}\right)^n$ .

## Answers

51.] Geometric

52.] Arithmetic

53.] Neither

54.] converges

55.] 21

56.] 1

57.]  $a_1 = 4, a_n = 2a_{n-1} + 1$

58.]  $a_n = 2(-2)^{n-1}$  or  $a_n = (-1)^{n-1}(2)^n$

59.] -69

60.] 378,250

61.] 4.981

62.] 4

63.] Determine the seating capacity of an auditorium with 25 rows of seats if there are 20 seats in the first row, 24 seats in the second row, 28 seats in the third row, etc.

64.] A new car depreciates in value at a rate of 20% each year. If the value of a car when it is new is \$30,000, find its value after 5 years.

65.] Change 2.2545454... to a fraction.

66.] Evaluate  $\binom{93}{91}$ .

67.] Evaluate  $\frac{n!}{(n+2)!}$

68.] Find the coefficient of the  $a^4b^3$  term in  $(a - b)^7$ .

69.] Expand  $(2x - y)^5$ .

70.] Use math induction to verify that  $1 + 5 + 5^2 + 5^3 + \dots + 5^{n-1} = \frac{1}{4}(5^n - 1)$ .

## Answers

62.] 4

63.] 1700

64.] \$9830.40

65.]  $\frac{124}{55}$

66.] 4278

67.]  $\frac{1}{n^2 + 3n + 2}$

68.]  $-35a^4b^3$

69.]

$$32x^5 - 80x^4y + 80x^3y^2 - 40x^2y^3 + 10xy^4 - y^5$$

70.] Math induction – your work is your answer