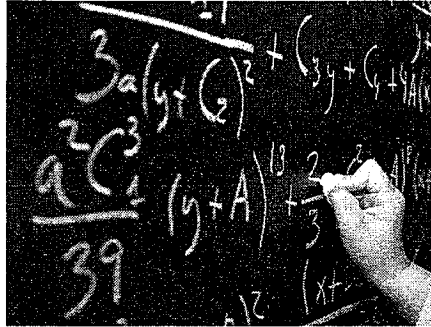


FOOTHILLS ACADEMY  
GRADES 11 & 12 SUMMER MATH PACKET



NAME \_\_\_\_\_

**11<sup>th</sup> & 12<sup>th</sup> GRADE SUMMER REVIEW PACKET**

**This will be graded as an assignment  
when you come to school this fall  
at Foothills Academy.**

- 1) Find the sum of the reciprocals of the four smallest integral factors of 18.  
 a)  $\frac{13}{6}$       b)  $\frac{10}{9}$       c)  $\frac{1}{12}$       d)  $\frac{5}{4}$       e) 2
- 2) The line  $y = mx + b$  passes through (1,3) and (-4,-3). Find the sum of m and b.  
 a)  $\frac{1}{3}$       b)  $\frac{4}{5}$       c) 2      d) 2.9      e) 3
- 3) Find the quadratic whose solutions are  $x = 5$  and  $x = \frac{2}{3}$   
 a)  $2x^2 - 13x + 15 = 0$       b)  $3x^2 - 17x + 10 = 0$       c)  $x^2 - \frac{10}{3} = 0$   
 d)  $2x^2 - 17x + 10 = 0$       e)  $3x^2 + 13x - 15 = 0$
- 4) How many revolutions per minute does a wheel make if its angular velocity is  $20\pi$  radians per second?  
 a) 120      b) 240      c) 600      d) 1200      e) 3600
- 5) Simplify:  $-5\sqrt{27} - 6\sqrt{243} + 4\sqrt{192}$   
 a)  $4\sqrt{3}$       b)  $-5\sqrt{3}$       c)  $-37\sqrt{3}$       d)  $-4\sqrt{3}$       e)  $6\sqrt{3}$
- 6) Solve for x:  $-3x + 6 < -15$   
 a)  $x > 7$       b)  $x < 7$       c)  $x > 3$       d)  $x < 3$       e)  $x > 7$  or  $x < -7$
- 7) If a student writes the integers from 5 to 305 inclusive by hand, how many times will she write the digit 5?  
 a) 30      b) 40      c) 43      d) 61      e) 65
- 8) Solve for k given:  $\frac{16^k + 16}{16} = 9$   
 a) 2      b)  $\frac{4}{7}$       c)  $\frac{7}{4}$       d)  $\frac{9}{5}$       e) 8
- 9) Jimmy earns \$5 an hour helping his neighbor do yard work. Jimmy is trying to save up for a new iPod which will cost him \$300 + 7% tax. If he has already saved \$111, how many hours does he have to work in order to save enough money for the iPod?  
 a) 37.5 hrs.      b) 39.2 hrs.      c) 42 hrs.      d) 64.4 hrs.      e) 210 hrs.
- 10) If  $x + y = 17$  and  $x^2 + y^2 = 167$  then what is the value of  $xy$ ?  
 a)  $17 + 4\sqrt{114}$       b) 61      c)  $48 + \sqrt{167}$       d) 122      e)  $17 - \sqrt{167}$

11) Sarah left town at 1 PM and was driving at 60 mph, and Jack left 15 minutes later and was driving in the same direction and on same road at 70 mph. How far out of town were they when Jack reached Sarah?

- a) 105 miles    b) 90 miles    c) 25 miles    d) 12.5 miles    e) 10 miles

12) Let  $\frac{1}{x + \frac{1}{x}} = p$ . Solve for x in terms of p.

- a)  $\frac{p}{p+1}$     b)  $\frac{1 \pm \sqrt{1-4p^2}}{2p}$     c)  $\frac{p \pm \sqrt{p^2-4}}{2}$     d)  $\frac{p}{1-p}$     e)  $p + \frac{1}{p}$

13) Subtract and simplify:  $\frac{x}{x^2-16} - \frac{4}{x^2+5x+4}$

- a)  $\frac{x^2+3x+16}{(x-4)(x+4)(x+1)}$     b)  $\frac{x^2-3x+16}{(x-4)(x+4)}$     c)  $\frac{x^2-3}{(x-4)(x+4)(x+1)}$   
 d)  $\frac{x^2-3x+16}{(x-4)(x+4)(x+1)}$     e)  $\frac{x^2+3x}{(x-4)^2(x+1)}$

14) Given a triangle ABC with the following coordinates: A (2a,2b), B (2c,2d), and C (0, 2e). Find the slope of the altitude from B to side AC.

- a)  $\frac{e-b}{a}$     b)  $\frac{a}{e-b}$     c)  $\frac{b-e}{a}$     d)  $\frac{a}{b-e}$     e)  $\frac{2a}{e-b}$

15) Write the converse for the statement: "If it rains today; then it will snow tomorrow."

- a) If it does not snow tomorrow; then it will not rain today.  
 b) If it snows tomorrow; then it will rain today.  
 c) If it snows tomorrow; then it will not rain today.  
 d) If it does not rain today; then it will not snow tomorrow.  
 e) If it rains today; then it will not snow tomorrow.

16) Find the next number in the following number sequence: 0, 1, 5, 14, 30, 55,

- a) 27    b) 71    c) 84    d) 89    e) 91

17) Define the operation "@", on real numbers as  $a@b = \frac{a+b}{2}$ . Evaluate:  $[(x-2)@(x+4)]@(x+7)$

- a)  $x+3$     b)  $x+3.5$     c)  $3x+9$     d)  $3x+4$     e)  $x+4$

18) What is the five number summary for the following set of data?

41    46    49    53    59    60    64    70    72    76    85    87    90    94    95

- a) 41, 56, 70, 86, 95    b) 41, 52.0, 70, 85.5, 95    c) 41, 52, 71, 85.5, 95  
 d) 41, 49, 70, 85, 95    e) 41, 53, 71, 87, 95.

19) What is the ratio of the area of a square that circumscribes a circle to the area of a square that inscribes the same circle?

- a) 2:1    b) 3:2    c)  $2:\sqrt{2}$     d)  $\sqrt{3}:2$     e) 5:3

20) How far does a wheel of radius 3 feet roll along level ground in making 136 revolutions?

- a)  $816\pi$  ft.    b)  $408\pi$  ft.    c)  $1224\pi$  ft.    d)  $1632\pi$  ft.    e)  $5280\pi$  ft.

21) If the graphs of  $x - y + 7 = 0$  and  $ax + 3y - 2 = 0$  are perpendicular, then the value of "a" is?

- a)  $-\frac{1}{3}$     b) 3    c)  $\frac{1}{3}$     d) -3    e)  $-\frac{2}{7}$

22) What is the area (in square inches) of a ring formed by two concentric circles if a tangent to the small circle forms a chord 10 inches long in the larger circle?

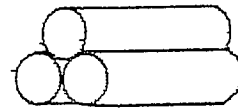
- a)  $5\pi$       b)  $10\pi$       c)  $25\pi$       d)  $100\pi$       e) not enough information given

23) If  $3^{x+1} + 3^{x-2} = 84$ , then find  $2x^2$

- a) 3      b) 28      c) 18      d) 27      e) 12

24) Three cylinders are placed on the table as shown. Each cylinder has a diameter of 150 centimeters. To the nearest centimeter, how tall is the stack?

- a) 257 cm      b) 280 cm  
c) 290 cm      d) 295 cm  
e) 300 cm



25) Let ABC be an equilateral triangle with sides  $x$ . Let P be a point of intersection of the three angle bisectors. Find  $\overline{AP}$ .

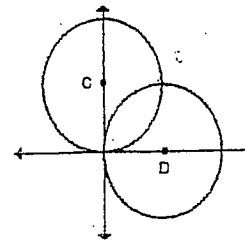
- a)  $\frac{x\sqrt{3}}{3}$       b)  $\frac{x\sqrt{3}}{6}$       c)  $\frac{x\sqrt{3}}{4}$       d)  $\frac{5x\sqrt{3}}{6}$       e)  $\frac{2x\sqrt{3}}{3}$

26) What is the length of a chord which is the perpendicular bisector of a radius of length 12 inches in a circle?

- a)  $3\sqrt{3}$       b) 27      c)  $6\sqrt{3}$       d)  $9\sqrt{3}$       e)  $12\sqrt{3}$

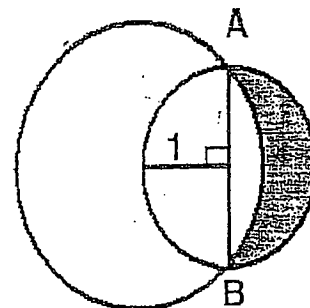
27) Circle C, has a center  $(0, 2)$  with a radius of 2, and circle D has a center  $(2, 0)$  with a radius of 2. The circles overlap in the first quadrant. What is the area of the overlap?

- a)  $3\pi - 7$  sq. units  
b)  $2\pi - 4$  sq. units  
c)  $\pi - 1$  sq. units  
d)  $2\pi - 2$  sq. units  
e)  $4 - \frac{\pi}{2}$  sq. units



28) The center of a circle lies on a unit circle and passes through the endpoints of a diameter  $\overline{AB}$ . Find the area of the crescent indicated by the shaded region.

- a)  $\frac{1}{2}\pi - 1$  sq. units  
b)  $\frac{1}{2}\pi + 1$  sq. units  
c)  $\frac{1}{2}\pi$  sq. units  
d)  $\frac{3}{2}$  sq. units  
e) 1 sq. unit

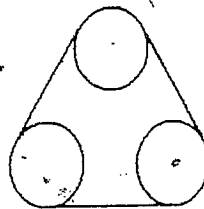


29) Tree A stands five meters from tree B. A map indicates that a treasure is buried 2 meters from tree A and four meters from tree B. Assuming the information on the map is true, what is the greatest number of places you would have to dig (if you know what you are doing) to locate the treasure.

- a) 1      b) 2      c) 3      d) 4      e) 5

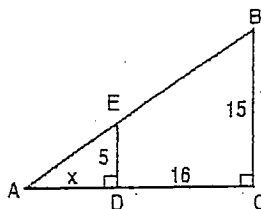
- 30) Three wheels, each with a radius of 1, have their centers at respective vertices of an equilateral triangle of side length of 4. A belt is wrapped continuously around the wheels. Find the length of the belt.

- a)  $3(\pi+4)$     b)  $\frac{2}{3}\pi+4$   
 c)  $2(\pi+6)$     d)  $\frac{3}{2}\pi+12$   
 e)  $6(\pi+2)$

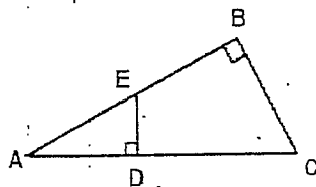


- 31) Given the right triangles ABC and AED. Find the length of x of  $\overline{AD}$ , when  $\overline{ED} = 5$ ,  $\overline{BC} = 15$  and  $\overline{DC} = 16$ .

- a) 4    b)  $5\frac{1}{3}$     c) 8  
 d)  $10\frac{2}{3}$     e) 11



- 32) In the figure triangles ABC and ADE are right triangles with length of  $AB = 24$ , length of  $BC = 10$ , length of  $AC = 26$ , and the length of  $AD = x$ . Find x to the nearest tenth so that the area of triangle ADE is 6 square units.



- a) 1.2    b) 2.2  
 c) 2.4    d) 5.4  
 e) 6.0

- 33) Find the area of a regular hexagon that is inscribed in a circle of radius 10 cm,  
 a)  $150\sqrt{3} \text{ cm}^2$     b)  $150 \text{ cm}^2$     c)  $25\sqrt{3} \text{ cm}^2$     d)  $600 \text{ cm}^2$     e)  $300\sqrt{3} \text{ cm}^2$

- 34) The hypotenuse of a right triangle has a length of  $\sqrt{164}$  meters and the sum of the legs is 18 meters. What is the area of this triangle?

- a)  $40.0 \text{ m}^2$     b)  $45.5 \text{ m}^2$     c)  $50.0 \text{ m}^2$     d)  $55.0 \text{ m}^2$     e)  $55.5 \text{ m}^2$

- 35) The circumference of a sphere is increased from 20 cm to 25 cm. What is the increase in the radius of the sphere?

- a)  $\frac{\pi}{5} \text{ cm}$     b)  $\frac{5}{2\pi} \text{ cm}$     c) 2.5 cm    d) 5 cm    e)  $\frac{5}{\pi} \text{ cm}$

- 36) The sides of a parallelogram 16 cm and 24 cm long, and one angle measures  $48^\circ$ . The area of the parallelogram is closest to

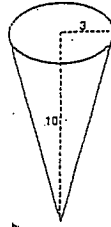
- a)  $263 \text{ cm}^2$     b)  $278 \text{ cm}^2$     c)  $285 \text{ cm}^2$     d)  $294 \text{ cm}^2$     e)  $305 \text{ cm}^2$

- 37) Two exterior angles of a pentagon have measures of 75 degrees and 105 degrees. The measures of the remaining three angles have a ratio of 3:4:5. The measure of the smallest angle, in degrees, is

- a) 15    b) 30    c) 40    d) 45    e) 75

- 38) The conical tank shown with a base radius of 3 feet and height 10 feet is full of water. What will the depth be when half of the water is drawn out?

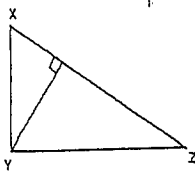
- a)  $\frac{5\sqrt[3]{9}}{3}$     b)  $5\sqrt[3]{4}$     c) 5  
 d)  $2\sqrt[3]{10}$     e) 6



- 39) The height of a square pyramid formed by four equilateral triangles is 10. What is the surface area of one of these triangles?

- a)  $50\sqrt{3}$     b) 100    c)  $15\sqrt{2}$     d)  $100\sqrt{3}$     e)  $25\sqrt{6}$

- 40)  $\triangle XYZ$  is a right triangle with the right angle at Y. The altitude to the hypotenuse XZ divides XZ into segments of 16 cm and 36 cm. The length of the altitude is:



- a)  $16\sqrt{13}$  cm    b)  $32\sqrt{13}$  cm    c) 24 cm  
 d) 36 cm    e) 52 cm

- 41) Change from rectangular to polar form:  $(-4, -4\sqrt{3})$ .

- a)  $(8, \frac{4\pi}{3})$     b)  $(-4, \frac{4\pi}{3})$     c)  $(\frac{4\pi}{3}, -8)$     d)  $(8, \frac{-4\pi}{3})$     e)  $(\frac{-2\pi}{3}, 8\sqrt{3})$

- 42) Find the distance between the points of intersection of  $x^2 + y^2 = 25$  and  $x + 2y = 5$

- a) 4    b)  $4\sqrt{5}$     c)  $5\sqrt{4}$     d) 10    e) 80

- 43) Find the center of the graph of  $-4x^2 + 9y^2 + 36y + 8x - 4 = 0$

- a) (1, -2)    b) (-1, 2)    c) (-2, 1)    d) (2, -1)    e) (1, 2)

- 44) Solve for x and choose the letter that corresponds to the sum of the solution(s):  $3^{2x} - 3^x - 20 = 0$

- a)  $sum = \frac{1}{\ln(5)}$     b)  $sum = 1$     c)  $sum = \frac{\ln(3)}{\ln(5)}$     d)  $sum = \frac{\ln(5)}{\ln(3)}$     e)  $sum = \frac{9}{\ln(3)}$

- 45) If  $\csc(x) = -5$  and  $\tan(x) < 0$ , then  $\cos(x) =$

- a)  $\frac{24}{25}$     b)  $\frac{-1}{5}$     c)  $\frac{2\sqrt{6}}{5}$     d)  $\frac{\sqrt{26}}{5}$     e)  $\frac{-2\sqrt{6}}{5}$

- 46) A survey of 300 high school students regarding their music preferences determined that 140 liked rap music, 115 liked country music, and 125 liked rock music, while only 50 liked all three. It was determined that 40 liked only rap music, 25 liked only country music, and 45 liked only rock music. How many liked none of these types of music?

- a) 60    b) 80    c) 110    d) 140    e) 155

- 47) The equation  $\sqrt{2x-1} - \sqrt{x-1} = 1$  has two solutions. The sum of these solutions is

- a) 3    b) 4    c) 5    d) 6    e) 7

- 48) Solve completely for x:  $\log_2 x + \log_2(x-7) = 3$

- a) -1, 4    b) 1, 8    c) 8    d) 16    e) 20

- 49) April has a rectangular garden that is 16 feet long and 8 feet wide. She wants to put a strip of gravel of uniform width around the garden. She has enough gravel to cover 112 square feet. How wide should she make the strip?

a) 1 ft                      b) 2 ft                      c) 3 ft                      d) 4 ft                      e) 5 ft

Jane filled her beaker with 40 ml of a 75% solution of hydrochloric acid. Her chemistry teacher pointed out that she should have 40 ml of a 50% hydrochloric acid solution. Jane drains  $x$  ml from her beaker and replaces with  $x$  ml of water to get the proper solution. In which of the following ranges does  $x$  lie?

a) Less than 5                      b) At least 5, but less than 10                      c) At least 10, but less than 15  
d) At least 15, but less than 20                      e) 20 or more

- 51) A parabolic function with a vertex (3,19) and a y-intercept of 1 passes through which of the following points?

a) (5, 11)                      b) (5, 13)                      c) (5, 15)                      d) (5, 18)                      e) (5, 25)

- 52) If  $a + b + c + d = 15$ ,  $a - b + c - d = 3$ , and  $a + b - c - d = 7$ . Determine  $b + 2c + 3d$

a) 25                      b) 20                      c) 14                      d) 10                      e) 7

- 53) Which values of  $x$  for which  $f(x) < g(x)$  given the functions  $f(x) = \frac{4}{x-1}$  and  $g(x) = \frac{2}{x+1}$

a)  $\langle -3, -1 \rangle \cup \langle 1, \infty \rangle$                       b)  $\langle -1, 1 \rangle \cup \langle 1, \infty \rangle$                       c)  $\langle -3, \infty \rangle$   
d)  $\langle -3, -1 \rangle \cup \langle -1, \infty \rangle$                       e)  $\langle -\infty, -3 \rangle \cup \langle -1, 1 \rangle$

A test consists of 10 true/false questions. To pass the test the student must answer at least 7 questions correctly. If a student guesses in each question, what is the probability that the student will pass the test?

a) 0.0                      b) 0.117                      c) 0.172                      d) 0.055                      e) 0.945

What is the probability that 6 rolls of a fair die will show four exactly 2 times?

a) 0.0067                      b) 0.0134                      c) 0.20094                      d) 0.3333                      e) 0.41667

- 56) Find the points of intersection of the ellipse  $16x^2 + 25y^2 = 400$  and the line  $5y + 4x = 20$

a) (0,4) and (5,0)                      b) (0,-4) and (-5,0)                      c) (0,5) and (4,0)  
d) (0,-4) and (0,-5)                      e) (0,4) and (0,-5)

A poker hand consists of five cards dealt from an ordinary deck of 52 playing cards. How many different hands are there consisting of 4 hearts and 1 spade?

a) 13                      b) 65                      c) 715                      d) 728                      e) 9295

- 58) From a hot air balloon 2 km high, the angles of depression to two towns east of the balloon and in line with the balloon are 81.2 degrees and 13.5 degrees. Which of the following best approximates the distance between the two towns?

a) 7.5 km.                      b) 8 km.                      c) 8.5 km.                      d) 9 km.                      e) 9.5 km.

- 59) For any nonzero  $a$  and  $b$ , define a sequence as follows:

$$x_1 = a, x_2 = b, x_{n+2} = \frac{x_{n+1} + 1}{x_n} \text{ for } n = 1, 2, 3, \dots \text{ Find } x_6$$

a)  $a$                       b)  $b$                       c)  $\frac{a+1}{b}$                       d)  $\frac{a+b+1}{ab}$                       e)  $\frac{b+1}{a}$