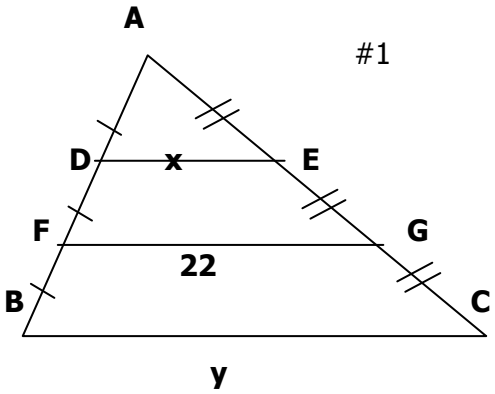
THETA GEMINI TEST

Note: For each problem, where there is no choice (e), assume (e) none of the above. Please bubble in one student code in the appropriate place on the answer sheet. If you have a partner, write his/her code on the answer sheet just inside the square for name.

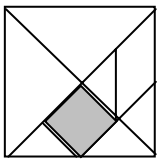
1. Find the values for x and y given:
(a) (7,32) (b) (11,44)
(c) (19,25) (d) (21,23)

#1



2. Harry has 3 sisters and 5 brothers. His sister Harriet has S sisters and B brothers. What is the product of S and B?
(a) 8 (b) 10 (c) 12 (d) 15 (e) 18

#3



3. What is the ratio of the shaded square to the area of the large square. (Figure is drawn to scale)
(a) $\frac{1}{6}$ (b) $\frac{1}{7}$ (c) $\frac{1}{8}$ (d) $\frac{1}{12}$ (e) $\frac{1}{16}$

4. If a, b, and c are digits for which $\begin{array}{r} 7\,a\,2 \\ -\,4\,8\,b \\ \hline c\,7\,3 \end{array}$, then a + b + c = ?
(a) 14 (b) 15 (c) 16 (d) 17 (e) 18

5. Let PQRS be a square piece of paper. P is folded onto R, and then Q is folded onto S. The area of the resulting figure is 9 square inches. Find the perimeter of square PQRS.
(a) 9 (b) 16 (c) 18 (d) 24 (e) 36

6. Walter rolls four standard dice and finds that the product of the numbers on the upper faces is 144. Which of the following could NOT be the sum of the upper four faces?
(a) 14 (b) 15 (c) 16 (d) 17 (e) 18

7. State the domain of the function: $f(x) = \frac{x-5}{x+2}$
$(a)\ \{all\ \Re\ except\ 5\}$ $(b)\ \{all\ \Re\ except\ -5\}$ $(c)\ \{all\ \Re\ except\ 2\}$ $(d)\ \{all\ \Re\ except\ -2\}$

8. The number of seniors at a high school is $\frac{2}{3}$ the number of juniors. The number of juniors is $\frac{3}{4}$ the number of sophomores. What is the number of seniors if the total enrollment for the three classes is 360? (a) 160 (b) 120 (c) 100 (d) 80

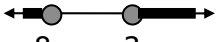
9. Solve the formula for π. $\frac{4}{3}\pi r^3 = A$

$a.\ \pi=\frac{3}{4}\left(A-r^2\right)$ $b.\pi=\frac{3A}{4r^3}$ $c.\ \pi=\frac{3Ar^3}{4}$ $d.\ \pi=\frac{4}{3}Ar^3$ $e.\ \pi=A-\frac{4}{3}r^3$

10. Write the equation of a line that passes through the points (-5,2) and (9,-5).

(a) $y-2=\frac{-1}{2}(x+5)$ (b) $y-2=2(x+5)$ (c) $y+5=2(x-9)$ (d) $y+5=\frac{3}{4}(x-9)$

11. The solution for $|2x+5|\le 11$ is a) 

b) 

c) 

d) 

12. If a person takes a trip and is 30 miles from home at the end of 45 minutes, and is 117.45 miles from home at the end of 2.4 hours, what is this person's rate of change in miles per hour? (a) 38 mph (b) 50 mph (c) 53 mph (d) 72 mph

13. Solve for x: $\frac{x}{3}+\frac{2x^2}{3x-4}=\frac{9x-2}{9}$ a) $\frac{4}{15}$ b) 4 c) $\frac{3}{7}$ d) 3

14. Y varies directly as the square of W and inversely as Z. If Y = 6 when W = 2 and Z = 5, find Y when W = 6 and Z = 9. a) $\frac{6}{5}$ b) 30 c) 10 d) $\frac{54}{5}$

15. If $f(x)=\frac{3x+6}{x+3}$, *then* $f(a+2)=$ (a) $\frac{12}{5}$ (b) $\frac{3a+12}{a+5}$ (c) $\frac{3a+8}{a+3}$ (d) $\frac{3a+12}{a+3}$ (e) $\frac{3a+6}{a+3}$

16. Find the interior angles of a pentagon if its interior angles are represented by x - 10, 2x - 20, 2x - 10, 2x + 10, and 3x - 30. (a) 60, 80, 120, 130, 150 (b) 60, 80, 90, 150, 160 (c) 35, 70, 80, 155, 200 (d) 50, 100, 110, 130, 150

17. Which is the largest? (a) $\frac{\frac{1}{2}}{\frac{3}{4}}$ (b) $\frac{\frac{1}{2}}{\frac{3}{4}}$ (c) $\frac{1}{\frac{\frac{2}{3}}{4}}$ (d) $\frac{1}{\frac{2}{\frac{3}{4}}}$

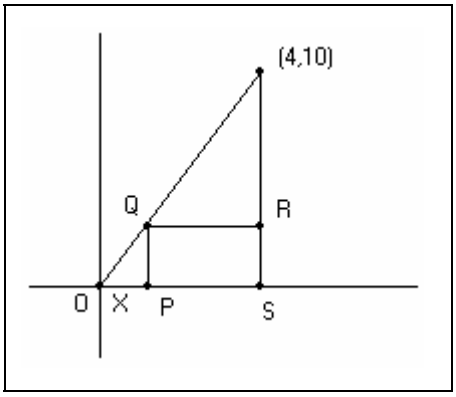
18. Write a formula for the area of rectangle PQRS in terms of x.

(a) $A=(4-x)(10-y)$

(b) $A=20-\frac{1}{6}\sqrt{116-x^2}$

(c) $A=20-\frac{xy}{2}$

(d) $A=10x-\frac{5}{2}x^2$



19. Simplify: $(-3b)^2$. (a) $-6b$ (b) $-9b^2$
(c) $-3b^2$ (d) $3b^2$ (e) $9b^2$

20. Which of the following numbers if the largest? (a) 9.12344 (b) 9.123444...
(c) 9.12343434... (d) 9.1234234... (e) 9.12341234...

21. In triangle ABC, angle C is a right angle and CB > CA. Point D is located on segment BC so that angle CAD is twice angle DAB. If $\frac{AC}{AD}=\frac{2}{3}$, then $\frac{CD}{BD}=\frac{m}{n}$, where m and n are relatively prime positive integers. Find m+n. (a) 10 (b) 14 (c) 18 (d) 22 (e) 26

22. At Luvamathville Junior High 30 % of the students in the math club are in the science club, and 80% of the students in the science club are in the math club. Fifteen students are in the science club. How many students are in the math club? (a) 12 (b) 16 (c) 30 (d) 36 (e) 40

23. Hydrogen and carbon chemically combine in the ratio of 3:2 to make moth balls. How much carbon is in a mass of 1200 g of moth balls? (a) 480 (b) 620 (c) 800 (d) 1800

24. Given $f(x)=\frac{x}{2}-\frac{3}{2}$, find $f^{-1}(x)$. (a) $\frac{2}{x}-\frac{2}{3}$ (b) $\frac{2}{x}+\frac{2}{3}$ (c) $\frac{x}{2}+\frac{3}{2}$ (d) $2x+3$

25. How many zeros are there in : $\left(10^{100}\right)^{100}$? (a) 1000 (b) 10000 (c) 100000 (d) 1000000

26. Which is not in the graph of the solution to $3x-y\geq 1$?
(a) (2, 1) (b) (1, 2) (c) (- 1, - 1) (d) (0, - 2)

27. What is the remainder for $\frac{x^4+2x^3-11x^2-7x+20}{x-1}$? (a) 5 (b) 10 (c) 15 (d) 19

28. Simplify: $\frac{|14-3|-|7-16|}{3|-2+1|}$ (a) 0 (b) $\frac{2}{3}$ (c) $-\frac{20}{3}$ (d) $\frac{20}{3}$

29. Each of two congruent sides of an isosceles triangle is 2 cm longer than twice the length of the base. If the perimeter of the triangle is 29 cm, what is the length of the base?
(a) 5 cm (b) 8 cm (c) 9 cm (d) 12 cm

30. Find the minimum of the expression - 2x + y over the triangular region with vertices (- 1, - 1), (1, 3), and (- 3, - 2). (a) - 6 (b) - 5 (c) - 4 (d) - 3

31. Find 2 geometric means between 4 and -32. (a) -8,16 (b) 8, -16 (c) 6, -6 (d) 8, 16

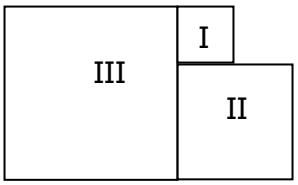
32. Find the value of $\sum_{k=1}^{\infty} 8\left(\frac{2}{3}\right)^{k-1}$. (a) 8 (b) 12 (c) 24 (d) 64

33. What is a + b given: $\sqrt{\frac{3}{2}\cdot\frac{4}{3}\cdot\frac{5}{4}\cdot\ldots\cdot\frac{a}{b}} = 3$? (a) 13 (b) 17 (c) 31 (d) 35

34. Which of the following operations has the same effect on a number as multiplying by $\frac{3}{4}$ and dividing by $\frac{3}{5}$? (a) dividing by $\frac{4}{3}$ (b) dividing by $\frac{9}{20}$ (c) multiplying by $\frac{9}{20}$ (d) dividing by $\frac{5}{4}$ (e) multiplying by $\frac{5}{4}$

35. A snap together cube has a protruding snap on one side and receptacle holes on the other 5 sides. What is the smallest number of these cubes that can be snapped together so that only receptacle holes are showing? (a) 3 (b) 4 (c) 5 (d) 6 (e) 8

36. Figures I, II and III are squares. The perimeter of I is 12 and II is 24. Find the perimeter of III. (a) 9 (b) 18 (c) 36 (d) 72 (e) 81



37. A circle of radius r has chords AB of length 10 and CD of length 7. When AB and CD are extended through B and C, respectively, they intersect at a point P, which is outside the circle. If $m\angle APD = 60^\circ$, and BP - 8, then r^2 = ? (a) 70 (b) 71 (c) 72 (d) 73 (e) 74

38. A cube of edge 3 cm is cut into N smaller cubes, not all the same size. If the edge of each of the smaller cubes is a whole number of centimeters, then what is the value of N? (a) 4 (b) 8 (c) 12 (d) 16 (e) 20

39. Several sets of 3 different numbers can be chosen from {1, 2, 3, 4, 5, 6, 7, 8, 9}. How many of these sets contain a 5? (a) 3 (b) 4 (c) 5 (d) 6 (e) 7

40. If $n = 3^x + 3^x + 3^x$, then n^2 equals which of the following?
(a) 9^{3x} (b) 27^{2x} (c) 9^{x+1} (d) 27^{6x} (e) 27^{3x}