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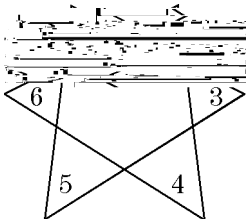
Team Math Quest - Category B

1. How many degrees are in the sum of the measures of the six numbered angles pictured.



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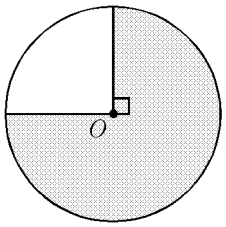
2. Find the area of the shaded region in circle O [illegible] O is 10. Express your answer in terms of π.



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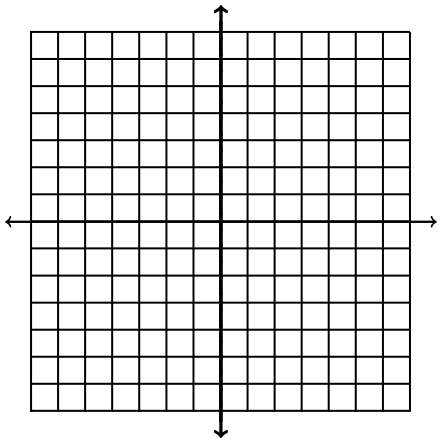
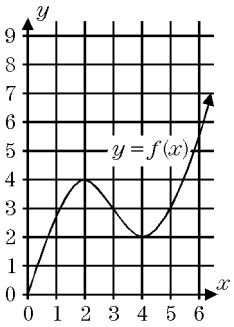
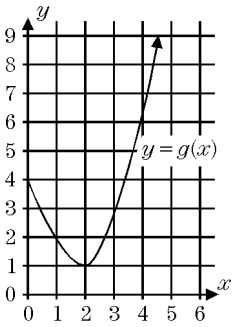
3. What is the number of square units in the area of the pentagon whose vertices are $(1, [redacted], -[redacted], 2)$, $(5, [redacted], 5)$?



4. What is the value of $f(g(0))$?





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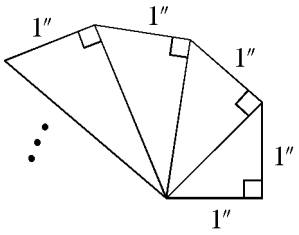
5. Long term parking rates at Logan International Airport are:

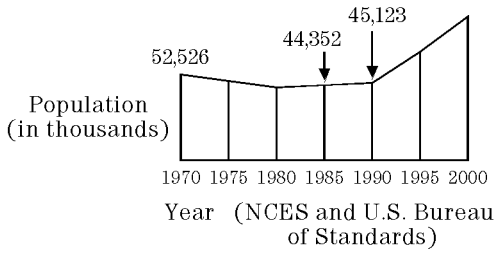
each 24 hours	$3.50
0–2 hours	$1.25
each additional hour	$0.50 (up to a maximum of $3.50 per day)

Jim entered the Long Term Parking Lot at 3:30 pm on Friday and left the lot at 11:00 pm the following Sunday. How much did he pay for parking?

1 inch as shown. Find the number of inches in the length of the hypotenuse of the tenth right triangle. Express your answer in simplified radical form.

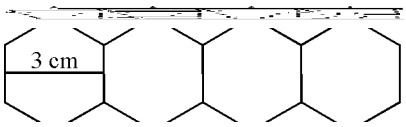


7. The number of United States school age children (in thousands) is shown in the following graph.

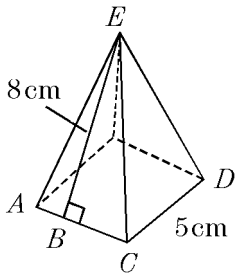


[redacted] x [redacted]
of school age children predicted for the year 2000, find x.

8. Regular hexagons are placed side-by-side in a continuous pattern. What is the maximum number of congruent hexagons that can be placed side-by-side such that the perimeter of the resulting figure is less than 100 cm?



9. What is the number of square centimeters in the surface area of the square pyramid shown if all lateral faces are congruent isosceles triangles? The length of $\overline{BE}$ is 8 cm and the length of $\overline{CD}$ is 5 cm.



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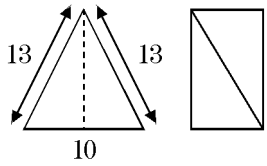
10. The isosceles triangle is cut in half and reassembled as the rectangle shown. What is the perimeter of the rectangle?



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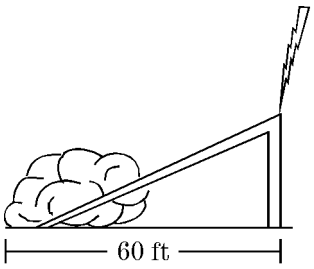
(in thousands)

Group	1980	Projected for 1990
White-collar	51,436	64,752
Blue-collar	32,435	40,497
Service	15,547	20,234
Farm	2,689	2,426

U.S. Department of Labor

12. Lightning hit a tree one-fourth of the distance up the trunk from the ground, breaking the tree so that its top landed at a point 60 feet from its base, as shown. How many feet tall was the tree originally?



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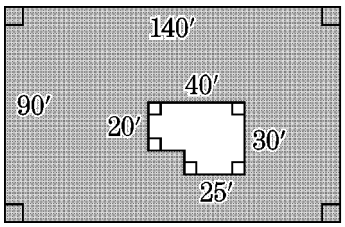
13. A map of a homeowner's lot is shown. The homeowner plans to seed grass in the shaded portion and to fertilize it once. Grass seed costs \$8.95 a bag, and one bag will seed 2500 square feet. Fertilizer costs \$3.95 a gallon, and one gallon will fertilize 4000 square feet. How much will it cost the homeowner to plant and fertilize his lawn?

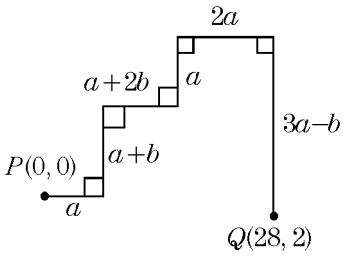


14. The annual incomes of the ten families living in a subdivision are:

$28,000	$ 35,000
$26,750	$180,000
$92,000	$ 27,500
$30,000	$ 26,750
$26,000	$ 27,000

Which statistic, the mean, median, or mode, is closest to the income of the greatest number of families?

15. Adam traces a path from $P(0,0)$ to $Q(28,-2)$ with the lengths of the horizontal and vertical segments as shown. What is the value of $a+b$?



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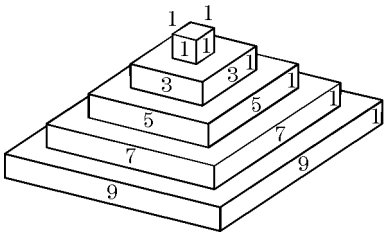
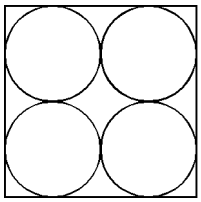
16. A step pyramid is formed by stacking successively smaller "steps" as illustrated in the drawing. If the edges of each square "step" have lengths 9, 7, 5, 3 and 1, and each "step" is 1 unit high, find the number of cubic units in the volume of this solid.



17. In the figure shown, four circles are tangent to each other and to the sides of the square as shown. A dart [redacted] your answer as a ratio in terms of π.



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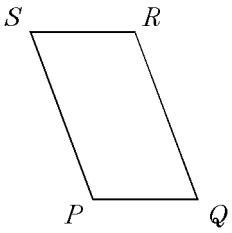
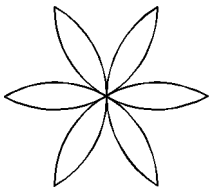
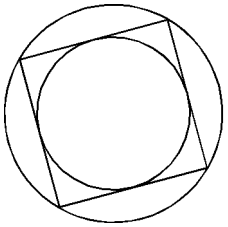
[redacted] $PQRS$, angle P [redacted] Q. How many degrees are in the measure of angle P?



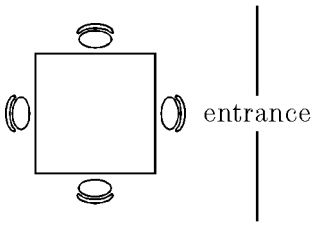
(Two flowers are the same if one can be obtained from another by rotating the flower.)



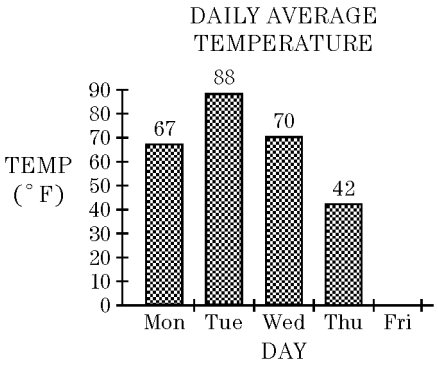
20. Both the inscribed and circumscribed circles are drawn for a square. What is the number of square inches in the area of the outer circle if the radius of the inner circle is 7 inches? Express your answer in terms of π.



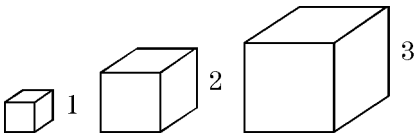
21. In how many ways can a host seat three guests and himself around a square table so that he sits in the chair nearest the entrance?



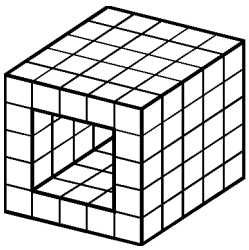
22. What must the average temperature, in degrees Fahrenheit, be on Friday in order to have a 5-day average of 70 degrees?



23. The cubes in the diagram have sides of 1, 2, and 3, respectively. If the pattern continues, what will be the sum of the number of cubic units in the volumes of the first 100 cubes in the sequence?



24. A $5 \times 5 \times 5$ cube is made leaving a 3 cube by 3 cube by 5 cube hole in the interior. The figure is then dipped in paint. How many of the cubes are painted on exactly two faces?



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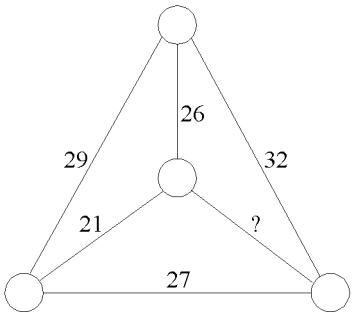
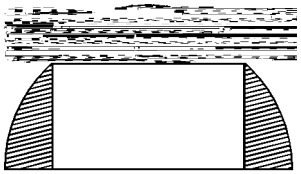
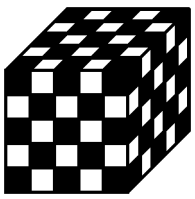
25. The number listed on each segment indicates the sum of the numbers represented by the two circles at the ends of the segment. One of the segment numbers is missing. What is the missing number?



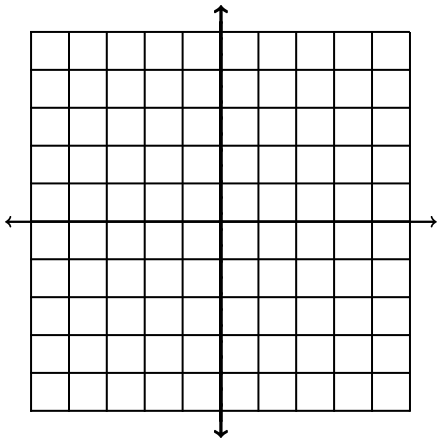
26. Rectangle $ABCD$, with $AB = 2BC$, is inscribed in a semicircle of radius 5 m. How many square meters, to the nearest whole number, are in the area of the shaded region?



27. Black and white unit cubes are alternately placed to form a $5 \times 5 \times 5$ cube as shown. How many black unit cubes are in the larger cube?



28. A triangle is formed by the lines $4x-y=3$, $x-y=0$, and $x+2y=12$. What is the sum of the y-coordinates of the three vertices?



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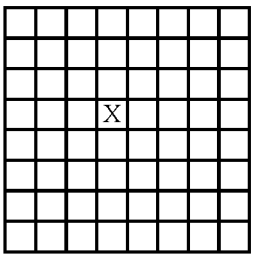
29. In the game of chess, the queen can move any number of spaces in one direction, either vertically, horizontally, or diagonally. On the chess board shown, the position of the queen is marked with an X. To how many squares could the queen move from its present position (not counting its present position)?



30. Partial tables of values for 2 linear functions are shown:

x	$f(x)$
2	5
4	9
6	13
8	17

x	$g(x)$
2	4
4	10
6	16
8	22

If the domains of f and g are the set of real numbers, find the value(s) of x for which $f(x) = g(x)$.

Answer List

1. 360 (degrees)
2. 75π (units^2)
3. 22 (square units)
4. 2
5. \$10.50
6. $\sqrt{\quad}$
7. 48,207
8. 13 (hexagons)
9. 105 (cm^2)
11. Service
12. $60\sqrt{2}$ (ft)
13. \$56.60
14. median
15. 8
16. 165 (units^3)
17. $\frac{\pi}{4}$
18. 144 (degrees)
19. 14 (ways)
20. 98π (square inches)
21. 6 (ways)
22. 83 ($^\circ$F)
23. 25,502,500
24. 48 (cubes)
25. 24
26. 14 (square meters)
27. 63 (cubes)
28. 10
29. 27 (squares)
30. 3