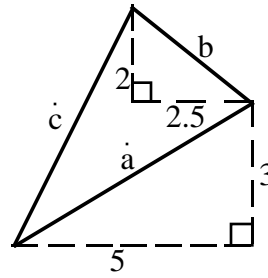


## 1999 Written Quest

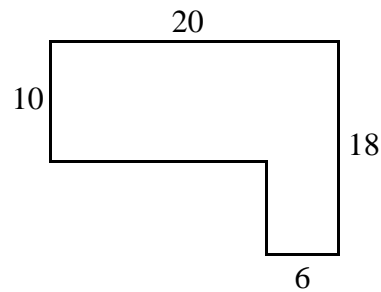
- Which of the following points is collinear with the points (1, -2) and (6, 1)?  
a) (4, -1)      b) (5, 0)      c) (12, 4)      d) (-4, -5)
- How many real numbers are there such that the 5th power of the number is the sum of the 4th and 3rd powers of the number?  
a) 1      b) 2      c) 3      d) 5      e) none of these
- "Snake-eyes" occur when you roll two 1's on a pair of regular, six-sided dice, numbered from 1 to 6. On any roll, what is the probability of rolling snake-eyes?  
a)  $1/6$       b)  $1/3$       c)  $1/36$       d)  $2/36$       e)  $1/18$
- If  $x$  is a positive integer, which could be an odd integer?  
a)  $2x + 2$       b)  $x^3 - x$       c)  $x^2 - x$       d)  $x^2 + x$       e)  $7x - 3$
- Which of the following has the highest probability?  
a) Flipping five heads in a row with a fair coin.  
b) Pulling the queen of hearts out of a shuffled deck of cards  
c) Winning at roulette by betting on 7 (there are 38 numbers on a roulette wheel).  
d) Rolling snake eyes (two ones) when rolling two fair dice.  
e) All of the above.
- Base seven has digits 0, 1, 2, 3, 4, 5, 6. In base seven  $5 + 3 = 11$ . 6636 and 36 are base seven numbers. What is their sum?  
a) 6672      b) 10,000      c) 10,002      d) 10,005      e) none of these
- Given  $|2x - 7| > 7$ . Solve for  $x$ .  
a)  $x < -7$  or  $x > 7$       b)  $x < -7/2$  or  $x > 7/2$   
c)  $x < 0$  or  $x > 7$       d)  $x < -2/7$  or  $x > 7$
- Suppose there exists an imaginary number  $i$  such that  $i^2 = -1$  or  $\sqrt{-1} = i$ . Then  $(3 + 5i)(2 - i)$  equals:  
a)  $11 - 7i$       b)  $11 + 7i$       c)  $6 - 5i^2$       d) 11

9. In the diagram, if ray  $\vec{a}$  is represented as  $(5, 3)$  and ray  $\vec{b}$  is represented as  $(-2.5, 2)$ , then ray  $\vec{c}$  would be represented as:



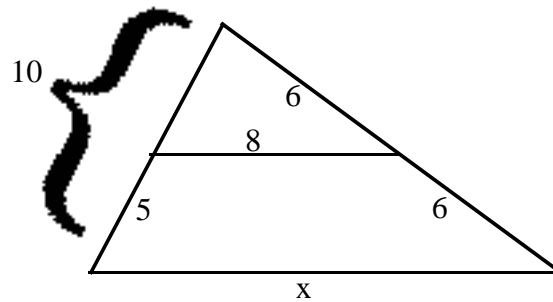
- a)  $(2.5, 5)$       b)  $(3, 2)$       c)  $(\sqrt{5^2 + 3^2}, -\sqrt{(-2.5)^2 + 2^2})$       d)  $(5, 5)$
10. Pipes A, B, and C individually drain a basin in 3, 2, and 1.5 hours respectively. If they were all opened to drain the basin together, how many minutes would it take?
- a) 20      b) 40      c) 60      d) 90
11. The alternate interior angles formed by the transversal of two parallel lines are complementary. What is the positive difference in the degree measure of these two angles?
- a)  $90^\circ$       b)  $180^\circ$       c)  $0^\circ$       d) Not enough information.
12. The hypotenuse of a right triangle is 37 m and one leg is 12 m. How many square meters are in the area of the triangle?
- a) 210      b) 222      c) 444      d) 420      e) 147
13. A sheep is worth a pig and a dog. Two sheep are worth three dogs. How many pigs is a sheep worth?
- a) 2      b) 3      c)  $\frac{1}{3}$       d)  $\frac{3}{2}$       e) 1 pig and 1 dog.
14. What is the last digit of  $93^{36}$ ?
- a) 3      b) 9      c) 7      d) 1      e) 4
15. What is the probability that the ones digit is 9 in the sum of two two-digit prime numbers?
- a)  $\frac{4}{10}$       b)  $\frac{3}{10}$       c) 0      d)  $\frac{4}{9}$       e)  $\frac{1}{3}$
16.  $\triangle MNP$  is formed by joining the midpoints of the sides of equilateral  $\triangle ABC$ . What is the ratio of the area of  $\triangle MNP$  to the area of  $\triangle ABC$ ?
- a)  $\frac{4}{1}$       b)  $\frac{1}{3}$       c)  $\frac{1}{4}$       d)  $\frac{3}{4}$       e)  $\frac{3}{1}$

17. What is the area of this figure?



- a) 56                      b) 74                      c) 264                      d) 274                      e) none of these

18. What is the length of the side marked  $x$ ?



- a) 13                      b) 14                      c) 15                      d) 16                      e) 17

19. If two sides of a triangle measure 5 cm and 8 cm, which of these could NOT be the length of the third side?

- a) 4                      b) 7                      c) 11                      d) 12                      e) 14

20. A picture of a triangle is placed on a copy machine and enlarged so that each side is twice as long as on the original picture. How does the area of the new picture compare to the area of the old picture?

- a) It is the same.                      b) It is half as big.                      c) It is twice as big.  
d) It is four times as big.                      e) It is one fourth as big.

21. If a circle of radius 2 cm is inscribed in a square, what is the area of the square?

- a)  $4 \text{ cm}^2$                       b)  $4\pi \text{ cm}^2$                       c)  $8 \text{ cm}^2$                       d)  $16 \text{ cm}^2$                       e)  $16\pi \text{ cm}^2$

22. Janine received test scores of 88%, 92%, 79%, 94%, and 86%. What is the minimum score she must receive on her final exam if the five test scores are weighted equally, the final exam score is weighted twice as much as each test score, and if she wishes to have an overall average of 91%?
- a) 91%            b) 95%            c) 89%            d) 99%            e) It is impossible for her to score high enough on the final exam to have an overall average of 91%.
23. A fly is in one corner of a cubical room which measures 10 ft. by 10 ft. by 10 ft. What is the shortest distance (in feet) to the opposite corner?
- a)  $10\sqrt{3}$             b)  $10\sqrt{5}$             c)  $10\sqrt{10}$             d) 30            e)  $10 + 2\sqrt{10}$
24. The outer surface of a rectangular block whose dimensions are 3 inches by 4 inches by 5 inches is painted blue. The block is then cut into one inch cubes. How many of the cubes will have exactly one of its sides blue?
- a) 60            b) 22            c) 0            d) 30            e) none of these
25. A man 6 feet tall stands 8 feet from the base of a lamppost. If his shadow is 16 feet long, the height of the lamppost (in feet) is:
- a) 12            b) 10            c) 9            d) 14            e) 11
26. A circle has a radius of "r" cm. If the radius is increased by 1 cm, the area of the new circle is exactly twice the area of the original circle. What was the radius "r" of the original circle?
- a) 1 cm            b)  $\sqrt{2}$  cm            c)  $(\sqrt{2} - 1)$  cm            d)  $(\sqrt{2} + 1)$  cm            e) r can be any positive real number.
27. A glass is half full of pure alcohol. A second glass whose volume is twice the volume of the first glass is one-third full of pure alcohol. Both glasses are then filled to the top with water and mixed together in a third container. What fraction of the final mixture is alcohol?
- a)  $\frac{5}{6}$             b)  $\frac{5}{12}$             c)  $\frac{7}{12}$             d)  $\frac{5}{18}$             e)  $\frac{7}{18}$
28. In order to stay on schedule, a Greyhound bus driver must average 48 miles per hour (m.p.h.) between two stops. Due to traffic congestion, the driver averaged only 40 m.p.h. on the first half of the trip. What must his average speed be on the second half of the trip if he is to stay on schedule?
- a) 48 m.p.h.            b) 56 m.p.h.            c) 60 m.p.h.            d) 72 m.p.h.            e) 96 m.p.h.

29. For the past three years, the price of apples has risen 5% per year. If this trend continues, how much more will apples cost in two years than they do now?
- a) 10%            b) 10.25%            c) 2.5%            d) cannot be determined
30. Suppose the operation  $\textcircled{R}$  is defined this way: if  $a$  and  $b$  are real numbers, then  $a \textcircled{R} b = a^2 - b^2$ . Simplify  $(x + y) \textcircled{R} y$ .
- a)  $2xy$             b)  $x^2$             c)  $x^2 + 2xy$             d)  $x^2 - y^2$
31. If the price of Chevy Cavaliers has risen 4% per year for two years and they currently cost \$12,500, approximately what did they cost two years ago?
- a) \$11,557            b) \$11,987            c) \$11,520            d) \$11,500
32. Which of the following is closest to having a volume of 1,700,000 in<sup>3</sup>?
- a) a large department store            b) a football stadium,  
c) a garbage can            d) a small bedroom
33. Which of the following numbers is largest?
- a) 74.4 thousands            b) 67,502 tens  
c) 50.9 ten-thousands            d) 68,432
34. Which of the following is the most amount of change you could have in your pocket and still not be able to make change for a dollar? (Do not include silver dollars as change.)
- a) \$.99            b) \$1.15            c) \$1.19            d) \$1.74
35. What is the measure of the interior angle of a regular pentagon?
- a)  $52^\circ$             b)  $72^\circ$             c)  $108^\circ$             d)  $120^\circ$

## Answers to 1999 Written Quest

1. d
2. c
3. c
4. e
5. a
6. d
7. c
8. b
9. a
10. b
11. c
12. a
13. b
14. d
15. c
16. c
17. e
18. d
19. e
20. d
21. d
22. d
23. a
24. b
25. c
26. d
27. e
28. c
29. b
30. c
31. a
32. d
33. b
34. c
35. c