

1999 SEVENTH GRADE MATHEMATICS COMPETITION

AUSTIN PEAY STATE UNIVERSITY
CLARKSVILLE, TENNESSEE

MIDDLE TENNESSEE STATE UNIVERSITY
MURFREESBORO, TENNESSEE

UNIVERSITY OF TENNESSEE AT MARTIN
MARTIN, TENNESSEE

Scoring Formula: $4R - W + 40$

DIRECTIONS:

For each problem there are 5 possible answers listed. You are to work the problems, determine the correct answer, and indicate your choice on the separate answer sheet provided.

SAMPLE:

1. If $x + 1 = 2$, then x equals
- a) 0
 - b) 2
 - c) -1
 - d) 1
 - e) none of the above

	A	B	C	D	E
1	①	②	③	●	⑤
	A	B	C	D	E
2	①	②	③	④	⑤
	A	B	C	D	E
3	①	②	③	④	⑤

The correct answer is 1, which is d); so you would answer this problem by darkening the space on the answer sheet corresponding with this choice.

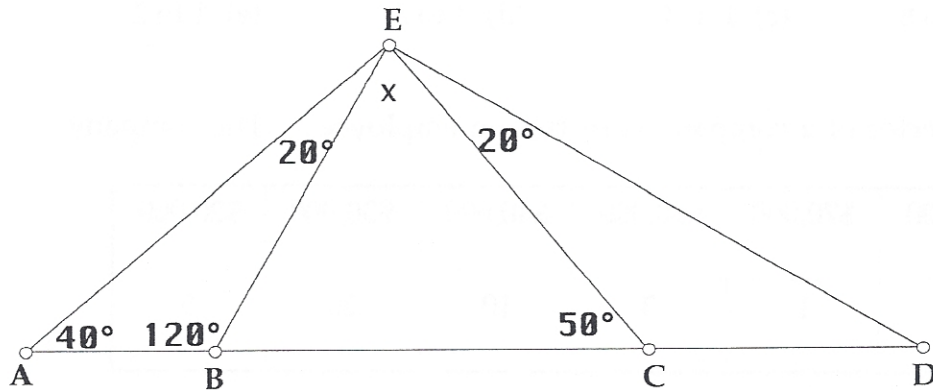
If you change your mind about your answer, be sure to erase completely. Avoid wild guessing, as wrong answers count against you. Do not mark more than one answer for any problem. Make no stray marks of any kind on your answer sheet.

When told to do so, open your test booklet and begin. When you have finished one page, go on to the next. The working time for the entire test is 60 minutes.

1. Tara was fouled at the buzzer of the basketball championship game with her team behind by 1 point. She was awarded two free throws, which are worth one point each if she makes them. Tara has made 80% of her free throws this season. Based upon that percentage, what is the probability that her team will win in regulation time?

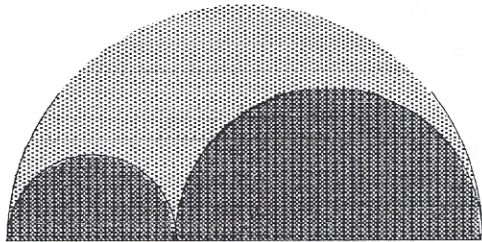
- (a) 0.16 (b) 0.20 (c) 0.36 (d) 0.64 (e) 0.8

2. Using the given angle measurements, what is the value of x ($m\angle BEC$)?



- (a) 50° (b) 55° (c) 60° (d) 65° (e) 70°

3. Three semicircles overlap as shown. If the radii of the two smaller semicircles are 2 and 3 units, then what is the area of the lightly shaded region?



- (a) $\frac{5\pi}{2}$ (b) $\frac{6\pi}{5}$ (c) 5π (d) 6π (e) 12.5π

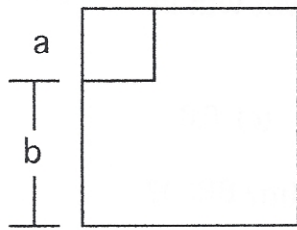
4. There are two numbers on the number line that are 8 units away from -3 . What are those numbers?

- (a) 5 and -5 (b) 11 and -11 (c) 11 and -5 (d) 5 and -11 (e) 8 and -8

5. What is the product of -3 , -2 , -1 , 3 , 2 , and 1 ?

- (a) 0 (b) 36 (c) -36 (d) 12 (e) -12

6. If the area of the smaller square is $\frac{1}{9}$ of the area of the larger square, what is the ratio of a to b?



- (a) 1 to 9 (b) 1 to 8 (c) 1 to 4 (d) 1 to 3 (e) 1 to 2

7. The personnel director of a company is recruiting employees. The company salaries are as follows:

Salary	\$90,000	\$70,000	\$50,000	\$40,000	\$30,000	\$20,000
No. of employees	1	1	3	10	20	5

What are the mean, median, and the mode of the salaries?

- (a) Mean: \$50,000 Median: \$45,000 Mode: none
 (b) Mean: \$50,000 Median: \$30,000 Mode: \$30,000
 (c) Mean: \$35,250 Median: \$45,000 Mode: \$30,000
 (d) Mean: \$35,250 Median: \$30,000 Mode: \$30,000
 (e) Mean: \$35,250 Median: \$45,000 Mode: none

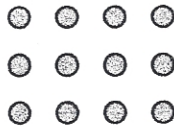
8. A manufacturer made 47 ounces of perfume. The company puts $\frac{3}{8}$ ounce of perfume in each bottle. After filling as many bottles as possible, how many ounces of perfume will be left over?

- (a) $\frac{1}{8}$ ounce (b) $\frac{1}{4}$ ounce (c) $\frac{1}{3}$ ounce (d) $\frac{1}{5}$ ounce (e) $\frac{1}{6}$ ounce

9. Fifteen percent of the students in the sixth period gym class wear glasses. There are 17 students in the sixth period gym class who do not wear glasses. How many students are in the sixth period gym class?

- (a) 2.55 (b) 20 (c) 32 (d) 70 (e) 85

10. If the figure shown below represents $\frac{6}{5}$, which of the figures shown below would represent one half?



- (a) (b) (c) (d) (e)

11. There are twelve \$1-bills, nine \$5-bills, two \$10-bills, and one \$20 bill mixed up in a paper bag. You may reach in and choose one of them at random. What is the probability you get at least \$10?

- (a) 12.5% (b) $\frac{3}{10}$ (c) $\frac{1}{12}$ (d) 0.18 (e) $\frac{1}{24}$

12. In the number puzzle shown below, the number at the end of a row is the product of the numbers in that row. The number at the end of a column is the product of the numbers in that column. Each letter stands for a different number between 1 and 9. What is the value of H? (Hint: $D = 1$)

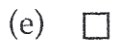
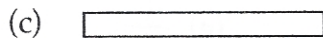
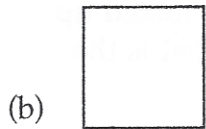
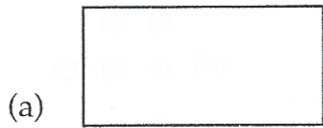
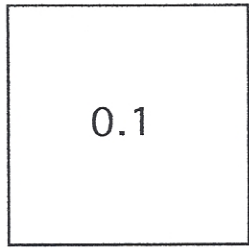
A	B	C	60
D	E	F	21
G	H	J	288
48	60	126	

- (a) 2 (b) 3 (c) 4 (d) 5 (e) 6

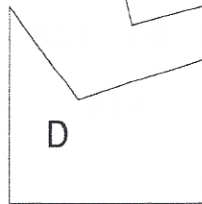
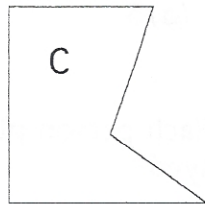
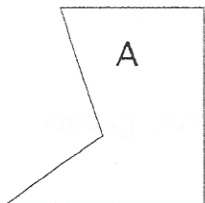
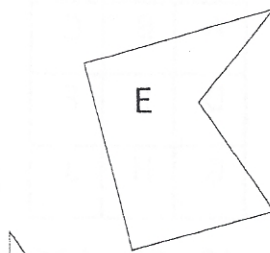
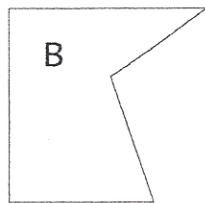
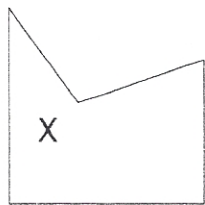
13. Five people entered a ping-pong tournament. Each person played two games with every other player. How many games were played?

- (a) 10 (b) 20 (c) 25 (d) 40 (e) 50

14. The square shown below represents 0.1. Which of the other figures would represent 0.001?



15. Which of the figures shown here is a reflection (flip) of Figure X?



(a) Figure A

(b) Figure B

(c) Figure C

(d) Figure D

(e) Figure E

16. Six students stand in a circle and toss a ball to each other. How many tosses are made if each student tosses the ball to every other student once? (For example, Jay tossing the ball to Lynn would be one toss, and Lynn tossing the ball to Jay would be another toss.)

- (a) 12 (b) 15 (c) 25 (d) 30 (e) 36

17. If four people can paint a house in 3 hours, how long would it take 6 people to paint the same house? (We will assume that everyone works the whole time at the same rate.)

- (a) 1.5 hours (b) 2 hours (c) 4.5 hours (d) 5 hours (e) 6 hours

18. A human being breathes approximately six quarts of air every minute. 14,625,000 people live in New York City. About how many gallons of air do New Yorkers breathe per second?

- (a) 40,625 gal. (b) 243,750 gal. (c) 365,625 gal. (d) 812,500 gal. (e) 9,750,000 gal.

19. Josh and Shane ordered a large pizza that had been cut into equal-sized slices. Josh ate one third of the pizza. Shane ate one fourth of the pizza. Together they ate 14 slices. How many slices were there to begin with?

- (a) 12 slices (b) 16 slices (c) 20 slices (d) 24 slices (e) 48 slices

20. Cindy used a 20% off coupon to purchase a new coat for \$60 (not including sales tax). How much would the coat have cost (excluding tax) if she had not used the coupon?

- (a) \$85 (b) \$80 (c) \$75 (d) \$72 (e) \$65

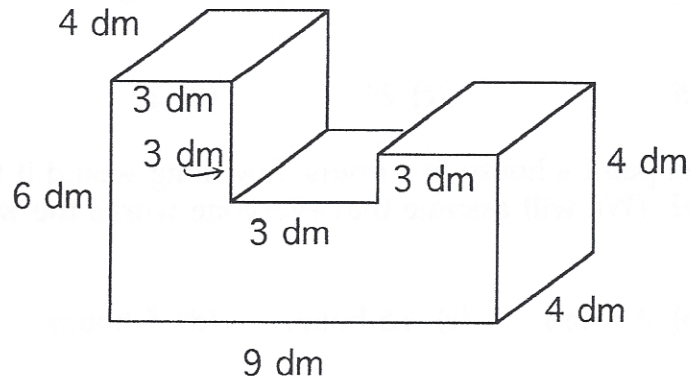
21. It takes Chad 1 hour to mow the lawn. It takes Curt 45 minutes to mow half the lawn. Which statement is true?

- (a) It takes Curt 30 minutes longer than Chad to mow the whole lawn.
(b) It takes Chad 30 minutes longer than Curt to mow the whole lawn.
(c) It takes Chad 15 minutes longer than Curt to mow the whole lawn.
(d) It takes Curt 15 minutes longer than Chad to mow the whole lawn.
(e) It takes Chad the same length of time to mow the lawn as it takes Curt.

22. $7^1 = 7$; $7^2 = 49$; $7^3 = 343$.
What digit will be in the ones position of 7^{1999} ?

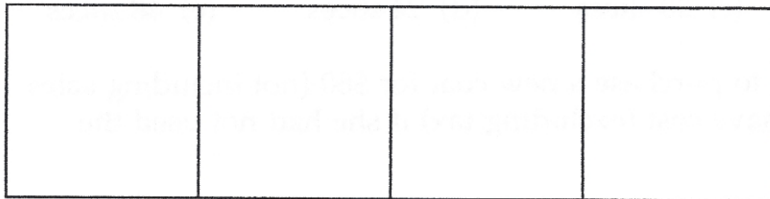
- (a) 1 (b) 3 (c) 5 (d) 7 (e) 9

23. Find the volume of the solid shown here. (All angles are right angles. There are no gaps you cannot see.)



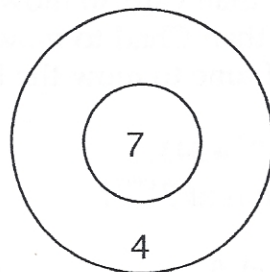
- (a) 93,312 cubic decimeters
- (b) 216 cubic decimeters
- (c) 156 cubic decimeters
- (d) 144 cubic decimeters
- (e) 39 cubic decimeters

24. The large rectangle shown here is made up of four squares placed side-by-side. If the area of the large rectangle is 1024 square centimeters, what is its perimeter in centimeters?



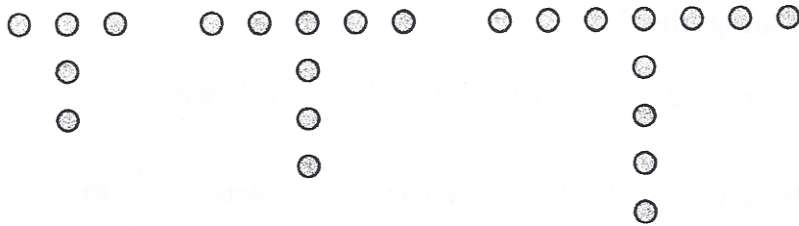
- (a) 256 cm
- (b) 102.4 cm
- (c) 25.6 cm
- (d) 1024 cm
- (e) 160 cm

25. The score on this dartboard is the sum of the points made by each dart. What is the highest score below 100 that is IMPOSSIBLE to score on the given dart board? (Assume you may throw as many darts as you would like.)



- (a) 26
- (b) 23
- (c) 22
- (d) 17
- (e) 11

30. The first three T-numbers are shown here.



There are 5 dots in the first T-number; 8 dots in the second T-number; and 11 dots in the third T-number. How many dots are in the 100th T-number?

- (a) 111 (b) 108 (c) 300 (d) 302 (e) 303

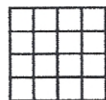
31. Lynn's average score on the first three tests was 92. Lynn's homework score is 96. There is one more test. The final grade is determined by averaging the five grades--4 tests and the homework. If the final grade is at least 94, the student gets an A in the course. What is the least test score Lynn needs on the last test to make an A in the course?

- (a) Lynn can't make an A. (b) 100 (c) 98 (d) 96 (e) 94

32. What is the least prime factor of $3187 + 5775$?

- (a) 2 (b) 3 (c) 5 (d) 7 (e) 13

33. A cube that is 4 cm on each side is dipped into paint. It is then cut apart into 64 cubes that are 1 cm on each side. One face of the large cube is shown in the figure. How many of the small cubes have no paint on them?



- (a) 0 (b) 4 (c) 6 (d) 8 (e) 27

34. Today is Tuesday, April 20, 1999. The year 2000 is a leap year. On what day of the week is January 1, 2003?

- (a) Sunday (b) Monday (c) Tuesday (d) Wednesday (e) Thursday

35. In base two, thirteen is written 1101, fourteen is written 1110, fifteen is written 1111. How would our base-ten number twenty be written in base two?

- (a) 10100 (b) 11000 (c) 10000 (d) 11100 (e) 11110

36. Keys of different shapes are designed by choosing from several patterns for each of their parts. The keys of General Motors cars have 6 parts. Each part can have one of three possible shapes. How many different key designs are possible?

- (a) 6×3 (b) $6 + 3$ (c) 6^3 (d) 3^6 (e) 6

37. Find the least possible counting number, N , such that $180 \cdot N$ is a perfect cube.

- (a) 50 (b) 75 (c) 150 (d) 180 (e) 196

38. Which set of numbers could not be the lengths of three sides of a triangle?

- (a) 4, 4, 4 (b) 3, 3, 2 (c) 2, 3, 4 (d) 1, 2, 3 (e) 5, 6, 7

39. The plane can be covered (tessellated) with congruent squares. Which of the following statements is false?

- (a) The plane can be covered (tessellated) with congruent scalene triangles.
 (b) The plane can be covered (tessellated) with congruent regular pentagons.
 (c) The plane can be covered (tessellated) with congruent isosceles triangles.
 (d) The plane can be covered (tessellated) with congruent regular hexagons.
 (e) The plane can be covered (tessellated) with congruent trapezoids.

40. Peter bicycles up a steep hill and coasts down the other side. Which graph illustrates his speed as time passes?

