CATEGORY 1

NUMBER THEORY

MARCH 29, 1990

1. _____

2. _____

3. _____

1. SIMPLIFY: $\sqrt{1.96}$

2. SIMPLIFY: $\sqrt[5]{\sqrt{1024}}$

Skip

3. $\dfrac{\sqrt{9}\cdot\sqrt{5}}{\sqrt{20}} + \dfrac{\sqrt{3}}{\sqrt{12}}$

CATEGORY 2

GEOMETRY

MARCH 29, 1990

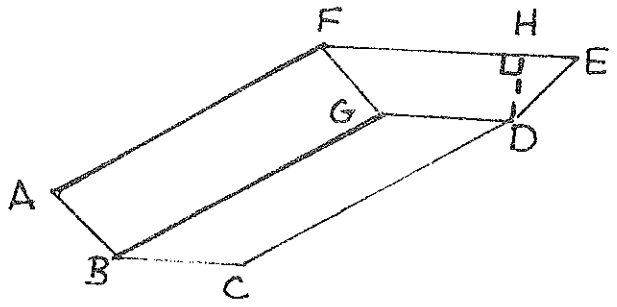
1. _____

2. _____ cm^3

3. _____ gal.

CALCULATORS MAY BE USED IN THIS CATEGORY

1.



THE ENDS OF THIS RIGHT PRISM ARE TRAPEZOIDS IF $BC = 6.2$, $FE = 8.5$, $BG = 11.4$ AND $DH = 3.1$, WHAT IS THE VOLUME OF THE PRISM.

2. THE VOLUME OF A PYRAMID IS $2126.478\ cm^3$. WHAT IS THE VOLUME OF A PRISM WITH THE SAME SIZE BASE AND THE SAME HEIGHT?

3. HOW MANY GALLONS OF PAINT ARE NEEDED TO PAINT THE ENTIRE INSIDE OF A CLOSED CYLINDRICAL STORAGE TANK THAT IS 47 FEET HIGH AND HAS A DIAMETER OF 23 FEET? ONE GALLON OF PAINT COVERS 450 SQ. FT. USE 3.14 FOR π. GIVE YOUR ANSWER TO THE NEAREST TENTH OF A GALLON.

CATEGORY 3

MYSTERY

MARCH 29, 1990

1. _____

2. _____ hr.

3. _____

1. THE SUM OF TWO NUMBERS IS 19 AND THEIR DIFFERENCE IS 5. WHAT IS THEIR PRODUCT?

2. SIX HORSES EAT SIX BALES OF HAY IN SIX HOURS. AT THE SAME RATE, HOW LONG WILL THREE BALES OF HAY LAST FOR THREE HORSES?

3. MULTIPLY A NUMBER BY 1000 AND ADD 5. THE RESULT IS 4. WHAT WAS THE ORIGINAL NUMBER?

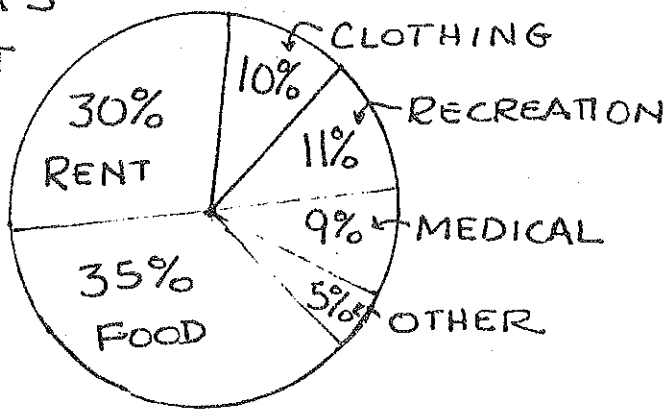
CATEGORY 4
ARITHMETIC
MARCH 29, 1990

1. $ _____

2. _____

3. _____

BERTHA'S BUDGET



IF BERTHA'S ANNUAL INCOME IS $32,400, HOW MUCH MONEY WILL SHE SPEND ON FOOD?

2. WHEN ROLLING TWO DICE NUMBERED FROM ONE TO SIX, WHAT IS THE PROBABILITY OF ROLLING DOUBLES (FOR EXAMPLE: 1,1 OR 2,2 OR 3,3 etc) EXPRESS YOUR ANSWER IN FRACTION FORM.

3. 3 MARBLES ARE DRAWN FROM A BAG CONTAINING 3 RED, 4 GREEN AND 5 YELLOW MARBLES. AS EACH MARBLE IS DRAWN IT IS <u>NOT</u> RETURNED TO THE BAG. WHAT IS THE PROBABILITY THAT THE FIRST MARBLE DRAWN IS RED, THE SECOND IS GREEN AND THE THIRD IS YELLOW? EXPRESS YOUR ANSWER AS A SINGLE FRACTION.

CATEGORY 5
ALGEBRA
MARCH 22, 1990

1. _____
2. _____
3. _____

1. FACTOR: $x^2+3x-18$

2. THE SUM OF THE SQUARES OF TWO CONSECUTIVE POSITIVE INTEGERS IS 41. FIND THE INTEGERS.

3. FACTOR COMPLETELY: $t^2(t+3)+6t(t+3)+9(t+3)$

ATEGORY 6
AM QUESTIONS
ARCH 22, 1990

1. A= _____
2. B= _____
3. C= _____
4. D= _____
5. E= _____
6. F= _____

. WHAT IS THE MAXIMUM NUMBER OF POINTS FORMED BY THE INTERSECTION OF SIX STRAIGHT LINES?

. THE LENGTH OF EACH SIDE OF A SCALENE TRIANGLE IS A PRIME NUMBER. ITS PERIMETER IS ALSO PRIME. FIND THE SMALLEST POSSIBLE PERIMETER THIS TRIANGLE COULD HAVE.

3. WHAT LOWEST TERM FRACTION IS EXACTLY IN THE MIDDLE OF $2/3$ AND $.4\overline{16}$

. WHAT NUMBER IS IN THE UNITS DIGIT OF 4^{172}?

5. 1, 3, 6, 10... ARE CALLED TRIANGULAR NUMBERS. IF 5050 IS THE 100th TERM IN THE SEQUENCE OF TRIANGULAR NUMBERS WHAT IS THE 101ST TERM?

6. SOLVE FOR F

$$\frac{+\sqrt{A+(-D)+(C)(\frac{1}{C})+B+E}}{\frac{1}{C}}$$

ANSWERS MEET 5 MARCH 29, 1990

CAT 1 NUMBER TH.

1. 1.4
2. 2
3. 2

CAT 2 GEOMETRY

1. 259.749
2. 6379.434
3. 9.4

CAT 3 MYSTERY

1. 84
2. 6 hr
3. −.001

CAT. 4 ARITMETIC

1. #11, 340
2. 1/6
3. 1/22

CAT. 5 ALGEBRA

1. $(x+6)(x-3)$
2. 4, 5
3. $(t+3)^3$ OR $(t+3)(t+3)(t+3)$

CAT. 6 TEAM

1. 15
2. 23
3. 13/24
4. 6
5. 5151
6. 39

SOLUTIONS

CAT. 1

2. $\sqrt{1024} = 32$

   $\sqrt[5]{32} = 2$

3. $\sqrt{\frac{45}{20}} + \sqrt{\frac{3}{12}} = \sqrt{\frac{9}{4}} + \sqrt{\frac{1}{4}} = \frac{3}{2} + \frac{1}{2} = 2$

CAT. 2

1. $(8.5+6.2)(3.1)(11.4)$
2. $(2126.478)(3)$
3. $(3.14)(11.5)^2(2)$ = Area of bases = 830.53

   $3.14(23)(42)$ = Area of side = 3394.34

   SA = 4224.87

   $4224.87 \div 450 \approx 9.4$

CAT 3

2. Each horse eats 1 bale of hay in 6 hrs.
   ∴ 3 bales, 3 horses, 6 hours –
3. Work backwards.

   $4-5=-1 \quad -1 \div 1000 = -.001$

CAT 4

2. 36 possible outcomes, 6 doubles

   $6/36 = 1/6$

3. $\frac{3}{12} \cdot \frac{4}{11} \cdot \frac{5}{10} = 1/22$

CAT 5

2. $x^2 + (x+1)^2 = 41$
3. $(t^2+6t+9)(t+3) = (t+3)(t+3)(t+3) = (t+3)^3$

CAT 6

FIND PATTERN

1. sequence: 0, 1, 3, 6, 10, 15 (triangular nos)
2. 2, 3, 7 is not a triangle and per. is not prime
   3, 3, 5 is not scalene. Therefore 5, 7, 11 = 23
3. $\left(\frac{2}{3} + \frac{5}{12}\right) \div 2$
4. FIND PATTERN: ALL EVEN POWERS END IN 6
5. $5050 + 101 = 5151$