National MAθ Convention 2002
Hustle..........Algebra/Geometry

1 Find the magic number for the given magic square.

$8a$	$3+24 \div 8-1$	30
$3a$	$5a$	$7a$
$5(6 \div 3 \cdot 2)$	$9a$	$\dfrac{4+4 \cdot 4}{8 \div 2-2}$

Ans. 75

2 At the grocery store, a new promotion rewards every 15th customers with a free coupon and every 25th customer with a surprise gift. Which customer will be the first to obtain both?
Ans. 75th

3 During the last 4 games of his last hockey season, Taylor had 8 minutes, 5 minutes, 10 minutes and 12 minutes in penalties. If he averages 4 minutes of penalties over the 30 games season, how many total penalty minutes did Taylor have last season?

Ans. 120

4 In $\triangle ABC$, $\overline{BC} \cong \overline{AC}$, $m\angle B = 3x+2$ and $m\angle C = 3x-4$, find $m\angle A$.

Ans. 62°

5 At Chips R Us, the ratio of small bags of plain chips to salt and vinegar to barbeque is 3:4:5. If the store usually sells 7200 bags of plain chips in a week, how many bags of barbeque do they usually sell?

Ans. 12,000

6 If a rhombus has an angle of $120°$, find the ratio of the longer diagonal to the shorter diagonal.
Ans. $\sqrt{3}$:1

7 If the point $(x,4)$ lies on the graph of the line $4x-5y=12$, find x.
Ans. x = 8

8 The length of a rectangle exceeds the width by 2. If the perimeter is greater than 68, what are the smallest possible integral dimensions of the rectangle?
Ans. w>16, so 17 by 19

9 Hurricane Camille completely destroyed 5579 homes. An additional 12491 homes had major damage and 25090 homes had minor damage. What percent of damaged homes were totally destroyed?

Ans. 12.926%

10 Find the exact area of a circle inscribed in a square of side 12 cm.

Ans. 36π

11 Given $\begin{bmatrix} a & d \\ 7 & -5 \\ -4 & c-d \end{bmatrix} = \begin{bmatrix} 6 & 3 \\ 7 & b \\ -4 & a+b \end{bmatrix}$.
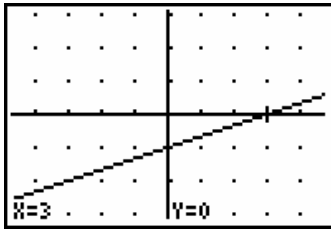
Find c.

Ans. c = 4

12 $\overline{EH}$ is divided by F and G in the ratio 5:3:2 from left to right. If $EH = 30$, find FG.

Ans. 9

13 $_{\triangle}FJH$ is isosceles with base $\overline{JH}$. K and G are midpoints. $FK = 2x+3$, $GH = 5x-9$, and $JH = 4x$. Find the perimeter of $_{\triangle}FJH$.

Ans. 60

14 Write the equation of the line in slope/intercept form.

Ans. $y = \dfrac{1}{3}x - 1$

15 Simplify into a single fraction:
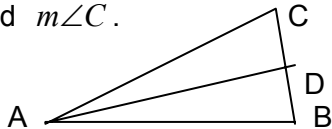$$\dfrac{\dfrac{2}{3} - \dfrac{5}{4}}{\dfrac{5}{4} + \dfrac{2}{3}}$$

Ans. $-\dfrac{7}{23}$

16 Find the sum of the first three prime numbers greater than 125.

Ans. 395

17
$m\angle DAC = 6x+5, m\angle BAC = 10x+13,$
$m\angle B = 102°;\ \ AD$ bisects $\angle BAC.$
Find $m\angle C$.

Ans. 50°

18 Subtract:

$$\dfrac{15a}{3a+9} - \dfrac{4a-5}{a+3}$$

Ans. $\dfrac{a+5}{a+3}$

19 Give an approximation of the circumference of a circle with area $\dfrac{169\pi}{5}\ sq.in.$

Ans. 36.529 in.

20 The sum of the measures of the interior angles of a polygon is between 5800 and 6000. How many sides does the polygon have?

Ans. 35

21 If $a*b = \dfrac{a+b}{2}$, what is $(6*8)*9$?

Ans. 8

22 Solve for x:
$(x+1)(x-6) - x^2 < x + 18$

Ans. x > - 4

23 13 is 20% of what ?

Ans. 65

24 If the length of a rectangle is 80 and the length of a diagonal is 100, what is the measure of the width?

Ans. 60

25 Express the average of the following numbers as a single fraction:
$$\dfrac{2}{5}, \dfrac{5}{6}, \dfrac{3}{10}, \dfrac{5}{12}$$

Ans. $\dfrac{39}{80}$