Edmonton Junior High Mathematics Contest 2008

Multiple-Choice Problems

1. The equation, shown below, which has **NO** solution is

A. $5x = 3x$

B. $x + 1 = x$

C. $\frac{x^2 - 1}{x - 1} = 0, \ x \neq 1$

D. $\frac{x + 1}{x} = 0, \ x \neq 0$

2. A quadrilateral drawn on the coordinate plane has the vertices R $(-4, 4)$, S $(3, 2)$, T $(3, -2)$ and U $(2, -3)$ The area of quadrilateral RSTU

A. $49\frac{1}{2}$ units^2

B. $38\frac{1}{2}$ units^2

C. $21\frac{1}{2}$ units^2

D. $20\frac{1}{2}$ units^2

3. The Jones family averaged 90 km/h when they drove from Edmonton to their lake cottage. On the return trip, their average speed was only 75 km/h. Their average speed for the round trip is

A. 81.8 km/h

B. 82.5 km/h

C. impossible to determine because the distance from Edmonton to the cottage is not given

D. impossible to determine, because the driving time is not given

4. The four answers shown below each contain 100 digits, with only the first 3 digits and the last 3 digits shown. The 100 digit number that could be a perfect square is

A. 512 … 972

B. 493 … 243

C. 793 … 278

D. 815 … 021

May 7, 2008

5. Two sides of ΔABC each have a length of 20 cm and the third side has a length of 24 cm. The area of this triangle is

A. 192 cm^2 B. 173 cm^2

C. 141 cm^2 D. 72 cm^2

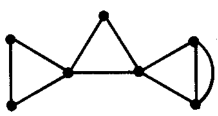
6. Only the **even** integers between 1 and 101 are written on identical cards, one integer per card. The cards are then placed in a box and mixed thoroughly. If a single card is drawn at random, then the probability that the number on the card is divisible by either 3 or 5, expressed as a decimal to the nearest hundredth, is

A. 0.50 B. 0.46

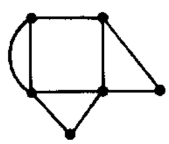
C. 0.32 D. 0.20

7. Each of the following connected networks consists of segments and curves. A connected network is said to be *traversable* if we can trace the network without lifting our pencil from the paper. We must trace each of the segments or curves exactly once.

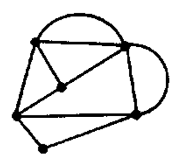
Of the following connected networks, the one which is NOT traversable is



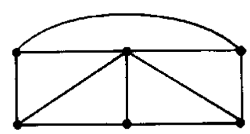
A.



B.



C..



D.

8. The number of digits in the product $1^{2008} \times 25^{81} \times 2^{160}$ is

A. 2008 B. 2000

C. 162 D. 160

9. Each side of equilateral triangle ABC measures 5 units. On the base BC, we draw point P. From Point P, we draw perpendiculars to the other 2 sides. The sum of the lengths of the perpendiculars is

A. $\frac{5\sqrt{3}}{2}$ B. $\frac{5\sqrt{2}}{2}$

C. $5\sqrt{3}$ D. $5\sqrt{2}$

10. The sum of the ages of three brothers is 73.
Tom is the oldest of the brothers, but he less than 40 years old.
The product of Tom's age and Michael's age is 750.
The difference between Tom's age and Don's age is 7 more than the difference between Tom's age and Michael's age.
Don is

A. 30 years old. B. 21 years old. C. 18 years old. D. 8 years old

11. The 9 digit number 6□8 351 962 is divisible by 3, where □ represents a missing digit. The remainder when this number is divided by 6 is

A. 3
B. 2.
C. 1
D. 0

12. A set of six numbers has an average of 47. If a seventh number is included with the original six numbers, then the average is 52. The value of the seventh number is

A. 99
B. 82
C. 49.5
D. 32.9

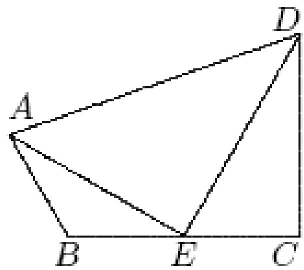
13. A set of N real numbers has an average, of N.
A set of M real numbers, where $M < N$, taken from the original set of N numbers has an average of M.
The average, of the remaining $N - M$ numbers is

A. M
B. N
C. $N + M$
D. $N - M$

14. A right angled triangle has sides *a, b* and *c,* where *c* is the length of the hypotenuse**.** If we draw a line *d*, from the right angle that is perpendicular to the hypotenuse, then an expression for *d* in terms of *a*, *b* and *c* is

A. $\frac{ab}{c}$
B. $\frac{bc}{a}$
C. $\frac{ac}{2b}$
D. $\frac{bc}{2a}$

15. In the quadrilateral *ABCD*, *AB*=1, *BC*=2, *CD*= $\sqrt{3}$, $\angle ABC$=120° and $\angle BCD$=90°. *E* is the midpoint of *BC*. The perimeter of quadrilateral *ABCD* is.

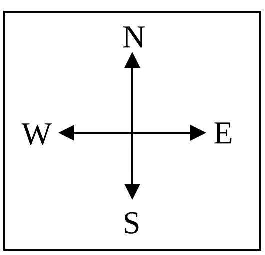


A. 5.16 units
B. 6.16 units
C. 6.38 units
D. 7.38 units

Answers-Only Problems

Problem 1

On the partial grid shown below, positive integers are written in the following pattern: start with 1 and put 2 to its WEST. Put 3 SOUTH of 2, 4 to the EAST of 3 and 5 to the EAST of 4. Now 6 goes directly NORTH of 5 and 7 to the NORTH of 6. Then 8, 9 and 10 follow in that order to the WEST of 7 and so on always moving in a counterclockwise direction.



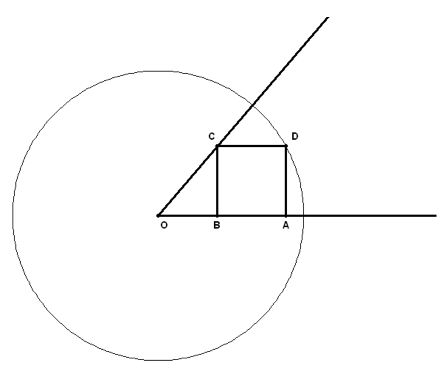
2	**1**	
3	**4**	**5**

We have made a 'SOUTH' turn at 2, an 'EAST ' turn at 3, a "NORTH" turn at 5, and a 'WEST' turn at 7. At which integer will we be making the 5^{th} 'WEST' turn?

Problem 2

Quadrilateral ABCD is a square. It is drawn so that points A and B are on $\overrightarrow{OA}$, and point D is on the circumference of a circle with its centre at point O. Point C is on $\overrightarrow{OC}$.

If the radius of the circle is 10 units and $\angle COB = 45°$, then the area of square ABCD is, to the nearest whole number is



Problem 3

Let a, b and c represent three **different** positive integers whose product is 16.

The maximum value of $a^b - b^c + c^a$ is

Problem 4

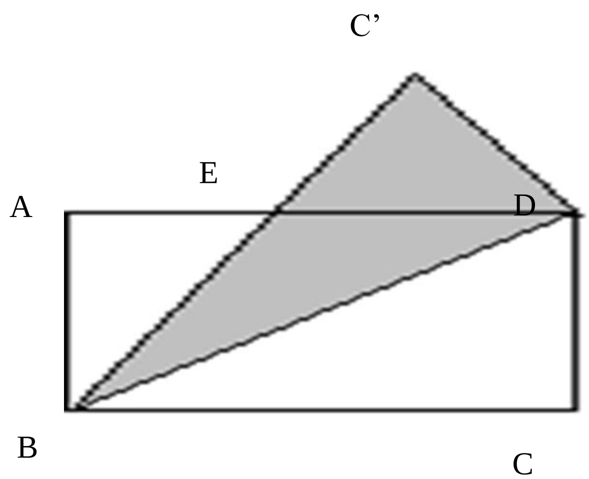
Let a, b and c represent any positive integers.

The value of

$$\frac{1}{a}+\frac{1}{b}\left(1+\frac{1}{a}\right)+\frac{1}{c}\left(1+\frac{1}{a}\right)\left(1+\frac{1}{b}\right)-\left(1+\frac{1}{a}\right)\left(1+\frac{1}{b}\right)\left(1+\frac{1}{c}\right) \quad \text{is}$$

Problem 5

A rectangular piece of paper $ABCD$ is such that $AB = 4$ and $BC = 8$. It is folded along the diagonal BD so that triangle BCD lies on top of triangle BAD. C' denotes the new position of C, and E is the point of intersection of AD and BC'.



The area of triangle BED is