BRITISH COLUMBIA COLLEGES

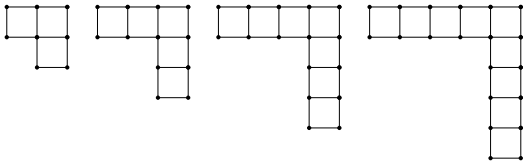
Junior High School Mathematics Contest

Preliminary Round March 8, 2000

1. After 15 litres of gasoline was added to a partially filled fuel tank, the tank was 75% full. If the tank's capacity is 28 litres, then the number of litres in the tank before adding the gas was:

   (a) 3 (b) 4 (c) 5 (d) 6 (e) 7

2. The following figures are made from matchsticks.



   If you had 500 matchsticks, the number of squares in the largest such figure you could build would be:

   (a) 164 (b) 165 (c) 166 (d) 167 (e) none of these

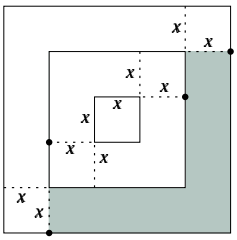
3. The perimeter of a rectangle is 56 metres. The ratio of its length to width is 4 : 3. The length, in metres, of a diagonal of the rectangle is:

   (a) 17.5 (b) 20 (c) 25 (d) 40 (e) none of these

4. If April 23 falls on Tuesday, then March 23 of the same year was a:

   (a) Saturday (b) Sunday (c) Monday (d) Wednesday (e) Thursday

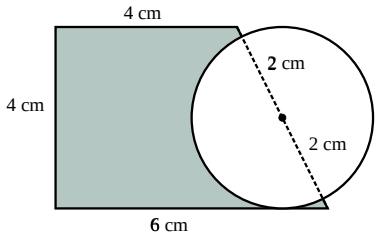
5. Consider the dart board shown in the diagram. If a dart may hit any point on the board with equal probability, the probability it will land in the shaded area is:
   (a) 0.07 (b) 0.24 (c) 0.25 (d) 0.28 (e) 0.32



6. The proper divisors of a number are those numbers that are factors of the number other than the number itself. For example, the proper divisors of 12 are 1, 2, 3, 4, and 6. An *abundant* number is defined as a number for which the sum of its proper divisors is greater than the number itself. For example, 12 is an abundant number since $1 + 2 + 3 + 4 + 6 > 12$. Another example of an abundant number is:

   (a) 13 (b) 16 (c) 30 (d) 44 (e) 50

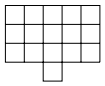
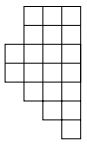
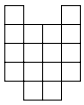
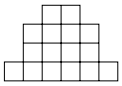
7. The figure to the right is a right trapezoid with side lengths 4 cm, 4 cm, and 6 cm as labelled. The circle has radius 2 cm. The area, in cm^2, of the shaded region is:
   (a) $20 - 4\pi$ (b) 16 (c) $24 - 2\pi$ (d) $20 - 2\pi$ (e) $16 + 2\pi$



8. Three vertices of parallelogram $PQRS$ are $P(-3,-2)$, $Q(1,-5)$, and $R(9,1)$ with P and R diagonally opposite. The sum of the coordinates of vertex S is:

   (a) 13 (b) 12 (c) 11 (d) 10 (e) 9

9. Which shape *cannot* be filled, without any overlapping, using copies of the tile shown on the right?

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

10. Arrange the following in ascending order:

$$2^{5555} \quad 3^{3333} \quad 6^{2222}$$

   (a) 2^{5555} 3^{3333} 6^{2222} (b) 2^{5555} 6^{2222} 3^{3333} (c) 6^{2222} 3^{3333} 2^{5555}
   (d) 3^{3333} 6^{2222} 2^{5555} (e) 3^{3333} 2^{5555} 6^{2222}

11. 2000 days, 2000 hours, 2000 minutes, and 2000 seconds would be equivalent to N million seconds. Of the choices offered, the closest approximation of N is:

   (a) 1 (b) 15 (c) 45 (d) 180 (e) 2000

12. A three digit decimal number abc may be expressed as $100a+10b+c$ where each of the digits is multiplied by its respective place value and subsequently summed. If $a=b=c$ and $a>0$, which of the following numbers must be a factor of the three digit number abc?

   (a) 7 (b) 11 (c) 13 (d) 19 (e) 37

13. If $(x+y)^2-(x-y)^2>0$, then

   (a) ($x>0$ and $y>0$) or ($x<0$ and $y<0$);
   (b) $x>0$ and $y<0$;
   (c) $x<0$ and $y>0$;
   (d) ($x>0$ and $y<0$) or ($x<0$ and $y>0$);
   (e) $x>y$ or $x<y$

14. Consider all noncongruent triangles with all sides having whole number lengths and a perimeter of 12 units. The following statements correspond to these triangles.

   (i) There are only three such triangles.
   (ii) The number of equilateral triangles equals the number of scalene triangles.
   (iii) None of these triangles are right angled.
   (iv) None of these triangles have a side of length 1 unit.

   Of the four statements made, the number of true statements is:

   (a) 0 (b) 1 (c) 2 (d) 3 (e) 4

15. An altitude, h, of a triangle is increased by a length m. How much must be taken from the corresponding base, b, so that the area of the new triangle is one-half that of the original?

   (a) $\frac{bm}{h+m}$ (b) $\frac{bh}{2(h+m)}$ (c) $\frac{b(2m+h)}{m+h}$ (d) $\frac{b(m+h)}{2m+h}$ (e) $\frac{b(2m+h)}{2(h+m)}$