## Instructions

- Write your information in the boxes provided on the ANSWER SHEET.

- You have a maximum of 40 minutes to complete as many questions as you can. Please wait for the Olympic Official's instruction to begin.

- Questions are worth 3, 4, or 6 points as indicated.

- Questions can be done in any order.

- Calculators, rulers and graph paper are allowed.

- Record your answers on the ANSWER SHEET. Indicate your choices using capital letters: A, B, C, D or E.

- Hand in the QUESTIONS booklet and the ANSWER SHEET.

PART A : Each correct answer earns 3 points.

1. Evaluate: $2^3 - 12 \div 4$
   A -1   B 5   C 3   D -1.5   E -40

2. A circle has a radius of 20 cm. A line segment is drawn between two points on the circle. The length of this line segment cannot be
   A 50 cm   B 10 cm   C 2 cm   D 1 cm   E 40 cm

3. A quadrilateral has two pairs of sides with equal lengths and its diagonals perpendicular to each other. What is the shape?
   A Parallelogram   B Rhombus   C Square
   D Rectangle   E Kite

4. The numbers 1, 2, ..., 12 are arranged in 3 columns of 4 numbers each so that each column has the same sum. The sum of the numbers in each column is
   A 18   B 26   C 21   D 32   E 39

5. A rectangular picture, 1.2 m wide, is centred on a wall that is 5 m wide. What is the distance, in metres, from an edge of the wall to the nearer edge of the picture?
   A 3.1   B 1.3   C 1.9   D 3.8   E 3.0

6. Twin primes are two prime numbers whose difference is 2. If P is the product of any pair of twin primes, then (P + 1) is always
   A divisible by 3   B odd   C divisible by 8
   D divisible by 4   E prime

7. The two equilateral triangles shown have sides of 2 cm and 3 cm. What is the perimeter of the figure?
   A 11cm   B 12 cm   C 13 cm   D 15 cm   E 5 cm

8. If $\frac{1}{42} = a$, then $\frac{1}{30} = ?$

   A $\frac{1}{12}a$ B $\frac{7}{6}a$ C $\frac{6}{7}a$ D $\frac{7}{5}a$ E $\frac{5}{7}a$

9. The number 30700 is said to end in two 0's. How many zeros does $2^{2012} \times 5^{2013} \times 10^{2014}$ end in?
   A 2014   B 4026   C 4027   D 2   E 2012

10. The smallest angle in a quadrilateral is 70°. The greatest its largest angle could be is
    A 70°   B 110°   C 147°   D 150°   E 98°
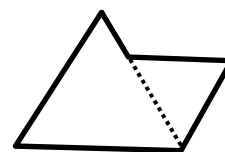
PART B : Each correct answer earns 4 points.

11. A year is called a "Blackjack" year if the sum of its digits is 21. For example, 1983 was a Blackjack year since 1 + 9 + 8 + 3 = 21. How many Blackjack years were there between 1900 and 2000?

    A 10   B 9   C 8   D 7   E 6

12. If $\frac{5}{6}$ of a number is 60, what is $\frac{3}{4}$ of the original number?

    A 48   B 72   C 37.5   D 54   E 96

13. A triangle has vertices P(16, 0), Q(16, 20) and R(1, 0). The area of the triangle is

    A 180   B 360   C 150   D 160   E 300

14. Your dad and your uncle won a prize in a fund-raising casino game. They shared the winning equally. Your dad kept a quarter of his portion and gave the rest to your mom. Your mom kept one-third of it and the rest was shared equally between you and your sister. Your share was $33.00. What was the value of the total prize?

    A $99   B $528   C $132   D $264   E $88

15. A square is cut into three pieces, as shown. The areas of the two isosceles triangles are 2 and 8. Find the area of the remaining piece.

    A 24   B 54   C 26   D 36   E 46
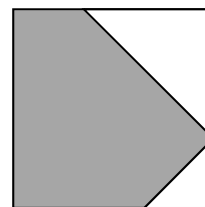
16. If x, y and z are positive numbers and 3x = 5y = 2z, then

    A x < y < z   B y < x < z   C y < z < x   D z < y < x   E x < z < y

17. On a farm, every two horses share a trough, every three cows share a trough, and every eight pigs share a trough. The farm has the same number of each animal. How many animals in total are there if there are 69 troughs?
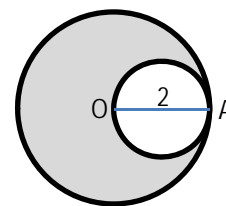
    A 69   B 299   C 72   D 144   E 216

18. If $\frac{1}{3} + \frac{1}{4} + \frac{1}{n} = 1$, determine the value of n.

    A $\frac{5}{12}$ B $\frac{12}{5}$ C $\frac{7}{12}$ D 12   E $\frac{12}{7}$

19. In the diagram, OA is a radius of the larger circle and a diameter of the small circle. If OA = 2, what is the area of the shaded region?
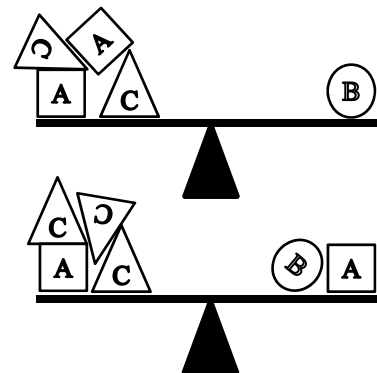
    A 2π B π C 4π D 3π E $\frac{\pi}{2}$

20. Using masses $\triangle C$, $\boxed{A}$ and $\bigcirc B$, two scales are balanced, as shown. The mass $\triangle C$ is equivalent to the mass of

    A $\boxed{A}$ B $\boxed{A}$ $\boxed{A}$ C $\bigcirc B$

    D $\bigcirc B$ $\bigcirc B$ $\bigcirc B$ E $\bigcirc B$ - $\boxed{A}$

PART C : Each correct answer earns 6 points.

21. The area of rectangle ABCD is 72. The mid-point of side BC, the midpoint of side CD and the point A are joined to form a triangle. What is the area of the triangle?
    A 36   B 24   C 45   D 48   E 27

22. In a regular deck of 52 cards, the suits matter in ranking with Spades being the highest, then Hearts, then Diamonds, then Clubs. The King of Spades is the card of the highest rank. Debbie draws the 9 of Clubs then puts the card back into the deck. What is the probability Eden draws a higher ranking card than Debbie's?
    A $\frac{4}{13}$ B $\frac{3}{4}$ C $\frac{19}{52}$ D $\frac{8}{13}$ E $\frac{21}{26}$

23. Using the digits 1, 2, 3, 4 and rearranging them, it is possible to form twenty-four different four digit numbers including number 1234. The sum of these twenty-four numbers is
    A 24000   B 55550   C 24568   D 29616   E 66660

24. Each of the letters, D, N, W, and P, in the chart represents a different number. The sums of the rows and columns are given.
    Find the sum T of the first row.
    A 20   B 31   C 7
    D 28   E 30

				Row Sum
D	D	D	D	28
D	D	N	N	30
N	W	P	D	20
P	P	W	N	22

Column Sum	T	19	20	32

This is a Column Sum and a Row Sum

25. The product of the positive integers 1 to 6 is 6 x 5 x 4 x 3 x 2 x 1 = 720 and can be abbreviated as 6!. We say "6 factorial". So 6! = 720.
    For a positive integer n, the product of the positive integers from 1 to n is n!. Find the smallest possible value of n such that n! ends in exactly six zeros.
    A 10   B 15   C 30   D 25   E 11

COMPETITION ANSWER SHEET

Scarborough Individual Math Challenge 2015

First Name:	
Last Name:	
School:	

Circle:	Grade: 7 8	Gender: F M

Circle your choice for each question:

1. A B C D E	11. A B C D E	21. A B C D E
2. A B C D E	12. A B C D E	22. A B C D E
3. A B C D E	13. A B C D E	23. A B C D E
4. A B C D E	14. A B C D E	24. A B C D E
5. A B C D E	15. A B C D E	25. A B C D E
6. A B C D E	16. A B C D E	
7. A B C D E	17. A B C D E	
8. A B C D E	18. A B C D E	
9. A B C D E	19. A B C D E	
10. A B C D E	20. A B C D E	
x 3 =	x 4 =	x 6 =
	Total =	/ 100 points