HARMONY SOUTH AFRICAN MATHEMATICS OLYMPIAD

FIRST ROUND 2007
JUNIOR SECTION: GRADES 8 AND 9

ANSWERS AND SOLUTIONS

QUESTION	ANSWER
1	C
2	B
3	E
4	E
5	C
6	B
7	D
8	D
9	C
10	B
11	C
12	E
13	B
14	B
15	C
16	D
17	A
18	B
19	E
20	C

1. $1 - \frac{1}{2} \times 2$
        $= 1 - 1$
        $= 0$

        Answer: C

2. $3^6 - 2^6$
        $= \ldots9 - \ldots4$
        $= 5$

        Answer: B

3.   9,81
        - 0,03
          9,78

        Answer: E

4.   **Rewriting all the numbers as common fractions**
        $0,125 = \frac{1}{8}$; $11\% = \frac{11}{100} = \frac{1}{9,\ldots}$

        $\frac{3}{8} = \frac{1}{2,\ldots}$; $\frac{2}{11} = \frac{1}{5,5}$; $\frac{1}{4}$

        The smallest is 11% since denominator is largest.

        Answer: E

5.   **Day 3   :   3105 visitors**

        Day 2   : $\frac{3105}{3}$ = 1035

        Day 1   : $\frac{1035}{3}$ = 345 visitors

        Answer: C

6.   **The investment return per year:**
                2500 x 5% = 125
                2500 + 125 x n = 5000 (initial investment to double)
                        n = 20

        Answer: B

7.   **If she takes out 8 they may all be green.**
Taking out 13 could imply 8 green and 5 blue.
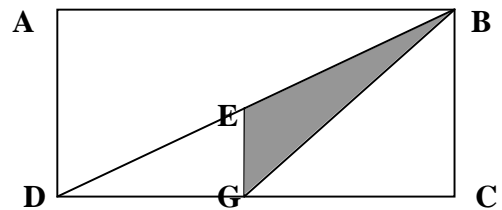**At least 14(13+1) will ensure that she has one of each colour.**

Answer: D

8.

	1st number	2nd number
Suppose y = 2	2 x 10 = 20	14 x 2 = 28
y = 3	8 x 13 = 104	20 x 5 = 100

Answer : D

9.   **15% represents 12 apples.**

35% represents $\dfrac{12}{1}$ **x** $\dfrac{35}{15}$ **= 28 apples**

Answer: C

10.   **Diagonal BD bisects ABCD. EG bisects DB.**
area ΔDGE = area ΔBGE

But area ΔBDE = area ΔBCE = $\dfrac{1}{4}$ **ABCD**

Area ΔBGE = $\dfrac{1}{8}$ **ABCD**

Answer: B

11.   **r = 14m**
Perimeter = 77 + 77 + 2π x 14
= 154 + 28π

Answer: C

12.   **Let one number = x**
other number   = 20 – x
5x – 4(20 – x)   = 10
9x = 90
x = 10
other number   = 10
Product = 10 x 10 = 100

Answer: E

13. $p = 5q$; $10q = 3t$
$2p = 10q$

$3t = 2p$
$t = \dfrac{2}{3}p$

Answer: B

14. **Consider points at the base:**
point 1 - 0 Δ's
point 2 - 1 Δ
point 3 - 3 Δ's
point 4 - 6 Δ's
Triangular numbers: 0;1;3;6;…

Point 6 and 4 layers : $\dfrac{6 \times 5}{2}$ **x 4**

= **60**

Answer: B

15. **Difference in time** (w_1/w_2) **= 5 hours**
Difference in earnings = **3125 – 2750**
= **R375**
Rate per hour = **375 ÷ (5 x 1,5)**
= **R50**
Amount earned = **40 x 50**
= **R2000**

Answer: C

16.

2	54 ; 90 ; 108
3	27 ; 45 ; 54
3	9 ; 15 ; 18
	3 ; 5 ; 6

HCF = 2 x 3 x 3
= **18 (maximum number)**

Answer: D

17. Using transformation from B to A
From B: move 6 units horizontally to the left
$\therefore x = 9 - 6 = 3$
and 5 units down
$\therefore y = 4 - 5 = -1$

Answer: A

18. 1 day : Sipho : $\frac{1}{4}$ of 33

   Pretty : $\frac{1}{6}$ of 33

   Alvin : $\frac{1}{3}$ of 33

Total 1 day $= (\frac{1}{4} + \frac{1}{6} + \frac{1}{3})$ x 33

4 days $= \frac{4}{1} \times \frac{3}{4}$ x 33

$= 99$ straws

Answer: B

19. Number of members $= 50 + 40 = 90$
32 do not play soccer
Therefore number play soccer $= 90 - 32 = 58$

Answer: E

20.

n =	No. hidden cubes
2^3	0
3^3	1
4^3	8
.	.
n^3	$(n-2)^3$

$(n-2)^3 > \frac{1}{2}n^3$

n = 5 ;   LHS = 27   RHS = 62,5
n = 7 ;   LHS = 125   RHS = 171,7
....
n = 10 ;   LHS = 512   RHS = 500
Therefore $n^3 = 10 \times 10 \times 10 = 1000$

Answer: C