

## HMC 2011 SECOND ROUND

### BOOKLET - **A**

#### INSTRUCTIONS

- Before you start, make sure that your answer is filled accurately.
- Do not open this booklet until told to do so.
- This examination paper consists of 30 multiple choice questions of mathematics, logical deduction, and analytical reasoning. Each question is followed by answers marked a, b, c, d and e. Only one of these is correct.
- The final answers must be entered in the correct circle on the ANSWER SHEET which is supplied separately.
- Each correct answer is worth:
  - 4 marks in Part 1 (Questions from 1 to 15)
  - 6 marks in Part 2 (Questions from 16 to 30)
- There is a penalty, -1 mark, for the incorrect answers.
- Exam duration is 75 minutes and no extra time will be given.
- Calculators and geometry instruments are **NOT** permitted.
- Diagrams are **NOT** necessarily drawn to scale.
- Rough paper, pen, pencil, and rubber are permitted.
- Start when the invigilator tells you to do so. Good luck!

## PART I

1) The value of  $1001 \times 321 - 198$  is

- A) 321001      B) 321123      C) 321231      D) 312001      E) 321321

2) Which of the following numbers is a fraction between  $\frac{3}{5}$  and  $\frac{5}{7}$ ?

- A)  $\frac{4}{7}$       B)  $\frac{20}{35}$       C)  $\frac{24}{35}$       D)  $\frac{4}{5}$       E)  $\frac{6}{18}$

3) The number that lies between  $12^2$  and  $13^2$  is:

- A) 140      B) 180      C) 120      D) 160      E) 142

4) Find the tens digit of  $9^2 - 7^2$ .

- A) 1      B) 2      C) 3      D) 4      E) 5

5) Which of the following divisions has the largest remainder?

- A)  $2004 \div 8$       B)  $55 \div 6$       C)  $708 \div 5$       D)  $604 \div 4$       E)  $8884 \div 3$

6) I multiplied two consecutive numbers (e.g. 4 and 5) on my calculator and got the answer 420. What is the smaller number?

- A) 15      B) 4      C) 5      D) 21      E) 20

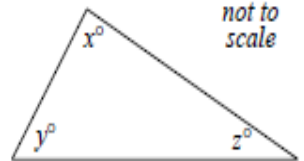
7) What is the value of X in the following number sequence? 5, 7, 10, X, 19, ...

- A) 14      B) 13      C) 12      D) 16      E) 18

8) Siyabonga said that 20% of the oranges were not sold. It is the same as 250 oranges. How many oranges were sold?

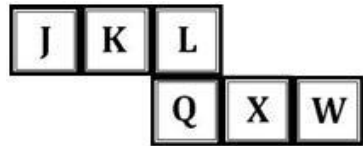
- A) 1250      B) 2500      C) 1000      D) 1500      E) 1200

9) In a triangle with angles  $x^\circ$ ,  $y^\circ$ ,  $z^\circ$ . The average of  $y$  and  $z$  is  $x$ . What is the value of  $x$ ?



- A) 90      B) 80      C) 70      D) 60      E) 50

10) If the figure shown is folded to make a cube, then what is the letter opposite the J?



- A) K      B) L      C) Q      D) X      E) W

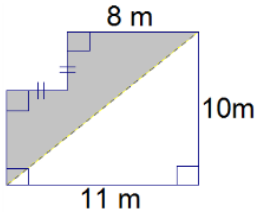
11) A snail is climbing up to a tree with height of 10 meters. During day time, it moves 3 meters up; at night, it slides 2 meters down. How many days later does it reach to the top of tree?

- A) 4      B) 6      C) 7      D) 8      E) 10

12) If  $b = 3a$  and  $c = 4b$ , then the value of  $a + b + c$  is

- A)  $15a$       B)  $16a$       C)  $8a$       D)  $3a$       E)  $abc$

13) In the given figure the area of the shaded region, in  $\text{cm}^2$ , is



- A)  $110 \text{ m}^2$     B)  $55 \text{ m}^2$     C)  $28 \text{ m}^2$     D)  $62 \text{ m}^2$     E)  $46 \text{ m}^2$

14) Which of the following is the longest period of time? (1 month=30days)

- A) 902hours    B) 100 days    C) 17 weeks    D) 3 months    E)  $\frac{1}{3}$  of a year

15) What is the sum of all two-digit numbers such that the tens digit is four less than the units digit?

- A) 365    B) 405    C) 185    D) 275    E) 105

## PART II

16) Two bells ring at intervals of 18 minutes and 24 minutes respectively. If they start to ring at the same instant, how long will it take before they will again ring together?

- A) 24 min      B) 1 hour      C) 48 min      D) 72 min      E) 2 hour

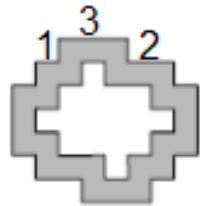
17) The angle between the hands of a clock at 5:30 o'clock is

- A) 20      B) 15      C) 180      D) 120      E) 160

18) I paint the whole outside of a  $5 \times 5 \times 5$  cube purple and then cut it up into  $125$   $1 \times 1 \times 1$  cubes. What is the number of cubes with exactly one purple face?

- A) 6      B) 18      C) 24      D) 30      E) 54

19) In the diagram shown, all the angles are right angles and all the sides are of length 1 unit, 2 units or 3 units. What, in square units, is the area of the shaded region?



- A) 20      B) 22      C) 24      D) 26      E) 28

20) The prices marked on articles in the tuck-shop already include 14% VAT. How much VAT do you pay if you buy a chocolate marked R10.26?

- A) R1.26      B) R0.26      C) R9.00      D) R1.44      E) R2.36

21) Study the pattern shown below. What is the result?

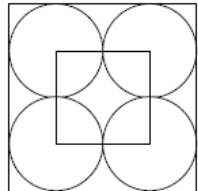
$$(20 + 20 + 10) \times \left(1 - \frac{1}{2}\right) \times \left(1 - \frac{1}{3}\right) \times \left(1 - \frac{1}{4}\right) \times \dots \times \left(1 - \frac{1}{50}\right)$$

- A) 60                      B) 1                      C) 0                      D) 30                      E) 2

22) A keyboard and a mouse together cost R120. If the price of keyboard is the twice the price of mouse; what is the cost of one keyboard and two mouse?

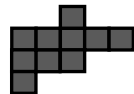
- A) 120                      B) 140                      C) 160                      D) 180                      E) 200

23) In the diagram, four equal circles fit perfectly inside a square; their centres are the vertices of the smaller square. The area of the smaller square is 4. The area of the larger square is



- A) 4                      B) 8                      C) 12                      D) 16                      E) 20

24) Which of the following shapes cannot be fit into this figure?



- A)      B)      C)      D)      E)

25) Mr. Brown wants to keep the students quiet during a Mathematics lesson. He asks them to multiply all the numbers from 1 to 99 together and then tell him the sum of the last three digits of the result. What is the correct answer?

- A) 1                      B) 0                      C) 2                      D) 8                      E) 9

26) At Maths Project Olympiad, prize money is awarded for 1st, 2nd and 3rd places in the ratio 3 : 2 : 1. Last year John and Ashley shared third prize equally. What fraction of the total prize money did John receive?

- A)  $\frac{1}{12}$       B)  $\frac{1}{10}$       C)  $\frac{1}{6}$       D)  $\frac{1}{5}$       E)  $\frac{1}{4}$

27) Thabo, Thami and Thando write names on bookmarks sold for charity. Thabo writes 7 names in 6 minutes, Thami writes 18 names in 10 minutes and Thando writes 23 names in 15 minutes. If all of the boys work together at these rates, how long will it take them to write 540 names?

- A) 2 hours      B) 2,5 hours      C) 3 hours      D) 1 hour      E) 1,5 hours

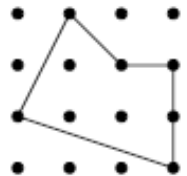
28) There are 20 boys at a Halloween party and 9 of them are dressed as ghosts. Altogether 12 of the people at the party are dressed as ghosts and 5 people at the party are neither boy nor dressed as ghosts. The number of people at the party is

- A) 20      B) 25      C) 28      D) 30      E) 32

29) The length of a rectangle is 1 cm more than twice its width. If the perimeter of the rectangle is 74 cm, what is the area of the rectangle?

- A) 200cm<sup>2</sup>      B) 250 cm<sup>2</sup>      C) 400 cm<sup>2</sup>      D) 300 cm<sup>2</sup>      E) 350 cm<sup>2</sup>

30) A single polygon is made by joining dots in the 4x4 grid with straight lines, which meet only at dots at their end points. No dot is at more than one corner. The diagram shows a five-sided polygon formed in this way. What is the greatest possible number of sides of a polygon formed by joining the dots using these same rules?



- A) 12      B) 13      C) 14      D) 15      E) 16

**THE END**

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