HORIZON

MATHEMATICS

# COMPETITION

HMC 2012   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. 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 geometric instruments are <u>NOT</u> permitted.**
- **Diagrams are <u>NOT</u> necessarily drawn to scale.**
- **Rough paper, pen, pencil, and rubber are permitted.**
- **Start when the invigilator tells you to do so. Good luck!**

1. $6^2 + 8^2 =?$

    A) 10^2 B) 9^2 C) 120   D) 14^2 E) 48^2

2. $\frac{1}{2} - \frac{1}{4} - \frac{1}{8} =?$

    A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{1}{8}$ D) $\frac{1}{16}$ E) 1

3. $\sqrt{\sqrt{\sqrt{256}}} =?$

    A) 2   B) 4   C) 8   D) 16   E) 32

4. $8 + [(16 - 4) \div 2] + (5 \times 3) =?$

    A) 21   B) 29   C) 25   D) 34   E) 27
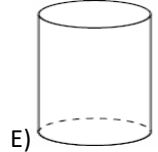
5. A circle and a rectangle are shown on the grid.
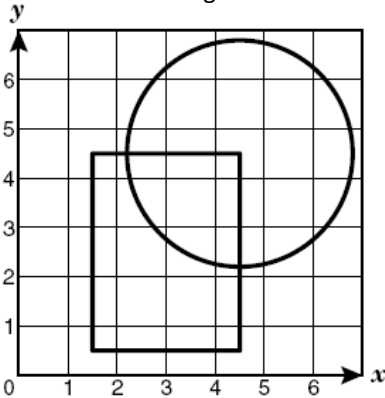
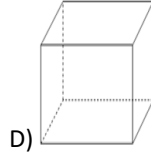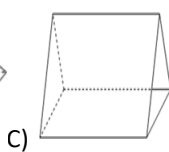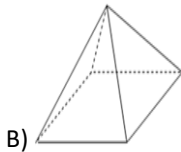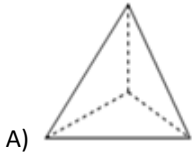
    Which coordinate pair is located inside the circle and outside the rectangle?

    A) (2, 5)   B) (3, 4)   C) (4, 4)   D(5, 3)   E) (1, 6)

6. Which of these could be solved by using the open sentence $m \div 8 =?$

    A) Maurice has 8 less markers than Joe. If m is the number of markers that Maurice has, how many does Joe have?

    B) Bertram has 8 more markers than Raul. If m is the number of markers that Raul has, how many does Bertram have?

    C) Bob has 8 times as many markers as David. If m is the number of markers David has, how many does Bob have?

    D) Ken has $\frac{1}{8}$ as many markers as Barbara. If m is the number of markers that Barbara has, how many does Ken have?

    E) Ben has $\frac{1}{8}$ as many markers as Sarah. If m is the number of markers that Ben has, how many does Sarah have?

7. What does this figure look like when rotated 90° clockwise?

A) ![arrow down-left]   B) ![arrow up-right]   C) ![arrow down-right]   D) ![arrow up-left]   E) ![arrow up]
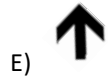
8. Which figure has exactly 5 faces, 9 edges and 6 vertices

A)   B)   C)   D)   E)

9. Using the digits 1-7 only once, what is the largest odd number you can make with 7 in the thousands place?

A) 6547312   B) 6547321   C) 6543712   D) 6543721   E) 6543312

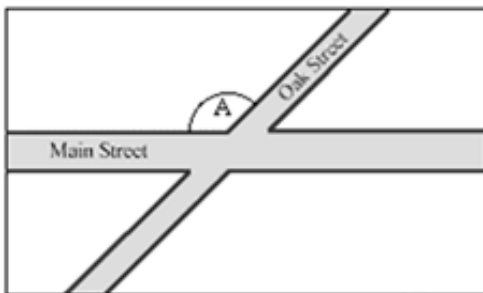10. Which of the following could be the measures of the angles of a triangle?

A) 120°, 50°, 20°   B) 105°, 25°, 70°   C) 30°, 50°, 80°   D) 30°, 20°, 130   E)40°, 70°, 80°

11. Examine the map below

Which of the following is true?

A) Angle A is an obtuse angle

B) Angle A is an acute angle

C) Oak Street is parallel to Main Street

D) Oak Street is perpendicular to Main Street

E) Oak Street has same length as Main Street

12. Dalian drinks 2 cans of soda in a day. If there are 4 cans in each pack of soda, how many packs will she drink in 30 days?

A) 16   B) 17   C) 14   D) 15   E) 13

13. There are four children in the Smith family. Only one of the children is older than Pete. Sarah is younger than Brad. Kevin is older than Brad. Which lists the children in order from youngest to oldest?

A) Brad, Pete, Kevin, Sarah

B) Sarah, Brad, Pete, Kevin

C) Pete, Sarah, Brad, Kevin

D) Kevin, Pete, Brad, Sarah

E) Pete, Brad, Kevin, Sarah

14. The map below shows the travel times between points on a hiking trail. If Chris and Jeff leave the campground at 8:45 A.M. and stop for 25 minutes at the pond, what time will they arrive at the cave?

Campground   2 hours, 50 min.   Pond   3 hours, 40 min.   Cave

25 minute break
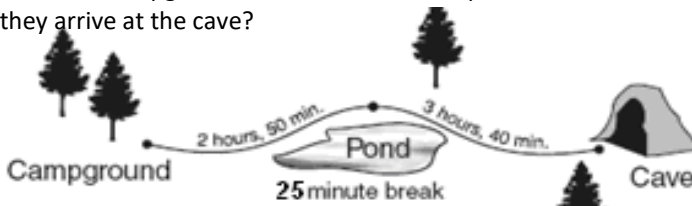
A) 2:20 pm   B) 3:10 pm   C) 4:20 pm   D) 7:50 pm   E) 3:40 pm

15. What building is the furthest from the Post office?
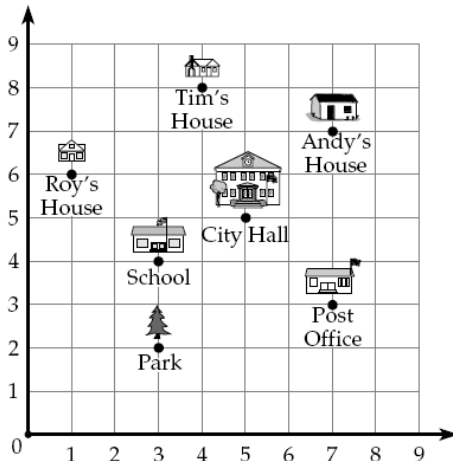
A) Tim's house   B) Roy's house   C) Andy's house   D) School   E) City hall

PART 2

16. In a class, 9 students like hockey and 11 students like soccer. Of these, 5 students like both hockey and soccer. On the other hand, 10 students in the class like neither hockey nor soccer. How many students are in the class?

    A) 22   B) 35   C) 30   D) 20   E) 25

17. Look at the drawing below.Which statement about this figure is true?

    A) The figure is a cone.
    B) The figure has 4 faces.
    C) The figure has 2 rectangular faces.
    D) The figure has no vertices.
    E) The figure has 2 square faces.

18. A group of boys share 180 bananas and 135 apples equally among themselves. What is the largest possible number of boys in this group?

    A) 135   B) 90   C) 12   D) 15   E) 45

19. Alan, Will, Elizabeth and Leland are all reading the same book with 75 pages. Alan has read $\frac{3}{5}$ of the book. Will has read 40 pages of the book. Elizabeth has read $\frac{2}{3}$ of the book. Leland says "I haven't started the book". Who has read the most of the book?

    A) Alan   B) Leland   C) Will   D) Elizabeth   E) No one

20. Sipho lives 12km away from his school. He walks to his school in 32 minutes. How many meters does he walk in a minute?

    A) 375   B) 325   C) 275   D) 125   E) 225

21. If Z is an even natural number, which of the following is always odd?

    A) $Z \times 7$ B) $Z + 8$ C) $2 \times Z + 4$ D) $(1 + Z) \times 3$ E) $(Z + 7) \times 2$

22. Two squares with integer sides have a total area of 85 cm² and a total perimeter of 52 cm. What is the area in cm² of the larger square?

A) 16 cm²   B) 25 cm²   C) 36 cm²   D) 49 cm²   E) 64 cm²

23. A ball is dropped from a height of 3 meters. On its first bounce it rises to a height of 2 meters. It keeps falling and bouncing to $\frac{2}{3}$ of the height it reached in the previous bounce. On which bounce will the ball not rise to a height of 0.5 meters for the first time?

A) 3   B) 4   C) 5   D) 6   E) 7

24. A shape is created by joining seven unit cubes, as shown. What is the ratio of the volume to surface area of the shape?

A) 1:6   B) 7:36   C) 1:5   D) 7:30   E) 6:25

25. If the pattern shown is continued, what is the sum of the terms in row 12?
Row 1 ... 2
Row 2 ... 2+4
Row 3 ... 2+4+6
Row 4 ... 2+4+6+8
Row 5 ... 2+4+6+8+10

A) 90   B) 72   C) 110   D) 132   E) 156
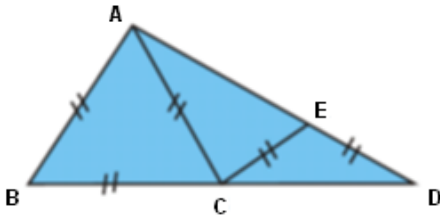
26. What is the units digit of the number 2012×4^{2012}?
A) 2   B) 4   C) 6   D) 8   E) 0

27. If the date of the second Wednesday of a month is a perfect cube, then the first day of this month is

A) Tuesday   B) Wednesday   C) Thursday   D) Monday   E) Sunday
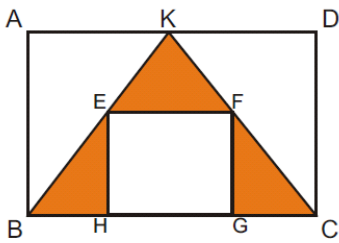
28.
$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2}}}} = ?$$

A) $\frac{5}{3}$ B) $\frac{8}{5}$ C) $\frac{13}{8}$ D) $\frac{18}{13}$ E) $\frac{21}{18}$

29. Given CB=AB=AC=CE=ED, points E and C are on the lines AD and BD respectively. Calculate the value of $\widehat{D}$?

A) 15   B) 20   C) 25   D) 30   E) 35

30. Examine the figure given below

If the area of rectangle ABCD is 600cm² and the area of the square EFGH is 75cm², then calculate the area of shaded region.

A) 150cm²   B) 175cm²   C) 200cm²   D) 225cm²   E) 250cm²

THE END

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