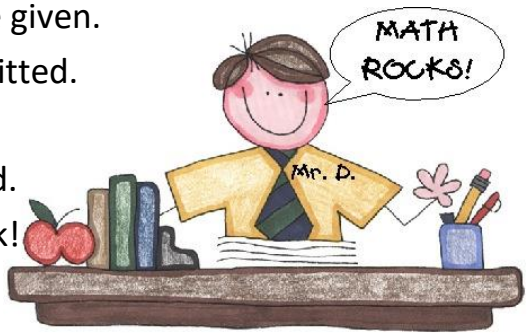
HORIZON MATHEMATICS COMPETITION

HMC 2018 - SECOND ROUND

BOOKLET - B

INSTRUCTIONS

- Before you start, make sure that your details are filled in accurately.
- Do not open this booklet until you are 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 them is correct.
- The final answers must be entered in the correct box on the ANSWER SHEET which is supplied separately.
- Each correct answer is worth:
  4 marks in Part 1 (Questions from 1 to 10)
  5 marks in Part 2 (Questions from 11 to 20)
  6 marks in Part 3 (Questions from 21 to 30)
- There is a penalty, **-1 mark**, for every incorrect answer.
- Exam duration is 75 minutes and no extra time will be given.
- Calculators and geometric instruments are NOT permitted.
- Diagrams are NOT necessarily drawn to scale.
- Rough paper, pen, pencil, and an eraser are permitted.
- Start when the invigilator tells you to do so. Good luck!

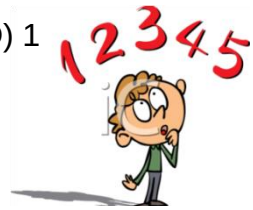


PART – 1

4 marks each

1. Two more than three times of a number is equal to three more than twice of itself. This number is...

A) 0 B) 5 C) 3 D) 1 E) 2



2. Which one of the following has a different value?

A) $\frac{14}{40}$ B) 35% C) $\frac{21}{60}$ D) $\frac{7}{20}$ E) 0.28

3. Niels Henrik Abel (1802-1829) and Évariste Galois (1811-1832) were two famous mathematicians that lived very short lives. What was the age of Galois when Abel was 15?

A) 24 B) 14 C) 8 D) 6 E) 16

4. Lwazi is a learner in Grade 7. He has seen the pictures of Newton and Einstein before.

É. Galois A. Einstein N. Abel F. Eisenstein L. Fibonacci I. Newton

What is the probability of Lwazi showing the correct portrait of Abel from the pictures above?

A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{2}{5}$ D) $\frac{1}{6}$ E) $\frac{1}{4}$

5. A large wooden block with a length of 40cm, a breadth of 60cm and a height of 80cm is cut into smaller rectangular blocks. How many small blocks with a length of 40cm, a breadth of 30cm and a height of 20cm can be sawn from the large block, if there is no wastage?

A) None of them B) 2 C) 3 D) 4 E) 6

6. Sarah gets money from her parents to spend on her birthday. When she was 12 they gave her R600. When she turned 13 they increased the amount in the ratio of her new age to her previous age.How much did she receive on her thirteenth birthday?

A) R650 B) R660 C) R613 D) R625 E) R626

7. Consider all the four-digit numbers formed by using each of the digits 3, 4, 5,and 6 once and only once, e.g. 3465 or 6453. How many of these are prime numbers?

A)1 B)0 C)6 D) 12 E) All of them

8. ***a*** and ***b*** are two different whole numbers from the sequence of numbers: 1, 2, 3, ..., 2018.

What is the largest possible whole value of $\frac{a+b}{a-b}$?

A) 2018 B) 4035 C) 2017 D) 4036 E) 1009

9. $\frac{18-3\times 2}{15\div 3-2}=?$

A) 10 B) 2 C) 5 D) 3 E) 4

10. Given $5.2\times 2.35=12.22$. Calculate the value of 0.235×5.2.

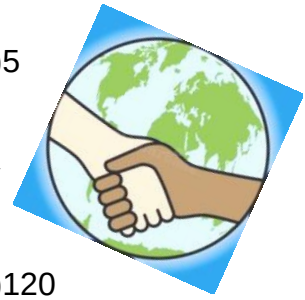
A) 1.222 B) 1.22 C) 12.22 D) 122.2 E) 122.222

PART – 2

5 marks each

11. What is unit digit of 7^{2018}?

A)7 B)3 C)9 D)1 E)5



12. How many handshakes occur when a group of 12 people shake hands exactly once with every other person at a party?

A)36 B)132 C)144 D)66 E)120

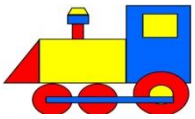
13. A man painted his house in x days. What part of the work can be done in 2 days?

A) $\frac{2}{x}$ B) $\frac{x}{2}$ C) $\frac{1}{2}$ D) $\frac{1}{2x}$ E) $\frac{1}{x}$

14. Of the 40 learners in the class, 12 walk to school. Twice the number who walk, cycle to school and the remaining come by taxi. What is the fraction of learners who do not come by taxi?

A) $\frac{1}{2}$ B) $\frac{2}{5}$ C) $\frac{2}{7}$ D) $\frac{9}{10}$ E) $\frac{1}{40}$

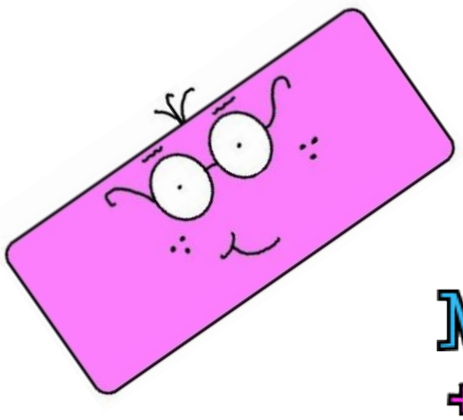
15. By going 15 km per hour faster, a train would have required 1 hour less to travel a distance of 180 km. What is the normal speed of this train?

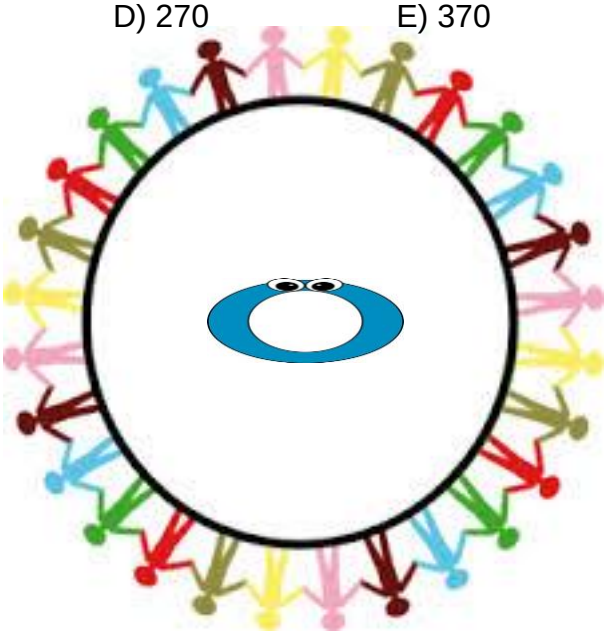


A)15km/h B)30km/h C)45km/h D)60km/h E)90km/h

16. What can be the minimum area of a rectangle with two-digit integer sides and 74 units of perimeter?

A) 320 B) 180 C) 36 D) 270 E) 370





17. There is a 190 pages document of Mathematics study material in pdf format. I want to print it double sided and multiple pages per sheet. How many A4 papers do I save, if I print this study material **four pages per sheet and back to back** instead of printing it one sided and only one page per sheet?

A) 166 B) 165 C) 167 D) 163 E) 164

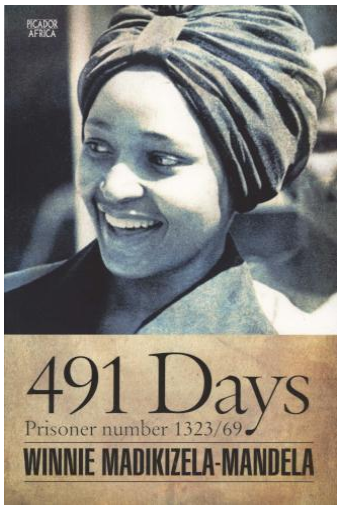
18. If we keep writing HMCREGULARSHOWSHMCREGULARSHOWSHMC... , what would be the 2018th letter?

A)S B) H C) A D) U E) L

19. I have a number of O'ya sweets. My first brother takes 10% of them and my sister comes and takes a quarter of the remaining sweets. My second brother takes only 70 sweets. After all that they have taken, I still have half of the O'ya sweets that I had in the beginning. How many sweets did my sister take?

A) 180 B) 80 C) 100 D) 45 E) 90

20. Nomzamo Winnie Madikizela-Mandela (26 September 1936-2 April 2018) was affectionately known as Mama Winnie to many. She will be remembered as a fearless freedom fighter, a woman of immeasurable strength and a heroine of the struggle for liberation in South Africa. She is the author of the book "*491 Days: Prisoner Number 1323/69*" that shares with the world her moving and compelling journal as well as some of the letters written between affected parties at the time, including Winnie and Nelson Mandela.



(*Source: https://www.sahistory.org.za/people/winnie-madikizela-mandela*)

It is known that 491 is the 94th prime number. What is the 93rd prime number?

A) 489 B) 487 C) 485 D) 483 E) 481

PART – 3

6 marks each

21. Given that $5! = 1\times2\times3\times4\times5$. So, $\frac{8!}{4!\times4!}$ is the equal to ...

A) $\frac{1}{2}$ B) 70 C) 1 D) 35 E) 2

22. Henri Schoeman won the men's triathlon event on Commonwealth Games at Gold Coast, Australia, in April 2018. He dominated the 750m swim, 20km cycle and 5km run from start to finish, winning in 52 minutes and 31 seconds. According to statistics Shoeman swam 531 seconds and cycled 27 minutes and 40 seconds.

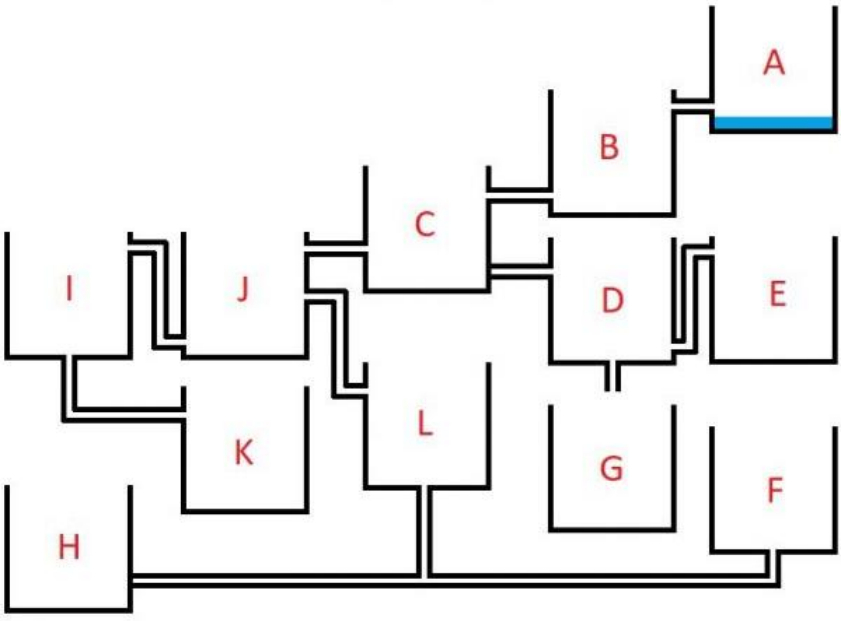
(*Source: https://www.triathlon.org/results/result/2018_gold_coast_commonwealth_games/327229*)

How many seconds does he need to run 11km with the same rate as he ran in the Commonwealth Games?

A) 2310 B) 1760 C) 1210 D) 1650 E) 2112

23. There is a tab just above tank A, starts to fill in the tanks. Look closely at the details and choose the tank which will fill first?

A) H B) K C) L D) G E) F



24. What should be the value of m, if $\left(1-\frac{1}{5}\right)\left(1-\frac{1}{6}\right)\left(1-\frac{1}{7}\right)\ldots\left(1-\frac{1}{m}\right)=\frac{1}{10}$?

A) 10 B) 20 C) 40 D) 50 E) 60

25. A mathematical subject's course structure for class-x is given below.

COURSE STRUCTURE CLASS -X

Units	Unit Name	Marks
I	NUMBER SYSTEMS	06
II	ALGEBRA	20
III	COORDINATE GEOMETRY	06
IV	GEOMETRY	15
V	TRIGONOMETRY	12
VI	MENSURATION	10
VII	STATISTICS & PROBABILTY	11
	Total	80

What percentage of the marks does not go into the first three units of this course?

A) 60 B) 48 C) 32 D) 64 E) 40

26. Which one of the following value satisfies the condition $\frac{1}{2} < \frac{n}{n+5} < \frac{2}{3}$ for *n*?

A) 4 B) 11 C) 10 D) 7 E) 12

27. Two trains travel towards each other from two different towns. The one train travels 20km/h faster the other train, which is travelling at x km/h. After 3 hours the trains pass each other. The distance between the two towns is 600 km. What is the travel distance of the faster train when they pass?

A) 600 B)270 C)330 D)300 E)450

28. Given that $2^3 = 2 \times 2 \times 2$. If the natural number $2^2 \times 2^a \times 5^a \times 5^5$ has 20 digits, ***a*** is ...

A) 16 B) 15 C) 10 D) 17 E) 20

29. A man who was born in the second half of the ninth century was x years old in theyear x^2. The year of his birth is ...

A)812 B) 878 C) 870 D)875 E)841

30. According to the following pattern, which one should be the next term?

A7 – C4 – F4 – J7 – 013

A) U22 B) T16 C) V25 D) U25 E) T13

THE END

NATIONAL HMC PARTICIPANTS

2004	800 Entrants	2011	17300 Entrants
2005	3000 Entrants	2012	18500 Entrants
2006	4500 Entrants	2013	23278 Entrants
2007	6000 Entrants	2014	23650 Entrants
2008	9500 Entrants	2015	33750 Entrants
2009	13250 Entrants	2016	36750 Entrants
2010	16800 Entrants	2017	50200 Entrants

7200Participants entered HMC 2017 inJohannesburg
207 Learnerswere invited to the PRIZE GIVING ceremony
as TOP LEARNERS of Johannesburg 94girls; 113boys;
143 in Grade-7; 47 in Grade-6; 17 in Grade-5

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I ♥ maths