19-20 F.5
1st TERM UT
MATH CP
PAPER

2019 – 2020
Form 5 First Term Uniform Test

MATHEMATICS Compulsory Part

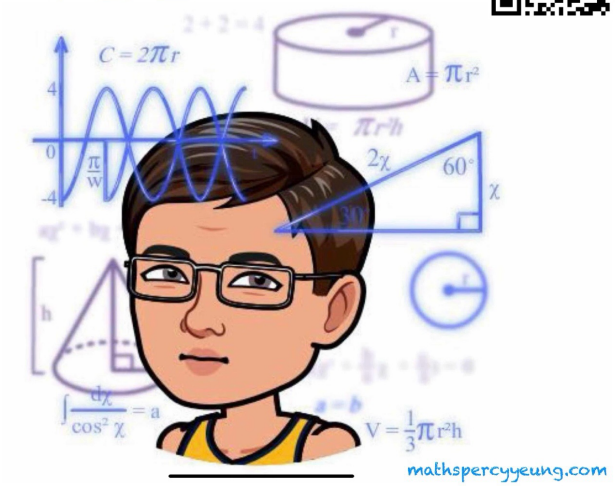
Question-Answer Book

4th November, 2019.
8:15 am – 9:45 am (1.5 hour)

This paper must be answered in English.

INSTRUCTIONS

1. Write your name, class and class number in the spaces provided on this cover.
2. This paper consists of FOUR sections, A, B(1), B(2) and C.
3. Answer ALL questions in Section A. You are advised to use an HB pencil to mark all the answers on the Answer Sheet, so that wrong marks can be completely erased with a clean rubber. You must mark the answers clearly; otherwise you will lose marks if the answers cannot be captured. You should mark only ONE answer for each question. If you mark more than one answer, you will receive NO MARKS for that question.
4. Attempt ALL questions in Sections B and C. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins. Answers written in the margins will not be marked. Unless otherwise specified, all working must be clearly shown and numerical answers should be either exact or correct to 3 significant figures.
5. The diagrams in this paper are not necessarily drawn to scale.



Section	Marks
A Total	**/ 36**
B (19)	/ 6
B (20 – 24)	/ 25
B Total	**/ 31**
C Total	**/ 19**
TOTAL	**/ 86**

Section A (36 marks)

Choose the best answer for each question.

1. $\dfrac{x^{-3}}{(2x^{-2})^3} =$

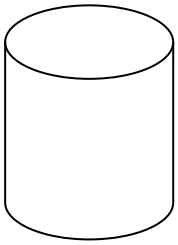
   A. $\dfrac{x^3}{8}$.

   B. $\dfrac{1}{8x^3}$.

   C. $\dfrac{x^3}{6}$.

   D. $\dfrac{1}{6x^3}$.

2. The figure shows a solid right cylinder of base circumference 18π cm and height 15 cm. Find the total surface area of the cylinder.



   A. 270π cm^2

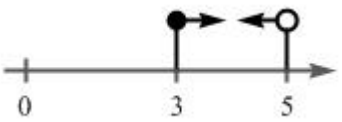
   B. 351π cm^2

   C. 432π cm^2

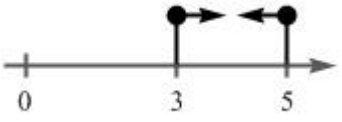
   D. 1215π cm^2

3. The graphical representation of $3 < x \leq 5$ is:

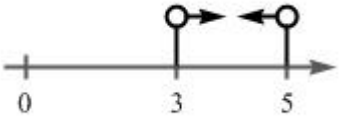
   A.



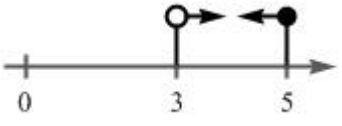
   B.



   C.

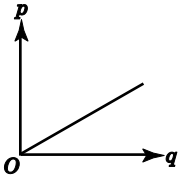


   D.

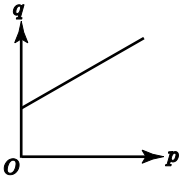


4. Which of the following graphs shows that p is partly constant and partly varies directly as q?

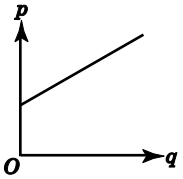
   A.



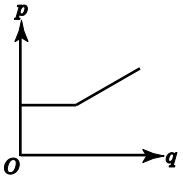
   B.



   C.



   D.



5. If c varies directly as b^2 and inversely as a, then

   A. $\dfrac{c}{ab^2} = \text{constant}.$

   B. $a\,b^2c = \text{constant}.$

   C. $\dfrac{ab^2}{c} = \text{constant}.$

   D. $\dfrac{ac}{b^2} = \text{constant}.$

6. It is given that c varies directly as a^2 and inversely as b. If a decreases by 60% and b increases by 60%, then c

   A. decreases by 90%.

   B. decreases by 30%.

   C. remains unchanged.

   D. increases by 90%.

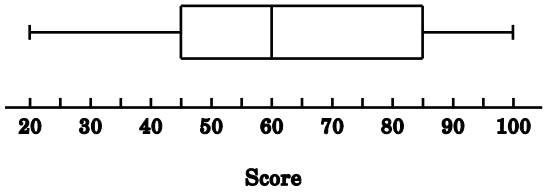
7. Solve $\frac{1}{2}(y-2) \le y-3 \le \frac{2}{5}(3+y)$.

A. $3 \le y \le 5$
B. $4 \le y \le 7$
C. $3 \le y \le 8$
D. $2 \le y \le 5$

8. The solutions of $x^2+12x+32>0$ are

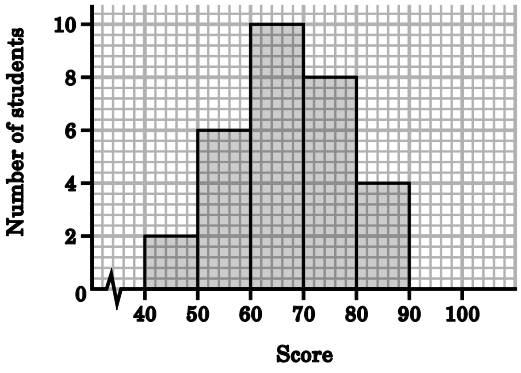
A. $x>-8$.
B. $x>-4$.
C. $-8<x<-4$.
D. $x<-8$ or $x>-4$.

9. The box-and-whisker diagram shows the distribution of the scores of a group of students in an English test. Find the inter-quartile range of their scores.



A. 20
B. 40
C. 60
D. 80

10. Distribution of the scores of S5E students in a Liberal Studies test



The histogram shows the distribution of the scores of S5E students in a Liberal Studies test. Find the standard deviation, correct to 3 significant figures.

A. 11.1
B. 14.1
C. 17.1
D. 19.0

11.

The figure shows the cumulative frequency curve of two data sets, A and B. Which of the following must be correct?

I. Median of A > median of B
II. Range of A > range of B
III. Inter-quartile range of A = inter-quartile range of B

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

12. Consider the two groups of data below:

Group A: $x-3$, $x-2$, x, $x+2$, $x+3$
Group B: $x-3$, $x-1$, x, $x+1$, $x+3$

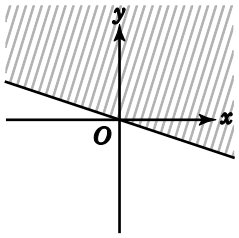
Which of the following must be true?

I. The two groups have the same mean.
II. The two groups have the same range.
III. The two groups have the same standard deviation.

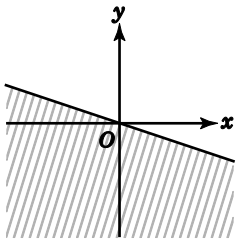
A. I and II only
B. I and III only
C. II and III only
D. I, II and III

13. Which of the following shaded regions may represent the solution of $-3y \geq x$?

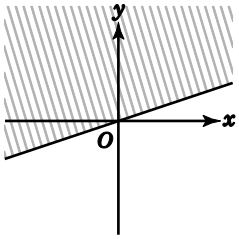
A.



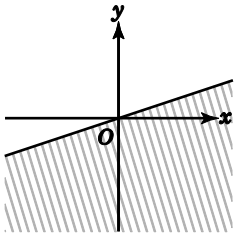
B.



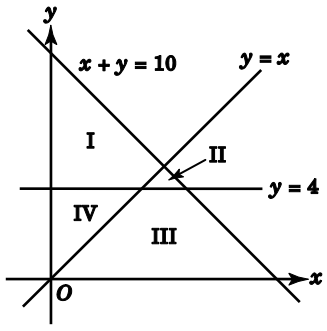
C.



D.



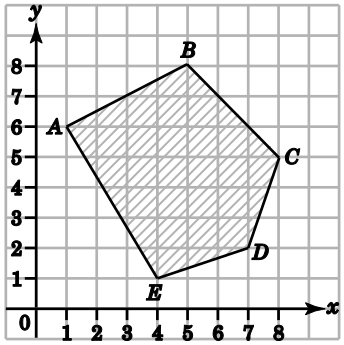
14.



Which of the regions in the figure may represent the solution of $\begin{cases} y \geq 4 \\ x + y \leq 10 \\ x \geq y \end{cases}$?

A. Region I
B. Region II
C. Region III
D. Region IV

15. In the figure, $(x\ ,\ y)$ is a point lying in the shaded region $ABCDE$ (including the boundary lines). Find the maximum and the minimum values of $7x - 6y$.



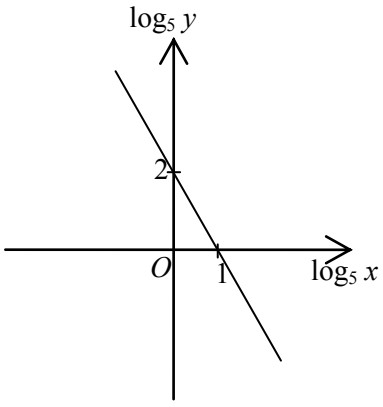
	Maximum value	Minimum value
A.	22	–13
B.	26	–29
C.	37	–13
D.	37	–29

16. Which of the following is the best estimate of 1234^{3235}?

A. 10^{4000}
B. 10^{5000}
C. $10^{10\,000}$
D. $10^{20\,000}$

17. The graph in the figure shows the linear relation between $\log_5 x$ and $\log_5 y$. If $y = kx^a$, then $k =$

A. –2.
B. 5.
C. 25.
D. 32.



18. $i - \dfrac{2\beta i}{i+1} =$

A. $-\beta + (1 - \beta)i$.
B. $\beta + (1 - \beta)i$.
C. $-\beta + (1 + \beta)i$.
D. $\beta + (1 + \beta)i$.

Section B(1) (13 marks)

19. In Figure 1, the volume of the solid right prism $ABCDEFGHIJ$ is $552\ \text{cm}^3$. It is given that $\angle ABC = \angle BAE = \angle BCD = 90°$, $AB = 7.5$ cm , $BC = 10$ cm , $CD = 4.5$ cm and $AE = 6$ cm.

(a) Find the length of AG and DE . (4 marks)

(b) Find the total surface area of the prism $ABCDEFGHIJ$. (2 marks)

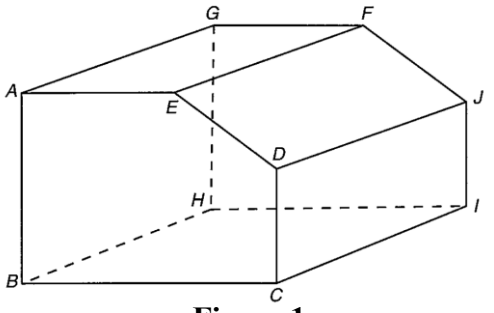


Figure 1

20. Solve the compound inequality $\frac{3x-7}{2} \geq \frac{5x+9}{6}$ and $-3x < -12$ and represent the solution graphically. (4 marks)

Answers written in the margins will not be marked.

21. Simplify $\dfrac{\sqrt{4x^6y^5}}{x\cdot\sqrt[3]{y^2}}$ and express your answer with positive indices. (3 marks)

Section B(2) (18 marks)

22. x varies directly as y^2 and inversely as z. $x = 8$ when $y = 4$ and $z = 10$.

(a) **(i)** Express x in terms of y and z.

(ii) Find the value of z when $x = 20$ and $y = 6$. (4 marks)

(b) If y increases by 20 % and z decreases by 25 %, find the percentage change in x. (2 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

23. Jim recorded the amounts he spent on lunch for eight days:

$ 51 , $ 53 , $ 55 , $ 55 , $ 56 , $ 57 , $ 58 , $ 63 .

(a) Find the mean and the median of the above data. (2 marks)

(b) Jim further recorded the amounts he spent on lunch for 3 more days. He spent $ 100 on lunch on 1 of these 3 days, while he spent over $ 50 on each of the other 2 days. It is given that the mean of the amounts spent on lunch on these 11 days is $ 59 .

(i) Find the mean of the amounts spent on lunch for the 3 more days.

(ii) Is it possible that the median of the amounts spent on these 11 days the same as the median found in **(a)** ? Explain your answer.

(4 marks)

Answers written in the margins will not be marked.

24. Let \$ C be the cost of making a toy car of volume V cm^3 . It is given that C is the sum of two parts, one part is a constant and the other part varies directly as V. When $V = 40$, $C = 25$; when $V = 48$, $C = 29$.

(a) Find the cost of making a toy car of volume 28 cm^3 . (4 marks)

(b) Jenny has a bigger toy car which is similar to the toy car described in **(a)**. The surface area of the bigger toy car is 4 times that of the toy car described in **(a)**. Jenny claims that the cost of making the bigger toy car is 8 times that of making the toy car in **(a)**. Do you agree? Explain your answer. (2 marks)

Answers written in the margins will not be marked.

Section C (19 marks)

25. If k is a constant and $2x^2 + (3k + 3)x + 2k^2 > 0$ for all real values of x, find the range of values of k. (4 marks)

26. Simplify $\dfrac{\log_5 3x^2 - \log_5 x}{\log_5 9 + 2\log_5 x}$. (3 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

27. In view of the growing demand of accommodation by tourists visiting Hong Kong, a developer plans to build a hotel with x single rooms and y double rooms subject to the conditions listed in the proposal below.

Proposal

(1) The hotel should accommodate at least 300 people.

(2) Each single room and double room must occupy an area of 15 m^2 and 20 m^2 respectively. The total floor area available for the rooms is at most 4 800 m^2.

(3) The number of double rooms should be at least 75% of the number of single rooms.

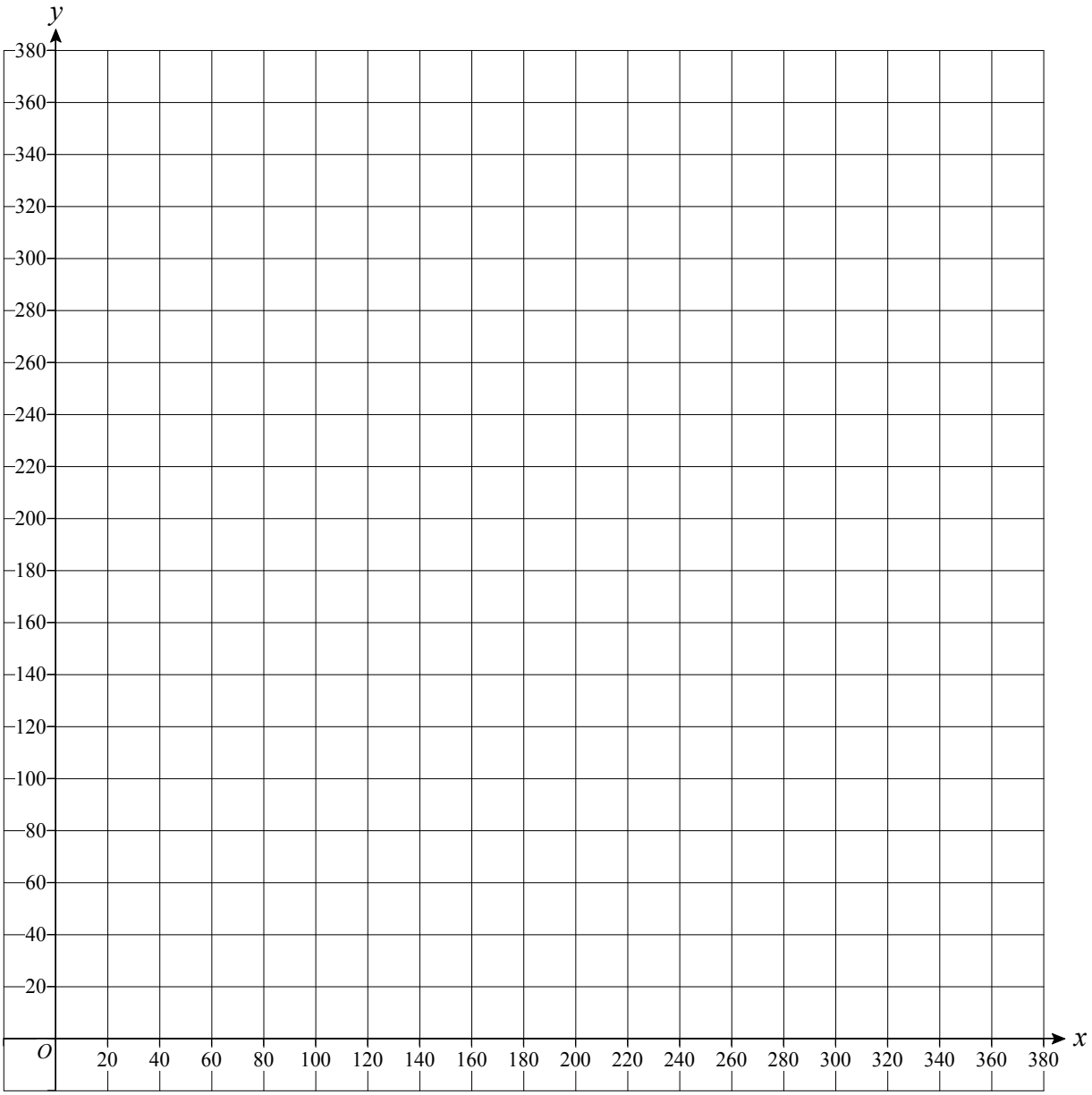


Figure 2

Answers written in the margins will not be marked.

(a) Write down all the constraints on x and y. (3 marks)

(b) In Figure 2, draw and shade the region that represents the solutions that satisfy all the constraints in **(a)**. (3 marks)

(c) It is known that the expected daily profit for a single room and a double room are \$ 1 000 and \$ 1 200 respectively. Using **(b)**, find the values of x and y so that the hotel can be run to maximize the expected daily profit. (3 marks)

Answers written in the margins will not be marked.

28. Form a quadratic equation in x whose roots are $\frac{5+12i}{13}$ and $\frac{5-12i}{13}$. (3 marks)

END OF PAPER

Answers written in the margins will not be marked.