

18-19 F.5  
2nd TERM UT  
MATH CP  
PAPER 1

2018 – 2019  
Form 5 Second Term Uniform Test

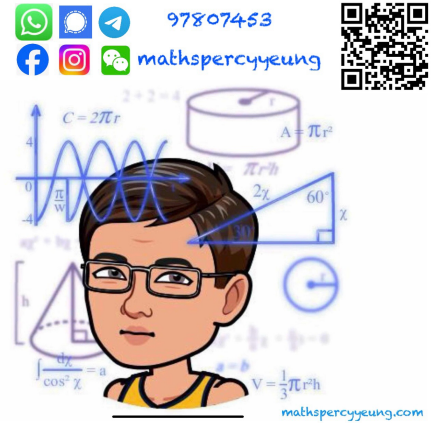
## MATHEMATICS Compulsory Part PAPER 1

### Question–Answer Book

25<sup>th</sup> March, 2019  
8:15 am – 9:30 am (1 hour 15 minutes)  
**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 THREE sections, A(1), A(2) and B.
3. Attempt ALL questions in this paper. 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.
4. Unless otherwise specified, all working must be clearly shown.
5. Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.
6. The diagrams in this paper are not necessarily drawn to scale.



Sections	Marks
A (1 – 5)	
A (6 – 9)	
<b>A Total</b>	<b>/40</b>
<b>B Total</b>	<b>/20</b>
<b>TOTAL</b>	<b>/60</b>

**Section A(1) (20 marks)**

1. Make  $y$  the subject of the formula  $\frac{y-2x}{x}-1=3y$ . (3 marks)

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2. Simplify  $\frac{(xy^2)^{-4}}{x^{-5}y^2}$  and express your answer with positive indices. (3 marks)

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3. Factorize

(a)  $4a^2 - 4ab + b^2$ ,

(b)  $9c^2 - 4a^2 + 4ab - b^2$ .

(3 marks)

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- 4. (a) Round up 519.39825 to the nearest integer.
- (b) Round down 519.39825 to 1 decimal place.
- (c) Round off 519.39825 to 5 significant figures.

(3 marks)

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5. Simplify  $\frac{\cos(90^\circ - \theta)\cos\theta}{\tan(90^\circ - \theta)}$ .

(3 marks)

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- 6. A circle passes through two points  $A(4, -3)$  and  $B(-2, 5)$  such that  $AB$  is a diameter.
  - (a) Find the equation of the circle.
  - (b) Determine whether the point  $C(-3, -1)$  lies on, inside or outside the circle.

(5 marks)

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**Section A(2) (20 marks)**

7. A swimming pool with 9-lines is going to hold a swimming competition.

(a) Find the numbers of ways for arranging the positions of

(i) 9 participants,

(ii) 6 participants, where the 6 participants are arranged in 6 adjacent lines.

(4 marks)

(b) If there are 8 participants, find the number of ways for arranging three particular participants in the middle three lines among the 9-lines. (2 marks)

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8. The following table shows the age distribution of a group of people when they were employed for first time.

Age	16	17	18	19	20	21
Frequency	2	6	$x$	4	7	$x + 3$

If a person is randomly selected from the group, the probability of selecting a person who was employed for first time at the age of 18 or above is  $\frac{3}{4}$ .

- (a) (i) Find  $x$ .  
 (ii) Find the mean and inter-quartile range of the distribution. (4 marks)
- (b) Eight people now join the group, and all of their ages of first employment are equal to the mean found in (a)(ii). A researcher claims that the variance of the age distribution will decrease by more than 0.5 accordingly. Do you agree? Explain your answer. (2 marks)

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9. Figure 1 shows a vertically inverted right circular conical container. The base radius and the height of this container are 16 cm and 30 cm respectively. There is some water of depth 9 cm in the container.

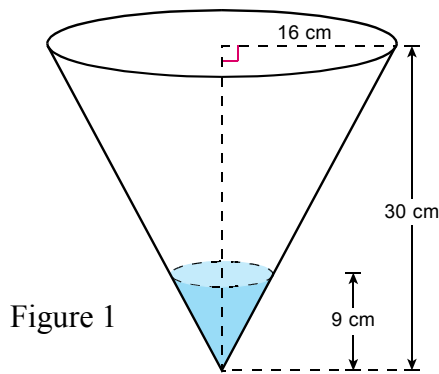


Figure 1

- (a) Express the volume of water in the container in terms of  $\pi$ . (3 marks)
- (b) (i) Express the area of the wet curved surface of the container in terms of  $\pi$ .
- (ii) There is another vertically inverted circular conical container of base radius 24 cm and height 45 cm. This larger container has the same volume of water as that inside the container in Figure 1. Is the area of the wet curved surface of the larger container greater than the area found in (b)(i)? Explain your answer. (5 marks)

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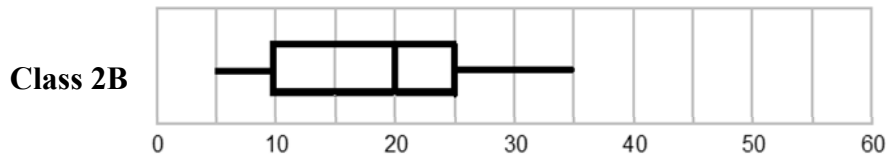
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**Section B (20 marks)**

10. The stem-and-leaf diagram below shows the distribution of the scores (in marks) of 15 students in class 2A in a quiz. It is given that the inter-quartile range of this distribution is 10.

<u>Stem (tens)</u>	<u>Leaf (units)</u>
1	0 1 1 5 5 6
2	0 0 0 1 3 $x$ 8
3	0 5

- (a) Find  $x$ . (1 mark)
  
- (b) If 4 students are randomly chosen from class 2A at the same time,
  - (i) find the probability that exactly 2 of them are of 20 marks;
  - (ii) find the probability that at least 3 of them with marks higher than the median mark. (4 marks)
  
- (c) A teacher draws the following box-and-whisker diagram to show the scores (in marks) of 15 students in class 2B in the quiz. Fiona gets the lowest score and George gets the highest score. Their standard scores of the quiz are  $-2$  and  $4$  respectively.



- (i) Find the mean of the distribution of the scores in class 2B.
- (ii) Fiona claims that there are more students with positive standard scores in class 2A than in class 2B. Do you agree? Explain your answer. (4 marks)

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11. The coordinates of points  $P$  and  $Q$  are  $(-6, -2)$  and  $(4, 22)$  respectively.

(a)  $H$  is a moving point in the rectangular coordinate plane such that  $PH = QH$ . Denote the locus of  $H$  by  $\Gamma$ .

(i) Describe the geometric relationship between  $\Gamma$  and the line segment  $PQ$ .

(ii) Find the equation of  $\Gamma$ .

(4 marks)

(b) Suppose that  $K$  is a point lying on  $\Gamma$  and quadrant II such that the circle,  $C$ , passing through  $P, Q$  and  $K$  is the smallest.

(i) Find the equation of the circle  $C$ .

(ii) Find the coordinates of  $K$ .

(iii) Find the equation of the tangent to the circle  $C$  at  $K$ .

(7 marks)

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**End of Paper**

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